OU-2 REMEDIAL INVESTIGATION
WELL INSTALLATION REPORT

LOCKHEED MARTIN CORPORATION
GREAT NECK, NEW YORK

MARCH 1999

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H2M GROUP
Engineers, Scientists, Planners

DRAFT

Appendix A

OU-2 Remedial Investigation Well Installation Report, March 1999, H2M

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OU-2 Remedial Investigation Well Installation Report
Lockheed Martin Corporation
Great Neck, New York

March 1999

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OU-2 Remedial Investigation Well Installation Report
Lockheed Martin Corporation
Great Neck, New York

March 1999

1.0 Introduction

Holzmacher, McLendon and Murrell, P.C. (H2M) was retained by Lockheed Martin Corporation (Lockheed Martin) to execute portions of the field phase of work detailed in the Operable Unit 2 Remedial Investigation/Feasibility Study (OU-2 RI/FS) work plan for the facility located at 365 Lakeville Road, Great Neck, New York.

In summary the work consisted of all steps to:

- Drill and install 12 off-site groundwater monitoring wells.
- Survey the horizontal and vertical locations of the newly installed wells.
- Sample and analyze groundwater samples from the existing and newly installed monitoring wells.
- Manage and appropriately dispose of investigation-derived waste (IDW).

2.0 Well Drilling and Installation

This section of the report details the work completed during the off-site well installation activities.

2.1 Geophysical Clearance

A total of three monitoring wells were to be installed at each of four location off of the Lockheed Martin site for a total of 12 wells. A surface geophysical survey was conducted in order to ensure that subsurface utilities were not encountered and damaged during the drilling activities.

The surface geophysical survey was conducted by Naeva Geophysics, Inc.(Naeva) of Tappan, New York under the oversight of H2M. Naeva utilized a cable avoidance tool, magnetometer, ground penetrating radar (GPR) and/or an electromagnetometer at each location to screen for the presence of subsurface utilities. The "Call Before You Dig" telephone number (Dig Safe) was also notified for utility mark outs prior to the commencement of intrusive activities. Additionally, the first four feet of each borehole were manually advanced utilizing a

hand auger as the final measure to ensure no subsurface utilities were encountered. The above-referenced activities were successful and no problems were encountered with respect to subsurface utilities.

2.2 Borehole Drilling

Based upon the requirements in the OU-2 RI/FS work plan, a total of four well clusters were installed off of the site using the mud-rotary drilling technique. Each well cluster consisted of three monitoring wells installed to target the Upper Glacial, Intermediate Magothy and Deep Magothy aquifers.

The twelve monitoring wells were installed by B & B Drilling of Netcong, New Jersey under the oversight of H2M utilizing the mud-rotary drilling technique summarized in the New York State Department of Environmental Conservation (NYSDEC) approved OU-2 RI/FS work plan. This technique involves the advancement of a borehole by simultaneously rotating and axially advancing a tri-cone roller drill bit attached to hollow drill rods into the geologic material. A drilling fluid, prepared by mixing 100 percent bentonite powder and water (drilling mud), was pumped through the hollow center drill rods to cool the drill bit, advance the drill cuttings to the surface, and also to allow the borehole walls to stabilize when drilling in geologic materials that are unstable. Prior to drilling activities, two water tight roll-off containers were placed at each well cluster location by Able Environmental, Inc. of Bohemia, New York. The drilling mud was mixed at each location in one pre-cleaned 20 cubic yard, watertight, roll-off container and then transferred to a 500 gallon tub for use. The other roll-off container was used for drill cuttings. Water for mixing was acquired at an on-site fire hydrant.

During the advancement of the borings, the drilling mud was transferred by the drill rig pump from the mud tub; circulated through the borehole; passed through a desander (a system which removes entrained sand and gravel) and returned back into the mud tub). Drill cuttings, carried to the surface by the drilling mud flow, were collected and observed for lithologic logging by the on-site H2M hydrogeologist. Because fine-grained sediments were entrained in the drilling fluid, only an approximate representation of the lithologies encountered could be provided during the drilling. The boring logs are included in Appendix A. Upon completing the deep borehole at each drilling location, the drilling mud was analyzed for Target Compound List (TCL) VOCs to determine if it could be re-used in the remaining two borehole. TCL VOCs were not detected in any of the samples; therefore, the drilling mud was re-used during the drilling of the intermediate and shallow borings at each off-site location. Fresh drilling mud was utilized at each drilling location.

2.3 Borehole Geophysics

To accurately represent the lithologies encountered, borehole geophysical surveys were performed by Aqua Terra Geophysics, Inc. of Bellport, New York utilizing the natural gamma method. The deepest borehole within the cluster was geophysically logged in order to aid in the selection of the screened intervals for the each well in the cluster. In the natural gamma method, measurements were made of naturally occurring radiation emitted from the lithologic materials encountered in the borehole. Fine–grained lithologies, such as clay and silt, contain high amounts of Potassium 40 which is a natural emitter of gamma radiation. Coarser-grained lithologies such as sand and gravel contain relatively lower amounts of Potassium 40 and emit much lower amounts of gamma radiation. The geophysical logs for each of the deep boreholes at each drilling location are included in Appendix B.

After the deep borehole at each location was drilled to its terminal target depth (typically 20 feet deeper than the deepest well's expected depth), the drill rods were removed and the decontaminated gamma probe was inserted. The probe was lowered to the bottom of the borehole and retrieved at a constant rate logging the record the lithologies present in the subsurface. Each gamma log was reviewed by H2M, CDM and/or the NYSDEC to select the screen intervals for each well in the cluster.

2.4 Monitoring Well Installation

The groundwater monitoring wells were constructed with decontaminated 4-inch inside-diameter (ID) flush-threaded Schedule 80 polyvinyl chloride (PVC) risers and 4-inch diameter screens with 0.020 slots. The well-completion details are summarized in Table 2-1. The well-completion diagrams are included in Appendix C.

The following describes the installation procedures utilized for each of the monitoring wells.

- Stainless steel centralizers were installed at the top and bottom of the well screen to ensure that the well was centered in the borehole. The well screen and blank casing was lowered to the target depth and tension was maintained throughout the installation process.
- The annular space around the well screen was filled with #2 Morie silica sand up to two feet above the top of the screen followed by a one-foot thick layer of #00 Morie membrane sand. All annular materials were emplaced utilizing the tremi-pipe method.

- A three -foot thick seal of bentonite slurry was placed above the membrane sand.
- The remaining annular space was filled with a bentonite/cement grout to three feet below grade.
- The remaining annular space was filled with a cement/bentonite surface seal to grade where a flush mounted well manhole was installed. Pursuant to the request of the New York State Parks Department, in whose right-of-way the wells were installed, the wells of the MW-30 cluster were completed with stick-up protective steel casings.

Upon completion, each monitoring was vigorously developed to repair damage done to the formation by the drilling operation and to alter the basic hydraulic characteristics of the formation near the well so that groundwater will move freely into the well. Monitoring well development was completed by using an air lift method, initially, followed by a submersible pump and surge techniques. The air lift method was used to remove any viscous remnants of drilling mud from the borehole. The well was flushed with potable water and air lifted, using an air compressor, to evacuate the well. A stainless steel, decontaminated, submersible pump with surging techniques was used to complete the development activities. During well development, specific conductance, pH, temperature, turbidity, and oxygen reduction potential were recorded on well development sheets along with other pertinent information such as total well depth, depth to groundwater and well volume. The well development logs are included in Appendix D. Well development continued until the following conditions were met:

1. Stabilization was established when two consecutive well volume readings taken one well casing volume apart are within 10 percent of one another.
2. Turbidity measurements were less than 50 nephelometric turbidity units (NTUs) or stabilized.
3. Ten well-bore volumes were removed.

2.5 Groundwater Sampling

Following well construction and development, groundwater samples were collected from the existing and newly installed monitoring wells as part of the regularly scheduled October sampling round. The 75 wells samples as part of the OU-2 RI/FS included:

- 48 on-site monitoring wells installed in support of previous investigations.
- 2 newly installed on-site monitoring wells (MW-35GL and MW-36GL).
- 1 out-of-service groundwater extraction well (RW-2).
- 12 off-site monitoring wells installed in support of previous investigations.

- 12 off-site monitoring wells installed as part of the OU-2 RI/FS.

The following procedure were followed for groundwater sampling:

1. Prior to the purging of the wells for sample collection, a synoptic static water level measurement to the nearest hundredth (0.01) foot was recorded in each monitoring well from the on- and off-site monitoring well network. A summary of the depth to water measurements is included in Table 2-2.
2. A volume of water equal to three or more times that standing in the casing was purged from the well before taking the sample. If the monitoring well had a low yield, standing water was fully evacuated and a sample collected upon recovery to 80 percent of static water level. Wells with high yield were sampled immediately after evacuation of three well volumes. A decontaminated stainless steel submersible pump was used to remove the required well volumes.
3. A dedicated, laboratory cleaned, polyethylene, disposable bailer was attached to dedicated polypropylene rope or nylon line. The first full bailer was removed and the water disposed. The appropriate laboratory-supplied, pre-cleaned sample bottles were filled directly from the bailer as soon as it is removed from the well. The field measurements (i.e., pH, turbidity, conductivity, and temperature) were recorded in pre-printed field forms (see Appendix D for groundwater sampling logs).

The pH probe will first be field calibrated with a No. 7 buffer solution and then with either a No. 10 or No. 4 buffer solution, depending on the anticipated pH of the groundwater sample. The specific conductivity probe will be calibrated with an ionic solution that is closest in conductivity to that anticipated in the groundwater sample. The thermometer will be used to measure temperature of the groundwater during purging. The thermometer will be tested to ensure its calibration in the laboratory prior to sampling.

The groundwater and associated quality assurance/quality control (QA/QC) samples were analyzed for TCL VOCs plus Freon 113 by H2M Labs of Melville, New York. The analytical data packages are included in Appendix E. The data are tabulated in Table 2-3.

The TCL VOC analytical data packages were subjected to an independent data validation review process by Data Validation Services, Inc. of North Creek, New York. The data validation report will be provided under separate cover.

2.6 Investigation-Derived Waste

Three primary IDW waste streams were generated during the OU-2 installation and sampling activities including:

- Spent drilling mud and cuttings.
- Development liquids (e.g., spent drilling mud and groundwater).
- Purged groundwater from sampling activities.

2.6.1 Spent Drilling Mud and Cuttings.

As previously discussed, two 20-cubic yard rolloff containers were utilized at each drill site to contain spent drilling mud and soil cuttings. Upon completion of the well installation activities at a well cluster, a single composite sample was collected from the two containers and analyzed for flashpoint, reactivity, pH, toxicity, and TCLP parameters (VOC's, SVOC's, RCRA metals, and PCB's). The filled containers were staged at a location on the site pending transport and disposal. The low-viscosity liquids were disposed of at the Nassau County Department of Public Works (NCDPW) publicly-owned treatment works (POTW) Cedar Creek facility. The more viscous liquids and drill cuttings from each roll-off container were disposed of at 110 Sand and Gravel facility located in Melville, New York.

2.6.2 Development Water

The well development water typically contained drilling muds and naturally occurring silt and clay which restricted their disposal through the on-site groundwater treatment system (as proposed in the OU-2 RI/FS work plan). Rather, the development water r was containerized, transported and stored in a 17,000 gallon, open topped, steel, Baker Tank staged on the site adjacent to the groundwater treatment system until the completion of the job. The liquids were approved for and disposed of at the NCDPW POTW Cedar Creek facility.

2.6.3 Purged Groundwater

Each well was purged of at least three well-bore volumes prior to their sampling. The water purged from the on-site wells was containerized, transported to and disposed of through the on-site groundwater treatment system. The water purged from the off-site wells was first run through a granulated activated carbon system at the well head, containerized, transported to and disposed of through the on-site groundwater treatment system.

Table 2-1
Summary Matrix of Monitoring Well Construction Details
OU-2 Remedial Investigation
Lockheed Martin Corporation
365 Lakeville Road
Great Neck, New York

Well No.	NYSDEC Well No.	Total Well Depth (ft.)	Screen Interval (ft. bgs)	Riser Length (ft.)	Well Dia. (in.) [b]	Screen Slot Size (in.)	Top of Casing Elev. (a)	Top of Screen Elevation (a)	Bottom of Screen Elevation (a)	Depth to Water (ft bgs) [c]	Water Table Elev. (a)
MW-30GL	N-12953	210	190-210	206	4	0.02	138.48	-51.52	-71.52	96.74	41.74
MW-30MI	N-12954	280	260-280	276	4	0.02	138.67	-121.33	-141.33	96.66	42.01
MW-30ML	N-12955	380	360-380	376	4	0.02	138.50	-221.50	-241.50	96.44	42.06
MW-31GL	N-12956	200	180-200	196	4	0.02	123.86	-56.14	-76.14	87.42	36.44
MW-31MI	N-12957	255	235-255	251	4	0.02	124.39	-110.61	-130.61	88.02	36.37
MW-31ML	N-12958	355	335-355	351	4	0.02	124.61	-210.39	-230.39	93.06	31.55
MW-32GL	N-12959	240	220-240	236	4	0.02	200.71	-19.29	-39.29	165.32	35.39
MW-32MI	N-12960	330	310-330	326	4	0.02	202.16	-107.84	-127.84	166.80	35.36
MW-32ML	N-12961	412	392-412	408	4	0.02	202.59	-189.41	-209.41	167.22	35.37
MW-33GL	Q-3795	252	232-252	248	4	0.02	256.16	24.16	4.16	222.04	34.12
MW-33MI	Q-3796	310	290-310	306	4	0.02	256.45	-33.55	-53.55	221.82	34.63
MW-33ML	Q-3797	425	405-425	421	4	0.02	256.37	-148.63	-168.63	167.22	89.15

Notes:

a: Reference mark at top of PVC monitoring well casing; all elevations in feet above mean sea level, USGS NGVD, 1929.

b: All well casings and screen constructed with schedule 80 PVC.

c: Water level measurements were taken on 11/20/98.

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Table 2-2
Depth to Water Measurements

WELL NO.	DATE DRILLED	TOTAL DEPTH	SCREEN INTERVAL	TOP OF CASING ELEVATION	6/22/1998*		11/20/1998*	
					DEPTH TO WATER	WATER LEVEL ELEVATION	DEPTH TO WATER	WATER LEVEL ELEVATION
1GU	May-88	115	105-115	143.77	100.90	42.87	103.10	40.67
1GL	May-88	147	127-147	144.41	101.03	43.38	103.40	41.01
1MI	May-88	255	235-255	144.39	100.76	43.63	101.36	43.03
1MI/L	May-89	342	322-342	144.55	101.21	43.34	101.30	43.25
1ML	May-91	395	390-400	144.89	101.62	43.27	101.62	43.27
2GL	May-88	147	127-147	128.35	82.60	45.75	83.12	45.23
2MU	Jul-91	185	175-185	125.90	80.29	45.61	80.46	45.44
2MI	Apr-89	250	230-250	128.57	82.88	45.69	83.38	45.19
2ML	Aug-94	447	397-407	125.69	80.47	45.22	80.96	44.73
3GL	May-88	149	129-149	139.50	93.70	45.80	93.76	45.74
3ML	Jul-94	350	325-335	137.02	91.73	45.29	91.76	45.26
4GL	May-88	150	130-150	144.81	97.57	47.24	98.98	45.83
4MI	Mar-89	250	230-250	145.10	99.60	45.50	99.50	45.60
5GU	Jan-92	95	74-94	131.32	86.05	45.27	86.46	44.86
5GL	Feb-89	130	110-130	130.32	85.17	45.15	85.40	44.92
5MI	Feb-89	250	239-250	130.31	85.67	44.64	85.68	44.63
5ML	Jul-94	350	325-335	129.17	84.61	44.56	84.60	44.57
6GL	Feb-89	125	105-125	128.30	83.46	44.84	83.60	44.70
6MI	Jul-91	240	215-235	128.80	84.72	44.08	84.00	44.80
7GL	Mar-89	150	130-150	149.76	106.91	42.85	107.58	42.18
7ML	Jun-94	355	323-333	148.98	107.00	41.98	107.10	41.88
8GU	Apr-89	90	80-90	120.42	73.97	46.45	74.36	46.06
8GL	Apr-89	150	130-150	120.32	74.60	45.72	75.62	44.70
8ML	Jun-94	355	328-338	126.94	75.57	51.37	75.00	51.94
9GL	Apr-89	155	135-155	126.94	81.44	45.50	82.00	44.94
10GL	Apr-89	132	112-132	126.03	81.59	44.44	82.10	43.93
11GL	May-89	140	120-140	129.02	83.95	45.07	84.04	44.98
11MI	May-89	250	230-250	129.39	84.74	44.65	84.78	44.61
12MI	May-91	253	243-253	133.61	86.81	46.80	87.20	46.41
12ML	May-91	393	383-393	133.85	86.95	46.90	87.00	46.85
13ML	Apr-96	275	255-275	158.97	119.00	39.97	118.76	40.21
14MI	Apr-96	250	220-250	160.52	122.33	38.19	122.22	38.30
15GL	Aug-94	170	150-160	132.57	86.36	46.21	86.62	45.95
15ML	Aug-94	340	328-338	132.63	86.62	46.01	86.84	45.79
16GL	Apr-96	222	202-222	227.08	187.65	39.43	187.36	39.72
16ML	Aug-95	326	316-326	227.11	187.45	39.66	187.16	39.95
17GL	Aug-94	170	155-165	138.99	96.69	42.30	97.42	41.57
17ML	Aug-94	428	390-400	138.64	96.26	42.38	96.42	42.22
18GL	Sep-94	170	160-170	150.24	108.52	41.72	108.56	41.68
18ML	Sep-94	345	324-334	149.55	108.04	41.51	107.84	41.71
19GU	Jan-92	99	78-98	137.20	91.65	45.55	92.04	45.16
19MI	Jan-92	248	229-239	137.22	91.95	45.27	91.76	45.46
20GU	Jan-92	93	73-93	NO ACCESS - LILCO				
21GU	Jan-92	98	78-98	132.85	87.52	45.33	87.60	45.25
22GL	Sep-94	168	158-168	135.53	92.60	42.93	93.08	42.45
22ML	Aug-94	340	315-325	135.16	92.30	42.86	92.74	42.42
23GL	Aug-94	150	140-150	139.82	97.40	42.42	98.86	40.96
23MI	Jun-94	215	202-212	138.88	97.25	41.63	99.12	39.76
24GL	May-94	150	139-149	139.89	97.20	42.69	98.68	41.21
24MI	May-94	220	200-210	139.97	97.25	42.72	99.20	40.77
25GL	May-94	170	159-169	134.66	90.71	43.95	91.52	43.14
25MI	May-94	220	200-210	135.75	92.02	43.73	92.98	42.77
26GL	May-94	184	174-184	130.46	86.01	44.45	86.80	43.66
26MI	May-94	240	220-230	130.79	86.35	44.44	87.08	43.71
27GL	Jun-94	180	170-180	121.75	76.90	44.85	77.78	43.97
27MI	Jun-94	230	217-227	122.24	77.20	45.04	78.20	44.04
28GL	Jun-94	150	140-150	136.21	92.49	43.72	94.02	42.19
28MI	Jun-94	250	222-232	136.57	92.70	43.87	93.18	43.39
29GL	Jun-94	170	145-155	143.37	100.46	42.91	101.80	41.57
29MI	Jun-94	250	207-217	143.48	100.61	42.87	101.94	41.54
30GL	Sep-98	210	190-210	138.48	N/A	N/A	96.74	41.74
30MI	Aug-98	280	260-280	138.67	N/A	N/A	96.66	42.01
30ML	Aug-98	380	360-380	138.50	N/A	N/A	96.44	42.06
31GL	Oct-98	200	180-200	123.86	N/A	N/A	87.42	36.44
31MI	Oct-98	255	235-255	124.39	N/A	N/A	88.02	36.37
31ML	Oct-98	355	335-355	124.61	N/A	N/A	93.06	31.55
32GL	Sep-98	240	220-240	200.71	N/A	N/A	165.32	35.39
32MI	Sep-98	330	310-330	202.16	N/A	N/A	166.80	35.36
32ML	Sep-98	412	392-412	202.59	N/A	N/A	167.22	35.37
33GL	Aug-98	252	232-252	256.16	N/A	N/A	222.04	34.12
33MI	Aug-98	310	290-310	256.45	N/A	N/A	221.82	34.63
33ML	Aug-98	425	405-425	256.37	N/A	N/A	167.22	89.15
35GL	Aug-98	135	115-135	129.21	N/A	N/A	84.62	44.59
36GL	Aug-98	135	115-135	134.41	N/A	N/A	90.44	43.97

Notes:
* - RW1 and EW1 on.

Table 2-3
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	10/22/98	10/22/98	10/22/98	10/22/98	10/22/98	10/26/98	10/20/98	10/20/98	10/20/98	10/20/98	10/19/98	NYS
		BD-5										Class GA
Well Location	1GU	(1GU)	1GL	1MI	1MI/L	1ML	2GL	2MU	2MI	2ML	3GL	Groundwater
Lab ID # - 983-	4387	4390	4386	4388	4389	4590	4047	4050	4048	4049	3699	Quality Stds.
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	<10	<10	<10	<10	3J	<10	<10	<10	<10	<10	<10	5
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,2-Dichloroethene (total)	2J	2J	**150**	**400D**	**250**	**95**	**27**	**34**	**280**	2J	**410D**	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Trichloroethene	4J	4J	**26**	**77**	**150**	**33**	5J	4J	**31**	<10	**78**	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	**<10**	1
Tetrachloroethene	<10	<10	**16**	**65**	**67**	**22**	5J	3J	**14**	<10	**64**	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	<10	<10	**6J**	**16**	**26**	5	<10	<10	3	<10	**16**	5

Notes:
<1 - Not detected at or above the method detection limit shown. Value may denote secondary dilution.
NS - Not sampled.
10 Denotes concentration above NYS Groundwater Quality Standards, Class GA.
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	10/19/98	10/1/98	10/1/98	10/19/98	10/20/98	10/20/98	10/20/98	10/20/98	10/20/98	9/29/98	10/14/98	NYS Class GA
Well Location	3ML	4GL	4MI	5GU	5GL	5MI	5ML	6GL	6MI	7GL	7ML	Groundwater
Lab ID # - 983-	3709	3368	3369	3703	4051	4052	4053	4054	4055	3370	3371	Quality Stds.
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	<10	<10	1	<10	<10	<10	<10	<10	<10	<10	4	5
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2	5
1,2-Dichloroethene (total)	**69**	**130D**	**190D**	**10J**	**6J**	**670D**	**770D**	2J	5J	**200D**	**950D**	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Trichloroethene	**42**	**75**	**70**	4J	2J	**130**	**150**	<10	<10	**87**	**190D**	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Tetrachloroethene	**15**	**79**	**110**	4J	3J	**64**	**130**	<10	<10	**100**	**160D**	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	3J	**6**	**18**	2J	3J	**13**	**28**	2J	<10	**14**	**50**	5

Notes:
<1 - Not detected at or above the method detection limit shown. Value may denote secondary dilution.
NS - Not sampled.
10
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	10/14/98	10/14/98	10/14/98	10/14/98	10/14/98	10/20/98	10/20/98	10/20/98	10/20/98	10/1/98	9/29/98	NYS Class GA Groundwater Quality Stds.
Well Location	8GU	8GL	8ML	BD-1 (8ML)	9GL	10GL	BD-3 (10GL)	11GL	11MI	12MI	12ML	
Lab ID # - 983-	3192	3193	3194	3204	3372	4056	4060	4057	4058	3195	3373	
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	3	<10	<10	<10	4	<10	1J	<10	<10	<10	<10	5
1,1-Dichloroethane	<10	<10	<10	1J	<10	<10	<10	<10	<10	<10	<10	5
1,2-Dichloroethene (total)	**92**	<10	**11**	**12**	**27**	**8J**	**9J**	**330**	**<10**	**160**	**23**	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	1	<10	<10	<10	<10	<10	<10	5
Trichloroethene	**56**	<10	**8**	**8**	**29**	**9J**	**8J**	**72**	**17**	**25**	**8**	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Tetrachloroethene	**33**	<10	**6**	**6J**	**21**	**8J**	**8J**	**66**	**16**	**23**	4	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	**16**	<10	1	1J	**6**	3J	4J	**29**	3J	5	<10	5

Notes:
<1 - Not detected at or above the method detection limit shown. Value may denote secondary dilution.
NS - Not sampled.
10
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	10/1/98	10/1/98	10/1/98	10/1/98	9/30/98	9/30/98	9/30/98	9/29/98	9/29/98	10/1/98	10/1/98	NYS Class GA
Well Location	13ML	BD-7 (13ML)	14MI	15GL	15ML	16GL	16ML	17GL	17ML	18GL	18ML	Groundwater
Lab ID # - 983-	5581	5582	5584	5271	5272	5585	5586	6334	6335	5273	5274	Quality Stds.
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10	<10	12	<10	<10	<10	5
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	7J	<10	<10	<10	5
1,2-Dichloroethene (total)	<10	<10	**13**	**25**	**8**	<10	**190**	**4,000D**	**180D**	**400D**	**410D**	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Trichloroethene	<10	<10	3	5	2	<10	**58**	**540D**	**49**	**120**	**150**	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	2J	<10	<10	<10	1
Tetrachloroethene	<10	<10	<10	**7**	2	<10	**25**	**660D**	**29**	**110**	**92**	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	<10	<10	<10	<10	<10	<10	**8**	**180JD**	**11**	**19**	**31**	5

Notes:
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NS - Not sampled.
10 Denotes concentration above NYS Groundwater Quality Standards, Class GA.
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	10/19/98	10/19/98	10/1/98	10/26/98	9/30/98	10/19/98	10/19/98 BD-6	10/19/98	10/19/1998	10/19/98 BD-2	9/29/98	NYS Class GA
Well Location	19GU	19MI	20GU	21GU	22GL	22ML	(22ML)	23GL	23MI	(23MI)	24GL	Groundwater
Lab ID # - 983-	3704	3705	32003	4591	5275	5276	5277	3700	3706	3698	3701	Quality Stds.
Vinyl Chloride	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1-Dichloroethane	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	5
1,2-Dichloroethene (total)	4J	**660D**	NS	2J	3	**190**	**190D**	**24**	**190**	**180**	**120**	5*
1,2-Dichloroethane	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	5
Trichloroethene	3J	**150**	NS	2J	**6**	**210**	**210D**	**18**	**39**	**39**	**29**	5
Dibromochloromethane	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	1
Tetrachloroethene	4J	**96**	NS	<10	<10	**63**	**62**	**6J**	**33**	**31**	**14**	5
Chlorobenzene	<10	**26**	NS	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	NS	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	<10	<10	NS	1J	<10	**43**	**44**	<10	**10J**	**9J**	4J	5

Notes:
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10 Denotes concentration above NYS Groundwater Quality Standards, Class GA.
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	9/29/98	10/1/98	10/1/98	9/29/98	10/1/98	10/1/98	10/1/98	10/14/98	9/30/98	10/19/1998	10/19/98	NYS Class GA Groundwater Quality Stds.
Well Location	24MI	25GL	25MI	26GL	26MI	27GL	27MI	28GL	28MI	29GL	29MI	
Lab ID # - 983-	3707	3196	3197	3198	3199	3200	3201	3202	3203	3702	3708	
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	**14**	<10	2
1,1-Dichloroethene	<10	<10	**6**	1	<10	<10	<10	10J	2	3J	2J	5
1,1-Dichloroethane	<10	<10	2	<10	<10	<10	<10	3J	10	2J	<10	5
1,2-Dichloroethene (total)	**280D**	**6**	**1,700D**	**25**	**63**	**19**	**15**	**2,600D**	**270D**	**1600D**	**850D**	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Trichloroethene	**62**	**6**	**150**	**15**	**16**	**12**	**8**	**47**	**47**	**130**	**180**	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Tetrachloroethene	**34**	3	**81D**	**6**	**11**	5	4	**100**	**68**	**89**	**190**	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	1J	<10	<10	<10	1
Xylene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	**10**	<10	**52**	2	<10	<10	<10	**120**	**14**	**32**	**36**	5

Notes:
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NS - Not sampled.
10 Denotes concentration above NYS Groundwater Quality Standards, Class GA.
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
Septemebr - November 1998

Sampling Date:	9/29/98	10/1/98	10/1/98	10/1/98	9/29/98	10/1/98	10/1/98	10/1/98	9/30/98	9/30/98	9/30/98	NYS
			BD-8									Class GA
Well Location	30GL	30MI	(30MI)	30ML	31GL	31MI	31ML	32GL	32MI	32ML	33GL	Groundwater
Lab ID # - 983-	6336	6337	6333	6338	6077	6078	6080	5579	5580	6339	7939	Quality Stds.
Vinyl Chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	<10	4J	4J	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,2-Dichloroethene (total)	**8J**	3J	2J	3J	2	4	<10	<10	4	<10	2J	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Trichloroethene	2J	5J	5J	<10	<10	<10	<10	<10	**8**	<10	<10	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Tetrachloroethene	3J	1J	<10	<10	3	2	<10	<10	<10	<10	<10	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5

Notes:
<1 - Not detected at or above the method detection limit shown. Value may denote secondary dilution.
NS - Not sampled.
10 Denotes concentration above NYS Groundwater Quality Standards, Class GA.
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	9/29/98	9/29/98	10/1/98	10/1/98	10/21/98	10/21/98	10/15/98	10/20/98	10/21/98	10/21/98	10/23/98	NYS
Well Location	33MI	33ML	35GL	36GL	RW2	BD-4 (RW-2)	FB-1	FB-2	FB-3	FB-4	FB-5	Class GA Groundwater
Lab ID # - 983-	6848	6849	6079	7141	4059	4061	3374	3710	4062	4063	4391	Quality Stds.
Vinyl Chloride	<10	<10	**21**	<10	<10	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	<10	<10	5J	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,2-Dichloroethene (total)	5J	<10	**2,700D**	**9J**	**42**	**40**	<10	<10	<10	<10	<10	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Trichloroethene	**6J**	**12**	**28**	2J	2J	2J	<10	<10	<10	<10	<10	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Tetrachloroethene	2J	<10	**26**	2J	**15**	**14**	<10	<10	<10	<10	<10	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	<10	<10	4J	3J	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	<10	<10	**48**	<10	<10	<10	<10	<10	<10	<10	<10	5

Notes:
<1 - Not detected at or above the method detection limit shown. Value may denote secondary dilution.
NS - Not sampled.
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D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
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Other TCL VOC's analyzed for were not detected above the method detection limit.

Table 2-3 (continued)
Summary of Volatile Organic Compounds Detected in Groundwater (ug/l)
Lockheed Martin Corporation
Great Neck, New York
Full Sampling Event
September - November 1998

Sampling Date:	10/26/98	10/30/98	11/4/98	11/6/98	11/8/98	11/9/98	NYS Class GA Groundwater Quality Stds.
Well Location	FB-6	FB-7	FB-8	FB-9	FB-10	FB-11	
Lab ID # - 983-	4592	5279	5583	6081	6340	6341	
Vinyl Chloride	<10	<10	<10	<10	<10	<10	2
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10	5
1,1-Dichloroethane	<10	<10	<10	<10	<10	<10	5
1,2-Dichloroethene (total)	<10	<10	<10	<10	<10	<10	5*
1,2-Dichloroethane	<10	<10	<10	<10	<10	<10	0.6
1,1,1-Trichloroethane	<10	<10	<10	<10	<10	<10	5
Trichloroethene	<10	<10	<10	<10	<10	<10	5
Dibromochloromethane	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichloroethane	<10	<10	<10	<10	<10	<10	1
Tetrachloroethene	<10	<10	<10	<10	<10	<10	5
Chlorobenzene	<10	<10	<10	<10	<10	<10	5
Benzene	<10	<10	<10	<10	<10	<10	1
Xylene	<10	<10	<10	<10	<10	<10	5
1,1,2-Trichlorotrifluoroethane	<10	<10	<10	<10	<10	<10	5

Notes:
<1 - Not detected at or above the method detection limit shown. Value may denote secondary dilution.
NS - Not sampled.
10 Denotes concentration above NYS Groundwater Quality Standards, Class GA.
D - Denotes concentration after secondary dilution.
B - Denotes compound detected in method blank.
J - Denotes an estimated value.
* - Standard for cis-1,2-DCE is 5 ug/l, and for trans-1,2-DCE is 5 ug/l.
Other TCL VOC's analyzed for were not detected above the method detection limit.

		DATE:	8/17-8/24/98
PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW30-ML
FIELD PERSONNEL:	WJW	BORING LOCATION:	Northern State Parkway

DRILLER:	B & B Drilling Co.	TYPE OF DRILLING:	
SURFACE EL (FT):	136.36	☐ HOLLOW STEM	☐ CABLE TOOL
WEATHER:		☐ AIR ROTARY	☐ DRIVEN
		■ MUD ROTARY	☐ OTHER (SPECIFY)
TEMP.	WIND.		

SOIL TYPE CODES

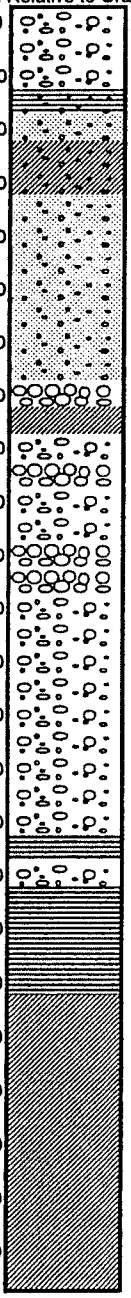
GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.) SPECIFY !!

MISC. COMMENTS:

Well set at 380 feet.

BORING PROFILE

(Depth Relative to Grade)



Description
Sand and gravel
Cobble / gravel
Black silty clay / coarse sand
Medium sand
Gray silt / medium to coarse sand
Medium-fine sand
Medium sand
Gravel
Fine sand
Coarse sand, some gravel
Gravel
Medium gravel / fine sand
Large gravel
Small-medium gravel / fine sand
Fine-medium sand / gravel
Clay
Medium-fine sand, light gravel
Clay
Fine sand and silty clay

DATE: 8/17-8/24/98

PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW-30ML
FIELD PERSONNEL:	WJW	BORING LOCATION:	Northern State Parkway

DRILLER:	B & B Drilling Co.
SURFACE EL (FT):	136.36
WEATHER:	
TEMP.	WIND.

TYPE OF DRILLING:

- ☐ HOLLOW STEM
- ☐ AIR ROTARY
- ■ MUD ROTARY
- ☐ CABLE TOOL
- ☐ DRIVEN
- ☐ OTHER (SPECIFY)

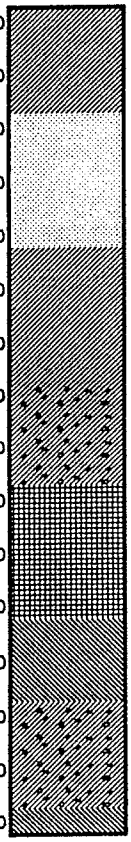
SOIL TYPE CODES

GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.) SPECIFY !!

MISC. COMMENTS:

BORING PROFILE

(Depth Relative to Grade)



Description
Fine sand and silty clay
Medium-fine sand, brownish color
Fine sand and silty clay
Fine sand and silt
Hard cobble
Clay
Sand and fine gravel
Silty clay

		DATE:	10/2-10/7/98
PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW-31ML
FIELD PERSONNEL:	WJW	BORING LOCATION:	600 Community Drive
DRILLER:	B & B Drilling Co.	TYPE OF DRILLING:	
SURFACE EL (FT):	124.87	☐ HOLLOW STEM	☐ CABLE TOOL
WEATHER:		☐ AIR ROTARY	☐ DRIVEN
		■ MUD ROTARY	☐ OTHER (SPECIFY)
TEMP.	WIND.		

SOIL TYPE CODES

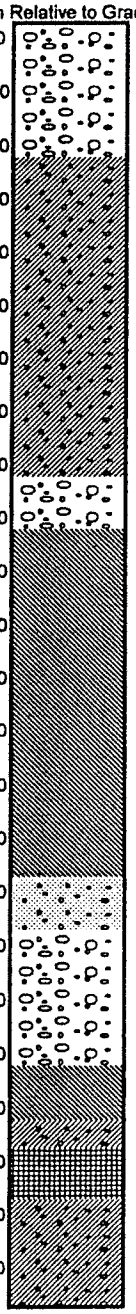
GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.) SPECIFY II

MISC. COMMENTS:

Well set at 355 feet.

BORING PROFILE

(Depth Relative to Grade)



Description
Sand and small gravel
Fine sand and some brown silt
Gray silt and medium sand
Medium sand / small cobbles
Gray silt
Medium-coarse sand
Small cobble
Medium-large gravel
Red silt
Gray silt
Red silt with medium-coarse sand
Large cobbles
Medium-fine sand with gray silt

DATE:	10/2-10/7-98		
PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW-31ML
FIELD PERSONNEL:	WJW	BORING LOCATION:	600 Community Drive

DRILLER:	B & B Drilling Co.	TYPE OF DRILLING:	
SURFACE EL (FT):	124.87	☐ HOLLOW STEM	☐ CABLE TOOL
WEATHER:		☐ AIR ROTARY	☐ DRIVEN
		■ MUD ROTARY	☐ OTHER (SPECIFY)
TEMP.	WIND.		

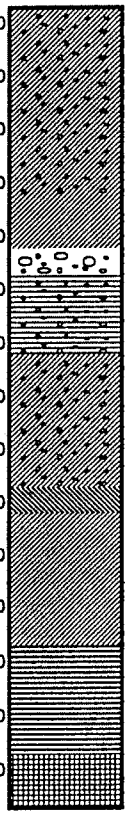
SOIL TYPE CODES

GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.) SPECIFY !!

MISC. COMMENTS:

BORING PROFILE

(Depth Relative to Grade)



Description
Fine sand and pinkish, yellow, white silt
Fine sand / silt
Small-medium gravel
Fine sands with silty clay
Medium-fine sands
Silty clay
Fine sands
Organic clay
Cobbles

DATE: 9/9-9/18/98

PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW-32ML
FIELD PERSONNEL:	MPE	BORING LOCATION:	Long Island Expressway

DRILLER:	B & B Drilling Co.
SURFACE EL (FT):	202.79
WEATHER:	
TEMP.	WIND.

TYPE OF DRILLING:

- ☐ HOLLOW STEM
- ☐ AIR ROTARY
- ■ MUD ROTARY
- ☐ CABLE TOOL
- ☐ DRIVEN
- ☐ OTHER (SPECIFY)

SOIL TYPE CODES

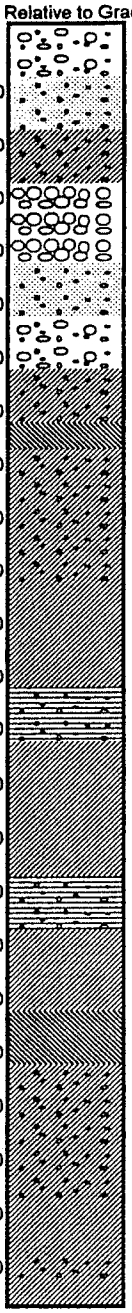
GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.)
	SPECIFY !!

MISC. COMMENTS:

Well set at 412 feet.

BORING PROFILE

(Depth Relative to Grade)



Description
Sand and gravel
Well sorted gravel with medium sand
Brown medium sand with some gravel
Medium sand with some fines
Fine sand/silt with medium sand
Gravel and sand mixture
Coarse-medium sand, well sorted
Medium-coarse sand
Gravel and sand
Medium sand with some silt
Brown silts with organic matter
Silts with medium to fine sands
Silts with fine sands
Silts with some clay
Medium-fine sand
Silt with some fine sands
Silt with some gravel, sand
Silt with clay, medium sand
Silt with gray clay
Silt
Silt and medium sand
Silt and some sand
Silt with medium-coarse sand
Silt / clay mixture
Silt with medium-coarse sand
Silt with some clay

		DATE:	9/9-9/10/98
PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW-32ML
FIELD PERSONNEL:	MPE	BORING LOCATION:	-

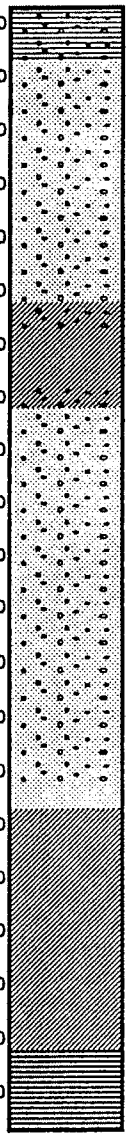
DRILLER:	B & B Drilling Co.	TYPE OF DRILLING:	
SURFACE EL (FT):	202.79	☐ HOLLOW STEM	☐ CABLE TOOL
WEATHER:		☐ AIR ROTARY	☐ DRIVEN
		■ MUD ROTARY	☐ OTHER (SPECIFY)
TEMP.	WIND.		

SOIL TYPE CODES

GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.)
	SPECIFY II

MISC. COMMENTS:

BORING PROFILE
(Depth Relative to Grade)



Description
Silt, medium-fine sand
Silt, well sorted sand
Medium sand
Silty sand
Silty Clay
Silty sand
Medium Sand
Medium-coarse Sand
Silty clay, some sand
Clay with fines

DATE: 7/27-8/5/1998

PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW-33ML
FIELD PERSONNEL:	WJW	BORING LOCATION:	Northshore Towers

DRILLER:	B & B Drilling Co.
SURFACE EL (FT):	256.66
WEATHER:	
TEMP.	WIND.

TYPE OF DRILLING:

- ☐ HOLLOW STEM
- ☐ AIR ROTARY
- ■ MUD ROTARY
- ☐ CABLE TOOL
- ☐ DRIVEN
- ☐ OTHER (SPECIFY)

SOIL TYPE CODES

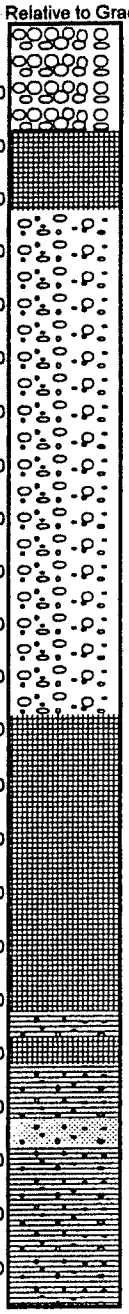
GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.)
	SPECIFY !!

MISC. COMMENTS:

Well set at 425 feet.

BORING PROFILE

(Depth Relative to Grade)



Description
Very coarse sand and gravel
Cobbles
Sand and Gravel
Rock, shale, gravel
Sand and gravel
Cobble
Clay and sand
Cobble material
Medium-coarse sand and some clay
Medium-coarse sand, very little clay
Yellowish/brown clay / Medium-coarse sand

		DATE:	7/27-8/5/1998
PROJECT NAME:	Lockheed Martin Corporation	SITE LOCATION:	Great Neck, NY
JOB NUMBER:	LOCK9801	BORING ID:	MW-33ML
FIELD PERSONNEL:	WJW	BORING LOCATION:	Northshore Towers
DRILLER:	B & B Drilling Co.	TYPE OF DRILLING:	
SURFACE EL (FT):	256.66	☐ HOLLOW STEM	☐ CABLE TOOL
WEATHER:		☐ AIR ROTARY	☐ DRIVEN
		■ MUD ROTARY	☐ OTHER (SPECIFY)
TEMP.	WIND.		

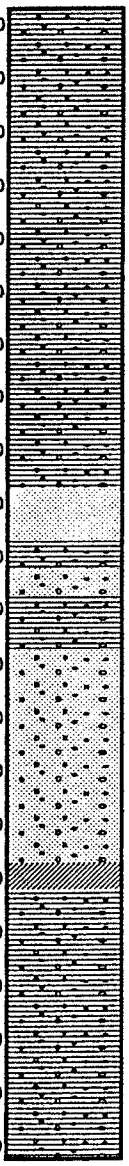
SOIL TYPE CODES

GW	Well graded gravels or gravel-sand mixtures.
GP	Poorly graded gravels or gravel-sand mixtures.
SW	Well-graded sands, gravelly-sands, no fines
SP	Poorly graded sands, gravelly-sands, no fines
SM	Silty sands, sand-silt mixtures.
ML	Inorganic silts, very fine sands, silty-clayey fine sands.
CL	Inorganic clays, gravelly-clays, sandy clays, silty or lean clays.
OL	Organic silts, organic silty-clays of low plasticity.
OH	Organic clays of med. to high plasticity, organic silts.
PT	Peat and other highly organic soils.
BD	Bedrock, rock, etc.
**	OTHER (fill, etc.)
	SPECIFY !!

MISC. COMMENTS:

BORING PROFILE

(Depth Relative to Grade)



FT	Description
240	Yellowish/brown clay / Medium-coarse sand
250	
260	
270	
280	Yellowish/brown clay / Medium-coarse sand with increasing amounts of clay
290	Yellowish/brown clay / Medium sand with increasing amounts of clay
300	
310	
320	
330	Medium-fine sands
340	Medium-fine sands, some clay
	Medium-coarse sands
350	Medium-coarse sands, traces of clay
360	Medium-coarse sands
370	
380	
390	
400	Clay
	Medium-coarse sand, some clay
410	
420	
	Medium-coarse sand, some clay
430	
	Medium-coarse sand, clay. More clay than sand
440	
450	Drilling ends.

Appendix B
Gamma Logs

AQUA TERRA GEOPHYSICS INC.

16 STATION ROAD # 8
BELLPORT, NY 11713
(516) 286 – 7699

BOREHOLE: MW–30–ML
LOGS: NATURAL GAMMA
S. POINT RESISTANCE
SPONT. POTENTIAL

PROJECT: **LOCKHEED MARTIN OU–2**
CLIENT: **H2M**
LOCATION: NORTHERN STATE PARKWAY

DATE: **AUGUST 19, 1998**
COUNTY: NASSAU
STATE: NEW YORK

BOREHOLE DATA

DRILLING CONTRACTOR: B&B DRILLING, LANDING NJ
ELEV: DEPTH REF: GRADE

CUSTOMER TD: 391 FT.
LOGGER TD392.15 FT.

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1	8 IN.	GRADE	T. DEPTH	8" STEEL	GRADE	9 FT.
2						
3						

DRILL METHOD: MUD ROTARY
HOLE MEDIUM: DRILLING FLUID
VISCOSITY:

DATE DRILLED: 8/98
FLUID LEVEL: 0 FT.
WEIGHT:

TIME SINCE CIRC: 1 HR.
MUD TYPE: BENTONITE
Rm: at Deg

GENERAL DATA

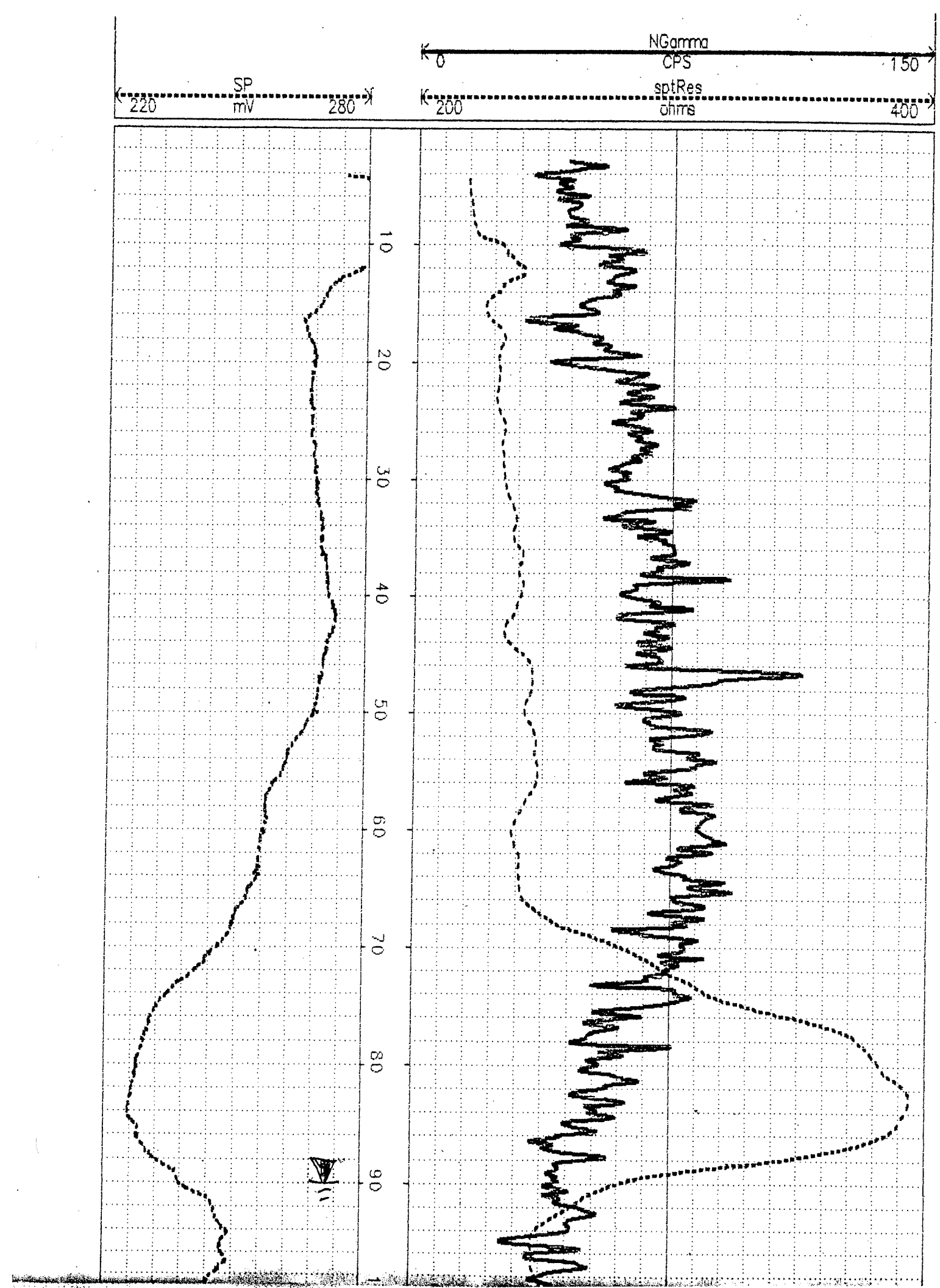
LOGGED BY: BENJAMIN RICE
WITNESS: RICHARD BALDWIN

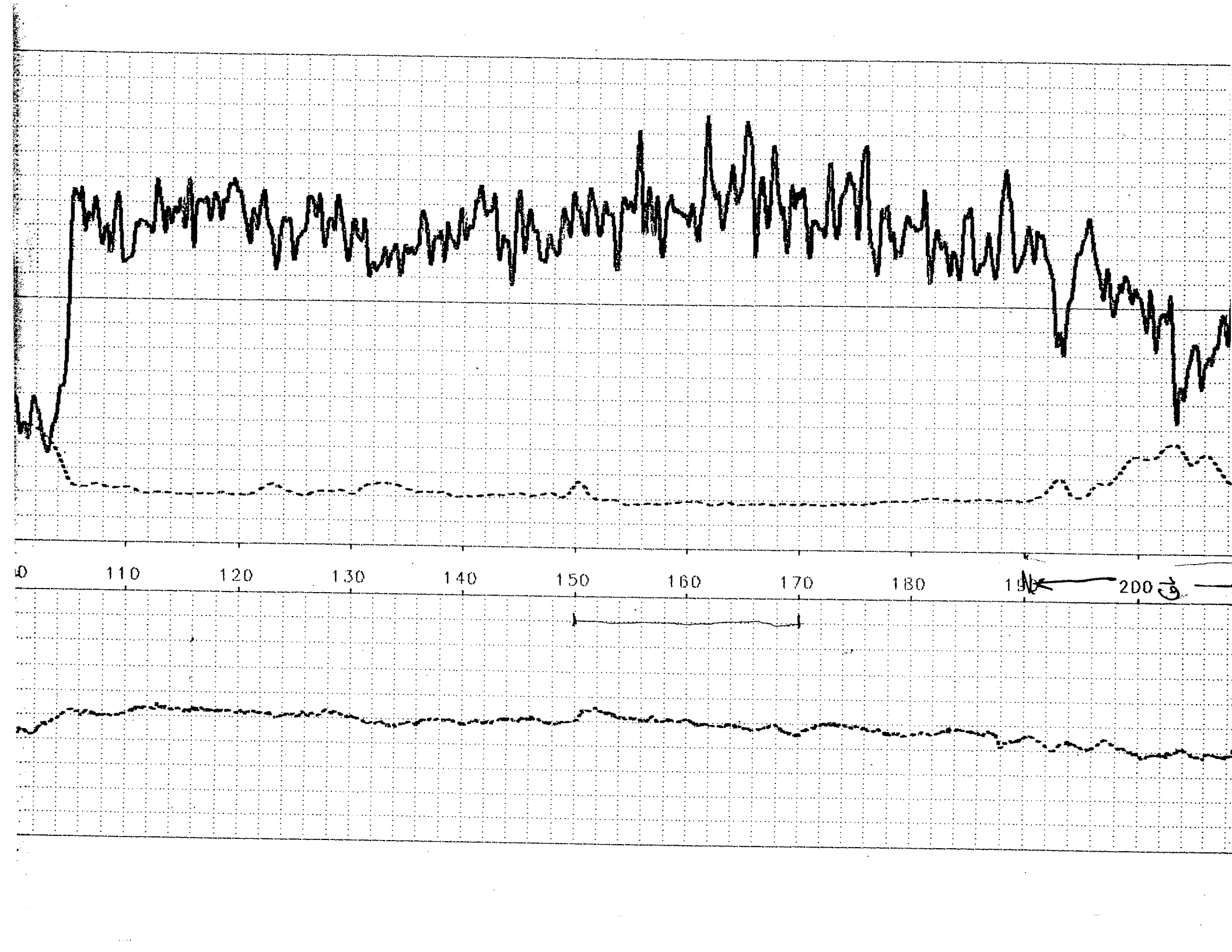
OTHER SERVICES:
UNIT/TRUCK: MT. SOPRIS MGX/1

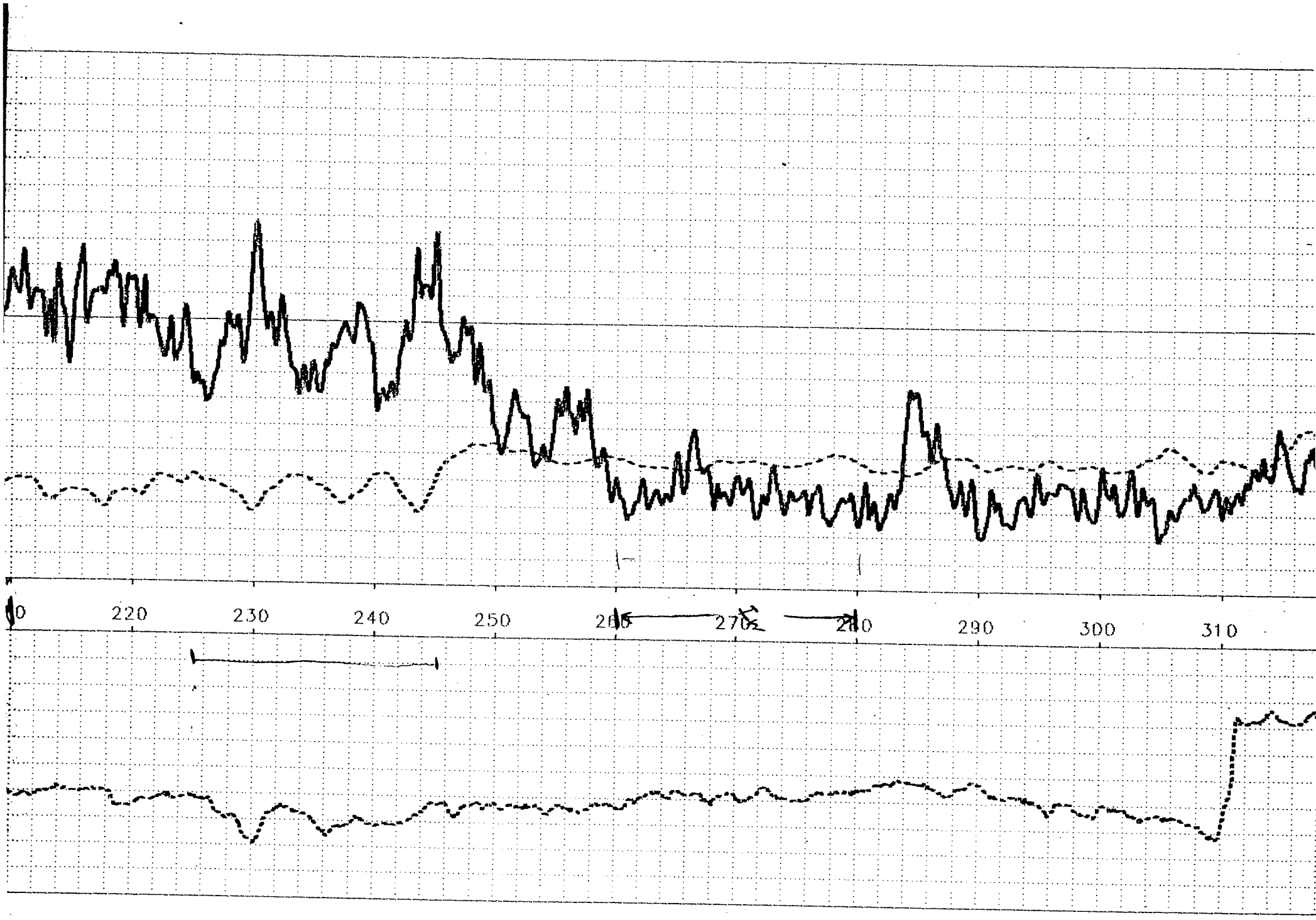
LOGGING DATA

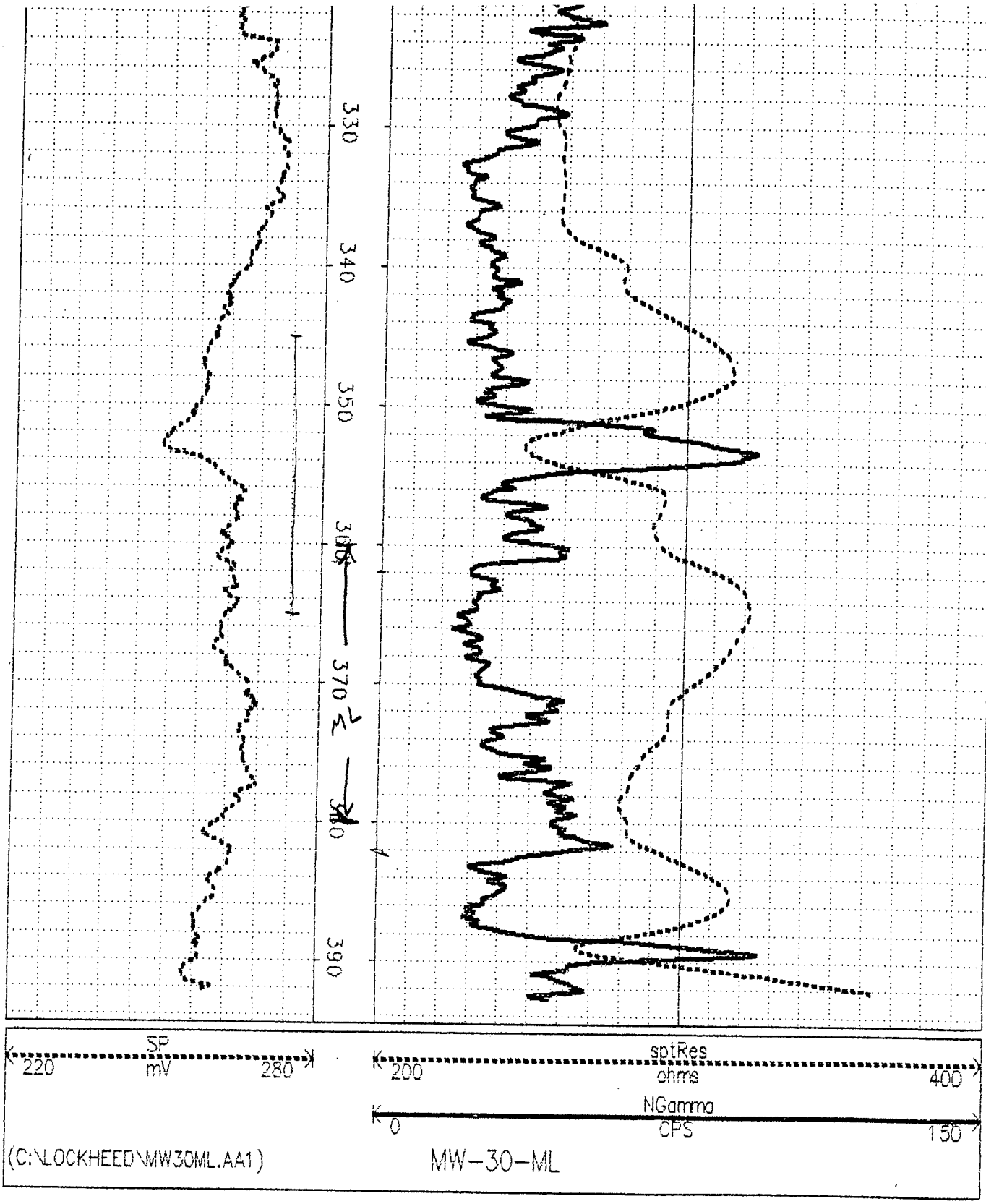
LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SOURCE		LOGGED INTERVAL			
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT/MIN	TYPE	TYPE	SIZE GBq	FROM	TO	INT. FEET	COMMENTS
N. GAMMA	1	305	2201	0200		20	SCINT.			3	392	389	W.A. = 2
SP–sptRES	2	305	2201	0200		25				9	392	383	

DIGITAL FILE NAME(S):
REMARKS:


NGamma
0
CPS
150
SP
220
mV
280
sptRes
200
ohms
400
10
20
30
40
50
60
70
80
90


110
120
130
140
150
160
170
180
190
200


220
230
240
250
290
300
310


330
340
350
360
370
380
390
SP
220
mV
280
sptRes
200
ohms
400
NGamma
0
CPS
150
(C:\LOCKHEED\MW30ML.AA1)
MW-30-ML

AQUA TERRA GEOPHYSICS INC.

16 STATION ROAD # 8
BELLPORT, NY 11713
(516) 286 – 7699

BOREHOLE: MW–31–ML
LOGS: NATURAL GAMMA
S. POINT RESISTANCE
SPONT. POTENTIAL

PROJECT: LOCKHEED MARTIN OU–2
CLIENT: H2M
LOCATION: 600 COMMUNITY DRIVE

DATE: OCTOBER 6, 1998
COUNTY: NASSAU
STATE: NEW YORK

BOREHOLE DATA

DRILLING CONTRACTOR: S&B DRILLING, LANDING NJ
ELEV: DEPTH REF: GRADE

CUSTOMER TD: 385 FT.
LOGGER TD: 384.4 FT.

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1	8 IN.	GRADE	385 FT.	8" STEEL	GRADE	10 FT.
2						
3						

DRILL METHOD: MUD ROTARY
HOLE MEDIUM: DRILLING FLUID
VISCOSITY:

DATE DRILLED: 10/98
FLUID LEVEL: 0 FT.
WEIGHT:

TIME SINCE CIRC: 1 HR.
MUD TYPE: BENTONITE
Rm = at Deg

GENERAL DATA

LOGGED BY: BENJAMIN RICE
WITNESS: RICHARD BALDWIN

OTHER SERVICES:
UNIT/TRUCK: MT. SOPRIS MGX/2

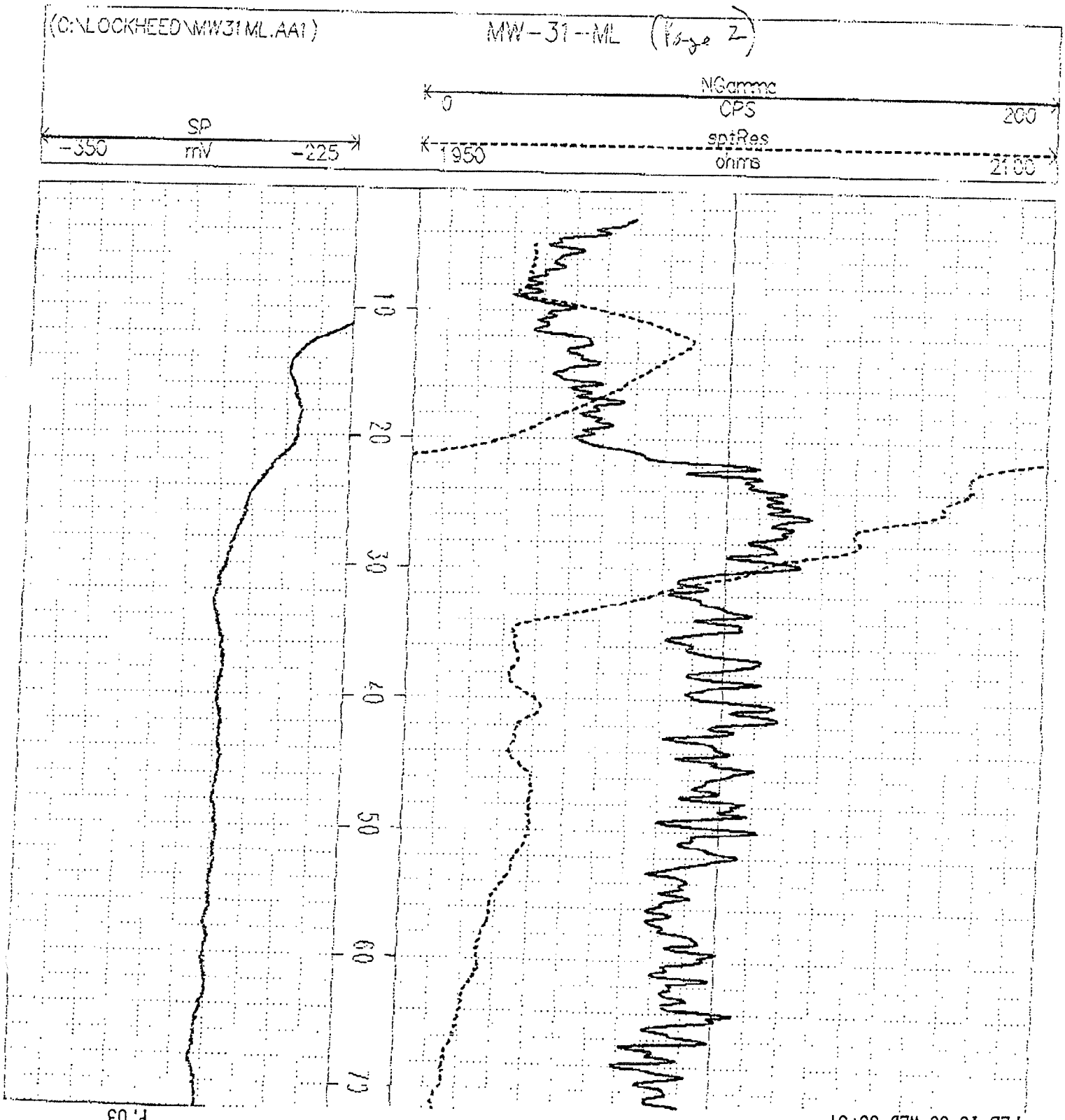
LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT MODEL	PROBE S.N.	CONSOLE S.N.	LOGGING DIG INT FEET	LOGGING SPEED FT/MIN	DETECTOR TYPE	SOURCE TYPE	SOURCE SIZE GBq	LOGGED INTERVAL FROM	TO	INT. FEET	COMMENTS
N. GAMMA	1	305	2201	0200		20	SCINT.			2	384	382	W.A. = 2
SP–spRES	2	305	2201	0200		20				10	384	374	

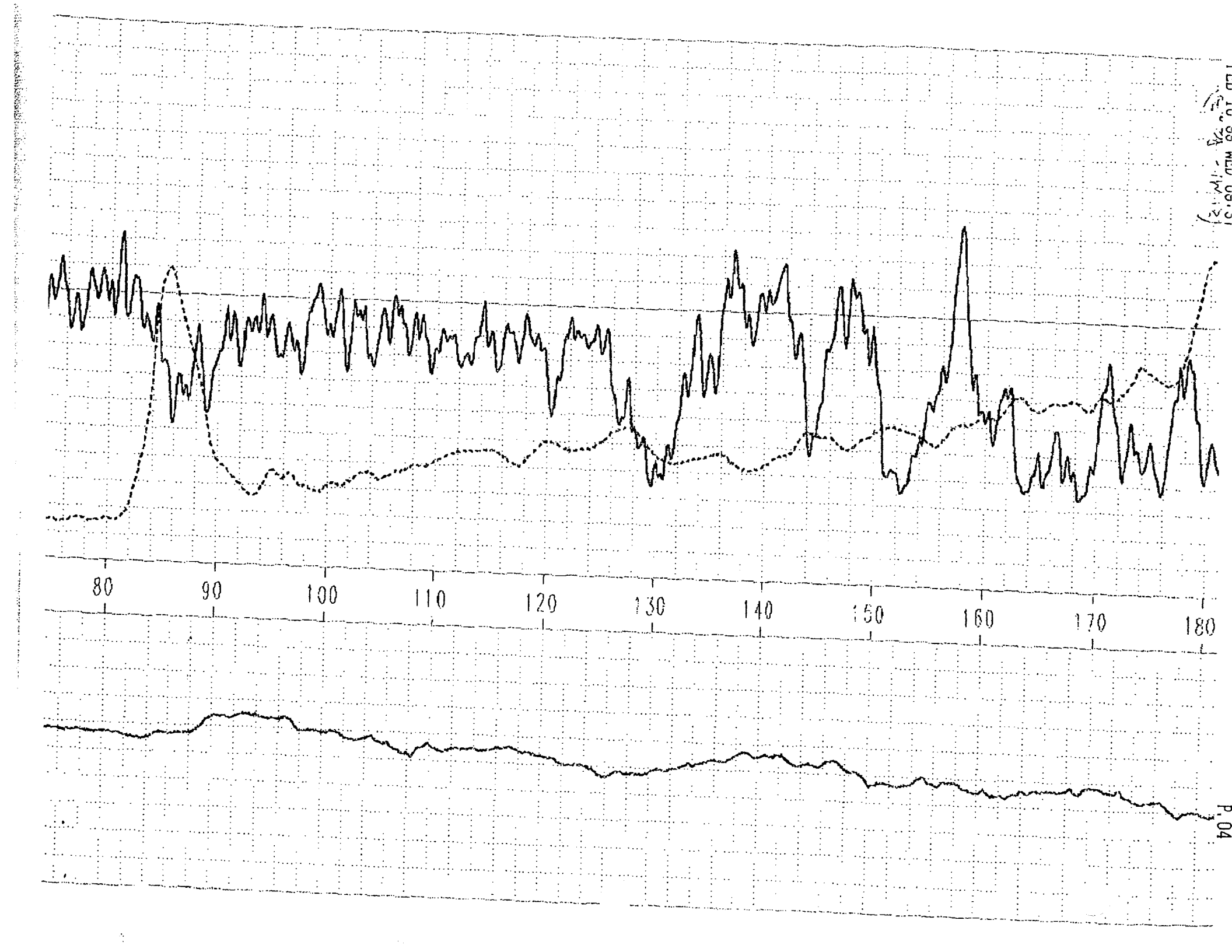
P.02
FEB-10-99 WED 09:30

DIGITAL FILE NAME(S):
REMARKS:

(C:\LOCKHEED\MW31ML.AA1) MW-31-ML (Page 2)

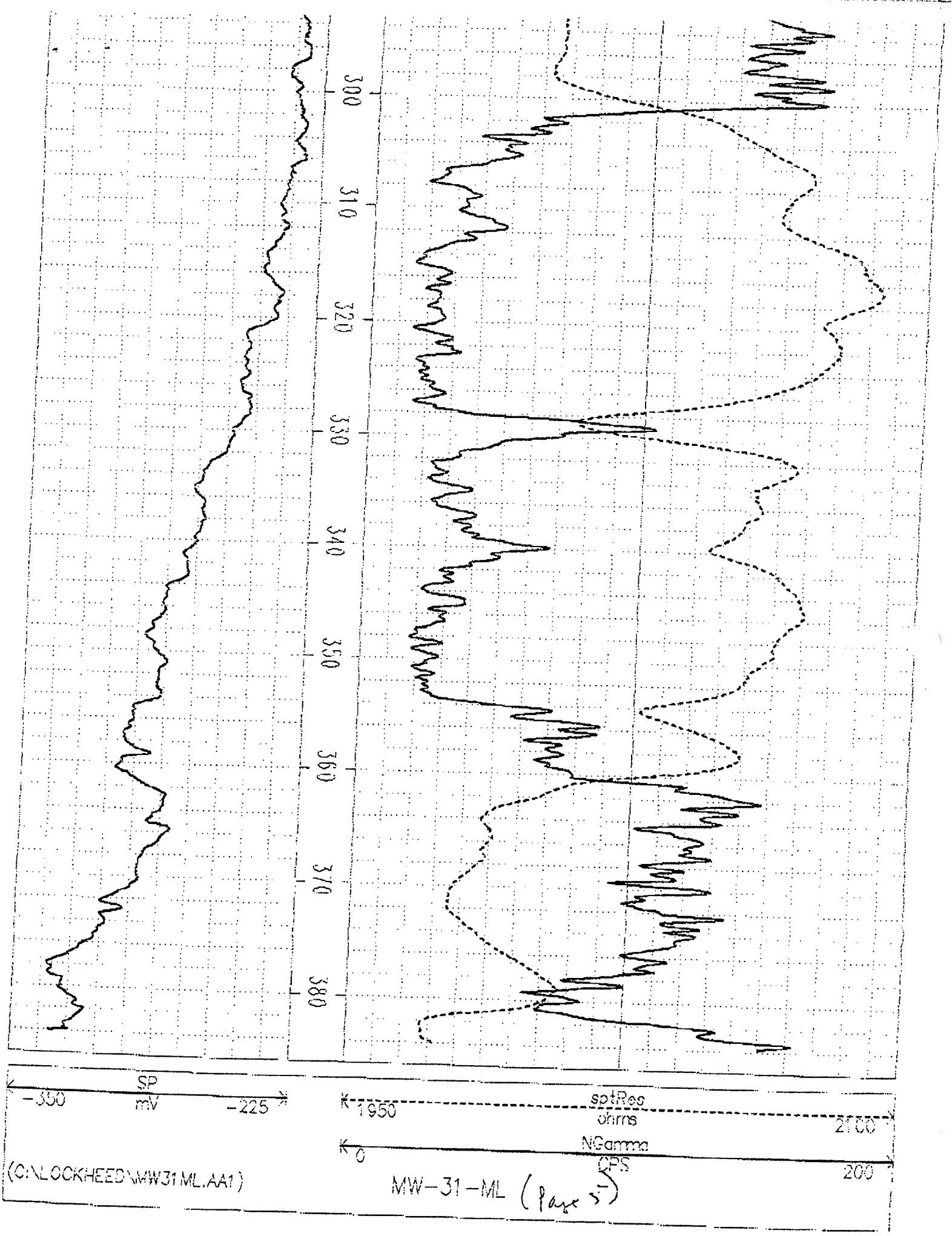


P.03


80
90
100
110
120
130
140
150
160
170
180

(3 mL · kg⁻¹)

190
200
210
220
230
240
250
260
270
280
290


300
310
320
330
340
350
360
370
380
SP
-350
mV
-225
sptRes
1950
ohms
2100
NGamma
0
CPS
200
(C:\LOCKHEED\MW31ML.AA1)
MW-31-ML (Page 5)

(Page 1)

AQUA TERRA GEOPHYSICS INC.	BOREHOLE: MW-32-ML LOGS: NATURAL GAMMA
16 STATION ROAD # 8 BELLPORT, NY 11713	

FEB-25-99 THU 14:34
P.02

(516) 286 - 7699

PROJECT: LOCKHEED MARTIN OU-2
CLIENT: H2M
LOCATION: S. SIDE OF LIE AT EXIT 32

DATE: SEPTEMBER 16, 1998
COUNTY: NASSAU
STATE: NEW YORK

BOREHOLE DATA

DRILLING CONTRACTOR: B&B DRILLING, LANDING NJ
ELEV: DEPTH REF: GRADE

CUSTOMER TD: 450 FT.
LOGGER TD: 444 FT.

RUN NO.	BIT RECORD			CASING RECORD		
	Bit Size	From	To	Size/Wgt/Thk.	From	To
1	8 IN.	GRADE	T. DEPTH	8" STEEL	GRADE	9 FT.
2						
3						

DRILL METHOD: MUD ROTARY
HOLE MEDIUM: DRILLING FLUID
VISCOSITY:

DATE DRILLED: 9/98
FLUID LEVEL: 0 FT.
WEIGHT:

TIME SINCE CIRC: 1 HR.
MUD TYPE: BENTONITE
Rm at Deg

GENERAL DATA

LOGGED BY: BRET ZIELENSKI
WITNESS: RICHARD BALDWIN

OTHER SERVICES:
UNIT/TRUCK: MT. SOPRIS MCX/2

LOGGING DATA

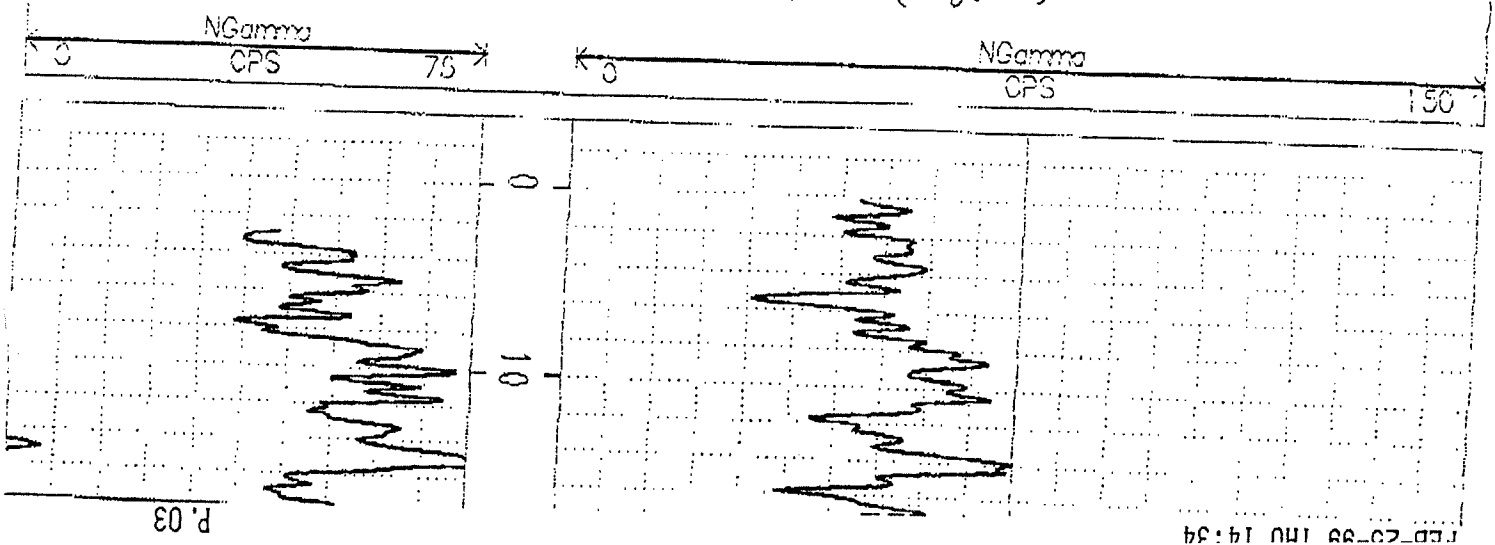
LOG FUNCTION	RUN NO.	EQUIPMENT: MODEL	PROBE S.N.	UPHOLE S.N.	LOGGING: DIG INT FEET	SPEED FT/MIN	DETECTOR: TYPE	SOURCE: TYPE	SIZE GBq	LOGGED INTERVAL: FROM	TO	INT. FEET	COMMENTS
N. GAMMA	1&2	305	2201	0200		20	SCINT.			0	444	444	W.A = 2

DIGITAL FILE NAME(S):
REMARKS:

LEFT TRACK - DOWN RUN

RIGHT TRACK - UP RUN

(C:\LOCKHEED\MW32ML.AA1) MW-32-ML (Page 2)



0
30
40
50
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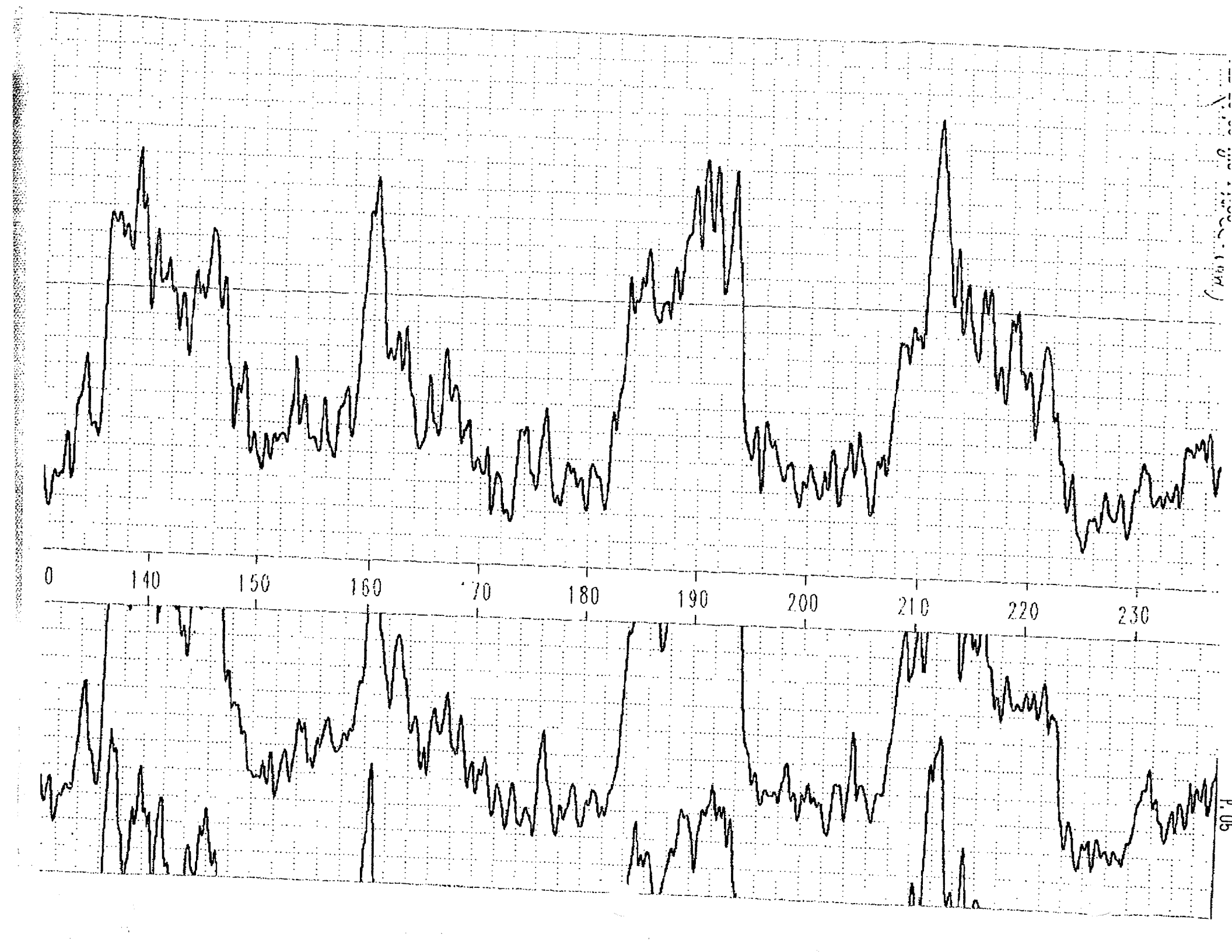
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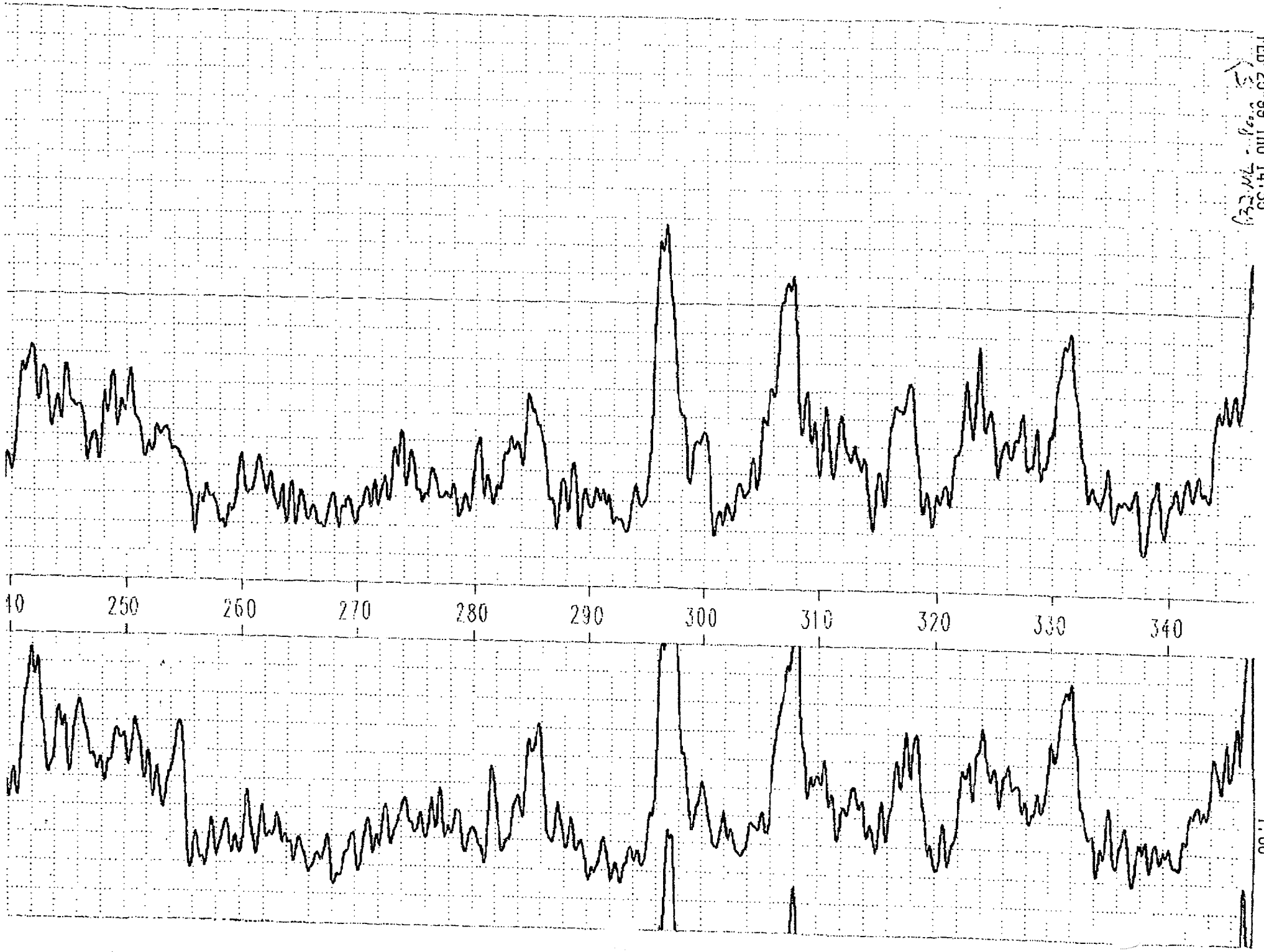
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430
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NGamma
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CPS
75
NGamma
0
CPS
150
(C:\LOCKHEED\MW32ML.AA1)
MW-32-ML (Page 6)

AQUA TERRA GEOPHYSICS INC. 16 STATION ROAD # 8 BELLPORT, NY 11713 (516) 286 – 7699	BOREHOLE: MW–33–ML LOGS: NATURAL GAMMA S. POINT RESISTANCE SPONT. POTENTIAL

PROJECT: **LOCKHEED MARTIN OU–2** DATE: **JULY 31, 1998**

CLIENT: **H2M** COUNTY: QUEENS

LOCATION: NORTH SHORE TOWERS STATE: NEW YORK

BOREHOLE DATA

DRILLING CONTRACTOR: B&B DRILLING, LANDING NJ CUSTOMER TD: 450 FT.

ELEV: DEPTH REF: GRADE LOGGER TD449 FT.

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk	From	To

2						
3						

DRILL METHOD: MUD ROTARY | DATE DRILLED: 7/98 | TIME SINCE CIRC: 1 HR.

HOLE MEDIUM: DRILLING FLUID | FLUID LEVEL: 0 FT. | MUD TYPE: BENTONITE

VISCOSITY: | WEIGHT: | Rm: at Deg

GENERAL DATA

LOGGED BY:. BENJAMIN RICE | OTHER SERVICES:

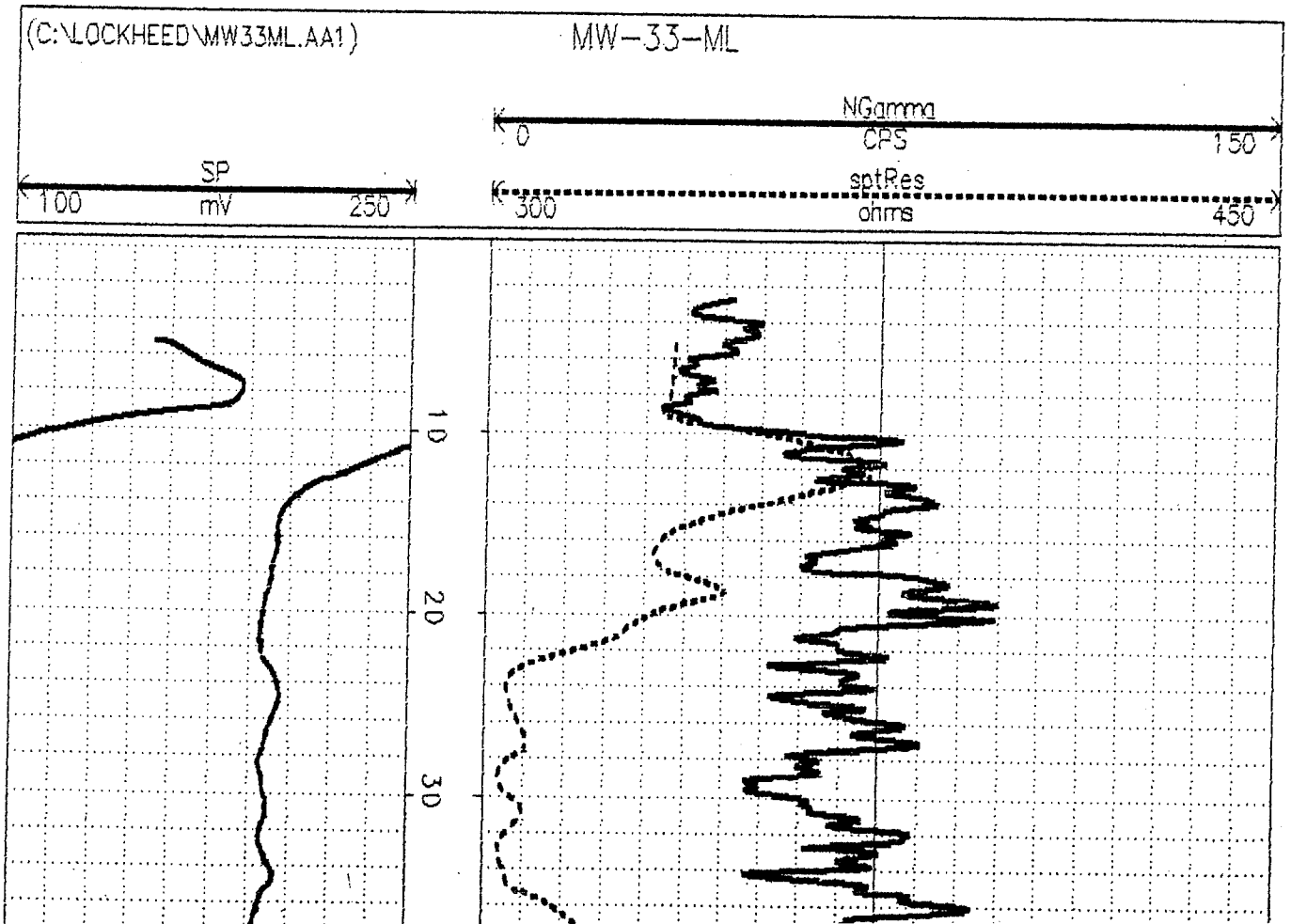
WITNESS: RICHARD BALDWIN | UNIT/TRUCK: MT. SOPRIS MGX/1

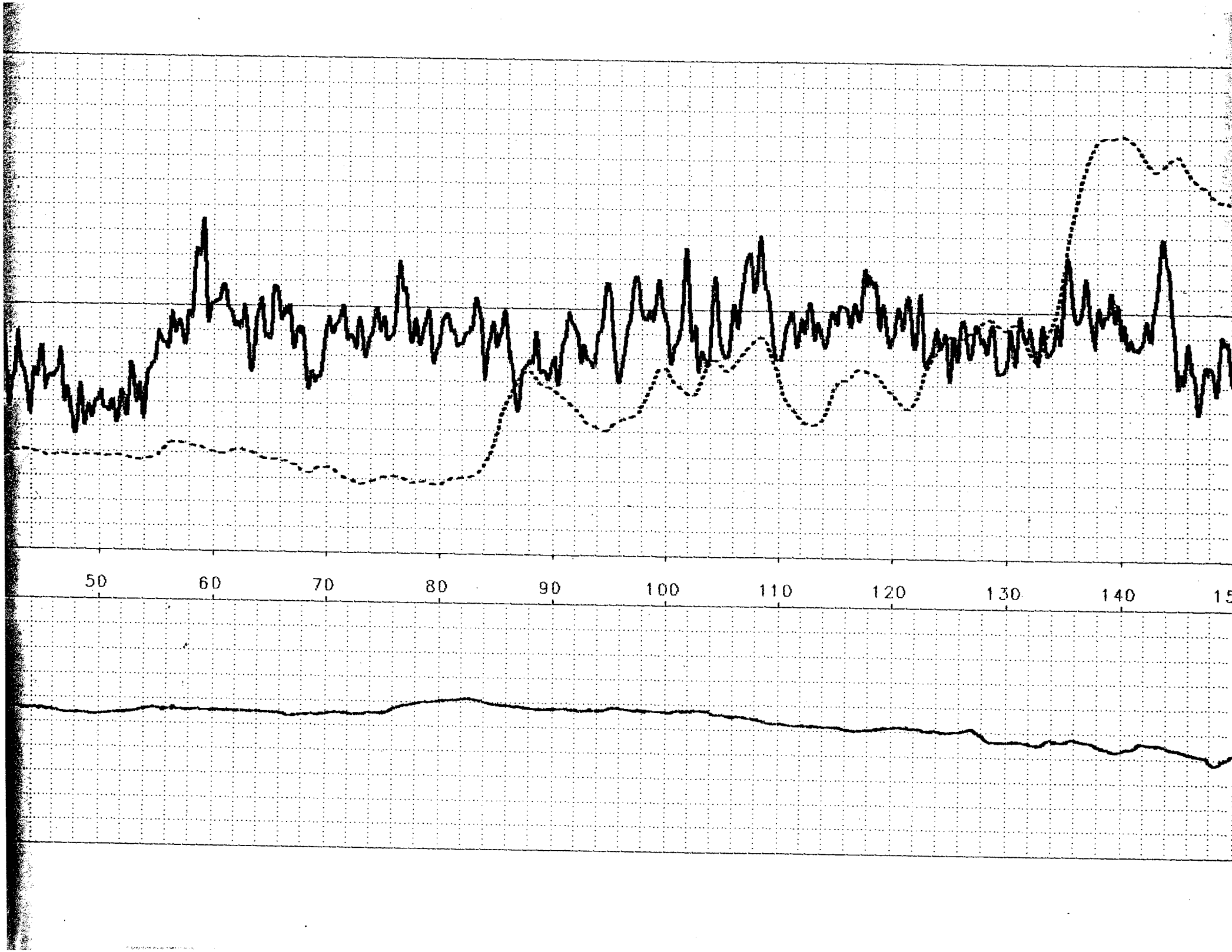
LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT MODEL	PROBE S.N.	UPHOLE S.N.	LOGGING DIG INT FEET	SPEED FT/MIN	DETECTOR TYPE	SOURCE TYPE	SIZE GBq	LOGGED INTERVAL FROM	TO	INT. FEET	COMMENTS
N. GAMMA	1	305	2201	0200		20	SCINT.			2	449	447	W.A. = 2
SP–sptRES	2	305	2201	0200		25				10	449	439	

DIGITAL FILE NAME(S):

REMARKS:

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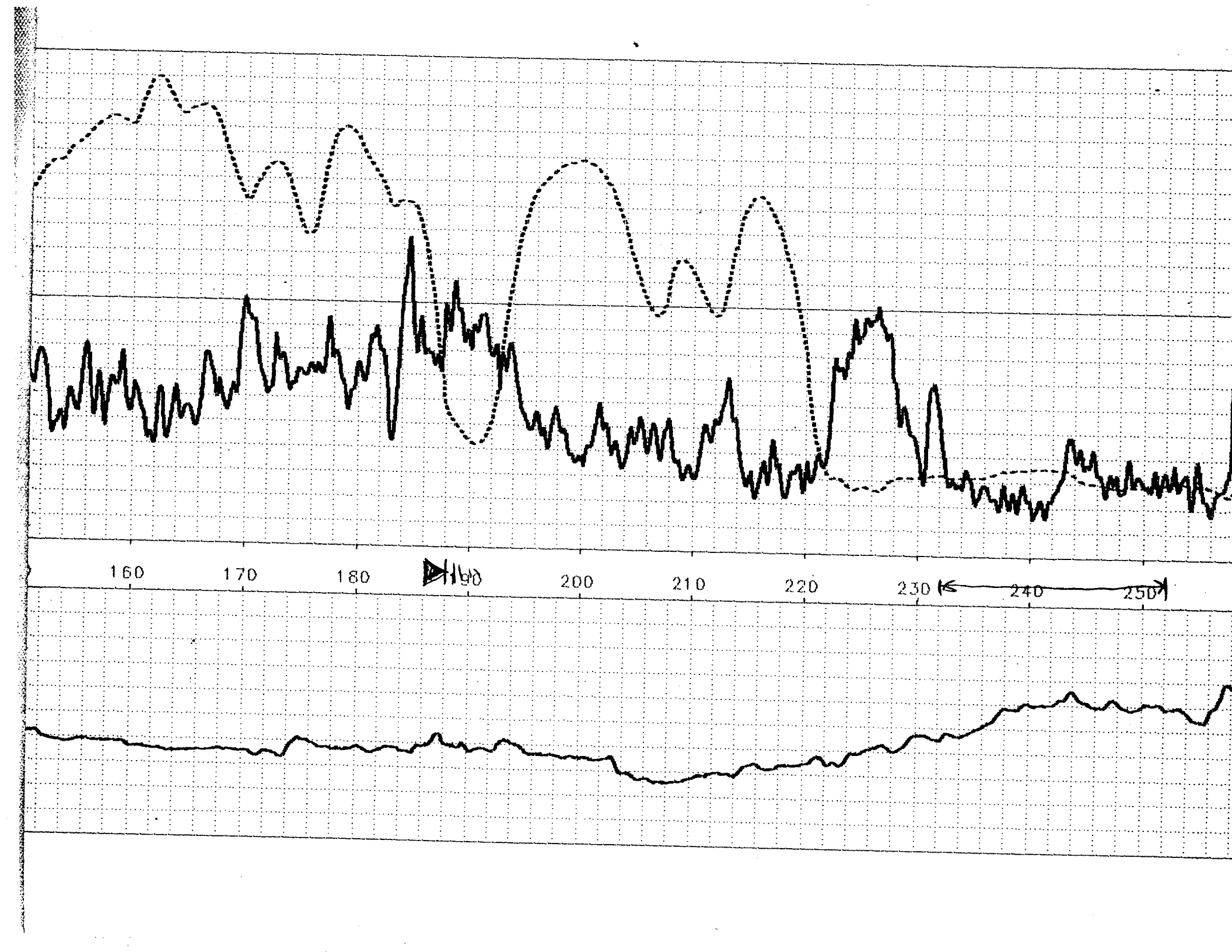
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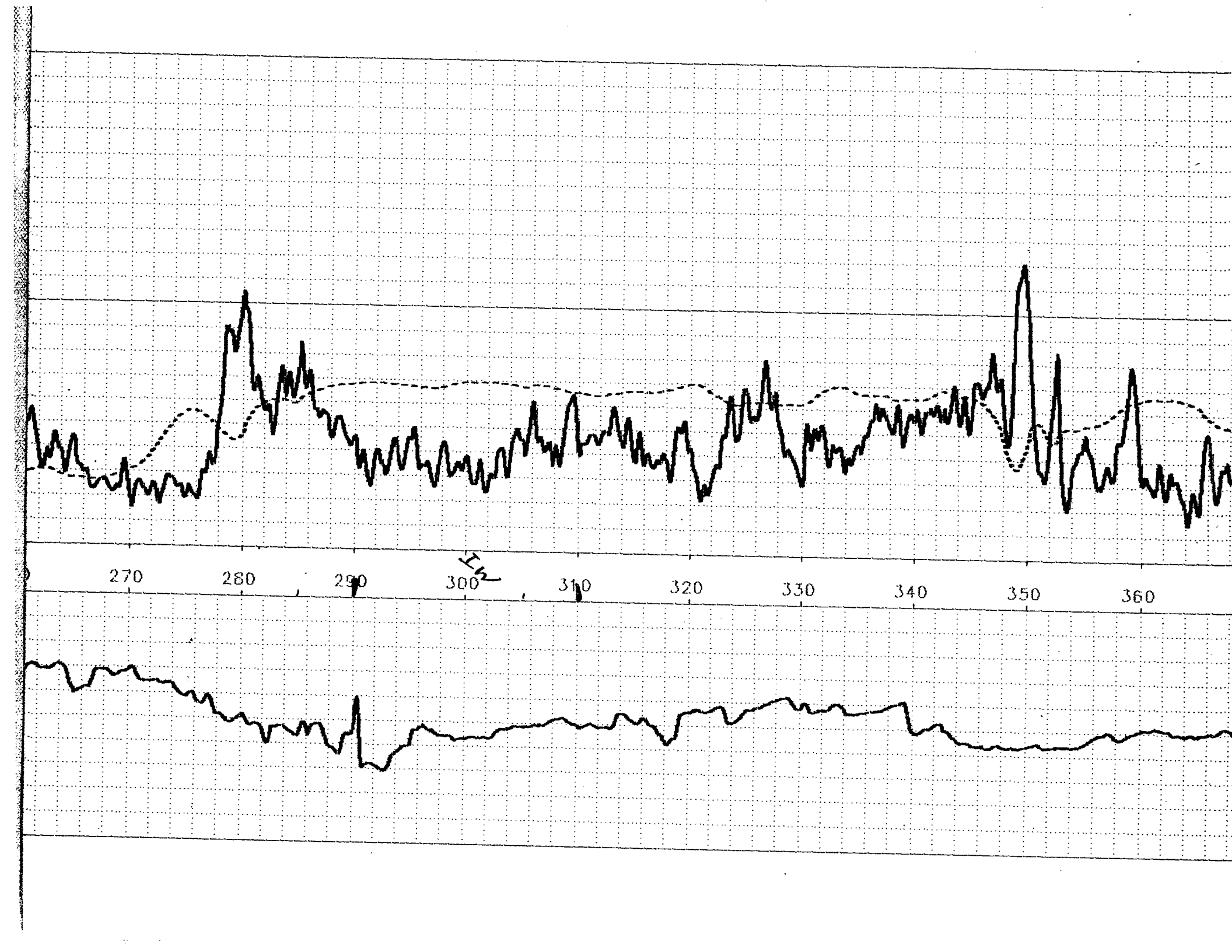
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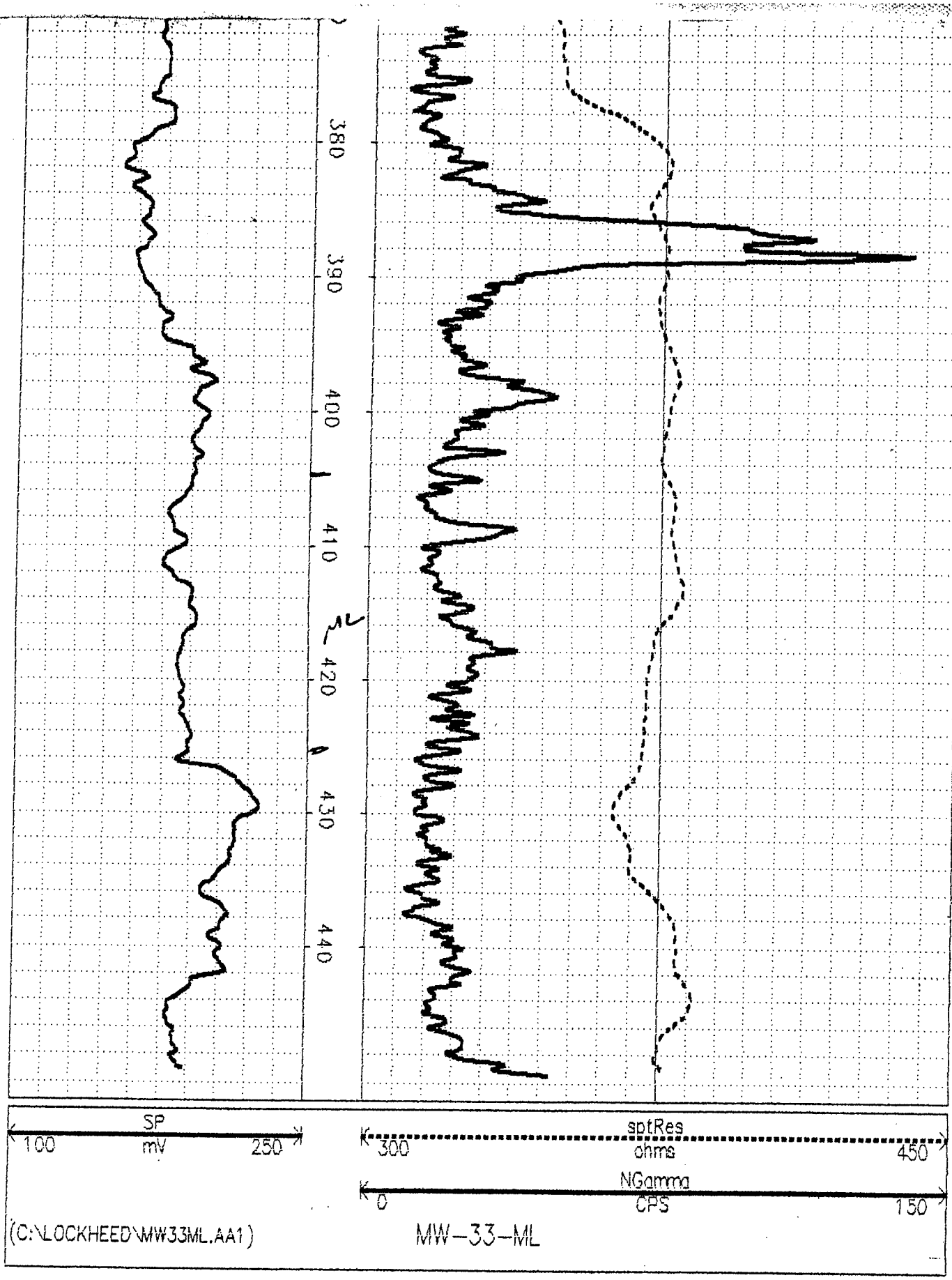
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mV
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CPS
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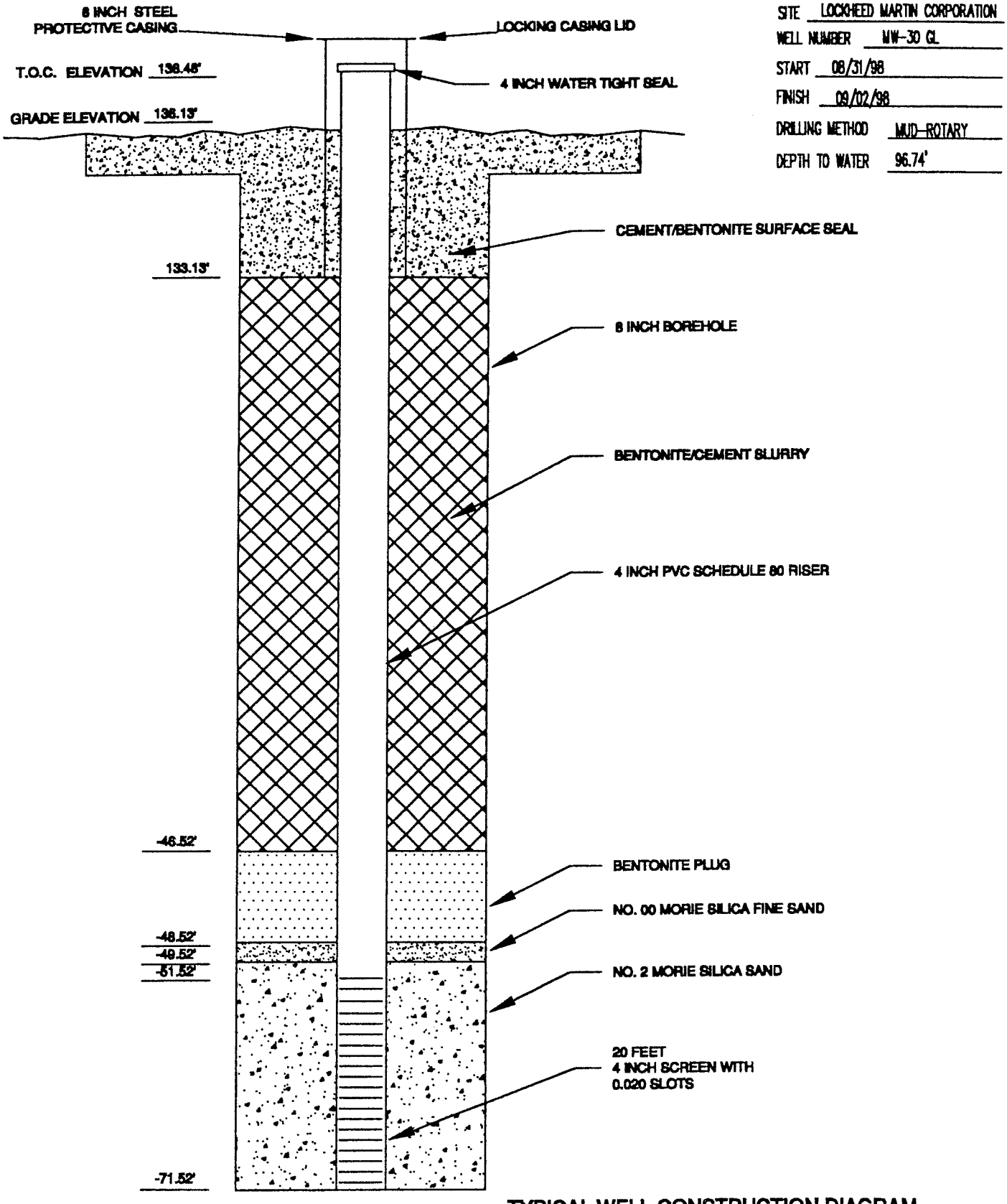
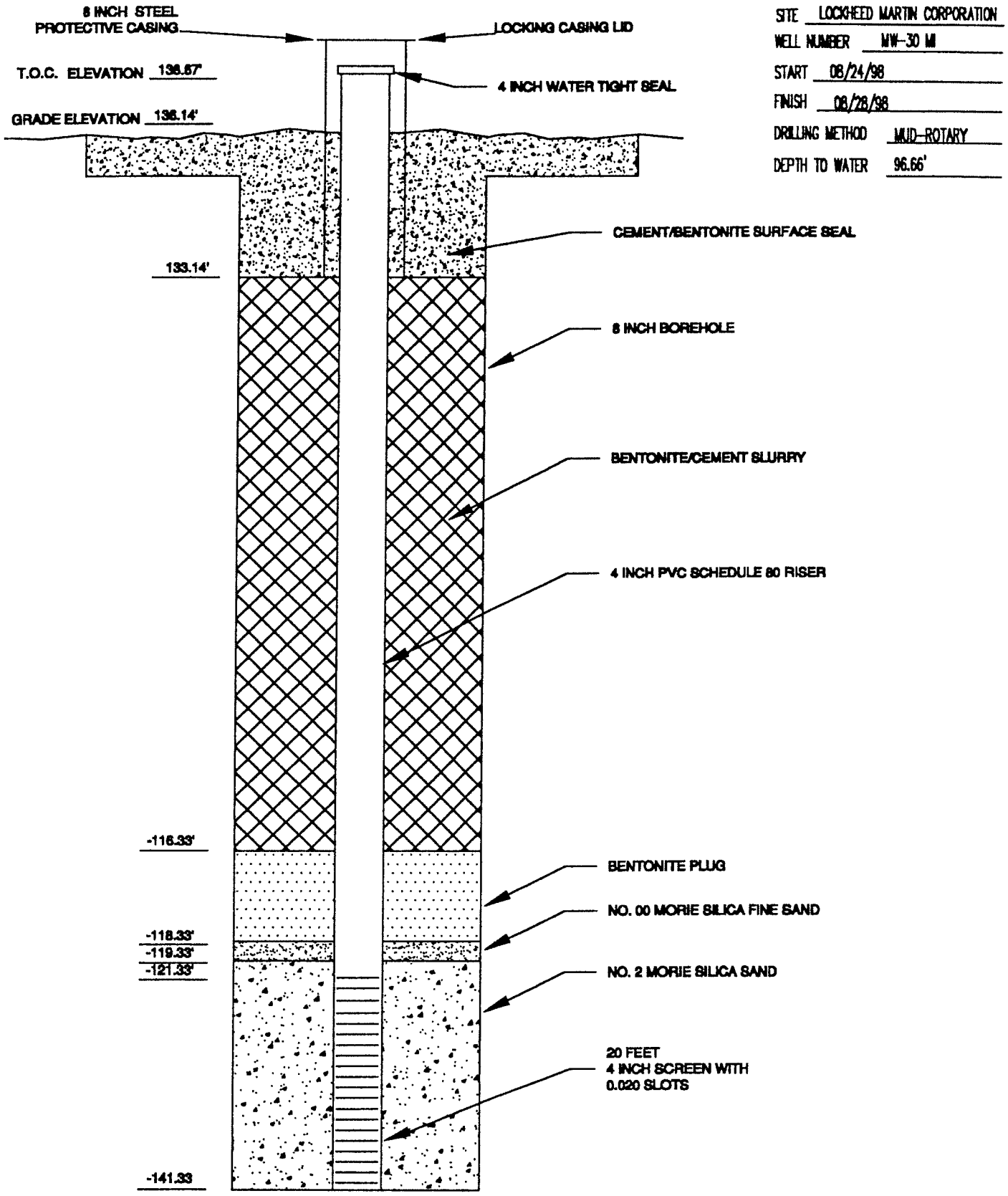
MW-33-ML

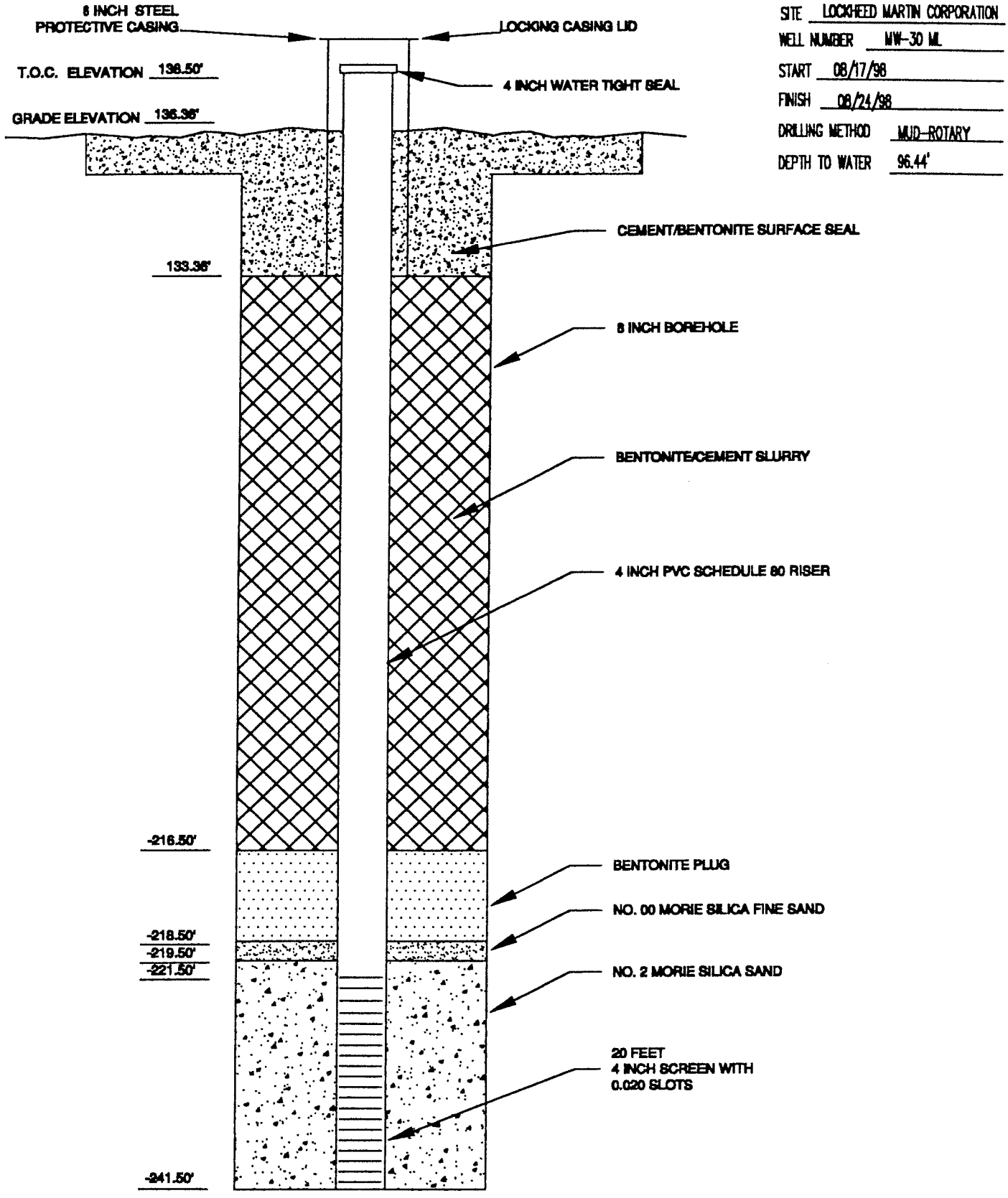
Appendix C
Well Completion Diagrams



TYPICAL WELL CONSTRUCTION DIAGRAM
STICK-UP WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK

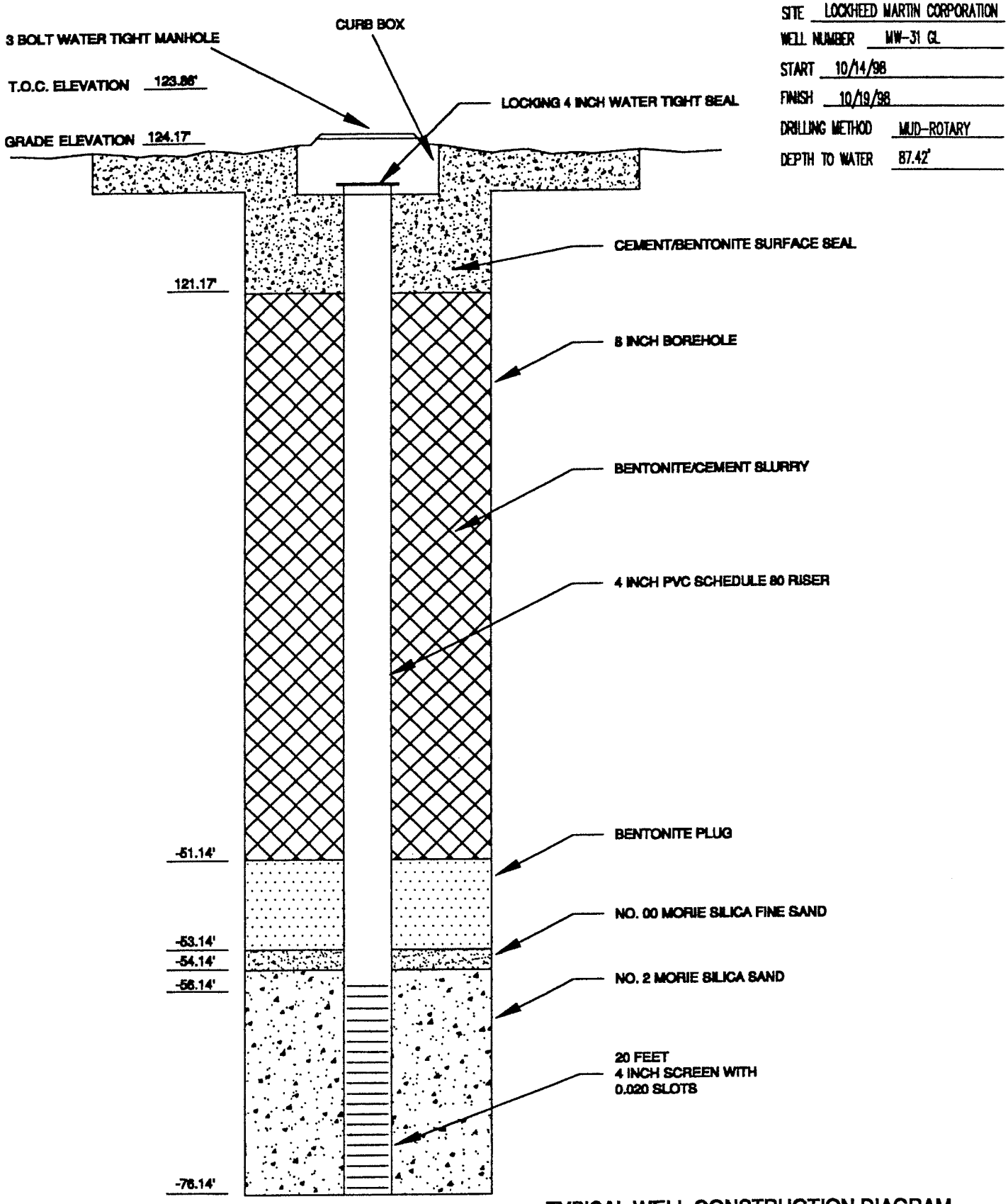


TYPICAL WELL CONSTRUCTION DIAGRAM
STICK-UP WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK

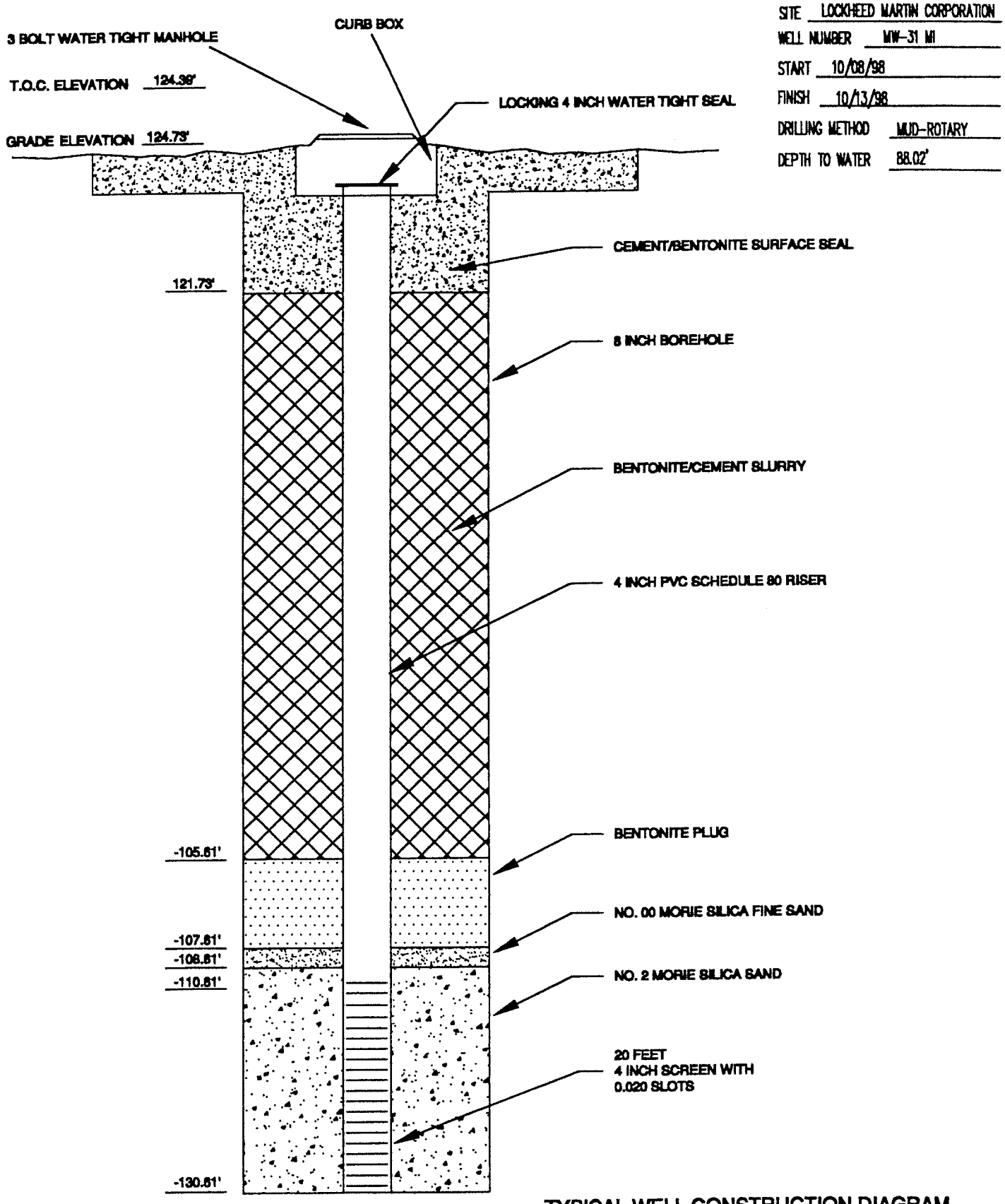


SITE LOCKHEED MARTIN CORPORATION
WELL NUMBER MW-30 ML
START 08/17/98
FINISH 08/24/98
DRILLING METHOD MUD-ROTARY
DEPTH TO WATER 96.44'

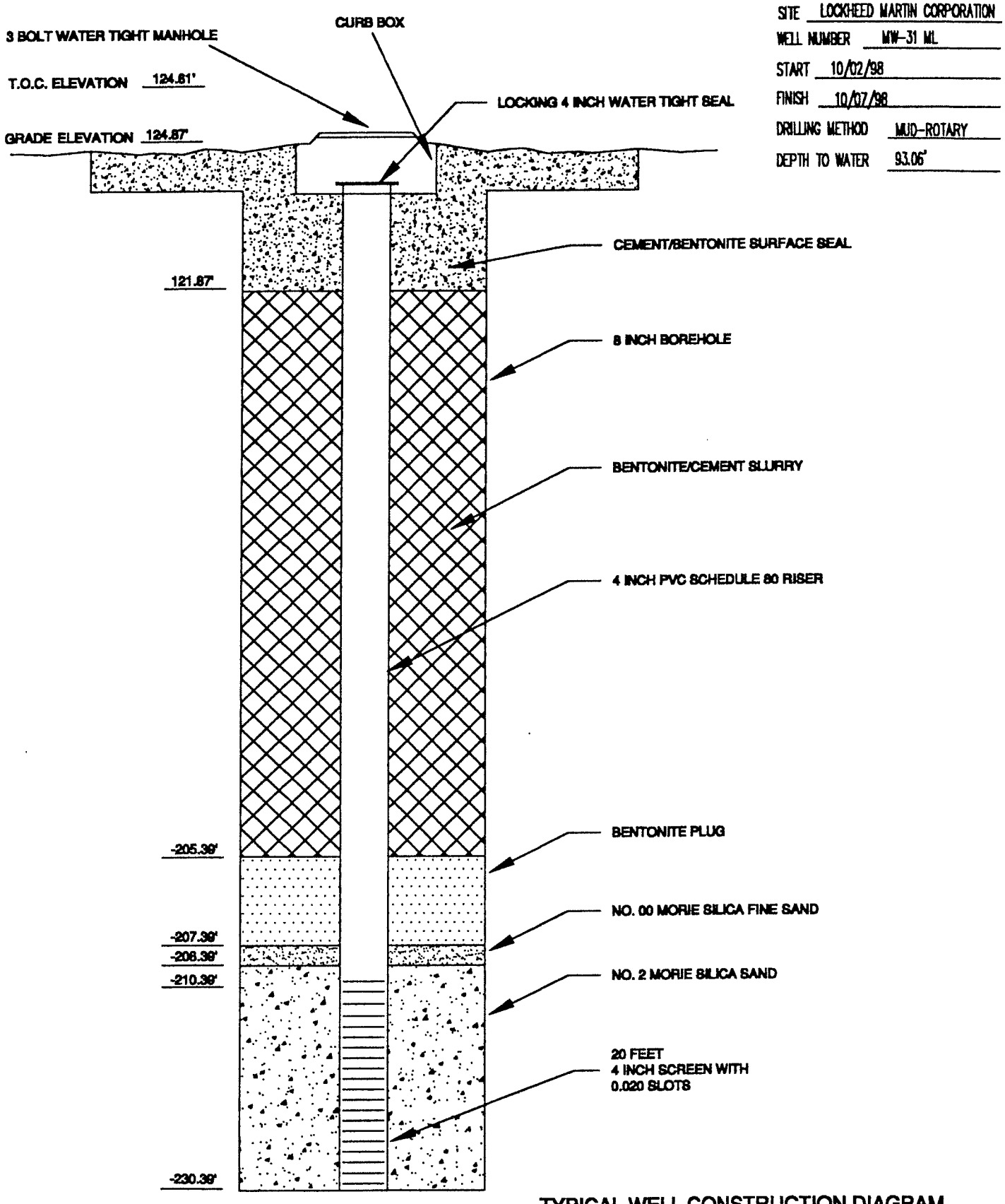
TYPICAL WELL CONSTRUCTION DIAGRAM
STICK-UP WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK



TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK



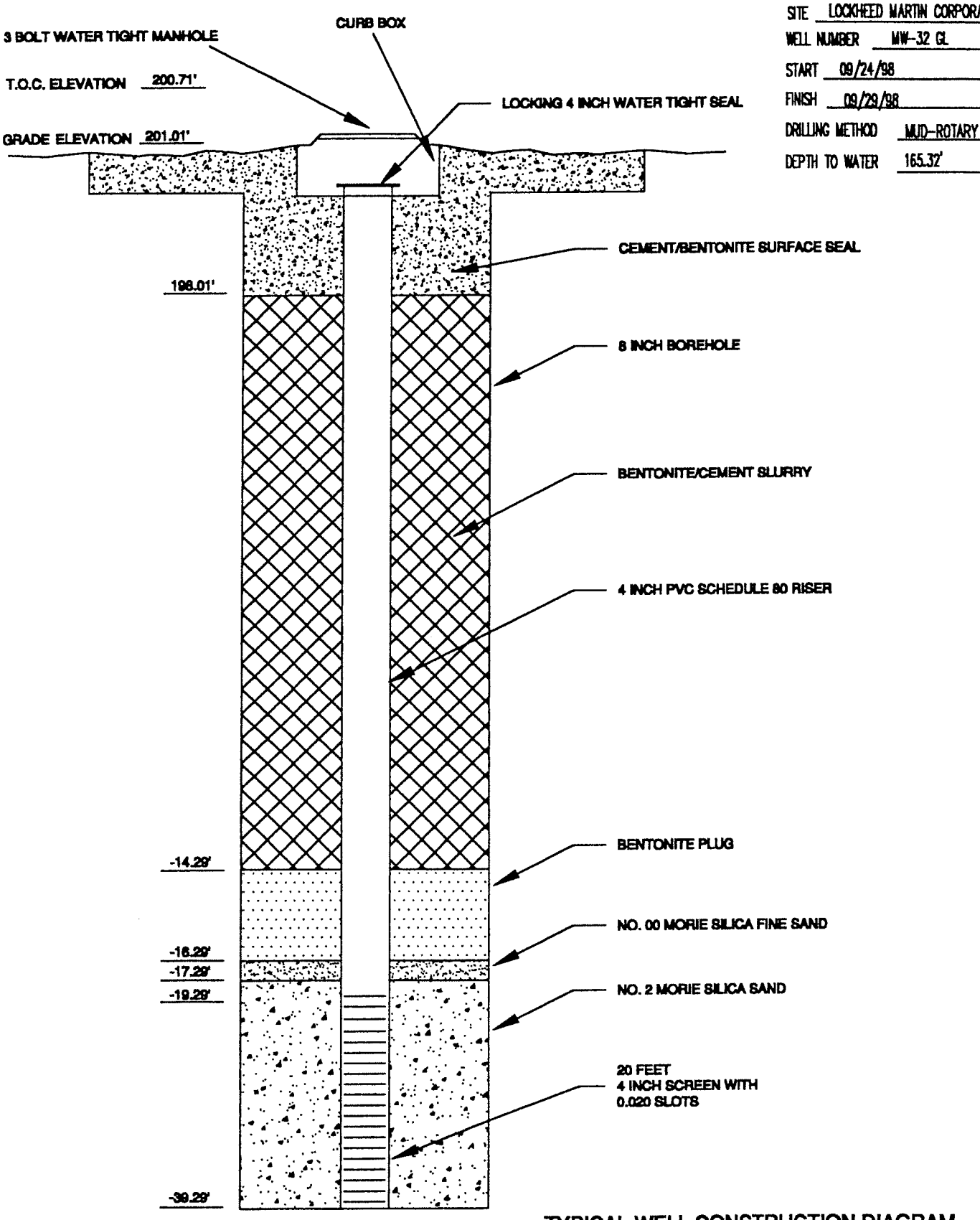
TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK



SITE LOCKHEED MARTIN CORPORATION
WELL NUMBER MW-31 ML
START 10/02/98
FINISH 10/07/98
DRILLING METHOD MUD-ROTARY
DEPTH TO WATER 93.06'

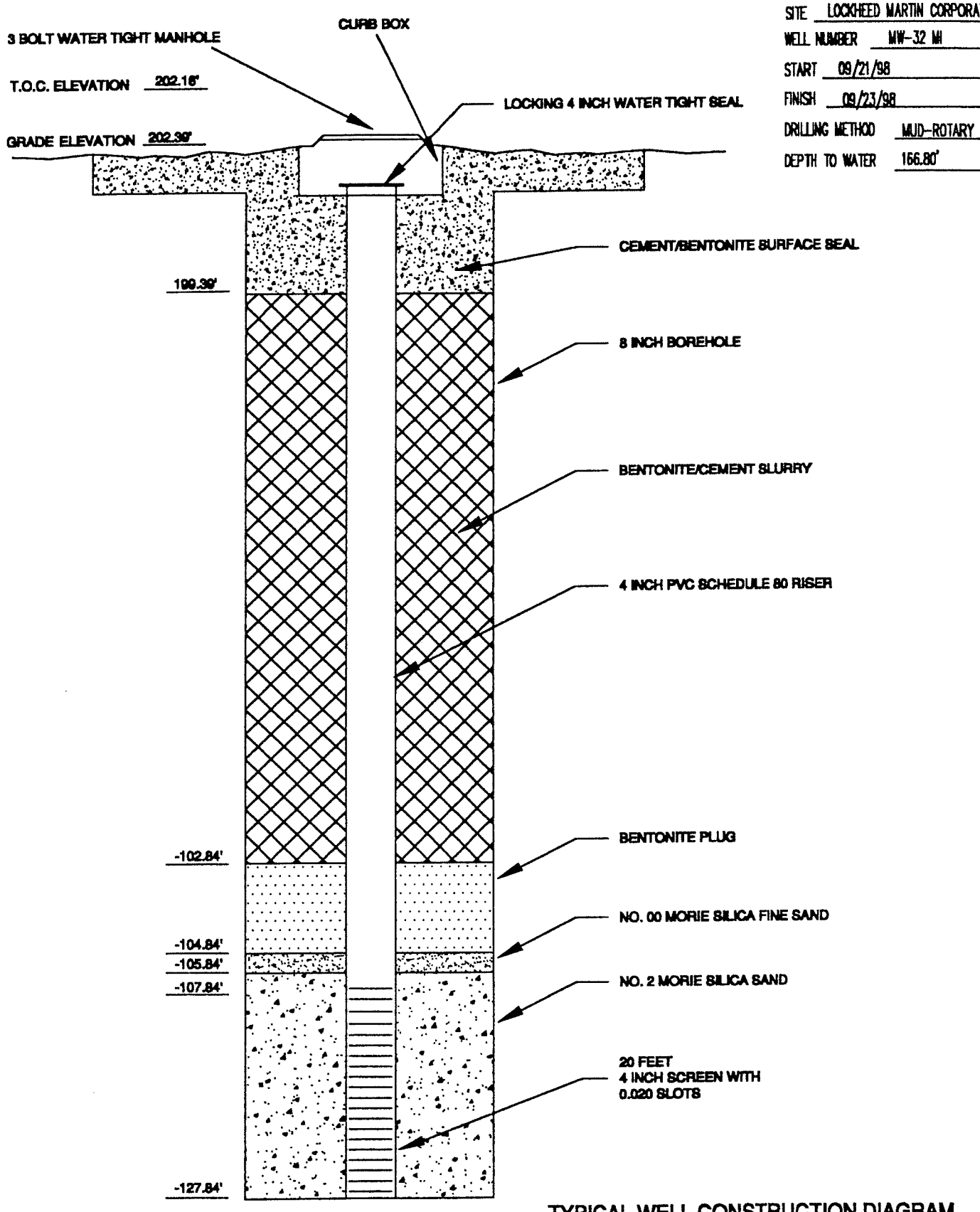
TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK

SITE LOCKHEED MARTIN CORPORATION
WELL NUMBER MW-32 GL
START 09/24/98
FINISH 09/29/98
DRILLING METHOD MUD-ROTARY
DEPTH TO WATER 165.32'

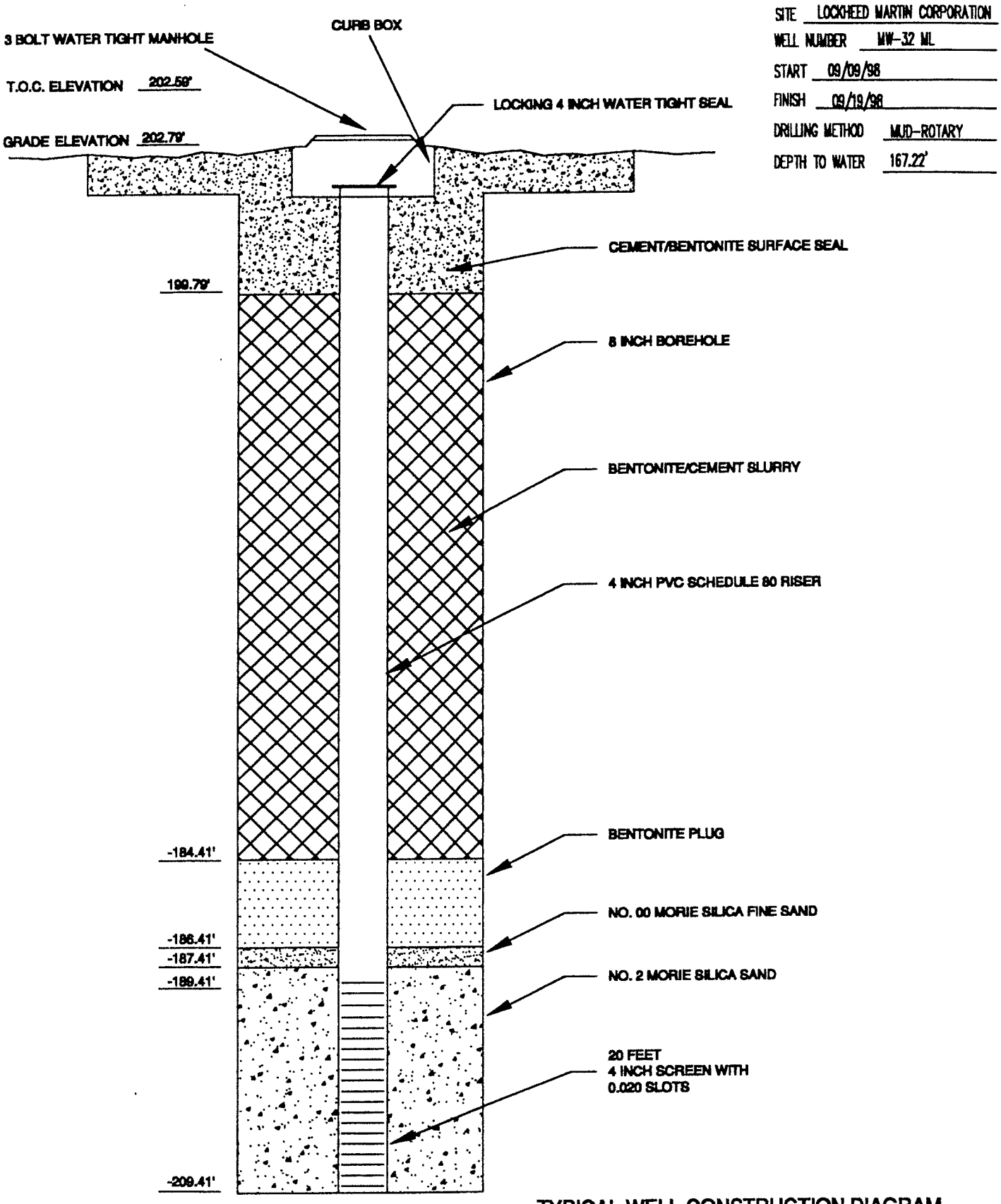


TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK

SITE LOCKHEED MARTIN CORPORATION
WELL NUMBER MW-32 MI
START 09/21/98
FINISH 09/23/98
DRILLING METHOD MUD-ROTARY
DEPTH TO WATER 166.80'

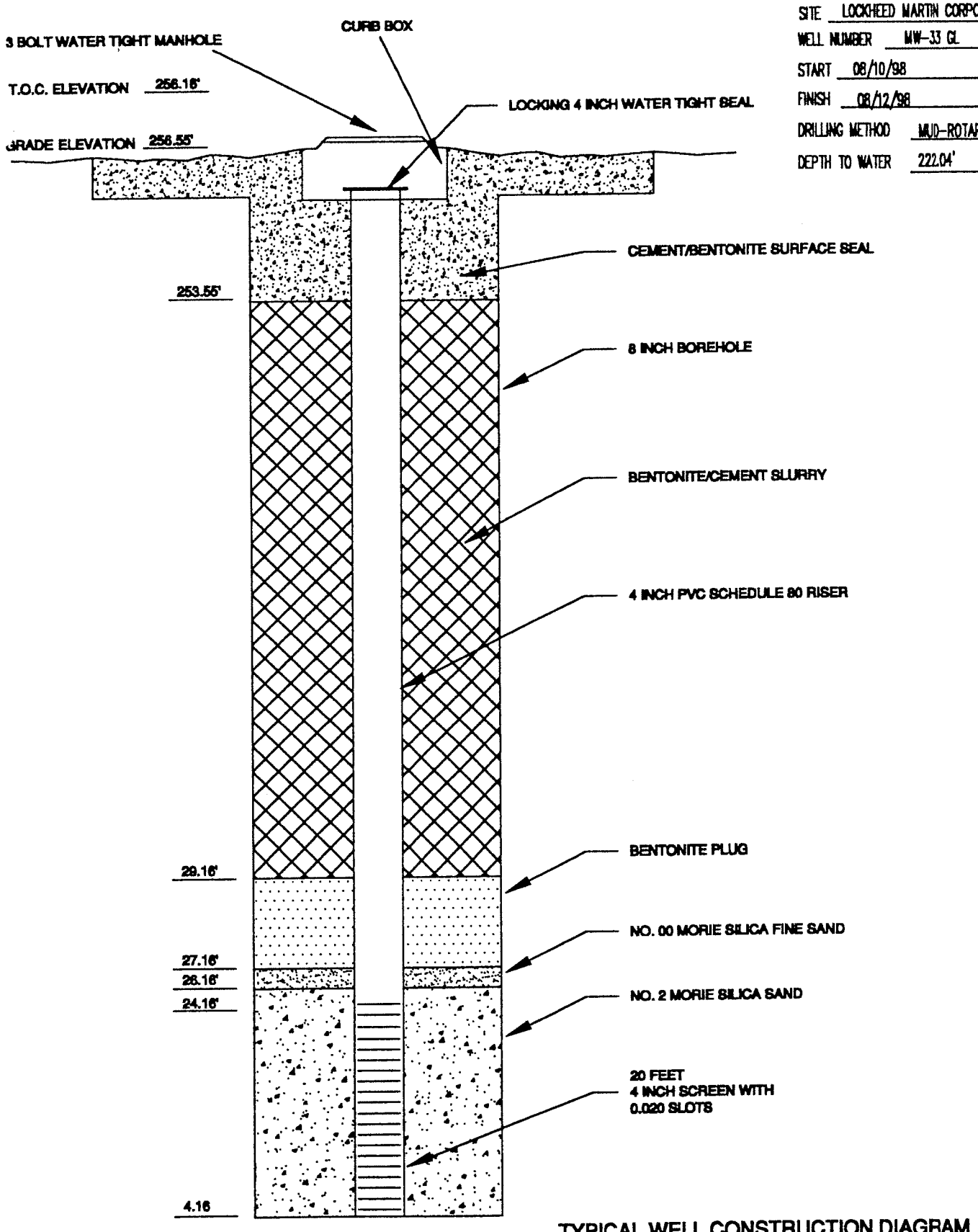


TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK



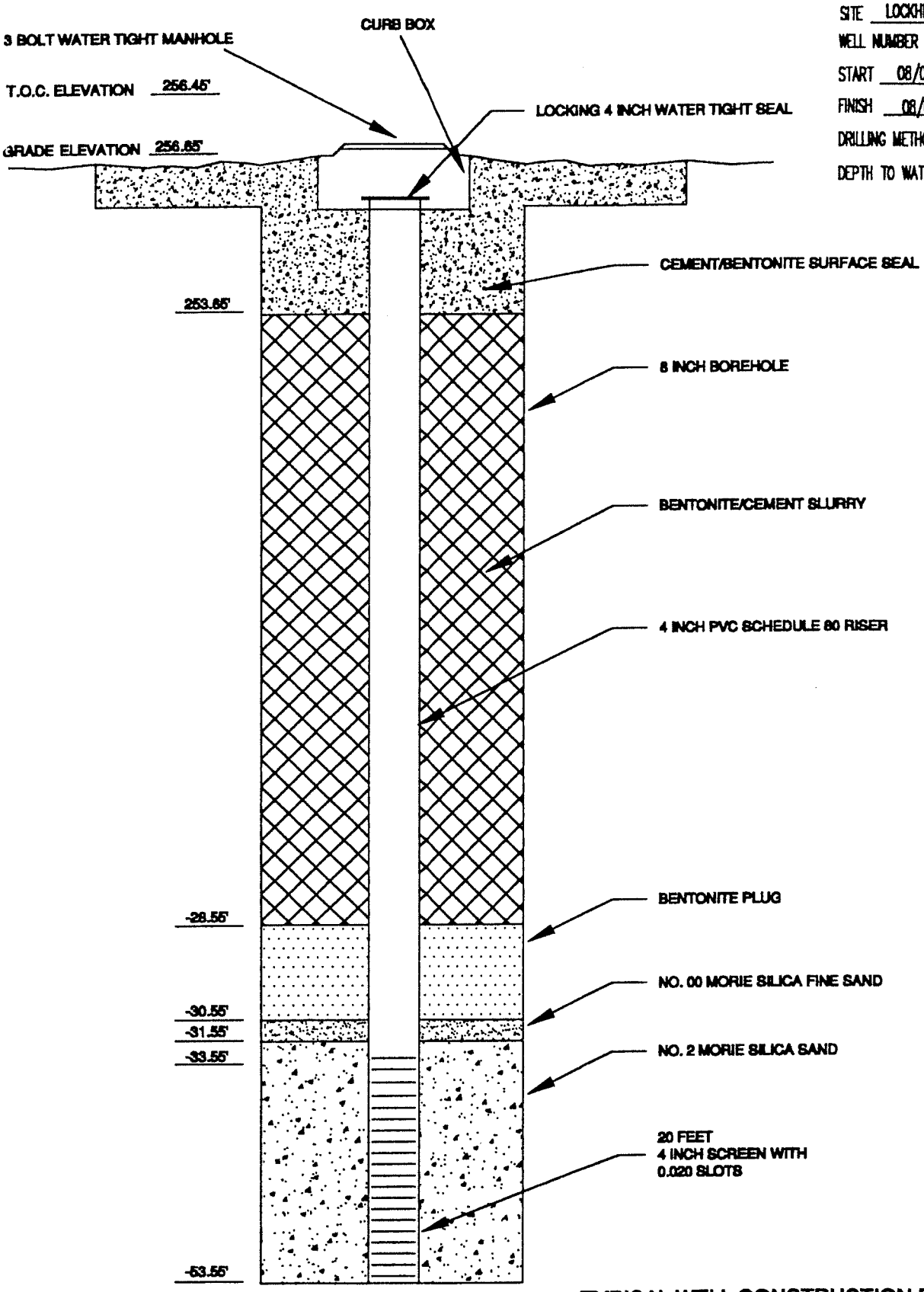
TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK

SITE LOCKHEED MARTIN CORPORATION
WELL NUMBER MW-33 GL
START 08/10/98
FINISH 08/12/98
DRILLING METHOD MUD-ROTARY
DEPTH TO WATER 222.04'

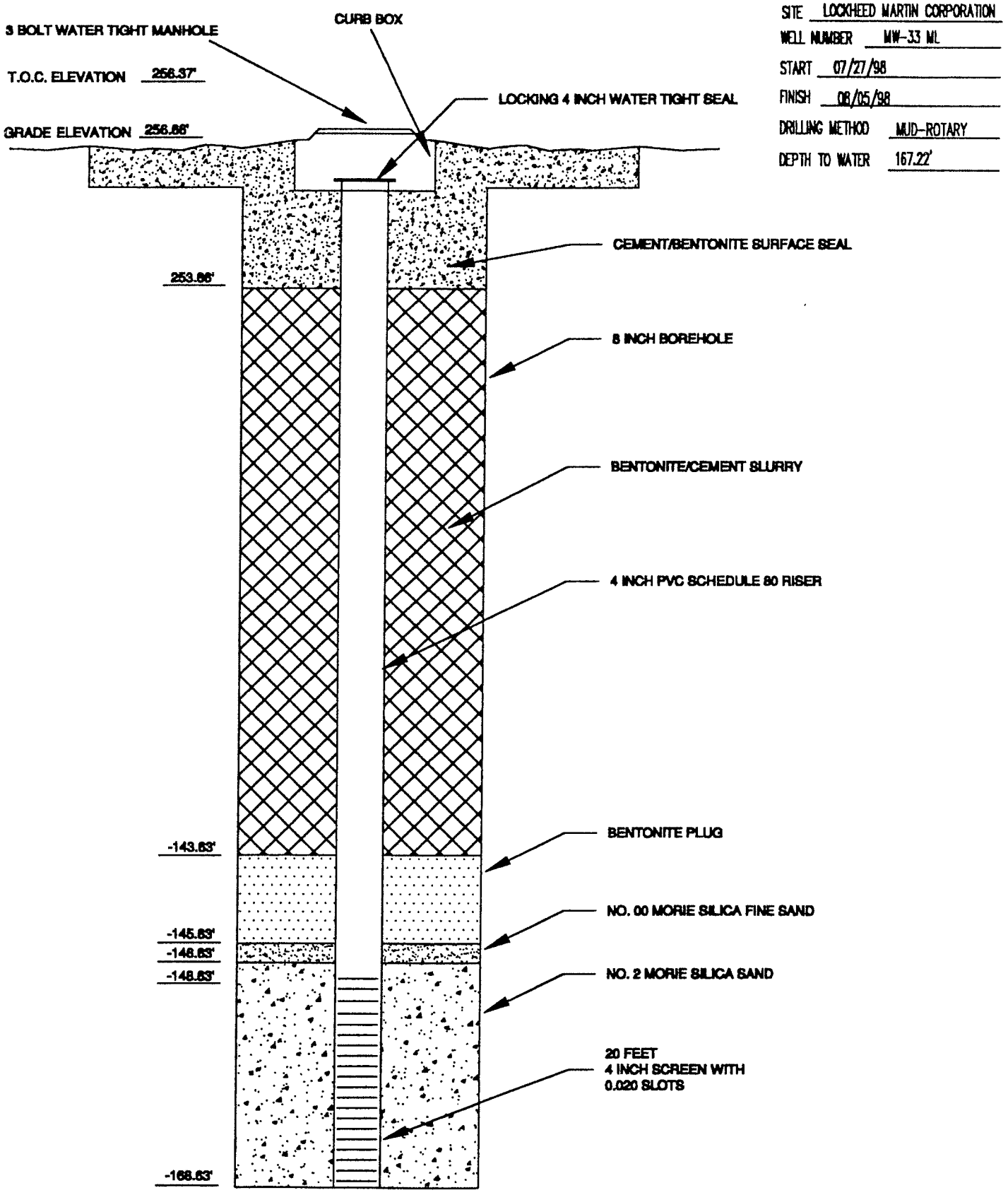


TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK

SITE LOCKHEED MARTIN CORPORATION
WELL NUMBER MW-33 MI
START 08/05/98
FINISH 08/07/98
DRILLING METHOD MUD-ROTARY
DEPTH TO WATER 221.82'



TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK



SITE LOCKHEED MARTIN CORPORATION
WELL NUMBER MW-33 ML
START 07/27/98
FINISH 08/05/98
DRILLING METHOD MUD-ROTARY
DEPTH TO WATER 167.22'

TYPICAL WELL CONSTRUCTION DIAGRAM
FLUSH MOUNT WELL
LOCKHEED MARTIN
GREAT NECK, NEW YORK

H2MGROUP
ENGINEERS · ARCHITECTS · PLANNERS · SCIENTISTS · SURVEYORS
MELVILLE, N.Y.
TOTOWA, N.J.

Appendix D
Development/Groundwater Sampling Logs

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LMC
Site: NORTHERN STATE PKWY
Job#: ___
Well ID: MW-30 GL

Total Well Depth*: ~~330'~~ (USW) 210'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 510.36

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste:
DISCHARGE TO HOLDING TANK

Date: 9-4-98

Static Water Level*: 53.64'
Standing Water Column: 156.36
Amnt of One Well Vol: 102.07
Total Water to be Pumped: 510.36

Develop Method: ~~PUMP~~ (SS) AIR LIFT
Presamp Purge Method: —
Sampling Method: —
Field Tech: WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC uS	pH	TEMP	TURB	~~PID~~ ORP	
1100	INITIAL	~~1682~~	7.14	~~13.4~~	~~>~~<200	116	VERY TURBID
1400	200	~~1529~~	6.86	20.6	<200	105	
9/13 1415-1440	300	140.9	5.93	23.7	~~1538~~	34	WATER GETTING CLEARER
1215	350	153.5	6.47	22.7	17.43	18	CLOUDY
1300	450	153.6	6.43	21.7	19.30	24	STILL CLOUDY
9/16 ~~730~~ 0930-0935	550	152.4	6.04	20.7	14.76		CLOUDY ≈ 4 GPM
	650	150.8	5.85	20.0	15.73		CLEARER (END DEVELOPMENT HERE)

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: __
Site: NORTHERN STATE PKWY
Job#: LOCK 9801 T26
Well ID: MW-30 MI

Total Well Depth*: 280'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: ____

Vol./ft of casing: ____
Vol./ft of borehole: ____

Waste: DISCHARGE TO HOLDING TANK

Date: 9/16/98

Static Water Level*: 38.74
Standing Water Column: 241.26
Amnt of One Well Vol: 157.50
Total Water to be Pumped: 787.50 (5 well vol.)

Develop Method: AIR LIFT
Presamp Purge Method: —
Sampling Method: —
Field Tech: WSW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP	TURB	PID	
INTIAL	0930	136.2	5.48	20.7	15.00		
1015	160	345	5.88	19.2	14.62		
1100	320	333	6.57	22.3	<200		
1145	480	327	6.50	20.8	<200		VERY CLOUDY
1230	640	304	6.09	24.6	102.6		BECOMING CLEARER
115	800	331	6.27	21.6	[illegible]46		EVEN CLEARER
200	960	329	6.21	20.9	49.4		END DEVELOPMENT HERE

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: ___
Site: NORTHERN STATE PKWY
Job#: 1006980.126
Well ID: MW-30 ML

Total Well Depth*: 380'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 950 gal

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: DISCHARGE TO HOLDING TANK

Date: 9/21/98

Static Water Level*: 96.04
Standing Water Column: 283.96
Amnt of One Well Vol: 185.37
Total Water to be Pumped: 926.85

Develop Method: AIR LIFT THEN 3" SUBMERSIBLE
Presamp Purge Method: -
Sampling Method: -
Field Tech: WSW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC uS	pH units	TEMP °C	TURB NTU	~~PH~~	
AIR LIFT — INITIAL	10:30	280	6.51	22.1	<200		VERY TURBID - BROWN CHUNKS OF SILT.
OUT OF GAS → 12:45	200	148.6	6.49	22.9	<200		STILL VERY TURBID - BROWN - SOME SILT
13:45	400	126.8	5.84	20.8	<200		SAME
1415	600	100.2	5.50	20.0	<200		STILL TURBID BUT IMPROVING
1445	800	97.6	5.34	19.7	<200		SAME
1515	1000	95.3	5.41	20.0	<200		SAME
1530	1100	94.9	5.41	19.6	<200		END DEVELOPMENT FOR TODAY → NEED TO CONTINUE
10/2/98 — 12 32	1300	103	6.57	15.7	908	—	
1 02	1400	106	6.81	15.6	459	—	
2 00	1600	101	6.91	15.3	270	—	GPM ≈ 6.5
2 32	1700	98	6.90	15.3	170	—	
3 05	1900	99	6.97	15.1	150	—	
3 30	2100	101	6.96	15.2	99	—	

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LOCKHEED MARTIN
Site: 600 COMMUNITY DRIVE
Job#: LOCK9801
Well ID: 31 - GL

Total Well Depth*: 200'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 220

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: Discharge to holding tank

Date: 10/21/98

Static Water Level*: 89.62 ?
Standing Water Column: 110.38
Amnt of One Well Vol: 72.07
Total Water to be Pumped: 216.21(3)

Develop Method: Air-lift
Presamp Purge Method: N/A
Sampling Method: N/A
Field Tech: MDC

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP °C	TURB	PID	
Airlift 10/27/98							
9:30	80	262	7.75	13.4	999	✓	via airlift reverse
11:30	160	218	7.01	14.1	999	✓	submersible 3" pump
12:30	300	250	6.50	13.4	374	✓	
1:15	450	243	6.61	13.3	181	✓	
2:00	650	244	6.52	13.3	40	✓	→ end pumping

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LOCKHEED MARTIN
Site: 600 COMMUNITY DRIVE
Job#: LOCK9801
Well ID: 31 - MW

Total Well Depth*: 255'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 330

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: Discharge to holding tank

Date: 10/22/98

Static Water Level*: 88.65'
Standing Water Column: 166.35'
Amnt of One Well Vol: 108.62
Total Water to be Pumped: 325.87 (3)

Develop Method: submersible 3" pump
Presamp Purge Method: N/A
Sampling Method: N/A
Field Tech: MPE

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP	TURB	PID	
1 30	initial	103	7.55	14.0	1100	✓	
2 00	200	102	7.58	13.9	334	✓	
2 30	400	101	7.60	14.2	259	✓	
3 00	600	104	7.58	14.1	170	✓	
3 30	800	99	7.41	14.7	159	✓	
4 00	1000	98	7.18	14.6	135	✓	- end for 10/22/98
10/27/98 10 30	1200	117	6.16	13.5	53	-	
10 45	1300	125	6.44	12.9	39	—	end purging

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LOCKHEED MARTIN
Site: 600 COMMUNITY DRIVE
Job#: LOCKGROL
Well ID: 31 - ML

Total Well Depth*: 355'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: ___

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: Discharge to holding tank

Date: 10/11/98
Static Water Level*: 93.94
Standing Water Column: 261.06
Amnt of One Well Vol: 170.47
Total Water to be Pumped: 511.41 (3)

Develop Method: submersible pump 3"
Presamp Purge Method: N/A
Sampling Method: N/A
Field Tech: MPG

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP °C	TURB	PID	
10:00	initial	111	8.06	13.2	999	✓	submersible pump 3" initial ~~50~~ 30 in tank
10:15	100	80	7.63	12.9	999	✓	
10:50	270	84	7.54	14.1	787	✓	
11:30	470	69	7.49	14.6	600	✓	
12:15	600	61	7.39	14.9	650	✓	
1:00	850	61	7.60	14.5	820	✓	
2:00	1050	62	7.49	14.3	530	✓	
3:00	1300	70	7.61	13.6	297	✓	end for Wednesday 10/11/98
10/12/98 9:20	1500	66	7.49	13.5	219	✓	
10:45	1700	61	7.51	13.7	211	✓	
11:00	1800	73	7.58	13.9	196	✓	
11:55	1950	72	7.49	14.2	165	✓	
12:00	2150	72	7.74	17.6	118	✓	
12:20	2350	60	7.73	13.6	93	✓	
1:00	2450	61	7.68	13.5	119	✓	End Development

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Client: Lock 9801
Site: LLE
Job#: _____
Well ID: MW-32GL

Total Well Depth*: 240'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 170.

Vol./ft of casing: _____
Vol./ft of borehole: _____

Waste: Discharge to holding tank

Date: 10/9/13

Static Water Level*: 165.78'
Standing Water Column: 74.22
Amnt of One Well Vol: 48.46
Total Water to be Pumped: 145.35 (3)

Develop Method: submersible pump
Presamp Purge Method: N/A
Sampling Method: N/A
Field Tech: MPE

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP	TURB	PID	
9:22	initial	347	—	16.1	800	—	Water is very silty
9:32	100	380	—	15.8	207	—	water appears cloudy
10:00	200	406	6.08	16.5	67	—	clearing up, slightly cloudy
10:32	300	372	6.61	16.3	48	—	clear
							* End purging

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LMC
Site: LF
Job#: LOCK 924.7.26
Well ID: MW-32mI

Total Well Depth*: _____
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: _____

Vol./ft of casing: _____
Vol./ft of borehole: _____

Waste: Discharge to holding tank

Date: 9/29/92

Static Water Level*: _____
Standing Water Column: _____
Amnt of One Well Vol: _____
Total Water to be Pumped: _____

Develop Method: Air Lift reverse
Presamp Purge Method: -
Sampling Method: -
Field Tech: MPG

* All measurements taken from: __ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP	TURB	PID	
09[00] 9/29	initial	1830	6.71	17.7	>200	-	Very turbid / muddy
10[00] 9/30	200	186.4	6.61	17.2	>200	-	silky water
1[00] 9/30	300	188	6.58	18.0	≈50.0	-	cloudy water

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LOCK 9801
Site: LLS
Job#: ___
Well ID: MW-32 MI

Total Well Depth*: 330'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 320

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: Discharge to holding tank

Date: 10/14/98

Static Water Level*: 167.10'
Standing Water Column: 162.9
Amnt of One Well Vol: 106.32
Total Water to be Pumped: 319.12(3)

Develop Method: submersible pump
Presamp Purge Method: N/A
Sampling Method: N/A
Field Tech: MPE

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH (pH-indicator Litmus Paper)	TEMP	TURB	PID	
10 45	initial	275	≈7.5	16.3	1100	—	water appears very silty
11 30	100	290	≈7.0	16.1	958	—	water appears silty & cloudy
12 15	200	218	≈7.0	17.2	570	—	less silty
1 05	300	192.2	≈6.5	18.1	321	—	" "
2 03	400	204	≈6.7	17.8	133	—	" "
3 15	500	180.6	≈6.7	17.6	48	—	clear
							# stop purging

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LMC
Site: LIE
Job#: LOCK9801T26
Well ID: MW-32 ML

Total Well Depth*: 412'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 1032

Vol./ft of casing: ____
Vol./ft of borehole: ____

Waste: DISCHARGE TO HOLDING TANK

Date: 9-23-98

Static Water Level*: 95.92' (171.39 AFTER 1000 gal PURGED)
Standing Water Column: 316.08'
Amnt of One Well Vol: 206.34 gal
Total Water to be Pumped: 1031.69 gal

Develop Method: AIR LIFT
Presamp Purge Method: -
Sampling Method: -
Field Tech: WJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC µS	pH UNITS	TEMP °C	TURB NTU	~~PID~~	TURBIDITY METER MALFUNCTION
1445	INITIAL	155.8	6.16	18.3	>200		VERY TURBID
9:30 START 100 gal 1200	~~200~~ 200	259	6.76	18.1	>200		VERY TURBID
1410	300	171	6.63	16.4	>200		TURBID BETTER THAN BEFORE
1530	400	154.6	6.37	16.4			"

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: Lockheed
Site: LIS
Job#: ___
Well ID: MW-32 ML

Total Well Depth*: 412'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 480 gallon

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: Discharge to holding tank → Baker Tank

Date: 10/15/98

Static Water Level*: 167.04'
Standing Water Column: 244.96
Amnt of One Well Vol: 154.90
Total Water to be Pumped: 479.73 (3)

Develop Method: submersible pump
Presamp Purge Method: N/A
Sampling Method: N/A
Field Tech: MPE

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC	pH	TEMP °C	TURB	PID	COMMENTS
9[12]	initial	100 01	8.1	13.8	883	/	silty / brown color ≈ 2 gpm
10[25]	100	100 02	8.0	14.1	1100	/	silty / brown very cloudy ≈ 1.5 gpm
11[25]	200	100 02	8.1	14.0	1100	/	silty / brown very cloudy
1[05]	300	237	5.41	16.3	244	/	less silty / cloudy
2[40]	400	958	6.18	16.2	1100	-	very silty, cloudy ≈ 8 gpm
3[00]	500	851	6.93	16.1	1100	-	very silty, cloudy
3[25]	600	1163	6.21	15.8	1100	-	very cloudy
9[??]	750	1633	6.04	15.7	956	-	less cloudy
11[00]	1000	1685	6.10	15.1	585	-	less cloudy
12[30]	1300	1420	6.47	15.7	463	-	less cloudy ≈ 4 gpm
1[50]	1500	147.5	6.54	17.2	385	/	less cloudy
7[30]	1650	146.1	6.50	17.3	350	-	less cloudy ≈ 3 gpm
9[30]	1800	160	7.01	15.8	302	-	1205 2250 = Turb. - 50.
11[00]	2000	158	7.21	17.1	120	-	
1200	2200	159	7.0[illegible]	17.[illegible]	[illegible]	-	

≈250 air lifted prior to submersible pump

1/16

10/23/98

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LMC
Site: Northshore Towers
Job#: ___
Well ID: MW-336L

Total Well Depth*: 252'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 650 (5 well vol.)

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: Discharge to Holding Tank.

Date: ___

Static Water Level*: 185.32
Standing Water Column: 66.68
Amnt of One Well Vol: 43.54
Total Water to be Pumped: 130.62

Develop Method: Air lift reverse
Presamp Purge Method: ___
Sampling Method: N/A
Field Tech: MPC

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP	TURB	~~PID~~ ORP (mV)	
1350	INITIAL	143.0	5.96	22.9	18.45	27	

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LMC
Site: Northshore Towers
Job#: ____
Well ID: MW-33 MI

Total Well Depth*: 310'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: ____

Vol./ft of casing: ____
Vol./ft of borehole: ____

Waste:
DISCHARGE TO HOLDING TANK.

Date: 8/24/18
Static Water Level*: Unknown *
Standing Water Column: ____
Amnt of One Well Vol: ____
Total Water to be Pumped: ____

Develop Method: Air Lift Reverse
Presamp Purge Method: ____
Sampling Method: N/A
Field Tech: MF

* All measurements taken from: __ Top of Casing; ___ Protective Casing; ___ Ground Level

	TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (µS)	pH	TEMP	TURB	PID	COMMENTS
8/25	11[00]	100	331	6.81	23.0	7000	—	* unable to obtain
	1[15]	150	335	6.78	21.8	60.1	—	water depth as
8/26	10[30]	250	339	6.64	17.8	47.8	—	it was > 200' bgs.
	12[00]	300	347	6.53	19.0	37.1	— →	water clearing up
	1[20]	350	317	7.01	18.0	7.8	—	
							→	end development [illegible]

H2M GROUP

GROUNDWATER DEVELOPMENT LOG

Page ___ of ___

Client: LMC
Site: NORTHSHORE TOWERS
Job#: ___
Well ID: MW-33 ML

Total Well Depth*: 425'
Well Dia: 4"
Borehole Dia: 8"
Min. Vol. to be Removed: 775

Vol./ft of casing: ___
Vol./ft of borehole: ___

Waste: DISCHARGE TO HOLDING TANK

Date: 8-6-98

Static Water Level*: 188.00
Standing Water Column: 237
Amnt of One Well Vol: 154.71
Total Water to be Pumped: 775

Develop Method: AIR LIFT (REVERSE)
Presamp Purge Method: ___
Sampling Method: N/A
Field Tech: [illegible] MKS 8/24/98

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC	pH	TEMP	TURB	PID	
		Ms					
	300	—	—		>200	—	VERY BROWN/TURBID
1080	400	.206 ms	6.75	14.9	>999	—	VERY BROWN/TURBID
1750	500	.118 ms	7.51	15.5	592	—	BECOMING CLEARER ≈ 1.5 GPM
3:20	700	0.138	7.17	15.4	679	—	CLOUDY - NOT AS TURBID ↓ SPURTS
	950 total						
8/24/98	250	149.3 us	6.41	17.2	69.3	—	cloudy - not as turbid → spurts ≈ 1.5 GPM
11=	350	123.3 us	6.62	16.9	38.3	—	less cloudy
12:00	450	121.7 us	6.73	16.7	77.3	—	water very cloudy again
1:45	550	117.8 us	6.97	17.0	21.0	—	water has cleared
2:40	650	118.9 us	7.13	17.1	20.8	—	water still clear
	1350 total						→ end development here

MPD

2.6112

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	207.5'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	8"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	LW-2	Volume Removed:			

Date: 10-21-98
Static Water Level*: 83.76
Standing Water Column: 123.74
Amnt of One Well Vol: 323.31
Total Water to be Pumped: 969.32

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: E.W.M.

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS) (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1307	INIT	.376	7.83	22.4	0	-114	
1440	325	.643	6.31	22.8	0	007	
1620	650	.679	6.15	22.8	0	017	
1656	975	.693	6.04	22.5	0	039	
							Sample Taken 1705
							BLIND DUP

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	170'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	17 GL	Volume Removed:	150 gal		

Date: 11/6/98
Static Water Level*: 91.90
Standing Water Column: 72.10
Amnt of One Well Vol: 47.07
Total Water to be Pumped: 141.20

Develop Method: N/A
Presamp Purge Method: SUB PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC ms ~~mS~~	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1020	1 MML	.643	5.54	15.0	2	205	
1030	50	.644	5.55	16.8	0	205	
1040	100	.641	5.59	17.1	0	211	
1050	150	.641	5.58	17.1	0	211	
							SAMPLE TIME: 1300

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	400'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	17ML	Volume Removed:	600 gal		

Date: 11/6/98
Static Water Level*: 96.93
Standing Water Column: 303.07
Amnt of One Well Vol: 197.84
Total Water to be Pumped: 593.53

Develop Method: N/A
Presamp Purge Method: SUB Pump
Sampling Method: Positive Displ. Bladder
Field Tech: WSW/MAC

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (~~uS~~ mS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1135	INITIAL	.185	6.04	14.9	0	191	
1215	200	.167	5.77	16.7	23	183	
1315	400	.165	5.66	15.5	7	207	
1445	600	.166	5.60	15.8	3	225	
							Sample time: 1500

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-1ML

Total Well Depth*: 395'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed: 600 gallons

Vol./ft of casing:
Vol./ft of borehole:

Waste: Discharge to holding tank

Date: 10/26/98

Static Water Level*: 102.34'
Standing Water Column: 292.66'
Amnt of One Well Vol: 191.10
Total Water to be Pumped: 573.32

Develop Method: N/A
Presamp Purge Method: 3" submersible pump
Sampling Method: disposable bailer
Field Tech: MEG/ZWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
945	initial	284	5.52	19.4	5	214	
1035	200	208	5.70	20.4	192	195	* collect sample @ 1:30 PM
1145	400	197	5.86	20.1	32	198	
1320	600	193	5.80	21.0	26	202	** collect Field Blank for 10/26/98 here @ 1:15

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	135'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	356L	Volume Removed:			

Date: 11-5-99 Static Water Level*: 84.87

Standing Water Column: 50.13

Amnt of One Well Vol: 8.18

Total Water to be Pumped: 24.54

Develop Method: N/A

Presamp Purge Method: Submersible Pump

Sampling Method: Disposable Bailer

Field Tech: NSW/MAC

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (mS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1015	INITIAL	.698	6.55	22.7	999	-80	
1020	9	.768	6.09	24.2	292	-5	
1025	18	.751	5.95	24.3	113	20	
1030	27	.746	5.91	24.5	85	32	
							SAMPLE TIME 1045
							MS/MSD.

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	100'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	21 GU	Volume Removed:			

Date: 10/26/98	Static Water Level*: 97.9'	Develop Method:	N/A
	Standing Water Column: 2.1	Presamp Purge Method:	Disposable Bailer
	Amnt of One Well Vol: 1.37	Sampling Method:	Disposable Bailer
	Total Water to be Pumped:	Field Tech:	ZWM / MPE

* All measurements taken from: __ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1410	INITIAL	211	6.40	15.4	190	231	
	1.5						
1414	3.0	221	6.07	15.5	999	233	
1420	4.5	224	6.12	15.3	999	226	
							Sample Taken 1420

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	255	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	IMI	Volume Removed:			

Date: 10/22/98 Static Water Level*: 101.72
Standing Water Column: 153.28
Amnt of One Well Vol: 100.06
Total Water to be Pumped: 300.18

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: EWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1103	INITIAL	.489	6.39	18.4	3	247	
1123	100	.410	6.07	21.6	0	218	
1220	200	.412	5.99	22.3	0	193	
1245	300	.413	5.97	22.5	0	175	
							SAMPLE TAKEN 1300
							MS/MSD

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	342	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	1 MI/L	Volume Removed:	480 gal		

Date: 10/22/98	Static Water Level*: 102.00	Develop Method:	N/A
	Standing Water Column: 240.00	Presamp Purge Method:	SUBMERSIBLE PUMP
	Amnt of One Well Vol: 156.67	Sampling Method:	DISPOSABLE BAILERS
	Total Water to be Pumped: 470.02	Field Tech:	WTN

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1301	INITIAL	.328	6.08	17.9	0	222	
1433	160	.331	5.83	21.6	0	201	
1625	320	.336	5.78	20.2	0	267	
1730	480	.331	5.90	20.7	0	214	
							SAMPLE AT 1740

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 16L
Total Well Depth*: 147'
Well Dia: 4"
Borehole Dia:
Volume Removed: 90 gal
Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/22/98
Static Water Level*: 104.00
Standing Water Column: 43
Amnt of One Well Vol: 28.07
Total Water to be Pumped: 84.21
Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1038	INITIAL	1.10	6.28	17.5	321	230	
1045	30	1.20	6.09	18.7	16	218	
1050	60	1.23	6.01	19.1	4	210	
1055	90	1.26	5.99	18.8	0	205	
							SAMPLE TIME 1100

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 164

Total Well Depth*: 115'
Well Dia: 2"
Borehole Dia:
Volume Removed: 6 gal

Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/22/98
Static Water Level*: 103.71
Standing Water Column: 11.29
Amnt of One Well Vol: 1.84
Total Water to be Pumped: 5.53

Develop Method: N/A
Presamp Purge Method: DISPOSABLE BAILER
Sampling Method: DISPOSABLE BAILER
Field Tech: WJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC MS ~~(uS)~~	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1005	INITIAL	.524	3.75	15.1	0	230	
1015	2	.486	6.13	16.1	695	230	
1025	4	.473	6.24	15.9	700	251	
1038	6	.473	6.20	16.3	739	240	
							SAMPLE TAKEN: 1038
							BD-5 TAKEN

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	407'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	ZML	Volume Removed:	640		

Date: 10/21/98 Static Water Level*: 81.11 Develop Method: N/A

Standing Water Column: 325.89 Presamp Purge Method: SUBMERSIBLE PUMP

Amnt of One Well Vol: 212.75 Sampling Method: DISPOSABLE BAILER

Total Water to be Pumped: 640 Field Tech: ~~KT~~ ZWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
0910	INITIAL	0.216	8.64	20.4	187	012	
1016	215	0.266	10.51	18.7	0	050	
1202	430	0.185	8.99	19.5	0	146	
1305	640	0.191	8.68	18.6	0	130	
							SAMPLE TAKEN: 1305

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	250'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	MW-1	Volume Removed:	330 gal.		

Date: 10-20-98 Static Water Level*: 84.91'
Standing Water Column: 165.09'
Amnt of One Well Vol: 107.70 gal
Total Water to be Pumped: 323.31 gal

Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: DJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (mS) (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1225	FIRST	.640	6.31	22.8	~~30~~ 0	161	
1242	110	.693	6.42	22.3	0	149	
1316	220	.732	6.47	22.3	0	167	
1331	330	.727	6.58	22.2	0	139	SAMPLE TIME 1340

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-11GL

Total Well Depth*: 140'
Well Dia: 4"
Borehole Dia:
Volume Removed: 118 gal

Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/20/98
Static Water Level*: 84.14
Standing Water Column: 55.86
Amnt of One Well Vol: 36.47
Total Water to be Pumped: 109.40

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: WJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1154	INITIAL	.749	5.79	22.1	11	185	
1204	40	.885	5.84	22.8	0	173	
1210	80	.921	5.93	22.7	0	169	
1215	110	0.97	6.06	22.8	0	165	
							SAMPLE TIME 1220

112M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	132'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	MW-106C	Volume Removed:	100 gal		

Date: 10/20/98 Static Water Level*: 82.33 Develop Method: N/A

Standing Water Column: 49.67 Presamp Purge Method: Submersible Pump

Amnt of One Well Vol: 32.42 Sampling Method: Disposable Bailer

Total Water to be Pumped: 97.27 Field Tech: LISA

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1035	INITIAL	.649	6.05	20.5	96	210	
1041	35	.578	6.17	20.9	10	197	
1047	70	.571	6.11	20.7	10	190	
1053	100	.568	6.08	20.9	10	190	
							BD-3
							SAMPLE AT 1100
							FB-3 AT 1055

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: GMI
Total Well Depth*: 250
Well Dia: 4"
Borehole Dia:
Volume Removed: 330
Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/20/98
Static Water Level*: 84.22
Standing Water Column: 165.78
Amnt of One Well Vol: 108.22
Total Water to be Pumped: 324.66
Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: MGW/ZWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1536	INITIAL	0576	7.40	19.3	0	257	
1550	110	0.628	7.62	20.7	0	194	
1625	220	0.633	7.89	20.8	0	212	
1640	330	0.632	8.14	20.8	0	189	
							SAMPLE TIME 1645

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 6 GL

Total Well Depth*: 125
Well Dia: 4"
Borehole Dia:
Volume Removed:

Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/20/98
Static Water Level*: 83.65
Standing Water Column: 41.35
Amnt of One Well Vol: 26.99
Total Water to be Pumped: 80.97

Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: MGR/REWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1425	INITIAL	0.162	7.89	15.7	0	193	
1430	30	0.179	7.88	15.1	0	179	
1435	60	0.185	7.69	14.9	0	188	
1439	90	0.191	7.67	14.7	0	187	
							SAMPLE TIME 1445

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	147'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	2GL	Volume Removed:	125 gal		

Date: 10/20/98 Static Water Level*: 83.20

Standing Water Column: 63.80

Amnt of One Well Vol: 41.65

Total Water to be Pumped: 125.00

Develop Method: N/A

Presamp Purge Method: SUBMERSIBLE PUMP

Sampling Method: DISPOSABLE BAILER

Field Tech: CVJC/MAC

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1425	INITIAL	.632	6.25	22.1	0	197	
1433	42	.613	6.10	22.5	0	181	
1437	84	.594	6.13	22.5	0	181	
1442	125	.587	6.12	22.5	0	182	
							Sample Time = 1450

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	250'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	211I	Volume Removed:			

Date: 10/20/98 Static Water Level*: 83.56 Develop Method: N/A

Standing Water Column: 166.44 Presamp Purge Method: Submersible Pump

Amnt of One Well Vol: 108.65 Sampling Method: Disposable Bailer

Total Water to be Pumped: 325.96 Field Tech: A Stanford

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (~~uS~~ mS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1452	INITIAL	.398	6.25	21.6	0	174	
1502	110	.391	6.18	23.0	0	174	
1544	220	.407	6.06	22.7	0	175	
1600	330	.406	6.04	22.6	0	183	
							SAMPLE TIME = 1605

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	200	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	ZMW	Volume Removed:	235		

Date: 10/20/98
Static Water Level*: 80.63
Standing Water Column: 119.37
Amnt of One Well Vol: 77.92
Total Water to be Pumped: 233.77

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech:

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1640	INITIAL	.331	5.94	21.1	0	184	
1650	75	.399	6.09	23.2	0	186	
1700	150	.400	6.11	23.2	0	184	
1710	235	.400	6.12	23.5	0	178	
							SAMPLE TIME 17:15

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	335	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	5-ML	Volume Removed:	495		

Date: 10/20/98 Static Water Level*: 81.69
Standing Water Column: 250.31
Amnt of One Well Vol: 163.40
Total Water to be Pumped: 490.21

Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: MGV / ZWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS ~~(uS)~~	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1050	INITIAL	0.359	7.49	17.9	0	204	
1207	165	0.358	8.09	17.4	0	194	
1233	330	0.310	7.39	18.9	0	170	
1330	495	0.304	7.16	19.1	0	224	
							SAMPLE TIME 1535

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	250	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	5-MI	Volume Removed:	330		

Date: 10/26/98
Static Water Level*: 85.70
Standing Water Column: 164.3
Amnt of One Well Vol: 107.26
Total Water to be Pumped: 321.77

Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: MGV / ZWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
~~0838~~ 839	Initial	0.434	7.17	17.1	0	161	
0900	110	0.396	6.76	19.9	0	184	
938	220	0.388	6.54	19.8	0	240	
1036	330	0.391	6.77	19.7	0	267	
							Sample taken 1040

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 5-GL

Total Well Depth*: 130
Well Dia: 4"
Borehole Dia:
Volume Removed: 90

Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/20/98
Static Water Level*: 85.37
Standing Water Column: 44.63
Amnt of One Well Vol: 29.13
Total Water to be Pumped: 87.40

Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: MTG/EWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
808	INITIAL	0.351	7.24	17.5	0	091	
0814	30	0.310	7.57	17.3	0	155	
820	60	0.305	7.28	17.1	0	163	
824	90	0.302	7.22	17.1	0	167	
							SAMPLE TIME 835
							MS/MSD TAKEN

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 296L

Total Well Depth*: 150'
Well Dia: 2"
Borehole Dia:
Volume Removed:

Vol./ft of casing:
Vol./ft of borehole:

Waste:

Date: 10-19-98
Static Water Level*: 102.40
Standing Water Column: 47.6
Amnt of One Well Vol: 7.77
Total Water to be Pumped: 23.30

Develop Method: N/A
Presamp Purge Method:
Sampling Method: DISPOSABLE BAILER
Field Tech:

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
~~1627~~	INITIAL	1.04	6.90	20.1	0	283	3 HAND BAILED
1708	8	.957	6.72	20.5	25	158	
1740	16	.941	6.77	21.5	511	248	Started using 2" pump
1757	24	1.00	6.61	23.8	168	187	
							SAMPLE TIME = 1800

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	200'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	29 MI	Volume Removed:			

Date: 10-19-98 Static Water Level*: 102.54 Develop Method: N/A

Standing Water Column: 97.46 Presamp Purge Method:

Amnt of One Well Vol: 15.90 Sampling Method: DISPOSABLE BAILER

Total Water to be Pumped: 47.72 Field Tech:

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1634	INITIAL	0.487	6.20	19.7	0	275	
1703	16	0.480	6.16	20.2	0	192	
1713	32	.491	6.37	20.2	0	215	
1805	48	0.492	6.28	20.6	0	137	
							SAMPLE TIME 1805

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	210'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	24 MI	Volume Removed:	40 gal		

Date: 10-15-98 Static Water Level*: 99.76 Develop Method: N/A

Standing Water Column: 110.24 Presamp Purge Method: SUBMERSIBLE PUMP

Amnt of One Well Vol: 18.00 Sampling Method: DISPOSABLE BAILER

Total Water to be Pumped: 54.00 Field Tech: MSW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1627	INITIAL	.643	6.55	19.5	291	172	
1637	20	.314	6.42	21.6	38	161	
1647	40	.301	6.75	22.7	16	156	
1657	60	.306	6.19	22.5	6	152	
							SAMPLE AT 1700

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 24 GL

Total Well Depth*: 149'
Well Dia: 2"
Borehole Dia:
Volume Removed: 27 gal

Vol./ft of casing:
Vol./ft of borehole:

Waste:

Date: 10-19-98
Static Water Level*: 99.12
Standing Water Column: 49.88
Amnt of One Well Vol: 8.14
Total Water to be Pumped: 24.42

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (mS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1600	INITIAL	1.57	6.03	20.5	999	175	
1607	9	1.46	6.19	19.7	374	132	
1614	18	1.41	6.18	19.6	28	163	
1621	27	1.40	6.18	19.4	15	175	
							SAMPLE AT 1630

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	96'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	5 6U	Volume Removed:	5		

Date: 10/19/98

Static Water Level*: 86.41
Standing Water Column: 9.59
Amnt of One Well Vol: 1.57
Total Water to be Pumped: 4.70

Develop Method: N/A
Presamp Purge Method: DISPOSABLE BAILER
Sampling Method: DISPOSABLE BAILER
Field Tech: MGV

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1528	Initial	1.13	5.80	21.1	0	282	
1536	1.6	1.15	6.01	20.8	366	286	
1547	3.2	1.12	6.08	21.0	>999	240	
1556	5.0	1.15	5.96	20.8	>999	304	
							SAMPLE TIME: 1556

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 19MI

Total Well Depth*: 239
Well Dia: 4"
Borehole Dia:
Volume Removed: 290

Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/19/98
Static Water Level*: 91.86
Standing Water Column: 147.14
Amnt of One Well Vol: 96.05
Total Water to be Pumped: 288.15

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MGV

* All measurements taken from: 1 Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1320	Initial	0.037	6.26	23.4	0	207	
1340	100	0.409	5.83	23.7	0	250	
1426	200	0.396	5.77	23.8	0	281	
1511	290	0.393	5.77	23.7	0	280	
							SAMPLE TAKEN: 1520

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 19 GU
Total Well Depth*: 98'
Well Dia: 2"
Borehole Dia:
Volume Removed: 3.5 GAL
Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/19/98
Static Water Level*: 91.47
Standing Water Column: 6.53
Amnt of One Well Vol: 1.06
Total Water to be Pumped: 3.19
Develop Method: N/A
Presamp Purge Method: DISPOSABLE BAILER
Sampling Method: DISPOSABLE BAILER
Field Tech: MGU

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1330	INITIAL	.488	5.92	20.6	6	251	
1335	1	.580	5.93	20.5	380	244	
1340	2	.610	5.92	20.4	555	257	
1345	3	.623	5.92	20.5	596	253	
							SAMPLE TIME: 1345

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	335'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	3 ML	Volume Removed:	480		

Date: 10-19-98	Static Water Level*: 92.05	Develop Method:	N/A
	Standing Water Column: 242.95	Presamp Purge Method:	SUBMERSIBLE PUMP
	Amnt of One Well Vol: 158.60	Sampling Method:	DISPOSABLE BAILER
	Total Water to be Pumped: 475.80	Field Tech:	MGV / ZWM

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1010	Initial	0.288	7.18	22.0	0	119	
1110	160	0.226	6.10	20.0	0	204	
1209	320	0.230	6.13	21.0	0	220	
1300	480	0.221	5.97	20.8	0	230	
							SAMPLE TIME 1310

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	149'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	36L	Volume Removed:	135		

Date: 10-19-98 Static Water Level*: 82.17
Standing Water Column: 66.83
Amnt of One Well Vol: 43.63
Total Water to be Pumped: 130.88

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MGV

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~(uS)~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
925	INITIAL	0.52	5.8	21	31	176	
938	~~130~~ 45	0.515	5.52	22.7	0	115	
948	~~200~~ 90	0.493	6.03	23.0	0	118	
957	135	0.485	6.04	23.0	0	174	
							SAMPLE TIME 1005

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	212'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	23MI	Volume Removed:			

Date: 10-19-98
Static Water Level*: 99.70
Standing Water Column: 112.30
Amnt of One Well Vol: 18.33
Total Water to be Pumped: 55 gal

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS (uS))	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1237	INITIAL	.334	6.45	19.0	18	171	
1258	20	.354	6.24	21.9	6	162	
1302	40	.354	6.17	22.3	4	168	
1312	60	.355	6.21	22.2	0	167	
							BLIND DUP TAKEN HERE
							SAMPLE AT 1320

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	150'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	23 GL	Volume Removed:	30 gal		

Date: 10-19-98	Static Water Level*: 99.40	Develop Method:	N/A
	Standing Water Column: 50.60	Presamp Purge Method:	SUBMERSIBLE PUMP
	Amnt of One Well Vol: 8.25	Sampling Method:	DISPOSABLE BAILER
	Total Water to be Pumped: 24.77	Field Tech:	WJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1200	INITIAL	.596	6.29	19.8	36	235	
1214	10	.718	6.24	19.7	999	173	
1222	20	0.95	6.16	19.8	97	170	
1232	30	.723	6.18	19.5	49	164	
							SAMPLE AT 1245

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	155'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	96L	Volume Removed:	150 GAL		

Date: 10-15-98 Static Water Level*: 82.17 Develop Method: N/A

Standing Water Column: 72.93 Presamp Purge Method: SUBMERSIBLE PUMP

Amnt of One Well Vol: 47.54 Sampling Method: DISPOSABLE BAILER

Total Water to be Pumped: 142.63 Field Tech: MGV/WJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1621	INITIAL	.446	6.61	19.8	-10	272	
1631	50	.401	6.01	20.6	228	232	
1646	100	.400	5.93	21.1	-10	188	
1702	150	.401	5.98	20.7	-10	157	
							SAMPLE TIME 1715

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	150'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4''	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	4 GL	Volume Removed:			

Date: 10-15-98	Static Water Level*: 98.12	Develop Method:	N/A
	Standing Water Column: 51.88	Presamp Purge Method:	SUBMERSIBLE PUMP
	Amnt of One Well Vol: 33.87	Sampling Method:	DISPOSABLE BAILER
	Total Water to be Pumped: 101.60	Field Tech:	

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS ~~(uS)~~	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1436	INITIAL	.587	6.10	24.2	234	278	
1443	35	.591	6.63	25.6	634	200	
1501	70	.568	6.13	26.3	228	200	
1514	105	.567	6.11	26.1	155	176	
							SAMPLE TIME 1520

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 4 MI

Total Well Depth*: 250'
Well Dia: 4"
Borehole Dia:
Volume Removed:

Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10-15-98
Static Water Level*: 99.87
Standing Water Column: 150.13
Amnt of One Well Vol: 98.00
Total Water to be Pumped: 294.00

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech:

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1440	INITIAL	.618	10.21	25.0	10	51	
1459	100	.438	6.11	21.8	10	206	SAMPLE TIME 1545
1522	200	0.424	6.12	21.5	0	190	
1544	300	.424	5.97	21.2	10	196	

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 12ML
Total Well Depth*: 393
Well Dia: 4"
Borehole Dia:
Volume Removed: 600
Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/15/98
Static Water Level*: 87.70
Standing Water Column: 305.30
Amnt of One Well Vol: 199.30
Total Water to be Pumped: 597.90
Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: WSW/MGV

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
905	INITIAL	0.316	6.00	21.7	10	144	
943	200	0.216	6.23	20.1	34	191	
1025	400	0.205	6.01	20.2	10	212	
1105	600	0.204	5.98	20.6	10	258	
							SAMPLE TIME 1110

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	150'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	7GL	Volume Removed:	90 GAL		

Date: 10-15-98 Static Water Level*: 107.80 Develop Method: N/A

Standing Water Column: 42.20 Presamp Purge Method: SUBMERSIBLE PUMP

Amnt of One Well Vol: 27.55 Sampling Method: DISPOSABLE BAILER

Total Water to be Pumped: 82.64 Field Tech: [redacted] MGV/WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1137	INITIAL	.511	6.03	23.8	560	242	
1142	30	.514	6.05	24.5	0	213	
1146	60	.516	6.00	24.7	0	215	
1151	90	.515	6.00	24.7	0	198	
							SAMPLE AT 1200

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	180'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	DISCHARGE TO HOLDING TANK
Well ID:	27GL	Volume Removed:	50 GAL		

Date: 10-13 98 Static Water Level*: 77.93'
Standing Water Column: 102.07'
Amnt of One Well Vol: 16.65 gal
Total Water to be Pumped: 49.97 gal

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: B.W.

* All measurements taken from: ✓ Top of Casing; ✓ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1230	INITIAL	.219 ms	5.65	17.7	70	52	SAMPLED AT 1325
1252	17	.292 ms	6.01	20.9	50	14	
1258	34	.296 ms	6.09	22.2	43	8	
1303	50	.297 ms	6.17	22.2	18	-	

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	332'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	7 ML	Volume Removed:			

Date: 10-15-98
Static Water Level*: 107.63
Standing Water Column: 224.37
Amnt of One Well Vol: 146.47
Total Water to be Pumped: 439.41

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MGV/WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~(uS)~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
~~12~~ 1140	INITIAL	.415	6.21	24.0	10	223	SAMPLE TIME 1405
1217	150	.451	6.02	21.6	0	192	
1305	300	.453	5.98	21.7	0	205	
1357	450	.452	5.98	21.9	0	197	

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	230'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	27MF	Volume Removed:	75GAL	DISCHARGE TO HOLDING TANK	

Date: 10-13-98
Static Water Level*: 78.29
Standing Water Column: 151.71
Amnt of One Well Vol: 24.75
Total Water to be Pumped: 74.27

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: W & W

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1310	FIRST	.280ms	6.33	20.3	302		
1321	25	.312ms	6.14	24.0	4		
1330	50	.313ms	6.15	23.8	3		
1339	75	.312ms	6.12	24.2	1		
							SAMPLE TIME 1345

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 26 GL
Total Well Depth*: 150'
Well Dia: 2"
Borehole Dia:
Volume Removed: 30
Vol./ft of casing:
Vol./ft of borehole:
Waste: DISCHARGE TO 200 GAL TANK

Date: 10-13-98
Static Water Level*: 87.10
Standing Water Column: 62.90
Amnt of One Well Vol: 10.07
Total Water to be Pumped: 30.21
Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1617	INITIAL	.303 MS	6.32	19.1	194		
1625	10	.359 MS	6.21	20.1	40		
1653	20	.359 MS	6.18	19.9	28		
1641	31	.363	6.16	20.4	24		
							SAMPLE AT 1700

112M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	230	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	26MI	Volume Removed:	70		

Date: 10-13-98 Static Water Level*: 87.38 Develop Method: N/A

Standing Water Column: 142.62 Presamp Purge Method: SUBMERSIBLE PUMP

Amnt of One Well Vol: 23.27 Sampling Method: DISPOSABLE BAILER

Total Water to be Pumped: 70 Field Tech: WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1725	INITIAL	.416	6.08	17.4	59		
1735	24	.422	6.03	21.0	4		
1745	48	.425	6.02	21.3	2		
1755	70	.428	6.03	21.3	1		
							SAMPLE 1800

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	169'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	~~2~~ 2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	~~25~~ 25GL	Volume Removed:	40 gal		

Date: 10-14-98 Static Water Level*: 97.00'
Standing Water Column: 77.00'
Amnt of One Well Vol: 12.57
Total Water to be Pumped: 37.70

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MTW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	MS/MSD COMMENTS
1332	INITIAL	.586	5.50	19.5	42		
1339	13	.536	5.83	20.8	29		
1346	26	.534	5.83	20.9	25		
1353	40	.534	5.83	20.9	23		
							SAMPLE TIME 1400 MS/MSD

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	210'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	25MI	Volume Removed:	60		

Date: 10-14-98 Static Water Level*: 93.47'
Standing Water Column: 116.53
Amnt of One Well Vol: 19.02
Total Water to be Pumped: 57.05

Develop Method: N/A
Presamp Purge Method: Submersible Pump
Sampling Method: Disposable Bailer
Field Tech: WJH

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1403	INITIAL	.477	5.78	20.3	67		
1410	20	.476	5.74	22.5	19		
1417	40	.444	5.74	22.7	4		
1424	60	.429	5.74	22.9	2		
							SAMPLE TIME = 1430

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	150'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	28GL	Volume Removed:	30		

Date: 10-14-98 Static Water Level*: 94.54
Standing Water Column: 55.46
Amnt of One Well Vol: 9.05
Total Water to be Pumped: 27.15

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: MJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~(uS)~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1515	INITIAL	.862	5.93	21.4	999		
1520	10	.845	5.87	23.3	512		
1525	20	.843	5.86	23.4	325		
1530	30	.844	5.85	23.4	229		
							SAMPLE 1540

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	232'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	28MI	Volume Removed:	70		

Date: 10-14-98
Static Water Level*: 93.64
Standing Water Column: 138.36
Amnt of One Well Vol: 22.58
Total Water to be Pumped: 67.75

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: WSW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1545	INITIAL	.439	5.85	21.6	11		
1552	23	.456	5.72	23.8	34		
1559	46	.459	5.71	23.9	10		
1606	69	.458	5.73	23.8	6		
							SAMPLE AT 1615

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 12MI
Total Well Depth*: 253
Well Dia: 4"
Borehole Dia:
Volume Removed:
Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/14/98
Static Water Level*: 87.47
Standing Water Column: 165.53
Amnt of One Well Vol: 108.06
Total Water to be Pumped: 324.18
Develop Method:
Presamp Purge Method:
Sampling Method:
Field Tech:

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1544	INITIAL	760	7.28	21.9	21	59	
1600	110	787	6.86	22.9	31	8	
1620	220	666us	7.09	24	20	15	
1644	325	606	7.03	24.1	20	37	
							SAMPLE TIME 1650

II2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	338	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	8ML	Volume Removed:	515		

Date: 10/14/98	Static Water Level*: 76.46	Develop Method:	
	Standing Water Column: 261.54	Presamp Purge Method:	
	Amnt of One Well Vol: 170.73	Sampling Method:	
	Total Water to be Pumped: 512.20	Field Tech:	

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1353	INITIAL	1588	6.34	19.4	58	64	
1418	170	358	6.97	21.4	40	26	
1455	340	365	7.34	22.2	25	54	
1420	515	364	6.85	22.3	21	71	
							SAMPLE TIME 1530
							BLIND DUPLICATE TAKEN
							BD-1

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 86L

Total Well Depth*: 150
Well Dia: 4"
Borehole Dia:
Volume Removed: 150

Vol./ft of casing:
Vol./ft of borehole:

Waste:

Date: 10/14/98
Static Water Level*: 75.53
Standing Water Column: 74.47
Amnt of One Well Vol: 48.61
Total Water to be Pumped: 145.83

Develop Method:
Presamp Purge Method:
Sampling Method:
Field Tech:

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1305	Initial	348	6.12	19.1	23	35	
1314	50	365 uS	5.86	20.8	461	49	
1324	100	367	5.79	22.2	95	48	
1334	150	334	5.49	21.9	95	46	
							SAMPLE TIME 1345

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 8GU
Total Well Depth*: 90
Well Dia: 4"
Borehole Dia:
Volume Removed: 40
Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 10/14/98
Static Water Level*: 74.64
Standing Water Column: 15.36
Amnt of One Well Vol: 10.03
Total Water to be Pumped: 30.09
Develop Method:
Presamp Purge Method:
Sampling Method:
Field Tech:

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
INITIAL	1253	384	7.06	21.2	271	47	
1256	10	403	7.59	18.8	58	51	
1259	20	408	7.25	18.2	31	05	
1301	30	414	7.04	18.1	27	72	
							SAMPLE TIME 1310

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	135'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	36 GL	Volume Removed:	50 gal		

Date: 11-5-98 Static Water Level*: 90.43 Develop Method: N/A

Standing Water Column: 44.57 Presamp Purge Method:

Amnt of One Well Vol: 7.27 Sampling Method:

Total Water to be Pumped: 21.82 Field Tech: MAC/GLSW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC MS (mS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
0900	INITIAL	.264	6.83	13.7	998	166	
0905	7	.262	6.60	15.4	999	129	
0910	14	.261	6.54	15.3	834	155	
0915	22	.261	6.43	15.2	345	150	
0930	40	.262	6.43	15.4	999	140	
0937	50	.262	6.35	15.2	293	143	
1110	INITIAL 50	.262	6.85	15.5	999	110	PUMP BACK IN
1120	60	.261	6.29	15.4	824	82	METALS SAMPLE AT
1148	80	.269	6.24	15.3	193	114	
1152	90	.272	6.23	15.3	138	087	

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 6 GL

Total Well Depth*: 125'
Well Dia: 4"
Borehole Dia:
Volume Removed:

Vol./ft of casing:
Vol./ft of borehole:

Waste:

Date: 11/16/98
Static Water Level*: 83.70
Standing Water Column: 41.30
Amnt of One Well Vol: 26.94
Total Water to be Pumped: 80.88

Develop Method: N/A
Presamp Purge Method: ~~2~~ SUBMERSIBLE 2" PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: WJW

* All measurements taken from: 1 Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1245	INITIAL	.197	6.74	15.1	241	141	SAMPLED AT-
1255	30	.217	6.66	14.9	0	134	
1301	60	.227	6.56	14.9	0	137	
1305	90	.228	6.57	15.0	0	140	SAMPLED FOR METALS THROUGH HOSE AT-

CONTINUED

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	135'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	2"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	366	Volume Removed:			

Date: 11/16/98	Static Water Level*: 90.50	Develop Method:	SUBMERSIBLE 2" PUMP
	Standing Water Column: 44.50	Presamp Purge Method:	1" " "
	Amnt of One Well Vol: 7.26	Sampling Method:	DISPOSABLE BAILER
	Total Water to be Pumped: 21.79	Field Tech:	WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC ms (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
0955	INITIAL	.307	6.37	14.3	999	139	SAMPLE PT -
1005	8	.266	6.51	14.5	999	134	
1009	16	.260	6.59	14.5	290	132	SAMPLE FOR METALS THROUGH HOSE
1014	24	.261	6.63	14.5	0	131	PT -
1035	100	.281	6.58	14.6	0	133	
1130	200	.285	6.59	15.3	0	138	

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	250'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	MW-4MI	Volume Removed:			

Date: 11-9-98 Static Water Level*: 99.87'

Standing Water Column: 150.13

Amnt of One Well Vol: 98.00

Total Water to be Pumped: 294.00

Develop Method: N/A

Presamp Purge Method: SUBMERSIBLE Pump

Sampling Method:

Field Tech:

* All measurements taken from: __ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS (uS))	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1155	Inlet	.493	8.24	21.0	-10	087	Break to pump ML
1405	100	.410	5.96	20.9	64	183	
1436	200	.404	5.96	21.0	0	186	
1515	300	.402	5.92	20.6	20	191	
1534	400	.404	5.95	20.8	27	194	
1600	500	.404	5.97	20.7	27	199	
1630	600	.405	5.97	20.8	7	203	SAMPLE AT 1645

7/4->8000 chlor x207

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-4-GL

Total Well Depth*: 150'
Well Dia: 4"
Borehole Dia:
Volume Removed:

Vol./ft of casing:
Vol./ft of borehole:
Waste:

Date: 11-9-98
Static Water Level*: 68.12
Standing Water Column: 51.88
Amnt of One Well Vol: 33.87
Total Water to be Pumped: 101.60

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: ZWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1226	INIT	.535	6.19	22.3	36	170	
1240	34	.554	6.15	25.2	700	175	
1255	68	.538	6.06	25.6	2	187	
1312	102	.539	6.05	25.8	0	184	SAMPLED AT 1315

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	275.0	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	MW-13ML	Volume Removed:	300 gallons	Discharge to Calgon Carbon Tank → Holding Tank	

Date: 11/3/98
Static Water Level*: 124.20
Standing Water Column: 150.80
Amnt of One Well Vol: 98.47
Total Water to be Pumped: 295.41 gals.

Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MPE/WJH/ZWM/DM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
903	initial	.313	5.63	11.9	1	222	
945	100	.405	6.56	11.9	3	189	
1020	200	.412	6.45	12.3	0	191	
1120	300	.414	6.47	12.8	3	182	→ end purging
							Sample taken 1130
							Field blank #8 910
							BD-7 TAKEN HERE

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-22 ML
Total Well Depth*: 325'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed: 460 gallons
Vol./ft of casing:
Vol./ft of borehole:
Waste: Discharge to Calgon Carbon Drum → holding tank

Date: 10/30/98
Static Water Level*: 93.90'
Standing Water Column: 231.1
Amnt of One Well Vol: 150.90
Total Water to be Pumped: 452.72
Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MPE/WSW/ZWM/BigMac

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (µS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1133	initial	347	6.35	16.4	6	173	
1214	150	.368	6.39	18.6	4	154	
1252	300	.354	6.23	18.5	0	185	
1331	460	.350	6.17	18.7	0	187	
							SAMPLE - 1340
							Field blank at 1240 FB-9 (ZM)
							BLIND DUPE (BD-6) Taken 1340

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	170'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	18GL	Volume Removed:	120 gallon	Discharge to Calgon Carbon Tank → Holding Tank	

Date: 10-30-98	Static Water Level*: 109.00'	Develop Method:	N/A
	Standing Water Column: 61'	Presamp Purge Method:	SUBMERSIBLE PUMP
	Amnt of One Well Vol: 39.82 GAL	Sampling Method:	DISPOSABLE BAILER
	Total Water to be Pumped: 119.46 GAL	Field Tech:	DJM - ZWM - WJM - MPE

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS/uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1435	START	.463	6.07	19.5	13	214	
1445	40	462	6.05	21.7	6	197	
1455	80	463	6.05	21.8	1	192	
1505	120	461	6.09	22.1	3	192	
							SAMPLE - 1515

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-15 GL

Total Well Depth*: 160'
Well Dia: 8" ↓ 4" ↑
Borehole Dia:
Volume Removed: 150 gallons

Vol./ft of casing:
Vol./ft of borehole:

Waste:
Discharge to Calgon Tanks → holding tank

Date: 10/29/98

Static Water Level*: 86.46'
Standing Water Column: 73.54
Amnt of One Well Vol: 48.02
Total Water to be Pumped: 144.06 gallons

Develop Method: N/A
Presamp Purge Method: submersible 2" pump
Sampling Method: disposable bailer
Field Tech: WJW/ZWM/DM/MPE

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
11:30	initial	550	6.31	20.7	278	56	
11:47	50	424	6.64	225	17	24	
12:05	100	410	6.23	22.6	2	66	
12:15	150	413	6.26	22.9	0	85	
							SAMPLE TAKEN: 1220
							FB-6 → 1225 (ZN)

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

40

Client:	Lockheed Martin	Total Well Depth*:	358'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801.T1	Borehole Dia:	8"	Waste:	
Well ID:	MW-15 (MPE) MC	Volume Removed:	500 gallons	Discharge to Calgon tanks → holding tank	

Date: 10/29/98
Static Water Level*: 87.27'
Standing Water Column: @ 50.73
Amnt of One Well Vol: 163.72
Total Water to be Pumped: 491.18 (3)

Develop Method: N/A
Presamp Purge Method: submersible 2" pump
Sampling Method: disposable bailer
Field Tech: WJW/ZWM/DM/MAE

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1310	initial	353	6.66	22.1	0	104	
1410	~~125~~ 170	307	6.32	19.3	0	161	
1535	~~250~~ 340	299	5.67	18.1	0	194	
1625	~~375~~ 510	303	5.77	17.5	0	204	
	~~500~~						SAMPLE TAKEN 1430

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-22GL

Total Well Depth*: 167.0'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed: 150 gallons

Vol./ft of casing:
Vol./ft of borehole:

Waste: Discharge to Calgon Carbon Drums → Holding tank

Date: 10/30/98
Static Water Level*: 94.10'
Standing Water Column: 72.9
Amnt of One Well Vol: 47.60
Total Water to be Pumped: 142.81

Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MPG/WJW/JLW/Big Mac

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (ms (uS))	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1047	initial	480	5.88	15.1	0	201	
1100	50	420	6.39	17.9	1	175	
1114	100	.417	6.30	18.0	0	183	
1126	150	.415	6.28	18.3	0	177	SAMPLE 1130

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 18ML

Total Well Depth*: 334'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed:

Vol./ft of casing:
Vol./ft of borehole:
Waste:
Discharge to Calgon Carbon Tank → holding tank

Date: 10-30-98
Static Water Level*: 108.45
Standing Water Column: 225.55
Amnt of One Well Vol: 147.23
Total Water to be Pumped: 441.71

Develop Method: N/A
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: DJM - ZWM - WTW - MPS

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1520	INIT	.307	6.56	20.2	1	169	
1615	150	.317	6.21	18.3	21	206	
1716	300	309	5.97	18.3	3	204	
1820	450	311	5.98	17.9	1	204	
							SAMPLE - 1830

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-16 ML

Total Well Depth*: 326'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed: 275 gallons

Vol./ft of casing:
Vol./ft of borehole:

Waste: Discharge to Carbon Drum → holding tank

Date: 11/3/98

Static Water Level*: 187.66'
Standing Water Column: 138.34
Amnt of One Well Vol: 90.37
Total Water to be Pumped: 271.00

Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MPG/WJW/CWM/DM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC ~~(uS)~~ mS	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
400	initial	.462	6.75	12.6	108	150	FLOW RATE ≈ 5 GPM
420	100	.434	6.66	11.3	23	181	
445	200	.408	6.19	12.6	4	217	
1705	275	.409	6.10	12.9	1	190	SAMPLE AT 17:15

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	250.0'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	MW-14ME	Volume Removed:	250 gallons	Discharge to Carbon Drum → holding tanks	

Date: 11/3/98

Static Water Level*: 122.70

Standing Water Column: 123/127.30

Amnt of One Well Vol: 83.12

Total Water to be Pumped: 249.38

Develop Method: N/A

Presamp Purge Method: submersible 3" pump

Sampling Method: disposable bailer

Field Tech: MPC/WJW/EWM/JM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS/uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1840	initial	.313	6.40	9.9	10	200	
1755	85	.283	6.00	12.7	8	212	
1815	170	.273	6.01	13.0	62	219	
1830	250	.272	6.02	13.1	51	216	
							SAMPLE TAKEN: 1840

II2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-16 GL

Total Well Depth*: 222'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed: 70 gallons

Vol./ft of casing:
Vol./ft of borehole:

Waste: Discharge to Calgon Carbon Drum ⇒ holding tank

Date: 11/3/98
Static Water Level*: 187.56'
Standing Water Column: 34.44
Amnt of One Well Vol: 22.48
Total Water to be Pumped: 67.46

Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MPG/WJW/ZWM/DM

* All measurements taken from: √ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (~~uS~~ mS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1230	initial	.585	6.54	16.1	484	225	
1315	25	.612	6.83	16.1	74	186	
1345	50	.613	6.84	15.9	7	169	
1415	70	.616	6.83	16.0	5	151	
1430							Sample taken: 1430 MS/MSD

I12M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	210'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	6"	Waste:	
Well ID:	MW-30GL	Volume Removed:			

Date: 11-7-98 Static Water Level*: 96.83

Standing Water Column: 113.17

Amnt of One Well Vol: 13.52

Total Water to be Pumped: 221.66

Develop Method: Submersible Pump + Air Lift

Presamp Purge Method:

Sampling Method: Bailer

Field Tech:

* All measurements taken from: 1 Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~(mS)~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
0950	INITIAL	.187	7.18	12.5	178	222	
1010	75	.160	7.00	13.8	439	-20	
1025	150	.152	6.66	13.9	93	-29	
1045	225	.148	6.62	14.0	65	-040	
							SAMPLE 1100

II2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	280'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	MW - 30MI	Volume Removed:			

Date: 11/7/98 Static Water Level*: 96.80

Standing Water Column: 183.2

Amnt of One Well Vol: 119.59

Total Water to be Pumped: 358.78

Develop Method: N/A

Presamp Purge Method: SUBMERSIBLE PUMP

Sampling Method: DISPOSABLE BAILER

Field Tech: MJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC ms (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1120	INITIAL	.237	8.34	13.5	107	-053	
1142	120	.357	6.82	14.6	184	083	
1224	240	.328	6.60	14.8	67	122	
1244	360	.324	6.47	14.7	97	139	
							SAMPLE : 1300
							BD #8

GWSS.XLS

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	390'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:		Waste:	
Well ID:	30 MC	Volume Removed:			

Date: 11/7/98 Static Water Level*: 97.30
Standing Water Column: 292.70
Amnt of One Well Vol: 191.07
Total Water to be Pumped: 573.22

Develop Method:
Presamp Purge Method: SUBMERSIBLE PUMP
Sampling Method: DISPOSABLE BAILER
Field Tech: WJW

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1313	INITIAL	.261	10.08	13.1	78	22	
1345	195	.096	7.77	14.5	638	078	
1515	390	.081	6.24	14.3	999	163	
1552	585	.076	6.17	14.4	640	169	
							SAMPLE 1610
							MS/MSD
							FIELD BLANK 10 AT 1350
							FIELD BLANK 11 AT 1700

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	200'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	316L	Volume Removed:			

Date: 11/4/98 Static Water Level*: 87.90 Develop Method:

Standing Water Column: 112.10 Presamp Purge Method:

Amnt of One Well Vol: 73.18 Sampling Method:

Total Water to be Pumped: 219.54 Field Tech:

* All measurements taken from: __ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
1555	INITIAL	.189	9.11	12.7	52	78	
1630	75	.297	8.22	12.3	999	124	
1640	150	.255	7.10	12.4	553	149	
1650	220	.246	6.62	12.4	304	147	
							SAMPLE TIME = 1700
							FB TIME = 1710

112M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	WJW ~~[illegible]~~ 355	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	31 ML	Volume Removed:	93.70 ~~620~~		

Date: 11-4-98 Static Water Level*: [illegible] ~~43.1~~ (EW) Develop Method: SUB Pump

Standing Water Column: [illegible] 261.3 Presamp Purge Method: SUBPump

Amnt of One Well Vol: [illegible] 170.58 Sampling Method: DISPOSABLE BAILER

Total Water to be Pumped: [illegible] 511.73 Field Tech: WJW / ZWM / MAC

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC mS (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
0955	INITIAL	.143	7.61	12.8	689	116	
1130	210	.071	6.35	14.2	158	191	
1245	420	.067	5.96	13.2	66	185	
1340	~~620~~	.063	6.27	13.3	56	.189	
							Sample Taken 1355

55

112M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-32 GL

Total Well Depth*: 240'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed: 150 gallons

Vol./ft of casing:
Vol./ft of borehole:

Waste: Drums, to Calgon Carbon Tank → holding tank

Date: 11/3/98
Static Water Level*: 167.50'
Standing Water Column: 72.50'
Amnt of One Well Vol: 47.34
Total Water to be Pumped: 142.02

Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MPE/LW JW/EWM/DM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC mS (~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
11[15]	initial	.384	6.69	14.4	10	180	
12[05]	50	.401	8.09	13.7	0	124	
12[34]	100	.398	8.25	15.1	1	89	
1254	150	.351	7.22	15.1	-10	122	SAMPLE AT 1315

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client:	Lockheed Martin	Total Well Depth*:	330'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	MW-32 MT	Volume Removed:	320 gallons	Discharge to holding tank via Calgon Carbon filter	

Date: 11/2/98	Static Water Level*: 167.50'	Develop Method:	NA
	Standing Water Column: 162.50	Presamp Purge Method:	submersible 3" pump
	Amnt of One Well Vol: 106.11	Sampling Method:	disposable bailer
	Total Water to be Pumped: 318.33	Field Tech:	MPG/TWM/WWD m

* All measurements taken from: __ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1315	initial	.181	7.02	14.7	32	181	
1520	110	.171	6.55	13.8	1	184	
1614	220	.169	6.36	13.5	1	184	
1715	320	.166	6.55	13.3	10	183	end purging
							SAMPLE AT 17:20

II2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page 1 of 1

Client:	Lockheed Martin	Total Well Depth*:	412'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	MW-32 M	Volume Removed:	480 gallon	Discharge to Calgon Carbon Tank → holding tank	

Date: 11/6/98
Static Water Level*: 167.85'
Standing Water Column: 244.15
Amnt of One Well Vol: 159.42
Total Water to be Pumped: 478.28

Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MFS/BWN/WJL/DM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
1550	initial	.145	6.24	12.5	136	196	
1620	160	.119	6.23	12.6	123	195	
1750	320	.117	5.97	12.0	160	209	
1820	480	.119	6.10	12.3	41	194	
							SAMPLE TIME 1830

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: MW-33 GL

Total Well Depth*: 252'
Well Dia: 4"
Borehole Dia: 8"
Volume Removed: 75 gallon

Vol./ft of casing:
Vol./ft of borehole:

Waste:
Discharge to Calgon Carbon Tank → holding tank

Date: 11/2/98

Static Water Level*: 218.70'
Standing Water Column: 33.3
Amnt of One Well Vol: 21.74
Total Water to be Pumped: 65.23

Develop Method: N/A
Presamp Purge Method: submersible 3" pump
Sampling Method: disposable bailer
Field Tech: MPE/DM/ZWM/WJW

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
							Flow rate ≈ gpm
1019	initial	198	8.23	13.6	999	098	
1035	25	.195	8.14	13.5	999	097	WELL STOPPED PRODUCING (REMAINDER)
	50						
	75						

II2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Client: Lockheed Martin
Site: Great Neck, NY
Job#: LOCK 9801 T1
Well ID: 33GL

Total Well Depth*: 252'
Well Dia: 4"
Borehole Dia:
Volume Removed: 20 gal then dry

Vol./ft of casing:
Vol./ft of borehole:

Waste:

Date: 11/20/98

Static Water Level*: 227.04
Standing Water Column: 29.96
Amnt of One Well Vol: 19.56
Total Water to be Pumped: 58.67

Develop Method:
Presamp Purge Method:
Sampling Method:
Field Tech:

* All measurements taken from: / Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	310'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	MW-33MF	Volume Removed:	175 GAL		

Date: 11-12-98	Static Water Level*: 220.91'	Develop Method:	N/A
	Standing Water Column: 89.09'	Presamp Purge Method:	SUBMERSIBLE 3" PUMP
	Amnt of One Well Vol: 58.17	Sampling Method:	DISPOSABLE BAILER
	Total Water to be Pumped: 174.52	Field Tech:	ZWM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED					COMMENTS
		EC (mS) (uS)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	
0957	FINIT	.282	7.30	14.0	0	190	
1107	60	.350	6.53	15.0	0	148	
1235	120	.341	6.42	15.6	0	145	
1355	175	.339	6.50	15.6	0	140	
							SAMPLE AT 1355
							VOC'S ONLY

H2M GROUP

GROUNDWATER SAMPLING/DEVELOPMENT LOG

Page ___ of ___

Client:	Lockheed Martin	Total Well Depth*:	425'	Vol./ft of casing:	
Site:	Great Neck, NY	Well Dia:	4"	Vol./ft of borehole:	
Job#:	LOCK 9801 T1	Borehole Dia:	8"	Waste:	
Well ID:	mw-33ml	Volume Removed:	400 Gal		

Date: 11-17-98 Static Water Level*: 220-91 Develop Method: N/A

Standing Water Column: 204.09 Presamp Purge Method: Submersible Pump

Amnt of One Well Vol: 133.27 Sampling Method: Disposable Bailer

Total Water to be Pumped: 399.81 Field Tech: ZW JM

* All measurements taken from: ✓ Top of Casing; ___ Protective Casing; ___ Ground Level

TIME	AMOUNT PURGED (GAL)	FIELD PARAMETER MEASURED EC (mS ~~uS~~)	pH	TEMP (C)	TURB (NTU)	ORP (mV)	COMMENTS
440 ~~FIRST~~	FIRST	.223	6.85	12.3	0	130	
1600	135	.122	6.33	13.9	971	169	
1740	270	.109	6.16	12.4	289	164	
1930	400	.109	6.02	13.9	128	173	
							Sample taken
							FIELD BLANK AT 1800

GWSS.XLS

DRAFT

Appendix B

Voclay Specifications

CETCO

COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY

TECHNICAL DATA SHEET

Volclay® Grout & Volclay® Granular Grout

High Solids Bentonite Grouts
(The original 1-step mix)

NSF®

Description: Volclay Grout is a 20% solids, polymer free, single component, bentonite grout.

Recommended Use: Both grouts are designed for use in sealing well casings, decommissioning abandoned wells and boreholes, and sealing closed-loop geothermal heat pump systems. It forms a low permeability, flexible seal.

Characteristics:

- Single component for easy one-step mixing
- Low permeability - laboratory tests range from 1×10^{-7} to 1×10^{-9} cm/sec.
- Generates no heat during mixing or curing, will not damage casings
- Remains flexible and maintains putty-like consistency over time
- Physically stable; will not flow through highly permeable soils
- Longer placement time than bentonite polymer grouts

Mixing and Application: Add one 50 lb. bag of grout to 24 gal. of freshwater to produce 3.5 $ft.^3$ of grout. The grout mixture should be properly agitated to disperse the bentonite clay evenly throughout the system. Once mixed to the proper consistency, the grout should be pumped through a tremie pipe with a positive displacement pump from the bottom of the well up to the surface. Pumping should continue until the grout purged to the surface reaches the initial mud weight of 9.4 lb./gal.

Bulk Density: 70.32lbs./ft^3.....Volclay Grout
65.00lbs/ft^3 .....Volclay Granular Grout

Packaging: 50 lb. multiwall, waterresistant bags, 48 bags per pallet. All pallets are plastic-wrapped.

1350 W. Shure Drive • Arlington Heights, Illinois 60004 1440 • (847) 392-5800 • FAX (847) 506-6150

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The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

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Appendix C

Sample/Core Logs for Well Clusters 37, 38 and 39

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well 37 ML Project/No. NY001227.0003 TSK1 Page 1 of 4

Site Location Jewish Center Lakeville Drilling Started 6.22.99 Drilling Completed 7-21-99

Total Depth Drilled 480 Feet Hole Diameter 8 1/2 inches Type of Sample/ Coring Device Flume

Length and Diameter of Coring Device N/A Continuous Sampling Interval Continuous feet

Land-Surface Elev. 179'11.5" feet ■ Surveyed ☐ Estimated Datum land surface

Drilling Fluid Used Baroid Pure bentonite (Polymer free) Drilling Method Mud Rotary

Drilling Contractor Delta Well & Pump. Driller Keith Helper Gary

Prepared By A. Gilmore Hammer Weight N/A Hammer Drop N/A ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	10			SP. Sand. Coarse Sands, Fine gravel Trace Fines. Brown
11	20			SP Sand Fine to Coarse Brown w/ Fine gravel
21	30			SP Sand Fine to Coarse Brown w/ Fine gravel & sandy clay
31	40			Same as above.
41	50			SP. SAND Fine to Coarse & Fine gravel.
51	60			SP SAND Medium to Coarse w/ Fine gravels Cobbles
61	70		GP	SP SAND Medium to Coarse w/ gravels, cobbles.
71	80		GP	SP Sand Medium to Coarse w/ gravels Cobbles.
81	90		GP	SP Coarse Sand, angular to sub-rounded Fine Gravel & cobbles
91	100			SP. Fine to Coarse Sand. Trace gravels

RCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 37ML

Prepared by A. Gilmore

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
101	110			SP. Fine to Coarse Sand w/ silt. Trace gravel. Tan clay inter beds
111	120			SP/CL Sand Fine to Medium & coarse w/ Tan clay "chunks".
121	130			SW Fine to Medium Sand. Trace Coarse material.
131	140			Same as above light brown - TAN
141	150			SP Fine to Medium Sand trace gravel w/ Tan clay.
151	166			SP. Fine to coarse Sands.
161	170			CL Clay, gray, w/ some sands. F-C Driller reports clay 165 - ~~167~~ 175
171	180			SP Sand fine to Coarse mostly Fine w/ tan Clay
181	190			SP Sand Fine to Coarse mostly Fine w/ tan & white Clay
~~207~~	19[illegible]	200		SW Sand Fine to Medium w/ some Coarse Sand. Brown to Tan
201	210			SP Sand fine to Coarse w/ Tan clay
211	220			SW Sand fine to Medium, Trace [redacted] mafics Brown to brown/gray.
221	230			SW Sand. Fine to Medium, Trace Mafics, Mica brownish-gray
231	240			SW SAND Fine to Medium Trace Mafics, mica Grayish brown

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 37ML

Prepared by A. Gilmore

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
241	250			SW SAND F-C w/ trace mafics, mica grayish brown. Driller reports gravel at bit
251	260			SW SAND Fine TO Medium w/ Some coarse Sand, Trace mafics, mica. light grayish brown - Brown
261	270			SW SAND F-M w/ Som coarse sand trace mafics, mica light grayish-brown
271	280			SW Sand. F-C mostly medium. Trace Mafics, Mica light grayish-brown
281	290			SW SAND Fine to Medium w/ some Coarse Sand. Trace mafics/mica. light grayish-brown
291	300			Same as above.
301	310			Same as above
311	320			SP SAND. Medium to Coarse w/ some Fine Sand. Trace mafics & mica brownish-gray.
321	330			SW SAND Medium TO Coarse brownish-gray w/ less amounts of Fine Sand. Trace mafics, mica
331	340			Same as above. brownish-gray.
341	350			Same as above. brownish-gray
351	360			SW Sand - Fine to Coarse. w/ Trace mafics, mica, oxide stainings. grayish-brown
361	370			SW Sand Medium w/ Some F & C sand. Trace mafics. mica grayish brown
371	380			SP Sand. Fine to Coarse. Trace mica, mafics grayish-brown

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 37ML

Prepared by A. Gilmore

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
381	390			SP. Fine to Medium Sand. w/ lesser amounts of Coarse Sand. trace Mafics, Mica. grayish-brown
391	400			SP. Fine to Medium Sand. Some Coarse Sand. Trace mafics, Mica grayish brown
401	410			Same as above. grayish-brown
411	420			Same as above. grayish-brown to light brown
421	430			SW Coarse Sands. Trace medium Sand. Trace silt brown to light brown
431	440			SP. Medium to Coarse Sand. Some white clay brown to white
441	450			SP Fine to Med Sand w/ trace clay gray brown to white
451	460			Same as above
461	470			SP fine sand w/ silt trace clay browns to gray Driller: clay at 475
471	480			Clay. brown to black, Some Tan.
				TD = 483

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well 38MT Project/No. NY/001227.0003.00001 Page 1 of 6

Site Location LAKE SUCCESS / G.N.S.D. Drilling Started 8/10/99 Drilling Completed 8/12/99

Total Depth Drilled 360 Feet Hole Diameter 8 inches Type of Sample/ Coring Device Roller Bit

Length and Diameter of Coring Device 3 inch Sampling Interval 10 feet

Land-Surface Elev. 189 feet ☐ Surveyed ☒ Estimated Datum ?

Drilling Fluid Used Super Gel X Drilling Method MUD ROTARY

Drilling Contractor DELTA WELL & PUMP Driller BOB. N Helper BROWN, W.

Prepared By J. Gabrowitz Hammer Weight — Hammer Drop — ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0'	10'			(GM) SILTY GRAVEL, FINE TO MEDIUM ANGULAR, PEA TO GRAPE SIZE; BROWN SILT, FINE TO MEDIUM; TRACE SAND; DRILLER REPORTS BOULDERS & COBBLES THROUGH INTERVAL.
10'	20'			(GP) GRAVEL FINE TO MEDIUM; ANGULAR TO SUBANGULAR, PEA TO GRAPE SIZE, COLOR/MATRIX BROWN; SAND FINE TO MEDIUM, TRACE SILT
20'	30'			(SP) SAND, BROWN, FINE TO COARSE SOME GRAVEL, FINE, PEA SIZE; TRACE MICA.
30'	40'			(SP) SAND, BROWN, FINE TO COARSE SOME GRAVEL, FINE, PEA SIZE; TRACE SILT
40'	50'			(SP) SAND BROWN FINE TO MEDIUM TRACE COARSE; TRACE GRAVEL, FINE.

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 38 MI

Page 2 of 6

Prepared by J Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
50'	60'			(SP) [redacted] TAN to BROWN SAND, FINE to COARSE, TRACE GRAVEL TRACE SILT.
60'	70'			(SP) SAND, BROWN, FINE to COARSE, TRACE GRAVEL.
70'	80'			(SP) SAME AS ABOVE.
'	90'			(SP) SAND, BROWN, FINE to COARSE TRACE GRAVEL, ANGULAR to SUB ANGULAR.
90'	100'			(SP) SAND, BROWN FINE to COARSE; TRACE GRAVEL, ANGULAR to SUB ANGULAR.
100'	110'			(SP) SAND, BROWN to TAN, FINE to COARSE; TRACE GRAVEL, FINE, ANGULAR to SUB ANGULAR.
110'	120'			(SP) SAND "SAME AS ABOVE"
120'	130'			(SC) SAND, TAN FINE to COARSE; TRACE GRAVEL; CLAY, SOFT TAN to yellowish ORANGE, FINE SAND IN MATRIX.

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 38 MI

Page 3 of 6

Prepared by J GABRINOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
130'	140'			(SP) SAND, BROWN MEDIUM TRACE COARSE; TRACE CLAY SOFT TAN to yellowish ORANGE FINE SAND IN MATRIX.
140'	150'			(SP) SAND, BROWN, MEDIUM TRACE COARSE; TRACE CLAY TAN to yellowish ORANGE, < PREVIOUS SAMP 6.
150'	160'			(SP) SAND, BROWN MEDIUM TRACE COARSE; TRACE CLAY, NODULES SOFT, TAN to Yellowish ORANGE.
160'	170'			(CL) CLAY Light GRAY & white to TAN, SOFT FINE SAND/SILT in MATRIX. TRACE GRAVEL, FINE PEA SIZE.
170'	180'			(CL) CLAY, NODULES Light GRAY white to TAN, SOME yellowish ORANGE (OXIDATION) FINE SAND/SILT IN MATRIX; TRACE GRAVEL, FINE PEA SIZE.
30'	190'			(SC) CLAYEY SAND, GRAY to yellowish ORANGE, FINE to MEDIUM with TRACE GRAVEL.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 38 MI

Page 4 of 6

Prepared by J Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
190'	200'			(SW) TAN SAND, MEDIUM, CLAY NODULES white to GRAY TRACE yellowish ORANGE, SOFT, TRACE GRAVEL
200'	210'			(SW) SAND, TAN FINE to MEDIUM, TRACE COARSE TRACE CLAY, white to GRAY SOFT,
210'	220'			(SP) SAND, TAN, FINE to MEDIUM, TRACE CLAY, WHITE to GRAY, SOFT
220'	230'			(SP) SAND, TAN, FINE to MEDIUM
230'	240'			(SP) SAND, TAN, FINE to MEDIUM, TRACE CLAY, white to GRAY, SOFT
240'	250'			(SP) SAND, TAN, FINE to MEDIUM TRACE CLAY, white, SOFT
250'	260'			(SP) SAND, TAN, FINE to MEDIUM SOME CLAY white to yellowish ORANGE, SOFT
260'	270'			(SP) SAND, TAN, FINE to MEDIUM TRACE CLAY, SOFT, yellowish ORANGE to white.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 38 MI

Page 5 of 6

Prepared by J Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
270'	280'			(SP) SAND, BROWN TO TAN, FINE TO MEDIUM, TRACE COARSE, TRACE CLAY, WHITE TO GRAY, SOFT
280'	290'			(SP) SAND, FINE TO COARSE BROWN TO TAN; TRACE CLAY GRAY TO WHITE, SOFT
290'	300'			(SW) SAND, BROWN TO TAN, MEDIUM TO COARSE TRACE CLAY TAN TO YELLOWISH ORANGE. (TRACE FINE SAND)
300'	310'			(SC) CLAYEY SAND, BROWN, FINE TO MEDIUM TRACE COARSE. CLAY NODULES GRAY TO WHITE, SOME TAN TO YELLOWISH ORANGE. TRACE MICA.
310'	320'			(SP) SAND, TAN, MEDIUM TO COARSE. SOME CLAY, WHITE TO GRAY, SOME YELLOWISH ORANGE, SOFT.
320'	330'			(SP) SAND, TAN MEDIUM TO COARSE TRACE FINE. SOME CLAY WHITE TO YELLOWISH ORANGE.
30'	340'			(SP) SAND, TAN FINE TO COARSE TRACE SILT, TRACE MICA.

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well _____ Project/No. _____ Page 6 of 6

Site Location _____ Drilling Started _____ Drilling Completed _____

Total Depth Drilled _____ Feet Hole Diameter _____ inches Type of Sample/ Coring Device _____

Length and Diameter of Coring Device _____ Sampling Interval _____ feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method _____

Drilling Contractor _____ Driller _____ Helper _____

Prepared By _____ Hammer Weight _____ Hammer Drop _____ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
340'	350'			(SP) SAND, TAN FINE to COARSE SUB-ANGULAR to SUB-Rounded.
350'	360'			(SP) SAND, TAN MEDIUM to COARSE TRACE GRAVEL, TRACE CLAY TAN to yellowish ORANGE, SOFT
360'	370'			(SP) SAND, TAN, FINE to MEDIUM TRACE COARSE.
				E.O.B.

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well 38 ML Project/No. Nyonia Land canal Page 1 of 6

Site Location LAKE SUCCESS, NY Drilling Started 7/26/99 Drilling Completed 8/2/99

Total Depth Drilled 480 Feet Hole Diameter 8 inches Type of Sample/ Coring Device Roller Bit/ Composite

Length and Diameter of Coring Device Sampling Interval continuous feet

Land-Surface Elev. 189 feet ☐ Surveyed ☒ Estimated Datum SEA LEVEL

Drilling Fluid Used AQUA GEL & SUPER GEL X Drilling Method MUD Rotary

Drilling Contractor DELTA WELL & PUMP Driller BOB D Helper BRIAN

Prepared By JOE GABRIELOWITZ Hammer Weight _____ Hammer Drop _____ ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0'	10'		5:40 PM	(SM) BROWN, SILTY FINE TO MEDIUM, SANDS
				FINE TO COARSE, WELL GRADED. ANGULAR
				Cobbles & Boulders Reported By Drillers
10'	20'		6:10 PM	(SW) BROWN WELL GRADED COARSE SANDS
				ANGULAR SHAPE, WITH LITTLE OR NO FINES observed
				Cobbles & Boulders Reported By Driller
20'	30'		4:15 PM	(SW) BROWN, WELL GRADED COARSE SANDS,
				ANGULAR SHAPE, WITH LITTLE OR NO FINES
				Cobbles & Boulders Reported By Driller
30'	40'		6:45 PM	(SW) BROWN WELL GRADED SANDS, GRAVELLY
				SANDS WITH TRACES OF SILT, (ANGULAR GRAVEL)
				Driller Reports Cobbles & Boulders in Borehole
40'	50'		9:20 AM	(SW) WELL GRADED SANDS, FINE TO COARSE
				ANGULAR TO SUBANGULAR, BROWN W/MAFICS & MICA
				Driller Reports Some Gravels & Cobbles.
50'	60'			(SW) WELL GRADED SANDS, FINE TO COARSE,
				ANGULAR TO SUBANGULAR, BROWN W/MAFICS & MICA
				Driller Reports Some Gravels & Cobbles.
60'	70'			"SAME AS ABOVE"
70'	80'			"SAME AS ABOVE"

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 38 ML

Page 2 of 6

Prepared by Joe Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
80'	90'			(SW) BROWN SAND, FINE to medium, WELL GRADED, ANGULAR to SUBANGULAR, Driller Reports lesser amounts of Cobbles & GRAVEL.
90'	100'			(SW) BROWN SAND, MEDIUM to COARSE, GRAVEL FINE to MEDIUM. WELL GRADED, ANGULAR to SUBANGULAR STONES.
100'	110'			(SW) BROWN SAND, MEDIUM to COARSE, GRAVEL FINE GRADE to PEA size. WELL GRADED
110'	120'			(SW) TAN OR Light BROWN SAND, COARSE to MEDIUM; GRAVEL, FINE, GRADE TO PEA Size, WELL GRADED; CLAY, white to TAN, SOFT, W/ FINE GRAIN SANDS IN MATRIX.
120'	130'			(SC) TAN, CLAYEY SAND, FINE, TRACE MEDIUM; clay nodules white to TAN W/ FINE SAND IN MATRIX. Driller Reports clay
130'	140'			(SC) TAN, CLAYEY SAND, FINE; clay Nodules WHITE TO TAN W/ FINE SAND IN MATRIX.
140'	150'			(SP) BROWN SAND, FINE to MEDIUM; TRACE clay white to TAN.
150'	160'			(SP) BROWN SAND, FINE TO MEDIUM; TRACE clay white.
160'	170'			(SC) GRAY to TAN CLAYEY SAND, FINE TO MEDIUM, clay NODULES GRAY W/ FINE SAND IN MATRIX

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 38 cluster 38ML

Page 3 of 6

Prepared by Joe Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
170'	180'			(CL) Gray to TAN silty clay, FINE to medium; TRACE GRAVEL, FINE; clay Nodules PEA to GRAPE Size.
180'	190'			(CL) Gray silty clay, FINE to medium TRACE GRAVEL.
190'	200'			(SC) TAN CLAYEY SANDS, FINE to MEDIUM, TRACE clay NODULES. Some OXIDATION present in nodules.
200'	210'			(SC) GRAY to TAN CLAYEY SANDS, FINE to MEDIUM, TRACE GRAVEL PEA Size clay NODULES, GRAY, GRAPE size
210'	220'			(SP) GRAY to BROWN SAND, FINE to MEDIUM, TRACE GRAVEL PEA SIZE.
220'	230'			(SP) BROWN SAND, FINE to medium clay NODULES, PEA to GRAPE Size white to GRAY.
230'	240'			(SP) BROWN SAND, FINE to MEDIUM TRACE COARSE GRAIN.
40'	250			(SP) BROWN SAND, FINE to MEDIUM TRACE COARSE GRAIN.

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 38 ML

Page 4 of 6

Prepared by Joe Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
250'	260'			(SP) BROWN SAND, FINE to MEDIUM TRACE COARSE GRAIN.
260'	270'			"SAME AS ABOVE"
270'	280'			" "
280'	290'			" "
290'	300'			" "
300'	310'			(SP) BROWN to TAN SAND, FINE to medium. TRACE CLAY. white, SOFT
310'	320'			(SP) TAN SAND, FINE to MEDIUM. Silty CLAY NODULES, TAN to white. SOME OXIDATION PRESENT.
320'	330'			(SP) TAN SAND, FINE to MEDIUM TRACE CLAY, TAN to white, SOFT
330'	340'			(SP) TAN SAND, FINE to MEDIUM
340'	350'			(SP) TAN SAND, FINE to MEDIUM TRACE COARSE.
350'	360'			(SP) TAN SAND, FINE to MEDIUM TRACE COARSE.
360'	370'			(SP) TAN SAND, MEDIUM. TRACE CLAY. SOFT white to TAN.

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 38 ML

Prepared by Joe BABENOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
370'	380'			(SP) TAN SAND, FINE to MEDIUM
				TRACE CLAY, white to TAN.
380'	390'			(SP) TAN SAND, FINE to MEDIUM
				TRACE COARSE.
				↗
390'	400'			(SP)/(SW) TAN SAND, FINE to MEDIUM
				MORE COARSE. TRACE GRAVEL, PEA
				SIZE. Driller Reports GRAVEL layer
				390'
400'	410'			(SP) TAN SAND, FINE to MEDIUM
				TRACE COARSE.
410'	420'			(SW) TAN SAND, FINE to COARSE;
				TRACE clay, SOFT, white.
420'	430'			(GC) GRAVEL, FINE (Pea Size) ANGULAR
				to SUBANGULAR; SAND TAN, FINE;
				clay, SOFT, white IN GRAVEL MATRIX.
430'	440'			(SW) TAN SAND, FINE to COARSE;
				TRACE clay, SOFT, white
440	450'			(GC) GRAVEL, FINE, Pea Size, ANGULAR
				to SUBANGULAR; SOME COARSE SAND;
				clay, GRAY, SOFT,
				DRILLER REPORTS CLAY 445'

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 38ML

Page 6 of 6

Prepared by Joe GABRINOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
450'	460'			(CL) CLAY, SOFT, white to GRAY; SOME GRAVEL, Angular to Sub Angular, Dom size. TRACE FINE SAND. DRILLER Reports CLAY ZONE. 457'
460'	470'			(CL) CLAY, SOFT, white to GRAY; SOME SAND, Coarse SubAngular, TRACE FINE; SOME ORGANIC MATERIAL.
470'	480'			(CL) CLAY, SOFT, DARK GRAY; SOME FINE SAND, TRACE COARSE. TRACE SILT.

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well 39 MW Project/No. NY001227.0003.00001 Page 1 of 4

Site Location Great Neck Schools Drilling Started 9/27/99 Drilling Completed

Total Depth Drilled 220 Feet Hole Diameter 8 inches Type of Sample/Coring Device Composite/Roller Bit

Length and Diameter of Coring Device N/A Sampling Interval 10 feet

Land-Surface Elev. feet ☐ Surveyed ☒ Estimated Datum $

Drilling Fluid Used Super Gel X Drilling Method Mud Rotary

Drilling Contractor Delta Well & Pump Driller Bob N Helper Brian W

Prepared By J Gabrinowitz Hammer Weight N/A Hammer Drop N/A ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0'	10'			(SM) Brown SAND, Fine to medium; Silt Brown Greater Than 12%. TRACE GRAVEL Pea to Grape Size.
10'	20'			(SW) Brown SAND, Fine to medium Some Coarse; Some Silt Brown.
20'	30'			(SW) SAND Brown to tan medium to Coarse, Angular; TRACE GRAVEL Pea to Grape Size
30'	40'			(SP) SAND Brown to tan, medium to Coarse, TRACE GRAVEL pea size.
40'	50'			(SW) SAND Brown to tan Fine to Coarse; TRACE GRAVEL, pea Size
50'	60'			(GW) GRAVEL, FINE, Pea to Grape Size Angular to Subangular; SAND, Fine Some

ARCADIS GERAGHTY & MILLER

mple/Core Log (Cont.d)

Boring/Well 39 MW

Page 2 of 4

Prepared by J Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
50'	60'	Continued		to COARSE, less THAN 30% SAND.
60'	70'			(SP) SAND BROWN to tan FINE to medium TRACE COARSE
70'	80'			(SP) SAND BROWN to tan FINE to medium TRACE COARSE.
80'	90'			(SW) SAND BROWN to tan, FINE to COARSE,
90'	100'			(SW) SAND BROWN to tan FINE to COARSE, TRACE clay, GRAY to tan; TRACE GRAVEL
100'	110'			(SW) SAND BROWN to tan FINE TRACE medium, TRACE clay, GRAY to BROWN, SOFT.
110'	120'			(SW) SAND BROWN to tan FINE TRACE medium, TRACE clay; GRAY to BROWN SOFT
120'	130'			(CL) CLAY, GRAYISH BROWN to tan SOME yellowish ORANGE; clay in FINE SAND MATRIX, BROWN

ARCADIS GERAGHTY & MILLER

.mple/Core Log (Cont.d)

Boring/Well 39 MW

Prepared by J Gabrinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
130'	140'			(CL) CLAY white to yellowish ORANGE, SOFT TRACE gray, & BROWN CLAY in FINE SAND MATRIX, TAN
140'	150'			(SC) SAND, BROWN to TAN, FINE to medium, clay yellowish ORANGE to tan, SOFT. MOSTLY FINE SAND THAN CLAY 60% SAND 40% SOFT CLAY
150'	160'			(SC) SAND, BROWN to TAN, FINE to medium, clay yellowish orange to tan, SOFT. 70% SAND 30% CLAY
160'	170'			(CL) CLAY DARK GRAY medium STIFF Some GRAYish BROWN to TAN SOFT, TRACE yellowish ORANGE. FINE SAND IN MATRIX.
170'	180'			(CL) clay DARK GRAY Medium STIFF TRACE yellowish ORANGE & TAN, SOFT. FINE SAND IN MATRIX. TRACE Lignite.
180'	190'			(CL) CLAY DARK GRAY Medium STIFF, TRACE yellowish ORANGE SOME SLT. FINE SAND IN MATRIX

ARCADIS GERAGHTY & MILLER

mple/Core Log (Cont.d)

Boring/Well 39 MW

Prepared by J GABRIOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
190'	200'			(CL) Clay grayish Brown to tan, Soft, Some white, Soft TRACE DARK GRAY. Soft. FINE SAND to Silt in MATRIX.
200	210			(SC)/(CL) SAND, 50%, FINE, Brown to tan; Clay yellowish ORANGE to tan, TRACE white, Soft TRACE PINKish ORANGE.
210'	220'			(SC)/(CL) SAND 55%, FINE Brown to tan; TRACE COARSE; Clay yellowish ORANGE to tan, TRACE white, Soft
				E.O.B.

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well 39 MI Project/No. NY001227.0003.00001 Page 1 of 6

Site Location GREAT NECKS SCHOOLS N/T (M YARD) Drilling Started 9/7/99 Drilling Completed 9/13/99

Total Depth Drilled 340 Feet Hole Diameter 8 inches Type of Sample/ Coring Device Composite / Roller Bit

Length and Diameter of Coring Device —

Sampling Interval 10' feet

Land-Surface Elev. _____ feet ☐ Surveyed ☒ Estimated Datum $

Drilling Fluid Used SUPER GEL X- Drilling Method MUD ROTARY

Drilling Contractor JC/HA WELL & PUMP Driller BOB N. Helper BRIAN W

Prepared By J GABRINOWITZ Hammer Weight — Hammer Drop — ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0'	10'	—		(SM) BROWN SAND, FINE TO MEDIUM; SILT BROWN GREATER THAN 12 %.
10'	20'			(SW) BROWN SAND FINE TO MEDIUM, TRACE COARSE; SOME SILT BROWN.
20'	30'			(SW) SAND MEDIUM TO COARSE; TRACE GRAVEL. ANGULAR PEA TO GRAPE SIZE.
30'	40'			(SP) SAND, BROWN MEDIUM TO COARSE. SUB ANGULAR TO ANGULAR
40'	50'			(SW) SAND, BROWN, FINE TO COARSE; TRACE GRAVEL PEA SIZE.
50'	60'			(GW) GRAVEL, FINE PEA TO GRAPE SIZE, ANGULAR TO SUB ANGULAR; SAND BROWN

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 39 MI

Prepared by J GABRINOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
50'	60'	Continued		Less than 40% fine to medium
60'	70'			(GP) GRAVEL Pea to grape size angular to subangular; SAND brown to tan, fine to medium, less than 15%.
70'	80'			(GP) GRAVEL Pea to grape size angular to subangular; SAND, brown to tan, fine to medium, less than 10%.
80'	90'			(SM)/(GW) GRAVEL Pea to grape size angular to subangular; SAND, brown to tan, fine to medium. Less than 45%. TRACE clay, brown soft
90'	100'			(SW) SAND, brown to tan, fine to coarse; some GRAVEL Pea to grape size, angular to subangular TRACE clay, soft, grayish brown Driller reports clay @ 91'.
100'	110'			(SW) SAND brown to tan, fine to medium; some GRAVEL, Pea to grape size angular to subangular; some clay grayish brown to tan in sandy silt matrix.

ARCADIS GERAGHTY & MILLER

mple/Core Log (Cont.d)

Boring/Well 39 MI

Prepared by J Babinowitz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
110'	120'			(CL) CLAY, GRAYish BROWN to TAN Some (15%) yellowish ORANGE (oxidation) & Some FINE SAND & FINE GRAVEL Pea Size.
120'	130'			(CL) CLAY, GRAYish BROWN to TAN, Some (30%) yellowish ORANGE; Some FINE SAND & FINE GRAVEL.
130'	140'			(CL) CLAY, BROWN to TAN, Some GRAYish BROWN & yellowish ORANGE, TRACE white. FINE SAND IN MATRIX.
140'	150'			(SW) SAND BROWN to TAN, FINE to MEDIUM, TRACE COARSE. CLAY, Soft white 10%, yellowish ORANGE 5%, GRAYish BROWN 15%. Some ORGANICS (Lignite) & (GRASSES)
150'	160'			(SP) SAND BROWN to TAN FINE; CLAY, 5% white, 10% yellowish ORANGE, 10% GRAYish BROWN, all SOFT. TRACE Lignite.
160'	170'			(CL) Clay DARK GRAY 60% BROWN to TAN 30% TRACE White, SOFT to MEDIUM STIFF SAND FINE, BROWN

ARCADIS GERAGHTY & MILLER

mple/Core Log (Cont.d)

Boring/Well 39 MI

Prepared by J GABRINOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
170'	180'			(CL) CLAY DARK GRAY, MEDIUM STIFF SILTY TRACE BROWN TO YELLOWISH ORANGE SOME COARSE SAND
180'	190'			(CL) CLAY DARK GRAY MEDIUM STIFF SILTY TRACE BROWN TO YELLOWISH ORANGE. SOME FINE SAND IN MATRIX
190'	200'			(CL) CLAY GRAYISH BROWN TO TAN 30%, SOFT, YELLOWISH ORANGE 20%, SOFT, SOME WHITE, SOFT TRACE LIGNITE. SOME SAND, FINE
200'	210'			(CL) CLAY GRAYISH BROWN TO TAN 25%, SOFT, YELLOWISH ORANGE 20%, SOFT, WHITE 30% SOFT. SOME FINE SAND IN MATRIX
210'	220'			(CL) CLAY, GRAYISH BROWN TO TAN, SOFT, WHITE SOFT, SOME DARK GRAY; SOME LIGNITE. TRACE FINE SAND.
220'	230'			(CL) CLAY GRAYISH BROWN TO TAN SOFT, WHITE, SOFT TRACE YELLOWISH BROWN; SOME FINE SAND IN MATRIX

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well 39 MI

Prepared by J GABRINOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
230'	240'			(CL) Clay GRAYISH BROWN to TAN, SOFT TRACE YELLOWISH ORANGE, SOFT. TRACE Lignite. SOME FINE SAND IN MATRIX.
240'	250'			(CL) CLAY GRAYISH BROWN TRACE DARK GRAY, TRACE white; FINE SAND IN MATRIX. SOME GRAVEL Pea SIZE. DRILLER REPORTS GRAVEL @ 245
250'	260'			(SP) SAND, Medium to COARSE SOME FINE SAND; [redacted] SOME SILT, SOME Lignite. DRILLER Reports GRAVEL
260'	270			(SP) SAND, medium to COARSE IN GRAY, to TAN SILT MATRIX SOME lignite & GRASSES, TRACE GRAY -ish BROWN & white clay, SOFT.
270'	280'			(CL) Clay GRAYISH BROWN to TAN, SOFT TRACE YELLOWISH ORANGE & white Both SOFT. medium to COARSE SANDS IN MATRIX. SOME Lignite & ORGANICS.
280'	290'			(CL) CLAY GRAYISH BROWN to TAN, SOFT TRACE YELLOWISH ORANGE & WHITE, SOFT. SOME medium to COARSE SANDS IN MATRIX; TRACE GRAVEL, Pea Size.

ARCADIS GERAGHTY & MILLER

mple/Core Log (Cont.d)

Boring/Well 39 MT

Prepared by J GABRINOWITZ

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
290'	300'			(SC) SAND, FINE, TRACE COARSE CLAY [redacted] GRAYish BROWN to TAN, SOFT, SOME yellowish ORANGE & white, BOTH SOFT.
300'	310'			(CL) Clay, GRAYish BROWN to TAN; FINE SAND MATRIX, TRACE COARSE SAND;
310'	320'			(SC) SAND FINE, TRACE COARSE Clay, GRAYish BROWN to TAN, SOFT SOME yellowish ORANGE, TRACE white SOFT.
320'	330'			(SC) SAND MEDIUM to COARSE; TRACE SILT; SOME Clay, GRAYish BROWN to TAN, TRACE CLAY LUMPS BOTH SOFT.
330'	340'			(SC) SAND Medium to COARSE; 20% SILT [redacted] IN MATRIX; Clay GRAYish BROWN to TAN, SOME white & yellowish ORANGE, all SOFT.
				E.O.B.

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well 39ML Project/No. NY001227.0003 TASK 1 Page 1 of 7

Site Location LMC; SCHOOL YARD Drilling Started 10.7.99 Drilling Completed 10.12.99

Total Depth Drilled 430 Feet Hole Diameter 8 inches Type of Sample/ Coring Device FLUME

Length and Diameter of Coring Device N/A Sampling Interval 10 feet

Land-Surface Elev. 150 feet ☐ Surveyed ☒ Estimated Datum MSL

Drilling Fluid Used SUPER GEL X Drilling Method MUD ROTARY

Drilling Contractor DELTA WELL AND PUMP Driller BOB Helper BRIAN

Prepared By R PORSCHE Hammer Weight — Hammer Drop — ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	10			SW SAND WELL GRADED
				SAND MEDIUM TO COARSE, SUB ROUNDED
~~10~~	~~20~~			GRAVEL - FINE, ANGULAR
10	20			GW GRAVEL WELL GRADED
				GRAVEL FINE TO COARSE; ANGULAR
				SAND MEDIUM TO COARSE SUBROUNDED
26	30			GP GRAVEL POORLY GRADED
				GRAVEL FINE TO COARSE; ANGULAR TO SUBROUNDED
				LITTLE MEDIUM TO COARSE SAND.
30	40			GP GRAVEL POORLY ~~SORTED~~ GRADED
				GRAVEL FINE TO COARSE; SUB ANGULAR TO SUBROUNDED
				LITTLE MEDIUM TO COARSE SAND.
40	50			GW GRAVEL WELL GRADED WITH FINE SAND
				GRAVEL - FINE TO COARSE, ROUNDED TO SUBROUNDED

ARCADIS GERAGHTY & MILLER

ımple/Core Log (Cont.d)

Boring/Well 39ML

Page 2 of 7

Prepared by R. PORSCHE

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
50	60			GW WELL GRADED GRAVEL, FINE TO COARSE, SUBROUNDED, SOME SAND
60				
60	70			GW WELL GRADED GRAVEL WITH SAND FINE TO COARSE SUBROUNDED GRAVEL WITH SAND
70	80			GC CLAYEY GRAVELS, LITTLE SAND ~~FINE, WELL ROUNDED GRAVEL WITH~~ RED-BROWN CLAY, SOFT. FINE SUBROUNDED TO SUBANGULAR GRAVEL
80	90			GC CLAYEY GRAVEL, LITTLE SAND FINE SUBROUNDED TO ANGULAR GRAVEL RED BROWN CLAY, SOFT LITTLE FINE SAND.
90	100			GC CLAYEY GRAVEL, LITTLE SAND FINE SUBROUNDED TO ANGULAR GRAVEL RED BROWN CLAY, SOFT.
100	110		SC	~~SC~~ CLAYEY SAND, FINE TO COARSE, ANGULAR TO SUBANGULAR, TRACE GRAVEL, GRAYISH BROWN, SOFT
110	120			SC CLAYEY SAND, FINE TO COARSE, ANGULAR TO SUBANGULAR, BROWN, SOFT

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 39 ML

Page 3 of 7

Prepared by C. KEEN

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
120	130			GC CLAY WITH FINE GRAVEL, ANGULAR TO SUBANGULAR, LITTLE SAND, FINE, ORANGE TO LIGHT BROWN, SOME WHITE AND ORANGE CLAY, SOFT
130	140			SC CLAYEY SAND, FINE TO MEDIUM, SUBROUNDED TO ANGULAR, TRACE COARSE SAND, ORANGE TO LIGHT BROWN, TRACE WHITE CLAY, SOFT
140	150			SC CLAYEY SAND, FINE TO MEDIUM, SUBROUNDED TO SUBANGULAR, TRACE COARSE SAND, BROWN TO TAN, TRACE WHITE AND ORANGE CLAY, SOFT
150	160			SP POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, BROWN; TRACE CLAY, WHITE AND ORANGE, SOFT, TRACE LIGNITE
160	170			CL CLAY, DARK GRAY, SOFT, W/ FINE TO MEDIUM SAND, SUBANGULAR, BROWN
170	180			CL CLAY, DARK GRAY, SOFT, W/ FINE TO MEDIUM SAND, SUBANGULAR, BROWN
180	190			CL CLAY, DARK GRAY, SOFT, TRACE WHITE AND ORANGE CLAY, W/ FINE TO MEDIUM SAND, SUBANGULAR

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 39 ML

Page 4 of 7

Prepared by C. KEEN

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
190	200			SC CLAYEY SAND, GRAY TO BROWN, SOFT, TRACE ORANGE AND WHITE CLAY, FINE TO MEDIUM SAND, SUBANGULAR.
200	210			SC CLAYEY SAND, FINE TO MEDIUM, SUBANGULAR, LT. GRAY TO PALE BROWN, TRACE WHITE, ORANGE AND GRAY CLAY, SOFT
10	220			SC CLAYEY SAND, MOSTLY FINE, TRACE MEDIUM, SUBANGULAR, GRAYISH BROWN, TRACE ORANGE, WHITE AND GRAY CLAY, SOFT
[redacted]	[redacted]			SC CLAYEY SAND, FINE TO MEDIUM,
220	230			TRACE COARSE, SUBANGULAR, GRAYISH BROWN, SOFT
230	240			SC CLAYEY SAND, FINE, SUBANGULAR GRAYISH BROWN, TRACE WHITE AND ORANGE CLAY, SOFT
240	250			SP POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, GRAYISH BROWN

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 39 ML

Prepared by C. KERN

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches		Sample/Core Description
250	260			SW	WELL GRADED SAND, FINE TO COARSE, SUBANGULAR, GRAY TO PALE BROWN DRILLER REPORTS GRAVEL
260	270			SW	WELL GRADED SAND, FINE TO COARSE, SUBANGULAR, GRAY TO PALE BROWN, TRACE CLAY, WHITE TO ORANGE, SOFT GRAVEL ENCOUNTERED (DRILL RIG CHATTERING)
270	280			SC	CLAYEY SAND, FINE TO MEDIUM, TRACE COARSE, SUBANGULAR, GRAYISH BROWN, TRACE WHITE AND ORANGE CLAY, SOFT
280	290			SP	POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, GRAYISH BROWN, SOME CLAY
290	300			SP	POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, TRACE COARSE SAND, ANGULAR, GRAYISH BROWN, SOME CLAY
300	310			SP	POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, GRAYISH BROWN, SOME SILT

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 39 ML

Prepared by C. KEEN

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
310	320			SP POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, GRAYISH BROWN, SOME SILT
320	330			SP AS 310 - 320
330	340			SP AS 320 - 330
340	350			SP POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, TRACE COARSE SAND, GRAYISH BROWN, TRACE BROWN CLAY, SOFT
350	360			SC CLAYEY SAND, MOSTLY FINE, SOME MEDIUM, SUBANGULAR, GRAYISH BROWN, TRACE WHITE CLAY, SOFT
360	370			SP POORLY GRADED SAND, FINE TO MEDIUM, SUBANGULAR, GRAYISH BROWN, SOME SILT
370	380			SP POORLY GRADED SAND, FINE TO MEDIUM, TRACE COARSE, SUBANGULAR, GRAYISH BROWN, SOME SILT
380	390			SP POORLY GRADED SAND, MEDIUM TO COARSE, SOME FINE, ANGULAR TO SUBANGULAR, GRAYISH BROWN, LITTLE SILT

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well 39 ML

Prepared by C. KEEN

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches		Sample/Core Description
390	400			SP	POORLY GRADED SAND, MEDIUM TO COARSE, LITTLE FINE, ANGULAR TO SUBANGULAR, GRAYISH BROWN
400	410			SP	AS 390'-400' WITH SOME GRAVEL (FINE)
410	420			SP	AS 400'-410'
420	430			SW	WELL GRADED SAND, FINE TO COARSE, SUBANGULAR, GRAYISH BROWN, [redacted] SOME SILT AND CLAY, SOME GRAVEL (FINE)

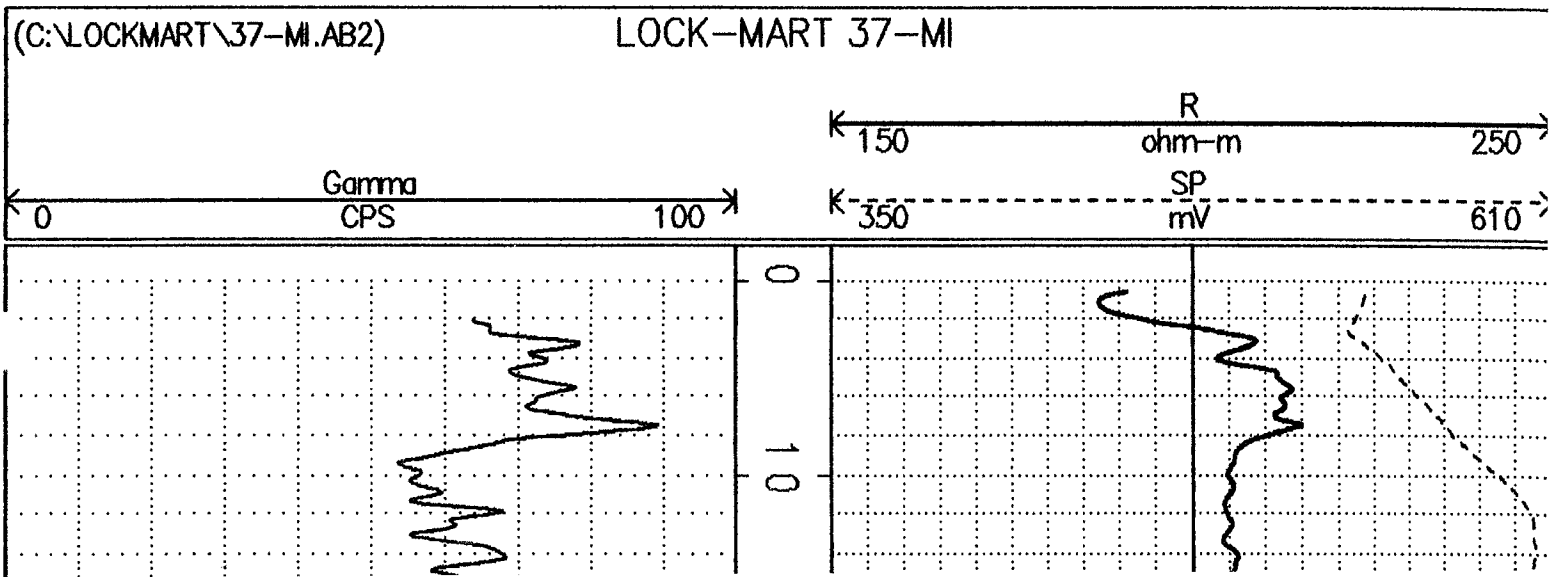
DRAFT

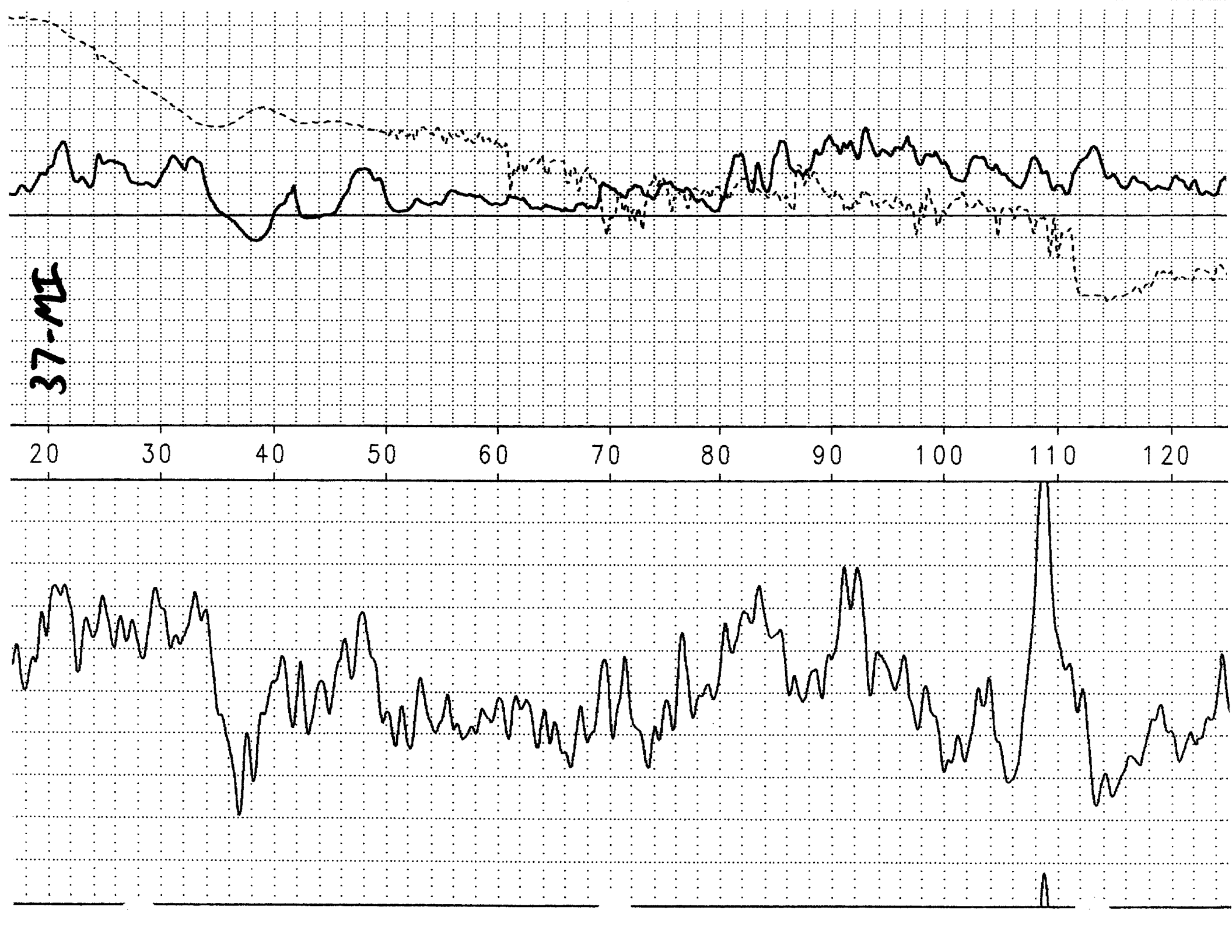
Appendix D

Geophysical Logs for Wells Clusters 37, 38, and 39

37MI

DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 516-981-2255 FAX 516-981-2369

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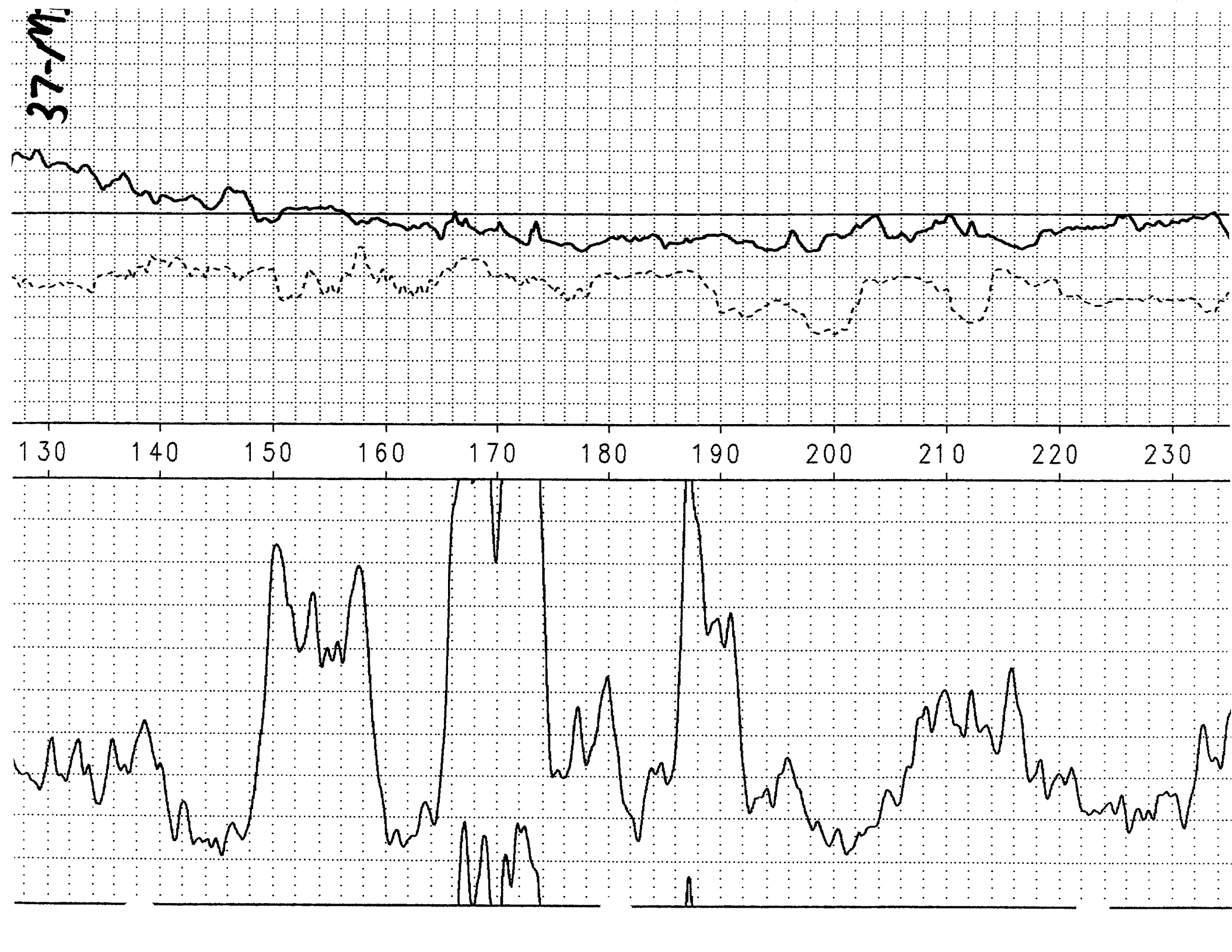
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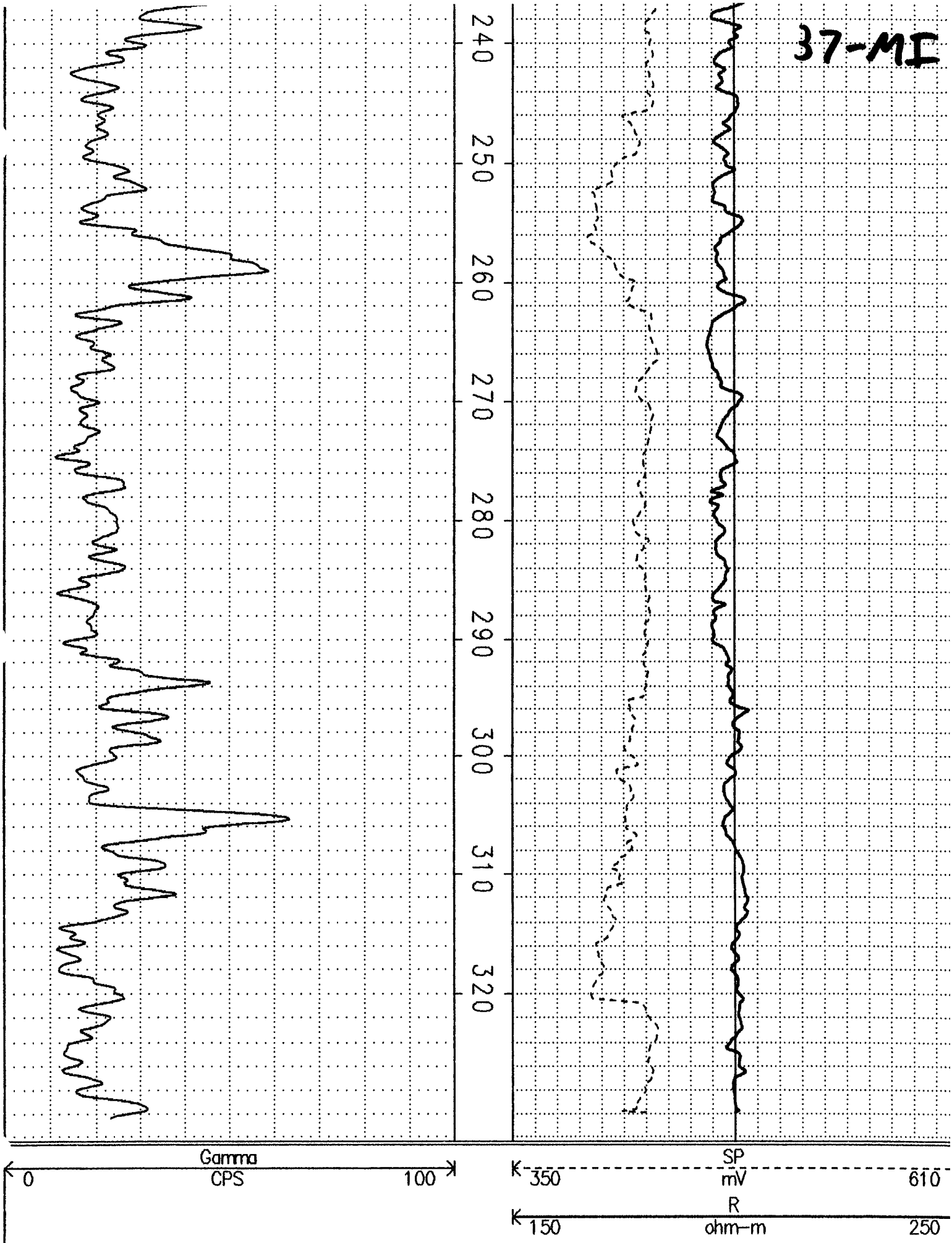
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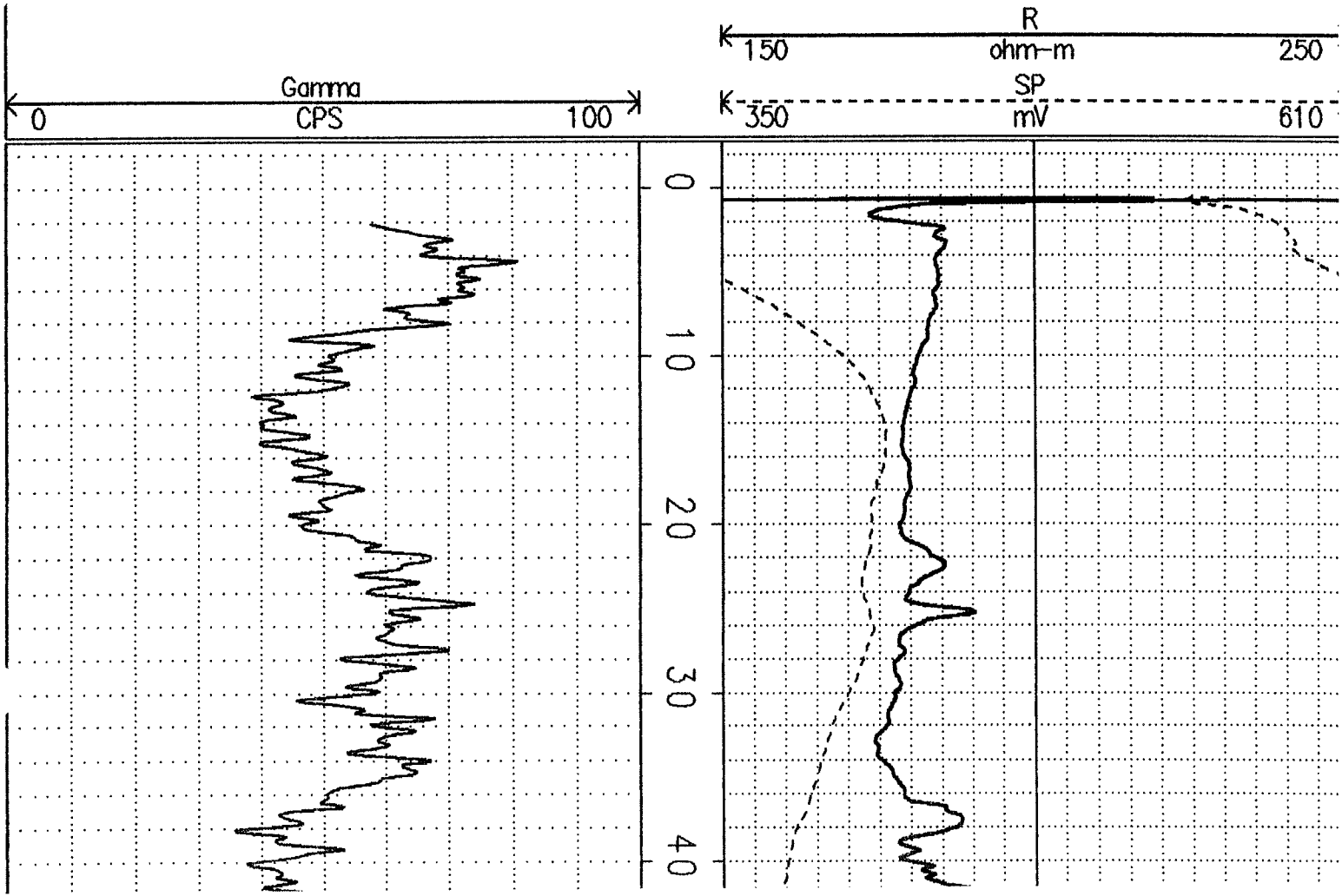
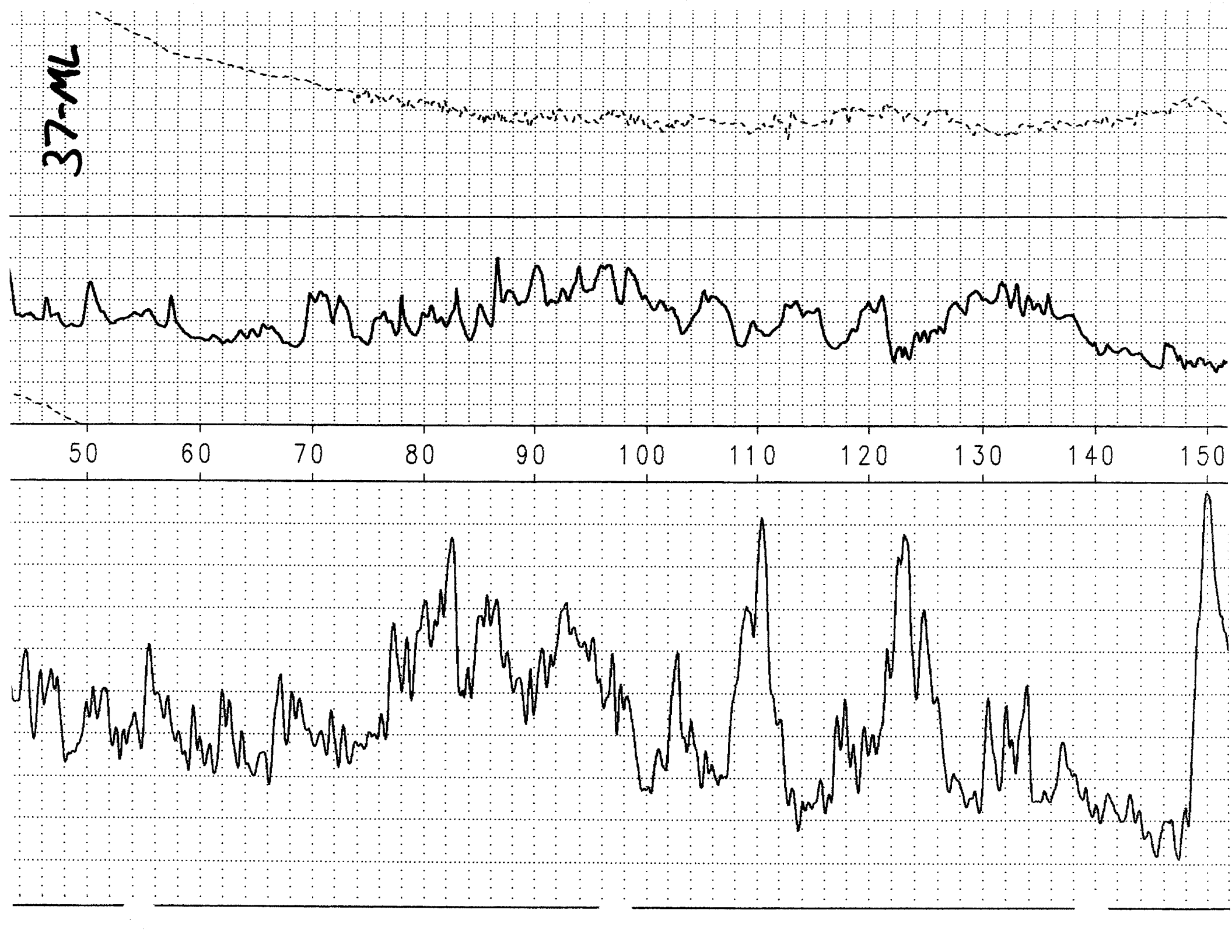
LOCK-MART 37-MI

37-ML

DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 516-981-2255 FAX 516-981-2369

(C:\LOCKMART\MW37.AD1) LOCKHEED MARTIN MW37 7/20/99

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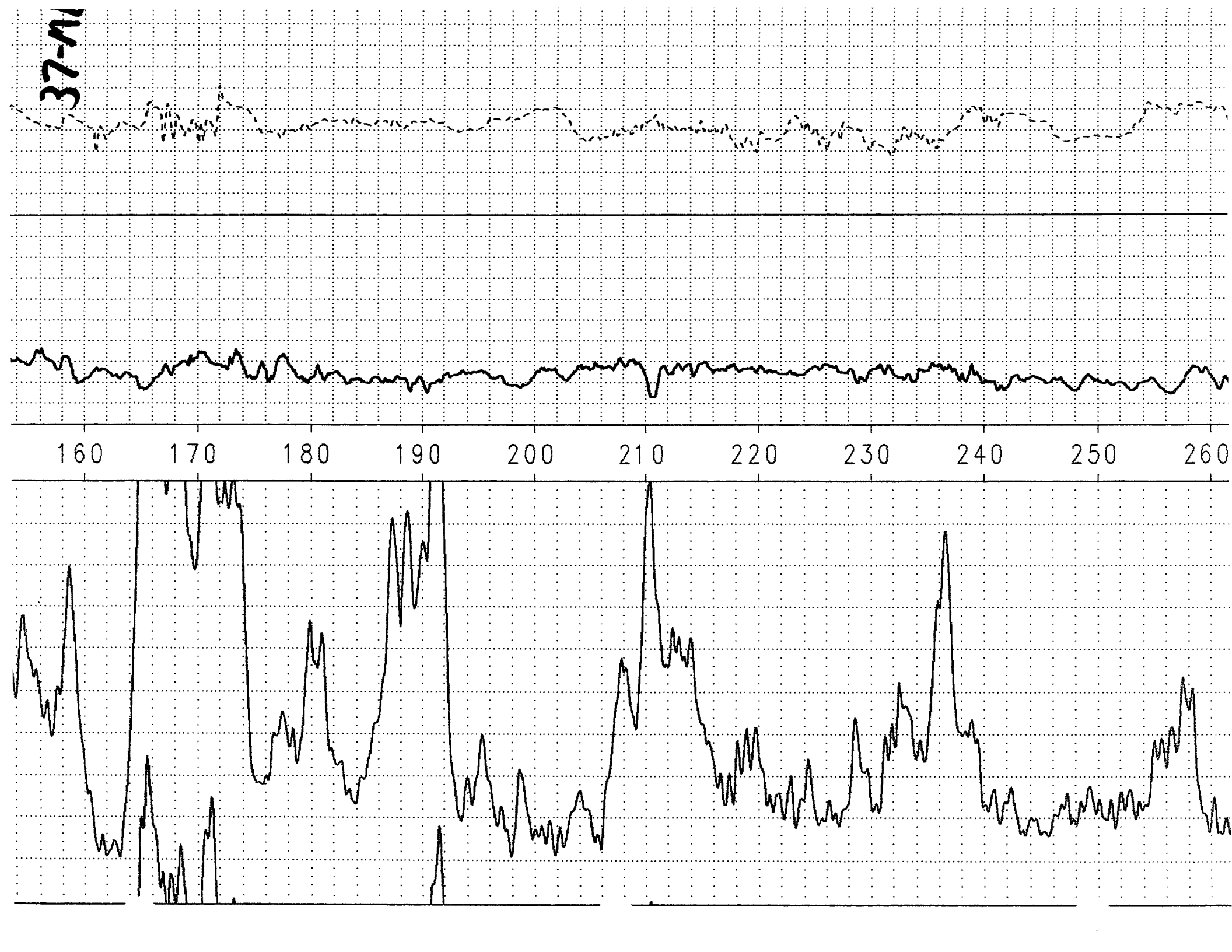
150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170
180
190
200
210
220
230
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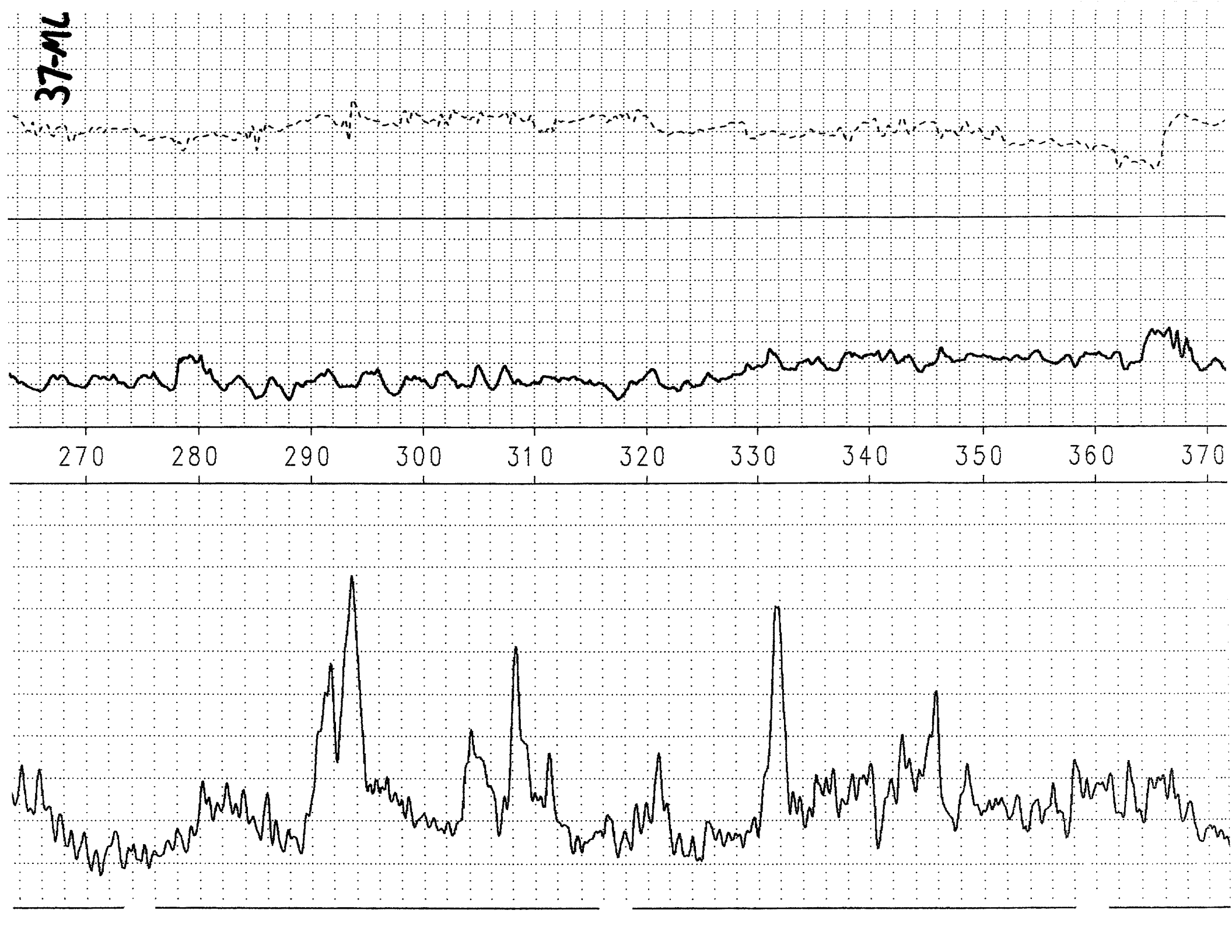
250
260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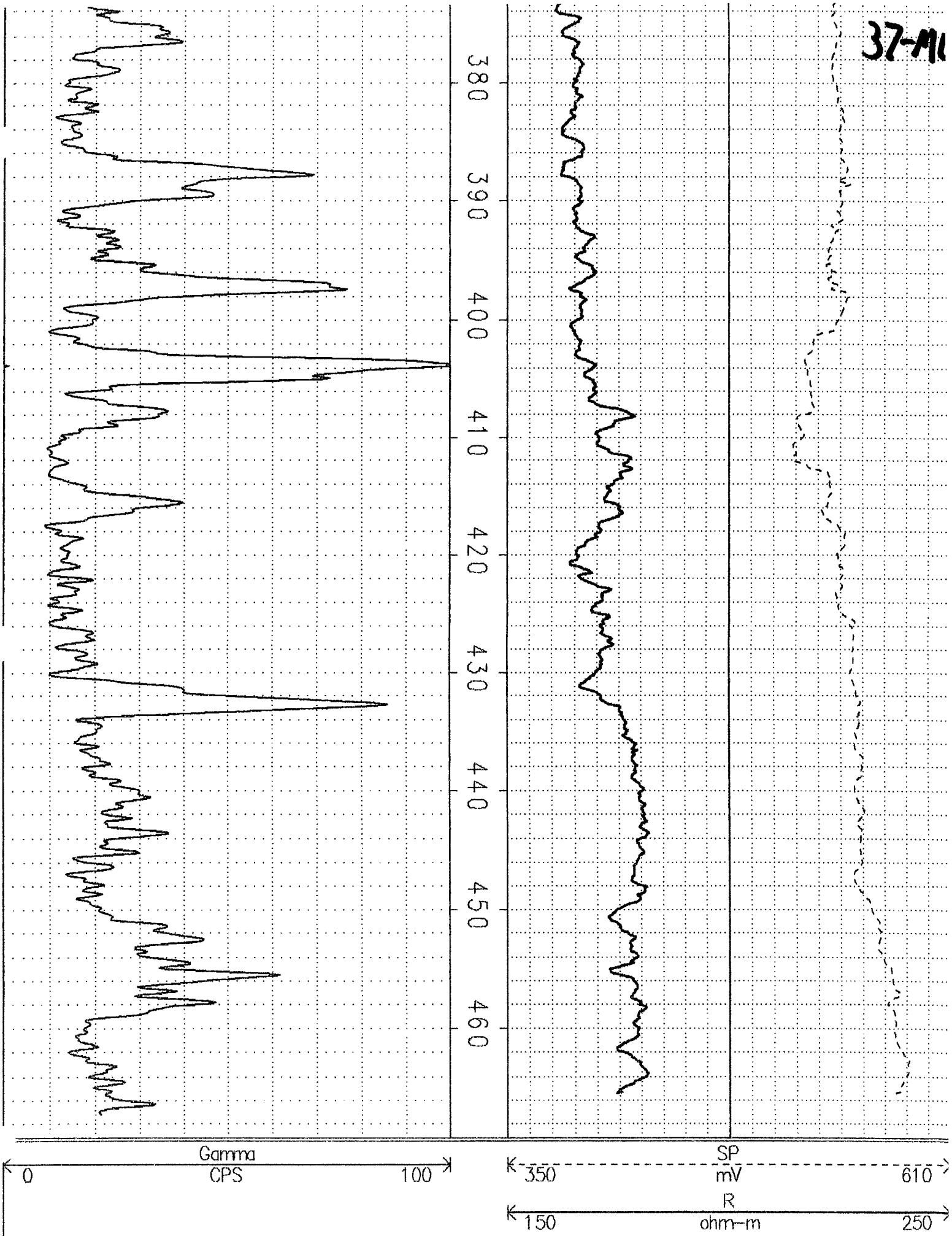
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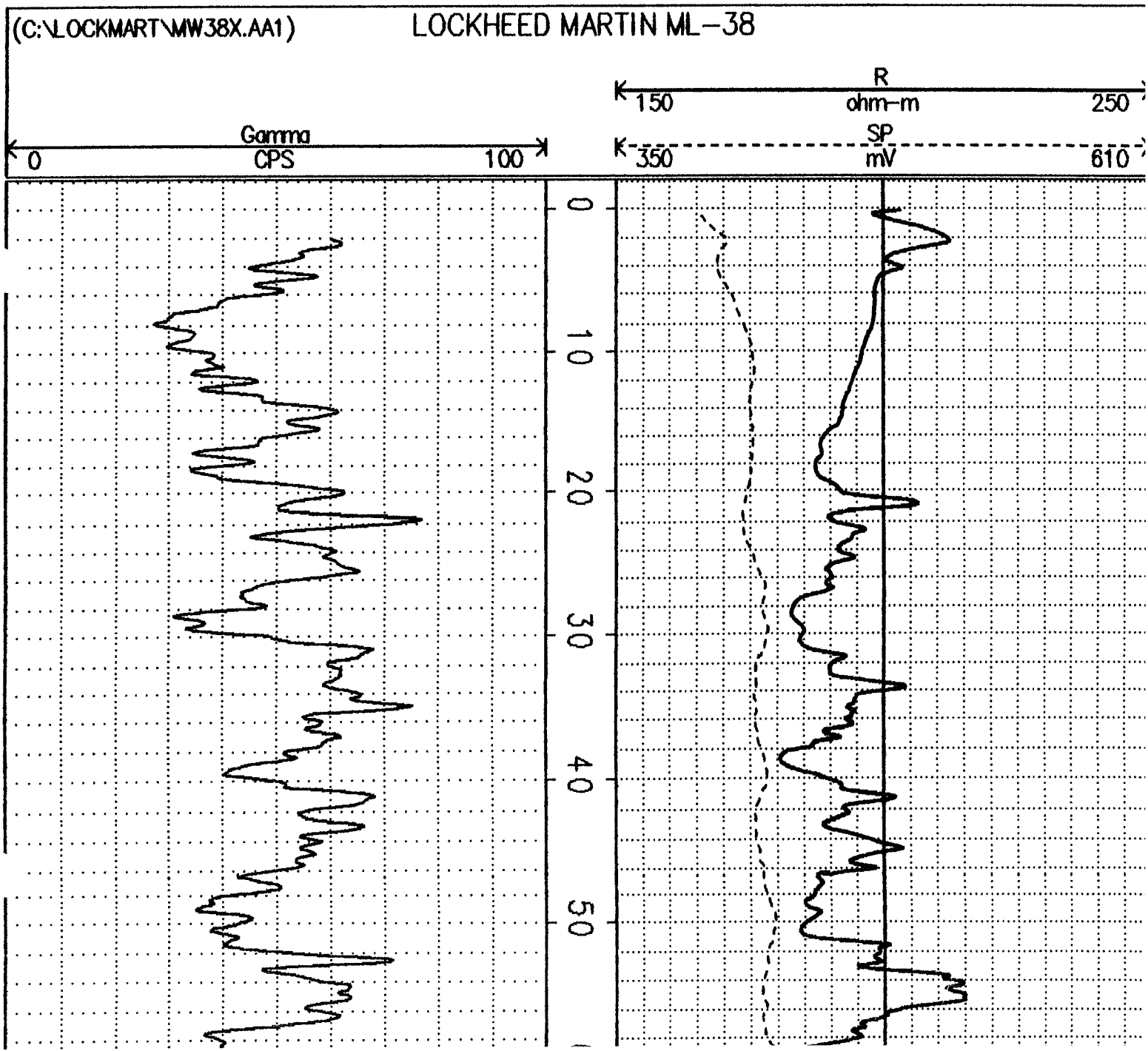
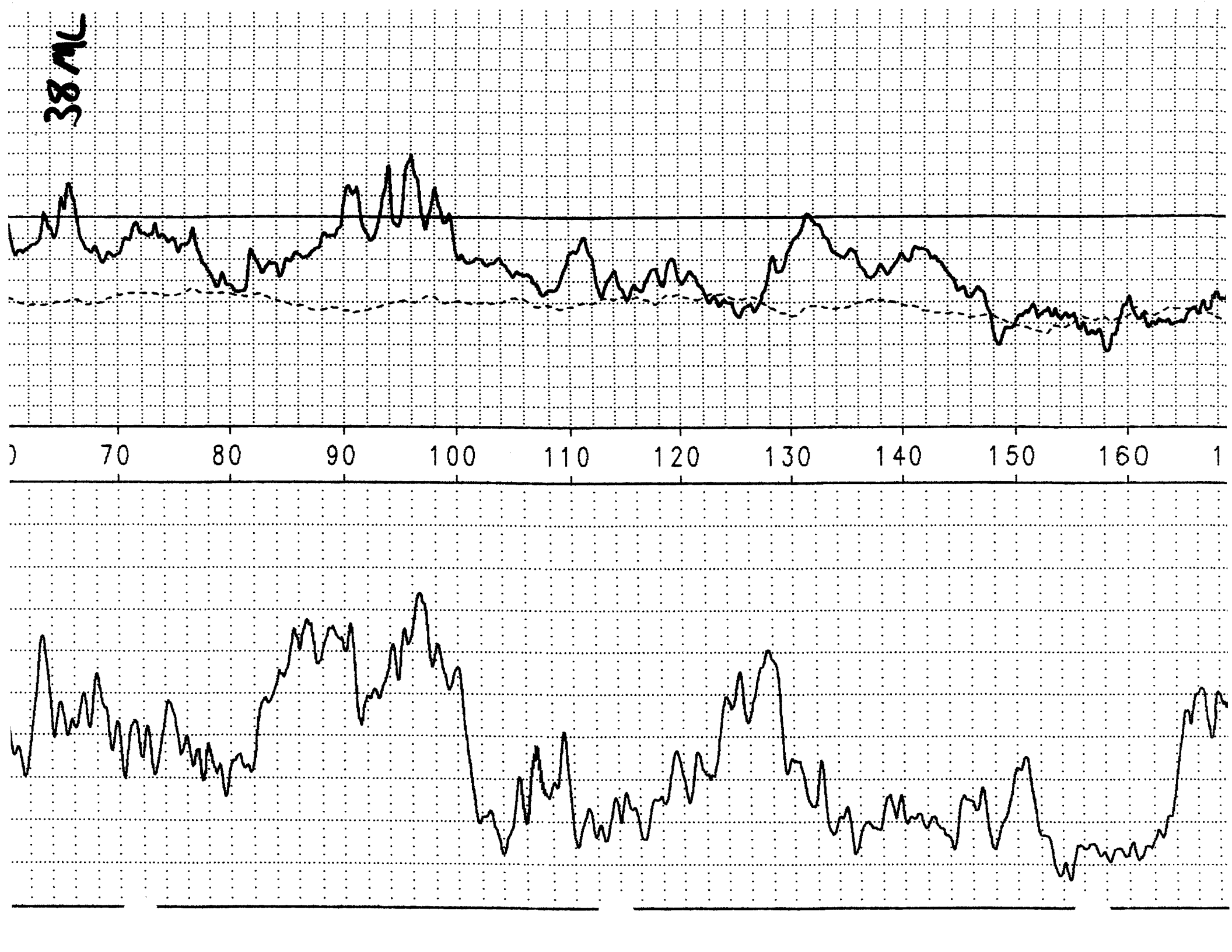
390
400
410
420
430
440
450
460
Gamma
0
CPS
100
SP
350
mV
610
R
150
ohm-m
250
(C:\LOCKMART\MW37.AD1)
LOCKHEED MARTIN MW37 7/20/99

38ML

DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 516-981-2255 FAX 516-981-2369

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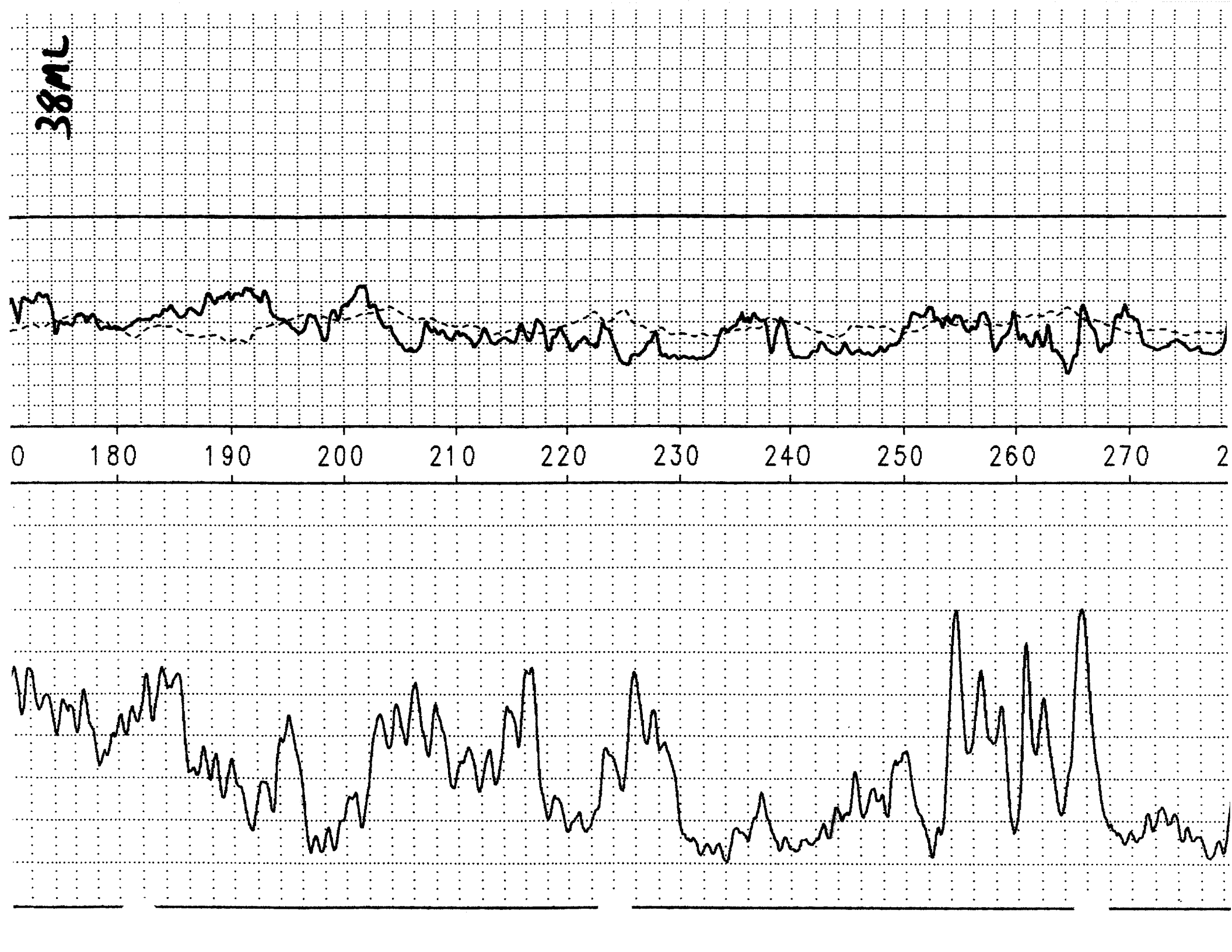
70
80
90
100
110
120
130
140
150
160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200
210
220
230
240
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260
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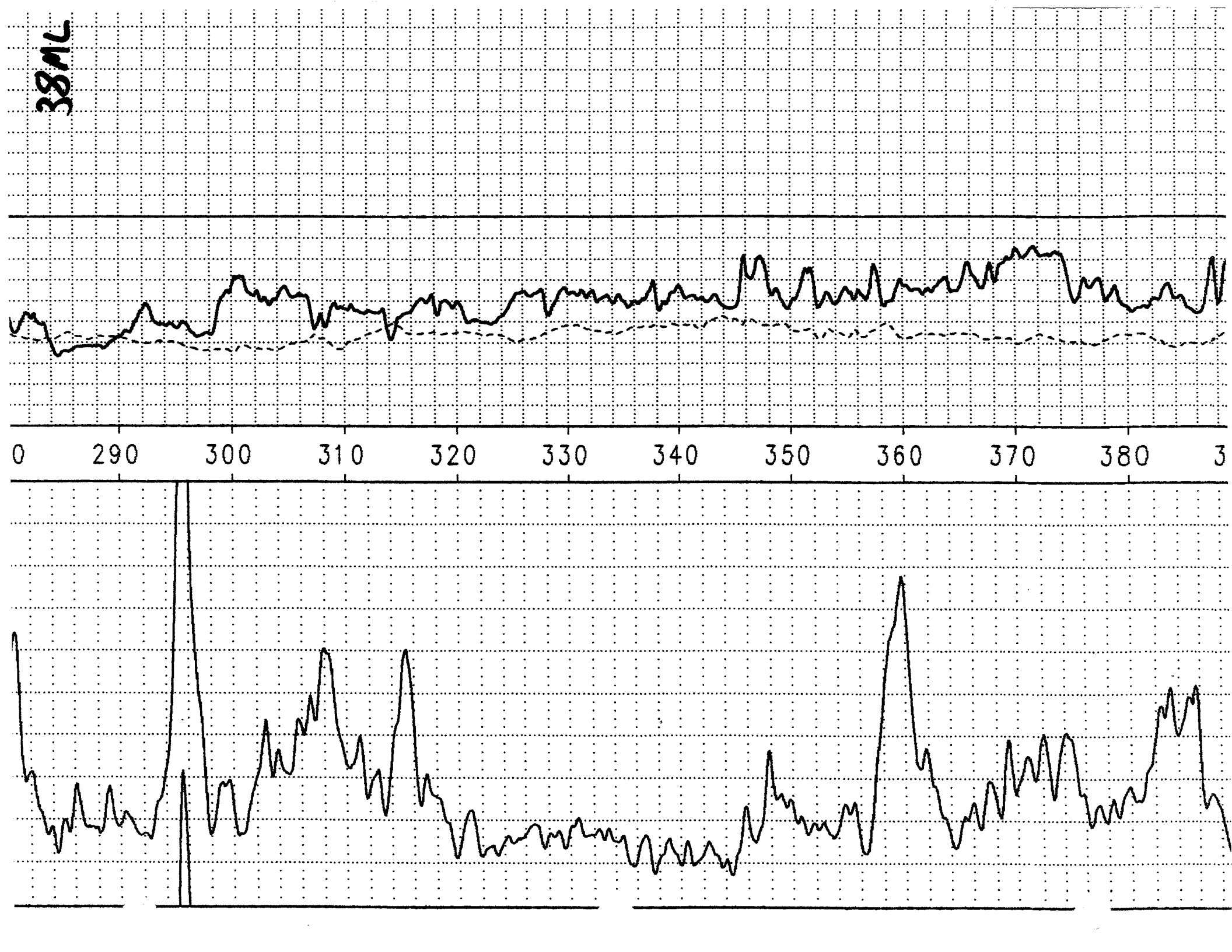
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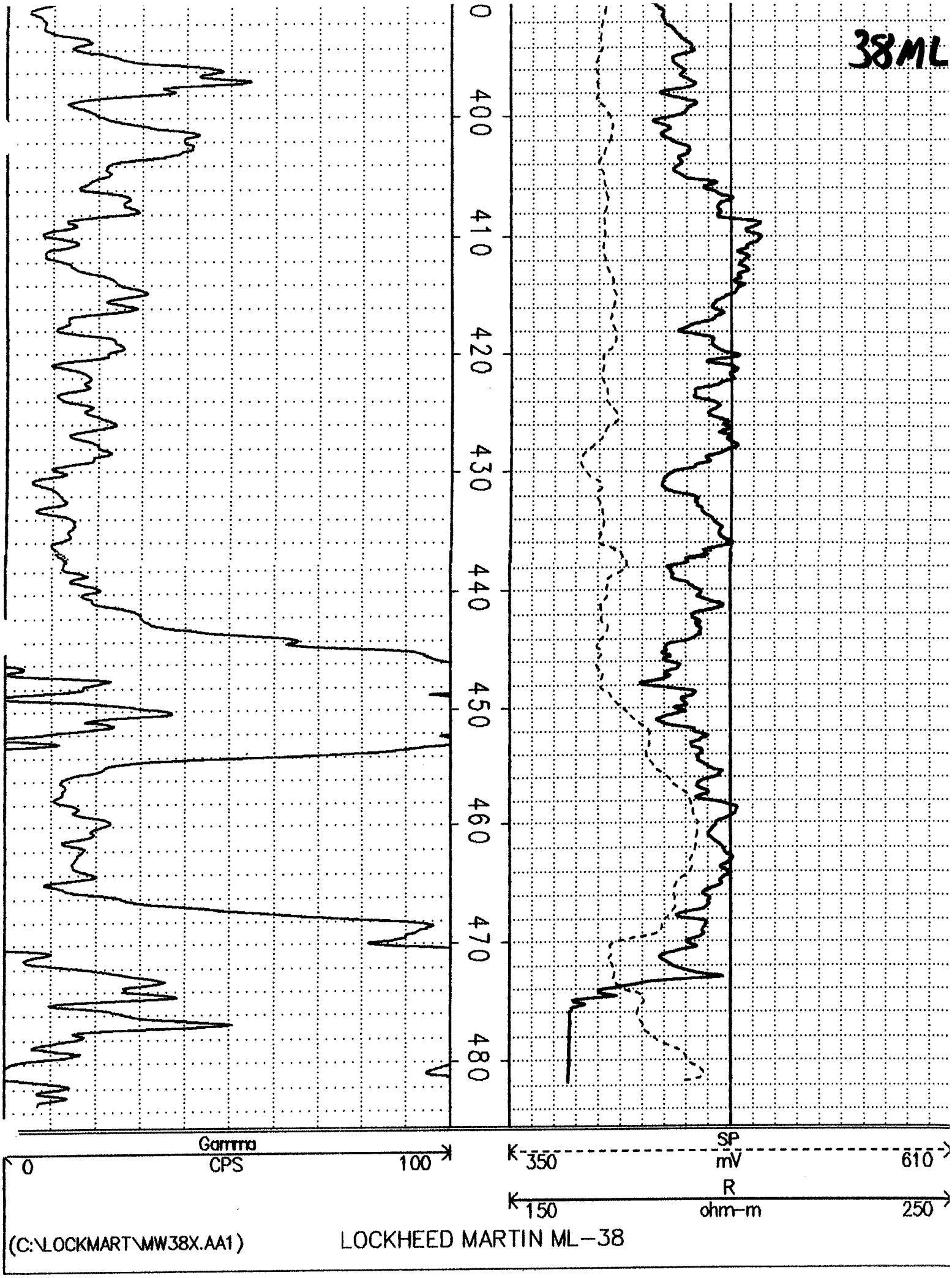
320
330
340
350
360
370
380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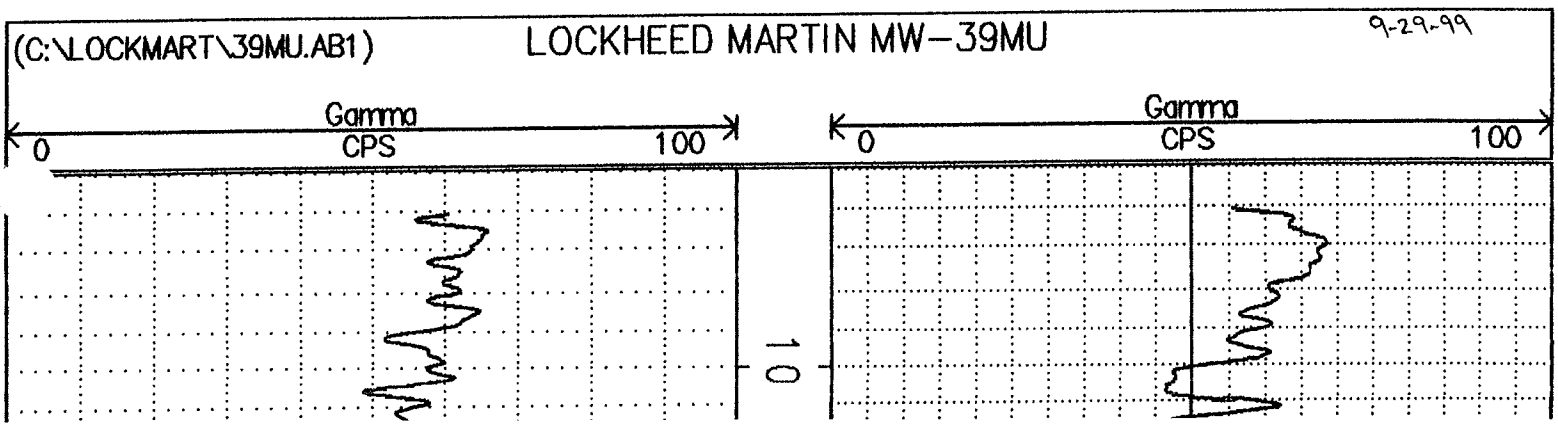
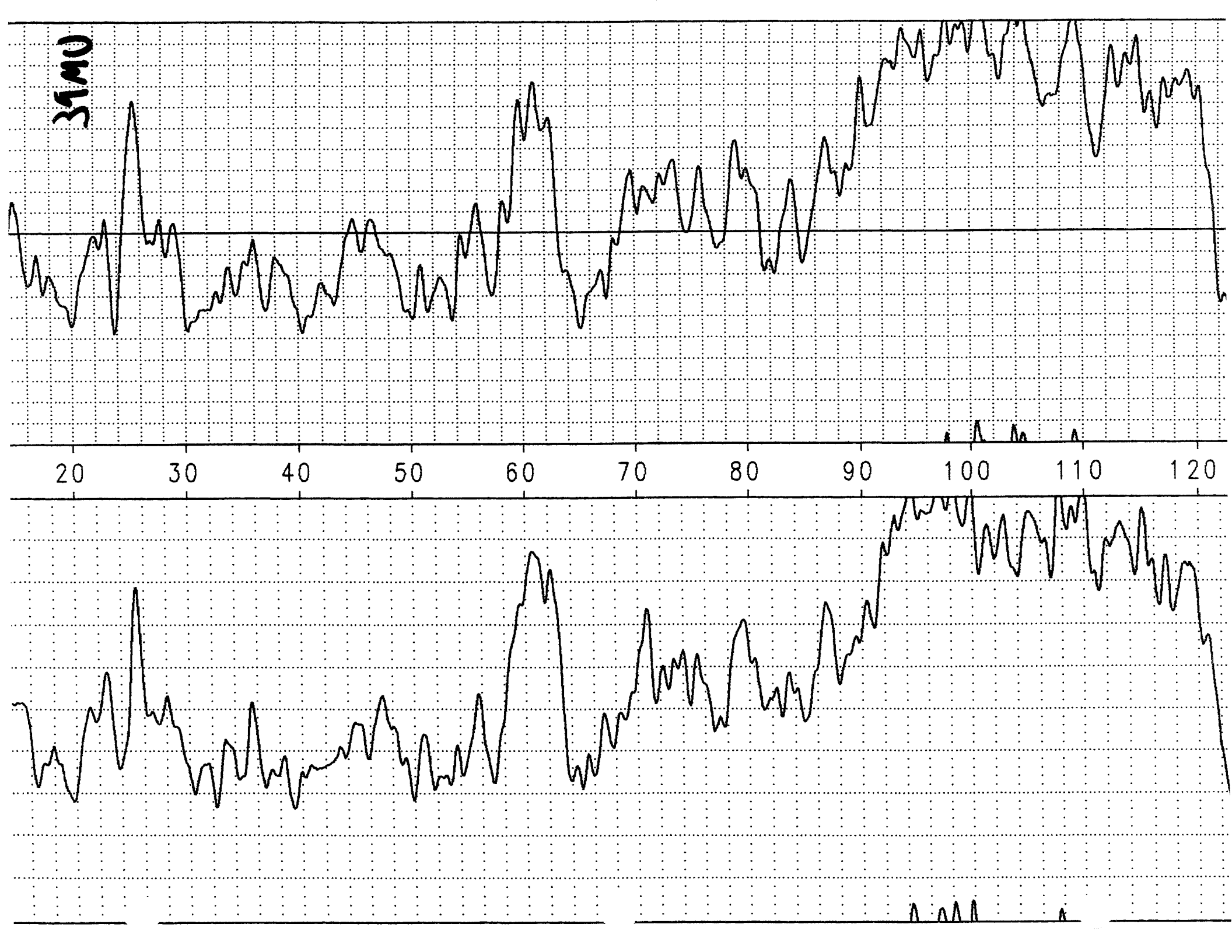
0
400
410
420
430
440
450
460
470
480
Gamma
0
CPS
100
SP
350
mV
610
R
150
ohm-m
250
(C:\LOCKMART\MW38X.AA1)
LOCKHEED MARTIN ML-38

39MU

DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 516-981-2255 FAX 516-981-2369

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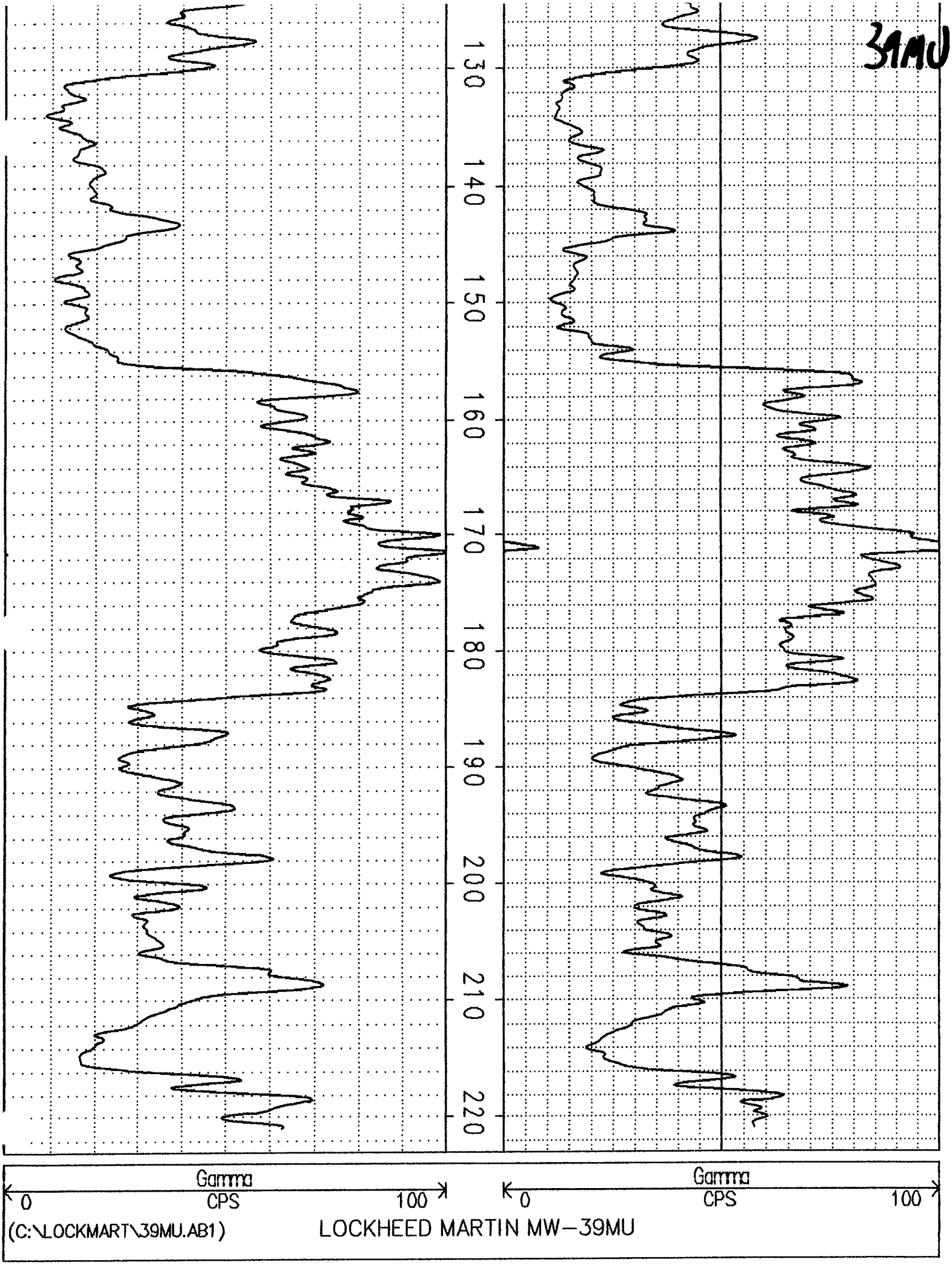
39MU
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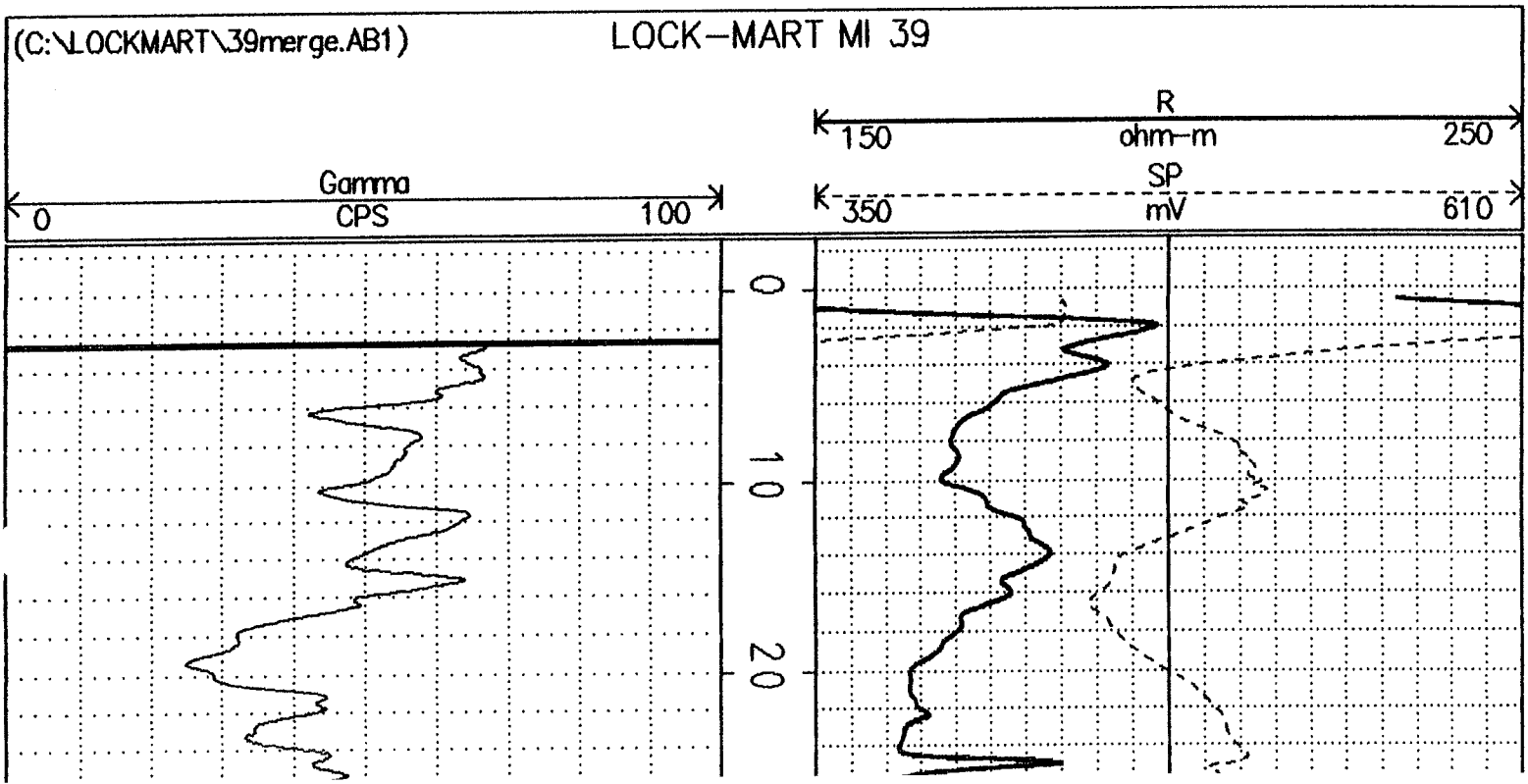
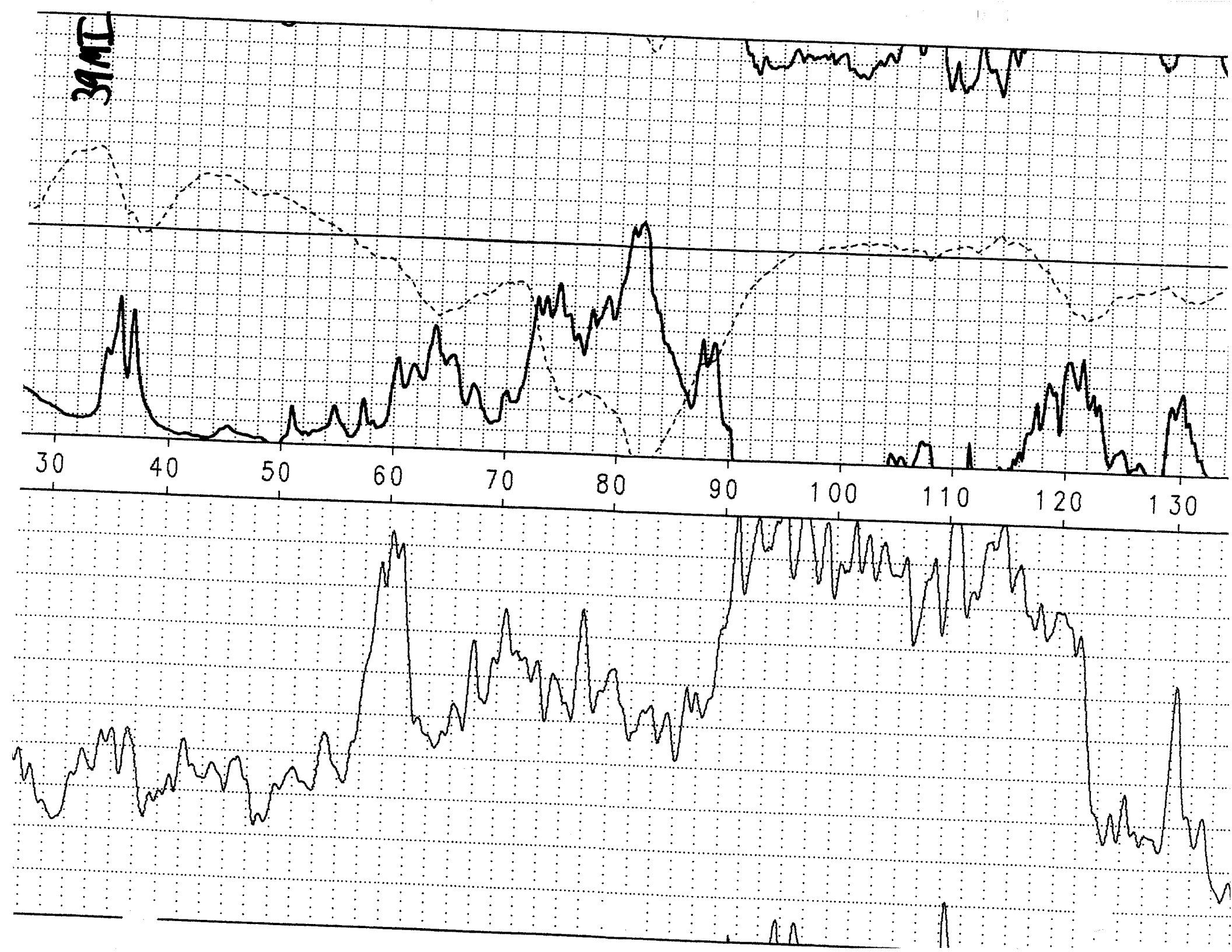
140
150
160
170
180
190
200
210
220
Gamma
0
CPS
100
Gamma
0
CPS
100
(C:\LOCKMART\39MU.AB1)
LOCKHEED MARTIN MW-39MU

39 MI

DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 516-981-2255 FAX 516-981-2369

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120
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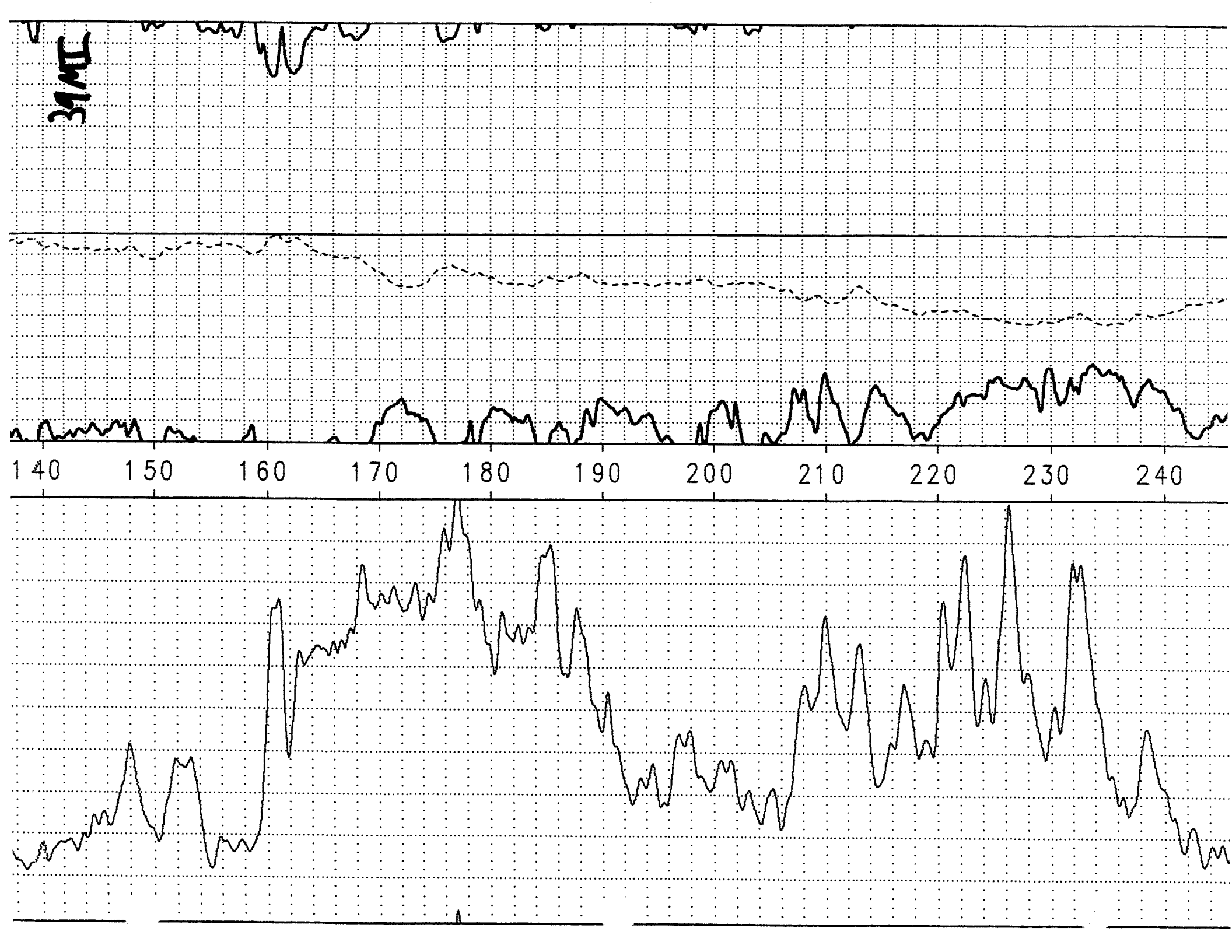
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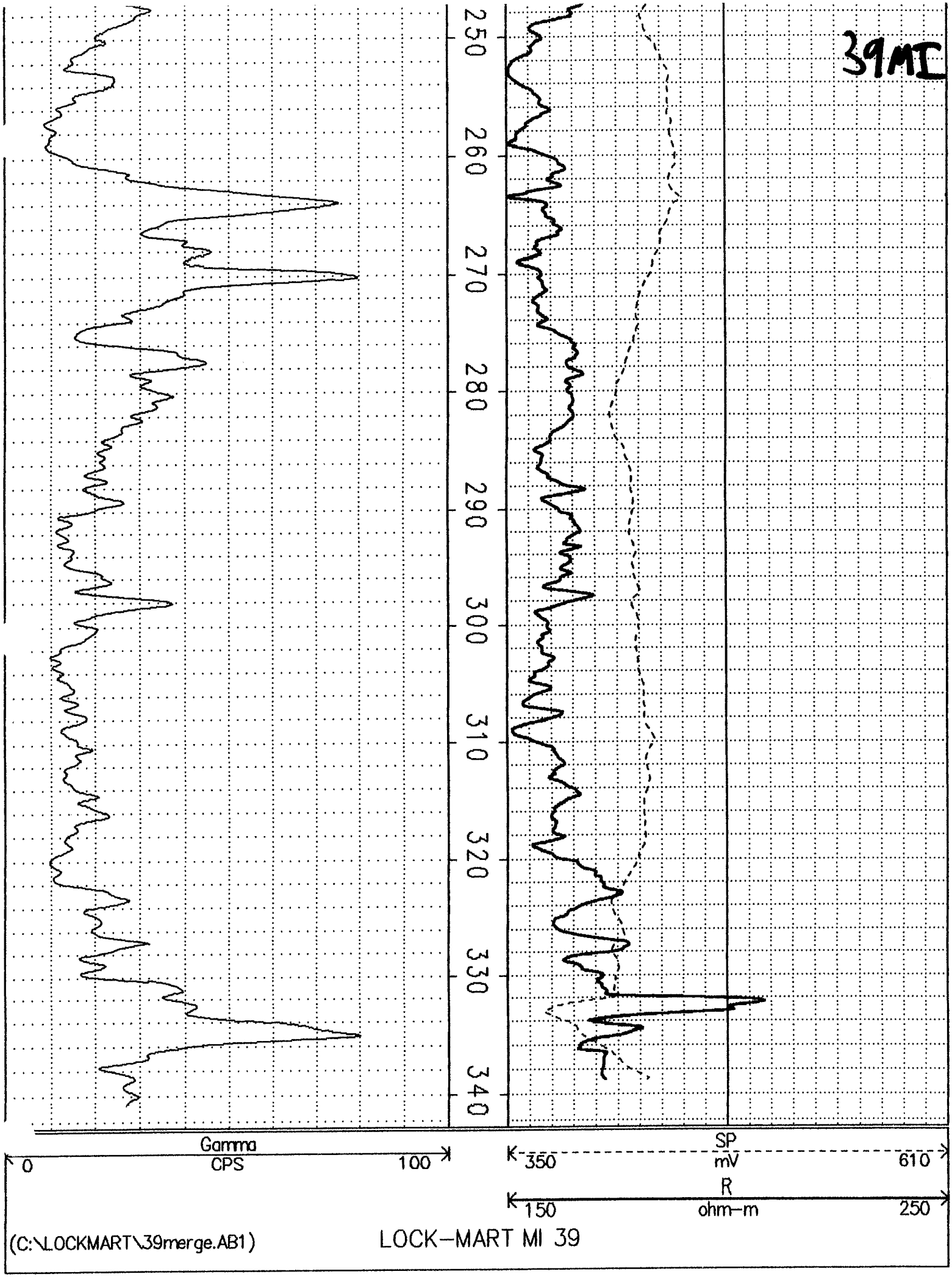
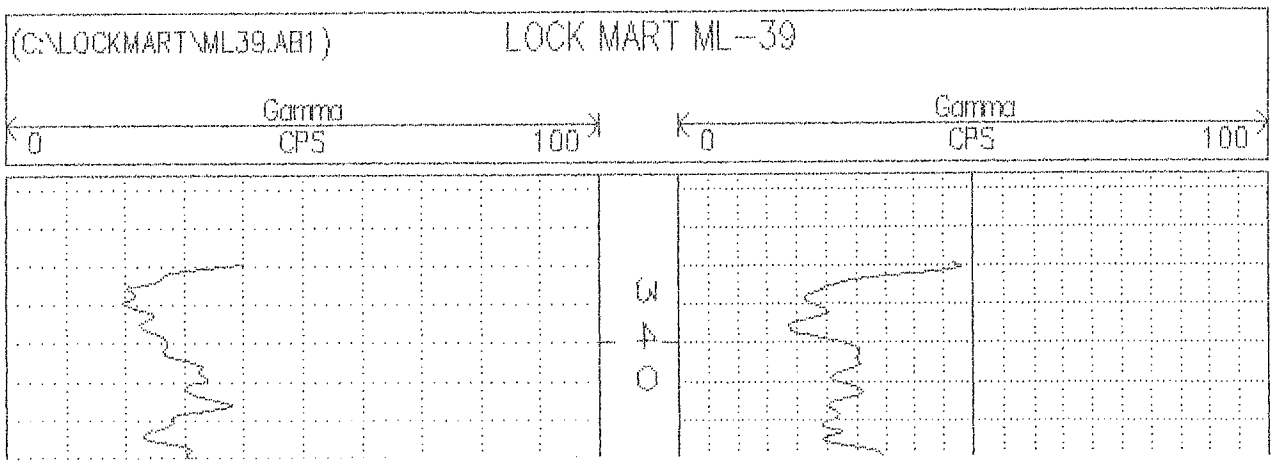
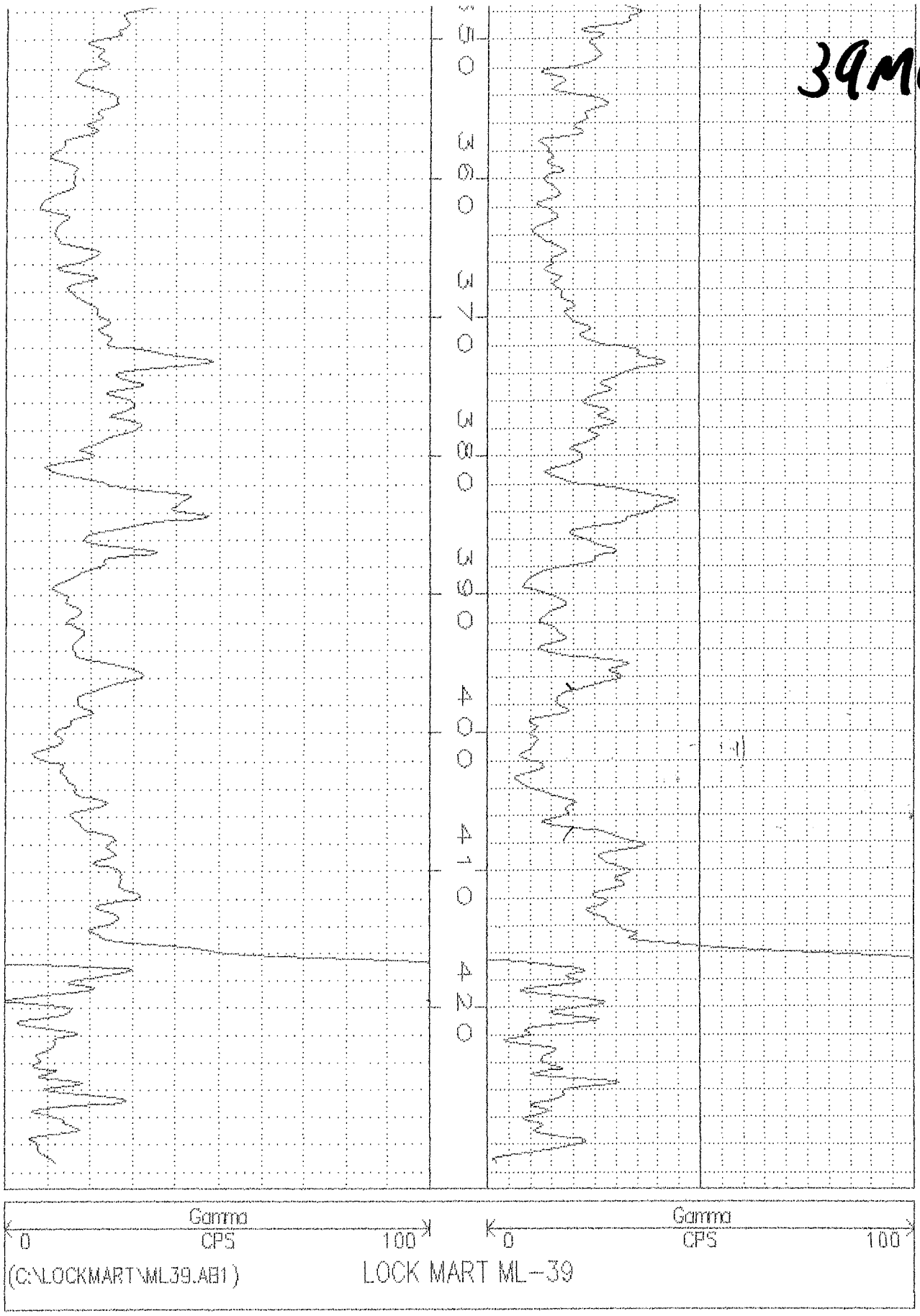

39MI
250
260
270
280
290
300
310
320
330
340
Gamma
CPS
0
100
SP
mV
K 350
610
R
ohm-m
K 150
250
(C:\LOCKMART\39merge.AB1)
LOCK-MART MI 39

39ML


(C:\LOCKMART\ML39.AB1)
LOCK MART ML--39
Gamma
0
CPS
100
Gamma
0
CPS
100
DEPTH

39ML


300
350
400
450
Gamma
0
CPS
100
Gamma
0
CPS
100
(C:\LOCKMART\ML39.AB1)
LOCK MART ML-39

DRAFT

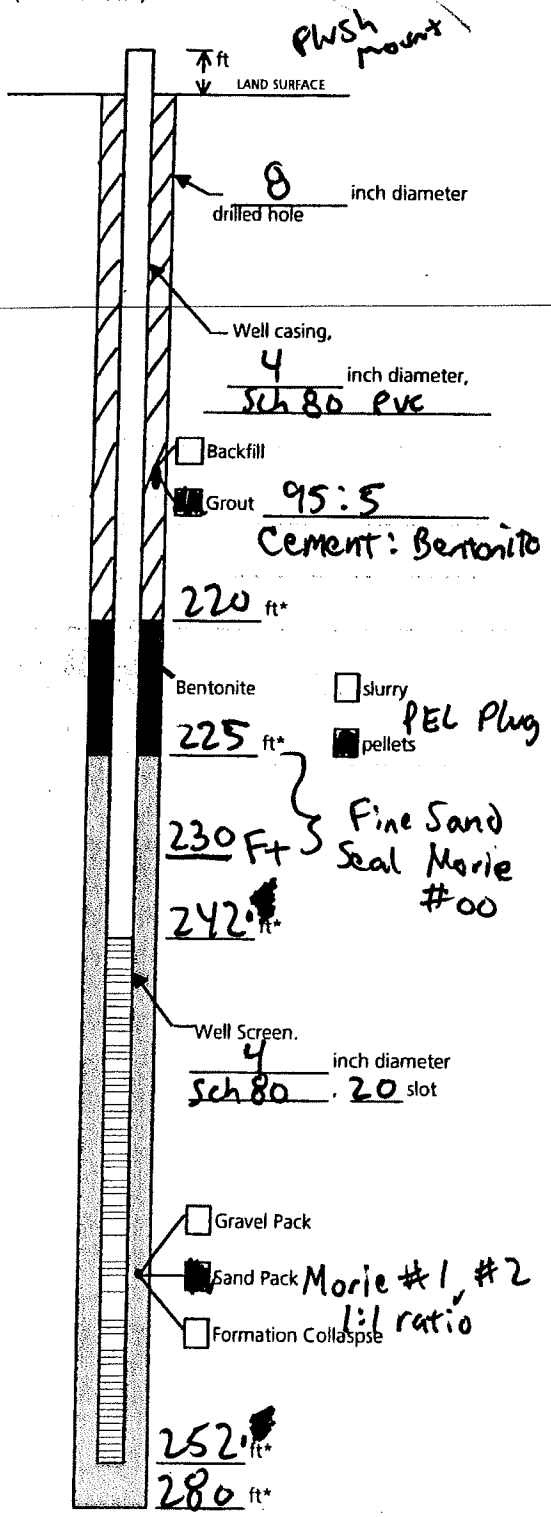
Appendix E

Construction Logs for Wells Clusters 37, 38, and 39

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project LMC Well 37MU

Town/City Lake Success

County Nassau State NY

Permit No. [redacted]

Land-Surface Elevation and Datum:

179' 11 1/2" feet ■ Surveyed ☐ Estimated

Installation Date(s) 7.27.99 → 7.30.99

Drilling Method Mud Rotary

Drilling Contractor Delta Well & Pump

Drilling Fluid Aquagel-bentonite & potable water

Development Technique(s) and Date(s)

Air Lift & Surge 8.2.99

Fluid Loss During Drilling 1500 gallons

Water Removed During Development 13,000 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

Remarks

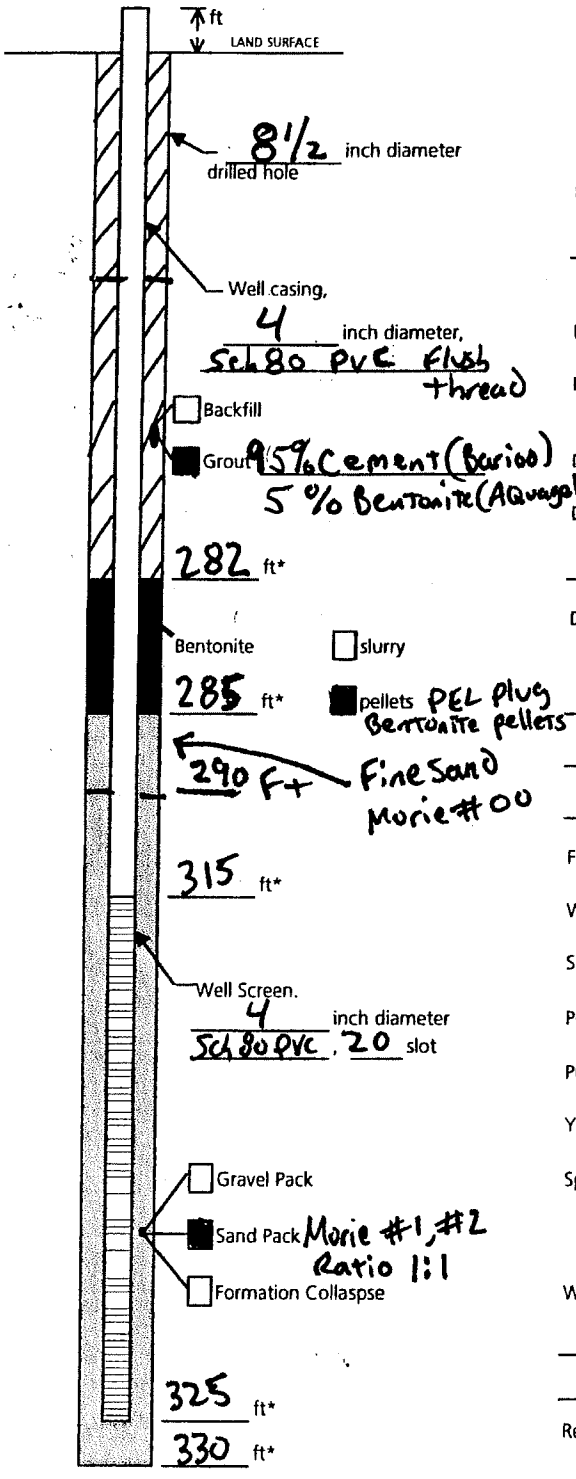
Prepared by A. Gilmore

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)

Flush mount



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project LMC Well 37MI

Town/City Lake Success

County Nassau State NY

Permit No. _____

Land-Surface Elevation and Datum:

179' 11 1/2" feet ■ Surveyed ☐ Estimated

Installation Date(s) 6·22·99 → 6·30·99

Drilling Method Mud Rotary

Drilling Contractor Delta Well & Pump

Drilling Fluid Aqua gel Bentonite & potable water

Development Technique(s) and Date(s)

7·1·99 → 7·2·99

Air lift & surge.

removed 5000 gallons

Fluid Loss During Drilling ≈ 3000 gallons

Water Removed During Development 5000 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

Remarks _____

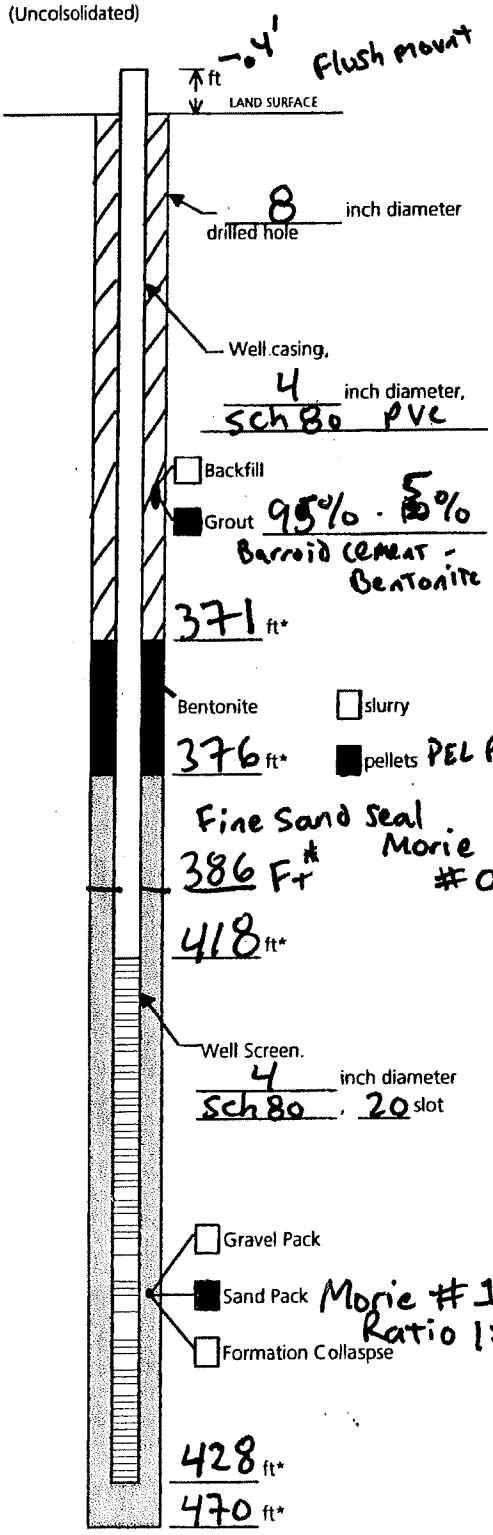
Prepared by A. Gilmore

Wellcstr.xls.xls
10/20/98

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project LMC Well 37 ML

Town/City LAKE SUCCESS

County NASSAU State NY

Permit No. _____

Land-Surface Elevation and Datum:

179' & 11.5" feet ■ Surveyed ☐ Estimated

Installation Date(s) 7.8.99 to 7.21.99

Drilling Method Mud Rotary

Drilling Contractor Delta Well & Pump, Inc.

Drilling Fluid Aqua gel bentonite & potable water

Development Technique(s) and Date(s)

Air Lift & surge 7.22.99

Fluid Loss During Drilling 5500 gallons

Water Removed During Development 7300 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

Remarks _____

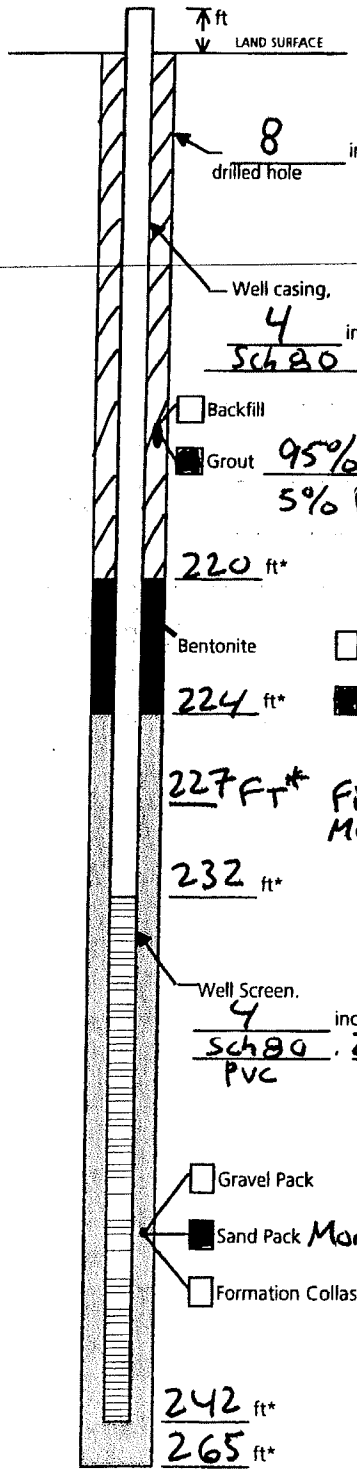
Prepared by A. Gilmore

Wellcstr.xls.xls
10/20/98

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project NY001827.0003 Well 38 MU

Town/City Lakeville

County Nassau State NY

Permit No. _____

Land-Surface Elevation and Datum:

_____ feet ■ Surveyed ☐ Estimated

Installation Date(s) 8 10 99 - 8.17.99

Drilling Method Mud Rotary

Drilling Contractor Delta Well & Pump, Inc.

Drilling Fluid Quick gel & potable water

Development Technique(s) and Date(s)

Air lift & surge. 8.18.99

Fluid Loss During Drilling 3,500 gallons

Water Removed During Development 4200 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

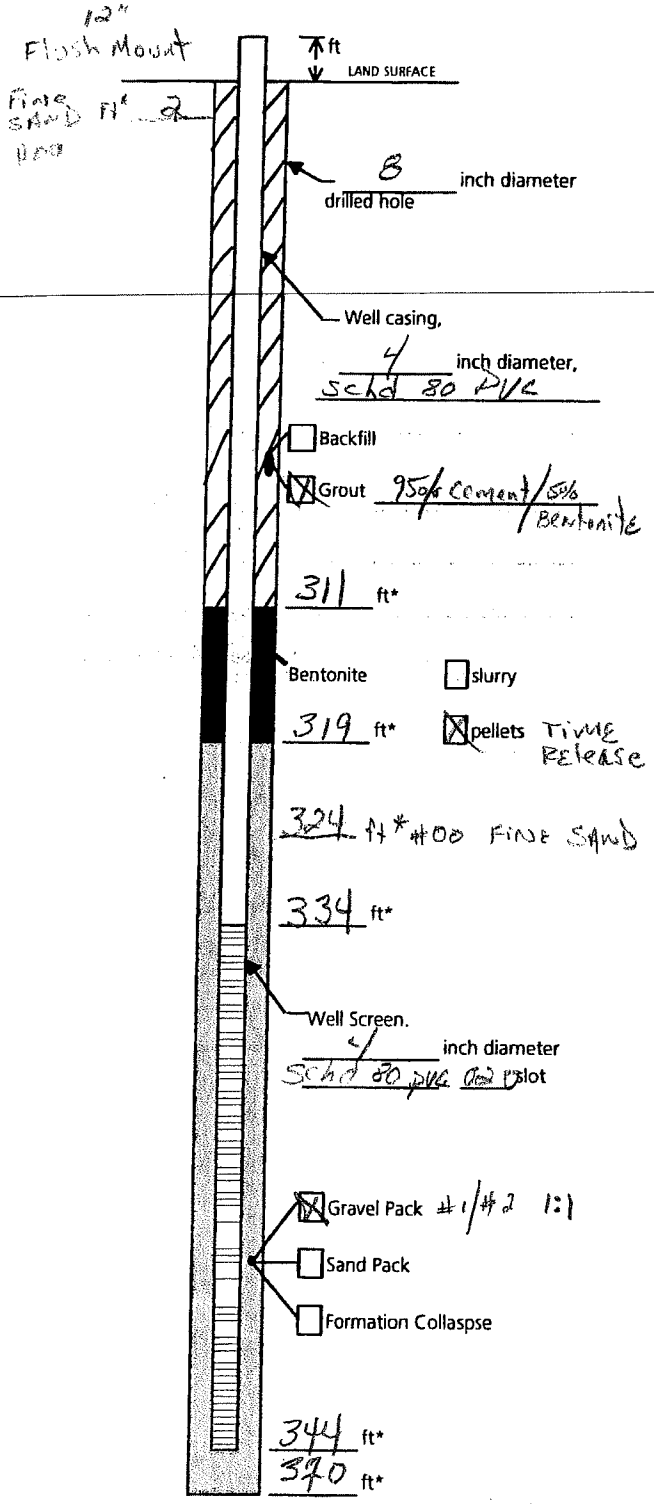
Remarks _____

Prepared by A. Gilmore

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project Lockheed Martin Well 38MI

Town/City Great Neck / Lake Success

County Nassau State NY

Permit No. N/A

Land-Surface Elevation and Datum:

189 feet ☐ Surveyed ☒ Estimated

Installation Date(s) 8/10/99 - 8/16/99

Drilling Method MUD Rotary

Drilling Contractor Delta Well & Pump

Drilling Fluid Super Gel X

Development Technique(s) and Date(s)

8/17/99 / Pump & Surge via Air Lift

Fluid Loss During Drilling ~3000 gallons

Water Removed During Development ~9,300 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water ~151 feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Monitoring

Remarks

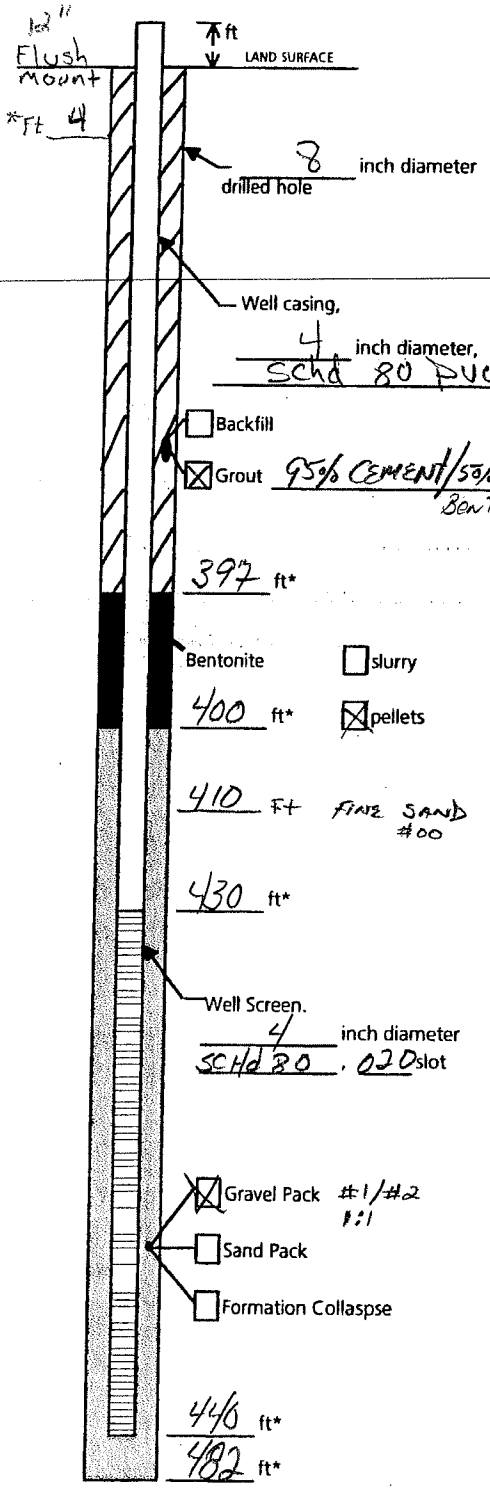
Prepared by J Gabrinowitz

Wellcstr.xls.xls
10/20/98

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project Lockheed Martin Well 38ML

Town/City Lake Success / Great Neck

County NASSAU State NY

Permit No. N/A

Land-Surface Elevation and Datum:

189 feet ☐ Surveyed ☒ Estimated

Installation Date(s) 7/26 – 8/4/99

Drilling Method MUD ROTARY

Drilling Contractor DELTA WELL & PUMP

Drilling Fluid AQUA GEL & SUPER GEL X.

Development Technique(s) and Date(s)

PUMP & SURGE VIA AIR LIFT 8/5/99

Fluid Loss During Drilling ~5210 gallons

Water Removed During Development ~11500 gallons

Static Depth to Water ~151 feet below M.P.

Pumping Depth to Water — feet below M.P.

Pumping Duration — hours

Yield — gpm Date —

Specific Capacity — gpm/ft

Well Purpose MONITORING

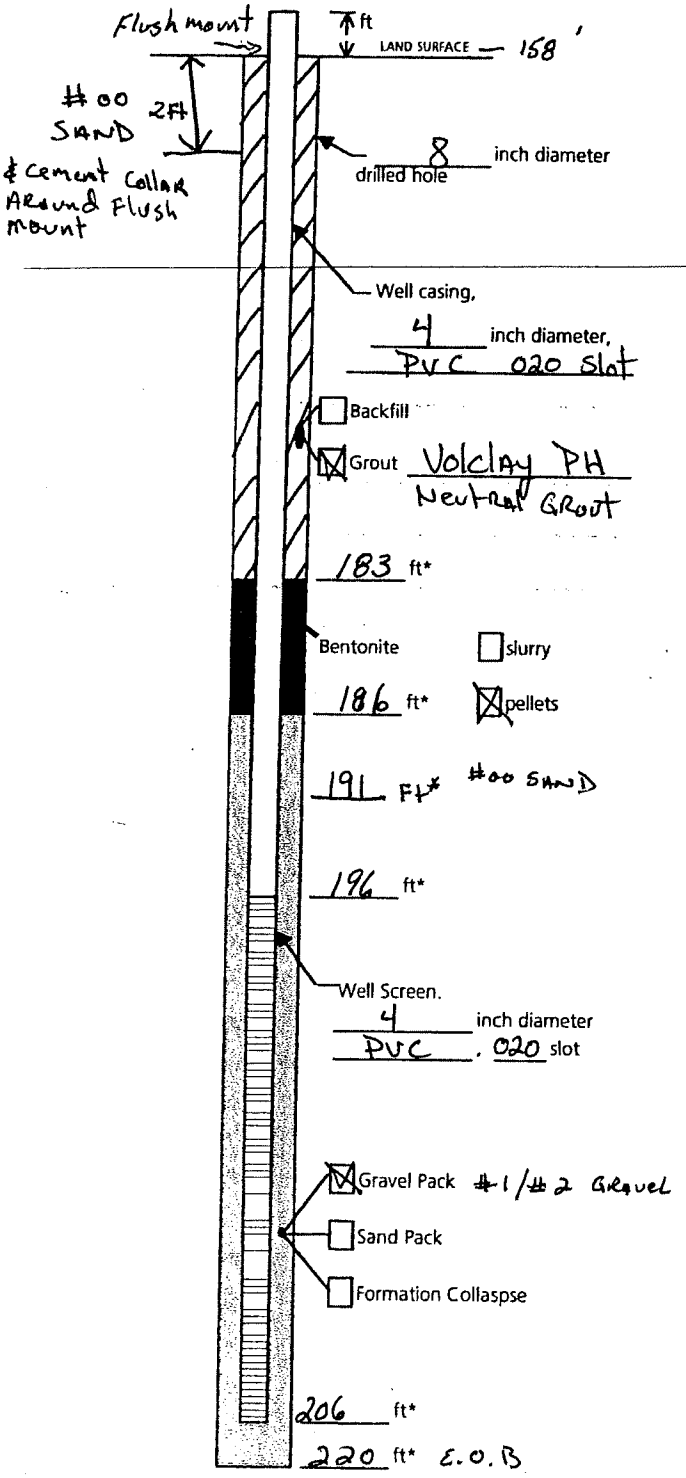
Remarks

Prepared by J GABRINOWITZ

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

END of Boring

Project Lock Heed Martin Well 39MW

Town/City Great Neck

County NASSAU State NY

Permit No. N/A

Land-Surface Elevation and Datum:

158 ± feet ☐ Surveyed ☒ Estimated

Installation Date(s) 9/27/99 – 10/1/99

Drilling Method MUD Rotary

Drilling Contractor Delta Well & Pump

Drilling Fluid Super Gel X Polymer Free Drilling Fluid

Development Technique(s) and Date(s)

Pump and Surge via Air Lift. 10/1/99

Fluid Loss During Drilling ~3,300 gallons

Water Removed During Development ~9540 gallons

Static Depth to Water 119.35 feet below M.P.

Pumping Depth to Water — feet below M.P.

Pumping Duration — hours

Yield — gpm Date —

Specific Capacity — gpm/ft

Well Purpose

Monitoring Well

Remarks

Total Depth of Well with End Cap 206.8'

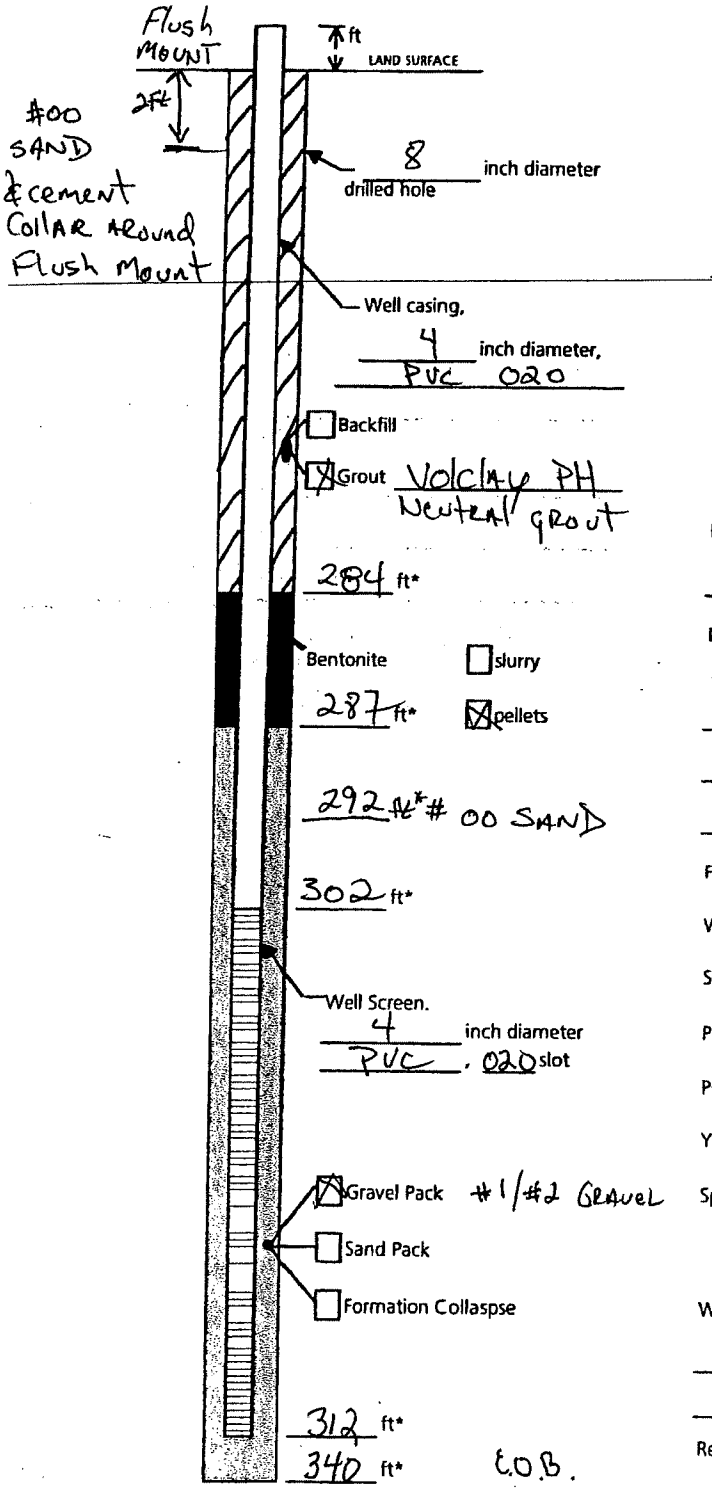
Prepared by J Babrinowitz

Wellcstr.xls.xls

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

END OF Boring

Project Lockheed Martin Well 39MI

Town/City Great Neck

County NASSAU State NY

Permit No. N/A

Land-Surface Elevation and Datum:

158 feet ☐ Surveyed ☒ Estimated

Installation Date(s) 9/7/99 - 9/17/99

Drilling Method MUD ROTARY

Drilling Contractor Delta Well & Pump

Drilling Fluid Super Rel X Polymer Free Drilling Fluid

Development Technique(s) and Date(s)

Pump & Surge Via Air Lift 9/20/99

Fluid Loss During Drilling ~4,100 gallons

Water Removed During Development ~11,900 gallons

Static Depth to Water 119.47 feet below M.P.

Pumping Depth to Water — feet below M.P.

Pumping Duration — hours

Yield — gpm Date —

Specific Capacity — gpm/ft

Well Purpose

MONITORING WELL

Remarks

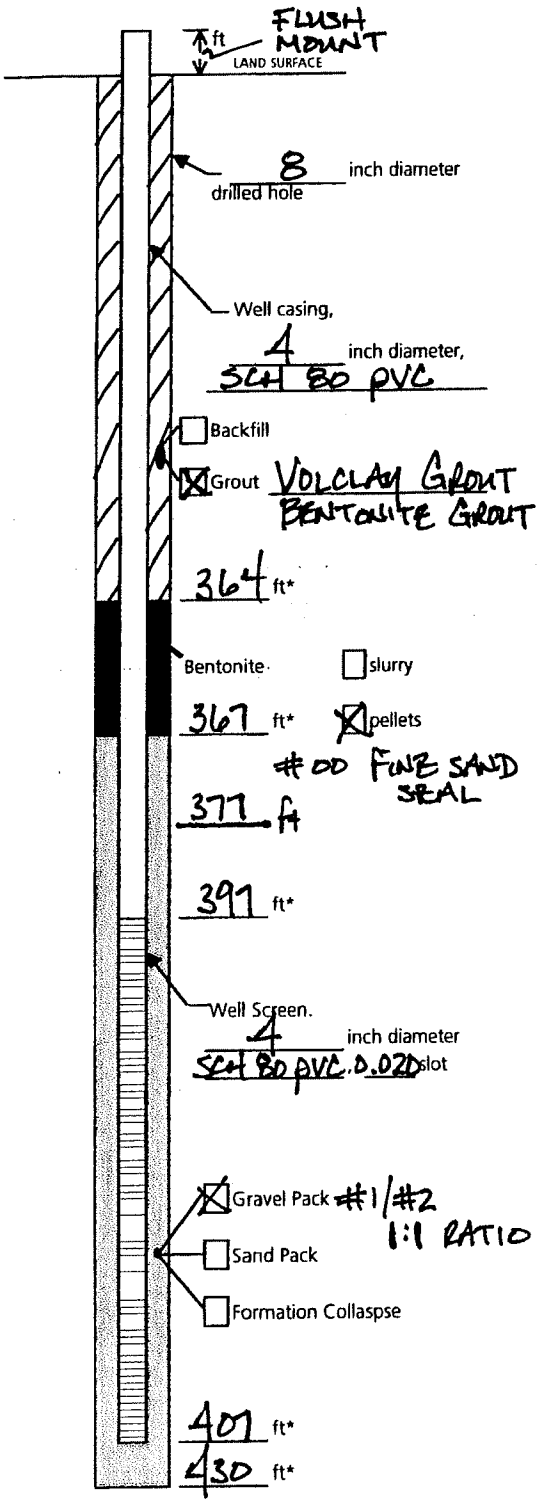
Total Depth of WELL with End Cap 312.8'

Prepared by J Cabrera

ARCADIS GERAGHTY & MILLER

Well Construction Log

(Uncolsolidated)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project LOCKHEED MARTIN Well 39 ML

Town/City GREAT NECK

County NASSAU State NY

Permit No. N/A

Land-Surface Elevation and Datum:

158 feet ☐ Surveyed ☒ Estimated

Installation Date(s) 10.7.99 → 10.14.99

Drilling Method MUD ROTARY

Drilling Contractor DELTA WELL & PUMP CO.

Drilling Fluid POTABLE WATER AND SUPER GEL X

Development Technique(s) and Date(s)

AIR LIFT PUMPING AND SURGING ON 10/15/99 AND 10/18/99 → DTW ≈ 120 FT BLS

Fluid Loss During Drilling 4,000 gallons

Water Removed During Development 19,000 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose MONITORING

Remarks _____

Prepared by C. KEEAL

DRAFT

Appendix F

Well Development Logs for Well Clusters 37, 38, and 39

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 37 MI

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: _____

STATIC DEPTH TO WATER*: _____

TOTAL DEPTH OF WELL*: 325'

TOTAL GALLONS REMOVED DURING DEVELOPMENT 5,000

DEVELOPED BY: A. Gilmore

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
7/2/99	13:05	55						
	13:20	Surging & Air for 5 minutes then pumping for 10 minutes						
	13:30		4,500	6.57	215	25°	16	
	13:40			7.62	215	24°	62.5	
	13:45			7.66	205	23°	20.7	"
	13:50			7.59	200	20°	14.03	
	14:00			7.61	190	20°	10.50	
	14:05			7.62	195	20°	10.16	
		→ End of development, removed * 5,000 gallons						
	* Well	Development started on 7/1/99.						

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 37 ML

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: _____

STATIC DEPTH TO WATER*: 97.4

TOTAL DEPTH OF WELL*: 428'

TOTAL GALLONS REMOVED DURING DEVELOPMENT 7,300

DEVELOPED BY: A. Filmore

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
7/22/99	13:35	75		11.60	1200	20°	7200	muddy (drill fluid)
	13:40	→ beginning to clear						
	14:15			8.55	220	17°	81.7	
	14:22	→ surging well						
	14:40	100	4,500					
	14:45			8.33	140	17°	32.1	
	14:55			7.99	140	17°	26.8	
	15:05			7.95	140	17°	22.1	
	15:08		7,300					
			↳	End development				

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 37mu

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: _____

STATIC DEPTH TO WATER*: 142.8

TOTAL DEPTH OF WELL*: 252'

TOTAL GALLONS REMOVED DURING DEVELOPMENT 13,000

DEVELOPED BY: A. Gilmore

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
8/2/99	10:00	7.5		8.34	290	19°	>200	
	10:30	surging well						
	11:30			7.64	230	19°	71.1	
	12:00	stop development						
	17:00	re-commence well developing						
	17:30			8.67	230	21°	59.6	
	17:40			7.66	210	21°	23.6	
	17:50			7.71	210	21°	17.01	
	18:00			7.72	210	21°	14.45	
	18:10	→ Complete well Development						

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 38 MW

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: _____

STATIC DEPTH TO WATER*: _____

TOTAL DEPTH OF WELL*: 242'

TOTAL GALLONS REMOVED DURING DEVELOPMENT 4,200

DEVELOPED BY: A. Gilmore

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
8/18/99	9:30	30		commence well development				
↓	11:00			7.75	900	21°	8.87	
	11:20			7.87	700	22°	6.21	
	11:30			8.04	650	20°	6.01	
	12:45			8.22	600	21°	5.95	
	12:50			8.25	600	20.5°	4.68	
	13:00			8.20	600	21°	4.51	
	13:15	Pump out ≈ 4,200, needed to remove ≈ 3500						
↓	13:30	complete well development						

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 38 MI

Air Lift tubing
~~PUMP~~ DECONTAMINATED PRIOR TO DEVELOPMENT: yes

STATIC DEPTH TO WATER*: 151.0

TOTAL DEPTH OF WELL*: 344.6'

TOTAL GALLONS REMOVED DURING DEVELOPMENT 9,300

DEVELOPED BY: J Gabrinowitz

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
8/17/99	14:00	105		6.65	140.0	16	10.21	clear
	14:12	↓		6.54	140.0	16	5.73	↓
	14:15	↓	Pump off		Surging			↓
	14:23	105	Pump on					
	14:25	↓		7.02	140.0	16	28.5	"
	14:28	↓	-	7.19	140.0	16	28.6	
	14:35	↓		7.54	140.0	16	11.7	
	14:42	↓	Pump off		Surging			↓
	14:42	105	Pump on					
	14:50	↓		7.40	135.0	15	13.3	
	14:55	↓		7.36	138.0	15	10.3	
	15:05	↓		7.40	140.0	15	9.87	
	15:20	↓	Pump off		Surging			↓
	15:23	↓	Pump on					

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 38 MI

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: yes

STATIC DEPTH TO WATER*: 15.1

TOTAL DEPTH OF WELL*: _____

TOTAL GALLONS REMOVED DURING DEVELOPMENT ~9,300

DEVELOPED BY: J Gabrinowitz

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (°C)	TURBIDITY (NTU)	appearance
8/17/99	15:29	105		7.40	140.0	15	10.8	clear
↓	15:35	↓		7.38	140.0	15	5.73	↓
↓	15:40	↓		7.40	140.0	15	5.68	↓
↓	15:45	↓	Pump OFF					↓

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 38ML

AIR LINE ~~PUMP~~ DECONTAMINATED PRIOR TO DEVELOPMENT: Yes

STATIC DEPTH TO WATER*: 15.10

TOTAL DEPTH OF WELL*: _____

TOTAL GALLONS REMOVED DURING DEVELOPMENT 11,200

DEVELOPED BY: J Gabrinowitz / C Keen

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
8/5/99	Initial	75		8.50	190.0	15.0	2000	cloudy
	11:00	↓		8.30	110.0	15.0	2000	↓
	11:02	↓		Pump	off	Surging		
	11:29	75		Pump	on			↓
	11:30	↓		8.3	100.0	15.0	159.1	cloudy
	12:00	↓		8.4	100.0	15.0	140.5	↓
				Pump	off	Surging		↓
				Changed	Compressors			
	17:20	120		Pump	on			
	17:22			8.30	100.0	16	102.0	cloudy
	17:33			8.10	100.0	15	67.3	↓
	17:45			7.70	90.0	14	29.1	clear
	17:48			Pump	off	Surging		↓
	17:55			Pump	on	↓		↓

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 38 ML

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: yes

STATIC DEPTH TO WATER*: 151

TOTAL DEPTH OF WELL*:

TOTAL GALLONS REMOVED DURING DEVELOPMENT

DEVELOPED BY: J Gabrinowitz / C Keen

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
8/5/99	18:07	120		7.85	90.0	15	22.0	clear
	18:09	"	Pump off Surging					"
	18:13	120	Pump on					"
	18:16	"		7.43	90.0	14	47.8	cloudy
	18:20	"		7.46	90.0	14	20.8	Clear
	18:24	"		7.42	90.0	14	16.9	Clear
	18:27		Pump off					

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: MW,39-MU

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: yes

STATIC DEPTH TO WATER*: 119.35

TOTAL DEPTH OF WELL*: 206.8

TOTAL GALLONS REMOVED DURING DEVELOPMENT ~9540

DEVELOPED BY: J Gabrinowitz

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
10/1/99	950	40		Pump	ON		>200	Cloudy
	1015	45					>200	Cloudy
	1030		Pump OFF	Surging				
	1100	55	Pump ON				>200	cloudy
	1125	55		7.3	600	14	39.5	Cloudy
	1129	55		7.6	575	14	22.6	Clear
	1135	55		7.6	575	14	20.6	clear
	1137	55	Pump off Surging					
	1144	55	Pump ON					
	1147	55		7.5	575	14	30.4	clear
	1155	55		7.6	575	14	14.5	clear
	1201	55		7.6	575	14	12.7	Clear
	1203	55	Pump off Surging					
	1210	55	Pump ON					

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: MW-39-MW

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: yes

STATIC DEPTH TO WATER*: 119.35

TOTAL DEPTH OF WELL*: 206.8

TOTAL GALLONS REMOVED DURING DEVELOPMENT ~9540

DEVELOPED BY: J Babriowitz

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
10/1/99	1215	55		7.6	575	14	40.3	Cloudy
	1222	55		7.6	575	14	20.4	Clear
	1237	55		7.6	575	14	14.5	Clear
	1239	55	Pump off Surging					
	1340	55	Pump on					
	1355	55		7.8	575	14	42.3	Cloudy
	1402	55		7.6	575	14	19.8	Clear
	1408	55		7.7	575	14	13.2	Clear
	1410	55	Pump off Surging					
	1425	55	Pump on					
	1430	55		7.6	575	14	38.4	Cloudy
	1445	55		7.7	575	14	19.6	Clear
	1452	55		7.6	575	14	12.7	Clear
	1455	55	Pump off					

* FEET BELOW TOP OF CASING

E.O.D

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 39 MI

poly air tube ~~PUMP~~ DECONTAMINATED PRIOR TO DEVELOPMENT: yes

STATIC DEPTH TO WATER*: 119.47'

TOTAL DEPTH OF WELL*: 312.8'

TOTAL GALLONS REMOVED DURING DEVELOPMENT ~11,900

DEVELOPED BY: J Gabrinowitz

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (°C)	TURBIDITY (NTU)	appearance
I 9/20/99	10:47AM	~85		6.2	160.0	20.0	6.20	clear
	10:52AM	Pump		OFF	Surging			
	11:01AM	~90		6.9	20.0	20.0	>200	cloudy
	11:05AM	~95		7.1	290.0	15.0	29.30	clear
	11:12AM	~100		7.3	270.0	15.0	10.70	clear
	11:15AM	Pump		OFF	Surging			
	11:20AM	~110	Pump	ON				
	11:23AM	~110		7.2	180.0	15.0	6.88	clear
	11:30AM	~110		7.3	270.0	15.0	3.42	clear
	11:40AM	Pump		OFF	Surging			
	11:45AM	~120	Pump	ON				
	11:46AM	~120		7.3	205.0	15.0	85.0	cloudy
	11:50AM	~120		7.3	285.0	15.0	22.0	clear
	11:56AM	~120		7.3	160.0	15.0	3.84	clear
	11:57AM	[redacted]	5,800	Pump	off	Surging		

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 39 MI

~~PUMP~~ tubing DECONTAMINATED PRIOR TO DEVELOPMENT: Yes

STATIC DEPTH TO WATER*: 119.47'

TOTAL DEPTH OF WELL*: 312.8'

TOTAL GALLONS REMOVED DURING DEVELOPMENT _____

DEVELOPED BY: J Gabrinowitz

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND.	TEMP. (C)	TURBIDITY (NTU)	appearance
9/20/99	3:07 PM	120		Pump	ON	[redacted]		cloudy
	3:15pm	120		7.3	175.0	15.0	82.3	cloudy
	3:23pm	120		7.2	170.0	15.0	27.4	clear
	3:27pm	120		7.3	185.0	15.0	4.63	clear
	3:32pm	Pump off			Surging			
	3:38pm	120	Pump on					clear
	3:45pm	120		7.1	150	15.0	336	clear
	3:49pm	120		7.2	150	15.0	1.98	clear
	3:56pm	120		7.2	165	15.0	1.96	clear
	3:58pm		Pump off		Surging			
	4:05 pm	120	Pump on				[redacted]	clear
	4:09pm	120		7.3	185.0	15.0	15.7	clear
	4:13pm	120		7.3	185.0	15.0	2.81	clear
	4:17pm	120		7.3	180.0	15.0	1.99	clear

4:20pm ~6,600 Pump off

* FEET BELOW TOP OF CASING

DEVELOPMENT OF MONITORING WELLS

MONITORING WELL DESIGNATION: 39 ML

PUMP DECONTAMINATED PRIOR TO DEVELOPMENT: YES

STATIC DEPTH TO WATER*: 120 FT BLS

TOTAL DEPTH OF WELL*: 401 FT BLS

TOTAL GALLONS REMOVED DURING DEVELOPMENT: ~14,000

DEVELOPED BY: C. KERN

DATE	TIME	PUMP RATE (GPM)	GALL. REMOVED	pH	SPEC. COND. (µmhos/cm)	TEMP. (°C)	TURBIDITY (NTU)	appearance
10.18.99	1041	90	7,690	6.7	115	14	13.56	CLEAR
	1051	90	8,320	6.7	112	13.5	174.62	S. TURBID
	1058	90	8,950	6.7	111	13.5	22.80	CLEAR
	1118	90	9,490	6.7	111	13	122.80	S. TURBID
	1125	90	10,120	6.7	108	13.5	12.83	CLEAR
	1135	90	11,020	6.7	110	13.5	4.05	CLEAR
	1153	90	12,020	6.7	110	13.5	68.80	V.S. TURB
	1203	90	12,920	6.7	111	13.5	9.09	CLEAR
	1213	90	13,820	6.7	110	13.5	2.92	CLEAR

* FEET BELOW TOP OF CASING

DRAFT

Appendix G

1999 and 2000 Groundwater Sampling Logs

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 1ML
Date: 6.15.99 Sampled By: CIC AG
Sampling Time: 437 Recorded By: CIC AG
Weather: Sunny 80s Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: bladder pump
Casing Diameter: 4 Purge Rate: 350 ml/min
Total Depth: 395 Total Volume Purged:
Depth to Water: 103.94 Pump Intake Depth:
Water Column: 291.01 Pump on: 1522 Off: 1638
Gallons/Foot: 0.65 Parameters Sampled: VOCs, Freon 113
Gallons in Well: 189.19

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
335	350			170	6.26	165	18.4	103.94	8.31	
340	350			169	6.24	165	18.6		7.27	
345	350			167	6.23	164	18.7		8.49	
350	350			167	6.16	165	18.5		8.01	
355	350			166	6.12	160	18.3		6.91	
400	350			164	6.16	172	18.1		6.87	
405	350			160	6.25	175	18.1		6.82	
410	350			159	6.14	165	18.2		7.44	
415	350			158	6.09	160	18.4		7.38	
420	350			158	6.07	160	18.3		7.46	
425	350			158	6.02	160	18.4		7.69	
430	350			157	5.98	160	18.4		7.79	
435	350			157	5.99	160	18.4	10282	7.69	

Well Secure: YES
Color: cream / brown
Odor: None

Purge Water Disposal: IRM
Turbidity(qualitative): Turbid
Other (OVA, HNU,etc.): 0.2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 1MI
Date: 6/1/99 Sampled By: JG/GW
Sampling Time: ~12:55 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.: MS/MSD

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow submersible
Casing Diameter: 4" Purge Rate: < 500 ml ~ 350 mL
Total Depth: 255.00 Total Volume Purged: 7.0
Depth to Water: 102.34 Pump Intake Depth: 245'
Water Column: 152.66 Pump on: 11:50 Off: 12:50
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss oxygen
Gallons in Well: 98.23

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:50	350 ml			256.6	6.07	410.0	23.0	102.34	5.2	
11:55				256.2	6.10	410.0	24.0		5.0	
12:00				255.2	6.12	420.0	24.0		4.5	
12:05				256.5	6.14	440.0	27.0		4.5	
12:10				251.7	6.14	440.0	26.0		4.5	
12:15				253.4	6.12	435.0	25.0		4.4	
12:20				244.5	6.12	390.0	21.0		4.7	
12:25				241.5	6.05	380.0	21.0	102.29	4.5	
12:30				240.6	6.07	395.0	22.0		4.2	
12:35				237.8	6.08	380.0	21.0		4.3	
12:40				239.0	6.09	3700	21.0		4.8	
12:45				237.4	6.08	380.0	21.0		4.8	
12:50		7.0		237.5	6.08	380.0	21.0	102.31	4.7	

Well Secure: yes Locking J-Plug & Secure Stick-up Purge Water Disposal: on Site Treatment System
Color: Colorless Turbidity(qualitative): Clear
Odor: NONE Other (OVA, HNU,etc.): PID (0 PPM)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 1GU
Date: 6.1.99 Sampled By: A. Gilmore & C. Keen
Sampling Time: 1300 Recorded By: A.G. & C.K.
Weather: Fair / 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" Grundfos Submersible pump
Casing Diameter: 2" Purge Rate: 500ml
Total Depth: 115 Total Volume Purged: 37.5 litres = 9.92 gallons
Depth to Water: 103.23 Pump Intake Depth: 113
Water Column: 11.77 Pump on: [redacted] 1145 Off: 1300
Gallons/Foot: 0.16 Parameters Sampled: VOCs Freon 113
Gallons in Well: 1.88

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml/min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1145	500			168	6.34	600	20.5		7.77	
1150	500			174	6.34	600	20.0		8.09	
1155	500			188	6.30	600	19.8		7.77	
1200	500			195	6.26	600	21.1		7.54	
1205	500			200	6.26	650	22.4		6.88	
1210	500			206	6.23	700	23.4		6.76	
1215	500			215	6.23	~~707~~ 703	24.4		7.03	
1220	500			223	6.23	700	24.6		6.72	
1225	500			227	6.23	700	24.7		7.08	
1230	500			229	6.23	700	24.7		7.07	104 = DTW
1235	500			234	6.23	700	24.9		7.09	
1240	500			236	6.23	700	25.0		7.38	
1245	500			240	6.23	700	25.4		8.54	
1250	500			243	6.23	700	25.7		[redacted]	8.59
1255	500			245	6.23	700	25.8		8.57	

Well Secure: YES Purge Water Disposal: IRM
Color: none Turbidity(qualitative): Clear
Odor: None Other (OVA, HNU,etc.): < 2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0002 Task: 3 Well ID: 1 GL
Date: 6.1.99 Sampled By: A. Gilman C. Keen
Sampling Time: 1441 Recorded By: A.G. CK.
Weather: 90° Sunny Coded Replicate No.: N/A

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" Submersible
Casing Diameter: 4" Purge Rate: 400 mL/MIN
Total Depth: 147 Total Volume Purged: 21.6 Liters = 5.7 gallons
Depth to Water: 103.47 Pump Intake Depth: 142
Water Column: 43.53 Pump on: 1348 Off: 1442
Gallons/Foot: 0.65 Parameters Sampled: VOCs + Freon 113
Gallons in Well: 28.30

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1350	400			187	6.58	750	20.8		4.35	
1355	400			200	6.57	750	21.4		4.29	
1400	400			203	6.60	725	21.5	104.5	4.20	
1405	400			203	6.59	725	21.4		4.16	
1410	400			205	6.58	750	21.2		4.11	
1415	400			205	6.56	750	21.3		4.05	
1420	400			205	6.57	750	21.7	104.08	3.25	
1425	400			203	6.53	750	21.8		3.31	
1430	400			207	6.51	750	22.1		3.33	
1435	400			206	6.50	750	21.6	103.93	3.32	

Well Secure: YES Purge Water Disposal: IRM
Color: None Turbidity(qualitative): Clear
Odor: None Other (OVA, HNU,etc.): <2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 1 M1 / L
Date: 6.9.99 Sampled By: CIC AG
Sampling Time: 1437 Recorded By: CIC AG
Weather: Sunny 90s Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: Bladder pump
Casing Diameter: 4" Purge Rate: 300 ml/min
Total Depth: 342 Total Volume Purged: 4.75 GALLONS
Depth to Water: 103.04 Pump Intake Depth 332
Water Column: 238.96 Pump on: 1318 Off: 1432
Gallons/Foot: 0.65 Parameters Sampled: VOCs Freon 113
Gallons in Well: 155.32

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1325	300			178	6.12	130	19.6	103.04	4.87	
1330	300			178	6.10	135	20.7		5.21	
1335	300			178	6.12	135	20.4		3.94	
1340	300			180	6.12	240	21.4		4.65	
1345	300			181	6.11	250	23.6		3.30	
1350	300			181	6.11	253	24.1		2.97	
1355	300			183	6.11	270	26.1	103.46	2.72	
1400	300			185	6.11	280	25.1		3.27	
1405	300			190	6.13	260	22.3		3.72	
1410	300			190	6.13	255	22.3		3.63	
1415	300			193	6.12	250	21.7		3.23	
1420	300			195	6.12	250	22.4		3.15	
1425	300			195	6.11	250	22.6	103.31	3.25	

Well Secure: YES Purge Water Disposal: IRM
Color: None Turbidity(qualitative): Clear
Odor: Wash Water Smell Other (OVA, HNU,etc.): 1.1 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 2GL
Date: 6.3.99 Sampled By: CK AG
Sampling Time: 1000 Recorded By: AG CK
Weather: Sunny 90's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" grunfos
Casing Diameter: 4 Purge Rate: 300 ml/min
Total Depth: 147 Total Volume Purged: 18 L
Depth to Water: 84.23 Pump Intake Depth
Water Column: 62.77 Pump on: 0900 Off: 1002
Gallons/Foot: 0.65 Parameters Sampled: VOCs Freon 113
Gallons in Well: 40.80

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
900	300			147	6.05	550	23.7	84.23	7.55	
905	300			189	6.10	550	23.6		6.24	
910	300			222	6.15	575	23.6		6.54	
915	300			233	6.14	575	23.7		6.37	
920	300			241	6.15	575	23.9		6.26	
925	300			248	6.17	575	24.1	84.33	6.12	
930	300			250	6.17	575	23.7		5.34	
935	300			254	6.19	600	23.6		4.91	
940	300			257	6.18	575	23.5		5.77	
945	300			261	6.20	575	24.4		5.84	
950	300			263	6.20	575	25.1		5.50	
955	300			262	6.20	575	25.2		5.52	
1000	300			264	6.19	575	25.5		5.47	

Well Secure: Yes No lock
Color: Clear
Odor: None
Purge Water Disposal: IRM
Turbidity(qualitative): Clear
Other (OVA, HNU,etc.): < .2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 2 ML
Date: 6.16.99 Sampled By: CK/BH
Sampling Time: 1200 Recorded By: CK/BH
Weather: Sunny 70's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: Bladder Pump
Casing Diameter: 4" Purge Rate: 300 ML/MIN
Total Depth: 407 Total Volume Purged: 5.2 GALLONS
Depth to Water: 82.45 Pump Intake Depth 402
Water Column: 324.55 Pump on: 1040 Off: 1200
Gallons/Foot: 0.65 Parameters Sampled: VOCs, Freon 113
Gallons in Well: 210.95

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1050	300			62	11.26	550	24.2		1.77	
1055	300			57	11.05	400	23.3		1.11	
1100	300			59	11.01	300	23.4		1.06	
1105	300			54	10.92	250	23.6		1.03	
1110	300			53	10.85	220	23.8		1.02	
1115	300			55	10.36	200	23.7		0.97	
1120	300			65	10.06	160	24.3		0.97	
1125	300			63	10.17	160	24.5		0.96	
1130	300			65	10.13	150	24.7		0.75	
1135	300			65	10.13	150	24.7		0.71	
1140	300			63	10.11	140	24.1		0.57	
1145	300			56	10.20	140	23.6		0.60	
1150	300			53	10.19	140	23.2		0.60	
1155	300			53	10.22	140	23.3		0.57	

Well Secure: NO
Color: BROWN
Odor: NONE

Purge Water Disposal: TRM
Turbidity(qualitative): SL. TURBID
Other (OVA, HNU,etc.): < .2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0002 Task: 00003 Well ID: 2 ME
Date: 6-7-99 Sampled By: G. WILLIAMS S. HORNACK
Sampling Time: _____ Recorded By: _____
Weather: CLEAR 90° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: MICROPURGE
Casing Diameter: 4 Purge Rate: 350 ml/min
Total Depth: 250 Total Volume Purged: ~5 GALLONS
Depth to Water: 84.67 Pump Intake Depth: 240
Water Column: _____ Pump on: 9:17 Off: 10:20
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:17	350ml			215.5	6.41	390	22.5	84.63	7.0	
9:22	350			221.7	6.38	390	23.7	84.69	6.6	
9:27	350			224.0	6.29	395	24.0	84.77	6.25	
9:32	350			232.5	6.25	410	25.1		6.2	
9:37	350			231.3	6.27	415	25.0		5.7	
9:42	350			227.8	6.20	410	24.0		5.7	
9:47	350			227.8	6.20	410	24.1	84.74	5.8	
9:53	350			226.7	6.19	415	24.3		5.7	
0958	350			223.3	6.19	415	24.5		5.25	
1003	350			221.8	6.20	420	24.8	84.75	5.45	
1008	350			217.8	6.19	425	25		5.5	
1013	350			216.6	6.20	425	25.2		5.45	
1018	350	5GAL		218.3	6.19	426	25.2	84.75	5.50	

Well Secure: _____ Purge Water Disposal: ON
Color: COLORLESS Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N1001227.0002.00002 Task: _____ Well ID: ~~BASE~~ DW 2MW

Date: 6-7-99 Sampled By: G.W. S.H.

Sampling Time: _____ Recorded By: _____

Weather: _____ Coded Replicate No.: MS/MSD

WELL IMFORMATION

Casing Material: PVC Purge Method: ~~None~~ Low flow

Casing Diameter: 4" Purge Rate: _____

Total Depth: _____ Total Volume Purged: _____

Depth to Water: ~~80.75~~ 81.68 Pump Intake Depth: _____

Water Column: _____ Pump on: 16.45 Off: 17:50

Gallons/Foot: _____ Parameters Sampled: _____

Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1645	325			286.2	6.39	410	26.5	~~81.15~~	3.15	
1650	325			277.0	6.33	420	27.0	81.60	2.95	
1655	325			293.0	6.30	425	28.0		2.90	
1700	350			290.1	6.29	425	26.0	81.73	2.75	
1705	350			285.1	6.27	430	27.0		2.55	
1710	350			270.1	6.27	430	26.5		2.5	
1715	350			263.4	6.26	435	27.0	81.~~85~~ 73	2.60	
1720	350			244.3	6.26	430	27.0		2.75	
1725	350			237.8	6.25	435	27.5		2.80	
1730	350			232.2	6.26	450	27.0	81.73	2.70	
1735	350			227.9	6.23	450	27.5		2.75	
1740	350			221.3	6.25	455	28.0		2.8	
1745	350	46AL		219.8	6.27	460	28.0	81.73	2.85	

Well Secure: _____ Purge Water Disposal: _____

Color: COLORLESS Turbidity(qualitative): SLIGHTLY TURBID

Odor: NONE Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 3GL
Date: 6.4.99 Sampled By: AG CK
Sampling Time: _____ Recorded By: AG CK
Weather: Sunny, windy 80s Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" Grundfos submersible pump
Casing Diameter: 4" Purge Rate: 300 mL/min
Total Depth: 149 Total Volume Purged: _____
Depth to Water: 94.77 Pump Intake Depth _____
Water Column: 35.25 Pump on: 1256 Off: _____
Gallons/Foot: 0.65 Parameters Sampled: VOCs + Freon 113
Gallons in Well: 22.9

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1300	300			218	6.20	450	21.7	94.77	4.70	
1305	300			264	6.15	460	22.7		4.96	
1310	300			277	6.14	455	22.3		5.16	
1315	300			285	6.13	455	22.0		5.26	
1320	300			285	6.12	445	21.6		5.01	
1325	300			284	6.12	445	21.9		5.16	
1330	300			285	6.15	450	22.1		4.87	
1335	300			287	6.12	450	22.2		4.72	
1340	300			289	6.13	450	22.2		4.86	
1345	300			290	6.12	450	22.4	94.91	4.99	
1350	300			292	6.12	450	22.4		4.89	
1355	300			294	6.13	450	22.6		4.92	
1400	300			294	6.10	450	22.8	94.89	4.81	

Well Secure: YES Purge Water Disposal: IRM
Color: _____ Turbidity(qualitative): _____
Odor: Sweet Other (OVA, HNU,etc.): 2.2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 3ML
Date: 6-10-99 Sampled By: CK AG
Sampling Time: 1012 Recorded By: CK AG
Weather: cloudy 60s Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Bladder Pump
Casing Diameter: 4 Purge Rate: 450 ML/MIN
Total Depth: ~~2~~ 335 Total Volume Purged: 7 GALLONS
Depth to Water: 93.45 Pump Intake Depth 330
Water Column: 241.55 Pump on: 907 Off: 1013
Gallons/Foot: 0.65 Parameters Sampled: VOC From 113
Gallons in Well: 157.01 TD = 335

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
0910	400			149	7.37	170	17.9	93.45	5.12	
0915	450			148	7.23	180	18.7		5.09	
0920	450			150	7.11	180	18.6		5.06	
0925	450			154	6.69	170	19.8		4.93	
0930	450			153	6.41	165	20.2		4.21	
0935	450			154	6.20	160	20.4		4.02	
0940	450			154	6.16	160	20.2		3.88	
0945	450			156	6.27	155	20.2	93.51	4.38	
0950	450			157	6.26	155	20.3		3.50	
0955	450			160	6.24	155	20.2		3.98	
1000	450			160	6.23	155	20.2		4.05	
1005	450			162	6.22	155	20.2		4.15	
1010	450			163	6.21	155	20.5	93.55	4.13	

Well Secure: ~~NO~~ YES
Color: NONE
Odor: NONE

Purge Water Disposal: IRM
Turbidity(qualitative): clear
Other (OVA, HNU,etc.): 0.2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 0003 Well ID: 4 GL
Date: 6/4/99 Sampled By: JG/GW
Sampling Time: 4:30 Recorded By: JG
Weather: Sunny 80° Coded Replicate No.: REP 2

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible (micro purge)
Casing Diameter: 4" Purge Rate: < 500 ml 500ml
Total Depth: 150.0' Total Volume Purged: ~8.0
Depth to Water: 98.71 Pump Intake Depth: 140.6'
Water Column: 51.29 Pump on: 3:15 Off: 4:30
Gallons/Foot: 0.65 Parameters Sampled: REDOX, PH, Conductivity, Temp, Diss O², VOC's, metals
Gallons in Well: 33.34

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3:15	~500ml		11.45	212.5	5.91	500.0	25.0	98.71	6.0	
3:20			9.30	210.8	6.27	500.0	25.0		6.0	
5:25			8.20	204.3	6.16	500.0	26.0		5.5	
3:30			8.50	201.3	6.16	500.0	26.0		5.5	
3:35			8.20	197.9	6.16	500.0	27.0		5.5	
3:40			7.90	191.0	6.16	500.0	27.0		5.3	
3:45			7.80	189.4	6.15	500.0	27.0		5.3	
3:50			8.20	186.5	6.15	500.0	27.0	100.74	5.3	* water level
3:55			8.40	185.0	6.15	500.0	27.0		5.2	
4:00			10.0	181.2	6.15	500.0	27.0		5.2	
4:05			9.80	180.9	6.15	500.0	27.0		5.2	
4:10			13.40	178.6	6.15	500.0	27.0		5.2	
4:15		~8.0	13.40	175.9	6.17	500.0	27.0		5.2	
4:30			12.90	172.9	6.17	500.0	27.0	101.65	5.2	

* M-Scape Reading

Well Secure: yes Locking J-Plug & secure manhole Purge Water Disposal: on site treatment system
Color: Colorless Turbidity(qualitative): Clear
Odor: none Other (OVA, HNU,etc.): PID 0 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 4-MI
Date: 6/8/99 (DD) Sampled By: JG/GW
Sampling Time: 3:45 Recorded By: JG
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi flow Submersible
Casing Diameter: 4" Purge Rate: <500 ml/min ~ 300 ml/min
Total Depth: 250 Total Volume Purged: ~5.0
Depth to Water: 101.10 Pump Intake Depth: 240
Water Column: 148.90 Pump on: 2:45 Off:
Gallons/Foot: 0.65 Parameters Sampled: VOC's, FREON 113, metals
Gallons in Well: 96.79

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:45	300 ml/min		10.9	210.0	8.44	490.0	25.0	101.10	5.0	
2:50			13.4	208.5	6.68	480.0	27.0		4.2	
2:55			24.2	220.6	6.41	460.0	27.0		3.5	
3:00			22.3	215.5	6.42	450.0	27.0		3.0	
3:05			20.0	210.0	6.41	450.0	27.0		3.2	
3:10			21.3	210.0	6.39	440.0	27.0		3.2	
3:15			22.4	209.8	6.40	440.0	27.0		3.2	
3:20			22.0	210.2	6.46	450.0	27.0	101.25	3.4	
3:25			20.3	210.2	6.39	450.0	27.0		3.4	
3:30			20.8	200.9	6.42	450.0	27.0		3.3	
3:38			21.2	200.3	6.43	450.0	27.0		3.3	
3:40			22.0	199.5	6.40	450.0	27.0		3.0	
8:45		-5.0	21.3	197.5	6.39	450.0	27.0	101.32	3.0	

Well Secure: yes manhole & locking J-plug Purge Water Disposal: IRM
Color: Colorless Turbidity(qualitative): clear
Odor: none Other (OVA, HNU,etc.): PID 2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 5 MI
Date: 6/2/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG
Weather: Sunny 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible
Casing Diameter: 4" Purge Rate: <500 ~350 mL
Total Depth: 250.0 Total Volume Purged: ~5.5
Depth to Water: 86.75 Pump Intake Depth: 240.0'
Water Column: 163.25 Pump on: ~11:00 Off: ~12:00
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss O^2 VOC
Gallons in Well: 106.71

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:00	350mL			170.0	6.49	400.0	21.0	86.75	4.5	
11:05				171.4	6.48	400.0	21.0		4.7	
11:10				171.5	6.48	400.0	21.0		4.8	
11:15				179.2	6.41	390.0	20.0		5.0	
11:20				179.6	6.44	380.0	20.0		4.9	
11:25				180.0	6.40	380.0	20.0	86.85	4.9	
11:30				182.1	6.36	375.0	19.0		4.6	
11:35				185.5	6.34	380.0	19.0		4.5	
11:40				187.3	6.34	385.0	19.0		4.5	
11:45				189.2	6.35	390.0	20.0		4.4	
11:50				191.9	6.34	400.0	21.0		4.5	
11:55				193.6	6.34	395.0	21.0		4.6	
12:00		~5.5		198.0	6.34	395.0	21.0	86.74	4.5	

Well Secure (yes) Locking stickups & sanitary seal Purge Water Disposal: on site treatment system
Color: Colorless Turbidity(qualitative): Clear
Odor: none Other (OVA, HNU,etc.): PID (0 ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 5ML
Date: 6.18.99 Sampled By: CK/JG
Sampling Time: 1343 Recorded By: CK/JG
Weather: SUNNY, 70's Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: ML/MIN
Total Depth: 335 Total Volume Purged: 6 GALLONS
Depth to Water: 85.91 Pump Intake Depth 330
Water Column: 249.09 Pump on: 1225 Off: 1345
Gallons/Foot: 0.65 Parameters Sampled: VOCs, freon 113
Gallons in Well: 161.91

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1230	480			97	8.67	40	17.1		5.13	
1235	480			82	8.11	275.0	17.4		4.42	
1240	480			75	7.78	269	17.6		4.34	
1245	480			70	7.49	255	17.7		3.52	
1250	300			63	7.23	250	17.2		3.55	
1255	300			63	7.08	250	17.5		5.0	
1300	300			63	7.05	245	17.6		4.97	
1305	300			65	6.97	245	17.8		4.38	
1310	300			65	6.97	245	18.2		4.39	
1315	300			65	6.95	250	18.7		4.46	
1320	300			65	6.93	250	19		4.56	
1325	300			79	6.93	240	17.3		5.49	
1330	300			84	6.92	240	17.1		5.17	
1335	300			81	6.88	240	17.1		4.93	
1340	300			80	6.88	240	17.2		4.84	

Well Secure: NO Purge Water Disposal: FRM
Color: NONE Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): PID C. 2ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 5GL
Date: 6.2.99 Sampled By: A. Gilmore, C. Keen
Sampling Time: 11:50 Recorded By: CK, AG
Weather: Sunny 90's Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" submersible pump
Casing Diameter: 4" Purge Rate: 300 ml/min
Total Depth: 130 Total Volume Purged: 20.6 L. = 5.45 gallons
Depth to Water: 86.27 Pump Intake Depth: 120 FTBLS
Water Column: 43.73 Pump on: 1049 Off: 11:52
Gallons/Foot: 0.65 Parameters Sampled: VOCs + Freon 113
Gallons in Well: 28.42

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1050	300			82	7.06	260	18.1	86.27	4.40	
1055	300			87	7.09	265	18.1		4.28	
1100	400			104	7.79	275	19.6		5.25	
1105	400			116	7.51	270	18.9		4.68	
1110	400			122	7.40	275	(9.4)		4.60	
1115	400			129	7.28	280	20.0	86.42	4.48	
1120	400			135	7.21	285	20.2		4.38	
1125	400			146	7.12	290	20.2		4.58	
1130	400			152	7.07	290	20.2		4.24	
1135	400			154	7.04	290	20.2		4.12	
1140	400			162	7.01	295	20.4		4.22	
1145	400			167	6.99	295	20.7		4.20	
1150	400			170	6.97	300	20.8	Bubbles	4.20	

Well Secure: Purge Water Disposal:
Color: Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.):

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 5GU
Date: 6/2/99 Sampled By: C. KEEN / A. GILMORE
Sampling Time: _____ Recorded By: CK / AG
Weather: SUNNY, 90's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" RED/FLO SUB PUMP
Casing Diameter: 2" Purge Rate: ML/MIN
Total Depth: 95 Total Volume Purged: _____
Depth to Water: 87.17 Pump Intake Depth: ~~95~~ FTBLS
Water Column: 7.83 Pump on: 1434 Off: _____
Gallons/Foot: 0.16 Parameters Sampled: VOCs + FREON 113
Gallons in Well: 1.25

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1435	450			177	6.17	1600	25.3	87.17	6.84	
1440	450			186	5.97	1550	24.4		6.44	
1445	450			204	6.17	1550	24.4		5.92	
1450										
1455	pump off, sitred pump.									
1500										
1505										
1510	450			202	6.14	1600	26.4	87.33	5.82	
1515	500			220	6.10	1550	24.5		6.88	
1520	→ pump sitting up.									
1525										
1526										
1535										

Well Secure: ~~NO~~ / NO LOCK Purge Water Disposal: IRM
Color: orange Turbidity(qualitative): turbid
Odor: none Other (OVA, HNU,etc.): PID = 0 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: GMI
Date: 6-7-99 Sampled By: G.W., S.H.
Sampling Time: _____ Recorded By: _____
Weather: _____ Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: MICROPURGE
Casing Diameter: 4" Purge Rate: _____
Total Depth: 85.28 Total Volume Purged: _____
Depth to Water: _____ Pump Intake Depth: _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

NOT SAMPLED

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1146	300 ml/			204.5	7.62	560	21.5	85.28	7.75	
1151	300			214.0	7.68	590	23.5		7.10	
1156	300			228.0	7.69	590	24.0		7.20	
1201	350			221.1	7.70	650	23.9	85.33	6.00	SED
1206	350			219.6	7.74	650	23.5		5.8	
1211	350			216.4	7.75	620	23.2		5.8	
1216	350			216.0	7.74	610	23.0	85.32	5.9	
1221	350			222.6	7.76	610	23.8		5.5	
1226	350			219.8	7.76	620	24.1		5.5	
1231	350			217.0	7.76	620	24.6	85.32	5.1	
1236	350			216.7	7.76	625	25.1		5.2	
1241				249.2	7.76	630	25.2		5.25	
1246									5.6	
	Pump	off	- SED	IN	Tubing					
1255				238.1	7.81	600	21.0	85.34	7.0	
1300										
1305										
1310		Pump SHUTTED UP		PULLED	PUMP					
			START OVER							

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 0003 Well ID: 6-MI
Date: 6/16/99 Sampled By:
Sampling Time: Recorded By:
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: 3 Hp Submeersible
Casing Diameter: 4" Purge Rate: 5-7 GPM
Total Depth: 250.0 Total Volume Purged: ~ 320.96
Depth to Water: 85.45 Pump Intake Depth
Water Column: 164.55 Pump on: 12:50 Off:
Gallons/Foot: 0.65 Parameters Sampled: VOC's, Freon 113
Gallons in Well: 106.96

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:55					7.59	500.0	20.0	85.45		
1:05		50			[redacted]	[redacted]	[redacted]			
1:45		50			7.79	600.0	23.0			
		50								
2:50		55			7.81	600.0	24.0			
[redacted]		50			[redacted]	[redacted]	[redacted]			
3:40		55			7.78	600.0	24.0			

Well Secure: yes Screw stick-up & locking J-plug
Color:
Odor:

Purge Water Disposal: IRM
Turbidity(qualitative):
Other (OVA, HNU,etc.): PID 0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 6GL
Date: 6/4/99 Sampled By: JG/GW
Sampling Time: ~10:00 Recorded By: JG
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow submersible (micro purge)
Casing Diameter: 4" Purge Rate: <500ml ~300 ml
Total Depth: 125.0' Total Volume Purged:
Depth to Water: 84.51 Pump Intake Depth: 115.0'
Water Column: 40.49 Pump on: ~9:00 Off:
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss O², VOC's, metals
Gallons in Well: 26.32
* 3 well Volumes 78.96

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:00	~300ml			178.3	6.71	160.0	19.0	84.51	4.2	
9:05				178.6	6.71	160.0	19.0		4.3	
9:10				179.5	6.90	160.0	19.0		4.8	
9:15				180.1	6.45	160.0	20.0		4.0	
9:20				183.4	6.68	170.0	21.0		4.3	
9:25				183.4	6.69	170.0	23.0		4.2	
9:30				183.5	6.70	165.0	22.0	84.61	4.1	
9:35				181.2	6.70	160.0	20.0		4.3	
9:40				179.7	6.71	160.0	20.0		4.0	
9:45				179.2	6.70	160.0	21.0		4.0	
9:50				175.9	6.71	160.0	21.0		3.8	
9:55				175.7	6.69	160.0	21.0		3.8	
1000		~4.75		175.2	6.70	160.0	21.0	84.61	3.9	
10105			8.3	175.1	6.70	160.0	21.0		3.9	*
10:10			8.3	175.1	6.69	165.0	21.0		3.8	
10:15			7.4	175.2	6.70	165.0	21.0		3.8	

Well Secure: (yes) Locking J-plug & secure stick-up Purge Water Disposal: on site treatment system
Color: Colorless Turbidity(qualitative): clear
Odor: none Other (OVA, HNU,etc.): PID 0.6 ppm

* Gerish Split samples

LTO # 4 LMC 5-99

.5G:\APROJECT\Lockheed Martin\Great Neck\NY001227.0002\Data\GWsmpfrm.xls- Sheet1

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: N/001227.0002 | Project No.: 00003 | Page: 1 of 1

Site Location: Lockheed martin | Date: 6/4/99

Site/Well No.: 6-GL | Replicate No.: | Code No.:

Weather: Sunny 80° | Sampling Time: Begin: | End:

Evacuation Data

Measuring Point	TOP OF CASING
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	125.0
Depth to Water (ft bmp)	84.61
Water-Level Elevation (ft)	
Water Column in Well (ft)	40.39
Casing Diameter/Type	4"/PVC
Gallons in Well	26.25
Gallons Pumped/Bailed Prior to Sampling	78.76
Sample Pump Intake Setting (ft bmp)	115, 100
Purge Time	begin 10:35 end
Pumping Rate (gpm)	Q=2 GPM T= ~~30.38~~
Evacuation Method	Redi flow Submersible

Field Parameters

	I	1	2	3	4
Color					
Odor					
Appearance					
pH (s.u.)	7.10	6.92	6.90	6.85	6.8
Conductivity (mS/cm) (µmhos/cm)	150	150	140	145	145
Turbidity (NTU)			1.85	1.70	1.9
Temperature (°C)	20	19	19	19	19
Dissolved Oxygen (mg/L)					
Salinity (%)					

Sampling Method:

Remarks: SAMPLE @ 11:50

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel: G. WILLIAMS T GABLOWITZ

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 7ML
Date: 6/11/99 Sampled By: JG/CK
Sampling Time: 1105 Recorded By: JG
Weather: Sunny 80° Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER Pump
Casing Diameter: 4" Purge Rate: 300 ML/MIN
333.0' Total Depth: ~~109.10~~ 224 Total Volume Purged: 5.5
Depth to Water: 109.10 Pump Intake Depth 328.0
Water Column: 223.90 Pump on: 9:55 Off: 1108
Gallons/Foot: 0.65 Parameters Sampled: VOCS, FREON 113
Gallons in Well: 145.54

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:65	300ml			180	6.53	310.0	21.9	109.10	5.02	
10:00	300			181	6.31	315.0	22.7		4.85	
10:05	300			180	6.45	310.0	21.9		4.97	
10:10	300			183	6.27	315.0	22.5		4.94	
10:15	300			189	6.14	310.0	22.4		4.92	
10:20	300			192	6.15	310.0	22.4		4.53	
10:25	300			194	6.13	315.0	22.5		4.38	
10:30	300			208	6.13	315	22.6		4.35	
10:35	300			213	6.12	315.0	22.6		4.26	
10:40	300			222	6.11	315.0	22.8	109.01	4.21	
10:45	300			218	6.09	320.0	23.0		4.23	
10:50	300			210	6.10	320.0	23.0		4.18	
10:55	300			197	6.10	320	23.1		4.10	
11:00	300			179	6.10	320	23.1		4.17	
11:05	300			169	6.10	320	23.1		4.21	

Well Secure: yes secure MANHole & Locking J-plug
Color: NONE
Odor: NONE
Purge Water Disposal: IRM
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): PID < 0.2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 7 GL
Date: 6/3/99 Sampled By: JG/GW
Sampling Time: ~4:05 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow submersible
Casing Diameter: 4" Purge Rate: <500ml 500 ml
Total Depth: 150.0' Total Volume Purged:
Depth to Water: 108.18' Pump Intake Depth: 140.0'
Water Column: 41.82 Pump on: ~2:25 Off: ~4:05
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss O2, VOC's
Gallons in Well: 27.183

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3:25 2:25	~500ml			218.3	6.16	500.0	26.0	108.18	4.5	
3:30 2:30				216.2	6.15	500.0	26.0		5.0	
3:35 2:35				215.0	6.16	500.0	26.0		4.8	
3:40 2:40				209.6	6.16	500.0	26.0		4.5	
3:45 2:45				210.1	6.17	500.0	26.0		4.5	
3:50 2:50				211.8	6.17	500.0	28.0	108.24	4.2	
3:55 2:55				212.9	6.16	475.0	27.0		4.6	
4:00 3:00				213.0	6.16	475.0	26.0		4.6	
4:05 3:05				221.0	6.17	475.0	27.0	108.21	4.4	
4:10 3:10										
4:15 3:15										
4:20 3:20										
4:25 3:25										

Well Secure: (yes) Locking PipTop & Secure manhole Purge Water Disposal: on Site Treatment System
Color: Colorless Turbidity(qualitative): Clear
Odor: none Other (OVA, HNU,etc.): PID 1 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY 001227.0002 Task: 05003 Well ID: 8GL
Date: 5-27-99 Sampled By: G.W. JG.
Sampling Time: Recorded By: G.W
Weather: CLEAR 70° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: MICROPURGE ~~>~~ <500 ml/min
Casing Diameter: 4" Purge Rate: MICROPURGE 300 ml/min
Total Depth: 150 Total Volume Purged: ~4.5 GAL
Depth to Water: 75.59 Pump Intake Depth: 145
Water Column: Pump on: 12:29 Off:
Gallons/Foot: 0.65 Parameters Sampled: VOC
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:30	300 ml		—	251.1	6.48	260	20	75.59	3.2	
12:35				234.5	6.43	240.0	25		2.5	
12:40				222.1	6.46	251.0	25		2.5	
12:45				213.8	6.41	251.0	25		2.5	
12:50				205.8	6.48	251.0	25	75.56	2.5	
2:00	400ml			194.0	6.45	251.0	25		2.0	
2:10				179.3	6.42	249.0	20		2.5	
2:20				167.7	6.37	250.0	20		2.5	
2:25				163.3	6.37	250.0	19		2.5	
2:30		4.5		160.5	6.37	250.0	20	~~75.58~~	2.5	

Well Secure: Purge Water Disposal:
Color: Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.):

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 50003 Well ID: 8GU
Date: 5-27-98 Sampled By: G.W. J.G.
Sampling Time: Recorded By:
Weather: CLEAR 70° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: MP:ROPORGE
Casing Diameter: 4 Purge Rate: 500 ml/min
Total Depth: 90 Total Volume Purged: ~ 10 GALLONS
Depth to Water: 74.91 Pump Intake Depth: 85'
Water Column: Pump on: 2:48 Off:
Gallons/Foot: 0.65 Parameters Sampled: VOC
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:48	400ml			177	6.66	345	20	74.91	3.0	
2:53				168.0	6.64	348	19		3.0	
2:58				152.0	6.60	350	19		3.0	
3:03				140.0	6.61	350	18		2.8	
3:08				136.4	6.74	360	18		2.6	
3:13				134.2	6.79	360	18	74.93	2.6	
3:18				135.1	7.13	360	17		2.6	
3:23				135.5	6.69	360	17		2.6	
3:28				131.0	6.67	360	17		2.6	
3:33				131.20	6.61	369	23*	74.94	2.6	
3:38				134.20	6.61	370	23		2.6	
3:43				136.3	6.60	367	23		2.5	
3:48		10.00		137.3	6.60	367	23		2.5	

Well Secure: Purge Water Disposal: CLEAR
Color: COLORLESS Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): PID NR

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: BML
Date: 6.10.99 Sampled By: CL/AG
Sampling Time: Recorded By: CL/AG
Weather: SUNNY, 90's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: 250 ML/MIN
Total Depth: 338 Total Volume Purged: 4.25 GALLONS
Depth to Water: 77.72 Pump Intake Depth
Water Column: 260.28 Pump on: 1554 Off: 1713
Gallons/Foot: 0.65 Parameters Sampled: VOCs, FREON 113
Gallons in Well: 169.18

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1600	550			176	7.07	70	23.8	77.72	3.99	
1605	250			185	6.95	65	20.8		2.68	
1610	250			176	6.84	65	22.6		3.10	
1615	250			173	6.75	65	23.0		2.69	
1620	250			173	6.76	65	23.3		2.45	
1625	250			173	6.73	65	23.5		2.16	
1630	250			171	6.69	60	23.8		2.46	
1635	250			171	6.70	60	24.1		2.38	
1640	250			171	6.67	62	24.2		2.27	
1645	250			169	6.69	65	24.3		2.45	
1650	250			169	6.68	65	24.5		2.40	
1655	250			171	6.64	65	24.5		2.22	
1700	250			169	6.68	65	24.5		2.15	
1705	250			167	6.68	65	24.4		2.57	
1710	250			170	6.67	65	24.3		2.50	

Well Secure: YES
Color: NONE
Odor: NONE

Purge Water Disposal: IRM
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): < .2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 0003 Well ID: 9GL
Date: 6/3/99 Sampled By: JG/BW
Sampling Time: ~1:10 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow submersible (micro purge)
Casing Diameter: 4" Purge Rate: < 500mL 400 ml
Total Depth: 155.0' Total Volume Purged: ~6.0, ~6.5
Depth to Water: 82.76 Pump Intake Depth: 145.0'
Water Column: 72.24 Pump on: ~12:00 Off: ~1:10
Gallons/Foot: 0.65 Parameters Sampled: REDox, PH, Conductivity, Temp, Diss O², VOC's
Gallons in Well: 46.96

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:05	400ml			159.0	9.61	165.0	24.0	82.76	3.0	
12:05				151.1	9.66	165.0	24.0		2.8	
12:00				147.7	9.66	170.0	24.0		2.8	
12:15				149.3	9.40	170.0	24.0		2.8	
12:20				150.2	9.09	180.0	25.0		2.7	
12:25				152.1	8.75	190.0	25.0		2.6	
12:30				162.4	7.12	210.0	25.0		2.5	
12:35				193.6	6.90	240.0	25.0		2.10	
12:40				194.8	6.85	240.0	25.0		2.5	
12:45				196.3	6.82	250.0	25.0	82.89	2.6	
12:50				198.9	6.82	250.0	25.0		2.7	
12:55				201.0	6.75	250.0	25.0		2.8	
1:00		~6.0		204.9	6.71	280.0	26.0		2.7	
1:05				205.0	6.70	280.0	26.0		2.7	
1:10		~6.5		205.2	6.70	280	26.0	82.84	2.6	

Well Secure: (NO) Broken manhole & sanitary seal Purge Water Disposal: on site treatment system
Color: Colorless Turbidity(qualitative): Clear
Odor: none Other (OVA, HNU,etc.): PID 0ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY000227.0002 Task: 3 Well ID: 10GL
Date: 6.2.99 Sampled By: CK AG
Sampling Time: 1758 Recorded By: CK AG
Weather: Sunny 90s Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" grunfos
Casing Diameter: 4 Purge Rate: 300 ml
Total Depth: 132 Total Volume Purged:
Depth to Water: 83.05 Pump Intake Depth: 122
Water Column: 48.95 Pump on: 1654 Off: 1800
Gallons/Foot: 0.65 Parameters Sampled: VOCs Freon 113
Gallons in Well: 31.81

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1655	300			199	6.50	500	32.2	83.05	3.82	
1700	300			208	6.28	500	29.4		3.78	
1705	300			225	6.29	550	27.5		3.82	
1710	300			234	6.28	550	27.2		3.72	
1715	300			240	6.28	550	26.9	82.93	3.70	
1720	300			243	6.30	550	26.6		3.73	
1725	300			245	6.29	550	26.3		3.66	
1730	300			247	6.30	525	26.0		3.69	
1735	300			249	6.29	525	25.7		3.52	
1740	300			250	6.31	525	25.6		3.55	
1745	300			251	6.30	525	25.6		3.51	
1750	300			252	6.29	525	25.6		3.46	
1755	300			253	6.29	525	25.5	82.91	3.51	

Need Sanitary Seal

Well Secure: No cap no lock Purge Water Disposal: IRM
Color: Clear Turbidity(qualitative): clear
Odor: None Other (OVA, HNU,etc.): NO <.2ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 11-GL
Date: 6/2/99 Sampled By: JG/GW
Sampling Time: ~6:00 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible
Casing Diameter: 4" Purge Rate: < 500 ml ~300 ml
Total Depth: 140.0' Total Volume Purged: ~5.0
Depth to Water: 84.75 Pump Intake Depth: 130.0'
Water Column: 55.25 Pump on: 5:05 Off: ~6:00
Gallons/Foot: 0.65 Parameters Sampled: ~~Redox, PH~~, Conductivity, ~~Temp~~, Diss O^2, VOC
Gallons in Well: 35.91

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:05	~300ml			272.4	6.17	750.0	23.0	84.75	5.2	
5:10				272.2	6.17	750.0	23.0		4.7	
5:15				265.0	6.15	800.0	23.0		4.0	
5:20				259.0	6.14	750.0	23.0		4.0	
5:25				255.4	6.13	800.0	24.0		3.9	
5:30				253.3	6.13	800.0	24.0	85.01	3.8	
5:35				240.7	6.15	800.0	24.0		4.3	
5:40				~~240.8~~	6.15	800.0	24.0		4.9	
5:45				237.5	6.15	800.0	24.0		4.3	
5:50				235.1	6.13	800.0	24.0		4.3	
5:55				232.4	6.15	800.0	24.0		4.3	
6:00	~5.0			227.2	6.15	800.0	24.0	84.96	4.3	
6:05										

Well Secure: YES Locking Stickup & Sanitary Seal Purge Water Disposal: on site Treatment system
Color: Colorless Turbidity(qualitative): Clear
Odor: none Other (OVA, HNU,etc.): PID 0PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 11MI
Date: 6/2/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG
Weather: Sunny 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible (Micro purge)
Casing Diameter: 4" Purge Rate: < 500 mL ~450 ml
Total Depth: 250.0 Total Volume Purged: ~ 7.5
Depth to Water: 85.79 Pump Intake Depth: 240.0
Water Column: 164.21 Pump on: ~3:00 Off:
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss O², VOC
Gallons in Well: 106.74

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3:00	~450 ml			235.9	6.43	560.0	25.0	85.79	5.8	
3:05				232.8	6.32	560.0	25.0		5.5	
3:10				230.6	6.32	565.0	25.0		5.4	
3:15				229.7	6.31	565.0	25.0		5.3	
3:20				223.0	6.34	565.0	25.0		5.6	
3:25				222.3	6.58	560.0	24.0		5.8	
3:30				222.3	6.59	560.0	23.5	85.94	5.9	
3:35				221.7	6.26	580.0	24.0		6.2	
3:40				219.9	6.28	600.0	24.0		6.2	
3:45				218.5	6.29	600.0	24.0		6.2	
3:50				218.2	6.30	600.0	24.0		6.0	
3:55				216.1	6.50	600.0	24.0		6.2	
4:00		~7.0		214.7	6.83	600.0	24.0		6.1	
				214.2	6.75	650.0	24.0		6.0	
				213.9	6.77	650.0	24.0		6.0	
		~7.5		213.6	6.75	650.0	24.0	85.93	6.0	

Well Secure: (Yes) Locking stick-up & Swinging Seal Purge Water Disposal: On site treatment Facility
Color: Colorless Turbidity(qualitative): clear
Odor: none Other (OVA, HNU,etc.): PID 0ppm

* 2:50pm Field Blank Completed before sampling

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 12ML
Date: 6.17.99 Sampled By: CK, BH
Sampling Time: 1139 Recorded By: CK, BH
Weather: RAINY, 60° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: 300 ML/MIN
Total Depth: 393 Total Volume Purged: 5.5 GALLONS
Depth to Water: 88.66 Pump Intake Depth
Water Column: 304.34 Pump on: 1015 Off: 1135
Gallons/Foot: 0.65 Parameters Sampled: VOCs, FREON 113
Gallons in Well: 197.82

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1020	300			112	7.42	220	19.2		4.23	
1025	300			108	6.95	210	19.6		4.20	
1030	300			101	6.82	205	19.8	88.61	3.97	
1035	300			95	6.75	202	19.9		3.70	
1040	300			92	6.69	200	19.7		3.43	
1045	300			88	6.62	195	19.6		3.82	
1050	300			86	6.57	195	19.7		3.50	
1055	300			89	6.52	190	19.8		3.37	
1100	300			89	6.52	190	19.8	88.65	3.37	
1105	300			86	6.47	190	20.0		3.49	
1110	300			89	6.44	190	20.2		3.57	
1115	300			91	6.43	190	20.2	88.58	3.81	
1120	300			92	6.36	190	20.3		3.54	
1125	300			92	6.35	190	20.3		3.50	
1130	300			92	6.41	190	20.5		3.61	

Well Secure: YES Purge Water Disposal: ON SITE
Color: LIGHT BROWN Turbidity(qualitative): SL. TURBID
Odor: ODORLESS Other (OVA, HNU,etc.): PID C. 2PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 12 MI
Date: 6/3/99 Sampled By: JG/GW
Sampling Time: ~10:30 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.: N/A

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow submersible micro purge
Casing Diameter: 4" Purge Rate: <500ml ~ 500 ml
Total Depth: 253.0' Total Volume Purged: ~8.0
Depth to Water: 88.57 Pump Intake Depth: 248.0'
Water Column: 164.49 Pump on: ~9:30 Off: ~10:30
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, conductivity, Temp, Diss O2
Gallons in Well: 106.92

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:30	~500ml			239.3	6.29	500.0	24.0	~~88.51~~	4.2	MIS READ
9:35				239.2	6.26	500.0	24.0		4.4	
9:40				239.5	6.28	500.0	24.0		4.4	
9:45				240.0	6.25	500.0	24.0		4.2	
9:50				241.1	6.25	500.0	24.0		4.2	
9:55				239.3	6.26	500.0	24.0		4.1	
10:00				238.9	6.25	500.0	24.0		3.8	
10:05				236.3	6.26	500.0	24.0		3.8	
10:10				235.1	6.26	500.0	24.0		3.8	
10:15				232.6	6.27	500.0	24.0	88.54	3.8	
10:20				228.8	6.26	500.0	24.0		3.7	
10:25				228.7	6.26	500.0	24.0		3.7	
10:30		~8.0		227.1	6.26	500.0	24.0	88.57	3.7	

* GW 88.51

Well Secure: yes Locking J-plug & secure
Color: Colorless
Odor: none

Purge Water Disposal: on site Treatment system
Turbidity(qualitative): clear
Other (OVA, HNU,etc.): PID (0 PPM)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: B 13ML
Date: 6/3/99 Sampled By: JG/GW
Sampling Time: ~6.15 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi flow Submersible (micro purge)
Casing Diameter: 4" Purge Rate: <500 ml ~ 400 ml
Total Depth: 275.0' Total Volume Purged: ~7.0
Depth to Water: 118.84 Pump Intake Depth: 265.0'
Water Column: 156.16 Pump on: ~5.15 Off: ~6.15
Gallons/Foot: 0.65 Parameters Sampled: Redox, ph, conductivity, Temp, Diss O^2, VOC's
Gallons in Well: 101.5

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp *(°C)	Depth to Water	Diss. Oxygen	Comments
5:15 ~	400ml			224.9	6.85	250.0	18.0	118.84	5.3	
5:20				220.1	6.80	260.0	17.0		5.6	
5:25				205.3	6.73	310.0	15.0		6.0	
5:30				205.7	6.71	310.0	15.0		6.0	
5:35				204.1	6.70	330.0	15.0	119.14	5.9	
5:40				200.5	6.69	340.0	15.0		5.9	
5:45				196.4	6.69	350.0	15.0		5.8	
5:50				196.8	6.68	350.0	15.0		5.7	
5:55				197.2	6.68	350.0	15.0		5.5	
6:00				198.6	6.68	350.0	15.0		5.6	
6:05				198.6	6.68	350.0	15.5		5.6	
6:10				198.4	6.69	350.0	16.0		5.7	
6:15		~7.0		198.4	6.69	350.0	16.0	119.28	5.7	

* flowcell in spray area

Well Secure: yes Locking J-Plug & secure manhole Purge Water Disposal: On site Treatment system
Color: Colorless Turbidity(qualitative): clear
Odor: none Other (OVA, HNU,etc.): PID 0ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 14-MI
Date: 6/17/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG/GW
Weather: RAIN 70° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible micropurge
Casing Diameter: 4" Purge Rate: < 500 ml
Total Depth: 250.0 Total Volume Purged:
Depth to Water: 122.32 Pump Intake Depth 235
Water Column: Pump on: 5:40 pm Off:
Gallons/Foot: 0.65 Parameters Sampled: VOC's FREON 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:45				156.8	6.35	250.0	13.1	122.32	3.8	
5:50				156.8	6.24	250.0	13.2		3.4	
5:55				156.8	6.20	250.0	13.3		3.3	
6:00				164.0	6.31	250.0	13.6		3.0	
6:05				173.2	6.30	250.0	13.8		2.5	
6:10				174.4	6.00	250.0	13.9		2.3	
6:15				175.0	5.86	250.0	14.0		2.3	
6:20				195.1	5.84	250.0	14.0		2.3	
6:25				198.1	6.16	250.0	13.9		2.3	
6:30				196.9	6.06	250.0	13.8	123.39	2.3	
6:35				193.9	5.87	250.0	13.5		2.2	
6:40				194.4	5.80	250.0	13.5		2.2	
6245				193.0	5.88	250.0	13.6	123.38	2.2	

Well Secure: (yes) secure manhole & locking J-Plug Purge Water Disposal: IRM
Color: Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.): PID 0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 15 ML
Date: 6.11.99 Sampled By: CL LG
Sampling Time: 3:05 Recorded By: CL LG
Weather: SUNNY 80's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: 375 ML/MIN
Total Depth: 538 Total Volume Purged: [redacted] 7 GALLONS
Depth to Water: 88.60 Pump Intake Depth 333.0
Water Column: 249.40 Pump on: 1:45 Off: 3:08
Gallons/Foot: 0.65 Parameters Sampled: NDCs, FREON 113
Gallons in Well: 162.11

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1:50	375			170	6.87	400.0	23.4	88.60	5.24	
1:55	375			122	6.00	370.0	24.4		4.58	
2:00	375			114	6.55	350.0	24.5		4.43	
2:05	375			107	6.18	285.0	26.1		4.75	
2:10	375			104	6.10	280.0	26.4		4.65	
2:15	375			104	6.06	275.0	26.5		4.57	
2:20	375			117	6.02	265.0	26.5		4.66	
2:25	375			109	5.98	260.0	25.7		5.22	
2:30	375			109	5.98	260.0	24.9	88.60	5.32	
2:35	375			117	5.97	250.0	25.1		5.36	
2:40	375			115	5.95	250.0	25.2		5.28	
2:45	375			122	5.94	250.0	25.2		5.13	
2:50	375			108	5.94	250	24.7		5.29	
2:55	375			103	5.93	252	25.1		5.10	
3:00	375			117	5.93	255	25.8		5.01	
3:05	375			106	5.92	255	26.1		5.10	

Well Secure: YES
Color: NONE
Odor: NONE

Purge Water Disposal: IRM
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): < 2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 15 GL
Date: 6.4.99 Sampled By: AG CK
Sampling Time: _____ Recorded By: AG CK
Weather: Sunny 80's Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" grunFos
Casing Diameter: 4" Purge Rate: _____
Total Depth: 170 160 Total Volume Purged: _____
Depth to Water: 87.73 Pump Intake Depth 155
Water Column: 72.27 Pump on: 1542 Off: _____
Gallons/Foot: 0.65 Parameters Sampled: VOCs Freon 113
Gallons in Well: 46.98

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1545 1555	350			159	7.15	235	23.0	87.73	1.38	
1550 1600	350			143	6.45	460	23.3		1.07	
55 1605	450			144	6.39	600	23.0		1.97	
1600 1610	450			148	6.37	600	23.6		1.50	
1605 1615	375			157	6.40	600	23.3		1.21	
1610 1620	375			165	6.38	600	23.3		1.39	
1615 1625	375			170	6.38	600	23.2		1.46	
1620 1630	375			176	6.38	575	23.0		1.24	
1625 1635	375			178	6.38	550	22.9		1.13	
1630 1640	375			182	6.39	500	23.2		0.63	
1635 1645	375			182	6.41	550	23.6	87.78	0.96	
1640 1650	375			186	6.42	550	23.8		1.00	
1645 1655				189	6.42	550	23.9		0.95	
1650 1700										

Well Secure: NO lock Purge Water Disposal: IRM
Color: grey Turbidity(qualitative): Turbid
Odor: None Other (OVA, HNU,etc.): < 2 ppm

NOTE: Sounded w/ M-Scope TD = 160

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: I-16 ML
Date: 6.17.99 Sampled By: CK | BH
Sampling Time: 700 Recorded By: CK | BH
Weather: CLOUDY, 60° Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: ML/MIN
Total Depth: 326 Total Volume Purged: 4.5 GALLONS
Depth to Water: 188.00 Pump Intake Depth 321
Water Column: 138.00 Pump on: 600 Off: 710
Gallons/Foot: 0.65 Parameters Sampled: VOCs, freon 113
Gallons in Well: 89.70

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp. (°C)	Depth to Water	Diss. Oxygen	Comments
615	350			66	7.95	260	13.5		3.75	
620	350			58	7.97	260	13.2		2.84	
625	350			53	8.01	260	13.4		3.12	
630	350			41	8.93	285	13.4		2.91	
635	350			39	9.10	290	13.4		3.19	
640	350			40	8.10	300	13.3		3.14	
645	350			49	8.14	310	13.3		2.92	
650	350			55	7.66	308	13.2		3.51	
655	300			57	7.23	305	13.2		2.69	
700	300			59	NF	305	13.2		2.51	
705	300			61	NF	305	13.2		2.53	

Well Secure: YES Purge Water Disposal: FRM
Color: ~~CLEAR~~ COLORLESS Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): PID ≤ 2 ppm

NF - NOT FUNCTIONING

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 16GL
Date: 6-8-99 Sampled By: G. W. S.H.
Sampling Time: _____ Recorded By: SH
Weather: Sunny 100° Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: Low flow
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: 222 Total Volume Purged: 2 GALLONS
Depth to Water: 187.63 Pump Intake Depth: 212
Water Column: 34.37 Pump on: 5:00 Off: 6:08
Gallons/Foot: 0.65 Parameters Sampled: VOC's
Gallons in Well: 22.34

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:05	450			216	7.19	500	28	187.63	—	
5:10	450			210.6	7.19	495	20		—	
5:15	450			200.1	7.19	490	20		2.5	
5:20	450			189.7	7.19	500	20.5	187.63	1.80	
5:25	450			188.5	7.19	500	20.5		1.60	
5:30	450			186.7	7.18	500	20.0	187.64	1.55	
5:35	450			183.1	7.21	505	19.5		1.45	
5:40	450			179.1	7.19	505	19.5		1.45	
5:45	450			177.0	7.19	500	19.5	187.65	1.50	
5:50	450			170.5	7.19	500	19.0		1.50	
5:55	450			165.1	7.21	500	19.0		1.50	
6:00	450			159.9	7.18	500	19.0		1.50	
6:05	450			155.9	7.19	500	19.0		1.60	

Well Secure: yes
Color: NONE
Odor: NONE

Purge Water Disposal: SPM
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): < .2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00002 Well ID: 17GL
Date: 6.23.99 Sampled By: GW JG
Sampling Time: 11:20 Recorded By: GW JG
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Low flow Submersible (micro purge)
Casing Diameter: 4" Purge Rate: 450 ml
Total Depth: 165 Total Volume Purged: ~5.0
Depth to Water: 99.30 Pump Intake Depth 160.0
Water Column: 65.70 Pump on: 10:00 Off: 11:25
Gallons/Foot: 0.65 Parameters Sampled: VOC's, Freon 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:00	450							99.30		
10:05				169.2	5.97	435	23.7		2.7	
10:10				177.3	6.09	450	22.5		3.0	
10:15				184.3	6.07	460	22.9		3.4	
10:20				184.4	6.05	460	22.6		2.4	
10:25				189.8	6.08	460	22.4		2.2	
10:30				188.0	6.08	460	22.9		2.5	
10:35				189.9	6.08	470	23.8		2.5	
10:40				191.9	6.07	470	23.9		2.3	
10:45				195.4	6.07	470	23.9		2.0	
10:50				197.8	6.08	470	23.9		2.0	
10:55				194.4	6.07	480	24.0	99.35	2.1	
11:00				194.4	6.05	490	24.8		2.1	
11:05				194.4	6.06	500	25.4		2.0	
11:10				194.1	6.06	500	25.8	99.35	2.0	
11:15										
11:20										
11:25										
11:30										
11:35										
11:40										

Well Secure: YES
Color: colorless
Odor: none

Purge Water Disposal: IRM
Turbidity(qualitative): clear
Other (OVA, HNU,etc.): PID 3.6 ppm @ 10 min mark 0 ppm

ARCADIS GERAGHTY & MILLER

~~Low-Flow Groundwater Sampling Log~~

Project Number: NY001227.0002 Task: 00003 Well ID: 17 GL

Date: 6/23/99 Sampled By: JG/GW

Sampling Time: _____ Recorded By: JG/GW

Weather: Sunny 80 Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi flow Submersible

Casing Diameter: 4" Purge Rate: 2 GPM

Total Depth: 165 Total Volume Purged: _____

Depth to Water: 99.35 Pump Intake Depth _____

Water Column: _____ Pump on: 11:40 Off: _____

Gallons/Foot: _____ Parameters Sampled: VOC's, FREON 113

Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate ~~(ml/min)~~	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
I 11:40					6.19	420	19.4	99.35		
1 12:00					6.03	440	20.5			
2 12:20					6.02	440	20.5			
3 12:40					6.02	435	20.3			
4 1:00					6.04	435	20.8			

* SPLIT SAMPLE WITH NYSDEC I

Well Secure: _____ Purge Water Disposal: IRM

Color: _____ Turbidity(qualitative): _____

Odor: _____ Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 | Task: 3 | Well ID: 17 ML
Date: 7.1.99 | Sampled By: CLL | GW
Sampling Time: 1:18 | Recorded By: CLL | GW
Weather: OVERCAST, 70's | Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC | Purge Method: BLADDER PUMP
Casing Diameter: 4" | Purge Rate: ML/Min
Total Depth: 400 | Total Volume Purged:
Depth to Water: 99.57 | Pump Intake Depth 395
Water Column: | Pump on: 12:10 | Off: 1:18
Gallons/Foot: 0.65 | Parameters Sampled: VOCs, freon 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:15	500			244.9	6.06	180	20	99.57	6.0	
12:20				248.0	6.16	160	18.5		6.2	
12:25				242.5	6.17	150	18.5		5.7	
12:30				241.2	6.16	150	18.2		5.6	
12:35				247.1	6.44	162	18.6		5.7	
12:40				244.3	6.45	170	18.6		5.55	
12:45				242.9	6.52	170	18.5		5.55	
12:50				243.2	6.53	170	18.5	99.73	5.5	
12:55				244.2	6.52	170	18.5		5.5	
1:00				242.1	6.62	170	18.6		5.47	
1:05				244.3	6.53	170	18.7		5.47	
1:10				244.9	6.43	170	18.7	99.58	5.47	
1:13	↓			245.6	6.43	170	18.7		5.46	

Well Secure: YES
Color: COLORLESS
Odor: ODORLESS

Purge Water Disposal: IRM
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): < .2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 18 MSL
Date: 6.10.99 Sampled By: CK/AG
Sampling Time: 1352 Recorded By: CK/AG
Weather: SUNNY, 80's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: 350 ML/MIN
Total Depth: ~~345~~ 334 Total Volume Purged: 6 GALLONS
Depth to Water: 109.54 Pump Intake Depth
Water Column: 224.46 Pump on: 1236 Off: 1354
Gallons/Foot: 0.65 Parameters Sampled: VOCs, FREON 113
Gallons in Well: 145.90

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1240	350			170	6.65	260	24.6	109.54	6.30	
1245	350			169	6.57	260	24.1		6.06	
1250	350			157	6.50	250	21.5		4.10	
1255	350			153	6.58	245	20.8		3.12	
1300	350			152	6.50	245	20.9		2.94	
1305	350			151	6.45	245	21.1		2.93	
1310	350			152	6.32	250	21.4		2.64	
1315	350			153	6.27	250	21.5		2.82	
1320	350			154	6.23	255	21.3		2.86	
1325	350			158	6.21	260	21.6		2.55	
1330	350			158	6.18	260	22.0		2.43	
1335	350			158	6.15	270	22.4		2.22	
1340	350			161	6.14	280	23.3		2.40	
1345	350			162	6.14	280	24.0	109.53	2.27	
1350	350			163	6.15	280	24.4		2.28	

Well Secure: YES
Color: NONE
Odor: NONE

Purge Water Disposal: ON SITE
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): < .2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 186L
Date: 6-7-99 Sampled By: GW SH
Sampling Time: 1045-1050 Recorded By:
Weather: Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Low-flow
Casing Diameter: 4 Purge Rate:
Total Depth: Total Volume Purged: 6GAL
Depth to Water: 109.70 Pump Intake Depth:
Water Column: Pump on: 0945 Off: 1050
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water ?	Diss. Oxygen	Comments
0945	400			224.6	6.07	440	22.5	109.70	5.8	
0950	400			225.2	6.09	435	23.0		5.1	
0955	400			225.5	6.12	425	23.0		4.7	
1000	400			217.4	6.14	420	22.0	108.80	5.0	
1005	400			209.6	6.17	415	22		4.8	
1010	400			207.1	6.15	415	22		4.6	
1015	400			206.8	6.16	420	22	108.8	4.4	
1020	400			201.6	6.15	430	23.5		5.0	
1025	400			196.0	6.17	430	22.5		5.0	
1030	400			191.10	6.17	430	22	108.81	4.9	
1035	400			188.4	6.17	425	22.5		4.8	
1040	400			186.9	6.16	430	23.5		4.6	
1045	400	6GAL		185.1	6.17	435	24.0		4.5	

Well Secure: Purge Water Disposal:
Color: C Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.):

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 19GU
Date: 6.7.99 Sampled By: AG JG
Sampling Time: 1141 Recorded By: AG JG
Weather: Sunny 100s Coded Replicate No.: ~~[illegible]~~

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" Grunfos, 2" disposable bailer
Casing Diameter: 2 Purge Rate: 350 ml/min
Total Depth: 99 Total Volume Purged: 1 gallon
Depth to Water: 93.10 Pump Intake Depth ~~Est~~
Water Column: 5.9 Pump on: 958 Off: ——
Gallons/Foot: 0.16 Parameters Sampled: VOCs Freon 113
Gallons in Well: 0.944

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml/min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1000	350			130	6.26	650	23.9	93.10	5.11	
1005										
1010	Shut	pump	down	drawdown	over	1 Foot	could	not		
1015		sustain	pump	rate	will	Bail	well			
1020										
1025	11:05	½		187.0	6.24	700	26.0		5.16	
1030	11:13	1		204	6.23	700	26.8		5.27	
1035	11:30	2		209	6.43	700	25.7		6.27	
1040	11:36	3		216	6.32	700	24.2		6.27	
1045										
1050										
1055										
1100										

Well Secure: No lock
Color: ~~None~~ Brown Tint
Odor: ~~Brown tint~~ Orange

Purge Water Disposal: IRM
Turbidity(qualitative): Slightly
Other (OVA, HNU,etc.): 0.6 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 0003 Well ID: 19 MW
Date: 6-8-99 Sampled By: G.W. SH
Sampling Time: Recorded By:
Weather: CLEAR 95° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: LOW flow
Casing Diameter: 4" Purge Rate: 375 ml/min
Total Depth: 248 Total Volume Purged: 6 GAL
Depth to Water: 93.05 Pump Intake Depth: 234
Water Column: — Pump on: 12:05 Off: 13:10
Gallons/Foot: — Parameters Sampled:
Gallons in Well: —

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:05	375			245.2	6.02	440	27	93.05	7.15	
1210	375			245.9	6.00	460	29.0		5.70	
1215	400			242.7	5.96	470	30.5	93.23	5.2	
1220	400			248.4	5.94	450	29.5		4.85	
1225	400			248.7	5.94	445	29.0		4.70	
1230	400			242.8	5.94	440	29.0	93.23	4.45	
1235	400			242.6	5.94	455	30.5		4.70	
1240	400			239.7	5.94	460	30.5		4.75	
1245	400			238.9	5.95	460	30.0	93.23	5.30	
1250	400			237.6	5.94	455	30.0		4.75	
1255	400			235.6	5.94	460	30.5		4.70	
1300	400			235.8	5.94	465	30.5		4.70	
1305	400	6 GAL		237.5	5.93	470	30.0		4.75	

Well Secure:
Color: COLORLESS
Odor: NONE
Purge Water Disposal:
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.):

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 21 GU
Date: 6/7/99 Sampled By: JG/AG
Sampling Time: 1526 Recorded By: JG
Weather: Sunny 100° F Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible
Casing Diameter: 4" Purge Rate: 275 ml
Total Depth: 98.0 Total Volume Purged: 4.7 GALLONS
Depth to Water: 88.93 Pump Intake Depth ~93.0
Water Column: 9.07 Pump on: 1420 Off: 1529
Gallons/Foot: 0.65 Parameters Sampled: VOC's
Gallons in Well: 5.9

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
14:20	275.0			154.0	6.51	130.0	16.0	88.93	6.54	
14:25	275			154.0	6.37	130.0	17.5		5.71	
14:30	275			155.0	6.37	125.0	17.8		5.70	
14:35	275			156.0	6.37	125.0	18.5		5.41	
14:40	275			158.0	6.39	120.0	19.4		5.11	
14:45	275			160.0	6.38	115.0	18.8		5.56	
14:50	275			163.0	6.39	115.0	18.9		5.15	
14:55	275			163.0	6.39	115.0	19.0		5.12	
15:00	275			154.0	6.40	115.0	18.5		5.19	
15:05	275			150.0	6.39	115.0	19.1		5.24	
15:10	275			143.0	6.39	115.0	19.2		5.54	
15:15	275			141.0	6.40	115.0	18.2		5.60	
15:20	275			140.0	6.39	115.0	18.8		5.40	
15:25	275			139.0	6.39	115.0	18.9	88.85	5.54	

Well Secure: (NO) Locking J-plug Stickup Not secure Purge Water Disposal: IRM
Color: Colorless Turbidity(qualitative): cloudy
Odor: none Other (OVA, HNU,etc.): PID 0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227 Task: _____ Well ID: 226L
Date: 6/1/99 Sampled By: JG/GW
Sampling Time: ~3:20 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible (Micro purge)
Casing Diameter: 4" Purge Rate: <500 ml ~ 400 ml
Total Depth: 168.0 Total Volume Purged: 6.0
Depth to Water: 93.96 Pump Intake Depth: 163'
Water Column: 74.04 Pump on: ~2:15 Off: ~3:15
Gallons/Foot: 0.65 Parameters Sampled: REDox, PH, Conductivity, TEMP, Diss Oxygen
Gallons in Well: 48.13

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:15	400ml			257.6	6.28	280	19	93.96	4.3	
2:20				255.3	6.24	280	19		4.2	
2:25				253.3	6.22	280	19		4.0	
2:30				254.3	6.21	280	20	94.00	4.0	
2:35				251.9	6.19	280	20		3.8	
2:40				250.9	6.34	290	20		3.6	
2:45				244.9	6.36	300	21		3.5	
2:50				245.6	6.36	300	21		3.0	
~~2:55~~				245.1	6.38	300	22		2.7	
3:00				244.3	6.40	300	21		3.0	
3:05				236.5	6.40	290	20		2.7	
3:10				229.7	6.50	290	19		2.7	
3:15		6.0		224.1	6.56	290	19	93.97	2.6	

Well Secure: yes Locking J-Plug & secured stick-up Purge Water Disposal: on site Treatment system
Color: Colorless Turbidity(qualitative): clear
Odor: none Other (OVA, HNU,etc.): PID

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 22 ML
Date: 7.1.99 Sampled By: CK/GW
Sampling Time: Recorded By: CK/GW
Weather: RAIN, 70's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: ML/MIN
Total Depth: 325 Total Volume Purged:
Depth to Water: 95.24 Pump Intake Depth: 320
Water Column: Pump on: Off:
Gallons/Foot: 0.65 Parameters Sampled: VOCs, freon 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3:35	350			250.8	6.58	305	19.1	95.24	5.2	
3:40				244	6.51	310	19.2		5.05	
3:45				240.7	6.51	328	19.4		4.9	
3:50				235.2	6.65	325	20.1		4.6	
3:55				236.4	6.66	329	19.3		5.0	
4:00				233	6.58	332	19.1	95.09	4.9	
4:05				234.6	6.37	335	18.9		4.9	
4:10				231.8	6.36	338	18.8		4.9	
4:15				229.8	6.29	340	18.8		4.9	
4:20				231.5	6.	340	18.8		4.9	
4:25				—	—	—	—		—	
4:30			280.4	~~[illegible]~~	5.81	340	18.8		4.5	
4:35				224.0	5.80	340	18.7		4.8	
4:40				222.3	5.80	340	18.8		4.8	

Well Secure: YES Purge Water Disposal: IRM
Color: NONE Turbidity(qualitative): CLEAR
Odor: ODORLESS Other (OVA, HNU,etc.): C. 2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 23-MI
Date: 6/14/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG/GW
Weather: Sunny 80° Coded Replicate No.: MS/MSD

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi flow Submersible (micro purge)
Casing Diameter: 2" Purge Rate: <500ml ~ 450 ml
Total Depth: 215.0' Total Volume Purged:
Depth to Water: 100.39' Pump Intake Depth 210.0'
Water Column: 114.61 Pump on: 1:25 Off:
Gallons/Foot: 0.16 Parameters Sampled: VOC's
Gallons in Well: 18.34

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1:30	450 ml			267.0	6.24	390.0	20.0	100.39	4.0	
1:35				253.2	6.20	400.0	21.0		3.8	
1:40				250.7	6.18	420.0	22.0		3.7	
1:45				270.1	6.20	400.0	22.0		3.6	
1:50				269.7	6.19	395.0	21.0		4.0	
1:55				259.1	6.18	380.0	20.0		4.0	
2:00				255.5	6.17	390.0	21.0		3.7	
2:05				249.5	6.17	390.0	21.0		3.5	
2:10				248.0	6.16	390.0	21.0	100.41	3.5	
2:15				238.9	6.17	390.0	21.0		3.6	
2:20				234.3	6.17	380.0	21.0		3.6	
2:25				222.8	6.16	390.0	21.0		3.6	
2:30				220.1	6.16	400.0	21.0		3.6	* Generator ran out of Gas During Sampling
2:35										
2:40				230.6	6.18	390.0	21.0	100.35	3.8	
2:45				230.1	6.17	390.0	21.0		3.7	
2:50				229.3	6.17	390.0	21.0		3.5	
2:55				228.3	6.17	390.0	21.0		3.5	
3:00				227.5	6.17	395.0	21.0	100.36	3.5	

Well Secure: (yes) secure manhole & Locking Cap
Color:
Odor:

Purge Water Disposal: IRM
Turbidity(qualitative):
Other (OVA, HNU,etc.): PID 0.2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 23GL
Date: 6.8.99 Sampled By: JG AG
Sampling Time: 1420 Recorded By: JG AG
Weather: Sunny 100 Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: micro purge w/ 2" grundfos
Casing Diameter: 2 Purge Rate: 375 ml/min
Total Depth: 150 Total Volume Purged: 7 GALLONS
Depth to Water: 99.97 Pump Intake Depth 145
Water Column: 50.03 Pump on: 1306 Off: 1429
Gallons/Foot: 0.16 Parameters Sampled: VOC From 113
Gallons in Well: 8.00

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1310	450			140	6.14	600	19.2	99.97	3.47	
1315	450			128	5.98	600	20.1		3.21	
1320	450			130	5.97	600	20.6		3.21	
1325	450			136	5.99	600	21.2	101.91	3.21	
1330	375			145	5.41	600	21.6	101.30	3.09	
1335	375			148	5.98	600	21.3		3.21	
1340	375			149	5.97	600	21.3		3.06	
1345	375			150	5.96	600	21.0		3.06	
1350	375			153	5.98	600	21.1		2.99	
1355	375			155	5.96	600	21.3		3.07	
1400	375			158	5.97	600	21.5		3.05	
1405	375			160	5.99	600	21.7	[redacted]	3.00	
1410	350			179	5.99	600	23.2	99.75	3.29	
1415	350			169	5.99	600	22.7		3.10	
1420	350			168	5.98	600	22.8		3.14	
1425	350			162	5.95	600	20.6		3.15	

Well Secure: NO lock
Color: None
Odor: None

Purge Water Disposal: IRM
Turbidity(qualitative): Cloudy
Other (OVA, HNU,etc.): 0.2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 24 MI
Date: 6/15/99 Sampled By: JG
Sampling Time: _____ Recorded By: JG
Weather: Sunny 80° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible
Casing Diameter: 2" Purge Rate: <500ml ~375 ml
Total Depth: 220.0' Total Volume Purged: ~8.5
Depth to Water: 100.82 Pump Intake Depth 200'
Water Column: _____ Pump on: 10:00 Off: _____
Gallons/Foot: _____ Parameters Sampled: VOC's Freon 113
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:05	~375			202.4	6.23	380.0	22.0	100.82	6.0	Turbidity High
10:10				203.6	6.20	380.0	22.0		5.0	
10:15				205.0	6.20	380.0	22.0		5.0	
10:20				207.3	6.19	380.0	22.0		5.0	
10:25				209.1	6.19	380.0	22.0		4.7	
10:30				210.0	6.19	380.0	22.0		4.5	
10:35				212.5	6.20	380.0	21.0		3.9	
10:40			>200	220.3	6.18	360.0	20.0	100.84	3.8	Not As Turbide
10:45				215.9	6.17	360.0	20.0		3.5	
10:50				214.5	6.18	360.0	20.0		3.5	
10:55				209.7	6.18	360.0	20.0		3.3	
11:00				204.3	6.17	360.0	20.0		3.2	
11:05				200.1	6.18	360.0	20.0		3.0	
11:10			>200	197.2	6.16	360.0	20.0	100.85	3.0	
11:15				192.7	6.18	360.0	20.0		3.0	
11:20			119.9	182.6	6.16	360.0	21.0		3.0	
11:25				180.3	6.17	360.0	21.0		3.0	
11:30		~8.5	35.7	180.9	6.17	360.0	21.0	100.79	2.9	

Well Secure: yes secure manhole & Locking J-plug
Color: colorless
Odor: none

Purge Water Disposal: IRM
Turbidity(qualitative): cloudy
Other (OVA, HNU,etc.): PID 0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 24GL
Date: 6.7.99 Sampled By: JG AG
Sampling Time: 1852 Recorded By: AG JG
Weather: Sunny 100 Coded Replicate No.: ———

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" Grundfos micropurge
Casing Diameter: 2 Purge Rate: 400 ml/min
Total Depth: 150 Total Volume Purged: 6.35 GALLONS
Depth to Water: 99.77 Pump Intake Depth ———
Water Column: 50.23 Pump on: 1748 Off: 1854
Gallons/Foot: 0.16 Parameters Sampled: VOCs Freon 113
Gallons in Well: 8.0368

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1750	400			90	6.19	3650	24.6	99.77	5.76	
1755	400			55	5.89	1600	20.2		3.11	
1800	400			52	5.93	1600	20.7		3.23	
1805	400			53	5.90	1600	20.1		3.35	
1810	400			51	5.96	1600	20.7		2.90	
1815	400			51	5.93	1400	21.7		3.22	
1820	400			51	5.94	1400	21.2		3.14	
1825	400			55	5.95	1400	21.3	100.08	3.06	
1830	400			58	5.95	1400	21.9		3.10	
1835	400			62	5.95	1400	22.2		2.72	
1840	400			68	5.97	1400	21.9		2.81	
1845	400			70	5.96	1400	21.7		2.76	
1850	400			70	5.96	1400	21.8		2.75	

Well Secure: YES Purge Water Disposal: IRM
Color: None Turbidity(qualitative): Cloudy
Odor: None Other (OVA, HNU,etc.): < .2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: 14001227.0002 Task: 00003 Well ID: 25 MW
Date: 6-15-99 Sampled By: G.W. JG
Sampling Time: _____ Recorded By: GW, GJ
Weather: OVERCAST 85° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi flow Submersible (micro purge)
Casing Diameter: 2" Purge Rate: <500ml ~500 ml
Total Depth: _____ Total Volume Purged: 96A
Depth to Water: 94.57 Pump Intake Depth _____
Water Column: _____ Pump on: 5:05 Off: _____
Gallons/Foot: _____ Parameters Sampled: VOC's FREON
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:10	~500ml			247.5	6.14	430.0	20.0	94.57	3.4	
5:15				247.5	6.13	430.0	20.0		3.2	
5:20				246.5	6.13	430.0	20.0		3.1	
5:25				246.4	6.12	430.0	20.0		3.1	
5:30				243.6	6.12	430.0	21.0		3.0	
5:35				230.5	6.12	430.0	21.0		2.5	
5:40				228.4	6.12	430.0	21.0		2.5	
5:45				222.3	6.13	430.0	21.0		2.5	
5:50				211.4	6.13	430.0	21.0	94.64	2.5	
5:55				211.8	6.14	430.0	21.0		2.6	
6:00				209.5	6.12	430.0	21.0		2.6	
6:05				208.0	6.12	430.0	21.0		2.6	
6:10		296A		206.7	6.12	430.0	21.0	94.66	2.6	

Well Secure: YES Secure Manhole & locking J-plug
Color: COLORLESS
Odor: NONE

Purge Water Disposal: IRM
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): PID 0ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 25GL
Date: 6.3.99 Sampled By: CK/AG
Sampling Time: 1333 Recorded By: CK/AG
Weather: SUNNY, 90'S Coded Replicate No.: —

WELL IMFORMATION

Casing Material: 2" Purge Method: 2" REDIFLO SUB PUMP
Casing Diameter: PVC Purge Rate: 450 ML/MIN
Total Depth: 170 Total Volume Purged:
Depth to Water: 92.45 Pump Intake Depth
Water Column: 77.55 Pump on: 1225 Off: 1335
Gallons/Foot: 0.16 Parameters Sampled: VOCs, FROM 113
Gallons in Well: 12.41

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1230	450			149	6.25	460	19.5	92.45	5.15	
1235	450			200	6.20	450	19.8		4.22	
1240	450			204	6.17	450	19.2		4.16	
1245	450			212	6.18	455	19.2		4.45	
1250	450			221	6.20	460	20.1	92.98	4.40	
1255	450			226	6.18	465	20.4		4.32	
1300	450			231	6.20	470	20.6		4.23	
1305	450			235	6.18	475	20.9		4.16	
1310	450			240	6.19	475	20.7		4.17	
1315	450			242	6.18	475	20.8		4.02	
1320	450			245	6.19	475	21.1		3.46	
1325	450			247	6.18	475	21.3		3.77	
1330	450			249	6.17	475	21.5	92.38	3.59	

Well Secure: YES Purge Water Disposal: IRM
Color: ~~CLEAR~~ BROWN Turbidity(qualitative): ~~CLEAR~~ TURBID
Odor: NONE Other (OVA, HNU,etc.): < .2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 26 GL
Date: 6.3.99 Sampled By: CL/AG
Sampling Time: 1728 Recorded By: CL/AG
Weather: SUNNY, 90's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: 2" Purge Method: 2" GRUNDFOS REDI FLO SUB pump
Casing Diameter: PVC Purge Rate: ML/MIN
Total Depth: 184 Total Volume Purged:
Depth to Water: 87.39 Pump Intake Depth —
Water Column: 96.61 Pump on: 1623 Off: 1730
Gallons/Foot: 0.16 Parameters Sampled: VOCs, FREON 113
Gallons in Well: 15.46

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1625	450			198	6.83	360	28.6	87.39	2.71	
1630	450			207	6.56	330	20.3		2.44	
1635	450			163	6.52	335	19.9		2.31	
1640	450			152	6.53	340	21.5		1.57	
1645	450			135	6.51	355	23.0		1.53	
1650	450			132	6.52	360	24.7	87.85	1.45	
1655	450			114	6.44	340	24.6		1.45	
1700	450			102	6.43	340	24.3		1.53	
1705	450			111	6.40	340	25.2		1.91	
1710	450			132	6.38	335	24.8		2.08	
1715	450			148	6.38	335	24.4		2.14	
1720	450			159	6.39	340	24.5		2.08	
1725	450			164	6.40	335	24.8	88.01	2.12	

Well Secure: NO LOCK Purge Water Disposal: IRM
Color: Brown - green Turbidity(qualitative): slt turbid.
Odor: None Other (OVA, HNU,etc.): < .2 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: D400227.0002 Task: 00003 Well ID: 26MS
Date: 6-10-99 Sampled By: G.W. JG.
Sampling Time: 5:15 Recorded By: JG
Weather: CLEAR 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Low-flow SAMPLING
Casing Diameter: 2" Purge Rate: <500ml ~400 ml
* Total Depth: 230.0 Total Volume Purged: ~6.0
Depth to Water: 88.38 Pump Intake Depth: [redacted] + 225.0
Water Column: 141.62 Pump on: 4:15 Off:
Gallons/Foot: 0.16 Parameters Sampled: VOC's, FREON 113
Gallons in Well: 22.66

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
4:15	400ml			221.7	6.11	440.0	19.0	88.38	2.5	
4:20				223.6	6.13	450.0	20.0		2.5	
4:25				215.3	6.13	450.0	21.0		2.2	
4:30				202.5	6.14	460.0	20.0		2.0	
4:35				197.3	6.11	470.0	20.0		2.1	
4:40				197.3	6.12	480.0	20.0		2.1	
4:45				197.0	6.12	490.0	21.0	88.45	2.0	
4:50				192.0	6.11	475.0	20.0		2.0	
4:55				187.7	6.10	460.0	20.0		2.0	
5:00				187.1	6.08	470.0	20.0		2.0	
5:05				186.8	6.08	470.0	20.0	88.75	2.0	
5:10				186.5	6.08	470.0	20.0	88.43	2.0	
5:15		~6.0		188.5	6.08	470.0	20.0	88.43	2.0	

Well Secure: yes Manhole & Locking J-plug (secure) Purge Water Disposal: IRM
Color: Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.): DID 0.5 ppm

* check Data sheet

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 27-MI
Date: 6/14/99 Sampled By: JG/GW
Sampling Time: ~11:35 Recorded By: JG/GW
Weather: Cloudy 75° Coded Replicate No.: — REP-3

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible (Micropurge)
Casing Diameter: 2" Purge Rate: < 500ml ~ 400ml
Total Depth: 230.0' Total Volume Purged: ~8.0
Depth to Water: 79.50 Pump Intake Depth 225.0'
Water Column: 150.50 Pump on: 10:25 Off:
Gallons/Foot: 0.16 Parameters Sampled: VOC's Freon 113
Gallons in Well: 24.08

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:30	~400ml			196.7	6.22	2700	20.0	79.50	4.0	
10:35				196.9	6.21	2700	20.0		3.9	
10:40				200.6	6.21	2700	20.0		4.0	
10:45				199.4	6.21	2700	19.0		4.2	
10:50				198.5	6.21	2700	20.0		4.4	
10:55				198.7	6.21	2700	21.0	79.32	4.4	
11:00				203.3	6.21	2700	21.0		4.3	
11:05				206.5	6.54	2850	21.0		4.3	
11:10				206.9	6.6	2850	21.5		4.3	
11:15				207.2	6.31	290	21.0		4.0	
11:21				209	6.21	290	22.0		3.9	
11:25				211.5	6.22	300	22.0		3.8	
11:30		~8.0		215.8	6.23	280	21.0	79.26	4.0	

Well Secure: (yes) secure manhole & Locking J-plug Purge Water Disposal: IRM
Color: Colorless Turbidity(qualitative): clear
Odor: none Other (OVA, HNU,etc.): PID 0ppm

J plug Broken

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 27 GL
Date: 6.4.99 Sampled By: CK/AG
Sampling Time: 1102 Recorded By: CK/AG
Weather: SUNNY, 80's Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" REDIFLO SUB PUMP
Casing Diameter: 2" Purge Rate: MC/MIN
Total Depth: 180 Total Volume Purged:
Depth to Water: 79.62 Pump Intake Depth
Water Column: 100.38 Pump on: 949 Off: 1104
Gallons/Foot: 0.16 Parameters Sampled: VOCs, from 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
955	300			211	6.62	220	19.2	79.62	1.93	
1000	300			222	6.19	220	19.7		1.68	
1005	300			222	6.16	230	20.0		1.78	
1010	300			217	6.16	240	20.1		1.61	
1015	300			177	6.17	250	20.0		2.07	
1020	300			184	6.16	250	20.0		2.71	
1025	300			195	6.18	250	19.8	79.71	3.38	
1030	300			210	6.16	250	19.9		3.37	
1035	300			218	6.18	250	20.0		3.57	
1040	300			222	6.17	250	19.7		3.66	
1045	300			230	6.17	250	19.0		3.90	
1050	300			236	6.18	250	18.8		4.16	
1055				236	6.18	250	18.6	79.39	4.05	
~~1100~~										
1100	300			235	6.18	250	18.4		4.03	

Well Secure: YES Purge Water Disposal: ON
Color: Brown ~~Brown~~ ~~Clear~~ Turbidity(qualitative): ~~Turbid~~ ~~Clear~~ Turbid
Odor: None Other (OVA, HNU,etc.): < .2 ppm

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: Lockheed Martin | Project No: NY000227.0002.00003 | Page: 1 of 1

Site Location: Great Neck, NY | Date: 6-10-99

Site/Well No.: 28 GL-B* | Replicate No.: | Code No.:

Weather: Sunny 75° | Sampling Time: Begin 11:40 End 11:45

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	150.0
Depth to Water (ft bmp)	95.54
Water-Level Elevation (ft)	
Water Column in Well (ft)	54.46
Casing Diameter/Type	2"
Gallons in Well	8.71
Gallons Pumped/Bailed Prior to Sampling	4 GW = 34.84
Sample Pump Intake Setting (ft bmp)	VARIOUS
Purge Time	begin 11:00 end 11:38
Pumping Rate (gpm)	1 GPM
Evacuation Method	Redi flow Submersible

Field Parameters

Field Parameters	I	1	2	3	4
Color	colorless	"	"	"	"
Odor	none	"	"	"	"
Appearance	cloudy	"	clear	clear	clear
pH (s.u.)	6.22	6.19	6.22	6.19	
Conductivity ~~mS/cm~~ (µmhos/cm)	750.0	750.0	750.0	750.0	750.0
Turbidity (NTU)					
Temperature (°C)	25.0	25.0	25.0	25.0	25.0
Dissolved Oxygen (mg/L)	0.8	0.8	2.5	2.5	2.6
Salinity (%)					
Sampling Method					
Remarks					

split sample with NYSDEC

Constituents Sampled	Container Description	Number	Preservative
* split sample - one way micro purge (28 GL MP) and one way bailer			

Sampling Personnel: G.W. J.G.

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002.0003 Task: _____ Well ID: 28 GLMP*
Date: 6-10-99 Sampled By: G.W. JG
Sampling Time: 10:45 Recorded By: JG
Weather: Cloudy 75° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: [redacted] Redi Flow Submersible (Micro purge)
Casing Diameter: 2" Purge Rate: <500 ml ~350 ml
Total Depth: 150.0' Total Volume Purged: _____
Depth to Water: 95.68 Pump Intake Depth 140.0'
Water Column: 54.32 Pump on: 9:15 Off: ~10:45
Gallons/Foot: 0.163 Parameters Sampled: VOC'S Freon 113
Gallons in Well: [redacted] 8.69
*3 [redacted] 26.07

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:15	~350ml			212.2	6.12	440.0	18.0	95.68	9.0	
9:20				195.8	6.13	460.0	19.0		8.8	
9:25				194.0	6.13	460.0	19.0		8.8	
9:30				189.6	6.13	460.0	20.0		8.8	
9:35				168.4	6.16	460.0	20.0		8.8	
9:40				167.5	6.15	470.0	20.0	95.72	8.8	
9:45				163.3	6.15	470.0	20.0		8.6	
9:50				160.9	6.16	470.0	20.0		8.6	
9:55				160.0	6.17	475.0	21.0		8.6	
10:00				159.4	6.16	480.0	21.0		8.4	
10:05				157.4	6.17	480.0	21.0		8.5	
10:10				155.9	6.16	480.0	22.0		7.4	
10:15				155.3	6.16	480.0	22.0	95.61	5.0	
10:20				152.2	6.16	480.0	22.0		4.0	
10:25				150.4	6.17	600.0	23.0		1.0	
10:30				150.4	6.16	650.0	23.0	95.55	1.1	
10:35				150.7	6.16	600.0	23.0		0.8	
10:40				150.7	6.16	600.0	23.0	95.56	0.9	
10:45				151.8	6.16	600.0	23.0	95.54	0.8	
10:50										
10:55										

* SPLIT SAMPLE WITH NYSDEC I

Well Secure: yes manhole & locking J-plug
Color: Colorless
Odor: none
Purge Water Disposal: IRM
Turbidity(qualitative): clear
Other (OVA, HNU,etc.): PID / PPM

* split sample - one way micro purge + one way Bailer (28 GLB)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 28-MI
Date: 6/14/99 Sampled By: JG/BW
Sampling Time: ~6:00 Recorded By: JG/BW
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible (micro purge)
Casing Diameter: 2" Purge Rate: < 500ml ~350 ml
Total Depth: 250.0' Total Volume Purged: ~ 5.5
Depth to Water: 94.26 Pump Intake Depth: 245.0'
Water Column: 155.74 Pump on: 4:55 Off:
Gallons/Foot: 0.16 Parameters Sampled: VOC's, FREON 113
Gallons in Well: 24.92

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
4:55	~350ml			323.7	6.24	390.0	23.0	94.26	1.6	
5:00				314.8	6.22	390.0	23.0		1.5	
5:05				300.8	6.26	400.0	23.0		1.5	
5:10				299.2	6.26	410.0	23.0		1.5	
5:15				293.1	6.29	410.0	24.0		1.5	
5:20				285.1	6.20	410.0	24.0		1.5	
5:25				280.6	6.20	410.0	24.0		1.6	
5:30				280.5	6.17	410.0	24.0	94.30	1.7	
5:35				278.9	6.17	410.0	24.0		1.7	
5:40				270.0	6.16	400.0	24.0		1.8	
5:45				268.8	6.16	400.0	24.0		1.8	
5:50				264.4	6.16	400.0	24.0		1.8	
5:55		~5.5		266.3	6.16	400.0	24.0	94.44	1.8	

Well Secure: Yes Secure MANhole & Locking CAP Purge Water Disposal: IRM
Color: Colorless Turbidity(qualitative):
Odor: none Other (OVA, HNU,etc.): PID 35 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: [redacted] 29GL

Date: 6-8-99 Sampled By: AG JG

Sampling Time: 1112 Recorded By: JG AG

Weather: Sunny 100 Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" Grundfos micro purge

Casing Diameter: 2 Purge Rate: 400 ml/min

Total Depth: 170 Total Volume Purged: 6 GALLONS

Depth to Water: 103.33 Pump Intake Depth 165

Water Column: 66.67 Pump on: 1008 Off: 1115

Gallons/Foot: 0.16 Parameters Sampled: VOCs Freon 113

Gallons in Well: 10.67

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1010	250			102	7.09	800	22.3	103.33	2.27	
1015	400			79	7.04	800	23.1		2.48	
1020	400			75	7.05	800	23.0		1.93	
1025	400			72	7.02	800	23.2		1.91	
1030	400			95	7.03	800	24.0		2.49	
1035	400			89	7.00	800	24.6		2.86	
1040	400			93	6.98	800	24.8		2.02	
1045	400			93	6.95	800	24.9		2.46	
1050	400			101	6.93	800	25.5		2.71	
1055	400			106	6.93	800	25.0		2.45	
1100	400			114	6.93	800	25.5		2.54	
1105	400			116	6.90	800	25.7		2.77	
1110	400			122	6.89	800	26.2	103.99	2.71	

Well Secure: yes Purge Water Disposal: IRM

Color: Clear Turbidity(qualitative): Cloudy

Odor: None Other (OVA, HNU,etc.): 0.3 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 29-MI
Date: 6/15/99 Sampled By: JG/GW
Sampling Time: 3:15 Recorded By: JG/GW
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible (micro purge)
Casing Diameter: 2" Purge Rate: <500 ml ~500 ml
Total Depth: 217.0 Total Volume Purged: 8.0
Depth to Water: 103.48 Pump Intake Depth
Water Column: Pump on: 2:10 Off: 3:15
Gallons/Foot: 0.16 Parameters Sampled: VOC's, FREON 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:15	~500ml			298.6	6.17	440.0	23.0	103.48	3.1	
2:20				289.8	6.16	430.0	23.0		3.2	
2:25				276.0	6.18	440.0	23.0		3.0	
2:30				274.4	6.18	440.0	23.0		3.0	
2:35				266.4	6.18	440.0	23.0		3.0	
2:40				253.5	6.18	410.0	23.0		3.1	
2:45				250.7	6.18	410.0	23.0	103.55	3.1	
2:50				244.5	6.16	410.0	23.0		3.0	
2:55				240.9	6.16	410.0	23.0		3.0	
3:00				236.2	6.16	410.0	23.0		3.0	
3:05				233.7	6.16	410.0	23.0		3.0	
3:10				232.4	6.16	400.0	23.0		3.0	
3:15		8.0		234.3	6.16	400.0	23.0		3.0	

Well Secure: YES Secure manhole & Locking J-plug
Color:
Odor:

Purge Water Disposal: IRM
Turbidity(qualitative):
Other (OVA, HNU,etc.): PID 0.6 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY000227.0002 Task: 3 Well ID: 30GL
Date: 6.1.99 Sampled By: A.G CK
Sampling Time: 1803 Recorded By: AGilman C. Keen
Weather: Sunny 90s Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" Submersible
Casing Diameter: 4" Purge Rate: 450 ML/MIN
Total Depth: 210 Total Volume Purged:
Depth to Water: 96.37 Pump Intake Depth: 195
Water Column: 113.63 Pump on: 1653 Off: 1804
Gallons/Foot: 0.65 Parameters Sampled: VOCs Freon 113
Gallons in Well: 73.86

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1655	450			106	7.41	155	21.1	96.37	3.01	
1700	450			-85	7.58	170	19.4		2.17	
1705	450			-106	7.72	180	18.5		1.74	
1710	450			-75	7.75	185	18.1		1.51	
1715	450			-90	7.75	185	17.2	97.50	1.54	
1720	450			-90	7.76	190	18.9		1.06	
1725	450			-102	7.76	190	19.2		1.00	
1730	450			-110	7.75	190	19.4		0.91	
1735	450			-109	7.74	190	19.7		0.74	
1740	450			-97	7.74	190	19.4		0.87	
1745	450			-98	7.74	190	19.9	97.50	0.81	
1750	450			-102	7.74	190	19.7		0.71	
1755	450			-98	7.74	190	19.7	97.50	0.67	

Well Secure: YES Purge Water Disposal: IRM
Color: NONE Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): 0.2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227 Task: Well ID: 30 MI
Date: 6/9/99 Sampled By: JG/SW
Sampling Time: ~6:30 Recorded By: JG
Weather: Sunny 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible (Micro Purge)
Casing Diameter: 4" Purge Rate: <500 mL ~ 350 mL
Total Depth: 280.00' Total Volume Purged: 5.0
Depth to Water: 97.62' Pump Intake Depth: 270
Water Column: 182.38' Pump on: 5:30 Off: 6:25
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss oxygen
Gallons in Well: 118.55

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:30	350 mL			219.2	6.92	300.0	18.0	97.62	4.2	
5:35				212.0	6.92	300.0	18.0		3.5	
5:40				207.4	7.02	300.0	18.0		3.6	
5:45				207.1	7.05	310.0	18.0		3.6	
5:50				206.5	7.06	310.0	18.0		3.5	
5:51				205.9	7.07	310.0	18.0	*	3.0	
6:00				200.1	7.10	310.0	18.0		2.9	
6:05				200.0	7.10	305.0	18.0		2.9	
6:10				197.6	7.11	305.0	18.0		2.8	
6:15				191.20	7.13	305.0	18.0		2.8	
6:20				190.70	7.14	310.0	18.0		2.8	
6:21		5.0		190.10	7.15	310.0	18.0	*	2.8	
6:30										

Well Secure: yes Locking J-Plug secure stick-up Purge Water Disposal: on site treatment system
Color: Colorless Turbidity(qualitative): cloudy
Odor: none Other (OVA, HNU,etc.): PID 0 PPM

* M Scope Faulty

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 30ML
Date: 7/2/99 Sampled By: JG/BW
Sampling Time: 3:25 Recorded By: JG/BW
Weather: Sunny 80° Coded Replicate No.: MS/MSD REP-03

WELL IMFORMATION

Casing Material: PVC Purge Method: [redacted] Bladder pump
Casing Diameter: 4" Purge Rate: <500 ml
Total Depth: 380 Total Volume Purged: 7 GALLONS
Depth to Water: 99.40 Pump Intake Depth 370
Water Column: Pump on: 12:05 Off: 3:35
Gallons/Foot: 0.65 Parameters Sampled: VOC's, FREON 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:15	400ml			194	8.5	1600	25.0	99.40	4.4	
12:20				180	8.8	128	21.0		3.5	
12:25				190	8.6	125	21		3.5	
12:30				99	8.4	120	21		3.6	
12:35				201.3	7.9	110	22.0		3.5	
12:40				215.5	7.5	100	22.0		3.4	
12:45				220.1	6.4	100	22.0	99.05	2.2	
12:50										
12:55				214.3	6.3	100	21.9		1.8	
3:00				209	6.3	100	27.5		1.7	
3:05				207.5	6.3	100	22.6		1.7	
3:10				206.2	6.3	100	22.8		1.6	
3:15				206.1	6.3	100	22.9		1.7	
3:20				203.1	6.3	100	23.4		1.6	
3:25				203.8	6.3	100	23.4	99.01	1.7	

Well Secure: Yes Secure stickup & locking J-plug
Color: Colorless
Odor: none

Purge Water Disposal: IRM
Turbidity(qualitative): Cloudy
Other (OVA, HNU,etc.): PID / 0ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 31-GL
Date: 5/28/99 Sampled By: JG/GW
Sampling Time: _____ Recorded By: JG
Weather: Sunny 80° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: Micro Purge (Redi Flow submersible)
Casing Diameter: 4" Purge Rate: ≤ 500 ml (350 ml)
Total Depth: 200.0' Total Volume Purged: _____
Depth to Water: 86.35 Pump Intake Depth: 190'
Water Column: 113.65 Pump on: _____ Off: 3:50
Gallons/Foot: 0.65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss Oxygen
Gallons in Well: 73.87

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:50	350 ML			125.6	6.95	200	18.0	86.35	6.0	
2:55				127.5	6.91	200	18.0		6.0	
3:00				130.5	6.85	215	18.0		5.7	
3:05				135.3	6.85	220	18.0		5.0	
3:10				133.0	6.86	220	18.0		4.5	
3:15				132.6	6.88	220	18.0		4.5	
3:20				133.1	6.87	220	18.0	86.57	4.5	
3:25				133.2	6.86	220	18.0		4.3	
3:30				132.2	6.86	220	18.0		4.0	
3:35				133.1	6.86	220	18.0		4.0	
3:40				132.7	6.85	220	18.0		4.0	
3:45				132.3	6.85	225	18.0		4.0	
3:50		8.0		132.3	6.85	225	18.0	86.51	3.9	

Well Secure: (yes) Locking J-Plug & Manhole Purge Water Disposal: On Site treatment system
Color: Colorless Turbidity(qualitative): _____
Odor: none Other (OVA, HNU,etc.): (PID) 0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 31-MI
Date: 5/28/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG
Weather: Sunny 80° Coded Replicate No.: REPLICATE 1

WELL IMFORMATION

Casing Material: PVC Purge Method: Micro purge (Redi Flow Submersible)
Casing Diameter: 4" Purge Rate: < 500 mL
Total Depth: 255.00 Total Volume Purged:
Depth to Water: 87.11' Pump Intake Depth: 245.0'
Water Column: 167.89' Pump on: Off: 2:45
Gallons/Foot: .65 Parameters Sampled: Redox, PH, Conductivity, Temp, Diss Oxygen
Gallons in Well: 109.13

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1:40	300 mL			191.0	7.58	130.00	16.5	87.11	4.2	
1:45				171.0	7.48	135.0	20.0		4.7	
1:50				162.9	7.50	145.0	22.0		2.5	
1:55				160.8	7.50	147.0	23.0		2.5	
2:00				157.3	7.54	150.0	22.0	87.46	1.8	
2:05				134.5	7.46	130.0	16.0		1.8	
2:10				112.7	7.46	125.0	16.0		1.7	
2:15				107.4	7.45	125.0	16.0		1.7	
2:20				96.9	7.42	120.0	16.0		1.9	
2:25				96.7	7.42	120.0	16.0		2.0	
2:30				94.6	7.30	115.0	16.0		2.1	
2:35				94.8	7.06	115.0	16.0	87.31	2.1	
2:40		~~12.0~~		94.8	7.04	115.0	16.0		2.1	
2:45		12.0		95.7	7.00	115.0	16.0		2.2	

Well Secure: (yes) Locking J-Plug & manhole Purge Water Disposal: on site treatment system
Color: clear colorless Turbidity(qualitative): Cloudy (slightly)
Odor: none Other (OVA, HNU,etc.): (PID) 0ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 31ML
Date: 6-15-99 Sampled By: CK AG
Sampling Time: 12:22 Recorded By: CK AG
Weather: Sunny 70s Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: bladder pump
Casing Diameter: 4 Purge Rate: ML/MIN
Total Depth: 355 Total Volume Purged: 345
Depth to Water: 92.85 Pump Intake Depth: 345
Water Column: 262.15 Pump on: 1111 Off: 1225
Gallons/Foot: 0.65 Parameters Sampled: VOCs, Freon 113
Gallons in Well: 170.40

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1115	450			128	7.54	7000	19.5	92.85	6.21	
1120	200			126	6.44	4500	15.7		5.52	
1125	225			130	6.36	4000	16.0		5.24	
1130	250			134	6.24	3400	16.0		5.50	
1135	250			139	6.21	1800	16.0		5.39	
1140	250			104	6.17	700	16.5		5.37	
1145	250			107	6.16	350	16.6		5.04	
1150	250			102	6.13	NF	16.5		5.10	
1155	250			142	6.10	NF	16.5		4.98	
1200	250			146	6.13	NF	16.6		4.97	
1205	250			117	6.09	NF	16.7		5.07	
1210	250			122	6.11	NF	16.9		4.39	
1215	250			132	6.10	NF	17.2		4.64	
1220	250			140	6.11	FAIL	17.7		4.72	

Well Secure: YES
Color: NONE
Odor: NONE

Purge Water Disposal: IRM
Turbidity(qualitative):
Other (OVA, HNU,etc.): C. 2 ppm

NF - NOT FUNCTIONING PROPERLY

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 32 MI
Date: 6.16.99 Sampled By: CK | BH
Sampling Time: 1628 Recorded By: CK | BH
Weather: SUNNY, 80'S Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: 450 ML/MIN
Total Depth: 330 Total Volume Purged: 7 GALLONS
Depth to Water: 167.45 Pump Intake Depth 320
Water Column: 162.55 Pump on: 1520 Off: 1630
Gallons/Foot: 0.65 Parameters Sampled: VOCs, freon 113
Gallons in Well: 105.66

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1525	450			138	8.25	140	18.4		2.23	
1530	450			137	7.79	130	17.0		2.09	
1535	450			137	7.40	125	16.7		1.73	
1540	450			134	7.15	125	17.0		1.72	
1545	450			131	6.98	125	17.0		1.85	
1550	450			131	6.96	125	17.0		1.89	
1555	450			127	6.97	122	16.2		1.94	
1600	450			125	6.79	122	16.2		2.01	
1605	450			125	6.79	122	16.2		2.01	
1610	450			124	6.77	122	15.9		1.99	
1615	450			122	6.59	122	16.2		2.02	
1620	450			121	6.70	122	16.0		2.42	
1625	450			121	6.69	122	16.0		2.23	

Well Secure: YES
Color: COLORLESS
Odor: ODORLESS

Purge Water Disposal: ERM
Turbidity(qualitative): SL. TURBID
Other (OVA, HNU,etc.): PID < .2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: UY001227.0002 Task: 3 Well ID: 32 ML
Date: 6.17.99 Sampled By: CK/BH
Sampling Time: 338 Recorded By: CK/BH
Weather: Cloudy 60° Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: Bladder Pump
Casing Diameter: 4" Purge Rate: 375 ML/MIN
Total Depth: 412 Total Volume Purged: 6 GALLONS
Depth to Water: 167.82 Pump Intake Depth 402
Water Column: 244.18 Pump on: 230 Off: 340
Gallons/Foot: 0.65 Parameters Sampled: VOC's, Freon 113
Gallons in Well: 158.72

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:35	375			82	7.30	100	16.4		4.48	
2:40	375			95	6.67	90	14.2		2.64	
2:45	375			99	6.46	90	14.2		2.20	
2:50	375			95	6.40	90	14.0		2.07	
2:55	375			95	6.19	90	13.9		2.01	
3:00	375			95	6.37	90	13.8		2.62	
3:05	375			90	6.64	90	13.3		2.89	
3:10	375			99	6.97	90	13.3		2.92	
3:15	375			99	6.29	90	13.7		2.95	
3:20	375			96	6.72	90	13.6		2.95	
3:25	375			99	6.65	90	13.6		3.20	
3:30	375			99	6.64	90	13.6		3.21	
3:35	375			95	6.60	90	13.5		3.17	

Well Secure: YES Purge Water Disposal: ERM
Color: LIGHT BROWN Turbidity(qualitative): SL. TURBID
Odor: odorless Other (OVA, HNU,etc.): PID C. 2 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: .00003 Well ID: 32-GL
Date: 5/28/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG
Weather: Sunny 75° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: micro Purge (Redi Flow submeasible)
Casing Diameter: 4" Purge Rate: (< 500 mL) 400 mL
Total Depth: 240.0' Total Volume Purged:
Depth to Water: 165.78' Pump Intake Depth: 230.0'
Water Column: 74.22' Pump on: Off: 11:45
Gallons/Foot: * 0.65 Parameters Sampled: Ph, Redox, Temp, Conductivity Dissolved Oxygen
Gallons in Well: 48.24

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water'	Diss. Oxygen	Comments
10 40	400 mL			148.3	7.22	270.0	14	165.78	5.7	
10 45				147.7	7.17	270.0	15		5.0	
10 50				144.3	7.18	290.0	18		5.0	
10 55				141.1	7.17	290.0	18		5.0	
11 00				139.9	7.17	300.0	19		5.4	
11 05				135.1	7.17	280.0	17		4.9	
11 10				119.0	7.18	280.0	16	165.85	4.8	
11 15				113.2	7.19	280	16		4.8	
11 20				111.9	7.18	280	16		4.7	
11 25				109.6	7.18	285	16		4.6	
11 30				105.8	7.18	280	17		4.4	
11 35				105.1	7.18	280	17		4.4	
11 40		10		104.7	7.18	285	17	165.84	4.4	

Well Secure: (yes) Locking J-Plug & manhole Purge Water Disposal: on-site treatment system
Color: Colorless Turbidity(qualitative): clear
Odor: none Other (OVA, HNU,etc.): PID 0 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 0003 Well ID: 33 GL
Date: 6/23/94 Sampled By: JG/GW
Sampling Time: 6:20 Recorded By: JG/GW
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Nitrogen Powered Bladder Pump
Casing Diameter: 4" Purge Rate: <500 ml
Total Depth: ? 252.0 Total Volume Purged:
Depth to Water: 225.35 Pump Intake Depth ? 242.0
Water Column: Pump on: 5:00 Off: 6:20
Gallons/Foot: 0.65 Parameters Sampled: VOC's, FREON 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:00	375		>200	-151.2	6.87	290	26.6	225.35	1.5	
5:05				-151.4	6.85	290	26.6		1.5	
5:10				-151.7	6.86	290	26.6		1.7	
5:15				-152.3	6.88	290	26.5		1.7	
5:20				-154.5	6.88	290	26.4		1.6	
5:25				-160.2	6.89	290	26.4		1.5	
5:30				-165.9	6.89	290	26.4		1.5	
5:35				-168.8	6.89	290	26.4	226.66	1.5	
5:40				-170.2	6.85	290	26.3		1.5	
5:45				-171.4	6.83	290	26.2		1.5	
5:50				-169.0	6.83	290	26.0	227.97	1.5	
5:55				-170.2	6.85	290	25.8		1.5	
6:00				-172.7	6.85	290	25.8	227.35	1.3	

Well Secure: yes secure manhole & locking J-plug
Color: BROWN/GRAY
Odor: NONE

Purge Water Disposal: TRM
Turbidity(qualitative): milky
Other (OVA, HNU,etc.): PID 0ppm

FB

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 83-MI
Date: 6/22/99 Sampled By: JG/GW
Sampling Time: 2:15 Recorded By: JG/GW
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Nitrogen Powered Bladder pump
Casing Diameter: 4" Purge Rate: < 500 ml - 300 ml/min
Total Depth: 310.0 Total Volume Purged: ~6
Depth to Water: 221.99 Pump Intake Depth 305.0
Water Column: [redacted] Pump on: ~12:20 Off: ~2:15
Gallons/Foot: 0.65 Parameters Sampled: VOC's, FREON 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1:05	300			162	6.64	150.0	18.6	221.94	5.39	
1:10				154	6.92	150.0	17.6		+15	
1:15				154	6.82	150.0	17.6		4.09	
1:20				142	6.84	160.0	17.9		3.80	
1:25				136	6.90	160.0	17.9		3.50	
1:30				132	6.88	190.0	18.7		4.76	
1:35				130	6.90	170.0	20.5	221.95	5.18	
1:40				128	6.91	160.0	19.8		5.34	
1:45				126	6.90	150.0	18.4		5.35	
1:50				126	6.88	152.0	18.0		5.35	
1:55				120	6.88	150.0	17.7		5.45	
2:00				114	6.84	150.0	17.3		5.55	
2:05				111	6.82	150.0	17.5	222.85	5.49	
2:10				110	6.80	150.0	17.6		5.60	

Well Secure: yes SECURE manhole & Locking Purge Water Disposal: FRM
Color: Colorless T-plug Turbidity(qualitative): Clear
Odor: none Other (OVA, HNU,etc.): PID 0ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 33-ML
Date: 6/22/99 Sampled By: JG/SW
Sampling Time: Recorded By: JG/SW
Weather: Sunny 85° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Nitrogen powered Bladder Pump
Casing Diameter: 4" Purge Rate: <500ml, ~ 375 ml/min
Total Depth: 425.0' Total Volume Purged: ~6.0
Depth to Water: 221.80 Pump Intake Depth 415
Water Column: Pump on: 3:05 Off:
Gallons/Foot: 0.65 Parameters Sampled: VOCs, FREON 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
4:30	375			149	6.86	100	14.3	221.80	4.92	
4:35				149	6.82	100	14.2		4.91	
4:40				148	6.83	110	14.0		4.82	
4:45				149	6.82	110	13.9		4.65	
4:50				142	6.80	100	14.2		4.33	
4:55				139	6.82	110	15.0	222.0	4.53	
5:00				136	7.03	120	14.2		4.08	
5:05				127	7.16	120	13.5		4.04	
5:10				126	7.15	120	13.5		3.85	
5:15				125	7.15	120	13.4		3.87	
5:20				124	7.16	120	13.5	221.92	3.86	
5:25				126	7.16	120	13.4		3.88	
5:30		~6.0								

Well Secure: yes Secure manhole & Locking J-plug
Color: Colorless
Odor: none

Purge Water Disposal: ON SITE
Turbidity(qualitative): cloudy
Other (OVA, HNU,etc.): PID *

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 35-GL
Date: 6/6/99 Sampled By: JG AG
Sampling Time: 1021 Recorded By: JG AG
Weather: Sunny 75° Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi flow Submersible
Casing Diameter: 2" Purge Rate: <500 ml ~400 ml
Total Depth: 135.0' Total Volume Purged:
Depth to Water: 86.32 Pump Intake Depth 125.0'
Water Column: Pump on: 908 Off: 10:23
Gallons/Foot: 0.16 Parameters Sampled: VOC's, FREON 11-3
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
910	~400			-85.5	6.79	550	22	86.32	1.5	
915				-94.8	6.53	600	23.8		0.7	
920				-94.4	6.51	650	23.9		0.7	
925				-78.3	6.38	700	24.5		0.7	
930				-54.4	6.35	800	26.0		0.5	
935				-56.0	6.37	800	26.1		0.5	
940				-63.3	6.37	800	26.5		0.5	
945				-49.7	6.33	800	26.3	86.49	0.5	
950				-34.2	6.28	800	26.2		0.5	
955				-21.9	6.29	800	26.4		0.5	
1000				-12.4	6.29	800	26.5		0.5	
1005				7.30	6.29	800	26.5		0.5	
1010				7.19	6.29	800	26.6		0.5	
10:15				7.43	6.29	800	26.5	86.23	0.5	

Well Secure: Yes Secure Stick-up & Locking J-plug
Color:
Odor:

Purge Water Disposal: IRM
Turbidity(qualitative):
Other (OVA, HNU,etc.): 6.2 ppm PID

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 3 Well ID: 36GL
Date: 6/8/99 (28) Sampled By: JG/BW
Sampling Time: 6:55 Recorded By: JG
Weather: Sunny 80° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi flow Submersible (micro purge)
Casing Diameter: 4" Purge Rate: < 400 ml → 400 ml
Total Depth: 135.0' Total Volume Purged:
Depth to Water: 91.22' Pump Intake Depth: 125.0'
Water Column: 43.78 Pump on: 5:40 Off:
Gallons/Foot: 0.16 Parameters Sampled: VOC's Meth/s Freon 113
Gallons in Well: 7.0048

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml/min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:40	~400ml		>200.0	210.6	6.59	250.0	20.0	91.22	6.1	
5:45			>200.0	210.6	6.60	250.0	20.0		6.1	
5:50			>200.0	214.5	6.55	250.0	19.0		6.1	
5:55			>200.0	214.4	6.55	250.0	19.0		6.0	
6:00			>200.0	213.6	6.55	250.0	19.0		5.5	
6:05			>200.0	216.8	6.54	250.0	19.0		5.5	
6:10			>200.0	217.6	6.53	250.0	19.0		5.4	
6:15			>200.0	217.1	6.53	250.0	19.0		5.3	
6:20			>200.0	216.8	6.53	250.0	19.0	91.40	5.3	
6:25			>200.0	215.3	6.52	250.0	19.0		5.2	
6:30			178.6	214.9	6.52	250.0	19.0		5.2	
6:35			139.2	212.6	6.51	250.0	19.0		5.0	
6:40			120.3	211.2	6.51	250.0	19.0		5.0	
6:45			102.7	207.9	6.50	250.0	19.0		5.0	
6:50			102.8	203.0	6.52	250.0	19.0		5.0	
6:55			103.8	202.1	6.51	250.0	19.0	91.31	5.0	
7:00										

Well Secure: Yes Locking Stickup & Locking J-plug Purge Water Disposal: IRM
Color: Yellow Brown TBWS Turbidity(qualitative): TURBID
Odor: None Other (OVA, HNU,etc.): PID 0ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N/001227.0002 Task: 00003 Well ID: 36-GL
Date: 6/17/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG/GW
Weather: cloudy 75° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Redi Flow Submersible
Casing Diameter: 2" Purge Rate: [redacted] 1.25 GPM
Total Depth: 135.00 Total Volume Purged: 20.97
Depth to Water: 91.32 Pump Intake Depth 125.0'
Water Column: 43.68 Pump on: 10:35 Off:
Gallons/Foot: 0.16 Parameters Sampled: metals,
Gallons in Well: 6.98

FIELD PARAMETER MEASUREMENTS

Time	Rate ~~(ml/min)~~ GPM	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
0145 S	1.25		<200.0		6.74	250.0	17.0	91.32		
0150 1 WV			17.5		6.55	242.0	16.5			
0:			11.5		6.52	250.0	17.0			
1:00			8.2		6.55	250.0	17.0			Pump
1:05	1.0		8.0		6.54	250.0	17.0			OFF *
1:10	[redacted]		89.4		6.54	250.0	16.0			
1:15			75.6		6.54	250.0	16.0			
11:20	1.0		21.8		6.51	250.0	16.0			
11:25			15.6		6.53	250.0	16.0			
11:30			12.0		6.53	250.0	16.0			
11:45			11.5		6.54	250.0	16.0			
11:50			4.6		6.54	250.0	16.0			
11:55			3.7		6.52	250.0	16.0			
12:00	1 Lt/min		4.5		6.53	250.0	16.0			
12:05			6.9		6.53	260.0	17.0			
12:10			6.8		6.53	260.0	17.0			
12:15			7.4		6.52	255.0	17.0			
12:20			6.7		6.53	250.0	17.0			
12:25			46.5		6.54	250.0	17.0			Pump OFF *
12:30			30.8		6.54	250.0	17.0			
12:35			18.9		6.54	250.0	17.0			

Well Secure: Yes Purge Water Disposal: FRM
Color: Turbidity(qualitative):
Odor: / Other (OVA, HNU,etc.): PID 0 PPM

E-1799 36GL

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:40			20.2		6.53	280.0	17.0			
12:45			14.9		6.52	258.0	17.0			
12:50			11.3		6.50	250.0	17.0			
12:55			8.1		6.47	250.0	17.0			
1:00			6.4		6.45	250.0	17.0			
1:05			5.3		6.45	250.0	17.0			

OBSERVATIONS DURING SAMPLING

Well Secure:_____ Purge Water Disposal:_____

Color:_____ Turbidity(qualitative):_____

Odor:_____ Other (OVA, HNU,etc.):_____

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LMC New Well Sample | Project No.: NY001227.0002 | Page: 1 of 1

Site Location: Great Neck Schools @ 39 cluster | Date: 9/27/99

Site/Well No.: 39 MI | Replicate No.: — | Code No.:

Weather: Sunny 75° | Sampling Time: Begin 1550 End 1557

Evacuation Data

Measuring Point	TOC
MP Elevation (ft)	[redacted]
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	312.80'
Depth to Water (ft bmp)	119.53'
Water-Level Elevation (ft)	
Water Column in Well (ft)	193.27'
Casing Diameter/Type	4" / PVC
Gallons in Well	125.63 GAL
Gallons Pumped/Bailed Prior to Sampling	376.88 GAL
Sample Pump Intake Setting (ft bmp)	START 290.0' — END 121.0
Purge Time	begin 1420 end 1557
Pumping Rate (gpm)	~4 Gpm
Evacuation Method	2" Redi Flow Submersible

Field Parameters

Field Parameters	1420 I	1455 1	1520 2	1550 3
Color (Colorless)	clear	clear	clear	clear
Odor	NONE	NONE	NONE	NONE
Appearance	clear	clear	clear	clear
pH (s.u.)	7.0	6.7	6.6	6.6
Conductivity (mS/cm)				
(µmhos/cm)	290	290	260	260
Turbidity (NTU)	11.22	1.85	1.85	1.61
Temperature (°C)	16.0	16.0	16.5	16.5
Dissolved Oxygen (mg/L)	4.2	3.0	2.9	2.9
Salinity (%)				
Sampling Method	Bailer			
~~Remarks~~	ORP (mV) 169	166	176	143

Constituents Sampled	Container Description	Number	Preservative
VOC's FREON 113	40 mL VOA	2	HCL
Field Blank Bailer	40 mL VOA	2	HCL

Sampling Personnel: Dennis M., Joe. G

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page 1 of 1

Project/No. NY00122 7.0002 Well 39 MI Date 9/27/99

Screen Setting 302'-312' / Measuring Point Description TOC Casing Diameter (inches) 4"

Static Water Level 119.53 Measured Width N/A Well Materials PVC / ST. Steel

Total depth 312.80 Pump On: 1000 — 1143 Pump Intake: 306'

Purge Method Pump Off: 1033 — 1315 **Volumes Purged** 3

Centrifugal _____ **Sample Time:** 1313

Submersible _____ Sampled By: JG / DM

Other BLADDER Bailer Type: N/A

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
1228	~	500	119.53		6.5	280	Clear	177	3.6	15°	
1233		500			6.3	280	Clear	181	3.4	15	
1238		500			6.3	285	Clear	182	3.4	15	
1243	~	475		1.98	6.3	285	Clear	182	3.4	15	
1248	~	480	119.53	2.61	6.3	285	Clear	182	3.3	15	
1253	~	375		3.14	6.3	285	Clear	183	3.2	15	
1258		375			6.3	290	Clear	183	3.1	16	
1303		375			6.3	290	clear	184	3.0	16	
1308	~	375	119.55		6.3	290	Clear	185	3.0	16	
1313	~	375			6.3	290	Clear	185	3.0	16°	
				5.12 gallons			2.44				

Lowflo.xls
7/7/99

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: NY001227.0002 00003 | Project No.: NY001227.0002 00003 | Page 1 of ___

Site Location: LAKE SUCCESS | Date: 7.8.99

Site/Well No.: EW-1 | Replicate No.: — | Code No.: —

Weather: CLEAR 90° | Sampling Time: Begin 2:00 End 2:30

Evacuation Data

Measuring Point	—
MP Elevation (ft)	—
Land Surface Elevation (ft)	—
Sounded Well Depth (ft bmp)	—
Depth to Water (ft bmp)	—
Water-Level Elevation (ft)	—
Water Column in Well (ft)	—
Casing Diameter/Type	—
Gallons in Well	—
Gallons Pumped/Bailed Prior to Sampling	—
Sample Pump Intake Setting (ft bmp)	—
Purge Time	begin — end —
Pumping Rate (gpm)	CONTINUOUSLY PUMPED WELL
Evacuation Method	

Field Parameters

Color	COLORLESS
Odor	—
Appearance	CLEAR
pH (s.u.)	5.94
Conductivity ~~mS/cm~~ (µmhos/cm)	660
Turbidity (NTU)	
Temperature (°C)	23.7
Dissolved Oxygen (mg/L)	
Salinity (%)	
Sampling Method	SAMPLE SPIGOT
Remarks	

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel: GW, DM

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LMC | Project No.: NJ0D1227.0002.0003 | Page: 1 of ____

Site Location: LAKE SUCCESS | Date: 7-7-99

Site/Well No.: RW-2 | Replicate No.: ____ | Code No.: ____

Weather: 90° | Sampling Time: Begin 1:00 End 4:30

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	215.0
Depth to Water (ft bmp)	85.01
Water-Level Elevation (ft)	
Water Column in Well (ft)	130.01
Casing Diameter/Type	8" 2.46
Gallons in Well	319.82
Gallons Pumped/Bailed Prior to Sampling	960
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 2:09 end 4:10
Pumping Rate (gpm)	Q=8 T=120
Evacuation Method	

I-2:09
1J=2:49
2J=3:29
3J=4:09

Field Parameters

Field Parameters	I	1J	2J	3J
Color				BRN TINGE
Odor				NONE
Appearance				SLIGHTLY T
pH (s.u.)	—	5.9	5.7	6.08 *
Conductivity (mS/cm)			650	
(µmhos/cm)		260	[illegible]	[illegible]600
Turbidity (NTU)				
Temperature (°C)		28.5	28.5	28.3
Dissolved Oxygen (mg/L)				
Salinity (%)				
Sampling Method		ODS POSABLE BAILER		

Remarks: *SWITCHED ph PROBE FOR LAST READING

Constituents Sampled	Container Description	Number	Preservative
SEE COC			

Sampling Personnel: GW DM

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002.00 Task: 00003 Well ID: RW-1
Date: 8-7-99 Sampled By: GW JG
Sampling Time: _____ Recorded By: GW
Weather: CLEAR 90° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: CONTINUOUSLY PURGED WELL
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: _____
Depth to Water: _____ Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
					6.34	435	24			

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project 114001227.0002.00003 Project No. LMC Page 1 of 1

Site Location GREAT NECK, NY Date 7/8/99

Site/Well No. NST WELL Replicate No. — Code No. —

Weather SUNNY, 80'S Sampling Time: Begin 12:00 End 12:30

Evacuation Data

Measuring Point	—
MP Elevation (ft)	—
Land Surface Elevation (ft)	—
Sounded Well Depth (ft bmp)	—
Depth to Water (ft bmp)	—
Water-Level Elevation (ft)	—
Water Column in Well (ft)	—
Casing Diameter/Type	—
Gallons in Well	—
Gallons Pumped/Bailed Prior to Sampling	—
Sample Pump Intake Setting (ft bmp)	—
Purge Time	begin — end —
Pumping Rate (gpm)	—
Evacuation Method	—

Field Parameters

Color	COLORLESS
Odor	ODORLESS
Appearance	CLEAR
pH (s.u.)	6.29
Conductivity (mS/cm)	—
(µmhos/cm)	550
Turbidity (NTU)	—
Temperature (°C)	22
Dissolved Oxygen (mg/L)	—
Salinity (%)	—
Sampling Method	VALVED SPIGOT

Remarks: SAMPLE WAS COLLECTED FROM A FINE STREAM OF WATER UNDER 120 PSI PRESSURE

Constituents Sampled	Container Description	Number	Preservative
VOCs, FREON 113			

Sampling Personnel CK / GW / DM

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

9/9/04

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: _____ Task: _____ Well ID: 37MW
Date: _____ Sampled By: _____
Sampling Time: _____ Recorded By: _____
Weather: _____ Coded Replicate No.: RLP 1444

WELL IMFORMATION

Casing Material: _____ Purge Method: _____
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: _____
Depth to Water: 141.0 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

NEED TO CHANGE TO 0-10 SCALE.

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:22	600			98	6.51	270	19		6 mg/l	
11:27				92	6.53	275	19	141.02	5	
11:32	400			94	6.60	270	18		3	
11:37				96	6.64	280	18	140.92	3	
11:42	500			98	6.65	280	18		3	
11:47				103	6.67	285	18	140.92	3	
11:52	400			103	6.67	285	18		2.8	
11:57				106	6.67	290	18	140.91	2.8	
12:02	400			109	6.67	290	18		3	
12:07				112	6.65	290	19	140.91	3	
12:12	200			117	6.66	295	19		3.2	
12:17				120	6.65	300	19		3.2	
12:22				150	6.55	302	20	140.92	~~4.095~~ 2.3	

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): 35 FRESH BLADDER

Scan 2

9/9/99

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: _____ Task: _____ Well ID: 37MD
Date: _____ Sampled By: _____
Sampling Time: _____ Recorded By: _____
Weather: _____ Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: _____
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: _____
Depth to Water: 141.02 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:19	200			140	6.7	195	20		7	
12:24				158	6.44	200	20		7	
12:29				160	6.76	200	20		6.1	
12:34				158	6.70	235	19		5.6	
12:39	400			150	6.8	230	19		5.6	
12:44				160	6.82	230	19		5.5	
12:49				155	6.65	230	19	140.91	5.5	
12:54				152	6.6	230	19		5.7	
12:59	450			152	6.66	235	20	140.92	5.7	
1:04				149	6.51	235	20		5.7	
1:09				160	6.51	230	20	140.92	5.8	
1:14				145	6.48	230	19		5.8	
1:19	450		8.99	[illegible]	6.62	230	20	140.92	6.2	

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

9/9/04

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: _____ Task: _____ Well ID: 37 ML
Date: _____ Sampled By: _____
Sampling Time: _____ Recorded By: _____
Weather: _____ Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: _____
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: _____
Depth to Water: 141 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
4:05	500			195	6.88	125	20		12	
4:10				193	6.76	125	18.5		11	
4:15				194	6.80	140	18.0	140.98	9	
4:20				24	12.69	90 x10	20		6	
4:25	50			9	12.55	90 x10	20		6	
4:30				12	12.7	110 x10	20	140.98	5	
4:35	300			15	12.64	120 x10	21		5	
4:40				14	12.8	140 x10	20		4.2	
4:45				19	12.75	150 x10	20	140.98	4.2	
4:50	350			24	12.6	150 x10	19		4	
4:55				28	12.89	140 x10	19		3.8	
5:00				43	11.72	135 x10	19		3.8	
5:05	400			35	11.90	130 x10	19	140.98	3.8	
5:10			2.75	43	12.07	125 x10	19		3.8	

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____
PID = 1.5 PPM ✓

* RE-CALIBRATED pH METER. [illegible] IC2

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: NY — Project No.: NY001227.0003 — Page 1 of 1

Site Location: Great Neck Schools — Date: 9/10/99

Site/Well No.: MW 38 MU — Replicate No.: — Code No.:

Weather: — Sampling Time: Begin: — End:

Evacuation Data	
Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	242
Depth to Water (ft bmp)	148.
Water-Level Elevation (ft)	
Water Column in Well (ft)	94.0
Casing Diameter/Type	4" PVC
Gallons in Well	61.1
Gallons Pumped/Bailed Prior to Sampling	183.3
Sample Pump Intake Setting (ft bmp)	[redacted]
Purge Time	begin 11:49 end 12:51
Pumping Rate (gpm)	Q 3 GPM
Evacuation Method	2" Grundfos Submersible

Q = 3 gpm

Field Parameters	I	1	2	3
Color				
Odor				
Appearance				
pH (s.u.)		9.87	6.66	
Conductivity (mS/cm)		750	675	
(µmhos/cm)				
Turbidity (NTU)				
Temperature (°C)		19	17	
Dissolved Oxygen (mg/L)				
Salinity (%)				
Sampling Method				
Remarks				

Constituents Sampled	Container Description	Number	Preservative
Q 3 GPM			
I ~ 12:10 pm			
2 12:31 pm			
3 12:51 pm			

Sampling Personnel

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
pm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
g/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

9/10/04

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: _____ Task: _____ Well ID: 38 MW
Date: _____ Sampled By: _____
Sampling Time: _____ Recorded By: _____
Weather: _____ Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: _____
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: _____
Depth to Water: 148.38 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:10	580							148.38		
10:15				34	12.0	1700	19		8.25	
10:20				31	12.05	1700	19		8.25	
10:25				29	12.05	1700	19		8.0	
10:30	400			29	12.03	1700	19		8.0	
10:35				30	12.00	1700	19		7.5	
10:40				29	11.93		20		7.2	
10:50				27	11.87	1580	21		8.0	
11:00				32	11.81	1500	21		7.8	
11:15	200		230	31	11.78	1500	21.5	148.48	7.8	
11:30				32	11.73	1450			8.0	

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0003 Task: _____ Well ID: 38MI
Date: 9/10/99 Sampled By: RW
Sampling Time: _____ Recorded By: JG/RW
Weather: RAIN Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: BLADDER PUMP
Casing Diameter: 4" Purge Rate: > 500 ml
Total Depth: _____ Total Volume Purged: _____
Depth to Water: _____ Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: VOC's, Freon 113
Gallons in Well: _____

GW 12:10

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:30	500 ml/min			179	8.99	180.0	21	149.9	11.3	
12:35				201	7.19	170	20		10.8	
12:40				214	6.90	180			5.4	
12:45				225	6.71	180	20	149.93	10.	
12:50				228	6.74	170	20	149.92	10.0	
12:55				231	6.60	170	20		10.0	
1:00	400			232	6.58	175	20		10.2	
1:05				235	6.52	175	20		9.6	
1:10			23.1	239	6.48	180	20	149.8	9.6	

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: _____ Task: _____ Well ID: 6M-38ML

Date: 9-10-99 Sampled By: _____

Sampling Time: _____ Recorded By: _____

Weather: _____ Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: _____

Casing Diameter: _____ Purge Rate: _____

Total Depth: _____ Total Volume Purged: _____

Depth to Water: 149.54 Pump Intake Depth _____

Water Column: _____ Pump on: _____ Off: _____

Gallons/Foot: _____ Parameters Sampled: _____

Gallons in Well: _____

Pump on 1634:05

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1635	500		~~214~~	214	7.29	140	22	149.54	11.6	
1640				231	6.76	115	19.9		12.4	
1645				239	6.49	111	19.1		12.2	
1650				249	6.36	110	19		11.6	
1655				258	6.26	110	19		11.4	
1700				262	6.22	109	19		11	
1705				267	6.19	109	19		10.2	
1710				272	6.20	109	19		10.2	
1715				277	6.18	109	19		10.6	
1720			15.0	281	6.19	110	19		10.6	

Well Secure: _____ Purge Water Disposal: _____

Color: _____ Turbidity(qualitative): _____

Odor: _____ Other (OVA, HNU,etc.): _____

39 MI
DTW 119.25

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 0002 Well ID: 39 MU
Date: 10/8/99 Sampled By: JG/GW
Sampling Time: Recorded By: JG/GW
Weather: Sunny 50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: MicRo Purge
Casing Diameter: 4" Purge Rate: ~500 ml
Total Depth: 206.8 Total Volume Purged:
Depth to Water: 119.59 Pump Intake Depth ~198.0 — ~121.0
Water Column: 87.21 Pump on: 10:30 AM Off:
Gallons/Foot: 0.65 Parameters Sampled: VOC's, FREON 113
Gallons in Well: 56.69
170.10

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:41	~500ml		[illegible]	206.3	6.41	290.0	13.9	119.59	5.9	
10:46			[illegible]	207.5	6.50	295.0	13.9	—	3.7	
1051			[illegible]	206.4	6.40	295	14.0		2.36	
1056			153.1	206.3	6.36	300	17.8	119.64	3.5	
1101			104.1	209.3	6.34	305	16.1		3.4	
1106			46.9	199.5	6.32	305	14.8		3.4	
1111				195.2	6.33	308	14.8		3.3	
1116										
1121										
1126				192.	6.33	310	15		3.2	
1131										
1136				195	6.29	310	15.2		3.3	
1141										
1146										
1151				185	6.29	310	15.2		3.3	
12:06			25.7	184.2	6.29	315	15.2	119.58	3.2	
12:21			23.2	182.	6.29	318	15.4		3.4	
12:36		15	17.5	182.1	6.25	320	15.3		3.4	

Well Secure: yes
Color: Colorless
Odor: NONE

Purge Water Disposal: IRM
Turbidity(qualitative): Clear
Other (OVA, HNU,etc.): 0 ppm

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project _____ Project No. NY001227.0002.00001 Page 1 of _____

Site Location LAKE SUCCESS Date 10-8-99

Site/Well No. 39MW-B Replicate No. _____ Code No. _____

Weather CLEAR 60° Sampling Time: Begin _____ End _____

Evacuation Data	
Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	206.80
Depth to Water (ft bmp)	119.59
Water-Level Elevation (ft)	
Water Column in Well (ft)	87.81
Casing Diameter/Type	0.65
Gallons in Well	56.69
Gallons Pumped/Bailed Prior to Sampling	170.10
Sample Pump Intake Setting (ft bmp)	
12:45 Purge Time	begin 12:45 end
12:58 Pumping Rate (gpm)	Q=4 GPM T=42 IV=13 m.w
1:13 Evacuation Method	
1:27	

Field Parameters	1U	2U	3J
Color			COLORLESS
Odor			NONE
Appearance			CLEAR
pH (s.u.)	6.46	6.19	6.13
Conductivity ~~(mS/cm)~~ (µmhos/cm)	330	375	330
Turbidity (NTU)			
Temperature (°C)	18.1	16.6	17.9
Dissolved Oxygen (mg/L)			
Salinity (%)			
Sampling Method			
Remarks			

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel G.W. J.G.

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002.00 Task: 00002 Well ID: 39MI
Date: 10-8-99 Sampled By: G.W. JG
Sampling Time: Recorded By: GW JG
Weather: Sunny 50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Bladder micro purge
Casing Diameter: 4" Purge Rate: ~500 ml
Total Depth: 312.8 Total Volume Purged:
Depth to Water: 119.25 Pump Intake Depth 306
Water Column: 193.55 Pump on: 11:50 Off:
Gallons/Foot: Parameters Sampled: VOC's Freon 113
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:10				156	6.6	270	13	119.25		
12:20				166	6.6	~~305~~ 275	13			
12:30										
1253				171	6.5	270	13	119.25	3.6	
1258				172	6.5	270	13		3.9	
1303			7.35	173	6.4	275	13		3.2	
1308				173	6.4	275	13		3.1	
1313				173	6.4	275	13		3.2	
1318				174	6.4	270	13		3.2	
1323										

Well Secure: Yes Purge Water Disposal: IRM
Color: Colorless Turbidity(qualitative): Clear
Odor: None Other (OVA, HNU,etc.): 0 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00002 Well ID: 39 ML
Date: 10-26-99 Sampled By: G.W ME
Sampling Time: Recorded By:
Weather: CLEAR 65° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: MICROPURGE
Casing Diameter: 4" Purge Rate:
Total Depth: 407 Total Volume Purged:
Depth to Water: 118.97 Pump Intake Depth
Water Column: Pump on: 12:00 Off: 1:35
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:20		3.0		237.0	6.39	110	13.9	118.97	6.2	
12:25				235.1	6.21	110	13.6 25.0		5.2	
12:30				230.7	6.19	115	13.5		4.8	
12:35		5.0		231.2	6.15	115	13.5		4.4	
12:40				228.1	6.09	110	13.5	119.00	4.3	
12:45		6.5		229.8	6.12	110	13.5		4.2	
12:50				223.8	6.11	110	13.5		4.2	
12:55		7.5		222.5	6.11	110	13.8		4.0	
1:00				221.1	6.12	110	13.7	119.00	4.0	
1:05				220.8	6.10	110	13.7		4.0	
1:10				220.5	6.11	115	13.9		3.8	
1:15		10.0		219.6	6.13	115	13.9		3.7	
1:20				218.2	6.09	120	14.5		3.7	
1:25		12.0	19.1	219.6	6.11	120	14.8		3.7	
1:30				218.8	6.09	115	14.5	119.01	3.7	

Well Secure:
Color: COLORLESS
Odor: NONE
Purge Water Disposal:
Turbidity(qualitative):
Other (OVA, HNU,etc.): @ <1

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LOCKHEED-MARTIN Project No. 10700127.0002.00003 Page 1 of ____

Site Location: LAKE SUCCESS Date: 8-10-99

Site/Well No.: NEST WELL Replicate No. ____ Code No. ____

Weather: CLEAR 85° Sampling Time: Begin 10:30 End 11:40

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	CONTINUOUSLY PUMPING

Field Parameters

Color	COLORLESS
Odor	[redacted] NONE
Appearance	CLEAR
pH (s.u.)	6.25
Conductivity (mS/cm)	
(µmhos/cm)	600
Turbidity (NTU)	
Temperature (°C)	23.3
Dissolved Oxygen (mg/L)	
Salinity (%)	
Sampling Method	SAMPLE SPEED PUMP
Remarks	

Constituents Sampled	Container Description	Number	Preservative
VOC	40 ml	2	—

Sampling Personnel: G. W., J. G., C. K.

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

DEEPDALE 350-390 16" well 10.5
LAKE SUCCESS 295 12" 6

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project LMC — Project No. NY000727.0002.00003 — Page 1 of

Site Location — Date 10-4-99

Site/Well No. DEEPDALE — Replicate No. — Code No.

Weather RAINY 60° — Sampling Time: Begin 9:30 — End 10:35

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	390
Depth to Water (ft bmp)	~100
Water-Level Elevation (ft)	
Water Column in Well (ft)	290
Casing Diameter/Type	16." (10.5)
Gallons in Well	3300
Gallons Pumped/Bailed Prior to Sampling	9900
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 9:40 end 10:25
Pumping Rate (gpm)	Q=400 T=25
Evacuation Method	

Field Parameters

	3rd D.	4th	5th
Color			
Odor			
Appearance			
pH (s.u.)	6.74	6.79	6.45
Conductivity ~~(mS/cm)~~ (µmhos/cm)	135	120	120
Turbidity (NTU)			
Temperature (°C)	15.9	15.7	15.4
Dissolved Oxygen (mg/L)			
Salinity (%)			
Sampling Method			

Remarks: Content TUM Fedora ~~Ontario~~ units results

Constituents Sampled	Container Description	Number	Preservative
VOC + FREON 113			

Sampling Personnel: G. WILLIAMS ~~D. MACKEY~~

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LMC
Site Location: LAKE SUCCESS NY
Site/Well No.: LAKE SUCCESS
Weather: CLEAR 65°

Project No.: NY000122 0002 0003
Replicate No.:
Sampling Time: Begin 12:20 End 1:00

Page 1 of
Date 10-4-99
Code No.

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	290.
Depth to Water (ft bmp)	100.
Water-Level Elevation (ft)	
Water Column in Well (ft)	190
Casing Diameter/Type	12" (6)
Gallons in Well	1,540
Gallons Pumped/Bailed Prior to Sampling	~3455
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 12:32 end 12:52
Pumping Rate (gpm)	Q = ~600
Evacuation Method	

Field Parameters

	12:37	12:42	12:47	12:52
Color				
Odor				
Appearance				
pH (s.u.)	6.82	6.40	6.35	6.33
Conductivity (mS/cm)				
(µmhos/cm)	224	208	204	201
Turbidity (NTU)				
Temperature (°C)	14.2	14.7	14.0	14.2
Dissolved Oxygen (mg/L)				

Salinity (%):
Sampling Method:
Remarks: SAMPLE AT 12:52

Constituents Sampled	Container Description	Number	Preservative
VOC + FREON 113			

Sampling Personnel: G. WILLIAMS D. MCCAFFREY

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: MW-12
Date: 11/22/99 Sampled By: GW/MPC
Sampling Time: 2:05 Recorded By:
Weather: cloudy, ~55° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro-Purge)
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 103.00' Pump Intake Depth 10' off bottom
Water Column: Pump on: 12:55 Off: 2:05
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:55	450 ml/min	initial						103.00'		
1:00				212	6.17	210	15.9		2.0	
1:05				212	6.16	210	15.8		2.0	
1:10				211	6.17	215	16.0		1.9	
1:15				205	6.06	230	16.7		3.4	
1:20				205	6.05	230	16.8	103.49'	3.3	
1:25				204	6.07	230	16.9		4.2	
1:30				203	6.06	230	16.9		4.1	
1:35				203	6.04	230	17.0		4.1	
1:40				204	6.03	230	17.0	103.37	4.2	
1:45				203	6.02	230	17.0		4.2	
1:50				206	6.03	230	17.2		4.4	
1:55				206	6.01	230	17.2		4.4	
2:00			23.2	206	6.01	230	17.2	103.50	4.4	

Well Secure:
Color:
Odor:
Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 23.2
Other (OVA, HNU,etc.): Non Detect

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: .00003 Well ID: 1ML
Date: 11/22/99 Sampled By: GW/mPE
Sampling Time: 12:05 Recorded By:
Weather: cloudy, ~55° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro-purge)
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: 103.30 Total Volume Purged:
Depth to Water: Pump Intake Depth 5' off bottom
Water Column: Pump on: 10:25 Off: 12:05
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:25	450ml/m	initial						103.30		
10:30				143	6.39	170	15.8		5.6	
10:35				143	6.38	170	15.9		5.6	
10:40				158	6.22	165	16.8		4.6	
10:95				168	6.04	160	17.1	103.41	5.0	
10:50				178	6.02	160	17.3		5.1	
10:55				184	6.04	160	17.4		5.2	
11:00				186	6.03	160	17.4	103.36	5.4	
11:05				190	6.02	160	17.5		5.2	
11:10				190	6.02	160	17.5		5.1	
11:15				196	6.00	160	17.6		5.2	
11:20				195	6.01	160	17.6	103.39	5.2	
11:25				200	6.00	160	17.6		5.2	
11:30				201	6.00	160	17.6	103.42	5.2	
11:35				202	5.98	160	17.6		5.2	
11:40				201	5.99	160	17.6		5.3	
11:45				206	5.98	160	17.7	103.46	5.4	
11:50				205	5.99	160	17.7		5.2	
11:55				206	5.99	160	17.7		5.4	
12:00		13 gallons	5.4	206	5.98	160	17.6	103.43	5.4	

Well Secure:
Color:
Odor:

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity: 5.4
Other (OVA, HNU,etc.): 7.0 ppm after 2 minutes < 3.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 1GL
Date: 1/14/00 Sampled By: GW/MPG
Sampling Time: 1:05 Recorded By:
Weather: Sunny, cold, ~20° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Low flow Sampling (Redi-flow)
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 104.90' Pump Intake Depth 5' ft bottom
Water Column: Pump on: 11:30 Off: 1:05
Gallons/Foot: Parameters Sampled: VOCs
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:30	450 ml/min	initial						104.90		
11:35				300	6.77	350	14.0°	8.6	3.6	
11:40				312	6.63	380	15.0°	3.7	3.7	
11:45				310	6.62	380	15.0	3.6	3.6	
11:50				303	6.62	430	18.0°	(14)	3.5	
11:55				302	6.62	435	18.5	105.50'	3.5	
12:00				300	6.54	445	19.0°		3.4	
12:05				301	6.49	450	20.0°		3.3	
12:10				305	6.52	410	16.0°	105.30'	3.3	
12:15				308	6.51	400	15.5°		3.2	
12:20				309	6.52	390	14.5°		3.3	
12:25				312	6.52	355	13.0		3.40	
12:30				313	6.45	355	13.0°		3.6	
12:35				313	6.42	350	13.0	105.42	3.6	
12:40				314	6.48	350	13.0°		3.5	
12:45				314	6.48	350	13.0°		3.4	
12:50				314	6.47	350	13.0°		3.6	
12:55			11.2	314	6.48	355	13.0°	105.20	3.5	
1:00		13 gallons		308	6.42	360	13.5		3.6	
Total	Volume Purged = 13.0 gallons									

Well Secure:
Color: clear
Odor: none
Redi-flow 245.1 cycles

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 11.2
Other (OVA, HNU,etc.): PID = Not Functional in extreme cold

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 2-MI
Date: 11/17/99 Sampled By: GW/MPC
Sampling Time: 4:25 Recorded By:
Weather: Sunny, ~40° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (MicroPurge)
Casing Diameter: 4" Purge Rate:
Total Depth: 250' Total Volume Purged: 450 ml/min
Depth to Water: 85.72 Pump Intake Depth 10' off bottom
Water Column: Pump on: 3:16 Off: 4:25
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3:16	450 ml/m	initial						85.72		
3:25				201.2	6.44	2600	12.9		4.1	
3:30				205.6	6.50	260	12.8	85.77	4.3	
3:35				212.2	6.06	300	16.1	85.78	6.0	
3:40				213.0	6.01	300	17.3		6.1	
3:45				213.1	5.93	300	18.4		6.0	
3:50				214.4	5.90	300	19.2	85.78	6.0	
3:55				214.9	5.86	305	17.8		6.1	
4:00				214.9	5.93	310	20.4		6.2	
4:05				215.0	5.87	310	20.9	85.70	6.2	
4:10				215.2	5.89	300	19.8		5.8	
4:15				216.1	5.87	300	18.5		6.0	
4:20			20.4	215.9	5.87	300	19.4	85.75	6.0	
		8 Gal								

Well Secure:
Color: yellow tint
Odor: slight odor

Purge Water Disposal:
Turbidity(qualitative): Final turbidity = 20.4
Other (OVA, HNU,etc.): <1.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: MW-3ML
Date: 1/11/00 Sampled By: GW/MPE
Sampling Time: Recorded By:
Weather: Cloudy, ~40° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Bladder pump)
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: 335 Total Volume Purged:
Depth to Water: 94.13' Pump Intake Depth
Water Column: Pump on: 4:00 Off: 5:15
Gallons/Foot: Parameters Sampled: VOC's
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
4:00	450ml/min	initial		139.7	7.57	150	15°	94.13'	2.5	
4:05				138.0	7.51	150	15.5°		2.5	
4:10				143.0	7.43	150	15.0°		2.2	
4:15				155.0	7.26	155	17.5°		.9	
4:20				171.5	6.71	155	17.5		2.4	
4:25				177.5	6.61	160	18.0		2.4	
4:30				186.0	6.36	155	18.0		3.1	
4:35				189.2	6.30	150	18.0	94.11	3.2	
4:40				189.1	6.31	150	18.0		3.2	
4:45				195.5	6.27	150	18.0		3.5	
4:50				197.1	6.25	150	18.0		3.7	
4:55				198.0	6.25	150	18.0	94.12	3.8	
5:00		7 gallons		205.0	6.21	155	18.0		3.7	
5:05				203.0	6.19	150	18.0		4.0	
5:10			420	205.0	6.17	150	18.0		4.0	
Total Volume Purged =		7 gallons								

Well Secure:
Color: BROWN TINT
Odor: NONE

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 420
Other (OVA, HNU,etc.): PID = 4.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 3-GL
Date: 11/16/99 Sampled By: GW/mlt
Sampling Time: 3:10 Recorded By:
Weather: Sunny, ~ 40° Coded Replicate No.: Replicate collected called Rep-1

WELL IMFORMATION

Casing Material: Purge Method: low flow sampling (micro Purge)
Casing Diameter: 4" Purge Rate: 500ml/min
Total Depth: Total Volume Purged:
Depth to Water: 96.02 Pump Intake Depth 5' off bottom
Water Column: Pump on: 2:00 Off: 3:10
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:05	500 m/min	initial		217.5	6.15	225	16.2	96.02	6.9	
2:10				217.9	6.05	200	25.0		6.0	
2:15				218.4	6.07	220	25.0		6.5	
2:20				217.7	6.07	210	17.5	96.20	6.2	
2:25				215.9	6.02	200	17.4		6.0	
2:30				215.7	6.02	205	17.7		6.0	
2:35				216.3	5.96	205	18.1	96.18	6.2	
2:40				215.7	6.02	210	19.0		6.0	
2:45				215.5	5.99	240	19.4		7.8	
2:50				216.8	5.99	205	19.7	96.28	8.0	
2:55				214.3	6.00	350	19.2		8.0	
3:00				212.9	6.00	350	17.8		8.0	
3:05				212.7	6.01	340	17.2		8.0	
3:10				212.9	6.00	340	17.1	96.17	8.0	

Well Secure:
Color:
Odor:

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity 19.8
Other (OVA, HNU,etc.): 6.0 → after 2 minutes reading want to <1.0 (ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 4-GL
Date: 11/18/99 Sampled By: GW/MPE
Sampling Time: 2:15 Recorded By:
Weather: Sunny, ~35° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro-Purge)
Casing Diameter: 4 Purge Rate: 500 ml/min
Total Depth: 150' Total Volume Purged:
Depth to Water: 100.90 Pump Intake Depth 10' off bottom
Water Column: Pump on: 1:00 Off: 2:15
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1:00	500 ml/min	initial	11.7	160	5.99	360	18.7	100.90	3.4	
1:10				157	5.89	350	19.0		3.5	
1:15				158	5.89	370	20.7		3.2	
1:20			6.1	159	5.87	370	22.1	102.43	3.6	
1:25				159	5.87	370	22.2		3.7	
1:30				161	5.87	360	22.5		3.7	
1:35			3.8	165	5.87	390	23.4	102.52	3.9	
1:40				165	5.87	450	23.3		3.5	
1:45			3.7	166	5.88	380	22.6	102.09	3.7	
1:50				171	5.88	380	22.0		3.6	
1:55			4.4	171	5.88	380	21.8		3.8	
2:00				172	5.88	360	21.7	102.05	3.6	
2:05				172	5.88	380	22.4		3.6	
2:10			9.7	172	5.88	380	22.4		3.6	
	10 gallons	purged								

Well Secure:
Color: clear
Odor: slight odor

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity - 9.7
Other (OVA, HNU, etc.): Cold weather affecting PID (ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 4-MI
Date: 11/18/99 Sampled By: GW/MPC
Sampling Time: 5:05 Recorded By:
Weather: sunny ~ 40-45° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro-Purge)
Casing Diameter: 4" Purge Rate: 350 ml/min
Total Depth: 250 Total Volume Purged:
Depth to Water: Pump Intake Depth 10' off bottom
Water Column: Pump on: 3:05 Off: 5:05
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3:05	350ml/min	initial						101.35		
3:15				149	7.36	280	17.8	101.60	5.4	
3:20				167	6.20	260	17.1		5.6	
3:25				169	6.10	255	17.1		5.6	
3:30				171	6.04	250	17.0	101.56	5.5	
3:35				173	5.99	250	16.8		5.6	
3:40				174	5.99	250	17.1		4.6	
3:45				177	5.99	235	16.4	101.45	5.0	
3:50				179	6.00	235	15.0		5.5	
3:55				179	6.00	230	15.0		5.6	
4:00				178	5.99	230	16.7	101.60	5.2	
4:05				178	5.99	235	16.9		5.2	
4:10				177	6.00	240	18.0		5.2	
4:15				178	6.00	250	18.4	101.63	5.0	
4:20				174	6.01	250	18.5		5.0	
4:25				174	6.01	250	18.5		5.0	
4:30				175	6.11	220	18.3	102.05	7.0	
4:35				173	6.00	230	21.1		5.2	
4:40				173	6.00	230	21.6		5.2	
4:45				174	5.98	230	21.6		5.0	
4:50				175	5.98	230	20.1	102.62	4.5	
4:55				175	5.97	220	18.7		4.3	
5:00			22.7	175	5.96	220	18.6	101.58	4.3	

Well Secure:
Color:
Odor:
Purge Water Disposal:
Turbidity(qualitative): Final Turbidity - 22.7
Other (OVA, HNU,etc.): Cold weather affecting PID (ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 5-MT
Date: 11/19/99 Sampled By: GW/MPG
Sampling Time: 11:45 Recorded By:
Weather: sunny ~ 40° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro-Purge)
Casing Diameter: 4" Purge Rate: 300 ml/min
Total Depth: 250' Total Volume Purged:
Depth to Water: 87.96' Pump Intake Depth 5' off bottom
Water Column: Pump on: 10:40 Off: 11:45
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:40	300 ml/min	initial						87.97'		
10:45				162	6.61	280	16.4		4.7	
10:50				167	6.48	280	16.8		4.2	
10:55				169	6.42	280	16.9	88.05	4.0	
11:00				170	6.41	280	16.9		4.2	
11:05										
11:10				173	6.37	260	16.2		4.4	
11:15				172	6.31	260	16.4		4.5	
11:20				172	6.31	260	16.6	88.10	4.5	
11:25				171	6.27	260	17.0		4.4	
11:30				171	6.26	260	17.0		4.5	
11:35				171	6.24	260	17.1	88.10	4.5	
11:40			8.28	171	6.22	260	17.2		4.5	

Well Secure:
Color:
Odor:

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 8.28
Other (OVA, HNU,etc.): 0.0 (ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: 14001227.0002 Task: 00003 Well ID: 5-ML
Date: 11/19/99 Sampled By: GW/MPG
Sampling Time: 12:55 Recorded By:
Weather: sunny, ~40° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: low flow sampling (Micro-Purge)
Casing Diameter: 4" Purge Rate: 400 ml/min
Total Depth: 350 Total Volume Purged:
Depth to Water: 87.11 Pump Intake Depth 5' ff bottom
Water Column: Pump on: 11:35 Off: 12:55
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:35	400 ml/min	initial						87.11		
11:45				145	6.86	230	16.2		4.2	
11:50				146	6.85	230	16.2		4.2	
11:55				148	6.89	240	16.3		3.5	
12:00				152	6.79	240	16.6	87.11	3.5	
12:05				154	6.78	240	16.7		3.5	
12:10				163	6.60	240	17.2		3.4	
12:15				164	6.58	250	17.3	87.08	3.5	
12:20				170	6.48	250	17.9		4.0	
12:25				172	6.42	250	17.2	87.12	4.5	
12:30				176	6.34	240	16.6		5.0	
12:35				178	6.25	240	16.7		5.1	
12:40				180	6.24	240	16.8		5.0	
12:45				183	6.26	240	17.2		5.1	

Well Secure:
Color:
Odor:

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = appears turbid
Other (OVA, HNU,etc.): 1.3 (ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: MW-6GL
Date: 1/11/00 Sampled By: GW/MPE
Sampling Time: 11:55 Recorded By:
Weather: Sunny, ~50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Redi flow)
Casing Diameter: 4" Purge Rate: 400 ml/min
Total Depth: 125' Total Volume Purged:
Depth to Water: 85.68' Pump Intake Depth 120'
Water Column: Pump on: 10:35 Off: 11:55
Gallons/Foot: Parameters Sampled: Metals / VOC's
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:35	initial			128.7	6.52	55	15.5	85.68'	7.0	
10:40	400 ml/min		95.0	126.5	6.50	55	16.0		7.1	
10:45				132.3	6.32	50	15.5		7.0	
10:50				135.0	6.31	50	15.0		7.0	
10:55				137.6	6.25	85	15.0	85.75'	7.1	
11:00			84.0	144.6	6.17	110	13.0		7.1	
11:05				149.5	6.29	115	14.0		7.0	
11:10				151.5	6.32	110	14.5	85.77'	7.0	
11:15				154.5	6.41	110	14.0		7.0	
11:20		5 gals	8.50*	156.5	6.45	115	14.5		7.0	
11:25				159.0	6.55	115	15.0	85.78	7.0	
11:30				159.7	6.57	115	15.0		6.9	
11:35			23.0	159.7	6.61	115	15.0		6.9	
11:40			19.5	159.8	6.61	115	15.0	85.79	6.9	
11:45		9 gallons	12.8	159.6	6.61	115	15.0		6.9	
11:50			19.9	159.8	6.61	115	15.0		6.8	

* = Reading taken from different location
Total Volume Purged = 9.0 Gallons

Well Secure:
Color: Clear
Odor: None

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 19.9
Other (OVA, HNU,etc.): PID = Non Detect 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 7GL
Date: 11/15/99 Sampled By: GW/mpc
Sampling Time: 11:40 Recorded By:
Weather: M. cloudy ~50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: Micro-purge (low flow sampling)
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 109.19 Pump Intake Depth 5' off bottom
Water Column: Pump on: 10:37 Off: 11:40
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:37	450ml	initial		169.3	6.03	310	11.5	109.19	8.4	
10:42				174.5	6.32	310	15.2		8.0	
10:47				189.0	6.10	320	17.5		6.5	
10:52				196.6	6.08	310	18.1		5.8	
10:57				198.0	6.07	310	18.3		5.4	
11:02				198.1	6.10	310	17.9		5.4	
11:07				197.1	6.10	310	18.0	109.19	5.4	
11:12				199.0	6.05	330	20.5		6.0	
11:17				197.6	6.04	370	23.0		5.6	
11:22				197.0	6.01	380	25.0		5.6	
11:27			16.4	197.1	6.04	380	24.8		5.4	
11:32				198.7	6.04	370	24.0		5.8	
11:37				198.6	6.03	370	23.1		5.6	

Well Secure: Purge Water Disposal:
Color: Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.):

* Well requires lock

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 7-ML
Date: 11/19/99 Sampled By: GW/MPB
Sampling Time: 3:15 Recorded By:
Weather: sunny, ~40° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro Purge)
Casing Diameter: 4" Purge Rate: 400 ml/min
Total Depth: 355 Total Volume Purged:
Depth to Water: 108.85 Pump Intake Depth 5' off bottom
Water Column: Pump on: 2:10 Off: 3:15
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:10	400 ml/min	initial							108.85	
2:20				203	6.46	290	18.5		3.6	
2:25				203	6.45	290	18.5	108.70	3.5	
2:30				200	6.33	290	19.6		3.0	
2:35				206	6.30	290	19.6		2.7	
2:40				198	6.20	295	19.4	108.65	2.6	
2:45				191	6.18	310	21.1		4.0	
2:50				189	6.13	320	21.9		4.7	
2:55				190	6.12	320	21.9	108.78	4.6	
3:00				191	6.06	315	21.9		4.5	
3:05				193	6.02	320	21.9		5.0	
3:10				195	6.01	320	21.9	108.78	4.7	

Well Secure:
Color:
Odor:
Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = approx turbid
Other (OVA, HNU,etc.): 2.5 (ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N1001227.0002 Task: 00003 Well ID: 8-GL
Date: 11/17/99 Sampled By: GW/MPL
Sampling Time: 11:35 Recorded By:
Weather: sunny, ~ 34° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro-purge)
Casing Diameter: 4" Purge Rate: 300 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 78.28 Pump Intake Depth 10' off bottom
Water Column: Pump on: 10:15 Off: 11:35
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:15	300 ml/min	initial		195.3	6.29	190	15.0	78.28	2.5	
10:20				195.2	6.27	190	15.0		2.4	
10:25				194.6	6.27	190	14.8		2.3	
10:30				194.8	6.30	190	14.6	78.44	2.0	
10:35				194.3	5.82	180	13.4		2.4	
10:40				201.8	6.30	180	15.0		2.3	
10:45				197.1	6.29	190	14.7		2.0	
10:50				197.0	6.27	190	14.5		2.0	
10:55				196.8	6.29	185	13.7	78.48	1.9	
11:00				194.5	6.28	180	13.3		1.9	
11:05				193.9	6.25	180	12.2		1.9	
11:10				193.7	6.19	180	12.6	78.75	3.2	
11:15				198.6	6.21	180	13.6		2.5	
11:20				198.2	6.27	190	14.1		2.1	
11:25				197.1	6.26	190	13.7		2.1	
11:30			36.0	198.1	6.25	190	14.7	78.65	2.0	
		5.0 gallons purged								

Well Secure:
Color: slightly cloudy
Odor: odorless

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity 36.0
Other (OVA, HNU,etc.): < 1.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 8-GU
Date: 11/17/99 Sampled By: GW/MPE
Sampling Time: Recorded By:
Weather: Sunny, ~34° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low-flow Sampling (Micro purge)
Casing Diameter: 4" Purge Rate: 400 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 76.76 Pump Intake Depth 18' off bottom
Water Column: Pump on: 12:10 Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:10	400 ml/m							76.76		
12:15				192.2	6.34	250	14.3		3.3	
12:20				190.3	6.34	270	15.4	76.80	2.6	
12:25				189.9	6.33	280	16.5		2.5	
12:30				187.1	6.35	290	16.8		2.4	
12:35				185.6	6.35	290	17.7	76.77	2.4	
12:40				185.7	6.33	300	18.2		2.5	
12:45				183.9	6.52	310	18.6		2.5	
12:50				182.1	6.37	310	15.7	76.80	2.4	
12:55				182.1	6.34	310	15.8		2.3	
1:00				181.9	6.32	310	16.0		2.4	
1:05				181.3	6.32	310	16.0		2.4	
1:10				181.3	6.49	310	15.8	76.77	2.4	
1:15				181.2	6.34	310	17.7		2.4	
1:20				180.9	6.34	310	17.8		2.4	
1:25			36.0	180.9	6.33	310	18.0		2.4	
	~~6.0 GAL~~	6.0 GAL								

Well Secure: Purge Water Disposal:
Color: slightly cloudy Turbidity(qualitative): Final Turbidity -36.0
Odor: odorless Other (OVA, HNU,etc.): <1.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227000 0R Task: 00003 Well ID: 15 - GL
Date: 11/18/99 Sampled By: GW/MPE
Sampling Time: 10:45 Recorded By:
Weather: sunny, ~ 35° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro-purge)
Casing Diameter: 4" Purge Rate: 400 ml/min
Total Depth: 170 Total Volume Purged:
Depth to Water: 89.05 Pump Intake Depth 5' off bottom
Water Column: Pump on: 9:20 Off: 10:45
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:20	400ml/min	initial			6.37	1600	16.8	89.05	1.9	very silty
9:25				-053	6.36	1600	16.9		1.9	
9:30				-053	6.41	1600	16.7		.5	
9:35				-051	6.45	1600	17.3	89.25	.5	
9:40				-039	6.48	1600	17.5		.5	
9:45				-030	6.49	1600	17.5		.5	
9:50				-018	6.45	1600	17.0	89.24	.6	
9:55				-010	6.43	1600	16.8		.5	
10:00				-008	6.42	1600	16.7		.5	
10:05				-003	6.40	1600	16.7	89.23	.5	
10:10				-001	6.38	1500	16.9		.5	
10:15				+006	6.37	1500	17.1		.5	
10:20				+014	6.34	1500	17.1	89.22	.5	
10:25				+016	6.31	1500	17.0		.5	
10:30			48.7	+017	6.30	1500	17.7		.5	
	10 gallons purged									

Well Secure: Purge Water Disposal:
Color: slightly yellow tinted Turbidity(qualitative): Final Turbidity - 48.7 // Turbid appearance
Odor: slight odor Other (OVA, HNU,etc.): problem with PID (ppm)

Particulate matter in tubing was discharged immediately after cutting tube for sampling. Allowed 5 min. for sediment to be purged from tubing.

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: ~~MW~~ 17BL
Date: 12-9-99 Sampled By: GW DS
Sampling Time: _____ Recorded By: G.W. DS.
Weather: CLEAR Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: Low flow SAMPLING
Casing Diameter: 4" Purge Rate: ~~400~~ 400 ml/min
Total Depth: 170 Total Volume Purged: 12 GAL
Depth to Water: 98.90 Pump Intake Depth 165
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: VOC + FREON 113
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:10	400			174	6.43	350	13.2	98.90	3.8	
12:15				182	5.96	355	15.0		2.2	
12:20				184	5.92	355	15.0		1.2	
12:25				184	5.92	355	15.0		1.8	
1230				183	5.92	355	14.7		1.8	
1235			~~98.90~~	183	5.92	350	14.2	98.90	1.8	
1240				183	5.91	350	14.3		1.8	
1245				181	5.88	350	15.2		1.4	
1250				180	5.88	370	16.7		1.2	
1255				174	5.86	380	17.7		1.2	
1300				179	5.85	380	17.8	98.96	1.2	
1305			~~200~~	179	5.84	375	17.6		1.2	
		12	<50 MV							

Well Secure: _____ Purge Water Disposal: _____
Color: COLORLESS Turbidity(qualitative): VERY CLEAR
Odor: SLIGHT Other (OVA, HNU,etc.): 31 PPM / AFTER 10 MIN 7 PPM
100 BREATHING ZONE

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: MW-18ML
Date: 1/12/00 Sampled By: GW/MPE
Sampling Time: 1:25 Recorded By:
Weather: Sunny, ~35° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Bladder pump)
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: 345' Total Volume Purged:
Depth to Water: 109.79' Pump Intake Depth 340'
Water Column: Pump on: 12:10 Off: 1:25
Gallons/Foot: Parameters Sampled: VOC's
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:10	450 ml/min	initial						109.79'		
12:15				—	—	—	—	—	—	
12:20				200	7.07	200	15.0		4.5	
12:25				202	7.09	205	15.0		4.3	
12:30				101	6.78	210	16.0	109.85	1.0	
12:35				103	6.75	210	17.0		2.1	
12:40				150	6.93	220	17.0		4.8	
12:45				156	6.31	225	17.5	109.89	4.7	
12:50				202	6.25	225	17.5		5.4	
12:55				223	6.23	220	17.0		5.8	
1:00				221	6.21	220	17.0	109.84	5.7	
1:05				236	6.25	230	17.0		5.8	
1:10				251	6.23	220	17.0		6.0	
1:15		7.0 gal	17.83	254	6.23	220	17.0	109.80	6.0	
— = Groundwater not yet at surface										
Total Volume Purged = 7.0 gallons										

Well Secure:
Color: clear
Odor: none

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 17.83
Other (OVA, HNU,etc.): PID = 3.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: 4001227.0002 Task: 00003 Well ID: MW-22ML
Date: 1/12/00 Sampled By: GW/MPE
Sampling Time: ~~10:55~~ 11:20 Recorded By:
Weather: Sunny, ~35° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Bladder pump)
Casing Diameter: 4" Purge Rate: 450 ml/min
Total Depth: 340' Total Volume Purged:
Depth to Water: 94.55' Pump Intake Depth 335'
Water Column: Pump on: 9:40 Off: ~~10:55~~ 11:20
Gallons/Foot: Parameters Sampled: VOC's
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:40	450ml/min	initial						94.55'		
9:45				174	6.73	175	11.5°		3.5	
9:50				173	6.71	190	12.5		1.8	
9:55				174	6.52	190	12.5°		1.1	
10:00				174	6.50	190	12.0		0.6	
10:05				178.5	6.52	185	12.0		.6	
10:10				174.3	6.48	185	12.0		1.2	
10:15				176.5	6.54	180	11.5		2.7	
10:20				174	6.51	180	11.5		2.5	
10:25				174	6.51	180	11.0		1.6	
10:30				177	6.44	180	11.0	94.75	1.5	
10:35				174.7	6.51	175	11.0		1.5	
10:40				175.0	6.53	175	11.0	94.76	1.4	
10:45				179.0	6.51	170	11.0		1.4	
10:50			2.93	169.0	6.48	170	11.0	94.76	1.6	
10:55				180.7	6.58	180	12.0		1.4	
11:00				189	6.69	200	15.0		4.0	
11:05				188	6.70	220	16.0	95.17	4.4	
11:10				186	6.74	220	16.0		4.6	
11:15			9.96	187	6.68	220	16.0	95.18	4.6	
Total Volume Purged =			gallons							

Well Secure:
Color: clear
Odor: none

Purge Water Disposal: (MW)
Turbidity(qualitative): Final Turbidity = 2.93 / 9.96
Other (OVA, HNU,etc.): PID = 1.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 25MI
Date: 1/10/00 Sampled By: GW/MPE
Sampling Time: 3:45 Recorded By:
Weather: rain, ~40° Coded Replicate No.: Replicate #1

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Redi-Flow)
Casing Diameter: 8" Purge Rate: 450 ml/min
Total Depth: 220 Total Volume Purged:
Depth to Water: 94.42 Pump Intake Depth
Water Column: Pump on: 2:35 Off: 3:45
Gallons/Foot: Parameters Sampled: VOC
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:35	initial	450ml/m						94.42		
2:40				312	6.64	350	17.0°		3.0	
2:45				316	6.69	370	17.0°		3.6	
2:50				317	6.73	390	16.0°		4.0	
2:55				324	6.64	390	16.0°	94.41	3.8	
3:00				321	6.67	390	16.0	"	3.9	
3:05				308	6.69	395	16.5		3.8	
3:10				310	6.70	400	17.0		3.6	
3:15				309	6.69	400	17.0	94.41	3.7	
3:20				308	6.76	400	17.5		3.7	
3:25				322	6.77	410	18.0		3.7	
3:30				321	6.77	410	18.0	94.40	3.8	
3:35				329	6.80	410	18.0		3.7	
3:40				323	6.81	410	18.0		3.7	
		Total	Volume	Purged=						

Well Secure:
Color: colorless
Odor: None
Purge Water Disposal:
Turbidity(qualitative): 49.0
Other (OVA, HNU,etc.): NA - rain

Collect replicate called Rep-1

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: MW-23MI
Date: 1/11/00 Sampled By: GW/MPG
Sampling Time: 2:35 Recorded By:
Weather: cloudy, ~40° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Redi-flow pump)
Casing Diameter: 2" Purge Rate: 400 ml/min
Total Depth: 215' Total Volume Purged:
Depth to Water: 100.81' Pump Intake Depth
Water Column: Pump on: 1:25 Off: 2:35
Gallons/Foot: Parameters Sampled: VOC's
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1:25	400 ml/min	initial						100.81		
1:30				170.0	6.27	255	16.0		6.2	
1:35				195.0	6.12	260	16.0		5.4	
1:40				196.0	6.10	260	16.0		5.7	
1:45				197.0	6.09	260	16.0	100.84	5.3	
1:50				197.0	6.11	265	17.5		4.8	
1:55				198.5	6.08	270	18.0		4.9	
2:00				199.0	6.10	270	18.0	100.85	5.0	
2:05				199.7	6.10	275	18.0		4.8	
2:10				199	6.08	275	18.0		4.7	
2:15				197.8	6.10	270	18.0		4.8	
2:20			44.3	198.0	6.10	275	18.0	100.85	4.9	
2:25		10 gallons	40.0	200.0	6.10	275	18.0		4.8	
Total Volume Purged = 10 gallons										

Well Secure:
Color: clear
Odor: none
Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 40.0
Other (OVA, HNU,etc.): PID = 5.1

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 26-MI
Date: 1/10/00 Sampled By: GW/MPC
Sampling Time: 1:15 Recorded By:
Weather: cloudy, ~45° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow Sampling (Redi-Flow)
Casing Diameter: 2" Purge Rate: 300 ml/min
Total Depth: 240' Total Volume Purged:
Depth to Water: 88.81 Pump Intake Depth 235'
Water Column: Pump on: 12:00 Off: 1:05
Gallons/Foot: Parameters Sampled: VOC
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:00	initial							88.41		
12:05	300ml/m.			187	5.97	410	15.00		1.2	
12:10				204	5.60	410	14.0		1.5	
12:15				205	5.63	405	14.4		1.5	
12:20				227	5.75	400	14.0		1.7	
12:25				225	5.71	400	14.1		1.6	
12:30				253	6.00	400	13.5		2.0	
12:35				251	6.05	400	13.7		2.0	
12:40				269	6.16	400	13.5		2.1	
12:45				279	6.16	409	14.5	88.95	2.0	
12:50				281	5.45*	410	15.0		2.9	
12:55				286	5.92*	410	15.0	88.98	3.0	
1:00				290	6.19	410	16.0		3.2	
1:05		6.0	43.0	287	6.78	430	16.0		3.3	
		* QUESTIONABLE READINGS								
		Total Volume Purged: 6 gallons								

Well Secure:
Color: colorless
Odor: None

Purge Water Disposal:
Turbidity(qualitative): Final Turb = 43.0
Other (OVA, HNU,etc.): PID = 2.1

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 286L
Date: 12-9-99 Sampled By: GW DS
Sampling Time: _____ Recorded By: GW DS
Weather: _____ Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: Low flow Sampling
Casing Diameter: _____ Purge Rate: ~~450~~ 450 ml/min
Total Depth: _____ Total Volume Purged: 12 GAL
Depth to Water: 95.69 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:17	450ml			150	6.01	445	17.7	95.69	1.2	
9:27				147	6.07	455	18.1		1.0	
9:37				147	6.09	450	18.2		0.7	
9:47				144	6.11	450	18.3	[redacted]	0.7	
9:55				143	6.12	445	18.0		0.6	
10:00				143	6.12	440	17.6		0.6	
10:05				142	6.12	450	18.1		0.6	
10:15				140	6.12	455	18.6		0.5	
10:20				140	6.10	460	18.8		0.5	
10:25				139	6.10	460	19.0	95.50	0.5	
10:30				139	6.10	470	19.7		0.5	
10:35				139	6.10	470	19.8		0.5	
10:40			1.58	139	6.09	470	19.9		0.4	
10:45				139	6.09	470	20.1		0.5	
10:50				139	6.09	470	20.3		0.5	
10:55				139	6.09	470	20.3		0.5	
11:00				139	6.09	480	20.6		0.5	
11:05				139	6.09	480	20.9	95.62	0.5	
11:10				138	6.08	485	21.2		0.4	
		12								

Well Secure: _____
Color: COLORLESS
Odor: NONE

Purge Water Disposal: _____
Turbidity(qualitative): CLEAR (1.5 NTU)
Other (OVA, HNU,etc.): 50 ppm / 5 ppm ~~BENZENE~~ 5 mw
NO BREAKTHROUGH 20'

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 28-MT
Date: 1/14/00 Sampled By: GW/MPC
Sampling Time: 10:25 Recorded By:
Weather: sunny, cold, 20° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Redi-flo)
Casing Diameter: 2" Purge Rate: 450 ml/min
Total Depth: 250' Total Volume Purged:
Depth to Water: 95.25' Pump Intake Depth 245'
Water Column: Pump on: 9:00 Off: 10:25
Gallons/Foot: Parameters Sampled: VOC's
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:00	450 ml/min	initial						95.25'		
9:05				241	6.79	220	13°		8.4	
9:10				230	6.64	230	14°		8.9	
9:15				231	6.25	260	16°		6.2	
9:20				243	6.18	260	16.5°		3.8	
9:25		4.0 gals		242	6.17	255	16.5°	95.35	3.7	
9:30				267	6.13	280	19.0°		3.5	
9:35				272	6.11	260	20.0°		3.5	
9:40				279	6.17	280	20.0°	95.32	3.6	
9:45				281	6.15	285	20.5°		3.6	
9:50				285	6.16	285	21.0°		3.4	
9:55				290	6.28	280	20.0°		3.3	
10:00				290	6.17	280	20.0°	95.28'	3.3	
10:05				290	6.18	280	20.0°		3.5	
10:10				291	6.18	280	20.0°		3.4	
10:15				280	6.15	280	20.0°		3.3	
10:20			20.8	280	6.16	280	20.0°	95.29	3.3	

Total Volume Purged = 13.0 gallons

Well Secure:
Color: clear
Odor: none

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity = 20.8
Other (OVA, HNU,etc.): PID: Not Functional in extreme cold.

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 29-ML
Date: 11/16/99 Sampled By: GW/MPE
Sampling Time: 12:25 Recorded By:
Weather: Sunny, ~33° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Micro Purge)
Casing Diameter: 2" Purge Rate: 300 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 103.21 Pump Intake Depth 5' off bottom
Water Column: Pump on: 11:15 Off: 12:25
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:15	300 ml/m	initial						103.21		
11:20	350 ml/m									
11:25				220.5	6.13	280	15.9	23	5.1	
11:30				215.7	6.11	265	15.8	103.24	4.8	
11:35				215.0	6.12	260	15.3		4.6	
11:40				215.8	6.11	260	15.2		4.6	
11:45				214.4	6.11	250	14.1	103.24	4.7	
11:50				216.0	6.08	255	15.2		5.0	
11:55				214.4	6.10	270	17.0		4.9	
12:00				212.3	6.06	290	13.8	103.29	4.8	
12:05				211.2	6.06	300	18.5		4.8	
12:10				211.3	6.04	295	20.3		4.8	
12:15				212.1	6.06	300	20.0	103.29	5.0	
12:20			16.5	210.8	6.04	300	20.0		5.0	

Well Secure:
Color: Colorless
Odor: NOT DETECTED

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity 16.5
Other (OVA, HNU,etc.): 20.8 after 5min 2.0 (ppm)

2018 ML | AFTER 5 min
12~~9~~ GL | 2.0 ppm
12.5 | 3.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 29 GL
Date: 11/15/99 Sampled By: GW/MPG
Sampling Time: 1:30 Recorded By:
Weather: M. cloudy ~50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low Flow sampling (Micro-purge)
Casing Diameter: 2" Purge Rate:
Total Depth: Total Volume Purged:
Depth to Water: 101.85 Pump Intake Depth 5' off bottom
Water Column: Pump on: 12:25 Off: 1:30
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:25	400ml/m	initial		149.4	7.01	490	14.8	101.85	4.0	
12:30				146.1	7.03	490	15.1		3.4	
12:35				134.7	7.04	490	15.1		3.4	
12:40				135.1	7.16	490	15.8		3.2	
12:45				79.2	7.02	625	15.6		2.8	
12:50				67.8	7.02	625	15.7		3.0	
12:55				77.0	6.99	600	16.1		3.2	
1:00				94.5	6.95	600	17.2		3.4	
1:05				102.8	6.89	600	17.2	109.7*	3.4	
1:10				107.1	6.85	625	17.4		3.4	
1:15				112.5	6.85	650	18.4		3.4	
1:20				118.5	6.83	650	18.5		3.4	
1:25				121.3	6.82	650	18.1		3.4	

RESAMPLED ON 11/16

Well Secure: Purge Water Disposal:
Color: Turbidity(qualitative): appears clear
Odor: Other (OVA, HNU,etc.):

* Well Cap needs new Sanitary Seal

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00003 Well ID: 29-GL
Date: 11/16/99 Sampled By: GW/MPE
Sampling Time: 10:30 Recorded By:
Weather: Sunny, cold, ~ 38° Coded Replicate No.:

WELL IMFORMATION

Casing Material: PVC Purge Method: low flow sampling (Mini Purge)
Casing Diameter: 2" Purge Rate: 450 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 101.39 Pump Intake Depth 5' off bottom
Water Column: Pump on: 9:34 Off: 10:35
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:34	450ml/min	initial						101.39		
9:46								110.30		
9:50	150 ml/min									
9:55				158.3	6.98	600	13.3	108.65	4.4	
10:00				158.0	6.96	600	14.6		3.7	
10:05				159.3	6.94	600	15.2		3.6	
10:10	350ml/min			159.9	6.90	600	15.5	108.48	3.6	
10:15				160.0	6.86	600	16.8		3.6	
10:20				162.0	6.84	600	16.2		3.4	
10:25				161.8	6.83	600	16.2	108.65	3.5	
10:30		6.0 gallons	35.0	162.7	6.81	600	16.2		3.8	

Well Secure:
Color: Colorless
Odor: not detected

Purge Water Disposal:
Turbidity(qualitative): Final 9.9
Other (OVA, HNU,etc.): 12.8 after 5 min 3.0 (ppm)

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0009 Task: .00003 Well ID: 35-GL
Date: 11/16/99 Sampled By: GW/MPC
Sampling Time: 5:50 Recorded By:
Weather: Sunset, ~35° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: low flow sampling (Micro Purge)
Casing Diameter: 2" Purge Rate:
Total Depth: Total Volume Purged:
Depth to Water: 87.14 Pump Intake Depth 5' off bottom
Water Column: Pump on: 4:45 Off: 5:50
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
4:45	450ml/min	initial		-92.6	6.64	370	19.3	87.14	1.0	
4:50				-91.8	6.62	370	19.2	"	.9	
4.55				-99.5	6.60	410	19.4		.8	
5:00				-91.5	6.31	600	21.8		.8	
5:05				-42.1	6.15	600	23.5	87.27	.7	
5:10				-27.0	6.11	650	23.6		.7	
5:15				-15.2	6.11	650	23.5		.7	
5:20				-12.2	6.09	600	22.7	87.33	.6	
5:25				-11.8	6.10	600	22.9		.6	
5:30				-11.4	6.11	600	23.3		.6	
5:35				-11.1	6.09	600	23.2	87.14	.5	
5:40				-6.1	6.10	600	22.5		.5	
5:45				-5.1	6.10	600	22.9	87.14	.5	

Well Secure:
Color:
Odor:

Purge Water Disposal:
Turbidity(qualitative): Final Turbidity -28.0
Other (OVA, HNU,etc.): 6.8 initial → after 5 minutes → 2.0 (ppm)

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LOCKHEED MARTIN | Project No.: M00227.0002 | Page: 1 of ___

Site Location: LAKE SUCCESS, NY | Date: 12/9/99

Site/Well No.: 36GL | Replicate No.: N/A | Code No.: —

Weather: CLEAR 50° | Sampling Time: Begin 1445 End 1600

Evacuation Data

Measuring Point	TOC
MP Elevation (ft)	—
Land Surface Elevation (ft)	—
Sounded Well Depth (ft bmp)	135.00
Depth to Water (ft bmp)	92.53
Water-Level Elevation (ft)	—
Water Column in Well (ft)	42.47
Casing Diameter/Type	2" (0.16)
Gallons in Well	7
Gallons Pumped/Bailed Prior to Sampling	~40
Sample Pump Intake Setting (ft bmp)	1500
Purge Time	begin ~~1500~~ end 1530
Pumping Rate (gpm)	1 GPM
Evacuation Method	SUBMERSIBLE PUMP

Field Parameters

Field Parameters	I	1V	2V	3V	4V	5V
Color						CLOUDY
Odor						NONE
Appearance						CLEAR
pH (s.u.)	6.42	6.08	6.14	6.08	6.09	6.01
Conductivity (mS/cm)						
(µmhos/cm)	210	210	210	220	220	210
Turbidity (NTU)	>200	>200	>200	80.6	21.8	8.5
Temperature (°C)	13.9	14.1	14.4	14.2	14.0	14.0
Dissolved Oxygen (mg/L)						
Salinity (%)						

Sampling Method: PUMP DISCHARGE

Remarks: SAMPLE AT CONDITIONAL PURGE RATE (1 GPM) TO LOWER TURBIDITY

Constituents Sampled	Container Description	Number	Preservative
SEE COC			

Sampling Personnel: TDS GW

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002.00003 Task: _____ Well ID: N 1102
Date: 11/4/99 Sampled By: GW/MPE
Sampling Time: _____ Recorded By: _____
Weather: sunny, cool, ~50° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: LOW flow SOP
Casing Diameter: 4" Purge Rate: _____
Total Depth: 165.90 Total Volume Purged: _____
Depth to Water: 145.45 Pump Intake Depth _____
Water Column: 20.45 Pump on: 9:50 Off: 11:10
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:50	350 mL			9.8	8.92	200	12.4	145.45	.5	
9:55				-151.5	8.88	220	12.5		.5	
10:00				-168.0	8.82	220	13.4		.5	
10:05				-184.6	8.80	225	13.6		.5	
10:10				-189.3	8.73	230	13.7		.5	
10:15				-67.1	8.61	260	14.9		.5	
10:20				-78.3	7.94	280	16.0		.7	
10:25				-41.1	7.45	300	16.3		1.1	
10:30				-9.3	7.14	305	16.3	146.4	1.5	
10:35				23.3	6.98	310	16.3		2.1	
10:40				31.7	6.88	310	18.1		2.5	
10:45				46.3	6.84	310	17.9		2.5	
10:50	V		48.7	54.8	6.77	310	16.3		3.0	
10:55				54.2	6.77	310	15.0		3.0	
11:00			20.6	61.0	6.75	310	15.1		3.1	

Well Secure: _____ Purge Water Disposal: _____
Color: COLORLESS Turbidity(qualitative): CLEAR
Odor: ~~NONE~~ SLIGHT Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LMC | Project No.: NY001727.0002.00007 | Page: 1 of ____

Site Location: LAKE SUCCESS NY | Date: 11-3-99

Site/Well No.: NST WELL N.2576 | Replicate No.: ____ | Code No.: ____

Weather: 60° | Sampling Time: Begin 9:30 End 11:00

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	200
Depth to Water (ft bmp)	60
Water-Level Elevation (ft)	
Water Column in Well (ft)	140
Casing Diameter/Type	10"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 10:05 end 10:25
Pumping Rate (gpm)	Q ~ 5 GPM
Evacuation Method	

Field Parameters

Color	COLORLESS
Odor	NONE
Appearance	VERY SLIGHTLY TURBID
pH (s.u.)	6.35
Conductivity (mS/cm)	
(µmhos/cm)	350
Turbidity (NTU)	
Temperature (°C)	20.
Dissolved Oxygen (mg/L)	
Salinity (%)	
Sampling Method	
Remarks	

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel: G. WILLIAMS D. MCCLAFFERTY, M. ENGLEMAN

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LOCKHEED MARTIN | Project No. NY001227.0012.00004 | Page 1 of ____

Site Location: LAKE SUCCESS NY. | Date: 6-5-02

Site/Well No.: NST WELL / N2576 | Replicate No. ____ | Code No. ____

Weather: CLEAR 80° | Sampling Time: Begin ____ End ____

Evacuation Data

Measuring Point ____

MP Elevation (ft) ____

Land Surface Elevation (ft) ____

Sounded Well Depth (ft bmp) CONTINUOUSLY PUMPING

Depth to Water (ft bmp) ____

Water-Level Elevation (ft) ____

Water Column in Well (ft) ____

Casing Diameter/Type ____

Gallons in Well ____

Gallons Pumped/Bailed Prior to Sampling ____

Sample Pump Intake Setting (ft bmp) ____

Purge Time begin ____ end ____

Pumping Rate (gpm) ~750 GPM

Evacuation Method PUMPED TO SYSTEM

Field Parameters

Color: COLORLESS

Odor: NONE

Appearance: CLEAR

pH (s.u.): 6.52

Conductivity (mS/cm) ____

(µmhos/cm): 325

Turbidity (NTU) ____

Temperature (°C): 21.4

Dissolved Oxygen (mg/L) ____

Salinity (%) ____

Sampling Method ____

Remarks ____

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel: GW, DM, SH

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

mp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0002 Task: 00003 Well ID: N1250
Date: 11-9-99 Sampled By: GW ME
Sampling Time: _____ Recorded By: _____
Weather: _____ Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: MICROPURGE
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: _____
Depth to Water: 21.59 Pump Intake Depth _____
Water Column: _____ Pump on: ~~9:55~~ 12:00 Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:00				243.1	6.11	22	13.6		11.8	250 ml/min
12:05				248.1	5.49	60	13.6		9.0	
12:10				240.7	5.51	35	13.4		6.5	
12:15				240.7	5.47	65	13.4		4.8	300 ml/minute
12:20				240.7	5.41	65	13.3		4.2	
12:25				243.7	5.45	65	13.0		4.1	
12:30				237.8	5.43	65	13.5		3.8	
12:35				237.8	5.43	65	13.5		3.8	
12:40				237.1	5.38	65	13.5		3.8	
12:45				241.1	5.48	65	13.5		3.2	
12:50				234.1	5.41	65	13.5		3.2	
12:55				223.6	5.40	65	13.5		3.0	
1:00				228.0	5.35	65	13.4		3.0	

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project _____ Project No. NY000122.0003.00002 Page 1 of _____

Site Location LAKE SUCCESS NY Date 11-3-99

Site/Well No. POOL / GLEN OAKS Replicate No. _____ Code No. _____

Weather OVERCAST 65° Sampling Time: Begin 12:00 End 12:40

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	210
Depth to Water (ft bmp)	150
Water-Level Elevation (ft)	
Water Column in Well (ft)	60
Casing Diameter/Type	4" (0.65)
Gallons in Well	39
Gallons Pumped/Bailed Prior to Sampling	~120
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 12:07 end 12:22
Pumping Rate (gpm)	Q~4 GPM
Evacuation Method	

Field Parameters

Color	
Odor	
Appearance	
pH (s.u.)	6.85
Conductivity (mS/cm)	
(µmhos/cm)	295
Turbidity (NTU)	
Temperature (°C)	14.9
Dissolved Oxygen (mg/L)	
Salinity (%)	
Sampling Method	
Remarks	

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel G. WILLIAMS

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

mp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 1 GL
Date: 5/3/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 65° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: QED-PC
Casing Diameter: Purge Rate: 400 ml/min
Total Depth: Total Volume Purged: 6 g
Depth to Water: 103.36 Pump Intake Depth 10' FROM BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1100				192	6.81	435	16.8	103.30	4.2	
05				188	6.86	448	17.5		3.3	
10				185	6.85	450	18.1		3.0	
15				181	6.85	460	18.8		3.1	
20				181	6.85	475	19.0	103.36	3.1	
25				179	6.84	460	18.4		3.1	
30				179	6.81	448	18.3		3.0	
35				177	6.79	448	18.0		3.2	
40				175	6.75	444	18.1		3.1	
45				173	6.74	440	18.0		3.0	
50				168	6.69	435	18.6	103.41	3.0	
55				163	6.61	465	18.6		3.1	
1200			21.5	162	6.62	466	18.6		3.1	

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 1MI-L
Date: 5/3/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 65° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: BLADDER PUMP
Casing Diameter: Purge Rate:
Total Depth: Total Volume Purged: 7.5g
Depth to Water: 103.40 Pump Intake Depth 10' FROM BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:45	450ml/m			191	6.86	161	15.9	103.40	8.9	
50				185	7.34	140	16.2		8.9	
55				180	7.48	170	16.3		8.8	
10:00				179	7.50	165	16.3		8.8	
05				178	7.33	198	16.1		8.9	
10				179	7.10	200	16.1		8.9	
15				181	6.95	200	16.6		9.0	
20				179	7.08	195	16.9	103.48	8.9	
25				182	6.99	180	16.9	10	9.7	
30				175	7.34	205	17.3	103.79	8.8	
35				179	6.88	210	17.3		8.8	
40				189	6.51	218	17.8		9.0	
10:45				192	6.51	220	18.1		9.2	
50		7.5 G	31.6	195	6.47	218	18.3		9.1	
55										

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): d.o

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00009 Well ID: 1ML
Date: 5/3/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 70° Coded Replicate No.: MS/MSD

WELL IMFORMATION

Casing Material: Purge Method: BLADDER
Casing Diameter: Purge Rate: 450 ml/min
Total Depth: Total Volume Purged:
Depth to Water: 103.81 Pump Intake Depth 5' OFF BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:15	450ml/m			155	6.68	154	17.8	103.81	5.9	
20				182	6.35	145	18.1		9.2	
25				184	6.36	153	18.2		10.1	
30				192	6.32	152	18.2		10.4	
35				196	6.28	159	18.3		10.4	
40				201	6.24	160	18.4		11.0	
45				205	6.23	160	18.4	103.77	11.0	
50				207	6.19	160	18.4		10.9	
55				208	6.19	160	18.5		10.8	
100				211	6.18	158	18.54		10.4	
05				213	6.17	160	18.5		10.5	
10				216	6.16	155	18.5		11.5	
15		12 GAL		217	6.15	156	18.5		11.5	

Well Secure:
Color: CLEAR
Odor: SLIGHT SWEET

Purge Water Disposal:
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 2 MI.
Date: 5/10/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: CLOY, LT RAIN, 55° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: Redi Flo
Casing Diameter: _____ Purge Rate: 500 ml/min
Total Depth: _____ Total Volume Purged: 8g
Depth to Water: 85.72 Pump Intake Depth: 5' from Bottom
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
435				~~[illegible]~~183	6.66	252	16.6	85.72	3.8	
40				187	6.46	251	17.1		3.5	
45				195	6.19	272	12.8		5.9	
50				199	6.09	286	12.4		6.8	
55				200	6.07	301	17.1		6.7	
500				201	6.06	308	16.5		6.9	
05				202	6.05	309	15.6		6.8	
10				204	6.04	303	15.1	85.70	7.0	
15				205	6.04	303	15.1		7.1	
20				205	6.04	303	15.1		7.1	
25				206	6.03	305	15.5	85.73	7.1	
30				206	6.02	310	15.8		7.1	
35			13.4	205	6.02	310	15.8		7.1	

Well Secure: _____ Purge Water Disposal: _____
Color: CLR Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 36L
Date: 5/9/00 Sampled By: GM/TM
Sampling Time: _____ Recorded By: TM
Weather: Sun 90° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI Flo
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: 10g
Depth to Water: 96.83 Pump Intake Depth: 10' From Bottom
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1 15	400			177	6.06	355	23.9	96.83	5.1	
20				178	6.06	360	23.7		4.4	
25				179	6.05	360	23.8		4.6	
30				181	6.03	352	22.6		4.7	
35				185	6.01	351	22.8		5.0	
40				185	6.01	361	23.4		4.8	
45				186	6.00	370	24.3	96.87	4.7	
50				187	6.00	370	24.3		4.5	
55				187	6.00	371	24.4		4.7	
200				188	6.00	370	24.5		4.8	
05				189	6.00	372	24.5		4.8	
10				191	6.00	372	24.8		4.5	
15				191	6.00	372	24.7		4.5	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00004 Well ID: 3ML
Date: 5/2/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN, 65° Coded Replicate No.: REP-2

WELL IMFORMATION

Casing Material: _____ Purge Method: BLADDER
Casing Diameter: _____ Purge Rate: 400 ml/min
Total Depth: _____ Total Volume Purged: 8g
Depth to Water: 94.69 Pump Intake Depth 10' OFF BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
4:30				151	7.34	152	17.4	94.69	9.2	
35				151	7.42	151	18.0		9.6	
40										
45				164	6.96	~~152~~ 172	19.3		10.2	
50										
55				177	6.63	162	19.5		10.1	
5:00										
05				186	6.43	161	19.4	94.55	11.0	
10				190	6.38	161	19.6		11.1	
15				197	6.25	161	19.5		~~11.9~~ 7.9	
20				202	6.17	161	19.4		~~7.9~~ 4.6	
25				203	6.14	161	19.4	94.56	4.2	
30			24.6	202	6.14	161	19.3		4.2	
35				203	6.14	161	19.3		4.2	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): _____
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00004 Well ID: 4SL
Date: 5/10/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: CLDY, WIND 60° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI FLO
Casing Diameter: _____ Purge Rate: 500 ml/MIN
Total Depth: _____ Total Volume Purged: 18?
Depth to Water: 100.82 Pump Intake Depth: 10' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
840				140	6.03	330	18.1	100.82	10.5	
45				140	6.05	331	19.0		10.4	
50				128	6.05	338	19.3		10.4	
55				116	6.09	348	20.4		10.4	
900				119	6.09	355	20.9		10.5	
05				126	6.10	359	22.9		10.5	
10				131	6.10	372	23.5		4.5	
15				138	6.10	384	23.7		4.6	
20				140	6.10	390	23.3		4.2	
25			5.0	146	6.10	390	23.4	101.97	3.3	
30				149	6.10	398	23.8		3.3	
35			5.8	153	6.16	385	22.0	101.74	4.5	
40				155	6.17	387	22.0		4.6	
45				150	6.15	390	22.7		4.0	
50			11.22	147	6.11	400	23.5	101.21	3.9	
55				148	6.13	408	23.7		3.5	
1000				149	6.14	411	24.1		3.2	
1010			9.1	154	6.16	411	23.9		3.1	
1020				157	6.16	420	23.9		3.0	
1030				162	6.16	420	23.8		3.1	
1035			9.0	164	6.16	420	23.8	101.95	3.0	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): 3.9 TO 4.0 IN 5MIN
0.0 IN BZ

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N7001227.0002 Task: 00004 Well ID: 4MI
Date: 5/2/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 65° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method:
Casing Diameter: Purge Rate: 350 ml/min
Total Depth: Total Volume Purged: 9
Depth to Water: 101.45 Pump Intake Depth
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:35				46	10.15	328	22.6	101.45	3.3	
40				141	6.33	381	20.1		6.9	
45				154	6.24	375	20.0		7.2	
50				173	6.19	368	20.3		7.2	
55				173	6.17	368	20.5		7.2	
3:00				171	6.17	368	20.6		7.2	
05				172	6.16	360	20.6		7.2	
10				173	6.16	359	20.8	101.85	7.2	
15				173	6.16	358	20.8		7.2	
20				174	6.15	359	21.1		7.4	
25				176	6.15	357	21.1		7.3	
30			17.14	176	6.15	358	21.5	101.98	7.2	
35				177	6.15	353	21.3		7.2	

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): <1.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: S ML
Date: 5/12/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: MSTLY CLD, 60° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: BLADDER
Casing Diameter: _____ Purge Rate: 450 ml/min
Total Depth: _____ Total Volume Purged: _____
Depth to Water: 87.37 Pump Intake Depth: 5' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1025				169	7.31	216	16.0	87.37	9.8	
30				105	7.32	210	15.9		9.9	
35				144	7.31	238	16.0		9.8	
40				173	7.30	241	16.4		9.5	
45				005	6.95	239	16.4		9.7	
50				-16	6.82	231	16.3		9.5	
55				-003	6.74	227	16.4		9.6	
1100				004	6.72	223	16.4	87.42	9.5	
05				017	6.69	221	16.4		9.5	
10				033	6.63	220	16.4		9.5	
15				051	6.62	220	16.4		9.5	
20				066	6.59	220	16.4	87.48	9.6	
25			20.8	069	6.59	220	16.4		9.6	
30				77	6.58	220	16.5		9.5	

Well Secure: _____ Purge Water Disposal: _____
Color: CLR Turbidity(qualitative): _____
Odor: STRONG (DEAD ANIMAL) Other (OVA, HNU,etc.): 5.9 TO 0.0 IN 5

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0013 Task: 00004 Well ID: S MW

Date: 5/12/00 Sampled By: GW/TM

Sampling Time: _____ Recorded By: TM

Weather: RAIN 55° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI FLO

Casing Diameter: _____ Purge Rate: 500 ml/min

Total Depth: _____ Total Volume Purged: 8g

Depth to Water: 88.47 Pump Intake Depth: 5' FROM BOTTOM

Water Column: _____ Pump on: _____ Off: _____

Gallons/Foot: _____ Parameters Sampled: _____

Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:15				133	7.83	267	12.1	88.47	8.0	
20				143	7.48	262	15.1		5.2	
25				149	7.13	259	15.4		4.9	
30				151	7.09	259	15.5		4.9	
35				157	6.77	257	15.6		4.8	
40				159	6.70	252	15.5		4.8	
45				159	6.63	251	15.6	88.51	4.9	
50				159	6.61	251	16.0		5.0	
55				160	6.52	251	16.2		5.0	
10 00				162	6.40	277	19.5		6.0	
05				161	6.28	269	19.7		5.1	
10				162	6.27	265	19.5		4.9	
15			11.9	162	6.26	265	18.9		4.9	
20				162	6.27	265	19.0		4.9	

Well Secure: _____ Purge Water Disposal: _____

Color: CLR Turbidity(qualitative): _____

Odor: _____ Other (OVA, HNU,etc.): 11.1 TO 0.0 IN 5 MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N000227.0012 Task: 00004 Well ID: 6 GL
Date: 5/10/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: CLOY, WIND 55° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: REDI-PLO
Casing Diameter: Purge Rate: 400 ml/min
Total Depth: 86.23 Total Volume Purged: 6g
Depth to Water: Pump Intake Depth: 10' OFF Bottom
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1125				162	6.77	141	12.1	86.23	6.2	
30				169	6.66	130	12.2		5.9	
35				175	6.60	129	12.5		6.0	
40				175	6.58	127	12.5		6.1	
45				177	6.57	121	12.7	86.32	5.6	
50				177	6.56	121	12.7		5.6	
55				178	6.56	121	12.9		5.6	
1200				178	6.54	121	12.9		5.5	
05			24.4	178	6.54	121	12.8	86.39	5.0	
10				178	6.54	121	13.1		6.0	
15				177	6.53	121	13.8		6.0	
20				177	6.53	121	14.7		5.8	
25			18.6	176	6.53	123	15.2	86.34	5.7	
30										

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY000227.0012 Task: 00004 Well ID: 7GL
Date: 5/1/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN, 55° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method:
Casing Diameter: Purge Rate:
Total Depth: Total Volume Purged: 8g
Depth to Water: 109.24 Pump Intake Depth
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml/min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1:50				155	6.03	220	21.0	109.24	11.2	
55				166	6.02	250	21.3		11.2	
2:00				161	6.03	210	21.3		10.9	
05				160	6.03	200	21.4		11.0	
10				160	6.03	305	21.6		11.0	
15				161	6.03	305	22.2	109.26	10.8	
20				163	6.03	310	22.1		10.9	
25				165	6.03	312	22.4		10.9	
30				166	6.03	312	22.3		10.8	
35				168	6.02	310	22.3		10.9	
40				168	6.03	311	22.4		10.7	
45				169	6.02	310	22.3		10.9	
50			4.54	170	6.02	312	22.4	109.26	11.0	*

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): 0.0

* DO METER WAS NOT OPERATIONAL

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N9001227.0012 11 Task: 0000 00004 Well ID: 7ML
Date: 5/1/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 60° WIND9 Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method:
Casing Diameter: Purge Rate: 450 ml/min
Total Depth: Total Volume Purged: 1/9
Depth to Water: 108.77 Pump Intake Depth 5' off Bottom
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1200	450ml			171	6.84	2.15	19.6	108.77	10.9	
05				169	6.72	290	21.7		11.0	
10				165	7.01	299	21.9		10.9	
15				167	6.91	302	21.8		10.9	
20				168	6.88	300	21.6		10.9	
25				168	7.02	281	21.1		10.8	
30				169	6.94	290	21.1		10.8	
35				170	6.93	295	20.7	108.93	10.9	
40				172	6.92	286	19.6		10.8	
45				185	6.33	285	20.9		10.8	
50				184	6.44	280	20.9		10.7	
55			25.0	182	6.53	292	20.7		10.8	
1400				182	6.54	290	20.7	108.94	10.8	*
05				182	6.53	290	20.7		10.8	

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): 0.0

* DO METER WAS NOT OPERATIONAL

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 8GU
Date: 5/2/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 65° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method:
Casing Diameter: Purge Rate: 400ml/min
Total Depth: Total Volume Purged: 5q
Depth to Water: 76.89 Pump Intake Depth 5' OFF BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:05	400 ML			181	6.29	260	17.6	76.71	2.8	
10				187	6.27	277	18.0		2.6	
15				183	6.28	282	18.1		2.4	
20				175	6.29	296	18.7		2.6	
25				162	6.29	302	20.1		2.5	
30				159	6.29	305	20.2	76.73	2.3	
35				155	6.30	310	20.3		2.1	
40				158	6.30	308	19.9		2.0	
45				157	6.30	301	18.8		1.9	
50				157	6.30	299	18.5	76.77	1.9	
55				157	6.30	299	18.8		2.1	
12:00				156	6.30	299	18.9		2.0	
05		9 GAL	16.23	156	6.30	298	19.0		2.1	

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 8GL
Date: 5/2/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: LT RAIN 60° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: REDI-FLO
Casing Diameter: Purge Rate:
Total Depth: Total Volume Purged: 7g
Depth to Water: 77.85 Pump Intake Depth 10' OFF BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml/min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:20	480ml/m		1	159	6.21	189	16.0	77.85	2.4	
25				168	6.24	182	16.9		1.7	
30				137	6.28	188	17.3		1.2	
35				132	6.28	190	18.0		1.2	
40				133	6.26	192	18.4		1.2	
45				146	6.23	199	18.7		1.6	
50				142	6.22	200	18.6	77.21	1.6	
55				147	6.21	206	18.4		1.8	
10:00				149	6.20	201	18.5		2.1	
05				149	6.21	202	18.7	76.93	2.1	
10				150	6.21	202	18.8		2.1	
15			15.2	149	6.20	202	18.6		2.5	
10:20				150	6.19	202	18.6	76.94	2.5	
:25		7GAL		153	6.20	202	18.8		2.4	

Well Secure:
Color: CLEAR
Odor: NONE
Purge Water Disposal:
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): RAIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 15 GL
Date: 5/15/00 Sampled By: CK/BW
Sampling Time: _____ Recorded By: CK/BW
Weather: SUNNY, 78° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" REDI-FLO SUB PUMP
Casing Diameter: 4" Purge Rate: 350 ML/MIN
Total Depth: 160 Total Volume Purged: _____
Depth to Water: 89.62 Pump Intake Depth: 155
Water Column: _____ Pump on: 1100 Off: _____
Gallons/Foot: 0.65 Parameters Sampled: SEE COC
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1100	350			-016	6.89	452	21.6	89.62	1.6	
1105				-024	6.91	452	21.6		1.5	
1110				-026	6.91	445	21.8		1.3	
1115				-025	6.89	440	21.6	89.87	1.4	
1120				-012	6.85	380	22.2		1.7	
1125				-002	6.84	780	22.1		1.4	
1130				002	6.83	750	21.6		1.2	
1135				009	6.77	410	22.6	89.79	1.1	
1140				011	6.76	410	22.6		1.1	
1145				014	6.74	410	22.8		1.1	
1150				016	6.71	400	23.1		1.0	
1155				018	6.72	400	23.6	89.74	1.0	
1200			79.4	020	6.69	390	23.8		1.0	
1205				022	6.68	380	23.8		1.0	
1210				025	6.66	388	23.2		1.0	
1215			93.2	027	6.67	380	23.0	89.72	1.0	
1220			85.5	027	6.65	370	23.7		1.0	
1225				029	6.63	365	23.1		1.0	
1230			76.4	030	6.62	360	22.6		1.0	
1235			62.2	032	6.61	350	22.2		0.8	
1240			61.0	033	6.61	350	22.7		0.9	

Well Secure: YES Purge Water Disposal: IRM
Color: YELLOWISH TINT Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): 0.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 15GL
Date: 5/15/00 Sampled By: CL/GW
Sampling Time: 1300 Recorded By: CL/GW
Weather: SUNNY, 70° Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" REDI-FLO SUB PUMP
Casing Diameter: 4" Purge Rate: 350 ML/MIN
Total Depth: 160 Total Volume Purged:
Depth to Water: 89.62 Pump Intake Depth: 155
Water Column: Pump on: 1100 Off: 1300
Gallons/Foot: 0.65 Parameters Sampled: SEE COC
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:45	350			034	6.61	340	23.3		0.8	
12:50	↓		51.8	034	6.61	330	23.9		0.8	
12:55	↓	↓	47.0	038	6.60	330	23.9	89.70	0.8	

Well Secure: YES
Color: YELLOWISH TINT
Odor: NONE

Purge Water Disposal: IRM
Turbidity(qualitative): CLEAR
Other (OVA, HNU,etc.): 0.0 PPM

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 17 GL
Date: 5/4/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN >70° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI PUL
Casing Diameter: _____ Purge Rate: 400 ml/MIN
Total Depth: _____ Total Volume Purged: 8g
Depth to Water: 98.49 Pump Intake Depth: 5' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
5:00				126	6.04	340	16.6	98.77	2.8	
25				142	6.01	341	17.2		1.9	
30				147	6.01	342	17.2		1.8	
35				148	6.00	348	17.1		1.6	
40				149	5.99	349	17.3		1.6	
45				149	5.97	351	17.6		1.6	
50				149	5.97	351	17.8	98.86	1.5	
55				150	5.96	351	17.9		1.9	
4 00				151	5.96	351	17.9		1.4	
05				152	5.95	351	18.0		1.2	
10				153	5.94	351	17.9		1.3	
15				154	5.94	351	17.9	98.79	1.3	
4120			4.15	154	5.94	352	17.9	8'	1.3	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): _____
Odor: NONE Other (OVA, HNU,etc.): 33.9 → 0.0 AFTER 5 MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 18GL
Date: 5/4/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 65° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: REDI FLO
Casing Diameter: Purge Rate: 400 ml/MIN
Total Depth: Total Volume Purged:
Depth to Water: 110.46 Pump Intake Depth: 10' FROM BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1100				156	6.23	303	18.6	110.46	5.9	
05				181	6.11	299	18.7		5.8	
10				190	6.06	279	19.1		5.1	
15				180	6.06	280	19.2		5.7	
20				–	–	–	–		–	
25				174	6.20	289	20.2	110.56	6.8	
30				176	6.05	292	21.0		5.7	
35				176	6.04	294	21.2		5.6	
40				179	6.04	292	21.4		5.5	
45				180	6.04	298	21.4		5.5	
50				–	–	–	–		–	
55				184	6.03	302	21.4	110.97	5.4	
1200			11.85	181	6.04	302	21.6		5.6	

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 18 ML
Date: 5/4/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 70° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: BE BLADDER
Casing Diameter: Purge Rate: 450 ml/MIN
Total Depth: Total Volume Purged: 7 g
Depth to Water: 109.77 Pump Intake Depth: 10' FROM BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1210				185	6.58	180	20.5	109.77	5.1	
15				188	6.65	191	19.0		5.6	
20				107	6.64	211	18.1		8.5	
25				-79	6.57	251	18.6		9.8	
30				-70	6.42	251	19.1		8.5	
35				61	6.21	233	19.3		8.8	
40				102	6.21	230	19.3		8.2	
45				114	6.26	230	19.3		8.3	
50				133	6.30	229	18.8		8.9	
55				146	6.30	232	19.3	109.84	8.9	
100				154	6.28	237	19.5		9.0	
05				162	6.28	238	19.6		8.9	
10		22.46		167	6.24	240	18.6		8.8	

Well Secure:
Color: CLOUDY → CLEAR
Odor: SLIGHT SWAMPY
Purge Water Disposal:
Turbidity(qualitative):
Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 22ML
Date: 5/4/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 60° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: BLADDER
Casing Diameter: Purge Rate: 400 ML/MIN
Total Depth: Total Volume Purged: 7g
Depth to Water: 94.44 Pump Intake Depth 5' FROM BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (umhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:10				184	6.58	200	14.5	94.44	8.4	
15				178	6.96	195	14.C		9.0	
20				180	6.66	188	14.9		9.8	
25				189	6.52	190	15.1		9.5	
30				196	6.51	198	15.3	94.68	9.2	
35				201	6.53	200	15.5		7.9	
40				194	6.73	208	15.8		6.1	
45				—	—	—	—		—	
50				191	6.71	211	15.8	94.57	5.7	
55				196	6.63	212	15.8		6.1	
10 00				190	6.59	211	15.9		5.2	
05				191	6.56	208	16.0		5.0	
10				191	6.[illegible]52	202	16.0		5.0	
15			14.42	192	6.51	201	16.0	94.54	5.0	

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 0000 4 Well ID: 23 MI
Date: 5/15/00 Sampled By: CH/GW
Sampling Time: 1610 Recorded By: CH/GW
Weather: SUNNY, 70° Coded Replicate No.: —

WELL IMFORMATION

Casing Material: PVC Purge Method: 2" PROP-FLO SUB pump
Casing Diameter: 2" Purge Rate: 500 mL/MIN
Total Depth: 212 Total Volume Purged:
Depth to Water: 98.05 Pump Intake Depth: 207
Water Column: Pump on: 1450 Off: 1610
Gallons/Foot: 0.16 Parameters Sampled: SEE COC
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1450	500			80	6.57	260	16.4	98.05	5.7	
1455				114	6.15	245	17.1		3.2	
1500				121	6.14	245	17.5	98.15	3.2	
1505				125	6.12	250	17.7		3.3	
1510				128	6.10	250	18.4		3.3	
1515				133	6.09	250	19.0		3.9	
1520				137	6.09	260	19.6		4.0	
1525				141	6.09	260	19.7		4.0	
1530				146	6.09	260	20.0		4.2	
1535				150	6.08	260	20.2		4.3	
1540				152	6.08	260	20.2		4.3	
1545				155	6.10	260	20.1		4.4	
1550			117.9	157	6.09	250	20.0		4.4	
1555			107.6	158	6.09	252	20.0	98.10	4.4	
1600			100.0	160	6.09	255	19.9		4.3	
1605			93.2	161	6.09	255	19.8		4.3	
1610			103							
			TURBIDITY WITH SAMPLE 60.1							

Well Secure: YES Purge Water Disposal: IRM
Color: Turbidity(qualitative): TURBID
Odor: MODERATE Other (OVA, HNU,etc.): 0.0 ppm

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00004 Well ID: 25 MW
Date: 5/3/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 70° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: REDI FLO
Casing Diameter: Purge Rate: 450 ml/min
Total Depth: Total Volume Purged: 15 g
Depth to Water: 94.23 Pump Intake Depth 5' ABOVE BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1330			7200	208	6.06	291	17.9	94.23	3.5	
35				208	6.04	288	19.7		3.7	
40			>200	205	6.04	282	19.6		3.8	
45				204	6.04	282	19.6		3.8	
50				202	6.04	281	19.2		3.7	
55				193	6.04	270	18.5	94.21	4.0	
400										
05				190	6.20	274	19.0	94.37	6.4	
10				188	6.08	269	17.8		5.7	
15			99.8	155	6.07	270	19.4		4.9	
20			72.5	164	6.05	277	19.9		4.6	
25				171	6.04	279	20.2		4.5	
30				177	6.05	280	20.3		4.1	
35				182	6.04	280	20.1		4.1	
40										
45			58.0	183	6.05	280	19.8		4.1	
50			40.2	181	6.05	280	19.9		4.1	

Well Secure: Purge Water Disposal:
Color: COLORLESS Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): 4.4 AFTER 5 MIN 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 26 M1
Date: 5/9/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: SUN 90° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: REDI FLO
Casing Diameter: Purge Rate: 400 ml/min
Total Depth: Total Volume Purged: 7
Depth to Water: 88.53 Pump Intake Depth: 5' FROM BOTTOM
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3 00	400			165	608	328	22.9	88.53	1.6	
05				171	6.06	320	22.8		1.1	
10				175	6.05	320	21.7		1.3	
15				167	6.06	310	21.5		1.7	
20				156	6.05	310	21.3		1.7	
25				150	6.06	309	21.2		2.0	
30				149	6.05	310	21.4		2.1	
35				149	6.05	310	21.2		2.3	
40				149	6.04	309	21.1		2.3	
45				149	6.04	308	21.2		2.6	
50				150	6.05	305	21.0		2.8	
55				151	6.04	300	19.9	89.03	2.9	
4 00	~~350~~ 300			153	6.04	300	20.0	89.07	3.0	
05				154	6.03	301	21.4	88.74	3.0	
10				154	6.03	302	21.6	88.69	3.0	

Well Secure:
Color: CLR
Odor:
Purge Water Disposal:
Turbidity(qualitative):
Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 28GL
Date: 5/5/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN/CLOS 70° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI FLO
Casing Diameter: _____ Purge Rate: 400ML/MIN
Total Depth: _____ Total Volume Purged: 9g
Depth to Water: 94.53 Pump Intake Depth: 5' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
1030				190	6.10	431	21.7	94.53	1.9	
35				190	6.08	440	21.4		1.2	
40				147	6.07	442	22.1		0.8	
45				146	6.07	451	23.2		0.8	
50				145	6.06	461	23.5		0.8	
55				145	6.06	470	23.4		0.8	
1100				144	6.06	478	23.9		0.7	
05				143	6.06	479	23.9	94.53	0.7	
10				143	6.06	480	24.4		0.7	
15				~~145~~ —	—	~~500+~~	—		—	
20				145	—	500+	—		0.8	Δ BATTERY IN PH
25				150	6.08	600	21.8		0.8	
30			10.2	144	6.08	670	23.5		0.9	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): _____
Odor: SLIGHT Other (OVA, HNU,etc.): 9.5 TO 0.0 IN 5 MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0013 Task: 00004 Well ID: 28 MI
Date: 5/5/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: MOSTLY CLOUDY 65° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI FLO
Casing Diameter: _____ Purge Rate: 400 ml/MIN
Total Depth: _____ Total Volume Purged: 12 q
Depth to Water: 94.81 Pump Intake Depth: 5' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
~~840~~				~~120~~		~~249~~		~~94.81~~		
845				129	6.41	245	18.9	94.81	1.8	
50				135	6.24	243	19.9		1.2	
55				148	6.10	251	20.0		2.1	
900				151	6.07	249	19.9		2.0	
05				143	6.06	262	20.3		2.1	
10				—	—	—	—		—	
15				147	6.05	275	21.6	94.93	2.5	
20				151	6.05	280	21.7		2.3	
25				154	6.05	281	21.5		2.2	
30				156	6.05	280	21.4		2.2	
35				—	—	—	—		—	
40				160	6.04	285	21.3		2.2	
945				161	6.04	280	21.4		2.3	
50			32.0	162	6.04	277	21.4		2.3	

Well Secure: _____
Color: CLEAN
Odor: —

Purge Water Disposal: _____
Turbidity(qualitative): _____
Other (OVA, HNU,etc.): 13.5 TO 0.0 IN 5MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002.00005 Task: _____ Well ID: 2 91
Date: 5/8/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN 98° Coded Replicate No.: _____

SAMPLE RELEASED WARM- RESAMPLED 5-11-00

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI-FLO
Casing Diameter: _____ Purge Rate: 450 ml/min
Total Depth: _____ Total Volume Purged: 7g
Depth to Water: 101.02 Pump Intake Depth: 5' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2:10	400			93	6.59	211	24.2	101.02	1.6	
15	450			68	6.52	199	22.7		1.1	
20				64	6.52	107	22.8		1.1	
25				54	6.52	220	23.1		0.9	
30				55	6.54	278	23.1		1.0	
35				61	6.63	428	23.9		1.1	
40				70	6.65	530	23.8		1.3	
45				77	6.66	690	23.8	110.51	1.4	
50				87	6.67	700	23.9		1.6	
55				92	6.65	700	24.0	110.68	1.8	
300	300			95	6.64	690	24.4		1.8	
05				104	6.62	700	24.1		1.7	
3:10			21.4	106	6.62	700	24.0	110.13	1.8	
3 15				109	6.61	700	24.1	110.15	2.0	
20				109	6.61	700	24.2		2.0	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 29 GL
Date: 5/11/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN >50° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REOI FLO
Casing Diameter: _____ Purge Rate: 500 ml/MIN
Total Depth: _____ Total Volume Purged: 7g
Depth to Water: ~~100.97~~ 110.97 Pump Intake Depth: 5' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
355				170	6.26	284	18.5	~~100.97~~	2.9	
400				175	6.59	425	18.7	110.97	1.8	
05				160	6.60	445	19.2		1.2	
10				150	6.63	457	19.4		1.1	
15				129	6.69	462	20.0		1.0	
20				124	6.70	472	20.5		1.2	
25				117	6.72	481	20.7	110.76	1.7	
30				121	6.72	495	20.7		1.7	
35				122	6.69	640	20.8	110.63	1.9	
40				126	6.67	610	21.0		2.1	
45				128	6.65	640	21.0	110.59	2.1	
50				130	6.64	620	21.1		2.1	
55			23	132	6.63	650	21.2	110.57	2.3	

Well Secure: _____ Purge Water Disposal: _____
Color: CLR Turbidity(qualitative): _____
Odor: SLIGHT Other (OVA, HNU,etc.): 5.7 TO 0.0 IN 5 MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002 Task: 00004 Well ID: 29 MI
Date: 5/8/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: Sun 95° Coded Replicate No.: _____

SAMPLE RECEIVED WARM - RESAMPLED 5-11

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI-FLO
Casing Diameter: _____ Purge Rate: 425 ml/min
Total Depth: _____ Total Volume Purged: 2.5 g
Depth to Water: 102.40 Pump Intake Depth: 5' OFF BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:30				147	5.85	311	25.7	102.40	2.1	
35				144	5.90	319	26.1		1.8	
40				149	5.90	320	26.2		1.9	
45				152	5.90	321	25.8		2.0	
50				153	5.91	303	24.5		2.2	
55				149	-	302	23.5		2.5	
1 00				149	-	301	23.6	102.47	2.5	
05				150	5.90	302	23.6		2.5	
10				153	5.92	302	23.5		2.6	
15				-	-	-	?		-	
20				158	5.91	305	24.0	102.48	2.5	
25				157	5.91	300	24.1		2.7	
30			12.5	159	5.92	302	24.3		2.7	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): 55.6 TO 0.0 > 5 MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0002.00004 Task: _____ Well ID: 29 - GL MI
Date: 5/11/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN 75° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI FLO
Casing Diameter: _____ Purge Rate: 350 ml/MIN
Total Depth: _____ Total Volume Purged: 8g
Depth to Water: 102.30 Pump Intake Depth: 5' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2 30				179	6.46	320	20.4	102.30	4.5	
35				177	6.09	302	22.1		3.1	
40				174	6.08	301	22.3		3.1	
45				170	6.06	291	21.2		3.1	
50				168	6.06	284	21.0		3.0	
55				164	6.05	282	21.2	102.34	3.0	
300				162	6.05	290	21.4		2.9	
05				161	6.05	290	20.7		2.9	
10				159	6.05	290	20.9		2.9	
15				159	6.05	290	20.7		2.9	
20				159	6.05	289	20.5		2.9	
25				158	6.05	290	20.2		2.8	
30			30.2	159	6.04	288	19.8		3.0	
35										

Well Secure: _____ Purge Water Disposal: 2?
Color: SL TURBID → CLR Turbidity(qualitative): _____
Odor: MODERATE Other (OVA, HNU,etc.): 23.7 → 20.0 IN 5 MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 35 GL
Date: 5/9/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN 85° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI-FLO
Casing Diameter: _____ Purge Rate: 300 ml/min
Total Depth: _____ Total Volume Purged: _____
Depth to Water: 87.25 Pump Intake Depth: 10' From Bottom
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
455				-005	6.52	470	26.3	87.25	0.8	
500				-015	6.18	485	26.5		0.9	
05				-012	6.29	680	26.3		0.5	
10				000	6.20	690	26.8		0.8	
15				004	6.17	700	27.2		0.8	
20				005	6.16	650	27.6		0.8	
25				005	6.15	670	27.7		0.8	
30				006	6.14	680	27.7	87.44	0.7	
35				007	6.12	670	27.7		0.7	
40				008	6.12	680	27.7		0.6	
45				009	6.11	680	27.8		0.7	
50				010	6.10	670	27.6	87.44	0.7	
55				010	6.10	670	27.6		0.7	
600										

Well Secure: _____
Color: CLR
Odor: _____

Purge Water Disposal: _____
Turbidity(qualitative): _____
Other (OVA, HNU,etc.): <1.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 36 GL
Date: 5/9/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: SUN 90° Coded Replicate No.: 40 GL

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI Flo
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: 32 gl
Depth to Water: 92.81 Pump Intake Depth: 10' FROM BOTTOM
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
~~8~~ 40	1300		>200	100	6.16	190	18.4	92.81	~~8.1~~	
45			>200	121	6.19	129	17.1		8.2	
50			150	~~144~~ 139	6.21	180	16.9		7.9	
55			100	144	6.24	182	16.8		7.7	
900			90	147	6.25	172	16.7		7.7	
05			56	150	6.25	171	16.8		7.3	
10			39	152	6.26	170	16.8	93.48	7.2	
15	500		31	154	6.26	172	16.8		7.3	
20				157	6.26	173	16.9		7.1	
25				157	6.28	182	18.7		6.1	
30				158	6.28	185	19.3		6.9	
35	400			158	6.29	186	19.8			
40			18.7	158	6.29	189	20.1		5.8	
45				—	—	—	—		—	
50				158	6.30	189	20.8		5.7	
55			15.6	158	6.30	190	21.1		5.7	
1000										
05			15.3	160	6.30	191	21.4		5.4	
10										
15				161	6.30	199	21.6		5.1	
20			9.9	160	6.30	199	21.6		5.3	

Well Secure: _____ Purge Water Disposal: _____
Color: _____ Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 36GL (2)
Date: 5/9/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: TM
Weather: Sun 90° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: _____
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: _____
Depth to Water: _____ Pump Intake Depth: _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10 23	200									
1030				161	6.31	199	22.1		5.5	
35			7.3	162	6.31	198	22.2	92.94	5.5	
40										
45				165	6.30	200	22.2		5.2	
50	400									
55				172	6.32	201	24.1		5.0	
1100										
05				170	6.30	199	21.7		5.7	
10				160	6.30	200	21.6		6.0	
15				151	6.30	200	21.6		6.1	
20										
25	400		9.0	160	6.30	199	20.7		6.1	
30				164	6.30	196	20.7		6.1	
35			5.0	169	6.29	190	20.9	93.06	6.1	
40				172	6.29	190	21.1		6.1	
45				173	6.29	190	21.1		6.1	
50										

Well Secure: _____ Purge Water Disposal: _____
Color: Tubid - 2 CLR Turbidity(qualitative): _____
Odor: _____ Other (OVA, HNU,etc.): _____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 37 MW
Date: 5/10/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: CLDY, LT. RAIN 55° Coded Replicate No.: REP-3

WELL IMFORMATION

Casing Material: Purge Method: REDI FLO
Casing Diameter: Purge Rate: 400 ml/min
Total Depth: Total Volume Purged: 6g
Depth to Water: 140.11 Pump Intake Depth: 5' From Bottom
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
2 40				174	6.45	192	14.2	140.15	4.4	
45				188	6.31	198	14.6		4.6	
50				188	6.26	202	14.6		4.8	
55				184	6.25	205	14.5		4.8	
300				187	6.25	207	14.4	140.11	4.8	
05				186	6.25	207	14.4		4.9	
10				185	6.25	207	14.4		4.9	
15				183	6.23	206	14.3		4.9	
20				181	6.23	202	14.4		4.9	
25				179	6.23	206	14.4	140.08	4.9	
30				176	6.23	205	14.4		4.9	
35			43.4	175	6.23	205	14.4		4.8	
40				175	6.23	205	14.4	140.09	4.8	

Well Secure:
Color: CLEAR SL TURBID TO CLR
Odor:
Purge Water Disposal:
Turbidity(qualitative):
Other (OVA, HNU,etc.): 19.2 -> 0 IN 5 MIN

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 37MU
Date: 4/18/00 Sampled By: GW/TM
Sampling Time: Recorded By:
Weather: Cloudy 40° Coded Replicate No.:

RESAMPLED 5-10-00

WELL IMFORMATION

Casing Material: Purge Method:
Casing Diameter: Purge Rate:
Total Depth: Total Volume Purged: 12g
Depth to Water: 140.23 Pump Intake Depth
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

WELL NOT SAMPLED PUMP FAILURE

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:10				191	6.23	~~180~~	11.3	~~140.28~~	4.8	
15				194	6.15	171	13.3		4.8	
20				193	6.13	171	132		4.9	
25				193	6.13	173	13.6	140.22	4.8	
30				186	6.13	180	14.5		4.7	
35				183	6.12	~~183~~ 187	15.0		4.8	
40				182	6.11	190	15.3		4.6	
45				178	6.17	182	12.9		4.8	
50				182	6.12	182	14.3	140.28	4.7	
55				182	6.13	190	14.4		4.4	
11:00				180	6.11	194	15.5		4.7	
05				181	6.11	193	15.3		4.6	
~~10~~	11:45			206		158			6.4	PUMP BREAK

gf NOT SAMPLED

Well Secure: Purge Water Disposal:
Color: Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.): 12ppm After 5 min <1

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 37- MW
Date: 4/18/00 Sampled By: CGW/TM
Sampling Time: _____ Recorded By: _____
Weather: Cloudy 35° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: Bladder Pump
Casing Diameter: _____ Purge Rate: 450 ml/min
Total Depth: _____ Total Volume Purged: 6 g
Depth to Water: 140.27 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
8:40				201	6.30	130	10.5	140.27	5.2	
45				196	6.29	128	10.1		4.9	
50				193	6.28	131	10.6		4.5	
55				192	6.28	134	9.8		4.5	
9:00				191	6.30	139	9.3	140.28	4.3	
05				-	-	-	-		-	
10				191	6.31	141	9.4		4.2	
15				190	6.32	142	9.3		4.1	
20				189	6.33	143	9.3		4.1	
25				189	6.31	165	11.7	140.39	5.1	Δ Flow Rate
30				188	6.35	~~160~~ 170	11.4		5.1	
35				188	6.32	170	11.7		5.5	
9:40				188	6.30	170	12.2		5.4	
45				188	6.30	170	12.8	140.69	5.5	

Well Secure: _____ Purge Water Disposal: _____
Color: Clear Turbidity(qualitative): _____
Odor: None Other (OVA, HNU,etc.): < 1

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N400/227.0012.0004 Task: 00004 Well ID: 37 MW
Date: 4/18/00 Sampled By: GW/TM
Sampling Time: _____ Recorded By: _____
Weather: Cloudy 40° Coded Replicate No.: REP-1

WELL IMFORMATION

Casing Material: _____ Purge Method: _____
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: 79
Depth to Water: 140.39 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:40				208	7.23	155	10.8	140.39	8.7	
45				210	7.23	189	10.7		2.3	
50				205	2.10	160	12.4		8.2	
55				206	6.82	139	12.7		2.9	
1:00				206	6.79	130	12.9		6.5	
05				154	8.86	127	13.1	140.39	4.8	
10				105	10.10	135	13.1		4.5	
15				100	10.39	141	13.3		4.5	
20				91	10.50	143	13.3		4.4	
25				86	10.26	138	13.4		4.6	
30				89	10.15	134	13.3		4.6	
35				96	9.96	~~13.4~~ 132	13.4		4.9	
12:40				101	9.81	129	13.4	140.42	4.8	
45				105	9.68	129	13.4		5.0	
50				108	9.61	129	13.4		5.0	
55				111	9.48	125	13.4		5.0	
1:00				116	9.34	125	13.4		5.0	
			<50							

Well Secure: _____ Purge Water Disposal: 1
Color: COLORLESS Turbidity(qualitative): —
Odor: NONE Other (OVA, HNU,etc.): 4.2 ppm + 5 min

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 4 Event Well ID: 38-MU
Date: 4/20/00 Sampled By: TM/SW
Sampling Time: _____ Recorded By: TM
Weather: Partly Cloudy 55° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: REDI-FLOW
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: 20g
Depth to Water: 142.76 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
9:40				85	11.13	700	13.2	142.26	5.1	
45				68	11.36	700	13.3		4.2	
50				"						
55				71	11.36	690	13.6		4.5	
10:06				68	11.35	680	13.8		4.4	
05				69	11.34	650	14.5		4.7	
10				63	11.34	680	14.1		4.2	
15				61	11.33	680	14.2	142.89	4.1	
20				59	11.33	680	14.3		4.1	
25				~~68~~	~~12.66~~					PUMP ↑
30				68	10.66	650	15.0		6.4	
35				74	10.65	640	15.9		5.7	
10:40			98.6	56	10.60	640	14.8		5.1	
45				51	9.98	660	15.8		4.9	
50				53	9.92	650	15.4		4.6	
55				56	9.79	640	15.3	142.98	4.5	
11:00			73.0	63	9.67	650	15.6		4.9	
05				72	9.54	650	15.8		4.9	
10										
15										
11:20										

Well Secure: _____ Purge Water Disposal: _____
Color: ~~Green~~ ~~Sand Colored~~ Milky White Turbidity(qualitative): Slight
Odor: None Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number:_____ Task:_____ Well ID: 38MU (pg 2)

Date:_____ Sampled By:_____

Sampling Time:_____ Recorded By:_____

Weather:_____ Coded Replicate No.:_____

WELL IMFORMATION

Casing Material:_____ Purge Method:_____

Casing Diameter:_____ Purge Rate:_____

Total Depth:_____ Total Volume Purged:_____

Depth to Water:_____ Pump Intake Depth _____

Water Column:_____ Pump on:_____ Off: _____

Gallons/Foot:_____ Parameters Sampled: _____

Gallons in Well:_____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:25				72	9.36	680	16.5	149	6.2	
30			58	81	9.27	680	16.0	148.65	5.8	
11 35			80	82	9.36	680	15.8	148.37	5.9	
40			24	86	9.32	680	15.7		5.8	
45										
50										

Well Secure:_____ Purge Water Disposal:_____

Color:_____ Turbidity(qualitative):_____

Odor:_____ Other (OVA, HNU,etc.):_____

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012. Task: 00004 Well ID: 38 - MI
Date: 4/20/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: CLOUDY 50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: BLADDER
Casing Diameter: Purge Rate:
Total Depth: Total Volume Purged: 8g
Depth to Water: 149.38 Pump Intake Depth
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
8:30A			20	208	6.78	110	12.0	149.88	11.0	
35				203	6.75	110	12.6		10.9	
40				201	6.79	110	12.8		10.8	
45				199	6.83	100	12.9		10.6	
50				199	6.83	117	12.9		10.7	
55				194	6.85	104	12.9	149.38	10.7	
9:00				199	6.85	108	12.9		10.5	
05				199	6.86	106	12.9		10.6	
10				198	6.86	109	13.0		10.4	
15				197	6.88	109	13.0		10.4	
20				196	6.86	105	13.1		10.5	
25				196	6.86	109	13.1		10.4	
30			29.5	195	6.87	104	13.3		10.2	

Well Secure: Purge Water Disposal:
Color: CLEAR Turbidity(qualitative):
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 38 - ML
Date: 4/20/00 Sampled By: CJW/TM
Sampling Time: _____ Recorded By: TM
Weather: PTLY CLDY 55° Coded Replicate No.: _____

WELL IMFORMATION

Casing Material: _____ Purge Method: BLADDER
Casing Diameter: _____ Purge Rate: _____
Total Depth: _____ Total Volume Purged: 7.5 g
Depth to Water: 149.49 Pump Intake Depth _____
Water Column: _____ Pump on: _____ Off: _____
Gallons/Foot: _____ Parameters Sampled: _____
Gallons in Well: _____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
11:45				129	7.49	105	15.9	149.49	9.5	
50				141	7.10	108	14.7		10.5 10.3	
55				152	7.26	103	14.7		10.2	
12:00				147	7.12	106	15.6		9.1	
05										
10				150	7.12	109	16.1		8.4	
15				153	7.11	113	18.6		8.2	
20				159	7.01	118	20.0		7.3	
25				165	6.81	117	19.5		7.1	
30				178	6.54	109	17.8		11.4	INCR. PUMP
35				189	6.38	103	16.6		12.0	
40				195	6.32	100	15.7	149.85	8.6	
12:45				193	6.30	100	15.8		7.2	
50										
55				194	6.28	100	15.6		6.8	
1:00			11.2	196	6.28	100	15.1		6.6	

Well Secure: _____ Purge Water Disposal: _____
Color: CLEAR Turbidity(qualitative): —
Odor: ~~NONE~~ SLIGHT SWAMPY Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N400 1227.0012 Task: 00004 Well ID: 39-MU
Date: 4/19/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: CLOUDY 50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: REDI-FLO
Casing Diameter: Purge Rate:
Total Depth: Total Volume Purged: 6g
Depth to Water: 119.56 Pump Intake Depth
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
12:55				199	6.16	258	10.9	119.56	5.5	
1:00				210	6.13	212	11.1		4.3	
05				210	6.12	210	11.2		4.0	
10				210	6.10	221	11.4		4.0	
15				211	6.06	282	11.7		4.0	
20				209	6.05	290	11.9	119.61	4.0	
25				206	6.05	292	11.9		4.1	
1:30				205	6.05	293	11.9		4.2	
35				197	6.04	295	12.8		4.3	
40				183	6.04	299	12.2		4.3	
45				179	6.05	301	12.5	119.69	4.2	
50				174	6.04	305	12.8		4.2	
55			16.34	173	6.05	308	13.1		4.2	
2:00				172	6.05	309	13.1		4.2	
05										

Well Secure: Purge Water Disposal:
Color: COLORLESS Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: NY001227.0012 Task: 00004 Well ID: 39 MI
Date: 4/19/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: CLOUDY, LT DRIZZLE 45° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method: BLADDER PUMP
Casing Diameter: Purge Rate:
Total Depth: 312 Total Volume Purged: 12 g
Depth to Water: 119.46 Pump Intake Depth
Water Column: 193 Pump on: Off:
Gallons/Foot: Parameters Sampled: DO, pH, COND., REDOX
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
10:46A								119.46		
45				186	5.985	165	10.8		2.8	
50				192	5.98	189	11.1	119.51	3.1	
55				191	6.00	197	11.3		3.2	
11:00				189	6.00	197	11.3		3.2	
05				185	6.01	199	11.4		3.2	
10				184	6.01	199	11.4		3.2	
15				183	6.01	199	11.4		3.1	
20				183	6.02	199	11.5		3.1	
25				183	6.02	199	11.5	119.60	3.2	
30				185	6.02	200	11.6		3.2	
35				187	6.02	200	11.5		3.2	
40				188	6.03	200	11.6		3.2	
45			8.49	189	6.04	200	11.6	119.68	3.2	
50				190	6.03	200	11.7		3.3	
55										
12:00P										

Well Secure: Purge Water Disposal: G
Color: COLORLESS Turbidity(qualitative): CLEAR
Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

Project Number: N4001227.0012 Task: 00004 Well ID: 39 - ML
Date: 4/19/00 Sampled By: GW/TM
Sampling Time: Recorded By: TM
Weather: PTLY CLDY 50° Coded Replicate No.:

WELL IMFORMATION

Casing Material: Purge Method:
Casing Diameter: Purge Rate:
Total Depth: Total Volume Purged:
Depth to Water: 120.43 Pump Intake Depth
Water Column: Pump on: Off:
Gallons/Foot: Parameters Sampled:
Gallons in Well:

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
3:25				161	6.25	120	12.4	120.43	4.3	
30				199	6.17	118	12.7	1	3.6	
35				202	6.14	119	12.9		3.0	
40				205	6.05	112	12.2		2.9	
45				207	6.02	111	12.7		2.9	
50				211	6.00	111	12.6	120.50	2.9	
55				215	5.98	110	12.5		2.9	
4:00				218	5.97	110	12.9		3.0	
05				217	5.96	110	12.3		3.1	
10				215	5.96	110	12.3		3.1	
15				213	5.95	110	12.4		3.1	
20				212	5.94	110	12.4		3.1	
25			10.90?	211	5.94	110	12.4		3.1	
			200+							
35				213	5.94	112	12.4		2.9	
40				213	5.94	113	12.4	12.51	2.8	
45										
50				212	5.94	116	12.6		2.5	
55				212	5.94	118	12.1		2.4	
5:00				211	5.94	119	12.5		2.4	
05				211	5.94	119	12.4		2.3	

Well Secure: Purge Water Disposal:
Color: Turbidity(qualitative):
Odor: Other (OVA, HNU,etc.):

ARCADIS GERAGHTY & MILLER
Low-Flow Groundwater Sampling Log

1

Project Number:_____ Task:_____ Well ID: 39-ML PG 2

Date:_____ Sampled By:_____

Sampling Time:_____ Recorded By:_____

Weather:_____ Coded Replicate No.:_____

WELL IMFORMATION

Casing Material:_____ Purge Method:_____

Casing Diameter:_____ Purge Rate:_____

Total Depth:_____ Total Volume Purged: 18g

Depth to Water:_____ Pump Intake Depth _____

Water Column:_____ Pump on:_____ Off: _____

Gallons/Foot:_____ Parameters Sampled: _____

Gallons in Well:_____

FIELD PARAMETER MEASUREMENTS

Time	Rate (ml./min)	Gallons Purged	Turbidity (NTUs)	REDOX (mV)	pH (SI Units)	Conductivity (µmhos/cm)	Temp (°C)	Depth to Water	Diss. Oxygen	Comments
510				211	5.95	118	12.5		2.3	
15			98.0	211	5.95	119	12.5		2.2	
20			81.0	211	5.96	119	12.3		2.4	
25			67.4	211	5.96	119	12.4		2.3	
30			52.3	211	5.97	118	12.9		2.4	
35				212	5.96	119	12.4		2.4	
40			47.5	212	5.96	119	12.3	120.31	2.2	
45										

Well Secure:_____ Purge Water Disposal:_____

Color: COLORLESS Turbidity(qualitative): TURBID

Odor: NONE Other (OVA, HNU,etc.): 0.0

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LMC | Project No.: N90127.0012.00004 | Page: 1 of ____

Site Location: LAKE SUCCESS NY | Date: 8-1-00

Site/Well No.: POOL / Glen oaks | Replicate No.: ____ | Code No.: ____

Weather: DUMMY 75° | Sampling Time: Begin ____ End ____

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	210
Depth to Water (ft bmp)	~150
Water-Level Elevation (ft)	
Water Column in Well (ft)	60.
Casing Diameter/Type	4 (0.65)
Gallons in Well	40
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 12:50 end 1:00
Pumping Rate (gpm)	Q = ~ 30-40 GPM
Evacuation Method	

Field Parameters

Color	COLORLESS
Odor	NONE
Appearance	CLEAR
pH (s.u.)	6.01
Conductivity ~~(mS/cm)~~	
(µmhos/cm)	365
Turbidity (NTU)	
Temperature (°C)	17.9
Dissolved Oxygen (mg/L)	
Salinity (%)	
Sampling Method	
Remarks	

Constituents Sampled	Container Description	Number	Preservative
VOC + FREON 113			

Sampling Personnel: G. WOOSTMAN

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS GERAGHTY & MILLER

Water Sampling Log

Project: LMC | Project No. N4001227.0812.0000 | Page 1 of ____

Site Location: LAKE SUCCESS | Date: 8.30.00

Site/Well No.: POOL / GOLF OUTS | Replicate No. ____ | Code No. ____

Weather: CLEAR 80° | Sampling Time: Begin 3:00 End 3:45

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	~21000
Depth to Water (ft bmp)	~15000
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 3:15 end 3:40 3:35
Pumping Rate (gpm)	Q = 2406pm
Evacuation Method	

Field Parameters

Color	COLORLESS
Odor	NONE
Appearance	ODORLESS
pH (s.u.)	6.95
Conductivity (mS/cm)	
(µmhos/cm)	385
Turbidity (NTU)	
Temperature (°C)	22.9
Dissolved Oxygen (mg/L)	
Salinity (%)	
Sampling Method	
Remarks	

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel: G. WILLIAMS

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

DRAFT

Appendix H

1998 Data Validation Letter

Data Validation Services

120 Cobble Creek Road P. O. Box 208

North Creek, N. Y. 12853

Phone 518-251-4429

March 4, 1999

Rich Baldwin
H2M Group
575 Broad Hollow Rd.
Melville, NY 11747

RE: Validation of Lockheed Martin Site Data Packages
H2M Labs SDG Nos. LDE001 through LDE006

Dear Mr. Baldwin:

Review has been completed for the data packages generated by H2M Labs, pertaining to samples collected at the Lockheed Martin site. Seventy five aqueous samples and eight blind duplicates were processed for TCL volatiles and Freon 113 by NYSDEC ASP method 95-1. Field and trip blanks, and sample matrix spikes were also processed.

Data validation was performed in accordance with the NYSDEC RI/FS Validation Scope of Work, with guidance from the most current editions of the USEPA CLP National Functional Guidelines for Organic Data Review and the EPA Validation SOPs HW-6. The following items were reviewed:

* Data Completeness
* Custody Documentation
* Holding Times
* Surrogate Standard Recoveries
* Matrix Spike Recoveries
* Duplicate Correlations
* Preparation/Calibration Blanks
* Control Spike/Laboratory Control Samples
* Calibration Standards
* Instrument IDLs
* Method Compliance
* Sample Result Verification

Those items showing deficiencies are discussed in the following sections of this report. All others were found to be acceptable as outlined in the above-mentioned validation procedures, and as applicable for the methodology. Unless noted specifically in the following text, reported results are substantiated by the raw data, and generated in compliance with protocol requirements.

In summary, sample processing was primarily conducted with compliance to protocol requirements and with adherence to quality criteria. Minor qualifications to sample reported results were indicated in some instances, and are discussed in the following narrative. Corrections to some reported values have also been made, and are detailed below.

Resubmission communications, copies of the laboratory case narratives, and laboratory NYSDEC Sample Requirement and Analysis Summary Forms are attached to this narrative, and should be reviewed in conjunction with this report.

Data Completeness

Resubmission communications, and corrected report forms, are attached to this report.

Upon request, the date for transfer on the custody form number 10091 (SDG LDE001) was corrected from 10/11/98 to 10/14/98 (see attached communications). This correction should have been initialed and dated.

The sample noted on the chain-of-custody as MW-MI/L is MW-1MI/L.

No release signature was present on the chain-of-custody relating to two samples and a field blank in SDG LDE005. The laboratory noted this omission at sample receipt.

Sample MW-26GL was not listed on the Sample Requirement/Analysis summary forms in SDG LDE001.

Volatile Analyses

EDITS

The following sample results should be edited to be the results listed; the initially reported results were incorrect (due to transcription and/or calculation errors). These are reflected on corrected Forms 1, attached.:

Sample ID	Analyte	Edit/Concentration, ug/L	SDG No.
MW-11GL-DL	1,2-dichloroethene(total)	310	LDE003
MW-11MI	1,2-dichloroethene(total)	100	LDE003
MW-14MI	1,2-dichloroethene(total)	6 J	LDE004
MW-16ML	1,2-dichloroethene(total)	97	LDE004
TRIPBLK10/26/98	TIC at 18.57'	27 JN	LDE003

Samples MW-31GL, MW-31MI, and MW-32MI were also reported with incorrect values for 1,2-dichloroethene(total). The corrected values, which are one-half the originally reported, are now below the Instrument Detection Limit (IDL), and are therefore likely noise. The results for this analyte in those three samples should be edited to nondetection ("10 U").

The initial analyses of the following samples should have been reported with the laboratory "E" flag for 1,2-dichloro-ethene(total), to denote response exceeding the calibration range. Corrected Forms 1 are attached: MW-2MI, MW-11GL, and MW-1MI/L.

Values from dilution analyses ("-DL") should be used for those analytes initially flagged as "E" (exceeding calibration range prior to dilution). Unless noted specifically within this text, the results for analytes not initially flagged as "E" can be derived from the initial analyses. The above mentioned edits should be applied prior to performing these substitutions.

Samples which followed those exhibiting very high concentrations of target analytes should have been reanalysed to verify that detections of those analytes are not a result of carryover. This was not performed, and the data has been reviewed to determine the effect. In summary, the following sample analyte results should be edited as indicated. In some cases elevated detection limits are now reported, as the sample constituency below the reported levels (which were originally detections) is unknown.

Sample ID	Analyte	Edit
MW-28I	tetrachloroethene	J
MW-3ML	1,2-dichloroethene(total)	J
MW-5GU	1,2-dichloroethene(total)	10 U
MW-23GL	1,2-dichloroethene(total)	24 U
MW-23MI	1,2-dichloroethene(total)	J
MW-6GL	1,2-dichloroethene(total)	10 U
MW-18GL	trichloroethene	J
MW-17ML	all four detected compounds	use "-DL" values only
MW-30GL	1,2-dichloroethene(total)	10 U

Due to poor spectral correlation, the identification of the Tentatively Identified Compound (TIC) #2 reported for sample MW-1ML should be edited to "unknown", and the CAS number and "N" flag should be removed.

TICs identified as "CO2" are analysis artifacts, and are to be rejected as sample components.

HOLDING TIMES

The 1995 ASP holding time of 10 days from laboratory sample receipt to analysis was required. All samples were processed within that holding time. However, due to delays in shipment of the two samples in SDG LDE006 (shipped three days after collection, received on the fourth day), technical holding times were violated, and losses of target analytes may have occurred. Therefore, the reported results for samples MW-33GL and BAKER are to be considered estimated, possibly biased low, and all analyte results qualified with the "J" qualifier.

SURROGATE SYSTEM MONITORING COMPOUNDS

Most surrogate recoveries fell within the required ranges. However, the initial analyses of seven samples from SDG LDE001 showed elevated recoveries for d8-toluene (113% to 130%). The associated method blank showed similar outlying response, so matrix effect is not indicated. Due to the elevated surrogate responses, the following detected sample analyte values should be considered estimated ("J" qualifier), with a possible slight high bias. Those already qualified as estimated are not listed:

Sample ID	Analytes
MW-4MI	trichloroethene, tetrachloroethene, and Freon 113
MW-4GL	trichloroethene and tetrachloroethene
MW-7GL	trichloroethene, tetrachloroethene, and Freon 113
MW-7ML	Freon 113
MW-25I	trichloroethene and Freon 113
MW-28GL	trichloroethene, tetrachloroethene, and Freon 113
MW-28MI	trichloroethene, tetrachloroethene, and Freon 113

Some of the above listed values are also considered estimated due to other quality issues discussed below.

Sample MW-5GL produced a slightly elevated recovery for d8-toluene (111%) in the initial analysis. The reanalysis ("-RE") was acceptable, and results for this sample should be derived from that run only.

DATA ANOMALIES

The following samples showed poor correlation between the initial analysis values of detected compounds, and those determined from dilution analyses. The reason for these variances are not known, but is likely related to losses during reprocessing. The data should be qualified as follows:

For the following samples, the initial results (not "-DL") should be used exclusively, but with all detected values which are flagged by the laboratory as "E" should be qualified as estimated ("J" qualifier);

MW-4GL, MW-4MI, MW-7GL, MW-25MI, MW-28MI, BD-6, MW-18GL, MW-22ML

The laboratory noted in the narrative for SDG LDE005 that a third analysis of MW-17GL produced lower values than the previous two. Because only two vials were provided, the lower values may have resulted from using a previously opened vial. Therefore, the third analysis ("-DL2") should not be used. The dilution analysis ("-DL") results should be used for the four compounds which were initially flagged as "E" in the initial analysis, but the dilution values should also be qualified as estimated ("J"), because the values are still above the calibration range (and flagged "E").

MATRIX SPIKES and SPIKED BLANKS

Matrix spikes were performed on MW-25GL, MW-5GL, MW-1MI-DL, MW-18ML-DL, MW-16GL, MW-35GL-DL, and MW-30ML.

All accuracy were acceptable with the exception of the recoveries of trichloroethene in MW-18ML-DL (64% and 68%; below the recommended limit of 71%). Results for trichloroethene in MW-18ML should therefore be considered slightly estimated ("J").

All precision values were acceptable, with the exception of the duplicate correlations for two compounds in MW-5GL, and for all five compounds in MW-30ML. The surrogates of the spikes of MW-30ML do not reflect similarly, and therefore the outlying correlations are likely due to solution/spiking variances. The samples MW-5GL and MW-30ML do not show detection of these compounds, and reported results are therefore unaffected.

No matrix spikes were associated with the two samples in SDG LDE006. These sample results are qualified due to holding time exceedences.

Detected levels of nonspiked analytes showed good correlation between the samples and their matrix spikes.

FIELD DUPLICATES

Blind duplicates were performed on samples MW-8ML, MW-23MI, MW-10GL, RW-2, MW-1GU, MW-22ML, MW-13ML, and MW-30MI. Correlations were very good.

STANDARDS

Calibration standards were compliant with protocol requirements, with the exception of that of 11/17/98 in SDG LDE005, which had an excessive number of variances exceeding 25%D.

Standard responses were evaluated for outlying (<25%D) values which effect sample reported results. Those showing elevated responses with associated sample detections, and those showing low responses of significance to lend question to the reported detection limits are listed below. Instrument sensitivity (chromatographic and spectral quality) and IDLs (instrument detection limits) were considered in this evaluation. Those analytes already qualified as estimated are not reiterated below. The following qualifications are recommended:

acetone in MW-1MI, MW-5ML, and MW-6GL
1,2-dichloroethene(total) in MW-17GL-DL and MW-17ML-DL
trichloroethene in MW-33ML

BLANKS

Some of the field and trip blanks showed detection of a substituted phenolic Tentatively Identified Compound (TIC) that was also detected in some of the project samples. Therefore that TIC, which elutes at about 18.5', should be rejected as a sample component.

Methylene chloride was detected at a low level in a trip blank. No associated samples reported detection of that analyte.

Please do not hesitate to contact me if questions or comments arise during your review of this report.

Very truly yours,

Judy Harry

Data Validation Services

Cobble Creek Road P. O. Box 208
North Creek, NY 12853
Phone and Fax (518) 251-4429

February 25, 1999

Joanne Duignan
H2M Labs
575 Broad Hollow Rd
Melville, NY 11747

RE: H2M Group --Lockheed Martin Project
H2M SDG Nos. LDE001-LDE006

Dear Joanne:

Review is in progress for the data packages pertaining to the above-mentioned site. The following items are needed prior to completion of the validation report:

1. Please provide documentation (log-in sheets or signed statement) to show whether the volatile vials were preserved with acid prior to sample collection.
2. The sample report Forms 1A for MW-11GL-DL and MW-11MI (SDG LDE003) do not report detected 1,2-dichloroethene(total). Please provide corrected Forms 1A.
3. Please provide a corrected Form 1E for the Trip Blank 10/26 in SDG LDE003, to include the TIC at 18/57'.
4. Please provide a corrected Form 1A for the initial analysis of samples MW-2MI (SDG LDE002), MW11GL (SDG LDE003), and MW-1MI/L (SDG LDE003) to show the "E" flag for 1,2-dichloroethene(total).
5. Please clarify the date of the second transfer on custody No. 10091 (SDG LDE001 pg. A0009) Dates of 10/14/98 and 10/11/98 are both noted.

An expedited response is important to meet project deadlines. Thank you for your prompt attention to this request; please call me if you wish to discuss any of these issues. Please also copy Rich Baldwin at H2M with all communications.

Very truly yours,

Judy Harry

Data Validation Services

Cobble Creek Road P. O. Box 208
North Creek, NY 12853
Phone and Fax (518) 251-4429

March 1, 1999

Joanne Duignan
H2M Labs
575 Broad Hollow Rd
Melville, NY 11747

RE: H2M Group --Lockheed Martin Project
H2M SDG Nos. LDE004 and LDE005

Dear Joanne:

In addition to the items requested on 2-25-99, the following additional resubmissions are needed for the project noted above:

1. The daily response factor for 1,2-dichloroethene(total) was incorrect for standards analysed 11-4-98 and 11-5-98 (the area for cis was used). The factor, and the subsequently reported detected values, are off by about a factor of 2. I have reviewed the associated sample results, and find that the following Forms 1A need to be corrected. Only those with an effect on final validated data are listed. Nondetects and those with resultant values below the IDL are not impacted. Please provide corrected forms for:
   MW-14I and MW-16ML (both in SDG LDE004).

2. My page 105 is missing from the volume for LDE004. Please forward a copy (Form 1F for MW-16GL).

3. Please discuss why samples with low level detections of the analytes which showed high concentrations in the previous samples were not reanalysed to verify no carryover.

An expedited response is important to meet project deadlines. Thank you for your prompt attention to this request; please call me if you wish to discuss any of these issues. Please also copy Rich Baldwin at H2M with all communications.

Very truly yours,

Judy Harry

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW-2MI

Lab Name: H2M LABS, INC Contract:

Lab Code: 10678 Case No.: LDE002 SAS No.: SDG No.: LDE002

Matrix: (soil/water) WATER Lab Sample ID: 9834048

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P10867.D

Level: (low/med) LOW Date Received: 10/21/98

% Moisture, not dec. Date Analyzed: 10/28/98

GC Column: RTX502. ID. 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1 Dichloroethane	280	E
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	31	
79-01-6	Trichloroethene	10	U
71-43-2	Benzene	10	U
124-48-1	Dibromochloromethane	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	14	
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	3	J
76-13-1	1,1,2- Trichlorotrifluoroethane(f113		

3/3/99

1A

EPA SAMPLE NO

VOLATILE ORGANICS ANALYSIS DATA SHEET

MW-1MI/L

Lab Name: H2M LABS, INC. Contract: LDE003

Lab Code: 10478 Case No.: _____ SAS No.: _____ SDG No.: LDE003

Matrix: (soil/water) WATER Lab Sample ID: 9834389

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P10913.D

Level: (low/med) LOW Date Received: 10/23/98

% Moisture: not dec. _____ Date Analyzed: 10/30/98

GC Column: RTX502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	3	J
75-34-4	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	250	E
67-66-3	Chloroform	10	U
107-06-2	1,2 Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	150	
71-43-2	Benzene	10	U
124-48-1	Dibromochloromethane	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	67	
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U
76-13-1	1,1,2- Trichlorotrifluoroethane(f113)	26	

10/31/98

03/03/1999 16:31 FROM 5164208436 TO DATA VALIDATION SERVICES P.02

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO

MW-11GL

Lab Name: H2M LABS, INC. Contract: LDE003

Lab Code: 10478 Case No.: _____ SAS No.: _____ SDG No.: LDE003

Matrix: (soil/water) WATER Lab Sample ID: 9834057

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P10901.D

Level: (low/med) LOW Date Received: 10/21/98

% Moisture: not dec. _____ Date Analyzed: 10/30/98

GC Column: RTX502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-4	1,1-Dichloroethane	330	E
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	72	
79-01-6	Trichloroethene	10	U
71-43-2	Benzene	10	U
124-48-1	Dibromochloromethane	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	66	
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	29	
76-13-1	1,1,2- Trichlorotrifluoroethane(f113)		

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW-11GLDL

Lab Name: H2M LABS, INC. Contract: LDE003

Lab Code: 10478 Case No.: SAS No.: SDG No.: LDE003

Matrix: (soil/water) WATER Lab Sample ID: 9834057DL

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P10916.D

Level: (low/med) LOW Date Received: 10/21/98

% Moisture: not dec Date Analyzed: 10/30/98

GC Column: RTX502. ID: 0.53 (mm) Dilution Factor: 2.0

Soil Extract Volume (uL) Soil Aliquot Volume: (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	20	U
74-83-9	Bromomethane	20	U
75-01-4	Vinyl Chloride	20	U
75-00-3	Chloroethane	20	U
75-09-2	Methylene Chloride	20	U
67-64-1	Acetone	20	U
75-15-0	Carbon Disulfide	20	U
75-35-4	1,1-Dichloroethene	20	U
75-34-4	1,1-Dichloroethane	310	D
540-59-0	1,2-Dichloroethene (total)	20	U
67-66-3	Chloroform	20	U
107-06-2	1,2-Dichloroethane	20	U
78-93-3	2-Butanone	20	U
71-55-6	1,1,1-Trichloroethane	20	U
56-23-5	Carbon Tetrachloride	20	U
75-27-4	Bromodichloromethane	20	U
78-87-5	1,2-Dichloropropane	20	U
10061-01-5	cis-1,3-Dichloropropene	64	D
79-01-6	Trichloroethene	20	U
71-43-2	Benzene	20	U
124-48-1	Dibromochloromethane	20	U
10061-02-6	trans-1,3-Dichloropropene	20	U
79-00-5	1,1,2-Trichloroethane	20	U
75-25-2	Bromoform	20	U
108-10-1	4-Methyl-2-Pentanone	20	U
591-78-6	2-Hexanone	58	D
127-18-4	Tetrachloroethene	20	U
79-34-5	1,1,2,2-Tetrachloroethane	20	U
108-88-3	Toluene	20	U
108-90-7	Chlorobenzene	20	U
100-41-4	Ethylbenzene	20	U
100-42-5	Styrene	20	U
1330-20-7	Xylene (total)	23	D
76-13-1	1,1,2- Trichlorotrifluoroethane(f1		

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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW-11MI

Lab Name: H2M LABS, INC. Contract: LDE003

Lab Code: 10478 Case No.: SAS No.: SDG No.: LDE003

Matrix: (soil/water) WATER Lab Sample ID: 9834058

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P10902.D

Level: (low/med) LOW Date Received: 10/21/98

% Moisture: not dec. Date Analyzed: 10/30/98

GC Column: RTX502 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume (uL) Soil Aliquot Volume: (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-4	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	100	
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	17	
71-43-2	Benzene	10	U
124-48-1	Dibromochloromethane	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	16	
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U
76-13-1	1,1,2- Trichlorotrifluoroethane(f113)	3	J

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW-14MI

Lab Name: H2M LABS, INC. Contract: _____

Lab Code: 10478 Case No.: _____ SAS No.: _____ SDG No.: LDE004

Matrix: (soil/water) WATER Lab Sample ID: 9835584

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P11003.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. _____ Date Analyzed: 11/06/98

GC Column: RTX502 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume _____ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-4	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	6	J
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	3	J
71-43-2	Benzene	10	U
124-48-1	Dibromochloromethane	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U
76-13-1	1,1,2- Trichlorotrifluoroethane(f1	10	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

MW-16ML

Lab Name: H2M LABS, INC. Contract:

Lab Code: 10478 Case No.: SAS No.: SDG No.: LDE004

Matrix: (soil/water) WATER Lab Sample ID: 9835586

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P11004.D

Level: (low/med) LOW Date Received: 11/04/98

% Moisture: not dec. Date Analyzed: 11/06/98

GC Column: RTX502 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume (uL) Soil Aliquot Volume: (uL)

3/3/99

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-4	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	97 ~~190~~	
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	58	
71-43-2	Benzene	10	U
124-48-1	Dibromochloromethane	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	25	
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U
76-13-1	1,1,2- Trichlorotrifluoroethane(f113)	8	J

um 3/3/99

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
TRIPBLK10/26/98

Lab Name: H2M LABS, INC. Contract: LDE003

Lab Code: 10478 Case No.: SAS No.: SDG No.: LDE003

Matrix: (soil/water) WATER Lab Sample ID: 9834593

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: P10933.D

Level: (low/med) LOW Date Received: 10/26/98

% Moisture: not dec. Date Analyzed: 11/02/98

GC Column: RTX502. ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume (uL) Soil Aliquot Volume (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

Number TICs found: 1

	CAS NO.	COMPOUND	RT	EST. CONC.	Q
1.	026746-38-3	Phenol, bis(1,1-dimethylethyl)-	18.57	27	JN

H2M LABS, INC.

575 Broad Hollow Rd, Melville, NY 11747-5076
Tel: (516) 694-3040 Fax: (516) 420-8436

No 10091

EXTERNAL CHAIN OF CUSTODY

CLIENT: LOCKHEED MARTIN CORP.

H2M SDG NO:

PROJECT NAME/NUMBER
LOCKHEED MARTIN CORP.
GROUNDWATER SAMPLING
LOCK 9801 ~~FB~~ (W&W) T1

SAMPLERS: (signature)/Client
Bill Walsh

DELIVERABLES: CS-1

TURNAROUND TIME:

NOTES:
TCL VOCs + FREON 12

Project Contact:
RJB

Phone Number:
1611

DATE	TIME	MATRIX	FIELD I.D.	Total No. of Containers	Sample Container Description	ANALYSIS REQUESTED: ORGANIC VOA	ORGANIC BNA	ORGANIC Pest/PCB	INORG. Metal	INORG. CN	LAB I.D. NO.	REMARKS:
10/14	1400	GW	MW-25GL	4	4 VIAL	4					9833196	MS/MSD
10/13	1325	GW	MW-27GL	2		2					200	
10/13	1345		MW-27MI								2001	
10/13	1700		MW-26GL								9833199	MS/MSD 10/14
10/13	1800		MW-26MI								1989	
10/14	1430		MW-25MI								9833197	
	1540		MW-28GL								204	
	1615		MW-28MI								203	
	1310		MW-8GL								193	
	1345		MW-8GL								9833192	
	1530		MW-8ML								194	

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	10/13/98	8:30	Bill Walsh	10/13/98	8:30
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Bill Walsh	10/14/98	1700		10/14/98	17*
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	10/14/98	17.5	Nicole Daly	10/14/98	1730
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

LABORATORY USE ONLY

Discrepancies Between Sample Labels and COC Record? Y or (N)
Explain:

Samples were:
1. Shipped ___ or Hand Delivered X Airbill# ___
2. Ambient or chilled 4°C
3. Received in good condition Y or N
4. Properly preserved (Y) or N
5. Samples returned to lab ___ Hrs from collection

COC Tape was:
1. Present on outer package: Y or (N)
2. Ur broken on outer package: Y or (N)
3. COC record present & complete upon sample receipt: (Y) or N

WHITE COPY - ORIGINAL

YELLOW COPY - CLIENT

05/03/1999 15:08 5164208436 FROM 5164208436 TO H2M LABS PAGE 03

Data Validation Services

120 Cobble Creek Road P. O. Box 208
North Creek, NY 12853
Phone and Fax (518) 251-4429

Facsimile Transmission

TO: Rich Baldwin

COMPANY: H2M Group

FAX NUMBER: 516 694 4122

FROM: Judy Harry

DATE: 03-04-99

No. of pages (including cover): 1

COMMENTS: RE: Lockheed Martin project data processing

As we have discussed, the Work Plan documentation provided to me for the above-mentioned project shows two different requirements for the volatile holding time. Table 5.3 is footnoted as requiring a seven day holding time. Appendix B, section 3.0 states that the method to be used is that of the 1995 ASP 95-1 (other sections reference the 1991 version of the ASP). Method 95-1 utilizes a ten day holding time, which was used for some of the project samples.

Please provide a statement clarifying which holding time is to be observed, as the level of qualification of some samples is affected.

H2M GROUP

Holzmacher, McLendon & Murrell, P.C. • H2M Associates, Inc.
H2M Construction Management, Inc. • H2M Labs, Inc.

ACEC Member
Supporting Excellence
in Engineering

575 Broad Hollow Road, Melville, NY 11747-5076
(516) 756-8000 • Fax: (516) 694-4122

March 4, 1999

Ms. Judy Harry
Data Validation Services
P.O. Box 208
North Creek, NY 12583

Re: OU-2 Data Validation
Lockheed Martin Corporation
365 Lakeville Road
Great Neck, New York

Dear Ms. Harry:

Pursuant to our telephone discussion, the NYSDEC Method 95-1 ten-day holding times are appropriate for the above-referenced project.

Should you have any questions, please feel free to call.

Very truly yours,

HOLZMACHER, McLENDON, & MURRELL, P.C.

Richard J. Baldwin, C.P.G.
Senior Hydrogeologist

H2M LABS, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SAMPLE IDENTIFICATION AND
ANALYTICAL REQUIREMENT SUMMARY
NYS DEC
SDG NO.: LDE001
SAMPLES RECEIVED: 10/14-15/98

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC	*BNA GC/MS	*HERB	PCB	*METALS	OTHER
MW-8GU	9833193	X					
MW-8GL	9833192	X					
MW-8ML	9833194	X					
MW-12MI	9833195	X					
MW-25GLMS/MSD	9833196	X					
MW-25MI	9833197	X					
MW-26MI	9833199	X					
MW27GL	9833200	X					
MW-27MI	9833201	X					
MW-28GL	9833202	X					
MW-28MI	9833203	X					
BD-1	9833204	X					
TB10/14	9833205	X					
MW-4GL	9833369	X					
MW-4MI	9833372	X					
MW-7GL	9833370	X					
MW-7ML	9833371	X					
MW-9GL	9833375	X					
MW-12ML	9833373	X					
BD-1	9833374	X					
TB10/15	9833375	X					

* Check Appropriate Boxes
* CLP, Non-CLP (Please indicate year of protocol) ASP 95
* TCL/TAL, HCL, TS

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collected	Date Received	Level	Date Analyzed
BD-1	water	10/15/98	10/15/98	LOW	10/23/98
MW-12MI	water	10/14/98	10/14/98	LOW	10/23/98
MW-25GL	water	10/14/98	10/14/98	LOW	10/23/98
MW-25GLMS	water	10/14/98	10/14/98	LOW	10/23/98
MW-25GLMSD	water	10/14/98	10/14/98	LOW	10/23/98
MW-25MI	water	10/14/98	10/14/98	LOW	10/22/98
MW-26GL	water	10/13/98	10/14/98	LOW	10/23/98
MW-26MI	water	10/13/98	10/14/98	LOW	10/23/98
MW-27GL	water	10/13/98	10/14/98	LOW	10/23/98
MW-27MI	water	10/13/98	10/14/98	LOW	10/23/98
MW-28GL	water	10/14/98	10/14/98	LOW	10/23/98
MW-28MI	water	10/14/98	10/14/98	LOW	10/23/98
MW-28MIDL	water	10/14/98	10/14/98	LOW	10/23/98
MW-8GL	water	10/14/98	10/14/98	LOW	10/23/98
MW-8GU	water	10/14/98	10/14/98	LOW	10/23/98
MW-8MI	water	10/14/98	10/14/98	LOW	10/23/98
MW25-MIDL	water	10/15/98	10/15/98	LOW	10/23/98
MW28-GLDL	water	10/15/98	10/15/98	LOW	10/23/98
TRIPBK10/14/98	water	10/14/98	10/14/98	LOW	10/23/98

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collected	Date Received	Level	Date Analyzed
FB-1	water	10/15/98	10/15/98	LOW	10/25/98
MW-12ML	water	10/15/98	10/15/98	LOW	10/25/98
MW-4GL	water	10/15/98	10/15/98	LOW	10/24/98
MW-4GLDL	water	10/15/98	10/15/98	LOW	10/25/98
MW-4MI	water	10/15/98	10/15/98	LOW	10/24/98
MW-4MIDL	water	10/15/98	10/15/98	LOW	10/25/98
MW-7GL	water	10/15/98	10/15/98	LOW	10/24/98
MW-7GLDL	water	10/15/98	10/15/98	LOW	10/25/98
MW-7ML	water	10/15/98	10/15/98	LOW	10/24/98
MW-7MLDL	water	10/15/98	10/15/98	LOW	10/25/98
MW-9GL	water	10/15/98	10/15/98	LOW	10/25/98
TRIPBK10/15/98	water	10/15/98	10/15/98	LOW	10/25/98

H2M LABS, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND
ANALYTICAL REQUIREMENT SUMMARY
LOCKHEED MARTIN CORP.
GROUNDWATER SAMPLES
SAMPLES RECEIVED: OCTOBER 20 & 21,1998
LOCK #9801
SDG NO.: LDE002

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC/MS	*BNA GC/MS	*VOA GC	*PEST PCBS	*METALS	OTHER
BD-2	9833698	X					
MW-3GL	9833699	X					
MW-23GL	9833700	X					
MW-24GL	9833701	X					
MW-29GL	9833702	X					
MW-5GU	9833703	X					
MW-19GU	9833704	X					
MW-19MI	9833705	X					
MW-23MI	9833706	X					
MW-24MI	9833707	X					
[illegible]-29MI	9833708	X					
MW-3ML	9833709	X					
FB-2	9833710	X					
TRIP BLANK	9833711	X					
MW-2GL	9834047	X					
MW-2MI	9834048	X					
MW-2ML	9834049	X					
MW-2MU	9834050	X					
MW-5GLMS/MSD	9834051	X					
BD-3	9834060	X					
FB-3	9834062	X					

* Check Appropriate Boxes
* CLP; Non-CLP (Please indicate year of protocol) 10.95
* TCL/TAL

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collected	Date Received	Level	Date Analyzed
BD-2	water	10/19/98	10/20/98	LOW	10/25/98
BD-3	water	10/20/98	10/21/98	LOW	10/28/98
FB-2	water	10/19/98	10/20/98	LOW	10/26/98
FB-3	water	10/20/98	10/21/98	LOW	10/28/98
MW-19GU	water	10/19/98	10/20/98	LOW	10/25/98
MW-19MI	water	10/19/98	10/20/98	LOW	10/25/98
MW-19MIDL	water	10/19/98	10/20/98	LOW	10/28/98
MW-23GL	water	10/19/98	10/20/98	LOW	10/25/98
MW-23MI	water	10/19/98	10/20/98	LOW	10/25/98
MW-24GL	water	10/19/98	10/20/98	LOW	10/25/98
MW-24MI	water	10/19/98	10/20/98	LOW	10/26/98
MW-24MIDL	water	10/19/98	10/20/98	LOW	10/28/98
MW-29GL	water	10/19/98	10/20/98	LOW	10/25/98
MW-29GLDL	water	10/19/98	10/20/98	LOW	10/28/98
MW-29MI	water	10/19/98	10/20/98	LOW	10/26/98
MW-29MIDL	water	10/19/98	10/20/98	LOW	10/28/98
MW-2GL	water	10/20/98	10/21/98	LOW	10/28/98
MW-2MI	water	10/20/98	10/21/98	LOW	10/28/98
MW-2MIDL	water	10/20/98	10/21/98	LOW	10/29/98
MW-2ML	water	10/21/98	10/21/98	LOW	10/28/98
MW-2MU	water	10/20/98	10/21/98	LOW	10/28/98
MW-3GL	water	10/19/98	10/20/98	LOW	10/25/98
MW-3GLDL	water	10/19/98	10/20/98	LOW	10/28/98
MW-3ML	water	10/19/98	10/20/98	LOW	10/26/98
MW-5GL	water	10/20/98	10/21/98	LOW	10/28/98
MW-5GLMS	water	10/20/98	10/21/98	LOW	10/28/98
MW-5GLMSD	water	10/20/98	10/21/98	LOW	10/28/98
MW-5GLRE	water	10/20/98	10/21/98	LOW	10/29/98
MW-5GU	water	10/19/98	10/20/98	LOW	10/25/98
TRIPBLK10/19/98	water	10/19/98	10/20/98	LOW	10/26/98

H2M LABS, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
INORGANIC ANALYSES
LOCKHEED MARTIN CORP.
GROUNDWATER SAMPLES
SAMPLES RECEIVED: OCTOBER 20 & 21,1998
LOCK #9801
SDG NO.: LDE002

SAMPLE ID	MATRIX	ANALYSIS REQUESTED	DATE RECEIVED	DATE * ANALYZED
BD-2	WATER	VOLATILE	10/20/98	10/98
MW-3GL	WATER	VOLATILE	10/20/98	10/98
MW-23GL	WATER	VOLATILE	10/21/98	10/98
MW-24GL	WATER	VOLATILE	10/20/98	10/98
MW-29GL	WATER	VOLATILE	10/20/98	10/98
MW-5GU	WATER	VOLATILE	10/20/98	10/98
MW-19GU	WATER	VOLATILE	10/20/98	10/98
MW-19MI	WATER	VOLATILE	10/20/98	10/98
MW-23MI	WATER	VOLATILE	10/20/98	10/98
MW-24MI	WATER	VOLATILE	10/20/98	10/98
MW-29MI	WATER	VOLATILE	10/20/98	10/98
MW-3ML	WATER	VOLATILE	10/20/98	10/98
B-2	WATER	VOLATILE	10/20/98	10/98
TRIP BLANK	WATER	VOLATILE	10/20/98	10/98
MW-2GL	WATER	VOLATILE	10/20/98	10/98
MW-2MI	WATER	VOLATILE	10/20/98	10/98
MW-2ML	WATER	VOLATILE	10/20/98	10/98
MW-2MU	WATER	VOLATILE	10/20/98	10/98
MW-5CLMS/MSD	WATER	VOLATILE	10/20/98	10/98
BD-3	WATER	VOLATILE	10/20/98	10/98
FB-3	WATER	VOLATILE	10/20/98	10/98

* SEE INDIVIDUAL RUN SHEETS FOR EXACT DATES.

H2M LABS, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SAMPLE IDENTIFICATION AND
ANALYTICAL REQUIREMENT SUMMARY
NYS DEC
SDG NO.: LDE003
SAMPLES RECEIVED: 10/21-26/98

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC	*BNA GC/MS	*HERB	PCB	*METALS	OTHER
MW-5MI	9834052	X					
MW-5ML	9834053	X					
MW-6GL	9834047	X					
MW-6MI	9834054	X					
MW-10GL	9834056	X					
MW-11GL	9834057	X					
MW-11MI	9834058	X					
RW-2	9834049	X					
BD-4	9834061	X					
EB-4	9834063	X					
TRIP BLANK 10/20	9834064	X					
MW-3GL	9834386	X					
MW-1GU	9834387	X					
MW-1MI MS/MSD	9834388	X					
MW-1ML	9834389	X					
BD-5	9834390	X					
EB-5	9834391	X					
TRIP BLANK	9834392	X					
MW-1ML	9834590	X					
MW21GU	9834591	X					
FIELD BLANK 10/26	9834592	X					
TRIP BLANK 10/26	9834593	X					

* Check Appropriate Boxes
* CLP/Non-CLP (Please indicate year of protocol)
* TCL/TAL, HCL, TS

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collected	Date Received	Level	Date Analyzed
BD-4	water	10/21/98	10/21/98	low	10/30/98
BD-5	water	10/22/98	10/23/98	low	10/30/98
FB-4	water	10/21/98	10/21/98	low	10/30/98
FB-5	water	10/22/98	10/23/98	low	10/30/98
MW-10GL	water	10/20/98	10/21/98	low	10/30/98
MW-11GL	water	10/20/98	10/21/98	low	10/30/98
MW-11GLDL	water	10/20/98	10/21/98	low	10/30/98
MW-11MI	water	10/20/98	10/21/98	low	10/30/98
MW-1GL	water	10/22/98	10/23/98	low	10/30/98
MW-1GU	water	10/22/98	10/23/98	low	10/30/98
MW-1MI	water	10/22/98	10/23/98	low	10/29/98
MW-1MI/L	water	10/22/98	10/23/98	low	10/30/98
MW-1MI/LDL	water	10/22/98	10/23/98	low	11/2/98
MW-1MIDL	water	10/22/98	10/23/98	low	10/30/98
MW-1MIDLMS	water	10/22/98	10/23/98	low	10/30/98
MW-1MIDLMSD	water	10/22/98	10/23/98	low	10/30/98
MW-1ML	water	10/26/98	10/26/98	low	11/2/98
MW-21GU	water	10/26/98	10/26/98	low	11/2/98
MW-5MI	water	10/20/98	10/21/98	low	10/28/98
MW-5MIDL	water	10/20/98	10/21/98	low	10/29/98
MW-5ML	water	10/20/98	10/21/98	low	10/28/98
MW-5ML	water	10/20/98	10/21/98	low	10/29/98
MW-5MLDL	water	10/20/98	10/21/98	low	10/29/98
MW-6GL	water	10/20/98	10/21/98	low	10/29/98
MW-6MI	water	10/20/98	10/21/98	low	10/30/98
RW-2	water	10/21/98	10/21/98	low	10/30/98

H2M LABS, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SAMPLE IDENTIFICATION AND
ANALYTICAL REQUIREMENT SUMMARY
NYS DEC
SDG NO.: LDE004
SAMPLES RECEIVED: 10/30-11/6/98

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC	*BNA GC/MS	*HERB	PCB	*METALS	OTHER
MW-15GL	9835271	X					
MW-15ML	9835272	X					
MW-18GL	9835273	X					
MW-18MLMS/MSD	9835274	X					
MW-22GL	9835275	X					
MW-22ML	9835276	X					
BD-6	9835277	X					
FB-6	9835278	X					
FB-7	9835279	X					
MW-32GL	9835579	X					
MW-32MI	9835580	X					
MW-13ML	9835581	X					
BD-7	9835582	X					
FB-8	9835583	X					
MW-14MI	9835584	X					
MW-16GLMS/MSD	9835585	X					
MW-16ML	9835586	X					
TB	9835587	X					
MW-31GL	9836077	X					
MW-31MI	9836078	X					

* Check Appropriate Boxes
* CLP/(Non-CLP) (Please indicate year of protocol) ASP10-95
* TCL/TAL, HCL, TS

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collected	Date Received	Level	Date Analyzed
BD-6	water	10/30/98	10/30/98	LOW	11/2/98
BD-6DL	water	10/30/98	10/30/98	LOW	11/3/98
BLINDDUP#7	water	11/3/98	11/4/98	LOW	11/5/98
FB-6	water	10/29/98	10/30/98	LOW	11/2/98
FB-7	water	10/30/98	10/30/98	LOW	11/3/98
FIELDBK#8	water	11/3/98	11/4/98	LOW	11/5/98
MW-13ML	water	11/3/98	11/4/98	LOW	11/5/98
MW-14MI	water	11/3/98	11/4/98	LOW	11/6/98
MW-15GL	water	10/29/98	10/30/98	LOW	11/2/98
MW-15ML	water	10/29/98	10/30/98	LOW	11/2/98
MW-16GL	water	11/3/98	11/4/98	LOW	11/5/98
MW-16GLMS	water	11/3/98	11/4/98	LOW	11/6/98
MW-16GLMSD	water	11/3/98	11/4/98	LOW	11/6/98
MW-16ML	water	11/3/98	11/4/98	LOW	11/6/98
MW-18GL	water	10/30/98	10/30/98	LOW	11/2/98
MW-18GLDL	water	10/30/98	10/30/98	LOW	11/3/98
MW-18ML	water	10/30/98	10/30/98	LOW	11/3/98
MW-18MLDL	water	10/30/98	10/30/98	LOW	11/3/98
MW-18MLDLMS	water	10/30/98	10/30/98	LOW	11/3/98
MW-	water	10/30/98	10/30/98	LOW	11/3/98
MW-22GL	water	10/30/98	10/30/98	LOW	11/2/98
MW-22ML	water	10/30/98	10/30/98	LOW	11/2/98
MW-22MLDL	water	10/30/98	10/30/98	LOW	11/3/98
MW-31GL	water	11/4/98	11/6/98	LOW	11/6/98
MW-31MI	water	11/4/98	11/6/98	LOW	11/6/98
MW-32GL	water	11/2/98	11/4/98	LOW	11/5/98
MW-32MI	water	11/2/98	11/4/98	LOW	11/5/98
TRIPBK11/2/98	water	11/2/98	11/4/98	LOW	11/6/98

H2M LABS, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SAMPLE IDENTIFICATION AND
ANALYTICAL REQUIREMENT SUMMARY
NYS DEC
SDG NO.: LDE005
SAMPLES RECEIVED: 12/6 & 16/98

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC	*BNA GC/MS	*HERB	PCB	*METALS	OTHER
MW-35GL MS/MSD	9836079	X					
MW-31ML	9836080	X					
FB-9	9836081	X					
TB	9836082	X					
BD-8	9836333	X					
MW-17GL	9836334	X					
MW-17ML	9836335	X					
MW-30GL	9836336	X					
MW-30MI	9836337	X					
MW-30ML MS/MSD	9836338	X					
MW-32ML	9836339	X					
FB-10	9836340	X					
FB-11	9836341	X					
TRIP BLANK	9836342	X					
MW-33MI	9836848	X					
MW-33ML	9836849	X					
FIELD BLANK	9836850	X					
MW-36GL	9837141	X					
TRIP BLANK	9837142	X					

* Check Appropriate Boxes
* CLP, Non-CLP (Please indicate year of protocol)
* TCL/TAL, HCL, TS

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collected	Date Received	Level	Date Analyzed
BD-8	water	11/7/98	11/9/98	LOW	11/12/98
FB-10	water	11/6/98	11/9/98	LOW	11/11/98
FB-11	water	11/7/98	11/9/98	LOW	11/11/98
FB-9	water	11/4/98	11/6/98	LOW	11/6/98
MW-17GL	water	11/6/98	11/9/98	LOW	11/11/98
MW-17GLDL	water	11/6/98	11/9/98	LOW	11/12/98
MW-17ML	water	11/6/98	11/9/98	LOW	11/11/98
MW-17MLDL	water	11/6/98	11/9/98	LOW	11/12/98
MW-30GL	water	11/7/98	11/9/98	LOW	11/11/98
MW-30MI	water	11/7/98	11/9/98	LOW	11/11/98
MW-30ML	water	11/7/98	11/9/98	LOW	11/11/98
MW-30MLMS	water	11/7/98	11/9/98	LOW	11/11/98
MW-30MLMSD	water	11/7/98	11/9/98	LOW	11/11/98
MW-31ML	water	11/4/98	11/6/98	LOW	11/6/98
MW-32ML	water	11/6/98	11/9/98	LOW	11/12/98
MW-35GL	water	11/5/98	11/6/98	LOW	11/6/98
MW-35GLDL	water	11/5/98	11/6/98	LOW	11/11/98
MW-35GLDLMS	water	11/5/98	11/6/98	LOW	11/11/98
MW-35GLDLMSD	water	11/5/98	11/6/98	LOW	11/11/98
TRIPBK4	water	11/4/98	11/6/98	LOW	11/6/98
TRIPBK9	water	11/9/98	11/9/98	LOW	11/12/98

12/15/98

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collected	Date Received	Level	Date Analyzed
FLDBK11/11/98	water	11/12/98	11/13/98	LOW	11/17/98
MW-17CLDL	water	11/6/98	11/9/98	LOW	11/17/98
MW-33MI	water	11/12/98	11/13/98	LOW	11/17/98
MW-33ML	water	11/12/98	11/13/98	LOW	11/17/98
MW-36GL	water	11/16/98	11/16/98	LOW	11/17/98
TRIPBK16	water	11/16/98	11/16/98	LOW	11/17/98

H2M LABS, INC.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SAMPLE IDENTIFICATION AND
ANALYTICAL REQUIREMENT SUMMARY
NYS DEC
SDG NO.: LDE006
SAMPLES RECEIVED: 11/24/98

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC	*BNA GC/MS	*HERB	PCB	*METALS	OTHER
BAKER	9837938	X					
MW-33GL	9837939	X					

* Check Appropriate Boxes
* CLP, Non-CLP (Please indicate year of protocol)
* TCL/TAL, HCL, TS

Volatile Sample Analysis Summary

Sample ID	Matrix	Date Collecte	Date Received	Level	Date Analyzed
BAKER	water	20-Nov-98	24-Nov-98	LOW	03-Dec-98
MW-33GL	water	20-Nov-98	24-Nov-98	LOW	03-Dec-98

H2M LABS, INC.

SDG NARRATIVE FOR VOLATILES
SAMPLES RECEIVED: 10/14-10/15//98
SDG #: LDE001

For Samples:

MW-8GU	MW27GL	MW-4MI
MW-8GL	MW-27MI	MW-7GL
MW-8ML	MW-28GL	MW-7ML
MW-12MI	MW-28MI	MW-9GL
MW-25GLMS/MSD	BD-1	MW-12ML
MW-25MI	TB10/14	FB-1
MW-26MI	MW-4GL	TB10/15

The above samples were analyzed according to the requirements of the NYSDEC ASP 10/95 method 95-1 for the TCL volatile organic analytes.

Due to concentration levels of targeted analytes above the calibration range, the following samples were analyzed at a dilution:

MW-25MI	MW-4MI
MW-28GL	MW-7GL
MW-28MI	MW-7ML
MW-4GL	

All initial analysis had a surrogate standard d-8 toluene above the QC limits. All diluted analysis had acceptable recoveries. The d-8 toluene was high in VBLK10/24. This was inadvertently not noted by the analyst and the samples were analyzed. The samples analyzed with this blank (MW-4GL, MW-4MI, MW-7GL and MW-7ML) all had similarly high recoveries for d-8 toluene.

Samples MW-4GL, MW-4MI, MW-7GL, MW-25MI and MW-28MI original analysis did not compare well to the diluted analyses. The results for the diluted samples were lower than the undiluted analyses.

Sample MW-25GL was analyzed as the matrix spike/matrix spike duplicate sample.

All other quality control and calibration requirements were met

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Date Reported: December 18, 1998

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Joann M. Slavin
Quality Assurance Manager

H2M LABS, INC.

SDG NARRATIVE FOR VOLATILES
SAMPLES RECEIVED: 10/20-10/21/98
SDG #: LDE002

For Samples:

BD-2	MW-19MI	MW-2GL
MW-3GL	MW-23MI	MW-2MI
MW-23GL	MW-24MI	MW-2ML
MW-24GL	MW-29MI	MW-2MU
MW-29GL	MW-3ML	MW-5GLMS/MSD
MW-5GU	FB-2	BD-3
MW-19GU	TRIP BLANK	FB-3

The above samples were analyzed according to the requirements of the NYSDEC ASP 10/95 method 95-1 for the TCL volatile organic analytes plus freon 113.

Due to concentration levels of targeted analytes above the calibration range, the following samples were analyzed at a dilution.

MW-3GL
MW-29GL
MW-19MI
MW-24MI
MW-29MI
MW-2MI

Both sets of data are submitted.

Sample MW-5GL was reanalyzed due to a slightly high surrogate recovery in the initial analysis. All surrogate percent recoveries were acceptable (though on the high side) in the reanalysis, as well as the matrix spike/matrix spike duplicate.

All percent recoveries of the spiked analytes were acceptable in the matrix spike and matrix spike duplicate of sample MW-5GL however the RPD's of 1,1-dichloroethene at 27% was high (limit 14%) and benzene at 19% (limit 11%).

All other quality control and calibration requirements were met

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Date Reported: November 30, 1998

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Joann M. Slavin
Quality Assurance Manager

SDG NARRATIVE FOR VOLATILES
SAMPLES RECEIVED: 10/21-10/26/98
SDG #: LDE003

For Samples:

MW-5MI	RW-2	MW-1MI/L
MW-5ML	BD-4	BD-5
MW-6GL	FB-4	FB-5
MW-6MI	TRIP BLANK 10/20	TRIP BLANK
MW-10GL	MW-1GL	MW-1 ML
MW-11GL	MW-1 GU	MW-21 GU
MW-11MI	MW-1 MI MS/MSD	FIELD BLANK 10/26
		TRIP BLANK 10/26

The above samples were analyzed according to the requirements of the NYSDEC ASP 10/95 method 95-1 for the TCL volatile organic analytes plus freon 113. Sample MW-1MI was analyzed as the matrix spike/matrix spike duplicate.

Due to concentration levels of targeted analytes above the calibration range, the following samples were analyzed at a dilution.

MW-5MI
MW-5ML
MW-11GL
MW-1MI
MW-1MI MS/MSD
MW-1 MI/L

Both sets of data are submitted.

All other quality control and calibration requirements were met

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Date Reported: December 4, 1998

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Joann M. Slavin
Quality Assurance
Manager

SDG NARRATIVE FOR VOLATILES
SAMPLES RECEIVED: 10/30-11/6//98
SDG #: LDE004

For Samples:

MW-15GL	FB-6	MW-14MI
MW-15ML	FB-7	MW-16GLMS/MSD
MW-18GL	MW-32GL	MW-16ML
MW-18MLMS/MSD	MW-32MI	TB
MW-22GL	MW-13ML	MW-31GL
MW-22ML	BD-7	MW-31MI
BD-6	FB-8	

The above samples were analyzed according to the requirements of the NYSDEC ASP 10/95 method 95-1 for the TCL volatile organic analytes plus freon 113.

Due to concentration levels of targeted analytes above the calibration range, the following samples were analyzed at a dilution.

MW-18GL
MW-18ML
MW-22ML
BD-6

The diluted results for these samples were low compared to the initial results for all samples except for sample MW-18ML, however it's matrix spike was low for the sample. All surrogate recoveries were acceptable, as were all internal standard areas. No sample without headspace was available for reanalysis for confirmation.

The matrix spike/matrix spike duplicate for sample MW-18ML were also analyzed at a dilution. Trichloroethene had a 64% recovery and 68% recovery in the matrix spike/matrix spike duplicate sample (lower limit 71%)

All other quality control and calibration requirements were met

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Date Reported: December 16, 1998

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Joann M. Slavin
Quality Assurance Manager

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SDG NARRATIVE FOR VOLATILES
SAMPLES RECEIVED: 11/6-11/16/98
SDG #: LDE005

For Samples:

MW-35GL MS/MSD
MW-31ML
TB 4
ED-8
MW-17GL
MW-17ML
MW-30GL
MW-30MI
MW-30ML MS/MSD
MW-32ML
FB-10
FB-11
TRIP BLANK 9
MW-33MI
FIELD BLANK 11/11/98
MW-366L
TRIP BLANK

The above samples were analyzed according to the requirements of the NYSDEC ASP 10/95 method 95-1 for the TCL volatile organic analytes plus freon 113.

Due to concentration levels of targeted analytes above the calibration range, the following samples were analyzed at a dilution.

MW-17GL
MW-17ML
MW-35GL

Sample MW-17GL required an additional dilution since a targeted analyte still exceeded in the dilution. The final dilution of sample MW-17GL has lower results than the first dilution. The cause is not clear. All results are submitted.

Samples MW-35GL and MW-30ML were analyzed as the matrix spike/matrix spike duplicate samples. All percent recoveries and RPD's were met except for the RPD's for MW-30ML.

All other quality control and calibration requirements were met

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Date Reported: December 22, 1998

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Joann M. Slavin
Quality Assurance
Manager

SDG NARRATIVE FOR VOLATILES
SAMPLES RECEIVED: 11/24/98
SDG #: LDE006

For Samples:

Baker
MW-33GL

The above samples were analyzed according to the requirements of the NYSDEC ASP 10/95 method 95-1 for the TCL volatile organic analytes.

No matrix spike/matrix spike duplicate was submitted.

All quality control and calibration requirements were met

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Date Reported: December 28, 1998

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Joann M. Slavin
Quality Assurance
Manager

DRAFT

Appendix I

1999 and 2000 Data Validation Memorandums

ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville
New York 11747
Tel 516 249-7600
Fax 516 249-7610

MEMO

To:
Neil Benowitz

Copies:

ENVRIONMENTAL

From:
Donna M Brown

Date:
November 2, 1999

Subject:
Data Validation of Volatile Organic Compound Groundwater Samples Collected at the Former Unisys facility, Great Neck Site, New York from May through October (Project No. NY001227.0002.00004).

Groundwater samples, replicates, and associated blanks were collected from May through October 1999 at the Former Unisys facility, Great Neck Site, New York. The samples were sent to Severn Trent Laboratories (STL) in Monroe, Connecticut for the analysis of volatile organic compounds (VOCs) using purge and trap GC/MS following New York State Department of Environmental Conservation (NYSDEC) 10/95 Method NYDEC 95-1.

A full validation was conducted on twenty percent of the samples collected. The full validation was conducted following the quality assurance/quality control (QA/QC) criteria set forth in the method, and the document "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" dated February 1993. The remaining eighty percent of the samples were reviewed for completeness and technical compliance in accordance with the above documents. The review of the VOC data packages included checking the following:

- Chain-of-custody forms.
- Holding times.
- GC/MS Instrument Performance checks
- Instrument calibration.
- Blank contamination (method, field, and trip).
- Surrogate spike recoveries.
- Matrix spike and/or duplicate results.
- Internal standards.

- Check for transcriptions between quantitation reports and form I's.
- Blind field replicates.

The quality of the data was acceptable with the appropriate qualifications described in this memorandum. The laboratory provided eleven data packages. The analytical data for samples were provided by the laboratory in sample delivery groups (SDG) 7099-1185A, 7099-1185B, 7099-1185C, 7099-1185D, 7099-1185E, 7099-1185F, 7099-1185G, 7099-1235A, 7099-1931A, 7099-2272A, 7099-2494A, 7099-2570A, and 7099-2655A. Packages 7099-1185B, 7099-1185D, and 7099-1931A were fully validated. The data validation results, for each SDG, are discussed separately below. The fully validated data was discussed first and then the review data. Table 1 at the end of this memo shows the sample identifications, sample dates, lab identifications, and associated SDGs.

VOC FULL DATA VALIDATION

SDG 7099-1185B

Twelve samples, one replicate, three trip blanks, and three field blanks were collected June 4 through 8, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs: The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs: All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs: One initial calibration was performed with this sample set. All compound relative response factors (RRFs) were found to be >0.05 and compound relative standard deviations (%RSDs) were found to be < 30%.

CONTINUING CALIBRATION

VOCs: Three continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound percent differences (%Ds) were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 06/08/99
Compound	% D
2-Butanone	25.2
4-Methyl-2-pentanone	33.0
2-Hexanone	26.0

Associated samples: TB Team1 060499, TB Team1 060799, FB 060499, FB 060799, 6GLMP, 27GL, 15GL, 6GLB, 2MU, 19GU, 21GU, and 24GL.

Instrument ID: HP5970M	Calibration Date: 06/9/99
Compound	% D
Chloromethane	51.5
Vinyl Chloride	39.7
Acetone	31.2
2-Butanone	35.3
trans-1,3-Dichloropropene	29.4
4-Methyl-2-pentanone	25.6
2-Hexanone	27.7

Associated samples: FB Aqua Bailer, TB Team2 060799, 4GL, 3GL, and REP2.

Instrument ID: HP5970M	Calibration Date: 06/10/99
Compound	% D
Acetone	26.5
Bromoform	25.3
Tetrachloroethene	30.7

Associated samples: 2MI and 18GL.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs: Three method blanks (VBLKMW, VBLKMX, and VBLKMZ) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKMW

Compound	Concentration in micrograms per liter (ug/L)
Acetone	3 J
2-Butanone	2 J
Tetrachloroethene	0.2 J
Xylene	0.4 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.83)	16 JN

Associated samples: TB Team1 060499, TB Team1 060799, FB 060499, FB 060799, 6GLMP, 27GL, 15GL, 6GLB, 2MU, 19GU, 21GU, and 24GL.

Method Blank VBLKMX

Compound	Concentration in ug/L
Methylene chloride	2 J
2-Butanone	3 J
4-Methyl-2-pentanone	1 J
2-Hexanone	1 J
1,1,2,2-Tetrachloroethane	0.7 J
Styrene	0.1 J
Xylene	0.3 J
Acetone	16

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.81)	130 JN

Associated samples: FB Aqua Bailer, TB Team2 060799, 4GL, 3GL, and REP2.

Method Blank VBLKMZ

Compound	Concentration in ug/L
Acetone	3 J

Associated samples: 2MI and 18GL.

Five trip blanks were analyzed in association with this SDG. The following target compounds and/or TIC were detected in the trip blanks:

TB TEAM2 060499	SDG: 1185A
Compound	Concentration in ug/L
Methylene chloride	0.4 J
Acetone	3 JB
Benzene	0.4 J
1,1,2-Trichlorotrifluoroethane	0.4 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.83)	14 JNB

Associated samples: 27GL, 3GL, and 15GL.

TB TEAM1 060499	SDG: 1185B
Compound	Concentration in ug/L
Methylene chloride	0.4 J
Acetone	4 JB
2-Butanone	2 JB
1,1,2-Trichlorotrifluoroethane	0.7 J

Associated samples: 4GL, 6GLMP, REP2, and 6GLB.

TB TEAM 1 060799	SDG: 1185B
Compound	Concentration in ug/L
Methylene chloride	0.4 J
Acetone	4 JB
1,1,2-Trichlorotrifluoroethane	0.7 J

Associated samples: 2MI and 2MU.

TB TEAM 2 060799	SDG: 1185B
Compound	Concentration in ug/L
Methylene chloride	1 JB
Acetone	2 JB
1,1,2-Trichlorotrifluoroethane	1 J

Associated samples: 19GU, 21GU, and 24GL.

TB TEAM1 060899	SDG: 1185C
Compound	Concentration in ug/L
Acetone	2 JB

Associated sample: 18GL.

Four field blanks were analyzed in association with this SDG. The following target compounds and/or TIC were detected in the field blanks:

FB 060499	SDG: 1185B
Compound	Concentration in ug/L
Methylene chloride	0.4 J
1,1,2-Trichlorotrifluoroethane	0.6 J

TIC (Retention Time)	Concentration in ug/L
Cyclotertasiloxane, octameth(19.29)	28 JN
Unknown Siloxane(21.61)	24 J
Unknown Siloxane(23.63)	8 J

Associated samples: 4GL, 6GLMP, 27GL, 3GL, 15GL, and REP-2.

FB 060799	SDG: 1185B
Compound	Concentration in ug/L
Methylene chloride	0.7 J
Acetone	2 JB
1,1,2-Trichlorotrifluoroethane	0.5 J

TIC (Retention Time)	Concentration in ug/L
Cyclotertasiloxane, octameth(19.27)	46 JN
Unknown Siloxane(21.60)	42 J
Unknown Siloxane(23.61)	12 J

Associated samples: 2MI, 2MU, 21GU, and 24GL.

FB AQUA BAILER	SDG: 1185B
Compound	Concentration in ug/L
Methylene chloride	1 JB

Associated samples: 19GU.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	27GL, 3GL, 15GL, 4GL, REP2, 6GLB, 2MU, 19GU, 21GU, and 24GL.
Acetone	3GL, 4GL, 6GLMP, REP2, 6GLB, 2MI, 2MU, 19GU, 21GU, and 18GL.
Tetrachloroethene	6GLMP and 21GU.
1,1,2-Trichlorotrifluoroethane	3GL, 4GL, 6GLMP, REP2, 6GLB, 2MI, 2MU, and 21GU.

Based on the method, trip, and/or field blank results, the following TIC sample results are qualified not usable (R):

Sample ID	TIC (retention time)
4GL	Cyclotertasiloxane, octameth (19.27)
4GL	Unknown Siloxane (21.59)
24GL	Cyclotertasiloxane, octameth (19.31)
24GL	Unknown Siloxane (21.61)

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 2MU was used for the matrix spike blank/matrix spike/matrix spike duplicate (MSB/MS/MSD). The spike recoveries and relative percent difference (RPD) values were within control limits for the MS/MSD and MSB and the percent recoveries (%R) were with limits. A QCS spike summary was also provided with this SDG. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

TARGET COMPOUND IDENTIFICATION

VOCs: Target compounds detected in the samples were reported correctly. Trichlorofluoromethane was incorrectly reported as target compound on the quantitation report for 2MU. This compound is not target compound, however, the calibration was performed for it. Since the calibration factor was not reported by the laboratory for this compound and it is not a target compound, trichlorofluoromethane and its associated result was transferred to corresponding TIC reporting form for 2MU and the results were qualified as estimated (J). Since it was a calibrated compound, the N qualifier (defined as presumptive evidence of material present) does not apply.

COMPOUND QUANTITATION AND REPORTED CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

VOCs: All compound detection limits were met.

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

VOCs : Tentatively identified compounds were reported correctly.

SYSTEM PERFORMANCE

VOCs : The performance of the instruments during analysis is considered acceptable.

OVERALL ASSESSMENT OF DATA

VOCs : One field replicate was collected with this SDG. Sample 4GL was replicated and labeled REP2. This duplicate results are considered acceptable. Sample 6GL was sampled using Micropurge, which was labeled 6GLMP, and a bailer, which was labeled 6GLB. The results are considered acceptable for both sampling techniques.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC FULL DATA VALIDATION

SDG 7099-1185D

Eight samples, one replicate, six trip blanks, and five field blanks were collected June 10 through 15, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Three initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Five continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 6/11/99 22:08
Compound	%D
Carbon Disulfide	-27.3

Associated samples: TB TEAM1 061099, TB TEAM2 061099, FB 061099, and FBB 061099.

Instrument ID: HP5970M	Calibration Date: 6/14/99 20:27
Compound	%D
Bromoform	39.7

Associated samples: TB 061199, FB 061199, and 15ML.

Instrument ID: HP5970M	Calibration Date: 6/11/99 22:08
Compound	% D
Carbon Disulfide	-25.1

Associated samples: 7ML, TB 061499, FB 061499, REP-3, 27MI, 23MI, 28MI, and 24MI.

Instrument ID: HP5970M	Calibration Date: 6/16/99 20:23
Compound	% D
Carbon Disulfide	-26.5

Associated samples: None.

Instrument ID: HP5970M	Calibration Date: 6/18/99 09:46
Compound	% D
1,1,1-Trichloroethane	31.0
Tetrachloroethene	27.1

Associated samples: TB TEAM1 061599, TB TEAM2 061599, FB 061599, 25MI, and 29MI.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Five method blanks (VBLKM4, VBLKM6, VBLKM9, VBLKMA, and VBLKMC) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKM4	
Compound	Concentration in ug/L
2-Butoanone	1 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.74)	83 JN

Associated Samples: TB TEAM1 061099, TB TEAM2 061099, FB 061099, and FBB 061099.

Method Blank VBLKM6

Compound	Concentration in ug/L
2-Butanone	3 J
Acetone	8 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.77)	38 JN

Associated samples: TB 061199, FB 061199, and 15ML.

Method Blank VBLKMA

Compound	Concentration in ug/L
Acetone	3 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.87)	25 JN

Associated samples: None.

Method Blank: VBLKM9

Compound	Concentration in ug/L
Acetone	4 J
2-Butanone	2 J

Associated samples: 7ML, TB 061499, FB 061499, REP-3, 27MI, 23MI, 28MI, and 24MI.

Method Blank VBLKMC

Compound	Concentration in ug/L
Acetone	8 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.87)	60 JN

Associated samples: TB TEAM1 061599, TB TEAM2 061599, FB 061599, 25MI, and 29MI.

Six trip blanks were analyzed with this SDG. The following target compounds and/or TIC were detected in the trip blanks:

TB TEAM1 061099

Compound	Concentration in ug/L
Methylene chloride	0.9 J

Associated samples: Samples in SDG 7099-1185C.

TB TEAM2 061099

Compound	Concentration in ug/L
Methylene chloride	0.6 J

Associated samples: Samples in SDG 7099-1185C.

TB061199

Compound	Concentration in ug/L
Methylene chloride	0.6 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.76)	10 JN

Associated samples: 15ML and 7ML.

TB061499

Compound	Concentration in ug/L
Methylene chloride	0.6 J

Associated samples: 27MI, 23MI, 28MI, and REP-3

TB TEAM1 061599

Compound	Concentration in ug/L
Methylene chloride	0.6 J

Associated samples: 24MI, 25MI, and 29MI.

TB TEAM2 061599

Compound	Concentration in ug/L
Methylene chloride	0.7 J

Associated samples: Samples in SDG 7099-1185E.

Five field blanks were associated with this SDG. The following target compounds and/or TICs were detected in the field blanks:

FB 061099

Compound	Concentration in ug/L
Methylene chloride	0.4 J

Associated samples: Samples in SDG 7099-1185C.

FBB 061099

Compound	Concentration in ug/L
Methylene chloride	0.4 J
Acetone	5 J

Associated samples: Samples in SDG 7099-1185C.

FB061199

Compound	Concentration in ug/L
Trichloroethene	0.7 J

Associated samples: 15ML and 7ML.

FB061499

Compound	Concentration in ug/L
Methylene chloride	0.5 J

Associated samples: 27MI, 23MI, 28MI, and REP-3.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	15ML, 7ML, 23MI, 28MI, 24MI, 25MI, and 29MI.
Acetone	7ML, 23MI, 28MI, 24MI, 25MI, and 29MI.
Trichloroethene	15ML.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 23MI was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB. A QSC Spike Summary was also analyzed. 2-Butanone and 1,1,2-Tetrachloroethane were not within limits for the QSC Spike sample. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

TARGET COMPOUND IDENTIFICATION

VOCs: Target compounds detected in the samples were reported correctly.

COMPOUND QUANTITATION AND REPORTED CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

VOCs: All compound detection limits were met.

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

VOCs: Tentatively identified compounds were reported correctly.

SYSTEM PERFORMANCE

VOCs: The performance of the instruments during analysis is considered acceptable.

OVERALL ASSESSMENT OF DATA

VOCs: One field replicate was collected with this sample set. Sample 27MI was replicated and labeled REP-3. The duplicate results are considered acceptable.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC FULL DATA VALIDATION

SDG 7099-1931A

Two samples and one trip blank were collected August 10, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Two initial calibrations were performed with this sample set. The compound RRFs were found to be >0.05 and compound %RSD were found to be < 30%, except for acetone % RSD in initial calibration on August 16, 1999, which was above the QC limit. Acetone was qualified as estimated (J) in TB081099 based on the initial calibration %RSD.

CONTINUING CALIBRATION

VOCs : Two continuing calibrations were performed for this SDG. All compounds had RRFs >0.05 and %Ds were found to be <25%

BLANKS

VOCs : Two method blanks (VBLKKU and VBLKK2) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKKU

Compound	Concentration in ug/L
1,1,2-Trichlorotrifluoroethane	0.4 J
Methylene chloride	2 J
Acetone	15

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.05)	37 JN

Associated Samples: NST Well and 38 Cluster Well.

Method Blank VBLKK2

Compound	Concentration in ug/L
Acetone	8 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (21.50)	11 JN
Butylated hydroxytoluene (23.16)	6 JN

Associated sample: TB 081099.

One trip blank was analyzed with this SDG. The following target compound was detected in the trip blank:

TB 081099

Compound	Concentration in ug/L
Acetone	8 JB
Methylene chloride	0.4 J

Associated samples: NST Well and 38 Cluster Well.

Based on the method and/or trip blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	NST WELL and 38 CLUSTER HOSE.

Based on the method blank TIC results, the following sample TIC results were qualified as not usable (R):

TIC	Sample ID
Butylated Hydroxytoluene	NST WELL and 38 CLUSTER HOSE

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample NST WELL was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB. A QSC Spike Summary was also analyzed.

Vinyl chloride, methylene chloride, acetone, and dibromochloromethane were not within limits for the QSC Spike sample. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

TARGET COMPOUND IDENTIFICATION

VOCs: Target compounds detected in the samples were reported correctly.

COMPOUND QUANTITATION AND REPORTED CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

VOCs: All compound detection limits were met.

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

VOCs: Tentatively identified compounds were reported correctly.

SYSTEM PERFORMANCE

VOCs: The performance of the instruments during analysis is considered acceptable.

OVERALL ASSESSMENT OF DATA

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-1185A

Twelve samples, one replicate, five trip blanks, and two field blanks were collected May 27 through June 4, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Two initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%, except for the following:

Instrument ID: HP5970K	Calibration Date: 5/1/99
Compound	% RSD
Chloroethane	-32.2

Associated samples: TB 052799, 8GU, and 8GL.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

CONTINUING CALIBRATION

VOCs : Five continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970K	Calibration Date: 6/2/99 09:16
Compound	% D
Acetone	-37.6
Carbon disulfide	36.9

Associated samples: TB 052799, 8GU, and 8GL.

Instrument ID: HP5970M	Calibration Date: 6/5/99 09:40
Compound	% D
Chloromethane	25.3
Vinyl chloride	30.6
Acetone	41.7
1,1-Dichloroethene	26.2
4-Methyl-2-pentanone	26.2
1,1,2-Trichlorotrifluoroethane	27.6

Associated sample: 7GL.

Instrument ID: HP5970M	Calibration Date: 6/4/99 21:09
Compound	% D
4-Methyl-2-pentanone	29.3

Associated samples: 25GL, 2GL, TB TEAM2 060399, FB 060399, 12ML, 9GL, 13ML, TB TEAM1 060399, and 26GL.

Instrument ID: HP5970M	Calibration Date: 6/8/99 18:45
Compound	% D
2-Butanone	25.2
4-Methyl-2-pentanone	33.0
2-Hexanone	26.0

Associated sample: TB TEAM2 060499.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Five method blanks (VBLKKL, VBLKMM, VBLKMQ, VBLKMR, and VBLKMW) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKKL

Compound	Concentration in ug/L
Acetone	2 J

Associated Samples: TB 052799, 8GU, and 8GL.

Method Blank VBLKMM

Compound	Concentration in ug/L
Methylene chloride	0.5 J
2-Butanone	1 J
Acetone	6 J
Xylene(total)	0.3 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.79)	56 JN

Associated samples: 32GL, 31GL, 31MI, REP-1, TB 052899, and FB 052899.

Method Blank VBLKMQ

Compound	Concentration in ug/L
Methylene chloride	0.2 J
2-Butanone	3 J
Acetone	7 J
4-Methyl-2-pentanone	0.4 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.71)	52 JN

Associated samples: 25GL, 2GL, TB TEAM2 060399, FB 060399, 12ML, 9GL, 13ML, TB TEAM1 060399, and 26GL.

Method Blank: VBLKMR

Compound	Concentration in ug/L
Methylene chloride	0.2 J
2-Butanone	2 J
Acetone	13
Xylene(total)	0.2 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.74)	21 JN

Associated sample: 7GL.

Method Blank VBLKMW

Compound	Concentration in ug/L
2-Butanone	2 J
Acetone	3 J
Xylene(total)	0.4 J
Tetrachloroethene	0.2 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.83)	16 JN

Associated sample: TB TEAM2 060499.

Five trip blanks were analyzed with this SDG. The following target compounds and/or TIC were detected in the trip blanks:

TB 052799

Compound	Concentration in ug/L
Methylene chloride	0.5 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.10)	10 JN

Associated samples: 8GU and 8GL.

TB 052899

Compound	Concentration in ug/L
Methylene chloride	3 JB
2-Butanone	1 JB

Associated samples: 32GL, 31GL, 31MI, and REP-1.

TB TEAM1 060399

Compound	Concentration in ug/L
Methylene chloride	1 JB
Acetone	2 JB

Associated samples: 12MI, 9GL, 7GL, and 13ML.

TB TEAM2 060399

Compound	Concentration in ug/L
Methylene chloride	0.5 JB

Associated samples: 25GL, 2GL, and 26GL.

TB TEAM2 060499

Compound	Concentration in ug/L
Methylene chloride	0.4 J
Acetone	3 JB
Benzene	0.4 J
1,1,2-Trichlorotrifluoroethane	0.4 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.83)	14 JNB

Associated samples: Samples in SDG 7099-1185B.

Two field blanks were associated with this SDG. The following target compounds and/or TICs were detected in the field blanks:

FB 052899

Compound	Concentration in ug/L
Methylene chloride	3 JB
Acetone	2 JB

Associated samples: 32GL, 31GL, 31MI, and REP-1.

FBB 060399

Compound	Concentration in ug/L
Methylene chloride	1 JB
Acetone	3 JB
2-Butanone	1 JB

TIC (Retention Time)	Concentration in ug/L
1-Propanol (7.19)	6 JN

Associated samples: 12MI, 9GL, 7GL, 13ML, 25GL, 2GL, and 26GL..

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	32GL, 31GL, 31MI, REP-1, 8GU, 8GL, 12MI, 9GL, 13MI, and 7GL.
Acetone	8GU, 8GL, 25GL, 2GL, 12MI, 9GL, 13ML, 26GL, and 7GL.
2-Butanone	12MI.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 2GL was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: One field replicate was collected with this sample set. Sample 31MI was replicated and labeled REP-1. The duplicate results are considered acceptable.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW
SDG 7099-1185C

Fourteen samples, four trip blanks, and two field blanks were collected June 8 through 10, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : One initial calibration was performed on May 27, 1999. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Three continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %D was found to be >25%:

Instrument ID: HP5970M	Calibration Date: 6/11/99 22:08
Compound	% D
Carbon Disulfide	-27.3

Associated samples: 28GLB.

The associated sample compound result was qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Three method blanks (VBLKM2, VBLKM3, and VBLKM4) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKM2

Compound	Concentration in ug/L
Acetone	10

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.77)	86 JN

Associated samples: 29GL, TB TEAM1 060899, TB TEAM2 060899, TB TEAM2 060999, FB 060899, FB 060999, 16GL, WT 060799, 4MI, and 36GL.

Method Blank VBLKM3

Compound	Concentration in ug/L
Acetone	2 J
Methylene chloride	0.8 J

Associated samples: 23GL, TB TEAM2 060999, 19MI, 1MI/L, 3ML, 8ML, 26MI, 18ML, and 28GLMP.

Method Blank VBLKM4

Compound	Concentration in ug/L
2-Butanone	1 J

Associated Samples: 28GLB.

Six trip blanks were analyzed with this SDG. Two trip blanks were analyzed in SDG 7099-1185D. Methylene chloride was detected in TB TEAM2 060999, TB TEAM1 061099, and TB TEAM2

061099 at 0.7 JB, 0.9 J, and 0.6 J ug/L, respectively. Acetone was detected in TB TEAM1 060899, TB TEAM2 060899, TB TEAM1 060999, and TB TEAM2 060999 at 2 JB, 2 JB, 1 JB, and 2 JB ug/L, respectively. No TICs were detected in the trip blanks.

Four field blanks were associated with this SDG. Two field blanks were analyzed in SDG 7099-1185D. Methylene chloride was detected in FB060999, FB061099, and FBB 061099 at 0.3 JB, 0.4 J, and 0.4 J ug/L, respectively. Acetone was detected in FB060999 and FBB 061099 at 2 JB and 5 J ug/L, respectively. No TICs were detected in the trip blanks.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	4MI, 36GL, 19MI, 23GL, 1MI/L, 8ML, 26MI, 18ML, 28GLB, and 28GLMP.
Acetone	29GL, WT 060799, 4MI, 19MI, 23GL, 1MI/L, 3ML, 8ML, 26MI, and 18ML.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 2MU from SDG 7099-1185B was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB. A QSC Spike Summary was also analyzed. All spike recoveries were within limits for the QSC Spike sample. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: No transcriptions between the quantitation reports and Form I's for the sample results. Sample 28GL was sampled using Micropurge, which was labeled 28GLMP, and a bailer, which was, labeled 28GLB. The results are considered acceptable for both sampling techniques.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-1185E

Eleven samples, five trip blanks, and three field blanks were collected June 15 through 18, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Three initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%, except for the following:

Instrument ID: HP59710	Calibration Date: 6/10/99
Compound	% RSD
Acetone	38.0

Associated samples: TB TEAM1 061799, FB 061799, TB TEAM2 061799, TB 061899, FB 061899, 14MI, 12ML, 32ML, and 16ML.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

CONTINUING CALIBRATION

VOCs : Six continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP59710	Calibration Date: 6/16/99 20:23
Compound	% D
Carbon disulfide	-26.5

Associated samples: 1 ML and 31ML

Instrument ID: HP59710	Calibration Date: 6/23/99 11:15
Compound	% D
Carbon Disulfide	-45.8
4-Methyl-2-pentanone	-29.2
2-Hexanone	-32.4

Associated samples: TB TEAM1 061799, FB 061791, TB TEAM2 061799, TB 061899, and FB 061899.

Instrument ID: HP59710M	Calibration Date: 6/23/99 21:30
Compound	% D
2-Butanone	-58.8
1,1,2-Trichlorotrifluoroethane	-32.9

Associated samples: 14MI, 12ML, 32ML, and 16ML.

Instrument ID: HP5970M	Calibration Date: 6/24/99 22:35
Compound	% D
Chloromethane	30.9

Associated sample: 5ML.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Six method blanks (VBLKMA, VBLKMD, VBLKMF, VBLKMO, VBLK08, and VBLK09) were analyzed with this SDG. The following target compound and/or TICs were detected in the method blanks:

Method Blank VBLKMA

Compound	Concentration in ug/L
Acetone	3 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (22.87)	25 JN

Associated samples: 1ML and 31ML

Method Blank VBLKMD

Compound	Concentration in ug/L
Acetone	6 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (22.82)	50 JN

Associated samples: TB TEAM1 061699, FB 061699, TB TEAM2 061699, 2ML, 2MI, and 6MI.

Method Blank VBLKMF

Compound	Concentration in ug/L
Acetone	10

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (22.84)	7 JN

Associated sample: 35GL

Method Blank VBLKMO

Compound	Concentration in ug/L
Methylene chloride	0.4 J
Acetone	14
2-Butanone	3J

Associated sample: 5ML

Method Blank VBLK08

Compound	Concentration in ug/L
Methylene chloride	0.6 J
Acetone	11J
2-Butanone	1 J

Associated samples: TB TEAM1 061799, FB 061799, TB TEAM2 061799, TB 061899, and FB 061899.

Method Blank VBLK09

Compound	Concentration in ug/L
Acetone	16
2-Butanone	4 J
Ethylbenzene	0.5 J
Styrene	0.4 J
Xylene (total)	2 J

Associated samples: 14MI, 12ML, 32ML and 16ML.

Six trip (TB TEAM1 061699, TB TEAM2 061699, TB TEAM1 061799, TB TEAM2 061799, and TB 061899 and from SDG TD99-1185D TB TEAM2 01599) were collected along with this sample set. No TICs were detected in the trip blanks. Methylene chloride was detected in TB TEAM2 061599, TB TEAM1 061699, TB TEAM2 061699, TB TEAM1 061799, and TB 061899 at 0.7 J, 0.6 J, 0.7 J, 0.3 JB, and 1 JB, respectively. Carbon disulfide and toluene were also detected in TB TEAM1 061799 at 0.1 J ug/L.

Four field blanks FB 061699, FB 061799, and FB 061899 and from SDG 7099-1185D FB 061599 were associated with this sample set. No TICs were detected in the field blanks. 2-Butanone was detected in FB 061799 at 1 JB. Methylene chloride and acetone were detected in FB 061899 at 0.4 JB and 2 JB, respectively.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Acetone	1ML, 14MI, 12ML, 32ML, 16ML, 35GL, and 5ML.
Methylene chloride	2ML, 14MI, 12ML, 16ML, 35GL, and 5ML.
2-Butanone	12ML and 16ML.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 23MI from SDG 7099-1185D was used for the matrix spike blank/matrix spike duplicate (MSD/MS/MSD). Spike recoveries and RPD values were within control limits for the MS/MSD and MSB. A QSC Spike Summary was also analyzed. 2-Butanone and 1,1,2-tetrachloroethane were not within limits for the QSC Spike sample. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: 1,2-Dichlorobenzene was reported on the quantitation report for 35GL. 1,2,3-Trichloropropene was reported on the quantitation report for TB TEAM1 061799. These compounds were not target compounds, however, calibrations were conducted for them. These compounds were added to the Form I TIC page for the samples and qualified as estimated (J). The N qualifier, tentatively identified, does not apply since the compound was calibrated for.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-1185F

Ten samples, one replicate, four trip blanks, and four field blanks were collected June 22 through July 2, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Four initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%, except for the following:

Instrument ID: HP5970K	Calibration Date: 5/1/99
Compound	% D
Chloroethane	32.2

Associated sample: TB 070199

Instrument ID: HP59710	Calibration Date: 6/10/99
Compound	% D
Acetone	38.0

Associated samples: TB 062399, FB062399, 33GL, 17GLMP, and 17GLB.

Instrument ID: HP59710	Calibration Date: 6/29/99
Compound	% D
Acetone	36.8

Associated samples: FB070199, FB070299, TB070299, 22ML, 17ML, JC HOSE, REP-3, and RW-1.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

CONTINUING CALIBRATION

VOCs : Seven continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970K Calibration Date: 7/2/99 21:38

Compound	% D
Carbon tetrachloride	37.9

Associated sample: TB070199.

Instrument ID: HP5970M Calibration Date: 6/24/99 09:45

Compound	% D
Chloromethane	40.6
Vinyl chloride	29.6
Chloroethane	34.1

Associated samples: FB 062299, 33MI, and 33ML.

Instrument ID: HP5970M Calibration Date: 6/24/99 22:35

Compound	% D
Chloromethane	30.9

Associated sample: TB 062299.

Instrument ID: HP5970M Calibration Date: 7/8/99 22:47

Compound	% D
Acetone	71.0
2-Butanone	39.6
2-Hexanone	34.3

Associated sample: 30ML.

Instrument ID: HP59710 Calibration Date: 6/23/99 08:43

Compound	% D
Bromomethane	-34.6
Vinyl chloride	-28.5
Chloroethane	-31.3
2-Butanone	-68.2
4-Methyl-2-pentanone	-36.8
2-Hexanone	-39.7
1,1,2-Trichlorotrifluorethane	-34.6

Associated samples: TB 062399, FB0362399, 33GL, 17GLMP, and 17GLB.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Seven method blanks (VBLKKT, VBLKMN, VBLKMO, VBLKMG, VBLKOG, VBLKOX, and VBLKOW) were analyzed with this SDG. The following target compound and TICs were detected in the method blanks:

Method Blank VBLKKT

Compound	Concentration in ug/L
2-Butanone	2 J
TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (23.31)	45 JN

Associated sample: TB 070199.

Method Blank VBLKMN

Compound	Concentration in ug/L
Methylene chloride	0.6 J
Acetone	6 J
TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.83)	55 JN

Associated samples: FB 062299, 33ML, and 33MI.

Method Blank VBLKMO

Compound	Concentration in ug/L
Methylene Chloride	0.4 J
Acetone	14
2-Butanone	3 J

Associated sample: TB062299.

Method Blank VBLKOG

Compound	Concentration in ug/L
Acetone	5 J
2-Butanone	3 JN

TIC (Retention Time)	Concentration in ug/L
Diphenyl ether (23.48)	5 JN

Associated samples: TB062399, FB062399, 33GL, 17GLMP, and 17GLB.

Method Blank: VBLKOW

Compound	Concentration in ug/L
Methylene chloride	0.3 J
Acetone	3 J
Carbon disulfide	0.4 J
Chlorobenzene	0.2 J
Xylene (total)	0.4 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (21.72)	42 JN

Associated samples: FB 00199, FB070299, TB070299, 22ML, 17 ML, JC HOSE, and REP-3.

Method Blank: VBLKOX

Compound	Concentration in ug/L
Acetone	14
2-Butanone	5 J
4-Methyl-2-pentanone	1 J
2-Hexanone	2 J

Associated sample: RW-1.

Method Blank: VBLKMV

Compound	Concentration in ug/L
Methylene chloride	1 J
Acetone	4 J
2-Butanone	2 J
Tetrachloroethene	0.3 J
Ethylbenzene	0.2 J
Styrene	0.1 J
Xylene (total)	0.6 J

Associated sample: 30ML.

Four trip blanks [TB062299, TB062399, TB070199, TB070299 (in SDG 0364B)] were collected along with this sample set. Target compounds were detected in the following trip blanks:

TB 062299

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (22.82)	32 JN

Associated samples: 33MI and 33ML.

TB 062299

Compound	Concentration in ug/L
Methylene chloride	2 JB
Acetone	2 JB
2-Butanone	0.7 JB

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (23.29)	35 JNB

Associated samples: 22ML, 17ML, and JC HOSE.

TB 070299

Compound	Concentration in ug/L
Methylene chloride	0.4 JB
Acetone	2 JB
Benzene	0.1 J
Xylene (total)	0.2 JB

Associated samples: RW-1, 30ML and REP-3.

Four field blanks (FB062299, FB062399, FB070199, and FB070299) were associated with this sample set. The following target compounds were detected in the field blanks:

FB 062299

Compound	Concentration in ug/L
Methylene chloride	0.4 JB

Associated samples: 33MI and 33ML.

FB 062399

Compound	Concentration in ug/L
2-Butanone	2 JB
Xylene (total)	0.5 J

Associated samples: 17GLMP, 17GLB, and 33GL.

FB070199

Compound	Concentration in ug/L
Methylene chloride	2 JB
Acetone	11
2-Butanone	3 J
Benzene	0.1 J
Ethylbenzene	0.2 J
Xylene (total)	0.5 JB

Associated samples: 17ML and 22ML and JC HOSE.

FB070299

Compound	Concentration in ug/L
Methylene chloride	58 B
Acetone	8 JB
Chloroform	2 J
2-Butanone	3 J
Benzene	0.3 J
Toluene	0.9J
Ethylbenzene	1 J
Xylene (total)	4 JB

Associated samples: RW-1, 30ML, and REP-3.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Acetone	33MI, 33ML, 17GLMP, 17GLB, 33GL, 30ML, 22ML, 17ML, REP-3, and RW-1.
Methylene chloride	30ML, 22ML, REP-3, and RW-1.
2-Butanone	17GLMP, 17GLB, 33GL, 30ML, 22ML, J C HOSE, and RW-1.
Ethylbenzene	30ML, 22ML, and REP-3.
Xylene (total)	30ML, 22ML, 17ML, REP-3, 17 GLMP, and 33 GL.
Benzene	30ML, 22 ML, 17ML, REP-3, and RW-1.

Compound	Sample IDs
Toluene	30ML and REP-3.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 30ML was used for the matrix spike blank/matrix spike/matrix spike duplicate (MSB/MS/MSD). Spike recoveries and RPD values were within control limits for the MS/MSD and MSB. A QSC Spike Summary was also analyzed. Vinyl Acetate was not within limits for the QSC Spike sample. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: No transcriptions between the quantitation reports and Form I's for the sample results. One field replicate was collected with this sample set. Sample 30ML was replicated and labeled REP-3. The replicate data was acceptable. Sample 17GL was sampled using Micropurge, which was labeled 17GLMP, and a bailer, which was labeled 17GLB. The results are considered acceptable for both sampling techniques.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-1185G

Three samples, two trip blanks, and one field blank was collected July 7 and 8, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : One initial calibration was performed on June 23, 1999. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Two continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 7/9/99
Compound	% D
Carbon tetrachloride	29.5

Associated samples: FB 7-7-99, TB-7-7-99, TB-7-8-99, and NST WEW.

Instrument ID: HP5970M	Calibration Date: 7/12/99
Compound	% D
1,1,1-Trichloroethane	31.5
Carbon tetrachloride	38.7

Associated samples: RW-2 and EW-1.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Two method blanks (VBLKMH and VBLKMS) were analyzed with this SDG. The following compound were detected in the method blanks:

Method Blank VBLKMH

Compound	Concentration in ug/L
Methylene chloride	5
Acetone	5 J
2-Butanone	2 J
4-Methyl-2-pentanone	0.6 J
Xylene (total)	0.3 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (22.89)	31 JN

Associated Samples: FB-7-7-99, TB-7-7-99, TB7-8-99, and NST WEW.

Method Blank VBLKMS

Compound	Concentration in ug/L
Methylene chloride	0.4 J
Acetone	5 J

TIC (Retention Time)	Concentration in ug/L
Unknown Straight Alkane (2130)	8 J
Butylated hydroxytoluene (22.8J)	5 JN

Associated samples: RW-2 and EW-1.

Two trip blanks TB-7-7-99 and TB-7-8-99 were analyzed with this SDG. The following compounds were detected in the trip blanks:

TB-7-7-99

Compound	Concentration in ug/L
2-Butanone	2 JB

Associated sample: RW-2.

TB-7-8-99

Compound	Concentration in ug/L
Acetone	2 JB

Associated samples: EW-1 and NST WEW.

One field blank FB-7-7-99 was associated with this SDG. The following target compounds were detected in the field blanks:

FB 061099

Compound	Concentration in ug/L
Methylene chloride	0.5 J
Acetone	2 JB
Benzene	1 J
Toluene	2 J
Xylene (total)	1 JB

TIC (Retention Time)	Concentration in ug/L
Propane, 2-Methoxy-2-Methyl (6.22)	15JN
Butylated hydroxytoluene (22.90)	8 JN
Trichloromonfluoromethane(3.90)	6 JN

Associated sample: RW-2.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Sample IDs	Compound
EW-1	Methylene Chloride
EW-1	Acetone
RW-2	Acetone
RW-2	Toluene
RW-2	Xylene (total)

Based on the method, trip, and/or field blank TIC data, the following sample results are qualified as not usable (R):

Sample ID	TIC (retention time)
RW-2	Butylated hydroxytoluene (22.90)
RW-2	Unknown Straight Alkane (21.38)

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 30ML from SDG 7099-1185F was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB. A QSC Spike Summary was also analyzed. Vinyl Acetate was not within limits for the QSC Spike sample. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW
SDG 7099-1235A

Twelve samples, four trip blanks, three field blanks, and a potable sample were collected June 1 and 2, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements, except for Potable, 22 GL, and TB TEAM1 060199 were two day out of the 7 day holding time criteria and 5GL, 5GU, 10GL, and TB TEAM2 060299 were one day out of the 7 day holding time criteria. Results for samples were qualified as estimated (J) for detects and estimated (UJ) for non-detects.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Three initial calibrations were performed on this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

Instrument ID: HP5970K	Calibration Date: 5/1/99
Compound	% D
Chloroethane	32.2

Associated samples: TB TEAM2 060199, FB060199, 1GL, and 30MI.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

CONTINUING CALIBRATION

VOCs : Five continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970K	Calibration Date: 6/3/99 16:37
Compound	% D
Acetone	-30.3
Carbon disulfide	32.0
2-Butanone	-31.7

Associated samples: TB TEAM2 060199 and FB 060199.

Instrument ID: HP5970K	Calibration Date: 6/5/99 08:25
Compound	% D
Carbon disulfide	33.2

Associated samples: 1GL and 30MI.

Instrument ID: HP5971L	Calibration Date: 6/8/99 15:52
Compound	% D
Bromomethane	-29.8
2-Butanone	165.0

Associated samples: 1MI, 5MI, 30GL, 1GU, TB TEAM1 060299, 11MI, FB060299, and FB BAILER.

Instrument ID: HP5971L	Calibration Date: 6/9/99 09:09
Compound	% D
2-Butanone	166.0

Associated sample: 11GL.

Instrument ID: HP5970M	Calibration Date: 6/10/99 08:29
Compound	% D
Acetone	26.5
Bromoform	25.3
Tetrachloroethene	30.7

Associated samples: TB TEAM2 060299, 22GL, TB TEAM1 060199, POTABLE, 5GL, 5GU, and10GL.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Five method blanks (VBLKKO, VBLKKR, VBLKLA, VBLKLB, and VBLKMZ) were analyzed with this SDG. The following compound were detected in the method blanks:

Method Blank VBLKKO

Compound	Concentration in ug/L
Acetone	6 J
2-Butanone	4J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (22.12	13 JN

Associated Samples: TB TEAM2 060199 and FB 060199.

Method Blank VBLKKR

Compound	Concentration in ug/L
Acetone	10

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (22.26)	30 JN
Unknown Isomer of Trimethyl (24.54)	12 J

TIC (Retention Time)	Concentration in ug/L
Unknown Isomer of Trimethyl (23.89)	10 J
Unknown Isomer of Trimethyl (25.37)	8 J
Unknown Isomer of Trimethyl (24.82)	7 J
Unknown (23.40)	6 J

Associated samples: 1GL and 30MI.

Method Blank VBLKLA

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (21.21)	52 JN

Associated samples: 1MI, 5MI, 30GL, 1GU, TB TEAM 1 060299, 11MI, FB060299, and FB BAILER.

Method Blank: VBLKLB

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (21.22)	89 JN

Associated samples: 11GL.

Method Blank VBLKMZ

Compound	Concentration in ug/L
Acetone	3 J

Associated samples: TB TEAM2 060299, 22GL, TB TEAM1 060199, POTABLE, 5GL, 5GU, and 10GL.

Four trip blanks TB TEAM 1 060199, TB TEAM2 060199, TB TEAM1 060299, and TB TEAM2 060299 were analyzed with this SDG. The following target compounds were detected in the trip blanks:

TB TEAM2 060299

Compound	Concentration in ug/L
Methylene chloride	0.4 J

Associated samples: 5GL, 5GU, 10GL, and 11GL.

TB TEAM2 060199

Compound	Concentration in ug/L
Methylene chloride	1 J
Acetone	5 JB

Associated samples: 30GL, 1GL, and 1GU.

Three field blanks (FB060199, FB060299, and FB BAILER) were associated with this sample set. The following target compounds were detected in the field blanks:

FB BAILER

TIC (Retention Time)	Concentration in ug/L
Propane, 2-Methoxy-2-methyl (9.53)	10 JN

Associated sample: 10GL.

FBB 060199

Compound	Concentration in ug/L
Methylene chloride	0.9 J
Acetone	4 JB

Associated samples: 30GL, 1GL, 1GU, 30MI, 1MI, and 22GL.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Acetone	5GL, 10GL, 1GL, and 30MI.
Methylene chloride	10GL and 1GL.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit:

Compound	TIC (retention time)
1GL	Butylated hydroxytoluene (22.26)
11GL	Butylated hydroxytoluene (21.04)

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 1MI was used for the MS/MSD analyses and MSB. One spike recovery and RPD values were outside control limits for the MS/MSD. The spike recoveries and RPDs were within control limits MSB. A QSC Spike Summary was also analyzed. 1,2-Dichloroethene and 2-butanone were not within limits for the QSC Spike sample. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: The following target compounds were reported on the quantitation report but were not reported on the form I:

Sample	Target Compound	Concentration in ug/L
1GL	1,1-Dichloroethene	1.3
1GL	1,1-Dichloroethane	0.5
1GL	1,1,1-Trichloroethane	0.5
30MI	1,1-Dichloroethane	0.5

The form I for these target compounds were changed.

1,2-Dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, methyltertbutyl ether and pentachloroethane was reported on the quantitation report for 1GL. Methyltertbutyl ether was reported on the quantitation report for 30MI. These compounds were not target compounds, however, calibrations were conducted for them. These compounds were added to the Form I TIC page for the samples and qualified as estimated (J). The N qualifier, tentatively identified, does not apply since the compound was calibrated for.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-2272A

Eight samples, one replicate, two trip blanks, and four field blanks were collected September 9 and 10, 1999 in this SDG and analyzed for VOCs. The chain-of-custody for September 9, 1999 did not have the sample date or matrix labeled. The lab contacted ARADIS Geraghty & Miller to confirm that they were collected on September 9, 1999 and were aqueous samples. Qualification of data was not necessary based on the chain-of-custody lacking that information.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : One initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Two continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5971L	Calibration Date: 9/13/99 20:49
Compound	% D
Acetone	-27.6
2-Butanone	-38.5
Bromoform	-26.2
4-Methyl-2-pentanone	-41.4
2-Hexanone	-44.5
1,1,2,2-Tetrachloroethane	-27.9

Associated samples: TB 9-9-99, TB-9-10-99, FB-9-9-99, FB-B-9-9-99, FB-9-10-99, FBB-9-10-99, MW37 MU-B, MW37 ML, GM38 MUM, GM38 MUB, and GM38 ML.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Two method blanks (VBLKLL and VBLKLM) were analyzed with this SDG. The following TIC was detected in a method blank:

Method Blank VBLKLL

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene (21.16)	57 JN

Associated samples: TB-9-9-99, TB-9-10-99, FB-9-9-99, FB-B-9-9-99, FB-9-10-99, FBB-9-10-99, MW37 MU-B, MW37 ML, GM38 MUM, GM38 MUB, and GM38 ML

Two trip blanks were analyzed with this SDG. No target compounds or TIC were detected in the trip blanks.

Four field blanks were associated with this SDG. No target compounds or TICs were detected in the field blanks.

No sample results were qualified based on method, trip, or field blank results.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample GM38ML was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: One field replicate was collected with this sample set. Sample MW37 MU-M was replicated and labeled REP-9-9-99. The duplicate results are considered acceptable. Sample MW-37 MU was sampled using Micropurge, which was labeled MW-37MU-M, and a bailer, which was labeled MW-37 MU-B. Sample GM38 MU was also sampled using Micropurge which was labeled GM38 MUM and sampled using a bailer, which was labeled GM38 MUB. The results are considered acceptable for both sampling techniques for GM38 MU. The results for MW37 MU were higher in the Micropurge sample. Qualification of the data was not necessary.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-2494A

Three samples, one trip blank, and two field blanks were collected September 27, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : One initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Two continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5971O	Calibration Date: 10/02/99 11:22
Compound	% D
Acetone	-25.4
Bromomethane	-25.2

Associated samples: MW39-MI GRUND and MW39-MI BLADDER.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Two method blanks (VBLKOD and VBLKOE) were analyzed with this SDG. No target compounds or TICs were detected in the method blanks.

A trip blank was analyzed with this SDG. The following target compound was detected in the trip blank:

TB 092799	
Compound	Concentration in ug/L
Methylene chloride	0.8 J

Associated samples: MW39-MI GRUND and MW39-MI BLADDER.

Two field blanks were associated with this SDG. The following target compounds were detected in the field blanks:

FIELD BLANK BAILER	
Compound	Concentration in ug/L
Methylene chloride	1 J
2-Butanone	2 J
Benzene	0.1 J

Associated sample: MW39-MI GRUND.

FIELD BLANK BLADD

Compound	Concentration in ug/L
Methylene chloride	1 J
Acetone	12
2-Butanone	6 J
Toluene	0.2 J

Associated sample: MW39-MI BLADDER.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Sample IDs	Compound
MW39-MI BLADDER	Methylene Chloride
MW39-MI BLADDER	Acetone
MW39-MI BLADDER	2-Butanone
MW39-MI BLADDER	Toluene
MW39-MI GRUND	Methylene Chloride
MW39-MI GRUND	2-Butanone

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample MW39-MI GRUND was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: Chloromethane was reported on the quantitation report for HYDRANT N/T39. The reference spectrum for chloromethane was crossed out by the lab. Chloromethane was not reported as detected HYDRANT N/T39 and was crossed off its quantitation report. Sample MW39-MI was sampled using Micropurge, which was labeled MW39-MI BLADDER, and a bailer, which was labeled MW39-MI

GRUND. The results for MW39 MI were higher in the Micropurge sample. Qualification of the data was not necessary.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW
SDG 7099-2570A

Two samples and one trip blank were collected October 4, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : One initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : One continuing calibration was performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5971O	Calibration Date: 10/8/99
Compound	% D
Acetone	-27.8

Associated samples: All.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : One method blank (VBLKO1) was analyzed with this SDG. The following target compounds were detected in a method blank:

Method Blank VBLKO1

Compound	Concentration in ug/L
Acetone	7 J
2-Butanone	3 J

Associated samples: All.

One trip blank was analyzed with this SDG. The following target compounds were detected in the trip blank:

TB100499

Compound	Concentration in ug/L
Methylene chloride	0.6 J
2-Butanone	2 JB

Associated samples: All.

Methylene chloride, acetone, and 2-butanone were qualified as not detected (U) in LAKE SUCCESS based on method and trip blank results.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: A batch specific sample was used for the MS/MSD analyses and MSB. One spike recovery from the MS and two RPD values were above control limits for the MS/MSD. No qualification of the data was necessary based on MS/MSD and MSB results.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW
SDG 7099-2655A

Three samples, one trip blank, and two field blanks were collected October 8, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : One initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : One continuing calibration was performed for this SDG. All compounds had RRFs >0.05 and %Ds were found to be <25%.

BLANKS

VOCs : One method blank (VBLKO6) was analyzed with this SDG. Acetone was detected in the method blank at 3 ug/L.

A trip blank was analyzed with this SDG. The following target compound was detected in the trip blank:

TB 10-8-99

Compound	Concentration in ug/L
Methylene chloride	1 J

Associated samples: All.

Two field blanks were associated with this SDG. The following target compounds were detected in the field blanks:

FB-B 10-8-99

Compound	Concentration in ug/L
Methylene chloride	0.8 J
2-Butanone	2 J
Acetone	3 JB

Associated sample: 39MU-B and 39MI.

FBP 10-8-99

Compound	Concentration in ug/L
Methylene chloride	0.7 J
Acetone	5 JB
2-Butanone	2 J

Associated sample: 39MU-MP.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene Chloride	39MU-MP and 39MI.
Acetone	39MU-MP, 39MU-B, and 39MI.
2-Butanone	39MU-B and 39MI.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: A batch specific sample was used for the MS/MSD analyses and MSB. Spike recoveries and RPD values were within control limits for the MS/MSD and MSB.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: Sample 39MU was sampled using Micropurge, which was labeled 39MU-MP, and a bailer, which was labeled 39MU-B. The results for 39MU were higher in the Micropurge sample. Qualification of the data was not necessary.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

Table 1. Summary of samples discussed in this validation memo.

Sample Identification	Sample Date	Lab Identification	SDG
TB 052799	5/27/99	991185A-01	1185A
8GU	5/27/99	991185A-02	1185A
8GL	5/27/99	991185A-03	1185A
32GL	5/28/99	991185A-04	1185A
31GL	5/28/99	991185A-05	1185A
31MI	5/28/99	991185A-06	1185A
REP-1	5/28/99	991185A-07	1185A
TB 052899	5/28/99	991185A-08	1185A
FB 052899	5/28/99	991185A-09	1185A
25 GL	6/3/99	991185A-10	1185A
2 GL	6/3/99	991185A-11	1185A
TB TEAM2 060399	6/3/99	991185A-12	1185A
FB 060399	6/3/99	991185A-13	1185A
12 MI	6/3/99	991185A-14	1185A
9 GL	6/3/99	991185A-15	1185A
7 GL	6/3/99	991185A-16	1185A
13 ML	6/3/99	991185A-17	1185A
TB TEAM1 060399	6/3/99	991185A-18	1185A
26 GL	6/3/99	991185A-19	1185A
TB TEAM2 060499	6/4/99	991185A-20	1185A
TB TEAM1 060499	6/4/99	991185B-01	1185B
FB 060499	6/4/99	991185B-02	1185B
4GL	6/4/99	991185B-04	1185B
6GLMP	6/4/99	991185B-05	1185B
27GL	6/4/99	991185B-06	1185B
3GL	6/4/99	991185B-07	1185B
15GL	6/4/99	991185B-08	1185B
REP 2	6/4/99	991185B-09	1185B
6GL B	6/4/99	991185B-10	1185B
2MI	6/7/99	991185B-11	1185B
2MU	6/7/99	991185B-12	1185B
TB TEAM1 060799	6/7/99	991185B-13	1185B
19GU	6/7/99	991185B-14	1185B
21GU	6/7/99	991185B-15	1185B
24GL	6/7/99	991185B-16	1185B
FB 060799	6/7/99	991185B-17	1185B
FB AQUA BAILER	6/7/99	991185B-18	1185B

Table 1. Summary of samples discussed in this validation memo.

Sample Identification	Sample Date	Lab Identification	SDG
TB TEAM2 060799	6/7/99	991185B-19	1185B
18GL	6/8/99	991185B-20	1185B
29GL	6/8/99	991185C-01	1185C
19MI	6/8/99	991185C-02	1185C
23GL	6/8/99	991185C-03	1185C
TB TEAM1 060899	6/8/99	991185C-04	1185C
TB TEAM2 060899	6/8/99	991185C-05	1185C
FB 060899	6/8/99	991185C-06	1185C
16GL	6/8/99	991185C-07	1185C
WT 060799	6/7/99	991185C-08	1185C
4MI	6/9/99	991185C-09	1185C
36GL	6/9/99	991185C-10	1185C
1MI/L	6/9/99	991185C-11	1185C
TB TEAM1 060999	6/9/99	991185C-12	1185C
TB TEAM2 060999	6/9/99	991185C-13	1185C
FB 060999	6/9/99	991185C-14	1185C
28GLMP	6/10/99	991185C-15	1185C
28GLB	6/10/99	991185C-16	1185C
26MI	6/10/99	991185C-17	1185C
3ML	6/10/99	991185C-18	1185C
18ML	6/10/99	991185C-19	1185C
8ML	6/10/99	991185C-20	1185C
FB 061099	6/10/99	991185D-01	1185D
TB TEAM1 061099	6/10/99	991185D-02	1185D
TB TEAM2 061099	6/10/99	991185D-03	1185D
FBB 061099	6/10/99	991185D-04	1185D
TB 061199	6/11/99	991185D-05	1185D
FB 061199	6/11/99	991185D-06	1185D
15ML	6/11/99	991185D-07	1185D
7ML	6/11/99	991185D-08	1185D
FB 061499	6/14/99	991185D-09	1185D
TB 061499	6/14/99	991185D-10	1185D
REP-3	6/14/99	991185D-11	1185D
27MI	6/14/99	991185D-12	1185D
23MI	6/14/99	991185D-13	1185D
28MI	6/14/99	991185D-14	1185D

Table 1. Summary of samples discussed in this validation memo.

Sample Identification	Sample Date	Lab Identification	SDG
FB 061599	6/15/99	991185D-15	1185D
TB TEAM1 061599	6/15/99	991185D-16	1185D
TB TEAM2 061599	6/15/99	991185D-17	1185D
24MI	6/15/99	991185D-18	1185D
25MI	6/15/99	991185D-19	1185D
29MI	6/15/99	991185D-20	1185D
1ML	6/15/99	991185E-01	1185E
31ML	6/15/99	991185E-02	1185E
TB TEAM1 061699	6/16/99	991185E-03	1185E
TB TEAM2 061699	6/16/99	991185E-04	1185E
2-ML	6/16/99	991185E-05	1185E
32-MI	6/16/99	991185E-06	1185E
35-GL	6/16/99	991185E-07	1185E
6-MI	6/16/99	991185E-08	1185E
FB 061699	6/16/99	991185E-09	1185E
14MI	6/17/99	991185E-10	1185E
TB TEAM1 061799	6/17/99	991185E-12	1185E
FB 061799	6/17/99	991185E-13	1185E
12ML	6/17/99	991185E-14	1185E
32ML	6/17/99	991185E-15	1185E
16ML	6/17/99	991185E-16	1185E
TB TEAM2 061799	6/17/99	991185E-17	1185E
5ML	6/18/99	991185E-18	1185E
TB 061899	6/18/99	991185E-19	1185E
FB 061899	6/18/99	991185E-20	1185E
33MI	6/22/99	991185F-01	1185F
33ML	6/22/99	991185F-02	1185F
FB 062299	6/22/99	991185F-03	1185F
TB 062299	6/22/99	991185F-04	1185F
17GLMP	6/23/99	991185F-05	1185F
17GLB	6/23/99	991185F-06	1185F
33GL	6/23/99	991185F-07	1185F
TB 062399	6/23/99	991185F-08	1185F
FB 062399	6/23/99	991185F-09	1185F
22ML	7/1/99	991185F-10	1185F
17ML	7/1/99	991185F-11	1185F

Table 1. Summary of samples discussed in this validation memo.

Sample Identification	Sample Date	Lab Identification	SDG
TB 070199	7/1/99	991185F-12	1185F
FB 070199	7/1/99	991185F-13	1185F
JC HOSE	7/1/99	991185F-14	1185F
RW-1	7/2/99	991185F-15	1185F
30ML	7/2/99	991185F-16	1185F
REP-3	7/2/99	991185F-17	1185F
FB 070299	7/2/99	991185F-18	1185F
TB 070299	7/2/99	991185F-19	1185F
FB-7-7-99	7/7/99	991185G-01	1185G
TB-7-7-99	7/7/99	991185G-02	1185G
NST WEW	7/8/99	991185G-03	1185G
EW-1	7/8/99	991185G-04	1185G
TB-7-8-99	7/8/99	991185G-05	1185G
RW-2	7/7/99	991185G-06	1185G
30 GL	6/1/99	991235A-01	1235A
1 GL	6/1/99	991235A-02	1235A
1 GU	6/1/99	991235A-03	1235A
FB 060199	6/1/99	991235A-04	1235A
TB TEAM2 060199	6/1/99	991235A-05	1235A
30 MI	6/1/99	991235A-06	1235A
1 MI	6/1/99	991235A-07	1235A
22 GL	6/1/99	991235A-08	1235A
TB TEAM1 060199	6/1/99	991235A-09	1235A
POTABLE	6/1/99	991235A-10	1235A
5 GL	6/2/99	991235A-11	1235A
5 GU	6/2/99	991235A-12	1235A
10 GL	6/2/99	991235A-13	1235A
TB TEAM2 060299	6/2/99	991235A-14	1235A
5 MI	6/2/99	991235A-15	1235A
TB TEAM1 060299	6/2/99	991235A-16	1235A
11 MI	6/2/99	991235A-17	1235A
11 GL	6/2/99	991235A-18	1235A
FB 060299	6/2/99	991235A-19	1235A
FB BAILER	6/2/99	991235A-20	1235A
TB 081099	8/10/99	991931A-01	1931A

Table 1. Summary of samples discussed in this validation memo.

Sample Identification	Sample Date	Lab Identification	SDG
NST WELL	8/10/99	991931A-02	1931A
38 CLUSTER HOSE	8/10/99	991931A-03	1931A
MW37 MU-M	9/9/99	992272A-01	2272A
MW37 MU-B	9/9/99	992272A-02	2272A
MW37 MI	9/9/99	992272A-03	2272A
MW37 ML	9/9/99	992272A-04	2272A
REP-9-9-99	9/9/99	992272A-05	2272A
FB-9-9-99	9/9/99	992272A-06	2272A
TB-9-9-99	9/9/99	992272A-07	2272A
FB-B-9-9-99	9/9/99	992272A-08	2272A
6M38 MUM	9/10/99	992272A-09	2272A
6M38 MUB	9/10/99	992272A-10	2272A
6M38 MI	9/10/99	992272A-11	2272A
FB-9-10-99	9/10/99	992272A-12	2272A
FBB-9-10-99	9/10/99	992272A-13	2272A
TB-9-10-99	9/10/99	992272A-14	2272A
6M38 ML	9/10/99	992272A-15	2272A
MW39-MI BLADDER	9/27/99	992494A-01	2494A
MW39-MI GRUND F	9/27/99	992494A-02	2494A
FIELD BLANK BAI	9/27/99	992494A-03	2494A
FIELD BLANK BLA	9/27/99	992494A-04	2494A
TB092799	9/27/99	992494A-05	2494A
HYDRANT N/T39	9/27/99	992494A-06	2494A
DEEPDALE	10/4/99	992570A-01	2570A
LAKE SUCCESS	10/4/99	992570A-02	2570A
TB 10-4-99	10/4/99	992570A-03	2570A
39MU-MP	10/8/99	992655A-01	2655A
39MU-B	10/8/99	992655A-02	2655A
39MI	10/8/99	992655A-03	2655A
FB-B 10-8-99	10/8/99	992655A-04	2655A
FBP 10-8-99	10/8/99	992655A-05	2655A
TB 10-8-99	10/8/99	992655A-06	2655A

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MEMO

To:
Neil Benowitz

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ENVRIONMENTAL

From:
Donna M Brown

Date:
April 20, 2000

Subject:
Data Validation of Volatile Organic Compound and Metals Groundwater Samples Collected at the Former Unisys facility, Great Neck Site, New York from November through January (Project No. NY001227.0012.00005).

Groundwater samples, replicates, and associated blanks were collected from October 1999 through January 2000 at the Former Unisys facility, Great Neck Site, New York. The samples were sent to Severn Trent Laboratories (STL) in Monroe, Connecticut for the analysis of volatile organic compounds (VOCs) using purge and trap GC/MS following New York State Department of Environmental Conservation (NYSDEC) 10/95 Method NYDEC 95-1 and selected samples were analyzed for ICAP metals using ICP and mercury following United States Environmental Protection Agency (USEPA) CLP SOW IMO4.0.

A full validation was conducted on twenty percent of the samples collected. The full validation was conducted following the quality assurance/quality control (QA/QC) criteria set forth in the method, and the document "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" dated February 1993 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" dated February 1994. The remaining eighty percent of the samples were reviewed for completeness and technical compliance in accordance with the above documents. The review of the VOC data packages included checking the following:

- Chain-of-custody forms.
- Holding times.
- GC/MS Instrument Performance checks
- Instrument calibration.
- Blank contamination (method, field, and trip).

- Surrogate spike recoveries.
- Matrix spike and/or duplicate results.
- Internal standards.
- Check for transcriptions between quantitation reports and form I's.
- Blind field replicates.

The review for the metals data packages included checking the following:

- Chain-of-custody forms.
- Holding times.
- Instrument calibration.
- Blank contamination (preparation, continuing, and field).
- ICP interference check samples.
- Laboratory control samples.
- Laboratory duplicates.
- Spike sample recovery.
- ICP Serial dilution.
- Blind field replicates.

The quality of the data was acceptable with the appropriate qualifications described in this memorandum. The laboratory provided eleven data packages. The analytical data for samples were provided by the laboratory in sample delivery groups (SDG) 7099-2853A, 7099-2959A, 7099-2992A, 7099-3055A, 7099-3055B, 7099-3270A, 7099-3270B, and 7000-0077A. Package 7099-3055A was fully validated. The data validation results, for each SDG, are discussed separately below. The fully validated data was discussed first and then the review data.

VOC FULL DATA VALIDATION

SDG 7099-3055A

Ten samples, one replicate, four trip blanks, and four field blanks were collected November 15 through 18, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs: The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs: All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs: One initial calibration was performed with this sample set. The compound relative response factors (RRFs) were found to be >0.05 and compound relative standard deviations (%RSDs) were found to be < 30% except for acetone. Acetone's %RSD was above limits and was qualified as estimated (J) if detected and estimated (UJ) if not detected in all samples based on the initial calibration results.

CONTINUING CALIBRATION

VOCs: Six continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound percent differences (%Ds) were found to be >25%:

Instrument ID: HP59710	Calibration Date: 11/22/99 22:17
Compound	%D
Acetone	-47.4

Associated samples: TB111899, FB111899, REP-1, and 8GU.

Instrument ID: HP59710	Calibration Date: 11/23/99 22:14
Compound	%D
1,1,2,2-Tetrachloroethane	-29.6
Bromoform	-30.7
Acetone	-44.9
2-Butanone	-40.5
4-Methyl-2-pentanone	-39.0
2-Hexanone	-38.4

Associated samples: 2MI, 15GL, and 4MI.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs: Six method blanks (VBLKOQ, VBLKOI, VBLKOO, VBLKOR, VBLKOS, and VBLKOX) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKOQ

Compound	Concentration in micrograms per liter (ug/L)
2-Butanone	4 J
Acetone	7 J

TIC (Retention Time)	Concentration in ug/L
3-Cyclohexene-1-methanol, .A(26.20)	46 JN
Bicyclo(2.2.1) Heptan-2-ol, l(26.13)	28 JN
Acetic Acid (12.36)	13 JN
Bicyclo(2.2.1) Heptan-2-ol, l(24.63)	11 JN

Associated samples: FB111699, TB111699, FB111799, TB11799, 7GL, and 3GL.

Method Blank VBLKOI

Compound	Concentration in ug/L
2-Butanone	8 J
Acetone	9 J
4-Methyl-2-pentanone	3 J
2-Hexanone	6 J

Associated samples: 2MI, 15GL, and 4MI.

Method Blank VBLKOO

Compound	Concentration in ug/L
Acetone	4 J
2-Butanone	5 J

TIC (Retention Time)	Concentration in ug/L
Unknown C2H4O2 Isomer (12.42)	25 JN
Acetic Acid (12.29)	18 JN
Unknown (26.23)	7 J

Associated samples: TB111599 and FB111599.

Method Blank VBLKOR

Compound	Concentration in ug/L
Acetone	8 J
2-Butanone	4 J

TIC (Retention Time)	Concentration in ug/L
3-Cyclohexene-1-methanol, .A(26.20)	17 JN
Acetic Acid (12.29)	12 JN

Associated samples: 29ML, 29GL, and 8GL.

Method Blank VBLKOS

Compound	Concentration in ug/L
Acetone	6 J
2-Butanone	3 J

Associated sample: 35GL.

Method Blank VBLKOX

Compound	Concentration in ug/L
Acetone	12
2-Butanone	5 J

TIC (Retention Time)	Concentration in ug/L
Butylated hydroxytoluene(25.74)	9 JN
Acetic Acid (12.29)	18 JN

Associated samples: TB111899, FB111899, REP-1, and 8GU.

Four trip blanks were analyzed in association with this SDG. The following target compounds and/or TIC were detected in the trip blanks:

TB111599

Compound	Concentration in ug/L
Methylene chloride	0.8 J
Acetone	16
2-Butanone	5 JB

TIC (Retention Time)	Concentration in ug/L
Unknown carboxylic acid (21.29)	10 J
Unknown carboxylic acid (20.80)	5 J

Associated sample: 7GL.

TB111699

Compound	Concentration in ug/L
Methylene chloride	0.7 J
Acetone	24 B
2-Butanone	6 JB

TIC (Retention Time)	Concentration in ug/L
Cyclohexene-1-methanol, .A(26.20)	20 JNB

Associated samples: 29GL, 29ML, 3GL, 35GL, and REP-1.

TB111799

Compound	Concentration in ug/L
2-Butanone	4 JB
Acetone	6 JB

TIC (Retention Time)	Concentration in ug/L
Cyclohexene-1-methanol, .A(26.20)	10 JNB

Associated samples: 8GL, 8GU, and 2MI.

TB111899

Compound	Concentration in ug/L
Methylene chloride	0.8 J
Acetone	12

Associated samples: 15GL and 4MI.

Four field blanks were analyzed in association with this SDG. The following target compounds and/or TIC were detected in the field blanks:

FB111599

Compound	Concentration in ug/L
Methylene chloride	0.9 J
Acetone	15 B
2-Butanone	6 JB

TIC (Retention Time)	Concentration in ug/L
Butanoic acid butyl ester(21.29)	12 JN

TIC (Retention Time)	Concentration in ug/L
Carboxylic acid(20.81)	6 J

Associated sample: 7GL.

FB111699

Compound	Concentration in ug/L
Methylene chloride	0.6 J
Acetone	12 B
2-Butanone	4 JB

TIC (Retention Time)	Concentration in ug/L
Acetic acid(12.28)	10 JNB
3-Cyclohexene-1-methanol(26.20)	28 JNB

Associated samples: 29GL, 29ML, 3GL, 35GL, and REP-1.

FB111799

Compound	Concentration in ug/L
Methylene chloride	0.7 J
Acetone	13 B
2-Butanone	4 JB

TIC (Retention Time)	Concentration in ug/L
3-Cyclohexene-1-methanol(26.20)	11 JNB

Associated samples: 8GL, 8GU, and 2MI.

FB111899

Compound	Concentration in ug/L
Acetone	12 B

Associated samples: 15GL and 4MI.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect (U) at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	29GL.

Compound	Sample IDs
Acetone	7GL, 29GL, 29ML, 3GL, 35GL, REP-1, 8GL, 8GU, 2MI, 15GL, and 4MI.
2-Butanone	7GL, 29GL, 29ML, 35GL, REP-1, 8GL, 8GU, 2MI, and 4MI.

Based on the method, trip, and/or field blank results, the following TIC sample results are qualified not usable (R):

TIC	Sample IDs
3-Cyclohexene-1-methanol	7GL, 29ML, and 3GL.
Acetic acid	29ML.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 29MI was used for the matrix spike blank/matrix spike/matrix spike duplicate (MSB/MS/MSD). The spike recoveries and relative percent difference (RPD) values were within control limits for the MS/MSD and MSB and the percent recoveries (%R) were with limits. A QCS spike summary was also provided with this SDG. Vinyl acetate was outside of limits in the QCS summary. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

TARGET COMPOUND IDENTIFICATION

VOCs: Target compounds detected in the samples were reported correctly.

COMPOUND QUANTITATION AND REPORTED CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

VOCs: All compound detection limits were met.

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

VOCs : Tentatively identified compounds were reported correctly.

SYSTEM PERFORMANCE

VOCs : The performance of the instruments during analysis is considered acceptable.

OVERALL ASSESSMENT OF DATA

VOCs : One field replicate was collected with this SDG. Sample 3GL was replicated and labeled REP-1. The duplicate results are considered acceptable.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

METAL DATA FULL VALIDATION
SDG 7099-3055A

One sample and one field blank were collected on November 18, 1999 in this SDG and analyzed for metals.

HOLDING TIMES

Metals: All samples were analyzed within holding time requirements.

CALIBRATION

Metals: One initial and five continuing calibrations were analyzed with this SDG. The following calibrations had %R below QC limits:

Initial Calibration

Compound	% R
Thallium	110.3

Associated samples: All samples.

Continuing Calibration 2

Compound	% R
Lead	110.7

Associated samples: All samples.

The thallium and lead results for associated samples were qualified as estimated (J), if detected.

A CRDL standard for ICP was also conducted. The following %Rs for CRDL Standard for ICP were not within QC limits:

CRDL Standard for ICP

Compound	% R
Initial lead	133
Final lead	152.5
Final Thallium	63.8
Initial Thallium	36.6

Associated samples: All samples.

Qualification of the data was not necessary based on CRDL standard for ICP results.

BLANKS

Metals : One initial calibration blank (ICB), five continuing calibration blanks (CCBs), and one preparation blank were analyzed with this sample set. No metals were detected in the blanks associated with samples in this SDG above the CRDL.

A field blank was collected with the samples in this SDG. The following compounds were detected in the field blank:

Compound	FB111899 Concentration in ug/L
Calcium	169B

Compound	FB111899 Concentration in ug/L
Magnesium	23.2 B
Potassium	109 B
Sodium	123 B
Zinc	4.8 B

Associated Samples: All samples.

Zinc was qualified as not detected (U) for sample 4GL based on the blank results.

ICP INTERFERENCE CHECK SAMPLE (ICS)

Metals : The percent recoveries (%R) for the ICS analyses were within the control limits of ±20% except for thallium (127.1 % and 121.1 %) and copper (120.1). Thallium and copper results were qualified as estimated (J), if detected.

LABORATORY CONTROL SAMPLE (LCS)

Metals : All LCS results were within the control limits.

DUPLICATE SAMPLE ANALYSIS

Metals : Sample 4GL was selected for the duplicate analysis. The RPD were within the control limits.

SPIKE SAMPLE ANALYSIS

Metals : Sample 4GL was selected for the spike analysis. The percent recoveries were within the QC limits.

FURNACE ATOMIC ABSORPTION QC

Metals : Not required.

ICP SERIAL DILUTION

Metals : Sample 4GL was selected for the ICP serial dilution. The ICP serial dilution results were within the control limits except for sodium, which was above QC limits. Sodium was qualified as estimated in 4GL and FB111899 based on ICP serial dilution results.

SAMPLE RESULT VERIFICATION

Metals : All sample results were reported correctly.

OVERALL ASSESSMENT OF DATA

Metals : One blind duplicate was collected with this sample set. Sample 4GL was replicated and labeled 4DL in SDG 7099-3055B. The following duplicate results, aluminum, iron, and lead were qualified as estimated (J) in 4GL and 4DL.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-2853A

One sample, one replicate, one trip blank, and one field blank were collected October 26, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : An initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%, except for the following:

Instrument ID: HP5970M	Calibration Date: 11/01/99
Compound	% RSD
Chloroethane	50.3

Associated samples: All samples.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

CONTINUING CALIBRATION

VOCs : A continuing calibration was performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 11/2/99 08:54
Compound	% D
1,1-Dichloroethene	29.9
1,1,2-Trichlorotrifluoroethane	26.5

Associated samples: All samples.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : A method blank (VBLKML) was analyzed with this SDG. No target compounds or TICs were detected in the method blank.

A trip blank was analyzed with this SDG. The following target compound was detected in the trip blank:

TB102699	
Compound	Concentration in ug/L
Styrene	0.3 J

Associated samples: 39ML and 39AA.

A field blank was associated with this SDG. The following target compounds were detected in the field blank:

FB102699

Compound	Concentration in ug/L
Toluene	0.9 J
Xylene (total)	0.6 J

Associated samples: 39ML and 39AA.

Based on the method, trip, and/or field blank results, styrene was qualified non-detect (U) in 39AA.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: A batch specific sample was used for the MS/MSD analyses and MSB. A RPD value was outside control limits for the MS/MSD. A QCS spike summary was also provided with this SDG. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: One field replicate was collected with this sample set. Sample 39ML was replicated and labeled 39AA. The duplicate results are considered acceptable.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-2959A

Three samples, two trip blanks, and one field blanks were collected November 3 and 4, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Two initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%, except for the following:

Instrument ID: HP5970K	Calibration Date: 10/09/99
Compound	% RSD
Acetone	34.0

Associated samples: NST WELL, POOL, and TB110399.

Instrument ID: HP59710	Calibration Date: 11/2/99
Compound	% RSD
Bromomethane	38.3
Chloroethane	46.0

Associated samples: TB110499, FB110499, and N1107.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

CONTINUING CALIBRATION

VOCs : Two continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970K	Calibration Date: 11/05/99 10:00
Compound	% D
Acetone	-42.4
1,1-Dichloroethane	30.6
4-Methyl-2-pentanone	-27.5
2-Hexanone	-26.8

Associated samples: NST WELL, POOL, and TB110399.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Two method blanks (VBLKKC and VBLKO3) were analyzed with this SDG. The following target compounds were detected in the method blank:

Method Blank VBLKO3	
Compound	Concentration in ug/L
2-Butanone	2 J
Methylene chloride	0.7 J
Acetone	4 J

Associated samples: FB110499, TB110499, and N1107.

Two trip blanks (TB110399 and TB110499) were collected along with this sample set. Target compounds were detected in the following trip blanks:

TB110399	
Compound	Concentration in ug/L
Methylene chloride	0.5 J
Tetrachloroethene	0.3 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (23.52)	42 JN

Associated samples: NST WELL and POOL.

TB110499

Compound	Concentration in ug/L
Methylene chloride	0.8 JB
Acetone	9 JB
2-Butanone	2 JB

Associated sample: N1107.

A field blank (FB110499) was associated with this sample set. The following target compounds were detected in the field blank:

FB110499

Compound	Concentration in ug/L
Methylene chloride	0.7 JB
Acetone	2 JB
2-Butanone	2 JB

Associated samples: N1107.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Acetone	N1107.
2-Butanone	N1107.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Not provided with this SDG.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-2992A

One sample, one trip blank, and one field blank were collected November 11, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Two initial calibrations were performed with this sample set. The compound RRFs found to be >0.05 and compound %RSD were found to be < 30% except for the following:

Instrument ID: HP59710	Calibration Date: 11/2/99
Compound	% RSD
Bromomethane	38.3
Chloroethane	46

Associated samples: FB110999 and N12450.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

CONTINUING CALIBRATION

VOCs : Two continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 11/12/99 09:14
Compound	% D
Acetone	-29.3
Chloroethane	27.8
4-Methyl-2-pentanone	-25.3
2-Hexanone	-28.1

Associated sample: TB110999.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Two method blanks (VBLKM9 and VBLKO7) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKM9

Compound	Concentration in ug/L
Acetone	8 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (22.91)	20 JN

Associated sample: TB110999.

Method Blank VBLKO7

Compound	Concentration in ug/L
2-Butanone	3 J
Acetone	7 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (26.12)	28 JN

Associated samples: FB110999 and N12450.

A trip blank was analyzed with this SDG. The following target compound was detected in the trip blank:

TB110999	
Compound	Concentration in ug/L
Methylene chloride	1 J
Acetone	9 JB

Associated samples: N12450.

A field blank was associated with this SDG. The following target compounds were detected in the field blanks:

FB110999	
Compound	Concentration in ug/L
Methylene chloride	2 J
2-Butanone	1 JB
Acetone	8 JB

Associated sample: N12450.

No results were qualified based on the method, trip, and/or field blank results.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for the sample and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: A batch specific sample was used for the MS/MSD analyses and MSB. A RPD value was outside control limits for the MS/MSD. A QCS spike summary was also provided with this SDG. Four compounds were outside QC limits in the QCS summary. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-3055B

Five samples, two trip blanks, and two field blanks were collected November 19 through 22, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs: The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs: All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs: One initial calibration was performed with this sample set. The compound relative response factors (RRFs) were found to be >0.05 and compound relative standard deviations (%RSDs) were found to be < 30% except for acetone. Acetone's %RSD was above limits and was qualified as estimated (J) if detected and estimated (UJ) if not detected in all samples based on the initial calibration results.

CONTINUING CALIBRATION

VOCs: One continuing calibration was performed for this SDG. All compounds had RRFs >0.05. The following compound percent differences (%Ds) were found to be >25%:

Instrument ID: HP59710	Calibration Date: 11/24/99 09:23
Compound	%D
1,1,2,2-Tetrachloroethane	-27.7

Compound	%D
Bromoform	-25.9
Acetone	-37.0
2-Butanone	-26.8
4-Methyl-2-pentanone	-35.1
2-Hexanone	-35.1

Associated samples: All samples.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs: A method blank (VBLK03) was analyzed with this SDG. The following target compounds and/or TICs were detected in the method blank:

Method Blank VBLK03

Compound	Concentration in ug/L
2-Butanone	3 J
Acetone	3 J

TIC (Retention Time)	Concentration in ug/L
Acetic Acid (12.34)	7 JN
Butylated Hydroxytoluene (25.78)	6 JN

Associated samples: All samples.

Two trip blanks were analyzed in association with this SDG. The following target compounds and/or TIC were detected in the trip blanks:

TB111999

Compound	Concentration in ug/L
Methylene chloride	2 J
Acetone	5 JB

TIC (Retention Time)	Concentration in ug/L
Acetic acid (12.32)	6 JNB

Associated sample: 5MI, 5ML, and 7ML.

TB112299

Compound	Concentration in ug/L
Methylene chloride	1 J
Acetone	5 JB
2-Butanone	2 JB

Associated samples: 1ML and 1MI/L.

Two field blanks were analyzed in association with this SDG. The following target compounds were detected in a field blank:

FB112299

Compound	Concentration in ug/L
Methylene chloride	2 J
2-Butanone	2 JB

Associated sample: 1ML and 1MI/L.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect (U) at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	5MI, 5ML, 7ML, and 1MI/L.
Acetone	5MI, 5ML, 7ML, and 1MI/L.
2-Butanone	5ML and 7ML.

Based on the method, trip, and/or field blank results, the following TIC sample results are qualified not usable (R):

TIC	Sample IDs
Acetic acid	7ML and 1MI/L.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: A batch specific sample was used for the MSB/MS/MSD. The spike recoveries and RPD values were within control limits for the MS/MSD and MSB and the %R were with limits. A QCS spike summary was also provided with this SDG. The %Rs were within QC limits for the QCS summary. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs : No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

METAL REVIEW
SDG 7099-3055B

One replicate was collected on November 18, 1999 in this SDG and analyzed for metals. The sample and associated field blank were analyzed in SDG 7099-3055A.

HOLDING TIMES

Metals: The sample was analyzed within holding time requirements.

CALIBRATION

Metals: One initial and five continuing calibrations were analyzed with this SDG. The following calibrations had %R below QC limits:

Initial Calibration

Compound	%R
Thallium	110.3

Associated sample: 4DL.

Continuing Calibration 2

Compound	%R
Lead	110.7

Associated sample: 4DL.

The thallium and lead results for associated samples were qualified as estimated (J), if detected.

A CRDL standard for ICP was also conducted. The following %Rs for CRDL Standard for ICP were not within QC limits:

CRDL Standard for ICP

Compound	%R
Initial lead	133
Final lead	152.5
Initial Thallium	36.6
Final Thallium	63.8

Associated samples: All samples.

Qualification of the data was not necessary based on CRDL standard for ICP results.

BLANKS

Metals : One initial calibration blank (ICB), five continuing calibration blanks (CCBs), and one preparation blank were analyzed with this sample set. No metals were detected in the blanks associated with samples in this SDG above the CRDL.

A field blank was collected in association with the replicate, in SDG 7099-3055A. The following compounds were detected in the field blank:

Compound	FB111899 Concentration in ug/L
Calcium	169B

Compound	FB111899 Concentration in ug/L
Magnesium	23.2 B
Potassium	109 B
Sodium	123 B
Zinc	4.8 B

Associated sample: 4DL.

Zinc was qualified as not detected (U) for sample 4DL based on the blank results.

ICP INTERFERENCE CHECK SAMPLE (ICS)

Metals : The percent recoveries (%R) for the ICS analyses were within the control limits of ±20% except for thallium (127.1 % and 121.1 %) and copper (120.1). Thallium and copper results were qualified as estimated (J), if detected.

LABORATORY CONTROL SAMPLE (LCS)

Metals : All LCS results were within the control limits.

DUPLICATE SAMPLE ANALYSIS

Metals : Sample 4GL from SDG 7099-3055A was selected for the duplicate analysis. The RPD were within the control limits.

SPIKE SAMPLE ANALYSIS

Metals : Sample 4GL from SDG 7099-3055A was selected for the spike analysis. The percent recoveries were within the QC limits.

FURNACE ATOMIC ABSORPTION QC

Metals : Not required.

ICP SERIAL DILUTION

Metals : Sample 4DL was selected for the ICP serial dilution. The ICP serial dilution results were within the control limits except for sodium, which was above QC limits. Sodium was qualified as estimated in 4DL based on ICP serial dilution results.

SAMPLE RESULT VERIFICATION

Metals : All sample results were reported correctly.

OVERALL ASSESSMENT OF DATA

Metals : One blind duplicate was collected with this sample set. Sample 4GL in SDG 7099-3055A was replicated and labeled 4DL. The following duplicate results, aluminum, iron, and lead were qualified as estimated (J) in 4GL and 4DL.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7099-3270A

Two samples, one replicate, one trip blank, and one field blank were collected December 9, 1999 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : An initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : A continuing calibration was performed for this SDG. All compounds had RRFs >0.05 and %Ds <25%.

BLANKS

VOCs : A method blank (VBLKOF) was analyzed with this SDG. The following target compounds were detected in the method blank:

Method Blank VBLKOF

Compound	Concentration in ug/L
Acetone	4
2-Butanone	3
Toluene	0.4 J

Associated samples: All samples.

A trip blank was analyzed with this SDG. The following target compounds were detected in the trip blank:

TB120999

Compound	Concentration in ug/L
Methylene chloride	0.9 J
2-Butanone	2 B
Acetone	3 B

Associated samples: All samples.

A field blank was associated with this SDG. The following target compounds were detected in the field blank:

FB120999

Compound	Concentration in ug/L
Methylene chloride	2
Acetone	6 B
Xylene (total)	0.4 J

Compound	Concentration in ug/L
Toluene	0.6 JB
2-Butanone	3 B

Associated samples: All samples.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	28GL and REP-2.
Acetone	28GL and REP-2.
2-Butanone	17GL, 28GL, and REP-2.
Toluene	17GL and REP-2.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 28GL was used for the MS/MSD analyses and MSB. A RPD value was outside control limits for the MS/MSD. A QCS spike summary was also provided with this SDG. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: One field replicate was collected with this sample set. Sample 17GL was replicated and labeled REP-2. The following duplicate results, trichloroethene, tetrachloroethene, and 1,1,2-trichlorotrifluoroethane were qualified as estimated (J) in 17GL and REP-2. The compound results on the quantitation reports did not match the Form I's compound results. All compound results were

calculated and the Form I's were found to be correct. No qualifications or corrections to the data were necessary.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

METAL REVIEW
SDG 7099-3270A and 7099-3270B

A sample, replicate, and field blank were collected on December 9, 1999 in these SDGs and analyzed for metals. The sample and replicate were mislabeled as 30GL and 30RL, respectively. The correct ids for the sample and replicate were 36GL and 36RL, respectively. Both SDG 7099-3270A and 7099-3270B had the results for the same samples. SDG 7099-3270A only reported the iron results. All metal results were reported in SDG 7099-3270B.

HOLDING TIMES

Metals: The samples were analyzed within holding time requirements except for mercury. Mercury's holding time of 28 days was exceeded for all samples. Mercury was qualified as estimated (J) if detected and estimated (UJ) if not detected based on holding time results.

CALIBRATION

Metals: One initial and eight continuing calibrations were analyzed with this SDG. The calibrations had %R within QC limits.

A CRDL standard for ICP was also conducted. The following %Rs for CRDL Standard for ICP were not within QC limits:

CRDL Standard for ICP

Compound	% R
Initial lead	159.6
Final lead	167.8
Final thallium	17.5

Associated samples: All samples.

Qualification of the data was not necessary based on CRDL standard for ICP results.

BLANKS

Metals : One initial calibration blank (ICB), eight continuing calibration blanks (CCBs), and one preparation blank were analyzed with this sample set. Thallium was detected in CCB3, CCB4, and CCB7. No samples were associated with these CCBs in this SDG.

A field blank was collected with the samples in this SDG. The following compounds were detected in the field blank:

Compound	FB120999 Concentration in ug/L
Barium	95.2 B
Calcium	21700
Iron	142
Lead	3.4
Magnesium	5670
Manganese	55.2
Potassium	3760 B
Sodium	68500
Zinc	51.9

Associated Samples: All samples.

Based on the field blank results, the following sample results are qualified non-detect (U):

Compound	Sample IDs
Barium	36GL and 36RL.
Calcium	36GL and 36RL.
Iron	36GL.
Magnesium	36GL and 36RL.
Manganese	36GL and 36RL.
Potassium	36GL and 36RL.
Sodium	36GL and 36RL.
Zinc	36GL and 36RL.

ICP INTERFERENCE CHECK SAMPLE (ICS)

Metals : The percent recoveries (%R) for the ICS analyses were within the control limits of ±20% except for thallium (129.6 %), antimony (127% and 125.4%), copper (132.1% and 129.3%), and

silver (124.0% and 122.1%). Thallium, antimony, copper, and silver results were qualified as estimated (J), if detected.

LABORATORY CONTROL SAMPLE (LCS)

Metals : All LCS results were within the control limits.

DUPLICATE SAMPLE ANALYSIS

Metals : 36GL was selected for the duplicate analysis. The RPD were within the control limits.

SPIKE SAMPLE ANALYSIS

Metals : 36GL was selected for the spike analysis. Thallium's percent recovery was outside the QC limits. Thallium results were qualified as estimated (J), if detected, based on spike analysis results.

FURNACE ATOMIC ABSORPTION QC

Metals : Not required.

ICP SERIAL DILUTION

Metals : 36GL was selected for the ICP serial dilution. The ICP serial dilution results were within the control limits except for sodium. Therefore, sodium results were qualified as estimated (J), if detected and estimated (UJ), if not detected.

SAMPLE RESULT VERIFICATION

Metals : All sample results were reported correctly. The raw data for all metals, except for mercury, were found in SDG 7099-3270A for data reported in SDG 7099-3270B.

OVERALL ASSESSMENT OF DATA

Metals : Sample 36GL was replicated and labeled 36RL. The duplicate results are considered acceptable. The data from SDG 7099-3270B will be reported for the metal results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7000-0077A

Nine samples, one replicate, four trip blanks, and four field blanks were collected January 10 through 14, 2000 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Two initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Five continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5971L	Calibration Date: 01/12/00
Compound	% D
Chloromethane	-29.3
Vinyl chloride	-25.8
2-Hexanone	-27.4

Associated samples: FB011000, FB011100, and 6GL.

Instrument ID: HP5971L	Calibration Date: 01/14/00
Compound	% D
Acetone	-48.9

Compound	% D
2-Butanone	-34.9
4-Methyl-2-pentanone	-26.4
2-Hexanone	-35.8

Associated samples: TB011000, TB011100, TB011200, FB011200, 3ML, REP-1A, 25MI, and 22ML.

Instrument ID: HP5971O Calibration Date: 01/19/00

Compound	% D
Vinyl chloride	25.6

Associated samples: 1GL and 28MI.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Five method blanks (VBLKL2, VBLKL4, VBLK03, VBLK05, and VBLK0A) were analyzed with this SDG. The following target compounds and/or TIC were detected in the method blanks:

Method Blank VBLKL2

Compound	Concentration in ug/L
Methylene chloride	0.8J
2-Butanone	1 J
4-Methyl-2-pentanone	0.6 J
2-Hexanone	2 J
Styrene	0.2 J
Xylene (total)	0.4 J

Associated samples: FB011000, FB011100, and 6GL.

Method Blank VBLKL4

Compound	Concentration in ug/L
Xylene (total)	0.5 J
Acetone	3 J

Associated samples: TB011000, TB011100, TB011200, FB011200, 3ML, REP-1A, 25MI, and 22ML.

Method Blank VBLK03

Compound	Concentration in ug/L
2-Butanone	5 J
Acetone	9 J

Associated samples: 23MI, 18ML, and 26MI.

Method Blank VBLK05

Compound	Concentration in ug/L
2-Butanone	4 J
Acetone	4 J

TIC (Retention Time)	Concentration in ug/L
Acetic Acid (12.33)	6 JN

Associated samples: TB011400 and FB011400.

Four trip blanks were analyzed with this SDG. The following target compound was detected in the trip blank:

TB011000

Compound	Concentration in ug/L
Acetone	7JB

Associated samples: 26MI, 25MI, and REP-1A.

TB011000

Compound	Concentration in ug/L
Acetone	3JB

Associated samples: 28MI and 1GL.

Four field blanks were associated with this SDG. The following target compounds were detected in the field blanks:

FB011100

Compound	Concentration in ug/L
Methylene chloride	2 JB
Acetone	5 J

Associated samples: 6GL, 23MI, and 3MI.

FB011200

Compound	Concentration in ug/L
Methylene chloride	2 J
Acetone	8 JB

Associated samples: 22ML and 18ML.

FB011400

Compound	Concentration in ug/L
Methylene chloride	2 J
Acetone	10 B

Associated samples: 28MI and 1GL.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect (U) at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Acetone	26MI, REP-1A, 23MI, and 18ML.
2-Butanone	26MI and 18ML.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 23MI was used for the MS/MSD analyses and MSB. A RPD value was outside control limits for the MS/MSD. A QCS spike summary was also provided with this SDG. Two compounds had %R below QC limits in the QCS. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: One field replicate was collected with this sample set. Sample 25MI was replicated and labeled REP-1A. The following duplicate results, 1,2-dichloroethene and tetrachloroethene were qualified as estimated (J) in 25MI and REP-1A.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

METAL REVIEW
SDG 7000-0077A

A sample and field blank were collected on January 11, 2000 in these SDGs and analyzed for metals.

HOLDING TIMES

Metals: The samples were analyzed within holding time requirements.

CALIBRATION

Metals: One initial and three continuing calibrations were analyzed with this SDG. The calibrations had %R within QC limits, except for zinc in the initial calibration. Zinc was qualified as estimated (J) if detected and estimated (UJ) if not detected based on calibration results.

A CRDL standard for ICP was also conducted. The following %Rs for CRDL Standard for ICP were not within QC limits:

CRDL Standard for ICP

Compound	% R
Initial/Final Lead	137.9/123.6
Initial/Final Silver	82.2/82.4
Initial/Final Thallium	83.2/76.2
Initial/Final Zinc	233.3/233.3

Associated samples: All samples.

Qualification of the data was not necessary based on CRDL standard for ICP results.

BLANKS

Metals : One initial calibration blank (ICB), three continuing calibration blanks (CCBs), and one preparation blank were analyzed with this sample set. No metals were detected in the blanks.

A field blank was collected with the samples in this SDG. The following compounds were detected in the field blank:

Compound	FB011100 Concentration in ug/L
Calcium	295 B
Copper	1.8 B
Iron	45.6 B
Magnesium	179 B
Manganese	1.9 B
Potassium	437 B
Sodium	907 B
Zinc	10.1 B

Associated sample: 6GL.

Copper, iron, manganese, potassium, and zinc were qualified non-detect (U) in 6GL based on the field blank results.

ICP INTERFERENCE CHECK SAMPLE (ICS)

Metals : The percent recoveries (%R) for the ICS analyses were within the control limits of ±20% except for lead (77.1% and 73.4%) and selenium (64.9% and 73.0%). Lead and selenium results were qualified as estimated (J), if detected.

LABORATORY CONTROL SAMPLE (LCS)

Metals : All LCS results were within the control limits.

DUPLICATE SAMPLE ANALYSIS

Metals : A batch specific sample was selected for the duplicate analysis. The RPD were within the control limits.

SPIKE SAMPLE ANALYSIS

Metals : A batch specific sample was selected for the spike analysis. The percent recovery were within the QC limits.

FURNACE ATOMIC ABSORPTION QC

Metals : Not required.

ICP SERIAL DILUTION

Metals : 6GL was selected for the ICP serial dilution. The ICP serial dilution results were within the control limits.

SAMPLE RESULT VERIFICATION

Metals : All sample results were reported correctly.

OVERALL ASSESSMENT OF DATA

Metals : No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

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MEMO

To:
Neil Benowitz

Copies:

ENVRIONMENTAL

From:
Donna M Brown

Date:
July 21, 2000

Subject:
Data Validation of Volatile Organic Compound and Metals Groundwater Samples Collected at the Former Unisys facility, Great Neck Site, New York from April through June (Project No. NY001227.0012.00005).

Groundwater samples, replicates, and associated blanks were collected in April through June 2000 at the Former Unisys facility, Great Neck Site, New York. The samples were sent to Severn Trent Laboratories (STL) in Shelton, Connecticut for the analysis of volatile organic compounds (VOCs) using purge and trap GC/MS following United States Environmental Protection Agency (USEPA) method 5030B/8260B and selected samples were analyzed for ICAP metals following SW846 method 3010A/6010B and mercury following SW846 method 7470A.

A full validation was conducted on twenty percent of the samples collected. The full validation was conducted following the quality assurance/quality control (QA/QC) criteria set forth in the method, and the document "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" dated October 1999 and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" dated February 1994. The remaining eighty percent of the samples were reviewed for completeness and technical compliance in accordance with the above documents. The review of the VOC data packages included checking the following:

- Chain-of-custody forms.
- Holding times.
- GC/MS Instrument Performance checks
- Instrument calibration.
- Blank contamination (method, field, and trip).

- Surrogate spike recoveries.
- Matrix spike and/or duplicate results.
- Internal standards.
- Check for transcriptions between quantitation reports and form I's.
- Blind field replicates.

The review for the metals data packages included checking the following:

- Chain-of-custody forms.
- Holding times.
- Instrument calibration.
- Blank contamination (preparation, continuing, and field).
- ICP interference check samples.
- Laboratory control samples.
- Laboratory duplicates.
- Spike sample recovery.
- ICP Serial dilution.
- Blind field replicates.

The quality of the data was acceptable with the appropriate qualifications described in this memorandum. The laboratory provided five data packages. The analytical data for samples were provided by the laboratory in sample delivery groups (SDG) 7000-0842A, 7000-0842B, 7000-0842C, 7000-0691A, and 7000-1143A. Package 7000-0842B was fully validated. The data validation results, for each SDG, are discussed separately below. The fully validated data was discussed first and then the review data.

VOC FULL DATA VALIDATION

SDG 7000-0842B

Eight samples, one replicate, four trip blanks, and four field blanks were collected May 4 through 10, 2000 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs: The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs: All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs: Two initial calibrations were performed with this sample set. The compound relative response factors (RRFs) were found to be >0.05 and compound relative standard deviations (%RSDs) were found to be < 30% except for acetone. Acetone's %RSD was above limits in the initial calibration for May 12, 2000 and was qualified as estimated (J) if detected in samples 3GL, 26MI, 35GL, FB050900, TB050900, 37MU, 2MI, REP-3, FB051000, and TB051000, based on the initial calibration results.

CONTINUING CALIBRATION

VOCs: Four continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound percent differences (%Ds) were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 05/15/00 09:56
Compound	% D
Chloromethane	-32.2
Vinyl chloride	-31.8
Acetone	27.2
Carbon disulfide	-29.6

Associated samples: 26MI, 35GL, FB050900, TB050900, 37MU, 2MI, REP-3, FB051000, and TB051000.

Instrument ID: HP5970M	Calibration Date: 05/15/00 21:12
Compound	% D
Bromomethane	-33.7
Carbon disulfide	-41.6

Associated sample: 3GL.

Instrument ID: HP5971O	Calibration Date: 05/12/00 08:47
Compound	% D
Chloromethane	-34.3
Vinyl chloride	-29.8
Acetone	52.4

Associated samples: 17GL, FB050400, TB050400, 28MI, and TB050500.

Instrument ID: HP5971O	Calibration Date: 05/12/00 11:02
Compound	% D
Acetone	77.9
1,1,-Dichloroethene	27.1

Associated samples: 28GL and FB050500.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs: Four method blanks (VBLKMU, VBLKMV, VBLKOI, and VBLKOJ) were analyzed with this SDG. The following target compounds and/or TICs were detected in the method blanks:

Method Blank VBLKMU

Compound	Concentration in micrograms per liter (ug/L)
Acetone	18

TIC (Retention Time)	Concentration in ug/L
1,2,4-Trichlorobenzene (26.68)	1.06 J

Associated samples: 26MI, 35GL, FB050900, TB050900, 37MU, 2MI, REP-3, FB051000, and TB051000.

Method Blank VBLKMV

Compound	Concentration in ug/L
Acetone	11

Associated sample: 3GL.

Method Blank VBLKOI

Compound	Concentration in ug/L
Acetone	4 J
2-Butanone	5 J
4-Methyl-2-pentanone	2 J
2-Hexanone	2 J
1,1,2,2-Tetrachloroethane	0.5 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (25.68)	21 JN
Acrylonitrile (10.16)	1.9 J
Methyl methacrylate (13.99)	0.7 J
1,2-Dibromo-3-chloropropane (24.36)	3.2 J
1,2,4-Trichlorobenzene (26.05)	0.5 J

Associated samples: TB050400, FB050400, 17GL, TB050500, and 28MI.

Method Blank VBLKOJ

Compound	Concentration in ug/L
Acetone	11
2-Butanone	4 J
Methylene chloride	0.6 J

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (25.71)	22 JN

Associated samples: FB050500 and 28GL.

Four trip blanks were analyzed in association with this SDG. The following target compounds and/or TIC were detected in the trip blanks:

TB050400

Compound	Concentration in ug/L
Methylene chloride	4 J
Acetone	3 JB
Chloroform	0.7 J
2-Butanone	2 JB

TIC (Retention Time)	Concentration in ug/L
Butylated Hydroxytoluene (25.68)	5 JNB

Associated sample: 17GL.

TB050500

Compound	Concentration in ug/L
Methylene chloride	1 J
Acetone	8 JB

Compound	Concentration in ug/L
Carbon disulfide	0.7 J
Chloroform	0.9 J
2-Butanone	2 JB
4-Methyl-2-pentanone	1 JB
2-Hexanone	2 JB

TIC (Retention Time)	Concentration in ug/L
Cyclotertrasiloxane, octameth (19.57)	9 JN
Unknown (22.85)	6 J

Associated samples: 28GL and 28ML.

TB050900

Compound	Concentration in ug/L
Chloroform	0.6 J
Acetone	3 JB

Associated samples: 3GL, 26MI, and 35GL.

TB051000

Compound	Concentration in ug/L
Chloroform	0.7 J
Acetone	3 JB

Associated samples: 37MU, 2MI, and REP-3.

Four field blanks were analyzed in association with this SDG. The following target compounds and/or TIC were detected in the field blanks:

FB050400

Compound	Concentration in ug/L
Methylene chloride	1 J
Acetone	1 JB
Chloroform	0.6 J

Associated sample: 17GL.

FB050500

Compound	Concentration in ug/L
Methylene chloride	2 JB

Compound	Concentration in ug/L
Acetone	2 JB
Carbon disulfide	0.2 J
Chloroform	0.4 J
2-Butanone	2 JB

TIC (Retention Time)	Concentration in ug/L
Unknown (25.73)	7 J

Associated samples: 28GL and 28MI.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect (U) at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	17GL, 28GL, and 28MI.
Acetone	17GL, 28GL, 28MI, 3GL, 26MI, REP-3, 35GL, 37MU, and 2MI.
2-Butanone	17GL, 28GL, and 28MI.
Chloroform	17GL, 28GL, 28MI, 37MU, and REP-3.
4-Methyl-2-pentanone	17GL.
2-Hexanone	17GL.
1,1,2,2-Tetrachloroethane	17GL.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 2MI was used for the matrix spike blank/matrix spike/matrix spike duplicate (MSB/MS/MSD). The spike recoveries and relative percent difference (RPD) values were within control limits for the MS/MSD and MSB and the percent recoveries (%R) were with limits. A QCS spike summary was also provided with this SDG. Ten compounds were outside of limits in the QCS summary. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

TARGET COMPOUND IDENTIFICATION

VOCs: Target compounds detected in the samples were reported correctly.

COMPOUND QUANTITATION AND REPORTED CONTRACT REQUIRED QUANTITATION LIMITS (CRQLs)

VOCs: All compound detection limits were met. 1,2,4-Trichlorobenzene was on quantitation report for VBLKMU and VBLKOI. Acrylonitrile, methyl methacrylate, and 1,2-dibromo-3-chloropropane were also on quantitation report for VBLKOI. These were not a target compound and were place on the TIC form. They were not qualified with a N because a calibration was conducted for the compound, however, they were J (estimated) qualified.

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

VOCs : Tentatively identified compounds were reported correctly.

SYSTEM PERFORMANCE

VOCs : The performance of the instruments during analysis is considered acceptable.

OVERALL ASSESSMENT OF DATA

VOCs : One field replicate was collected with this SDG. Sample 37MU was replicated and labeled REP-3. The duplicate results are considered acceptable.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

METAL DATA FULL VALIDATION
SDG 7000-0842B

Three samples and two field blanks were collected on May 9 and 10, 2000 in this SDG and analyzed for metals.

HOLDING TIMES

Metals: All samples were analyzed within holding time requirements.

CALIBRATION

Metals: One initial and several continuing calibrations were analyzed with this SDG. The calibrations had all %R within QC limits.

A CRDL standard for ICP was also conducted. The following %Rs for CRDL Standard for ICP were not within QC limits:

CRDL Standard for ICP

Compound	% R
Initial silver	121.7
Final silver	133.9
Final thallium	136.8

Associated samples: All samples.

Qualification of the data was not necessary based on CRDL standard for ICP results.

BLANKS

Metals : One initial calibration blank (ICB), several continuing calibration blanks (CCBs), and one preparation blank were analyzed with this sample set. Metals were not detected in the blanks associated with samples in this SDG above the CRDL.

Two field blanks were collected with the samples in this SDG. The following compounds were detected in the field blank:

Compound	FB050900 Concentration in ug/L
Aluminum	45.7 B
Calcium	35.3 B
Chromium	0.31 B
Iron	11.8 B
Sodium	454 B

Associated samples: 36GL and 40 GL.

Compound	FB051000 Concentration in ug/L
Chromium	0.31 B
Copper	25.4
Sodium	391 B
Zinc	9.6 B

Associated sample: 6GL.

Aluminum was qualified as not detected (U) for sample 36GL and 40GL based on the blank results. Copper and zinc were qualified as not detected (U) for sample 6GL based on the blank results.

ICP INTERFERENCE CHECK SAMPLE (ICS)

Metals : The percent recoveries (%R) for the ICS analyses were within the control limits of ±20%.

LABORATORY CONTROL SAMPLE (LCS)

Metals : All LCS results were within the control limits.

DUPLICATE SAMPLE ANALYSIS

Metals : A batch specific sample and FB051000 were selected for the duplicate analysis. The RPD were within the control limits. A field blank is not supposed to be used for the duplicate analysis. Qualification of the data was not necessary.

SPIKE SAMPLE ANALYSIS

Metals : A batch specific sample and FB051000 were selected for the spike analysis. The percent recoveries were within the QC limits. A field blank is not supposed to be used for the spike analysis. Qualification of the data was not necessary.

ICP SERIAL DILUTION

Metals : Sample 6GL was selected for the ICP serial dilution. The ICP serial dilution results were within the control limits.

SAMPLE RESULT VERIFICATION

Metals : All sample results were reported correctly.

OVERALL ASSESSMENT OF DATA

Metals : The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section. Sample 36GL was replicated and labeled 40GL. Iron was qualified as estimated (J) in 36GL and 40GL due to duplicate results.

VOC REVIEW

SDG 7000-0842A

Thirteen samples, one replicate, three trip blanks, and three field blanks were collected May 1 through 4, 2000 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Three initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Four continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 5/4/00 08:56
Compound	% D
Bromomethane	-29.6
Acetone	-39.3
Carbon disulfide	-34.1
Bromoform	33.5

Associated samples: TB050100, FB050100, TB050200, FB050200, 7GL, 7ML, 8GU, REP-2, 3ML, and 4MI.

Instrument ID: HP5970K	Calibration Date: 5/5/00 09:44
Compound	% D
Chloromethane	-41.3
Vinyl chloride	-33.1
Acetone	78.4

Associated samples: 1ML, TB050300, FB050300, 8GL, and 1MI/L.

Instrument ID: HP5971O	Calibration Date: 5/12/00 08:47
Compound	% D
Chloromethane	-34.3
Vinyl chloride	-29.8
Acetone	52.4

Associated samples: 22ML, 18GL, and 18ML.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Four method blanks (VBLKKC, VBLKMA, VBLKOI, and VBLKOH) were analyzed with this SDG. The following target compounds or TICs were detected in the method blanks:

Method Blank VBLKKC	
TIC (retention time)	Concentration in ug/L
Butylated Hydroxytoluene (28.43)	28 JN

Associated samples: 1ML, TB050300, FB050300, 8GL, and 1MI/L.

Method Blank VBLKMA

Compound	Concentration in ug/L
2-Butanone	3 J
Acetone	5 J

TIC (retention time)	Concentration in ug/L
Methyl acetate (8.69)	0.52
Methyl cyclohexane (15.38)	0.50
Isopropylbenzene (21.57)	0.14

Associated samples: TB050100, FB050100, TB050200, FB050200, 7GL, 7ML, 8GU, REP-2, 3ML, and 4MI.

Method Blank VBLKOI

Compound	Concentration in ug/L
2-Butanone	5 J
Acetone	4 J
4-Methyl-2-pentanone	2 J
2-Hexanone	2 J
1,1,2,2-Tetrachloroethane	0.5 J

TIC (retention time)	Concentration in ug/L
Butylated Hydroxytoluene (25.68)	21 JN
Methyl acetate (9.49)	1.46
Methyl methacrylate (13.99)	0.71
Acrylonitrile (10.16)	1.87
1,2-Dibromo-3-chloropropane (24.36)	3.20
1,2,4-Trichlorobenzene (26.05)	0.47

Associated samples: 22ML, 18GL, and 18ML.

Method Blank VBLKOH

Compound	Concentration in ug/L
2-Butanone	8 J
Acetone	3 J

Associated samples: 1GL and 25MI.

Four trip blanks were collected along with this sample set. TB050400 is located in SDG 7000-0842B. Target compounds were detected in the following trip blanks:

TB050100

Compound	Concentration in ug/L
Methylene chloride	22
Acetone	89 B
Trichloroethene	0.3 J

Associated samples: 7GL and 7ML.

TB050200

Compound	Concentration in ug/L
Chloroform	0.5 J

Associated samples: 8GL, 8GU, 4MI, 3ML, and REP-2.

TB050300

Compound	Concentration in ug/L
Methylene chloride	31
Acetone	90

Associated samples: 1MI/L, 1GL, 25MI, and 1ML.

Four field blanks were associated with this sample set. FB050400 is located in SDG 7000-0842B. The following target compounds or TICs were detected in the field blanks:

FB050100

Compound	Concentration in ug/L
Methylene chloride	7 J
Acetone	0.4 J
Toluene	0.4 J

Associated samples: 7GL and 7ML.

FB050200

Compound	Concentration in ug/L
Methylene chloride	38
Acetone	3 JB

TIC (retention time)	Concentration in ug/L
Ethyl ether (7.47)	2.26

Associated samples: 8GL, 8GU, 4MI, 3ML, and REP-2.

FB050300

Compound	Concentration in ug/L
Chloroform	0.4 J

TIC (retention time)	Concentration in ug/L
Butylated Hydroxytoluene (28.08)	8 JN

Associated samples: 1MI/L, 1GL, 25MI, and 1ML.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	1MI/L, 1GL, 25MI, 7GL, 8GU, 4MI, 3ML, and REP-2.
Acetone	1MI/L, 1ML, 1GL, 25MI, 7GL, 7ML, 8GU, 4MI, 3ML, REP-2, 22ML, 18GL, and 18ML.
Chloroform	1MI/L, 3ML, and REP-2.
2-Butanone	1GL, 25MI, 22ML, 18GL, and 18ML.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 1ML was used for the MS/MSD analyses and MSB. A spike recovery in the MS and a RPD values in the MSD were above control limits for the MS/MSD. The %Rs were within limits in the MSB. A QCS spike summary was also provided with this SDG. Two compounds were outside of limits in the QCS summary. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: The following compounds were on quantitation reports, however they were not target compounds:

Sample: VBLKMA

Compounds (retention time)	Concentration in ug/L
Methyl acetate (8.69)	0.52
Methyl cyclohexane (15.38)	0.50
Isopropylbenzene (21.57)	0.14

Sample: VBLKOI

Compounds (retention time)	Concentration in ug/L
Methyl acetate (9.49)	1.46
Methyl methacrylate (13.99)	0.71
Acrylonitrile (10.16)	1.87
1,2-Dibromo-3-chloropropane (24.36)	3.20
1,2,4-Trichlorobenzene (26.05)	0.47

Sample: 8GU

Compounds (retention time)	Concentration in ug/L
Ethyl acetate (9.57)	1.82

Sample: FB050200

Compounds (retention time)	Concentration in ug/L
Ethyl ether (7.47)	2.26

These were not a target compound and were place on the TIC form. They were not qualified with a N because a calibration was conducted for the compound, however, however, they were J (estimated) qualified.

One field replicate was collected with this SDG. Sample 3ML was replicated and labeled REP-2. The duplicate results are considered acceptable.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7000-0842C

Seven sample, three trip blank, and three field blank were collected May 10 through 15, 2000 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : Two initial calibrations were performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%, except for the following:

Instrument ID: HP5970M	Calibration Date: 5/12/00
Compound	% RSD
Acetone	30.8

Associated samples: 5MI, 5ML, FB051200, TB051200, 4GL, 29MI, 29GL, FB051100, and TB051100.

The associated sample compound results were qualified as estimated (J) if detected.

CONTINUING CALIBRATION

VOCs : Two continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 5/15/00 21:12
Compound	% D
Bromomethane	-33.7
Carbon disulfide	-41.6

Associated samples: 5MI, 5ML, FB051200, TB051200, 4GL, 29MI, 29GL, FB051100, and TB051100.

Instrument ID: HP5970M	Calibration Date: 5/17/00 09:02
Compound	% D
Acetone	32.2

Associated samples: FB051500, TB051500, 15GL, and 23MI.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Two method blanks (VBLKMV and VBLKM4) were analyzed with this SDG. The following target compound or TICs were detected in the method blanks:

VBLKMV

Compound	Concentration in ug/L
Acetone	11

Associated samples: 5MI, 5ML, FB051200, TB051200, 4GL, 29MI, 29GL, FB051100, and TB051100.

VBLKM4

Compound	Concentration in ug/L
Acetone	4 J

TIC (retention time)	Concentration in ug/L
Butylated Hydroxytoluene (25.02)	6 JN

Associated samples: FB051500, TB051500, 15GL, and 23MI.

Four trip blanks were associated with this SDG. TB051000 is located in SDG 7000-0842B. The following target compounds or TICs were detected in the trip blanks:

TB051000

Compound	Concentration in ug/L
Acetone	3 JB
Chloroform	0.7 J

Associated sample: 4GL.

TB051100

TIC (retention time)	Concentration in ug/L
Cyclotetrasiloxane, octameth (22.04)	110 JN
Unknown Siloxane (24.69)	30 J
Cyclotrisiloxane, hexamethyl (18.31)	8 JN

Associated samples: 29MI and 29GL.

TB051200

Compound	Concentration in ug/L
Methylene chloride	2 J

Associated samples: 5MI and 5ML.

Four field blanks were associated with this SDG. FB051000 is located in SDG 7000-0842B. The following target compounds or TICs were detected in the field blanks:

FB051100

Compound	Concentration in ug/L
Toluene	0.6 J

TIC (retention time)	Concentration in ug/L
Cyclotetrasiloxane, octameth (22.06)	55 JN
Unknown Siloxane (24.71)	12 J

Associated samples: 29MI and 29GL.

FB051200

Compound	Concentration in ug/L
Methylene chloride	2 J

TIC (retention time)	Concentration in ug/L
Cyclotetrasiloxane, octameth (22.06)	6 JN

Associated samples: 5MI and 5ML.

Based on the method, trip, and/or field blank results, the following compounds were qualified non-detect (U):

Compound	Sample IDs
Acetone	4GL, 29MI, 29Gl, 5MI, and 5ML.

Compound	Sample IDs
Methylene chloride	5MI and 5ML.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 2MI from SDG 7000-0842B was used for the MS/MSD analyses and MSB. The spike recoveries and RPD values were within control limits for the MS/MSD and MSB and the %R were with limits. A QCS spike summary was also provided with this SDG. One compound was outside of limits in the QCS summary. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

METAL REVIEW

SDG 7000-0842C

One sample was collected on May 10, 2000 in this SDG and analyzed for metals. The associated field blank was reported in SDG 7000-0842B.

HOLDING TIMES

Metals: The sample was analyzed within holding time requirements.

CALIBRATION

Metals: One initial and several continuing calibrations were analyzed with this SDG. The calibrations had all %R within QC limits.

A CRDL standard for ICP was also conducted. The following %Rs for CRDL Standard for ICP were not within QC limits:

CRDL Standard for ICP

Compound	%R
Initial silver	121.7
Final silver	133.9
Final thallium	136.8

Associated samples: All samples.

Qualification of the data was not necessary based on CRDL standard for ICP results.

BLANKS

Metals: One initial calibration blank (ICB), several continuing calibration blanks (CCBs), and one preparation blank were analyzed with this sample set. No metals were detected in the blanks associated with samples in this SDG above the CRDL.

A field blank was collected in association with this sample is located in SDG 7000-0842B. The following compounds were detected in the field blank:

Compound	FB051000 Concentration in ug/L
Chromium	0.31 B
Copper	25.4
Sodium	391 B
Zinc	9.6 B

Associated sample: 4GL.

Copper and zinc were qualified as not detected (U) for sample 4GL based on the blank results.

ICP INTERFERENCE CHECK SAMPLE (ICS)

Metals : The percent recoveries (%R) for the ICS analyses were within the control limits of ±20%.

LABORATORY CONTROL SAMPLE (LCS)

Metals : All LCS results were within the control limits.

DUPLICATE SAMPLE ANALYSIS

Metals : A batch specific sample and FB051000 were selected for the duplicate analysis. The RPD were within the control limits. A field blank is not supposed to be used for the duplicate analysis. Qualification of the data was not necessary.

SPIKE SAMPLE ANALYSIS

Metals : A batch specific sample and FB051000 were selected for the spike analysis. The percent recovery for selenium was above the QC limits in the batch specific spike sample. A field blank is not supposed to be used for the spike analysis. The selenium result in 4GL was qualified as estimated (J) if detected.

ICP SERIAL DILUTION

Metals : Sample 4GL was selected for the ICP serial dilution. The ICP serial dilution results were within the control limits.

OVERALL ASSESSMENT OF DATA

Metals : No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7000-0691A

Eight samples, one replicate, three trip blanks, and three field blanks were collected April 18 through 20, 2000 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : An initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : Three continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5970M	Calibration Date: 4/26/00 09:36
Compound	%D
Acetone	-27.1

Associated samples: TB041800, 39ML, 39MU, 37MI, 39MI, FB041900, and TB041900.

Instrument ID: HP5970M	Calibration Date: 4/27/00 09:29
Compound	%D
Acetone	-42.1
2-Butanone	-34.2
4-Methyl-2-pentanone	-31.1
2-Hexanone	-33.2

Associated samples: 37ML, TB042000, FB042000, FB041800, REP-1, 38ML, and 38MU.

Instrument ID: HP5970M	Calibration Date: 4/28/00 08:50
Compound	% D
Acetone	-35.7
2-Butanone	-26.5
4-Methyl-2-pentanone	-25.6
2-Hexanone	-30.1

Associated sample: 38MI.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : Three method blanks (VBLKM4, VBLKM5, and VBLKM6) were analyzed with this SDG. The following target compounds were detected in the method blanks:

Method Blank VBLKM4

Compound	Concentration in ug/L
Methylene chloride	0.3 J
Acetone	3 J

Associated samples: TB041800, 39ML, 39MU, 37MI, 39MI, FB041900, and TB041900.

Method Blank VBLKM5

Compound	Concentration in ug/L
Acetone	6 J

Associated samples: 37ML, TB042000, FB042000, FB041800, REP-1, 38ML, and 38MU.

Method Blank VBLKM6

Compound	Concentration in ug/L
Acetone	6 J

Associated sample: 38MI.

Three trip blanks were collected along with this sample set. Target compounds or TICs were detected in the following trip blanks:

TB041800

Compound	Concentration in ug/L
Methylene chloride	19 B

Compound	Concentration in ug/L
Acetone	77 B
Trichloroethene	0.3 J
Chloroform	0.2 J

Associated samples: 37MI, 37ML, and REP-1.

TB041900

Compound	Concentration in ug/L
Methylene chloride	14 B
Acetone	63 B
Trichloroethene	0.3 J
Chloroform	0.2 J
Toluene	0.2 J

TIC (retention time)	Concentration in ug/L
Cyclotetrasiloxane, octameth (22.08)	16 JN

Associated samples: 39MI, 39MU, and 39ML.

TB042000

Compound	Concentration in ug/L
Methylene chloride	14
Acetone	66 B
Chloroform	0.2 J
Trichloroethene	0.5 J

Associated samples: 38MI, 38MU, and 38ML.

Three field blanks were associated with this sample set. The following target compounds or TICs were detected in the field blanks:

FB041800

Compound	Concentration in ug/L
Methylene chloride	10
Acetone	2 JB
Trichloroethene	0.4 J

TIC (retention time)	Concentration in ug/L
Cyclotetrasiloxane, octameth (22.06)	12 JN

TIC (retention time)	Concentration in ug/L
Cyclotrisiloxane, hexamethyl (18.30)	8 JN
Unknown siloxane (24.74)	7 J

Associated samples: 37MI, 37ML, and REP-1.

FB041900

Compound	Concentration in ug/L
Methylene chloride	11 B
Acetone	3 JB
Trichloroethene	0.9 J
Chloroform	0.2 J

TIC (retention time)	Concentration in ug/L
Cyclotetrasiloxane, octameth (22.08)	28 JN
Cyclotrisiloxane, hexamethyl (18.33)	18 JN
Unknown siloxane (24.73)	10 J

Associated samples: 39MI, 39MU, and 39ML.

FB042000

Compound	Concentration in ug/L
Methylene chloride	6 J
Toluene	0.3 J
1,1,2,2-Tetrachloroethane	0.5 J
Chloroform	0.5 J

Associated samples: 38MI, 38MU, and 38ML.

Based on the method, trip, and/or field blank results, the following sample results are qualified non-detect at the method detection limit or non-detect (U), if above detection limit:

Compound	Sample IDs
Methylene chloride	37MI, 37ML, REP-1, 39MI, 39MU, 39ML, 38MI, 38MU, and 38ML.
Acetone	37MI, 37ML, REP-1, 39MI, 39MU, 39ML, 38MI, 38MU, and 38ML.
Chloroform	37MI, 37ML, REP-1, 39MI, 39MU, 39ML, 38MI, and 38ML.

Compound	Sample IDs
Toluene	39MI.

Based on the trip and/or field blank results, the following sample TIC results were qualified not usable (R):

TIC (retention time)	Sample IDs
Cyclotetrasiloxane, octameth (22.07)	REP-1
Cyclotetrasiloxane, octameth (22.08)	39ML
Cyclotrisiloxane, hexamethyl (18.32)	39ML
Unknown siloxane (24.75)	39ML

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: Sample 39ML was used for the MS/MSD analyses and MSB. The spike recovery and RPD values were within control limits for the MS/MSD/MSB. A QCS spike summary was also provided with this SDG. A compound was outside of limits in the QCS summary. Qualification of the data based on MS/MSD and MSB or QSC spike summary was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: One field replicate was collected with this SDG. Sample 37ML was replicated and labeled REP-1. The replicate results were considered acceptable.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

VOC REVIEW

SDG 7000-1143A

One sample and a trip blank were collected June 5, 2000 in this SDG and analyzed for VOCs.

HOLDING TIMES

VOCs : The samples were analyzed within holding time requirements.

GC/MS INSTRUMENT PERFORMANCE CHECK

VOCs : All GC/MS instrument tunes were within criteria.

INITIAL CALIBRATION

VOCs : An initial calibration was performed with this sample set. All compound RRFs found to be >0.05 and compound %RSD were found to be < 30%.

CONTINUING CALIBRATION

VOCs : A continuing calibrations were performed for this SDG. All compounds had RRFs >0.05. The following compound %Ds were found to be >25%:

Instrument ID: HP5971O	Calibration Date: 6/9/00 08:12
Compound	% D
Carbon disulfide	-64.4
2-Butanone	-43.2
4-Methyl-2-pentanone	-34.7
2-Hexanone	-34.6
1,1,2-Trichlorotrifluoroethane	-30.4

Associated samples: NST WELL and TB060500.

The associated sample compound results were qualified as estimated (J) if detected, and estimated (UJ) if not detected.

BLANKS

VOCs : A method blank (VBLKO8) was analyzed with this SDG. The following target compound was detected in the method blank:

VBLKO8	
Compound	Concentration in ug/L
Acetone	4 J

Associated samples: NST WELL and TB060500.

A trip blank was associated with this SDG. The following target compound was detected in the trip blank:

TB060500	
Compound	Concentration in ug/L
Methylene chloride	3 J

Associated sample: NST WELL.

Methylene chloride was qualified as non-detect (U) in NST WELL, based on trip blank results.

SYSTEM MONITORING COMPOUNDS (SURROGATE SPIKES)

VOCs: All surrogate spike recoveries were within control limits for all samples and blanks.

MATRIX SPIKES/MATRIX SPIKE DUPLICATES

VOCs: No MS/MSD was provided. Qualification of the data was not necessary.

INTERNAL STANDARDS

VOCs: All internal standard area counts and retention times were within control limits for all samples and blanks.

OVERALL ASSESSMENT OF DATA

VOCs: No transcriptions between the quantitation reports and Form I's for the sample results.

The quality of the data presented in this SDG package is acceptable with the appropriate qualifications described in the above section.

DRAFT

Appendix J

Groundwater Model
Documentation Report

Groundwater Model Documentation Report

Former Unisys Facility
OU-2 Remediation Investigation

October 15, 1999

Prepared for: Lockheed Martin Corporation
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Section 1
Introduction

1.1 Intent of Document

This Groundwater Model Documentation Report was prepared by Camp Dresser and McKee (CDM) for Lockheed Martin Corporation (Lockheed Martin) as part of the Groundwater Modeling Activities and OU-2 Remediation Investigation Scopes of Work for the former Unisys Great Neck, Long Island, New York facility. The purpose of this Groundwater Model Documentation Report is to present a summary of the groundwater flow and mass transport model development and the application of the models to evaluate current and potential groundwater flow and mass transport in the vicinity of the site.

1.2 Background

The former Unisys facility occupies approximately 94 acres of land in Great Neck, New York. The site is located close to the Queens County/Nassau County Line near the Village of Lake Success and the Town of North Hempstead in Nassau County, New York. A site location map is shown in **Figure 1-1.**

The site was an active manufacturing facility from its construction in 1941 until its sale in 1995. The United States Government constructed the facility in 1941, and the facility was operated by Sperry Rand Company from 1941 to 1951. In 1951, the property was sold to Sperry, and in 1986 Sperry merged with another company to form Unisys Corporation. The facility was sold by Unisys to Loral Corporation in 1995. In 1996, Lockheed Martin acquired the electronics and systems integration business of Loral.

Manufacturing processes used in the past at the facility included a foundry, etching, degreasing, plating, painting, machining and assembly. Chemicals used during these manufacturing processes included halogenated and non-halogenated hydrocarbon solvents, cutting oil, paints and fuel oils. The site is no longer an active manufacturing facility, and is currently used only for engineering and administrative tasks.

1.3 Summary of Scope

Groundwater flow and mass transport models were developed as part of an investigation of groundwater flow and contaminant migration pathways near the former Unisys facility Great Neck. The flow model was based on the existing stratigraphy and hydrogeologic properties represented in the Nassau County regional model (NCRM) and the Great Neck model (GNM), and supplemented with local site data from boring logs. The NCRM and GNM were also used to provide boundary

conditions for the former Unisys facility model. Additional description of the NCRM and the GNM is presented later in this report.

A mass transport model was also developed to evaluate potential migration of site related contamination. For the OU-2 Remediation Investigation, the groundwater flow and mass transport models were used to evaluate future migration of site related contaminants for the no-action (i.e. no site pumping) scenario.

1.4 Organization of Report

The remainder of this report presents the development, calibration and application of the groundwater flow model for the OU-2 Remedial Investigation. Previous modeling investigations are presented in Section 2.0. The calibration of the groundwater flow model is discussed in Section 3.0. Section 4.0 presents the mass transport simulation results. References used in compiling this report are listed in Section 5.0.

Section 2
Previous Modeling Investigations

2.0 Previous Modeling Investigations

Previous modeling investigations performed in the vicinity of the site were used as the basis for the development of the local model. Existing groundwater flow models that cover the regional and local area in the vicinity of the site are the Nassau County regional model (NCRM) and the Great Neck model (GNM). A summary of development and application of these models is presented below.

2.1 Nassau County Regional Model (NCRM)

The existing NCRM was used as a basis for developing the local groundwater flow model. The NCRM was developed and calibrated by CDM for Nassau County beginning in 1988. It has since been the basis of modeling studies addressing water supply planning and management, saltwater intrusion, streamflow maintenance and augmentation, nitrate and assessment and remediation of VOC and hydrocarbon plumes. A number of local models have been created based on the NCRM, including a model of the Great Neck peninsula focusing on salt water intrusion developed by CDM and a model of Great Neck and Manhasset currently under development by the Nassau County DPW.

2.1.1 NCRM Grid

The NCRM was created using DYNFLOW, a fully three-dimensional, finite element groundwater flow modeling code developed by CDM. The domain of the NCRM extends across Queens and Nassau Counties, and into the western portion of Suffolk county. The NCRM grid is shown in **Figure 2-1**. The NCRM grid consists of 1,143 triangular elements and the grid is denser in Nassau County, which was the focus of the groundwater flow model. Smaller elements, and more nodes (the points where the triangles or elements intersect) provide more detailed representation and simulation of aquifer conditions.

The northern and southern boundaries of the NCRM grid extend, respectively, to the north shore and beyond the barrier islands along the south shore. The boundary condition assigned to these boundaries is a specified head boundary condition. The model boundary heads at the surface are assigned an elevation of mean sea level. At depth, specified heads at the boundaries are assigned equivalent head values (greater than mean sea level) that represent the greater density of salt water.

The western model boundary extends to the Queens/Brooklyn county line, where the bedrock surface rises in elevation and outcrops. This boundary was simulated using a no flow boundary

condition. The eastern model boundary extends to central Suffolk county and follows a groundwater flow line; this boundary is also simulated using a no flow boundary condition.

2.1.2 NCRM Stratigraphy

The NCRM is divided vertically into eight levels, which define seven layers for groundwater modeling purposes. Near the site, the NCRM includes the major aquifer and confining units (Lloyd aquifer, Raritan clay, Magothy aquifer and Upper Glacial aquifer). The NCRM model stratigraphy was developed based on boring logs, structural contour maps, and cross sections developed by the USGS (Smolensky et al., 1989). In some cases, the units are subdivided into lower and upper subgroups to achieve a better representation of heads in the model.

2.1.3 NCRM Pumping and Recharge Distribution

Active pumping wells are represented in the NCRM model by specified fluxes at nodes that correspond to the vertical and horizontal coordinates of each well. During the time of model development and calibration, Nassau County maintained a comprehensive database of both Nassau County and Queens County water supply withdrawals, as well as water production by nonresidential users (commercial and industrial).

The main source of groundwater recharge to the model area is precipitation infiltration; however, the amount of groundwater recharge applied to a given area in the NCRM depends on the land use in the area, and whether the area is paved or unpaved. To account for this variation in groundwater recharge, groundwater recharge was not uniformly distributed in the NCRM; rather, the application of groundwater recharge to the model was varied according to the land use of a given area, and took into account other potential sources of groundwater recharge such as recharge basins, septic systems and leaking water mains.

At the time of the development of the NCRM, it was estimated that approximately 50 percent of the total annual precipitation (Mineola, NY average: 44 inches per year) infiltrated the subsurface and recharged the groundwater. The applied groundwater recharge specified in the NCRM for the local area near the site is 28 to 29 inches per year, which represents precipitation infiltration as well as contribution from the other groundwater recharge sources discussed above. During the Great Neck modeling investigation, which will be discussed later in this section, the groundwater recharge estimates for the site area were refined.

2.1.4 NCRM Calibration

The NCRM was calibrated to several historical steady state and transient conditions. The model successfully reproduced the observed groundwater system behavior in 1902 which represented groundwater conditions prior to major groundwater development; the decline in water levels measured during the 1960s drought; and the effect of increased pumping in Nassau County in the 1980s in response to increasing development and water supply demand.

Figure 2-2 shows average measured water levels (red) and average computed simulated water levels (blue) at selected representative wells in the Upper Glacial, Magothy and Lloyd aquifers. The figure illustrates how the model successfully reproduced the decline in water level elevations observed in the 1960s, as well as the impact of seasonal changes in groundwater pumping on water level elevations in the three aquifers.

2.2 Great Neck Model

A groundwater flow model of the Great Neck peninsula was developed by CDM for Nassau County DPW to evaluate the extent of salt water intrusion beneath the Great Neck peninsula, and to improve the understanding of subsurface stratigraphy on Great Neck peninsula. The Great Neck model (GNM) was developed using the NCRM as a basis for model formulation. DYNFLOW was also used to create the Great Neck model.

2.2.1 Great Neck Model Grid

The Great Neck groundwater flow model covers the entire Great Neck peninsula, extending from beyond the Long Island Expressway to the south, and to the Long Island Sound and surrounding bays north of the peninsula. **Figure 2-3** shows the Great Neck model grid. The southern extent of the model is located at the groundwater divide which is approximately 1,000 feet south of the former Unisys facility.

The eastern and western boundaries of the Great Neck model were simulated using a fixed head boundary condition. Specified head values were obtained from recent water level elevation data or the NCRM. The northern portion of the eastern model boundary was simulated using a fixed head boundary condition at the surface (fixed at mean sea level) and a no flow condition at depth.

The southern model boundary was simulated using a no flow boundary condition in the Magothy and Upper Glacial aquifers, since groundwater flow in the area is essentially east to west coinciding with the groundwater divide and is parallel to the model boundary. Heads in the lower model layer, which represents the Lloyd aquifer, were fixed to represent flow into and out of the model area within this unit.

At the northern boundary, the model level that represented bottom of Long Island Sound was simulated using a specified head boundary at mean sea level. At depth, a no-flow boundary condition was assigned to represent the outcropping of the bedrock beneath the Sound. In the interior of the model domain, the surface nodes coincided with the phreatic surface and were permitted to fluctuate in response to aquifer stresses.

2.2.2 Great Neck Model Stratigraphy

The Great Neck model contains six layers defined by seven levels. On Great Neck peninsula, the subsurface stratigraphy is characterized by a complex sequence of aquifers and confining units which

includes reworked Upper Glacial and Magothy sediments, the Port Washington Aquifer, the Port Washington confining unit, the Raritan clay and the Lloyd aquifer.

South of the peninsula, the subsurface stratigraphy becomes less complex and generally consists of the Upper Glacial aquifer, Magothy aquifer, the Raritan and the Lloyd. The former Unysis facility is located near the southern extent of this model, where the subsurface stratigraphy consists of the major hydrogeologic units and is consistent with that represented in NCRM.

2.2.3 Groundwater Pumping

Active pumping wells are represented in the Great Neck model by specified fluxes at nodes that correspond to the vertical and horizontal coordinates of each well. The model was calibrated to a high and a low groundwater pumping condition. Pumping fluxes representative of these two conditions were assigned to the model for each simulation.

2.2.4 Groundwater Recharge

The specified groundwater recharge rate for the Great Neck model is comprised of contributions from the following recharge sources:

- precipitation, infiltration, adjusted for surface water runoff collection method;
- septic systems; and,
- leaky water mains and pipes.

Precipitation Infiltration

Statistical analyses of data from across Nassau County have indicated that there are no significant differences in average precipitation within the county. Therefore, precipitation readings from the centrally located Mineola weather station were used. The long term average precipitation rate is between 43 and 45 inches per year. Studies conducted by Cornell University (Steenhius) and the USGS have concluded that 75 to 90 percent of the precipitation falling during the non-growing season becomes groundwater recharge, while virtually all precipitation during the growing season (May through September) becomes evapotranspiration. Using the Thornthwaite and Mather method to calculate recharge, which accounts for seasonal variation in recharge, results showed that on an average basis in Nassau County 49.8 percent of total precipitation recharges the aquifer system.

Nassau County DPW carried out a field study of recharge basins during the late 1980s, which consisted of continuous flow measurements made at 11 recharge basin inlet structures. Based on these data, it was determined that recharge basins actually increase recharge by capturing precipitation during the summer months and recharging the groundwater, when recharge is normally absent. Using these data, as well as information from a subsequent USGS study (Ku, 1992) recharge rates were adjusted upward for areas of the county where stormwater runoff is discharged to recharge basins. In areas where stormwater runoff is discharged to the Long Island Sound via streams,

average recharge rates were adjusted downward. The study indicated that the average annual recharge rate in the Great Neck model area should be adjusted downward by about 11 percent to account for urban run off routed to the Long Island Sound. Thus, the natural recharge rate in the Great Neck area is estimated to average about 19 inches per year.

In the areas of the model within Queens, the USGS estimates that only 29 percent of rainfall infiltrates the ground due to the higher level of urbanization. For those areas of the model within Queens, 14 inches per year of natural recharge was applied.

Septic Systems

In addition to natural recharge, adjusted for the 11 percent loss due to runoff collection, recharge from septic systems was included in the model. In areas which are not served by sewers, the per capita water consumption was multiplied by the population of the unsewered area. Per capita water consumption was available on the water district by water district basis. Based on USGS data, a reasonable estimate of the percentage of water that is used annually in Nassau County homes for outdoor purposes in approximately 15%. Therefore, 85% of all water consumed was assumed to be recharged back to the groundwater in those areas of the model where sanitary sewers were not available. Depending on the population density and the amount of sewering, additional recharge from septic systems in the Great Neck model area ranged from 0 to 8 inches per year.

Leaky Water Mains and Pipes

Finally, additional recharge was added based on an estimate of the countywide average leakage rate for water supply pipes. Nassau County Department of Health Data indicate that unaccounted-for water averages about 10 percent of the amount of water pumped for water supply purposes in Nassau county. Of this, 10 percent loss, it is estimated that about 7 percent is due to leaking water mains. Water leakage of 7 percent of total annual pumpage was distributed on a village by village basis using per capita consumption rates and population density. The water was added to the natural recharge as additional surface recharge. In Queens, the leakage rate from water supply pipes was estimated to be 9 percent because of the age of the system. New York City per capital consumption rates were used, and a population density of 15 people per acre was assumed based on New York City land use maps. Across the model, additional recharge due to leaky water mains ranged from 0.2 to 5 inches per year.

Summary

Groundwater recharge to the Great Neck model was simulated using a methodology similar to that employed in NCRM. Groundwater recharge to the model was varied spatially and represented precipitation infiltration, septic system and sewage return flows and water main leakage. The applied average groundwater recharge rate for the site area in the GNM was approximately 19 to 21 inches per year.

2.2.5 Model Calibration

The Great Neck model was calibrated to two conditions. One calibration target data set consisted of water level elevation data collected during the summer 1992. The purpose of this calibration was to evaluate if the model could simulate the observed aquifer response to increased pumping during the summer months. The second calibration target data set consisted of water level elevation data collected during the first three months in 1992, when groundwater withdrawals were low.

The Great Neck model was successfully calibrated to the two conditions mentioned above. As such, calibration simulations demonstrated the model's ability to reasonable reproduce groundwater flow patterns in all the aquifers beneath Great Neck peninsula.

2.2.6 Salt Water Intrusion

The DYNSWIM simulation code was applied to the Great Neck model to represent salt water intrusion in Great Neck aquifers. DYNSWIM is an extension of DYNFLOW which simulates the subsurface flow of two distinct, but interacting fluid phases (i.e. fresh water and salt water). An important part of the Great Neck model calibration process included successfully reproducing observed past and present salt water intrusion. The Great Neck model was then used to simulate potential future salt water intrusion for assumed groundwater management conditions.

Section 3
Model Development and Calibration

The groundwater flow model developed for the former Unisys Great Neck site was based on the Nassau County regional model (NCRM) and the Great Neck model (GNM), and local site data collected during previous investigations. The development and calibration of the former Unisys facility local model is presented in greater detail below.

3.1 Modeling Code

The groundwater flow modeling software used in this study was DYNFLOW, a fully 3-dimensional, finite element modeling code. The finite element method provides much greater flexibility in model grid configuration which allows more natural matching of physical features, such as the complex shape of the coastline, and the complex stratigraphy beneath the Great Neck peninsula. It also allows model detail to be focused in areas of particular interest, e.g. in the vicinity of extraction wells and the site, while areas hydraulically distant from the site can be incorporated at a lower level of computational detail. Another feature of DYNFLOW is the ability to reliably simulate water table rise and fall into and out of model layers, particularly the "rewetting" of previously unsaturated layers.

DYNFLOW operates in both steady state and transient modes. A number of different types of boundary conditions may be specified to represent groundwater pumping, areal and point recharge, groundwater interaction with surface water bodies, hydraulic and structural groundwater flow divides and interaction with adjacent aquifers. One-dimensional elements to represent pumping wells screened over multiple layers, and 2-dimensional elements to represent planar flow barriers such as faults and slurry walls may be superimposed onto the 3-dimensional finite element grid.

DYNFLOW has been developed over the past 18 years by CDM engineering staff, and is in general use for large scale basin modeling projects and site specific remedial design investigations. It has been applied in over 150 modeling studies in the United States, and has been accepted by federal and state regulators and for use in litigation. The DYNFLOW code has been reviewed and tested by the International Groundwater Modeling Center (IGWMC) (van der Heijde, 1985), and has been extensively tested and documented by CDM (CDM, 1997).

DYNFLOW is linked with an integrated set of modeling codes (DYN system) which simulate solute transport, non-aqueous phase liquid (NAPL) flow and sea water intrusion in conjunction with groundwater flow. A graphical user interface, DYNPLOT provides model building capabilities and graphical displays of model inputs, simulation results, field data and physical and geographical features for all DYN codes.

3.2 Model Grid

The local model grid is shown in **Figure 3-1**. The local grid extends south and east from the site approximately 2 miles. To the north, it extends to Long Island Sound, including all of the Great Neck Peninsula. The grid extends somewhat further from the site to the west than to the east, considering that available groundwater data indicate a slight westward component in flow near the site. **Figure 3-2** shows the local former Unisys facility model domain superimposed on the NCRM grid.

The extent of the local model grid was designed to accommodate offsite plume migration simulations, maintaining sufficient distance from the model boundaries to any potential simulated plume area. At the same time, the grid was designed to provide a high level of computational refinement at and near the site, where the node spacing is much finer than at the model boundaries.

The coordinate system for the model is generally the same as the New York state plane coordinate system, except that the easting coordinates are reduced by two million.

3.3 Model Stratigraphy

The entire sequence of unconsolidated aquifer units, from the Lloyd to the Upper Glacial, are included in the local model. Other formations identified on the Great Neck peninsula, such as the Port Washington Confining Unit, Port Washington Aquifer and Reworked Magothy, are also included in the local model. A cross-section near the site showing local model stratigraphy is shown in **Figure 3-3**. Neither groundwater transport from the site nor current or proposed remedial activities are expected to extend into the deeper Raritan and Lloyd aquifer units. Nevertheless, these units are included for completeness, and to facilitate the model transition of the aquifer layering sequence in the site area to the more complex sequence at the Great Neck peninsula.

The local model stratigraphy was developed by first interpolating NCRM and GNM stratigraphy to the local model grid. In all, nine model layers are included in the local model to incorporate the complex stratigraphy from the GNM, and to facilitate the setting of boundary conditions for the local model using regional model output.

The local model stratigraphy near the site was then modified based on boring log data from on-site and offsite monitoring wells. In the local model, the basal magothy and middle magothy are

each represented by individual model layers, and the upper magothy is represented by two model layers.

Several boring logs from offsite monitoring wells showed evidence of a silty sand and/or clay layer at the Upper Glacial/Magothy contact. A similar feature is present near the site in the GNM. In the local model, this feature was incorporated based on reported observations in the well boring logs.

3.4 Aquifer Properties

Aquifer properties were assigned to model layers to represent the hydrogeologic characteristics of the formations represented in the model. The following aquifer properties were specified for each aquifer material defined in the model: horizontal hydraulic conductivity, vertical hydraulic conductivity, specific storativity, and specific yield (applicable only to the layer where the phreatic surface occurs). During the course of model calibration, the horizontal and vertical hydraulic conductivity assignments in the model were adjusted until the model produced a reasonable representation of observed heads. Specific storativity and specific yield values were adjusted during transient test simulations.

The calibrated aquifer properties for the local model in the vicinity of the site are listed in **Table 3-1.** The hydraulic conductivity values listed in Table 3-1 are generally consistent with estimates from previous investigations shown in **Table 3-2.**

3.5 Boundary Conditions

A specified head boundary condition was assigned to all local model perimeter nodes, at all model levels. The boundary head distribution was established by simulations with the Great Neck and NCRM models.

The Great Neck model was used to establish heads at the Long Island Sound boundary nodes. Since the Great Neck model used DYNSWIM, a three-dimensional salt water intrusion model, to explicitly account for fresh water-sea water interaction, GNM results provided a realistic seaward boundary condition. Due to the distance of the seaward boundary from the site, it is not expected that the seaward boundary heads in the local model would need to be revised when alternative remedial scenarios are simulated at and near the site.

NCRM simulations were used to establish boundary heads at the southern, eastern, and western local model boundaries. The NCRM was revised to include the more complex stratigraphy on

the Great Neck peninsula and to reflect the salt water intrusion modeling results from the GNM. The NCRM was resimulated and new local model boundary heads were established when significant changes to pumping and/or recharge operations near the site were represented.

A no-flow boundary condition was specified at the bottom of the model due to the relative impermeability of the bedrock. The top of the model is a phreatic surface which moves in response to changes in pumping, recharge, or other boundary conditions.

The distribution of recharge established for the NCRM and GNM was applied to the local model. This recharge distribution accounts for land use, recharge basins, sewering, and pipe leakage. Recharge conditions in the vicinity of the site have not changed significantly since development of the NCRM and GNM.

The steady state calibration target was a set of water level elevations collected in September and October 1996. The total annual precipitation and the non-growing season (October to December) precipitation for 1996 were both greater than the long term average. For model calibration, groundwater recharge slightly higher than average (1.085) was assigned to the NCRM and local model. The applied groundwater recharge for the calibration simulation ranged from 21 to 23 inches per year near the site.

The major pumping stresses on the aquifer are due to public water supply pumping. This pumping was represented in the local flow model using average 1996 pumping rates. **Table 3-3** presents a summary of average seasonal and average annual water supply pumpage for wells in the vicinity of the site. **Figure 3-4** and **Figure 3-5** show the average annual 1996 public supply well withdrawal rates at Magothy aquifer and Lloyd aquifer wells in the vicinity of the site.

Other groundwater pumping near the site includes off site commercial and industrial pumping (non-municipal). This pumping was not represented in calibration simulations. Since model calibration, a survey of non-municipal pumping wells has been completed, and simulations incorporating the available data from these wells have been performed. **Figure 3-6** shows the location and average 1997 pumping rates for the non-municipal wells near the site. All of the identified active non-municipal wells near the site are represented in the model with the exception of wells Q-01909 and N-07560 for which pumping information could not be obtained. Available location and depth information for these two wells is presented in **Table 4-1** in Section 4. Commercial/industrial pumping is expected to have only a local hydraulic effect on the aquifer, considering that the water is usually recharged or re-injected onsite. The representation of non-municipal pumping wells may be revised in the future based on ongoing investigations.

3.6 Model Calibration

The model was calibrated in both steady state and transient modes. The primary steady state calibration target was to reproduce the distribution of water levels measured at the site in October 1996. Onsite extraction well EW-3 was the only remediation well operating during this period with reinjection occurring at wells DW-5, DW-6, and DW-8. Water levels measured at this time were reasonably similar to water levels measured six months previously, indicating that a steady state representation is appropriate for that time period. Water levels measured at off site non-project wells in September of 1996 were also be used in the calibration.

Calibration was achieved by first simulating regional groundwater conditions using the NCRM and adjusting hydraulic conductivity and groundwater recharge until the model reproduced a reasonable representation of the observed heads. Boundary heads for the local former Unisys facility model were then obtained from the NCRM simulation. Consistent adjustments to groundwater recharge and hydraulic conductivity were made to the NCRM and local model during the calibration process.

Table 3-4 and **Figure 3-7** present local model calibration results and indicate that the local model reproduces local water level conditions reasonably well. During calibration, some potential survey discrepancies were identified, and a recommendation for a confirmatory survey of top of casing elevations at selected wells (well cluster 4, well cluster 8, and well cluster 12) was made.

A transient calibration was also performed to verify that the model reasonably represents aquifer response to pumping at the site. Aquifer storage parameters were also estimated. Portions of the pumping test performed during the Phase 1 remedial investigation (H2M, 1996) were simulated. This pumping test, which was conducted in September 1994, consisted of pumping wells EW-1, EW-2, EW-3 and RW-1 individually, and monitoring water level changes at nearby observation wells. The transient calibration analysis focused on the results from the tests at EW-1 and RW-1. These tests were selected because they showed the least amount of anomalous water level variation or interference from other pumping activity. **Table 3-5** presents transient calibration results.

3.7 No-Action Groundwater Flow Simulation

Once calibrated, the groundwater flow model was used to simulate average groundwater flow conditions without onsite pumping (no-action). The simulated groundwater flow field was then used to simulate potential groundwater plume migration under the no-action scenario (Section 4).

The population in the local site area, and in the area within the model domain, is not expected to increase significantly in the future, because this portion of Nassau County is already fairly developed. As such, current pumping rates are believed to be generally representative of potential future public supply pumping rates for this area. Therefore, for the no-action simulation, average groundwater recharge and average 1996 public supply pumping was represented. In addition, groundwater withdrawals from two new Water Authority of Great Neck North (WAGNN) wells were also simulated. Construction of these two wells, which will draw water from the Magothy aquifer, started in 1998. Information from the well permit was used to estimate the well locations, depths and potential pumping rates. For the no-action simulation, the combined pumping rate from these two wells was 2.17 million gallons per day. Pumping at other WAGNN wells was adjusted downward, so that the total pumping for the district was the same as in the calibration simulation (1996 average). Average 1997 non-municipal pumping was also included in the no-action groundwater flow simulation.

Section 4
Mass Transport Simulation

Mass transport simulations were performed to evaluate potential groundwater plume migration under the no-action (no site pumping) scenario. A discussion of the model input and results is presented below.

4.1 Modeling Code

DYNTRACK is a fully 3-dimensional particle tracking and solute transport modeling code which is linked with DYNFLOW. In simple particle tracking mode, DYNTRACK simulates the mean advective flow path of dissolved solutes using 3-dimensional flow fields developed by DYNFLOW. In full transport mode, the code simulates the advection, dispersion, adsorption and decay processes controlling solute transport in groundwater using the random walk method.

The random walk method is a particle based approach to approximating the solution of the partial differential equation of transport. A statistically significant number of particles are tracked, wherein each particle is advected with the mean velocity within a grid element and then dispersed according to specified dispersion parameters. The concentration within a particular zone of interest is represented by the total number of particles that are present within the zone, multiplied by their associated solute mass and divided by the volume of water within the zone. A solute source can be represented as an instantaneous input of solute mass, as a continuous source for which mass is input over a specified area at a specified time-variable rate, or as specified concentrations at nodes. The random walk method is intuitive, limits numerical dispersion and conserves solute mass.

The DYNTRACK code has also been reviewed and tested by the International Groundwater Modeling Center (IGWMC) (van der Heijde, 1985), and has been tested and documented by CDM (CDM, 1998).

4.2 Model Input

The volatile organic compounds of concern at the site are PCE, TCE, cis-1, 2-DCE and vinyl chloride. For this study, mass transport of the total volatile organic compound (TVOC) plume, consisting of the compounds listed above, was simulated.

TVOC was defined as the sum of the concentrations of PCE, TCE, cis-1, 2-DCE and vinyl chloride concentrations. A review of onsite and offsite water quality data was performed to evaluate the lateral and vertical distribution of the TVOC plume near the site. The data used for this analysis included Fall 1998 site monitoring well data and historical water quality data from public supply wells N-03905, N-04243 and N-05710 (1996), and offsite non-municipal pumping

wells (1994 to 1997). The water quality data from site monitoring are presented in the main report. Other water quality data used in the evaluation of the TVOC plume are listed in **Table 4-1.**

The estimated TVOC plume extent based on the Fall 1998 data is presented in the main report. The TVOC plume distributions shown in these figures were used as the starting condition for simulating future plume migration. No additional sources were represented in the mass transport simulations.

Table 4-2 lists the mass transport model properties. No biodegradation of the TVOC mass was specified, which results in a conservative estimate of mass in the system during the simulation. A retardation coefficient of 1.0 was specified for the TVOC mass. While it is expected that some retardation of the TVOC plume occurs, the no action simulation included no retardation so that a conservative assessment of maximum future plume extent could be made.

TVOC plume transport was simulated for a period of 30 years using the no-action steady-state flow field.

4.3 Simulation Results

The mass transport simulation results were evaluated by reviewing:

- maximum simulated TVOC concentrations
- average simulated TVOC concentrations for different depth intervals
- influent concentrations at impacted pumping wells

Figure 4-1 shows the maximum simulated TVOC concentrations after 20 and 30 years under the no-action scenario. This figure depicts the maximum computed TVOC concentration for all model layers for a given location. This figure indicates the maximum simulated extent of the TVOC plume and where, in plan view, the highest groundwater concentrations after 20 and 30 years are predicted to occur.

Figure 4-2, **Figure 4-3**, **Figure 4-4**, and **Figure 4-5** show the average simulated TVOC concentrations after 20 and 30 years for the model layers representing, respectively, the Upper Glacial aquifer, the upper Magothy, the middle Magothy and the basal Magothy. If these formations are represented by more than one layer in the model, simulated concentrations were averaged together to present the model simulation results. As such, a direct comparison between these figures and Figure 4-1 cannot be made. Figures 4-2 to 4-5 show the projected distribution of the TVOC plume for different depth intervals.

Simulated influent concentrations at impacted pumping wells were also reviewed. **Figure 4-6** and **Figure 4-7** show the simulated influent concentrations at impacted public supply wells and non-municipal wells, respectively. **Table 4-3** contains additional information about the pumping wells that were predicted to be impacted by TVOC plume migration from the site under the no-action scenario.

Section 5
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Tables

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Table 3-1
Model Hydraulic Conductivity Assignments in Site Vicinity

Hydrogeologic Unit	Model Layer (1)	Horizontal Hydraulic Conductivity (Feet/Day)	Horizontal to Vertical Anisotropy	Specific Storativity (1/Foot)	Specific Yield (2)
Upper Glacial Aquifer	7,8	135	10:1	7.0×10^{-6}	0.15
Upper Glacial Clay/Silt	7	10	100:1	7.0×10^{-6}	0.15
Upper Magothy Aquifer	5,6	45	13:1	7.0×10^{-6}	--
Middle Magothy Aquifer	4	35	14:1	7.0×10^{-6}	--
Basal Magothy Aquifer	3	125	20:1	1.0×10^{-5}	--
Raritan Confining Unit	2	0.05	50:1	1.0×10^{-5}	--
Lloyd Aquifer	1	30	100:1	1.0×10^{-5}	--

Notes:
(1) DYNFLOW model layers are numbered from the bottom up.
(2) Applicable only to layer where phreatic surface occurs.

Table 3-2
Summary of Hydraulic Conductivity Estimates

Hydrogeologic Unit	Smolensky et al (1989) (1)		Nassau County Regional Model (2)		Great Neck Model (2)	
	Average Horizontal Hydraulic Conductivity	Horizontal to Vertical Anisotropy	Horizontal Hydraulic Conductivity	Horizontal to Vertical Anisotropy	Horizontal Hydraulic Conductivity	Horizontal to Vertical Anisotropy
Upper glacial aquifer	270 ft/day	10:1	200 ft/day	10:1	135 ft/day	10:1
Magothy aquifer (3)						
upper	50 ft/day	10:1	10 to 35 ft/day	100:1	25 ft/day	50:1
basal	---	---	125 ft/day	20:1	125 ft/day	20:1
Raritan confining unit	Poorly permeable	Vertical K: 0.001 ft/day	0.3 ft/day	Vertical K:0.002 ft/day	0.05 ft/day	Vertical K: 0.001 ft/day
Lloyd aquifer	40 ft/day	10:1	35 ft/day	100:1	30 ft/day	100:1

Notes:
(1) From *Hydrologic Framework of Long Island, New York*
(2) In vicinity of Lockheed Martin site.
(3) Magothy subdivided into upper and basal Magothy layers.
Basal Magothy is more permeable than upper Magothy.

Table 3-3
Average Seasonal and Annual Pumping Summary

Well ID (1)	Year	Pumping Summary (gpm) (2) Winter	Spring	Summer	Fall	Annual Average (3)
N-00022	1990		193	13	393	151
	1991	13	46	159	0	51
	1992	0	11	342	231	144
	1993	0	0	321	700	306
	1994	383	24	291	581	309
	1995	331	524	618	289	386
	1996	44	386	600	193	301
	1997 (Through July)	0	0			235
	Average	**110**	**148**	**335**	**341**	**235**
N-00700	1990		262	0	1	112
	1991	0	0	118	373	121
	1992	0	0	0	0	0
	1993	0	0	0	0	0
	1994	0	0	0	0	0
	1995	0	0	0	0	0
	1996	0	0	0	0	0
	1997 (Through July)	0	0			
	Average	**0**	**33**	**17**	**54**	**33**
N-01328	1990		369	717	536	496
	1991	603	340	630	275	401
	1992	189	293	535	357	342
	1993	274	277	622	320	364
	1994	230	379	582	743	515
	1995	478	724	891	993	774
	1996	858	893	931	905	893
	1997 (Through July)	853	835			790
	Average	**498**	**514**	**701**	**590**	**572**
N-01618	1990		37	0	0	9
	1991	0	0	0	0	0
	1992	0	0	0	0	0
	1993	0	0	0	0	0
	1994	0	0	34	15	12
	1995	0	0	0	0	0
	1996	0	0	0	0	0
	1997 (Through July)	0	0			
	Average	**0**	**5**	**5**	**2**	**3**
N-01802	1991	0	53	220	16	71
	1992	0	0	89	145	58
	1993	0	0	0	0	0
	1994	0	0	0	34	8
	1995	0	0	0	0	0
	1996	0	0	154	0	38
	1997 (Through July)	0	0			
	Average	**0**	**8**	**77**	**33**	**29**

(1) Wells listed are located close to site.
(2) Average pumping values listed for each season.
Winter = December, January, February; Spring = March, April, May
Summer = June, July, August; Fall = September, October, November
(3) Annual average calculated from monthly pumping records.

Table 3-3
Average Seasonal and Annual Pumping Summary

Well ID (1)	Year	Pumping Summary (gpm) (2) Winter	Spring	Summer	Fall	Annual Average (3)
N-03905	1990		0	0	0	10
	1991	0	0	35	164	61
	1992	74	395	466	0	219
	1993	0	279	477	89	211
	1994	65	418	272	159	224
	1995	99	10	70	0	42
	1996	0	0	45	48	23
	1997 (Through July)	0	0			
	Average	**34**	**138**	**195**	**66**	**113**
N-04243	1991	0	0	49	69	35
	1992	44	338	404	0	188
	1993	0	167	93	19	76
	1994	71	236	161	109	147
	1995	58	0	124	0	33
	1996	0	0	9	5	3
	1997 (Through July)	0	0			
	Average	**25**	**106**	**140**	**34**	**80**
N-04388	1990		618	382	31	457
	1991	658	923	525	214	568
	1992	850	886	213	78	520
	1993	904	937	851	421	707
	1994	72	636	951	904	674
	1995	608	605	910	494	586
	1996	81	673	903	898	644
	1997 (Through July)	616	959			730
	Average	**541**	**780**	**677**	**434**	**611**
N-04390	1991	0	0	0	0	0
	1992	0	0	0	0	0
	1993	0	0	0	0	0
	1994	0	0	0	0	0
	1995	0	0	0	0	0
	1996	0	0	0	0	0
	1997 (Through July)	0	0			
	Average	**0**	**0**	**0**	**0**	**0**
N-05099	1990		0	429	660	324
	1991	46	510	1,048	876	640
	1992	504	736	1,028	569	694
	1993	231	741	1,004	944	742
	1994	767	818	1,042	1,137	963
	1995	1,026	1,019	992	1,106	945
	1996	761	1,073	949	234	729
	1997 (Through July)	0	280			373
	Average	**476**	**647**	**927**	**789**	**676**

(1) Wells listed are located close to site.
(2) Average pumping values listed for each season.
Winter = December, January, February; Spring = March, April, May
Summer = June, July, August; Fall = September, October, November
(3) Annual average calculated from monthly pumping records.

Table 3-3
Average Seasonal and Annual Pumping Summary

Well ID (1)	Year	Pumping Summary (gpm) (2) Winter	Spring	Summer	Fall	Annual Average (3)
N-05710	1991	0	0	19	2	5
	1992	15	62	87	0	41
	1993	0	90	403	1	144
	1994	178	127	750	551	410
	1995	476	41	646	136	283
	1996	0	0	366	417	214
	1997 (Through July)	86	61			236
	Average	**108**	**54**	**379**	**184**	**191**
N-07445	1990		485	883	494	485
	1991	245	533	762	242	431
	1992	125	162	465	380	295
	1993	271	462	644	103	345
	1994	79	49	502	171	265
	1995	453	72	245	111	145
	1996	0	99	333	127	138
	1997 (Through July)	27	0			12
	Average	**171**	**233**	**548**	**233**	**264**
N-07512	1990		635	1,181	966	855
	1991	789	589	1,035	588	709
	1992	219	0	0	537	197
	1993	630	1,034	1,220	448	861
	1994	1,059	1,202	1,214	536	907
	1995	134	0	919	308	336
	1996	0	0	0	695	219
	1997 (Through July)	418	524			616
	Average	**464**	**498**	**795**	**583**	**587**
N-08342	1990		171	893	488	394
	1991	241	235	822	896	551
	1992	86	554	745	675	523
	1993	228	756	912	796	673
	1994	278	294	669	167	324
	1995	419	226	569	719	516
	1996	732	303	195	651	476
	1997 (Through July)	882	509			731
	Average	**409**	**381**	**687**	**627**	**524**
N-09308	1990		428	860	541	601
	1991	402	433	716	464	457
	1992	3	212	673	64	243
	1993	92	175	535	128	222
	1994	82	118	1,158	976	614
	1995	231	0	198	606	290
	1996	542	417	755	665	558
	1997 (Through July)	497	865			802
	Average	**264**	**331**	**699**	**492**	**473**

(1) Wells listed are located close to site.
(2) Average pumping values listed for each season.
Winter = December, January, February; Spring = March, April, May
Summer = June, July, August; Fall = September, October, November
(3) Annual average calculated from monthly pumping records.

Table 3-3
Average Seasonal and Annual Pumping Summary

Well ID (1)	Year	Pumping Summary (gpm) (2) Winter	Spring	Summer	Fall	Annual Average (3)
N-10557	1990		641	1,297	1,118	1,019
	1991	954	1,061	1,030	960	959
	1992	589	268	188	782	478
	1993	1,012	680	1,081	903	834
	1994	49	4	531	269	205
	1995	59	324	499	606	391
	1996	250	143	168	106	137
	1997 (Through July)	56	11			83
	Average	**424**	**391**	**685**	**678**	**513**
N-10612	1990		99	517	311	244
	1991	368	237	408	125	274
	1992	75	299	569	333	357
	1993	369	1	139	1	75
	1994	0	177	857	430	361
	1995	0	253	826	675	448
	1996	387	776	874	492	609
	1997 (Through July)	362	432			516
	Average	**223**	**284**	**599**	**338**	**360**

(1) Wells listed are located close to site.
(2) Average pumping values listed for each season.
Winter = December, January, February; Spring = March, April, May
Summer = June, July, August; Fall = September, October, November
(3) Annual average calculated from monthly pumping records.

Table 3-4
Calibration Statistics Summary For Site Monitoring Wells

Model Layers (1)	Formation	Number of Wells	Mean Difference (2) (Feet)	Standard Deviation
7, 8	Upper Glacial	16	-0.02	1.22
5, 6	Upper Magothy	21	0.20	1.73
4	Mid-Magothy	10	1.01	2.95
3	Basal Magothy	8	-1.50	2.77

Notes:

(1) Model Layers are numbered from the bottom up.

(2) Calibration target data set was October 1996 water levels.

Difference is simulated minus measured water levels.

Table 3-5
Transient Pumping Test Simulation Results

EW-1 Pumping at 980 gpm

Monitoring Well	Drawdown (Feet) Observed[1]	Simulated[2]
7GL	0.13	0.28
7ML	0.13	0.75
23GL	2.13	2.31
24GL	1.75	1.43
24MI	3.76	4.30

RW-1 Pumping at 450 gpm

Monitoring Well	Drawdown (Feet) Observed[1]	Simulated[2]
1GL	2.52	1.6
12MI	0.12	0.26
25GL	0.52	1.24
25MI	0.76	1.23
28GL	1.5	1.03

Notes: 1. From Distance-Drawdown Plots (Phase 1 Remedial Investigation Report (H2M, December 1996)).
2. 60 minutes after pump startup

Table 4-1
Historical Water Quality at Off Site Public Supply and Non-Municipal Wells

Well	Well Coordinates		Aquifer	Water Use	Sampling Date	Measured TVOC(1) (ppb)	Reference
	Easting	Northing					
Public Supply Wells							
N-03905	2,083,849	195,773	Magothy	Public Supply	September-96	961	(3)
N-04243	2,083,960	195,549	Magothy	Public Supply	September-96	96	(3)
N-05710	2,083,574	197,328	Magothy	Public Supply	December-96	133	(3)
Non-Municipal Pumping Wells							
N-02576	2,081,152	194,140	Magothy	Irrigation	March-97	750	(2)
N-07560	2,081,574	194,456	Unknown	Cooling	July-95	627	(6)
N-08038	2,079,000	195,981	Magothy	Irrigation	July-95	81	(5)
Q-01909	2,080,407	192,887	Unknown	Cooling	July-95	ND	(6)

Notes:
(1) TVOC is the sum of PCE, TCE, 1,2-DCE, and vinyl chloride.
(2) H2M Labs, Inc. March 5, 1997.
(3) *Analytical Testing Results, Supplement to 1996 Annual Water Supply Statement.* Nassau County, New York.
(5) *Phase I Remedial Investigation Report* (H2M, December 1996).
(6) *Supplemental Remedial Investigation Report* (H2M, December 1996)

Table 4-2
Mass Transport Model Properties

Formation	Dispersivity (Feet)		Effective Porosity	Retardation Coefficient
	Longitudinal	Transverse		
Upper Glacial	30	3	0.3	1
Upper Magothy	30	3	0.2	1
Middle Magothy	30	3	0.2	1
Basal Magothy	30	3	0.3	1
Raritan Clay	30	3	0.1	1
Lloyd	30	3	0.25	1

Table 4-3
Well Information Summary For Impacted Wells
No Action Scenario

Well	Permit Number (2)	Owner Information		Water Use	Well Coordinates		Well Depth	Screen Information			Simulated Pumping Rate (3)	Pumping Capacity	Range of Simulated Influent TVOC Concentrations	Most Recent Available TVOC Measurements		
		Name	Address		Easting (ft)	Northing (ft)	(ft)	Length (ft)	Top (ft MSL)	Bottom (ft MSL)	(gpm)	(gpm)	(ppb)	Date	Value (ppb)	Reference
N-03905	--	Manhasset Lakeville Water District	170 East Shore Road, Manhasset, NY	Public Water Supply	2,083,849	195,773	254	40	-64	-104	23	1050	0 - 372	9/96	961	(5)
N-04243	--	Manhasset Lakeville Water District	170 East Shore Road, Manhasset, NY	Public Water Supply	2,083,960	195,549	255	50	-55	-105	3	NA (4)	0 - 535	9/96	96	(5)
N-05099	--	Manhasset Lakeville Water District	170 East Shore Road, Manhasset, NY	Public Water Supply	2,080,527	202,139	393	48	-170	-218	730	1050	0 - 73	1/96	ND (4)	(5)
N-05710	--	Manhasset Lakeville Water District	170 East Shore Road, Manhasset, NY	Public Water Supply	2,083,574	197,328	385	60	-165	-225	215	1400	41 - 246	12/96	133	(5)
WAGNN-12 (1)	--	Water Authority of Great Neck North	171 Great Neck Road, Great Neck, NY	Public Water Supply	2,083,468	200,912	400	118	-96	-214	753	1400	0 - 33	--	--	--
WAGNN-13 (1)	--	Water Authority of Great Neck North	171 Great Neck Road, Great Neck, NY	Public Water Supply	2,083,468	200,374	400	40	-90	-130	753	1400	0 - 123	--	--	--
N-02576	0093	North Shore Tower Country Club	272-40 Grand Central Pkwy, Floral Park, NY	Irrigation	2,081,152	194,140	201	20	-46	-66	21	325	0 - 459	3/97	750	(6)
N-08038	2726	Lake Success Park Golf	318 Lakeville Rd., Lake Success, NY	Irrigation	2,079,000	195,981	295	24	-61	-85	46	700	6 - 131	7/95	81	(7)
N-05535	1466	Deepdale Golf Course	Manhasset, NY	Irrigation	2,084,558	199,324	390	60	-80	-140	26	500	< 1	--	--	--

Notes:

(1) Information for these wells is based on Permit to Construct, No. 2822-00522/00003, January 16, 1998.

(2) Permit numbers listed for non-municipal wells only.

(3) The simulated pumping rates for municipal wells are based on 1996 average pumpage; pumping values at non-municipal wells are based on average 1997 pumpage.

(4) ND indicates not detected.

(5) *Analytical Testing Results, Supplement to 1996 Annual Water Supply Statement*, Nassau County, New York.

(6) H2M Labs, Inc. March 5, 1997.

(7) *Phase I Remedial Investigation Report* (H2M, December 1996).

Figures

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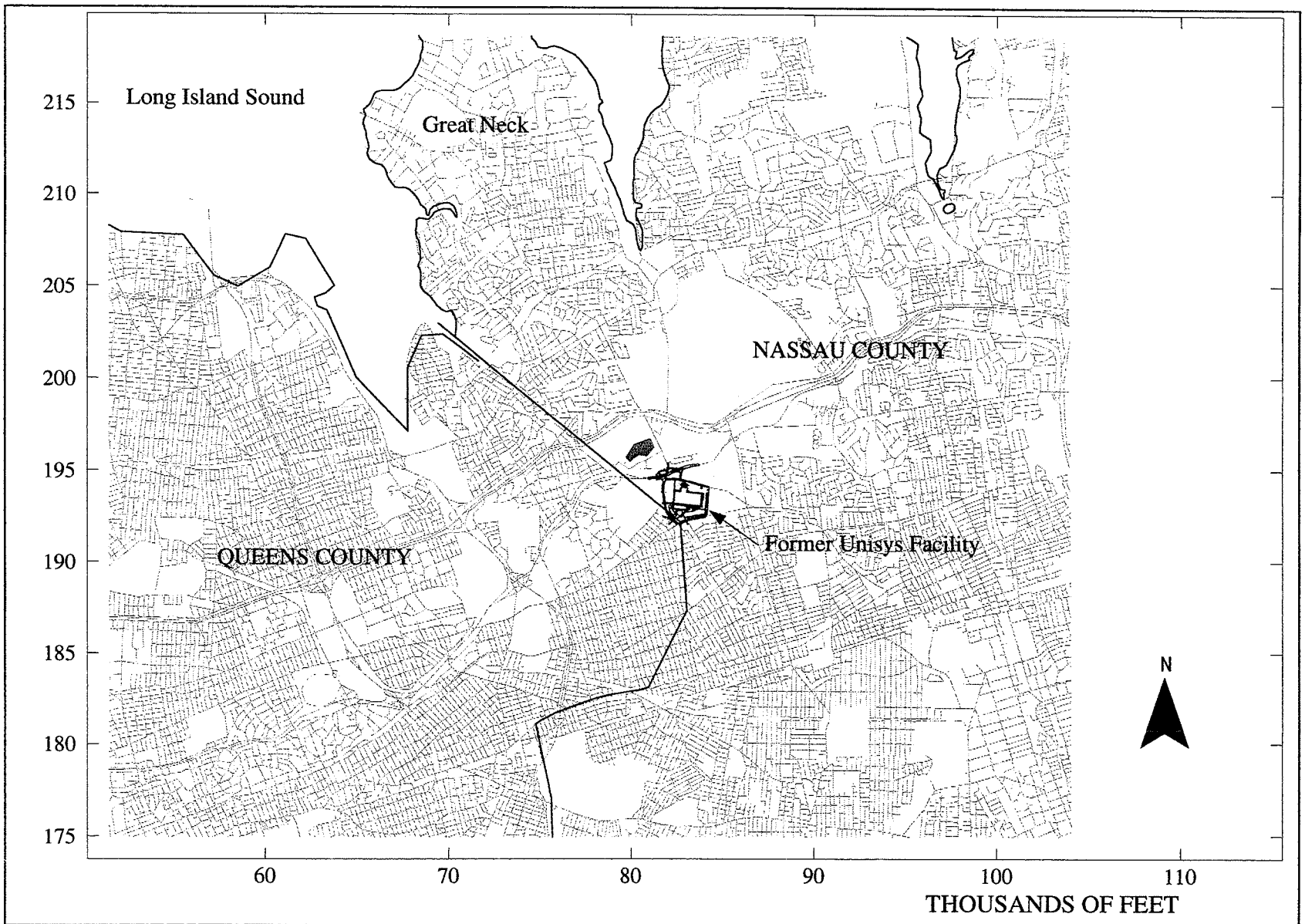

FIGURE 1-1

Regional Site Location Map

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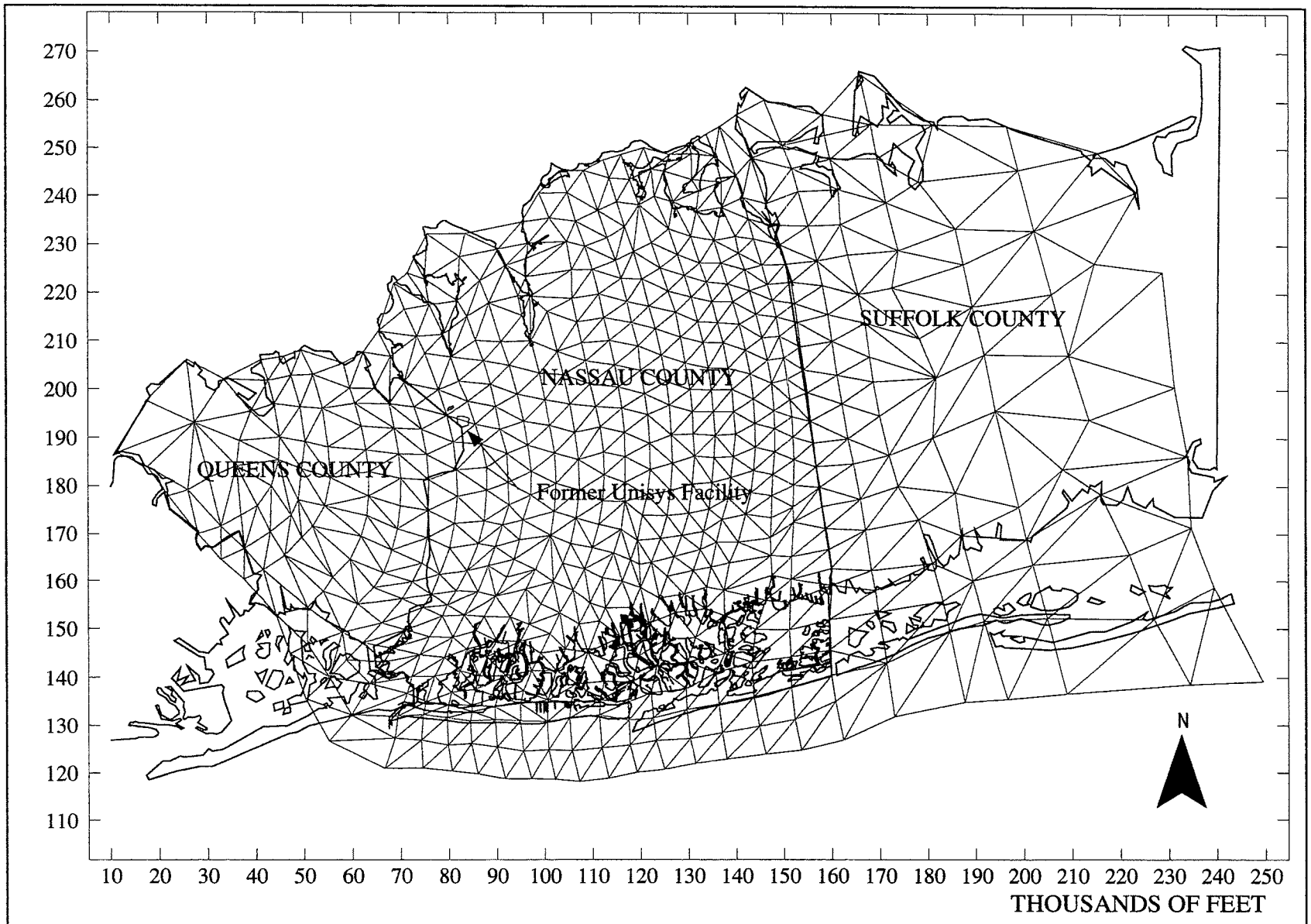

FIGURE 2-1

Nassau County Regional Model Grid

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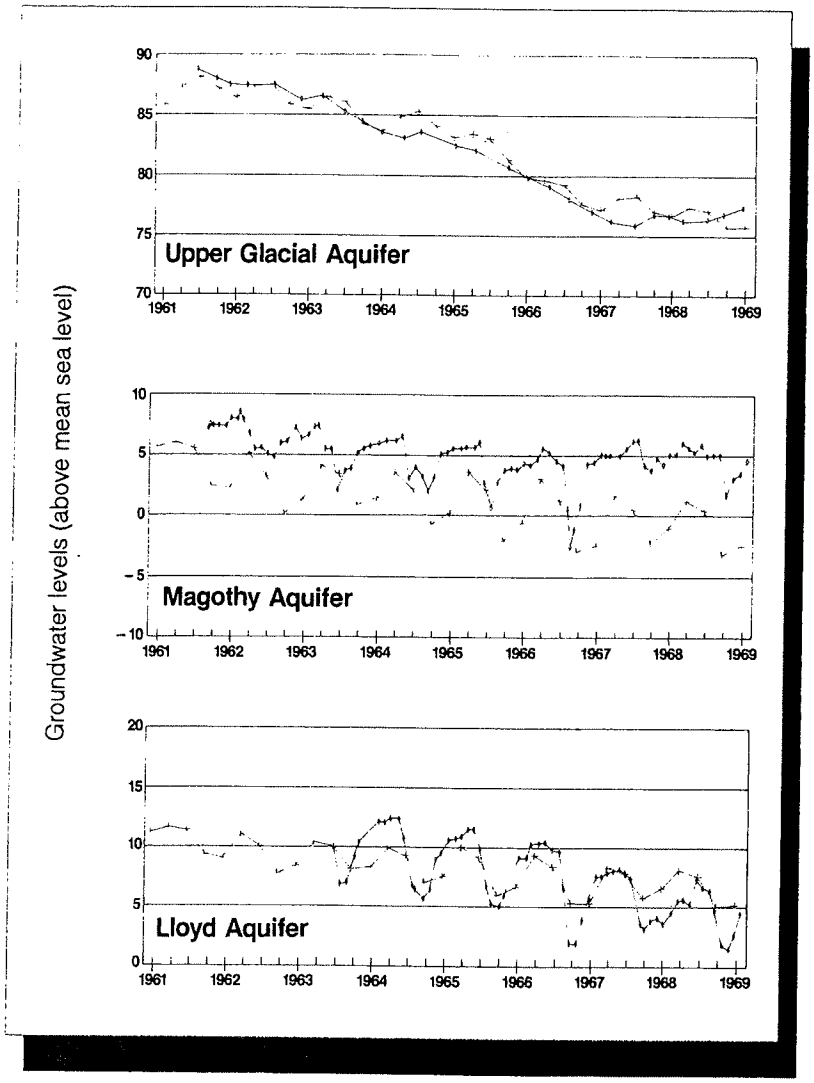

Figure 2-2
Measured and Computer-Simulated Water Levels in Representative Wells

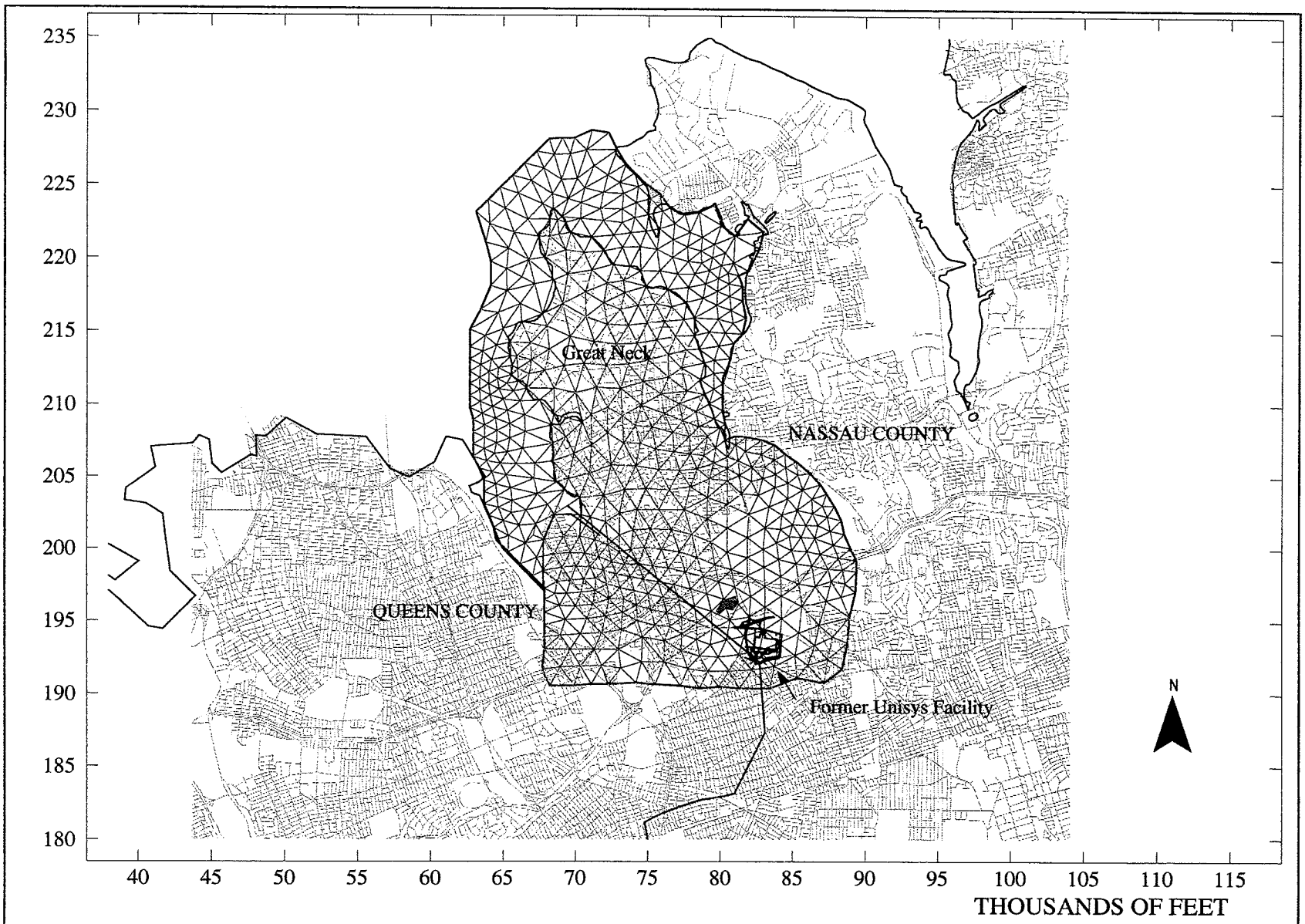

FIGURE 2-3

Great Neck Model Grid

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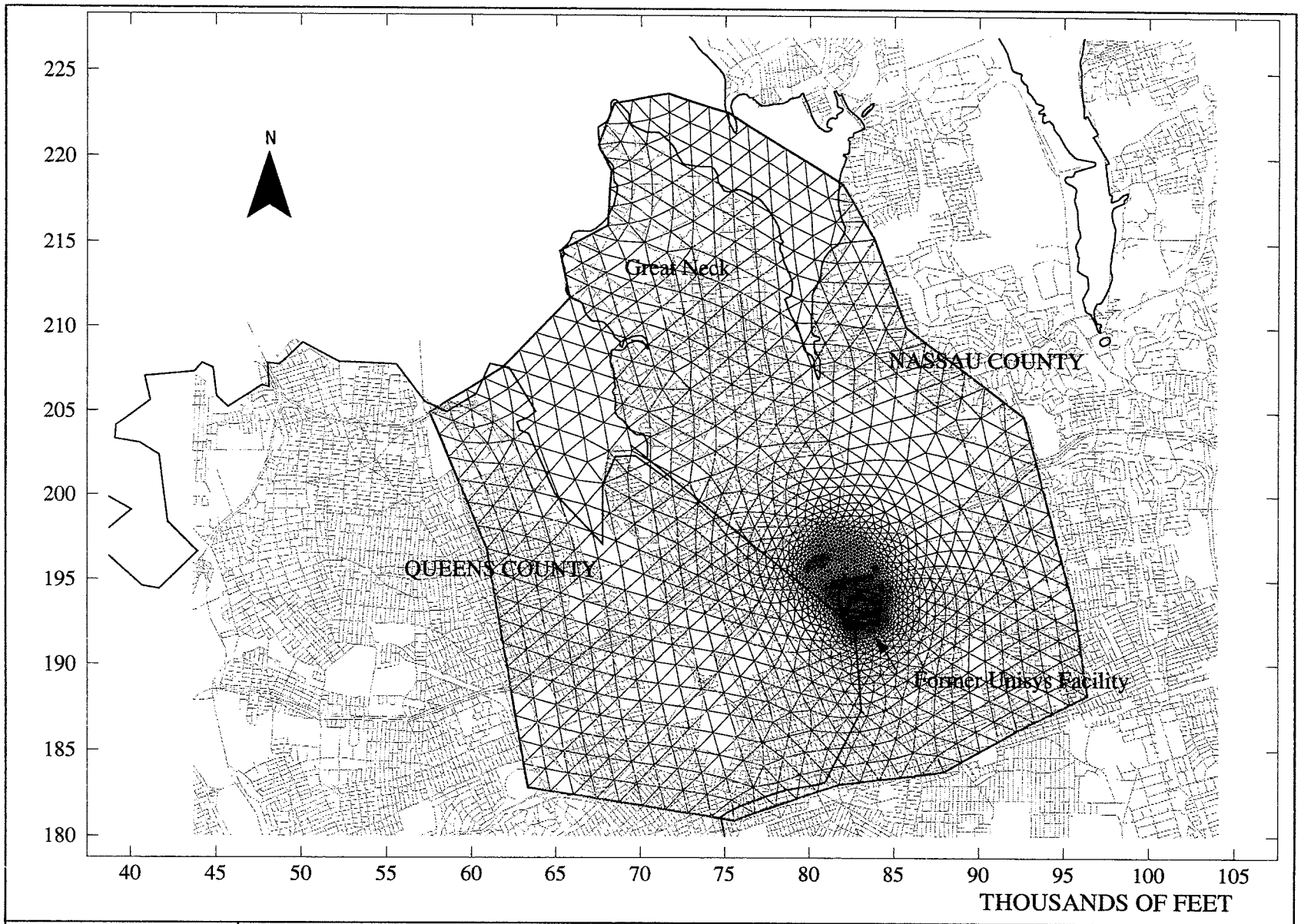

FIGURE
3-1

Local Model Grid

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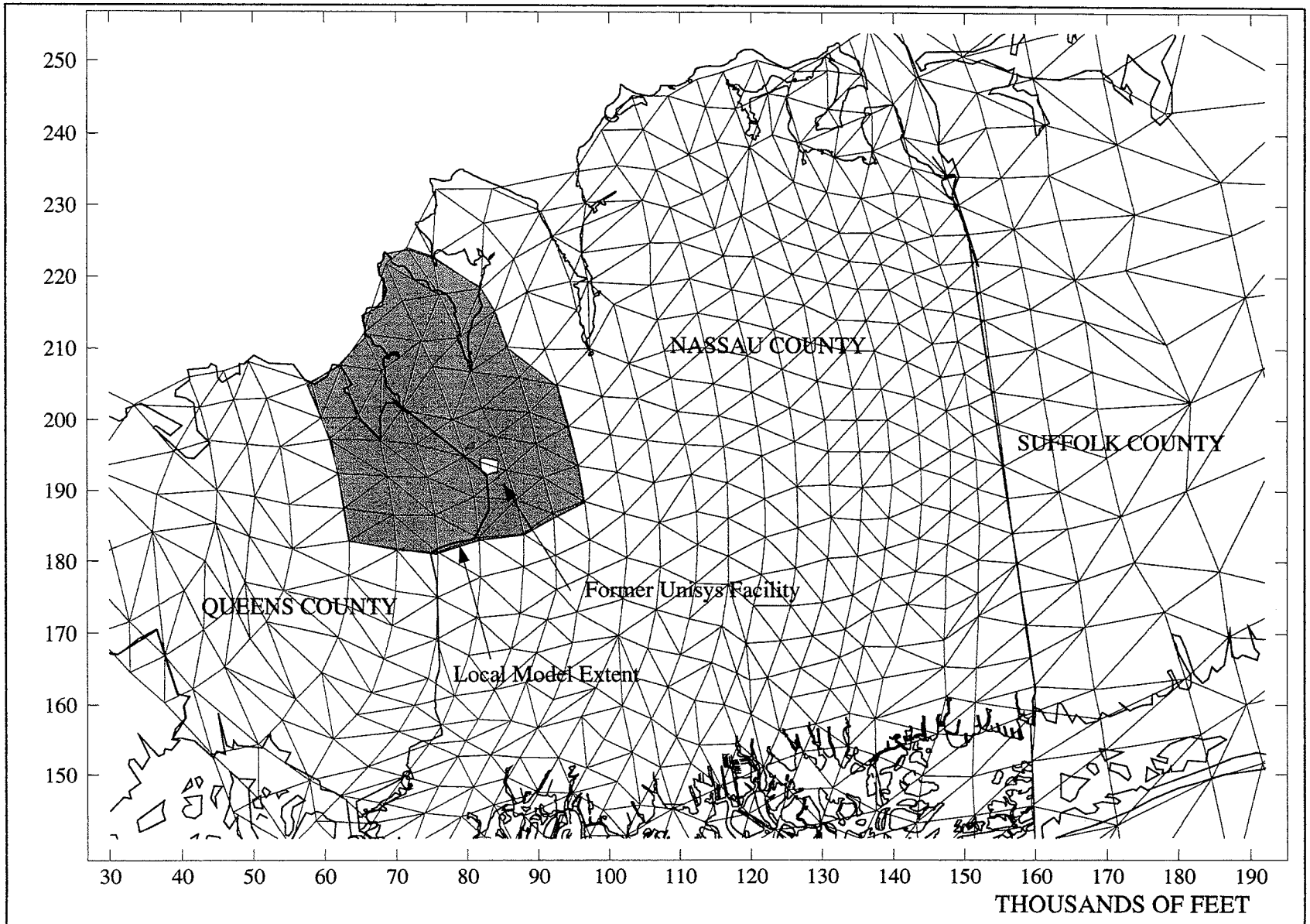

FIGURE
3-2

Nassau County Regional Model Grid

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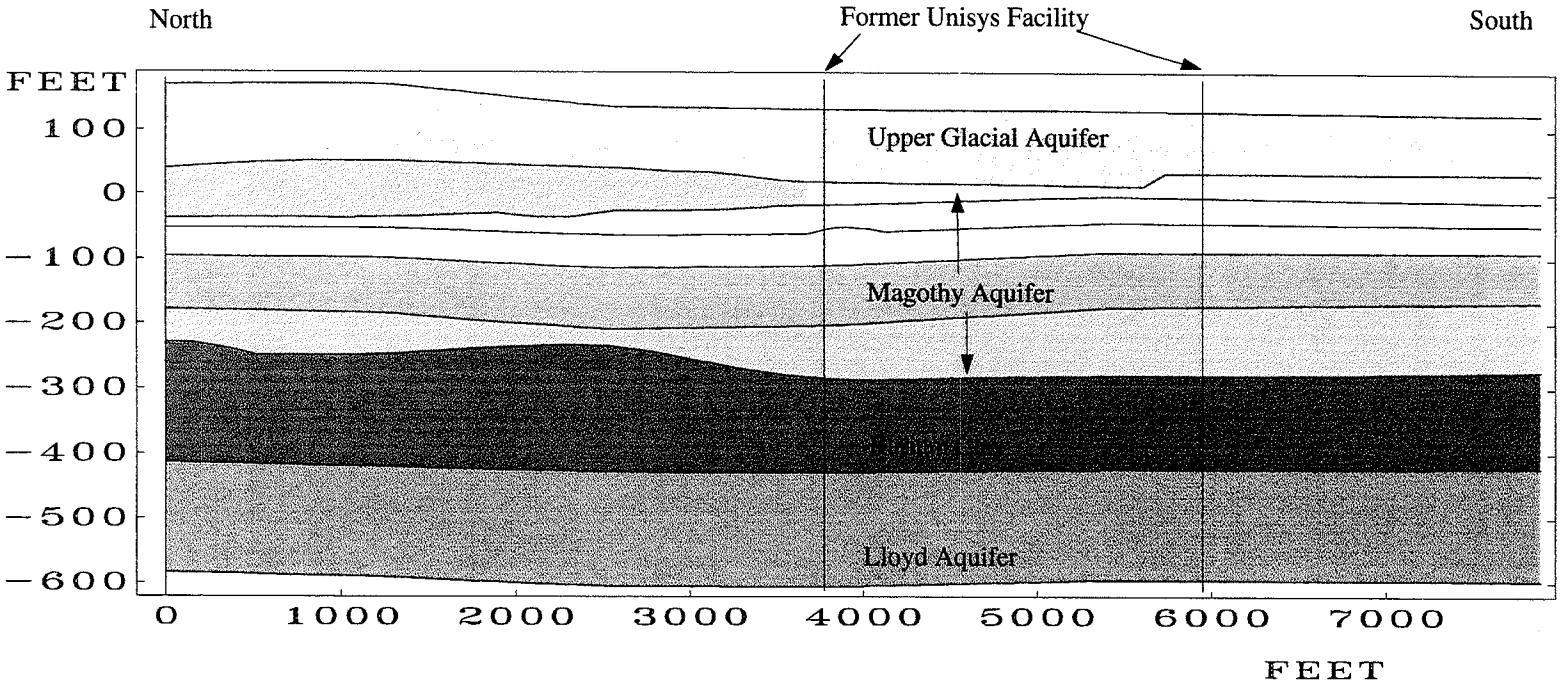

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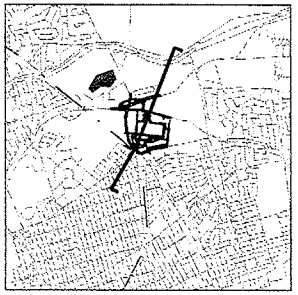

FIGURE 3-3

Local Model Stratigraphy

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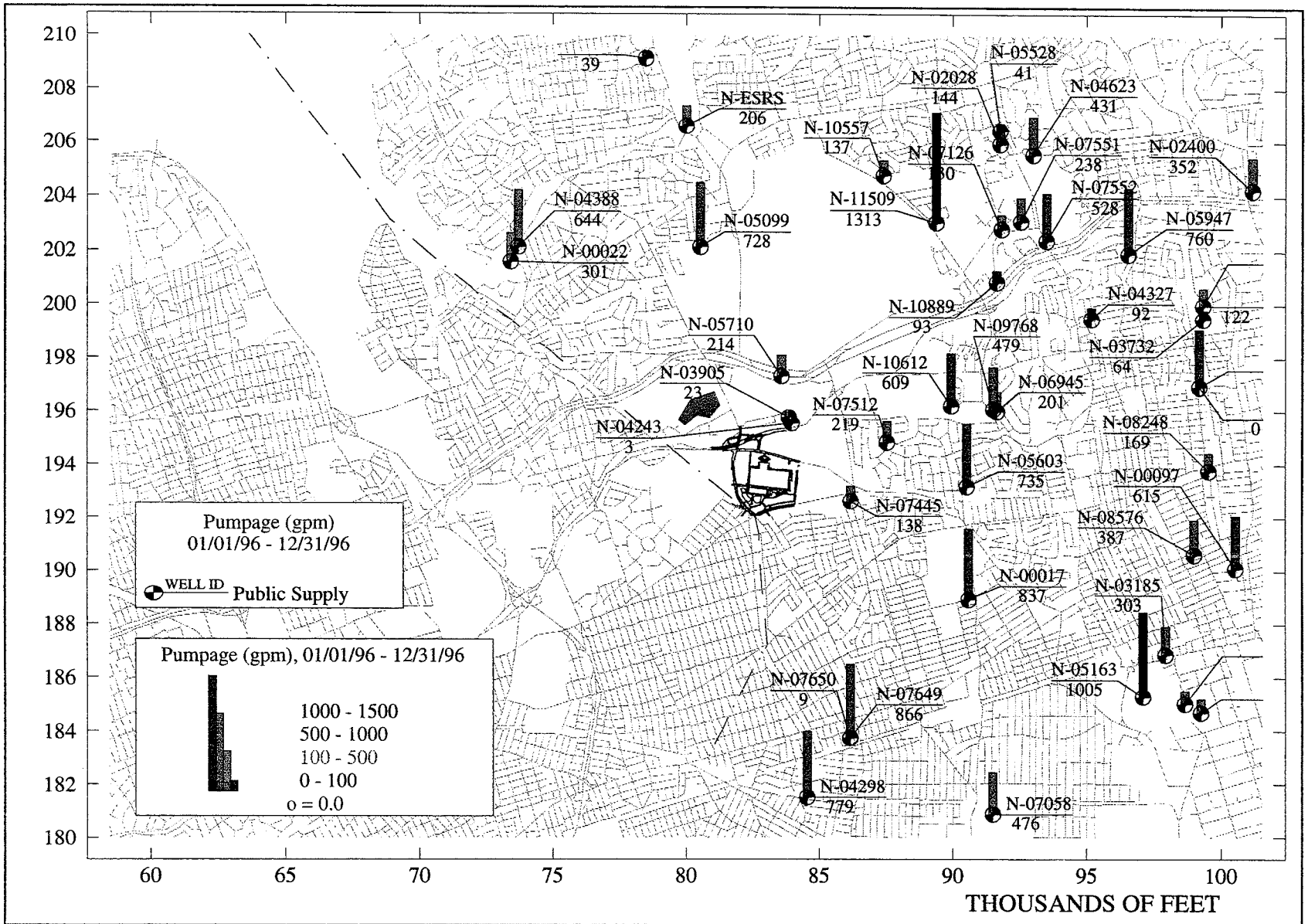

FIGURE
3-4

Average 1996 Municipal Supply Well Pumpage
Magothy Aquifer
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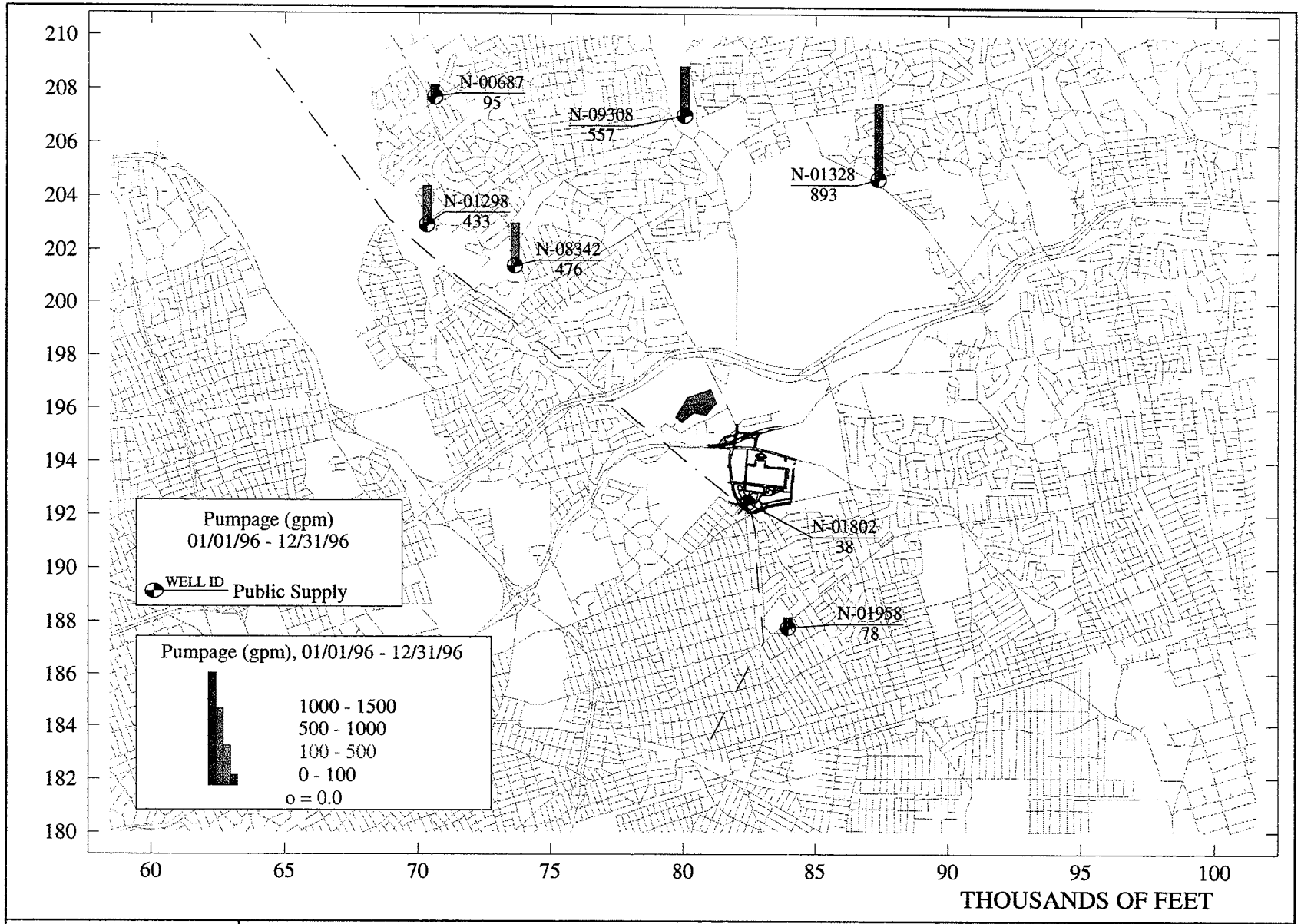

FIGURE
3-5

Average 1996 Municipal Supply Well Pumpage
Lloyd Aquifer
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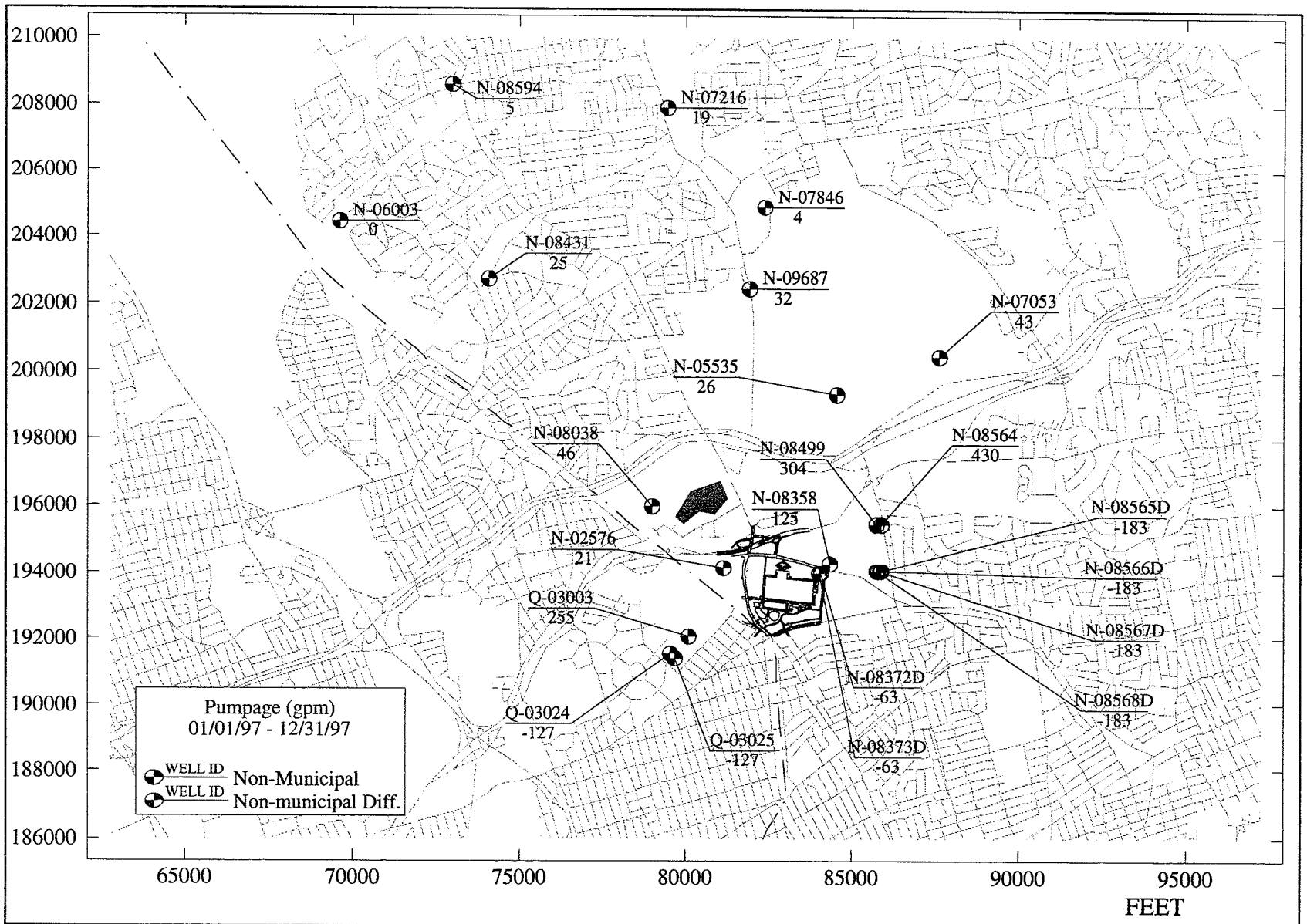

FIGURE
3-6

Average 1997 Non-Municipal Well Pumpage

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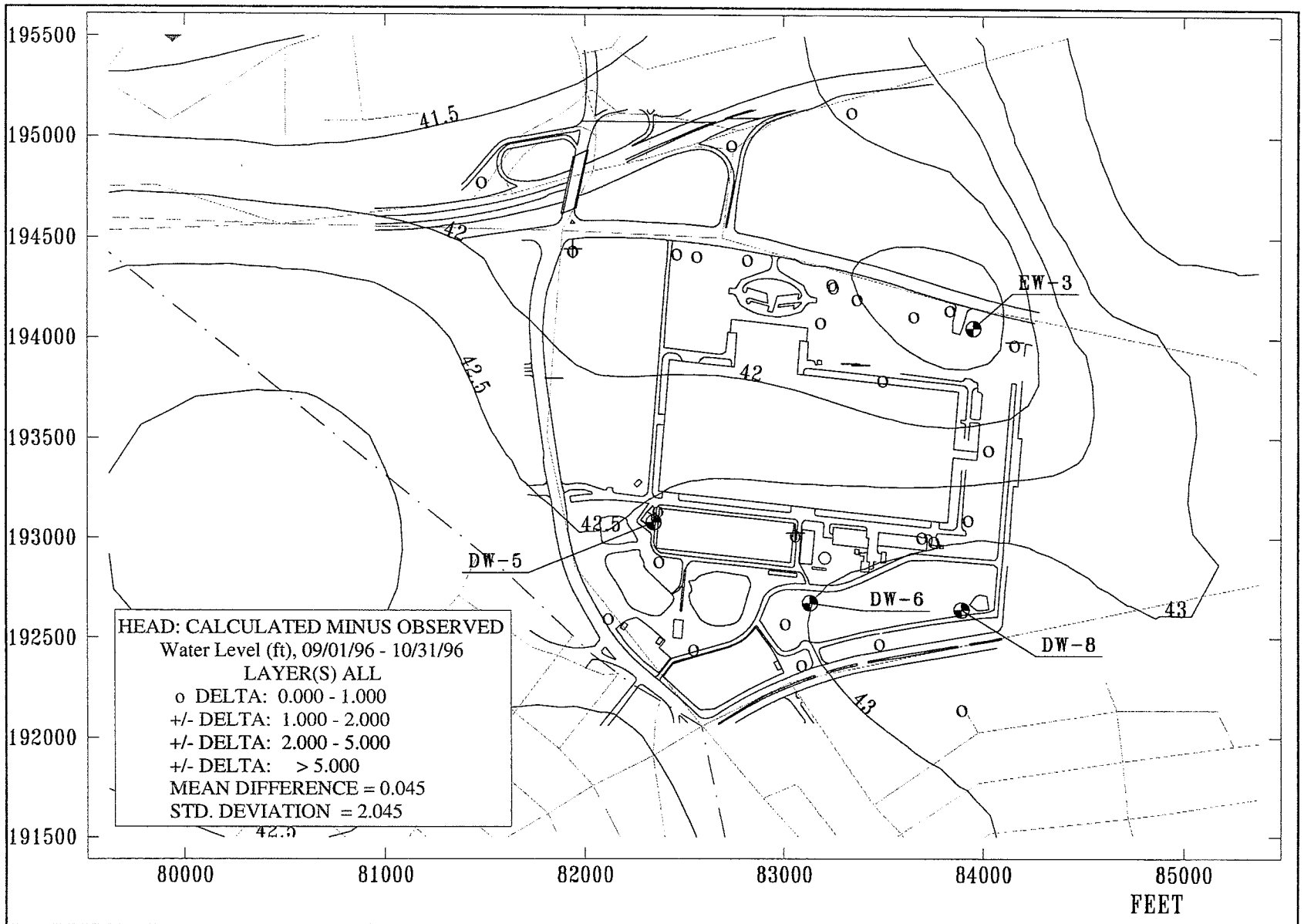

FIGURE 3-7

Comparison of Simulated and Observed Heads
and Simulated Water Table Contours
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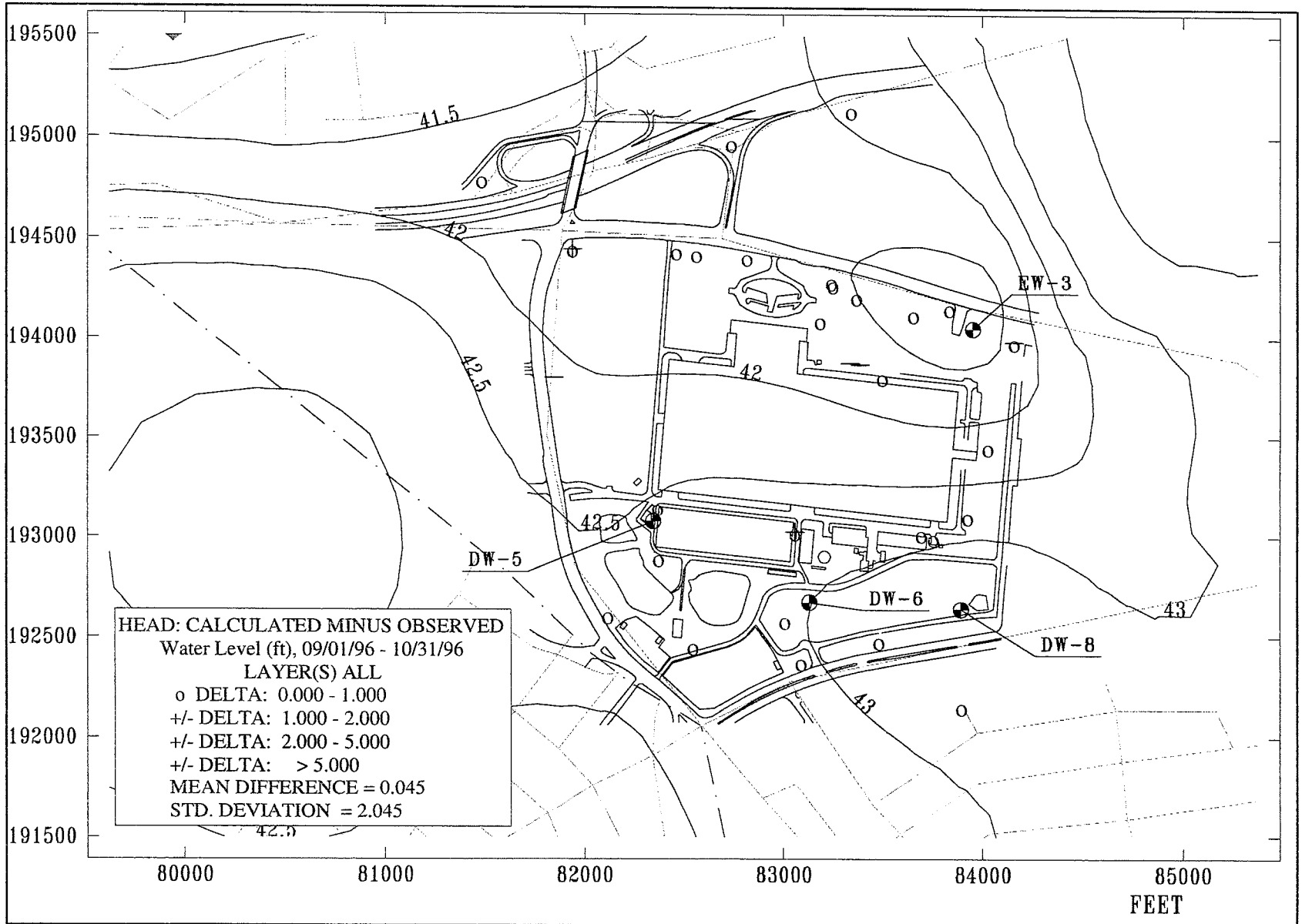

FIGURE
3-7

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and Simulated Water Table Contours
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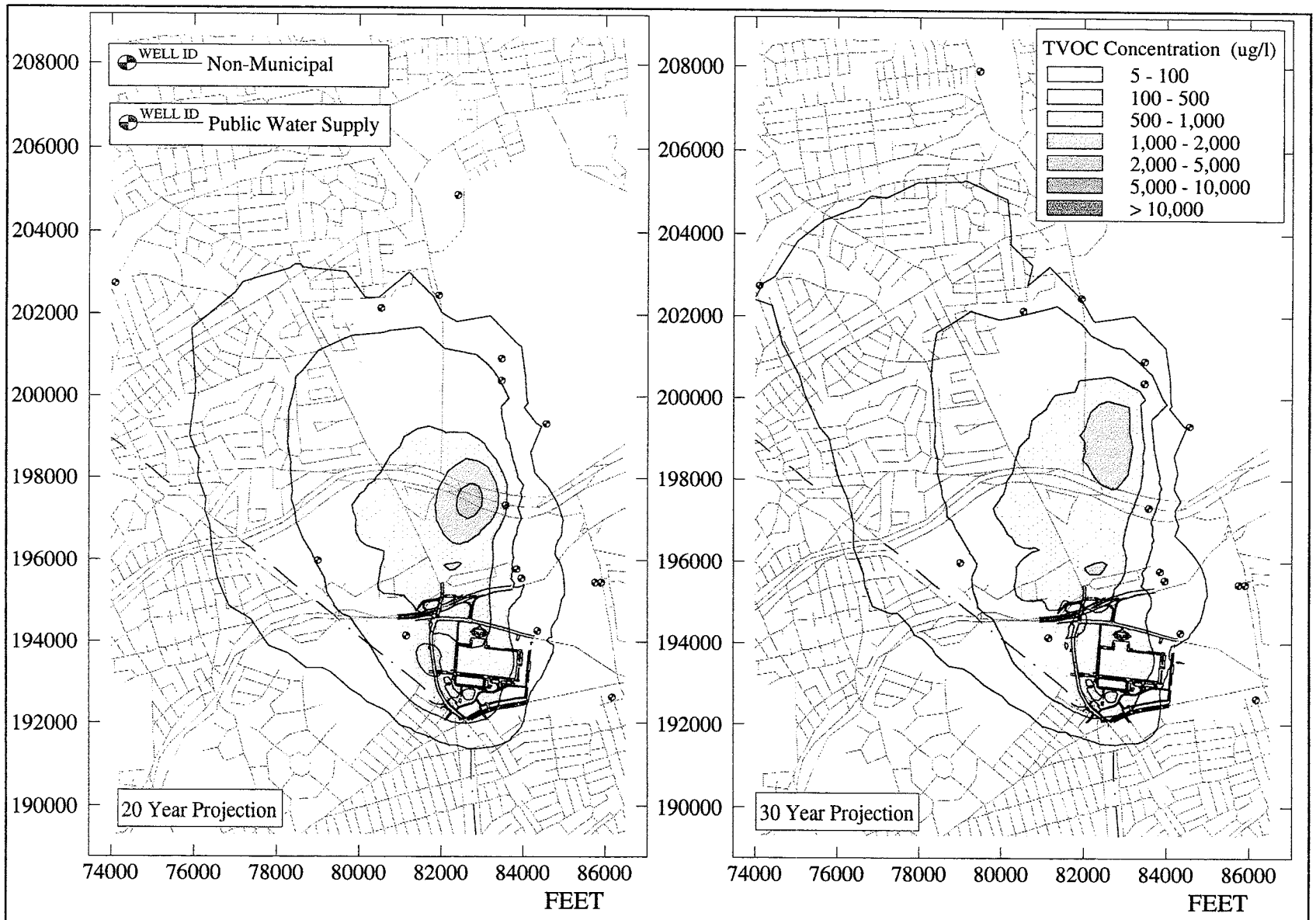

FIGURE 4-1

Simulated Maximum TVOC Concentrations For No Action Scenario
For All Model Levels
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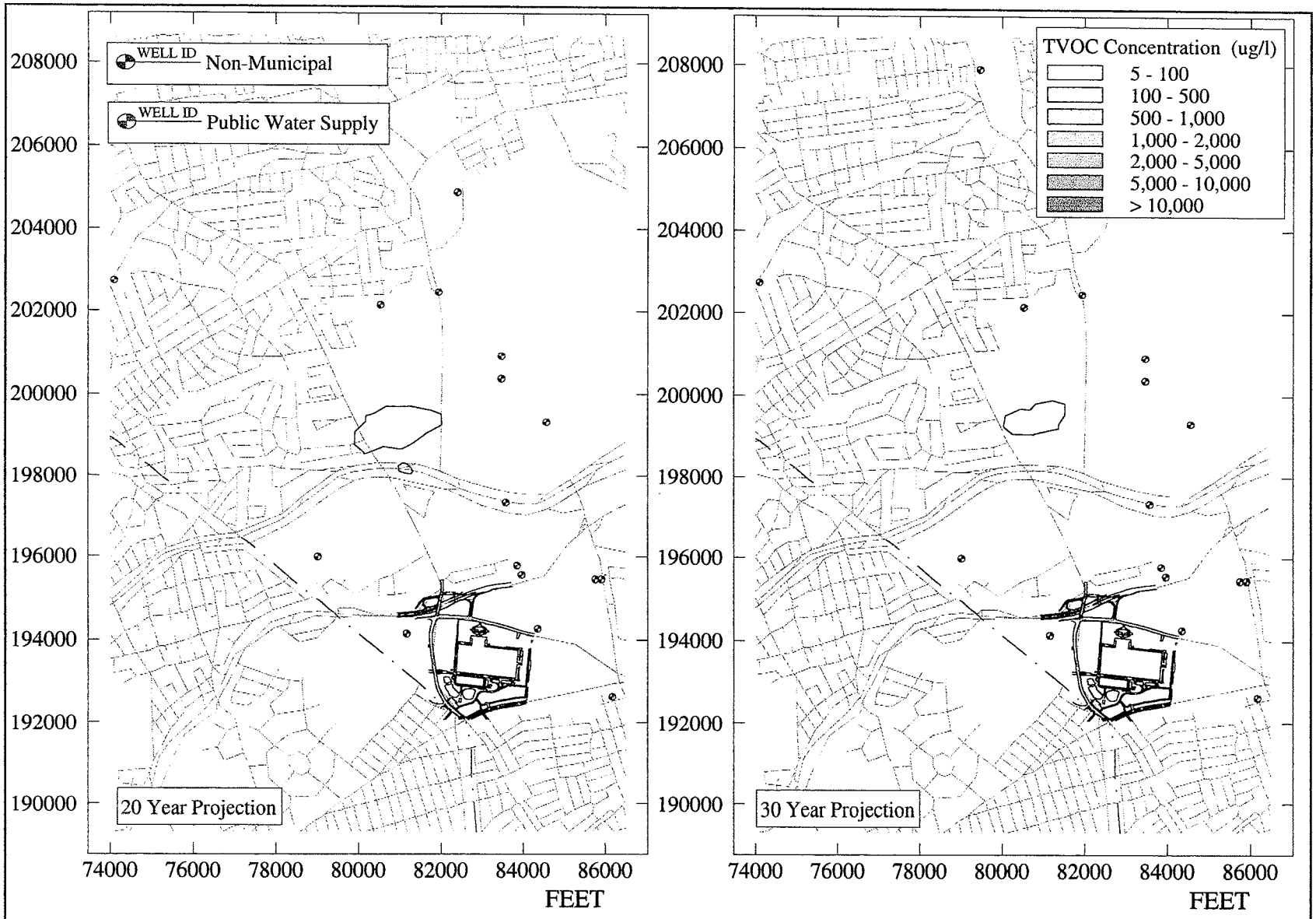

FIGURE
4-2

Simulated Upper Glacial TVOC Concentrations
No Action Senario
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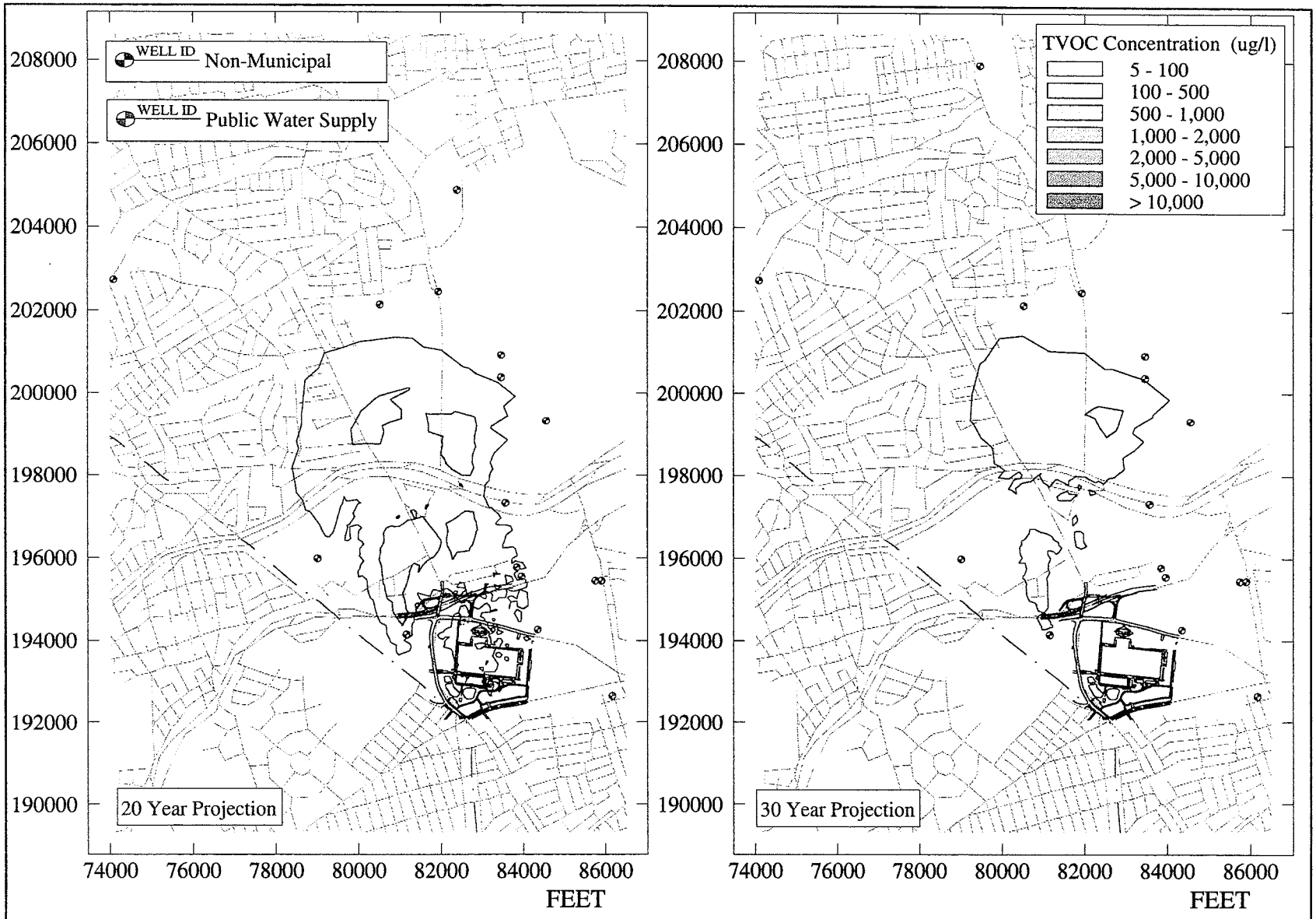

FIGURE
4-3

Simulated Upper Magothy TVOC Concentrations
No Action Scenario
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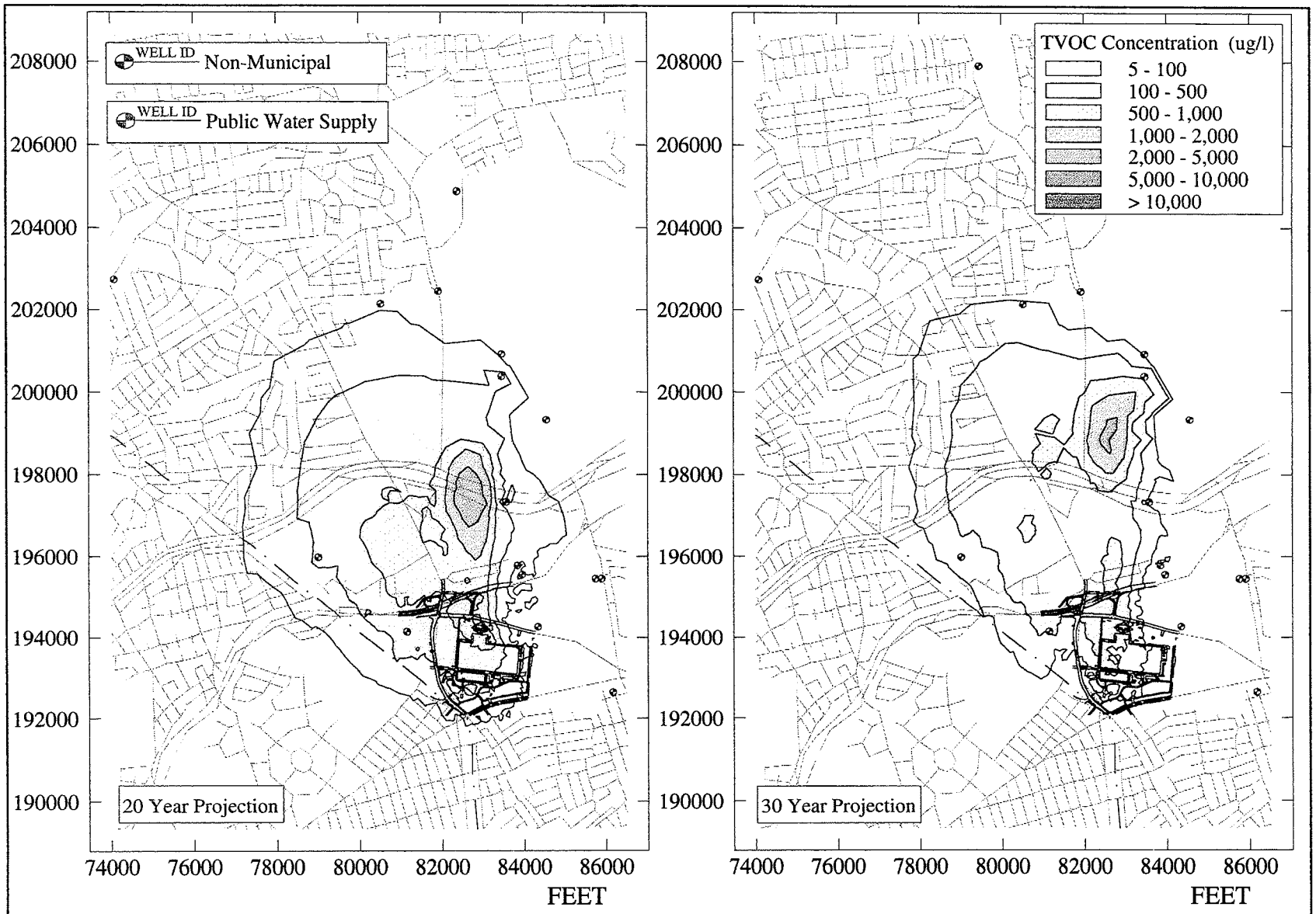

FIGURE 4-4

Simulated Middle Magothy TVOC Concentrations
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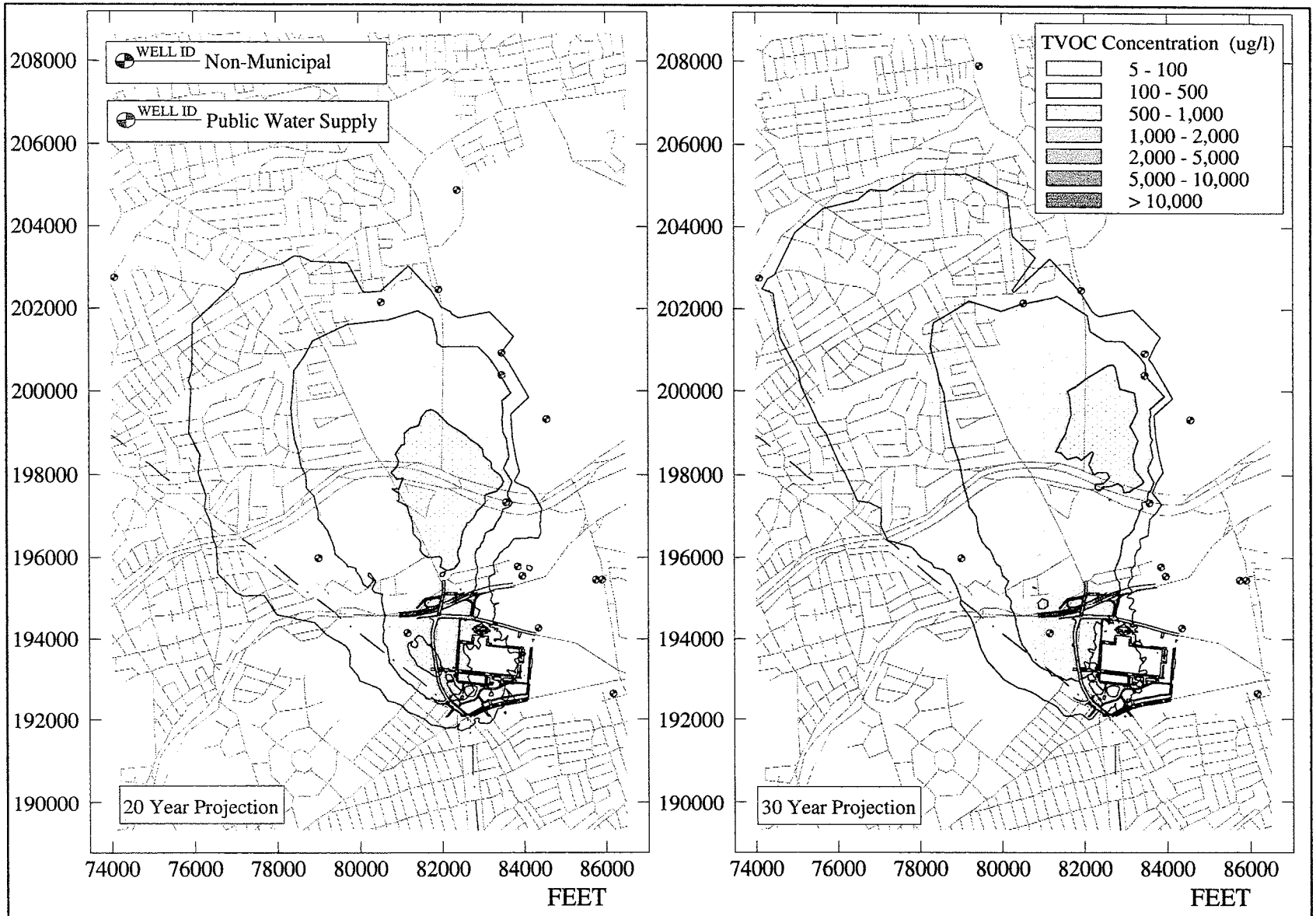

FIGURE 4-5

Simulated Basal Magothy TVOC Concentrations
No Action Scenario
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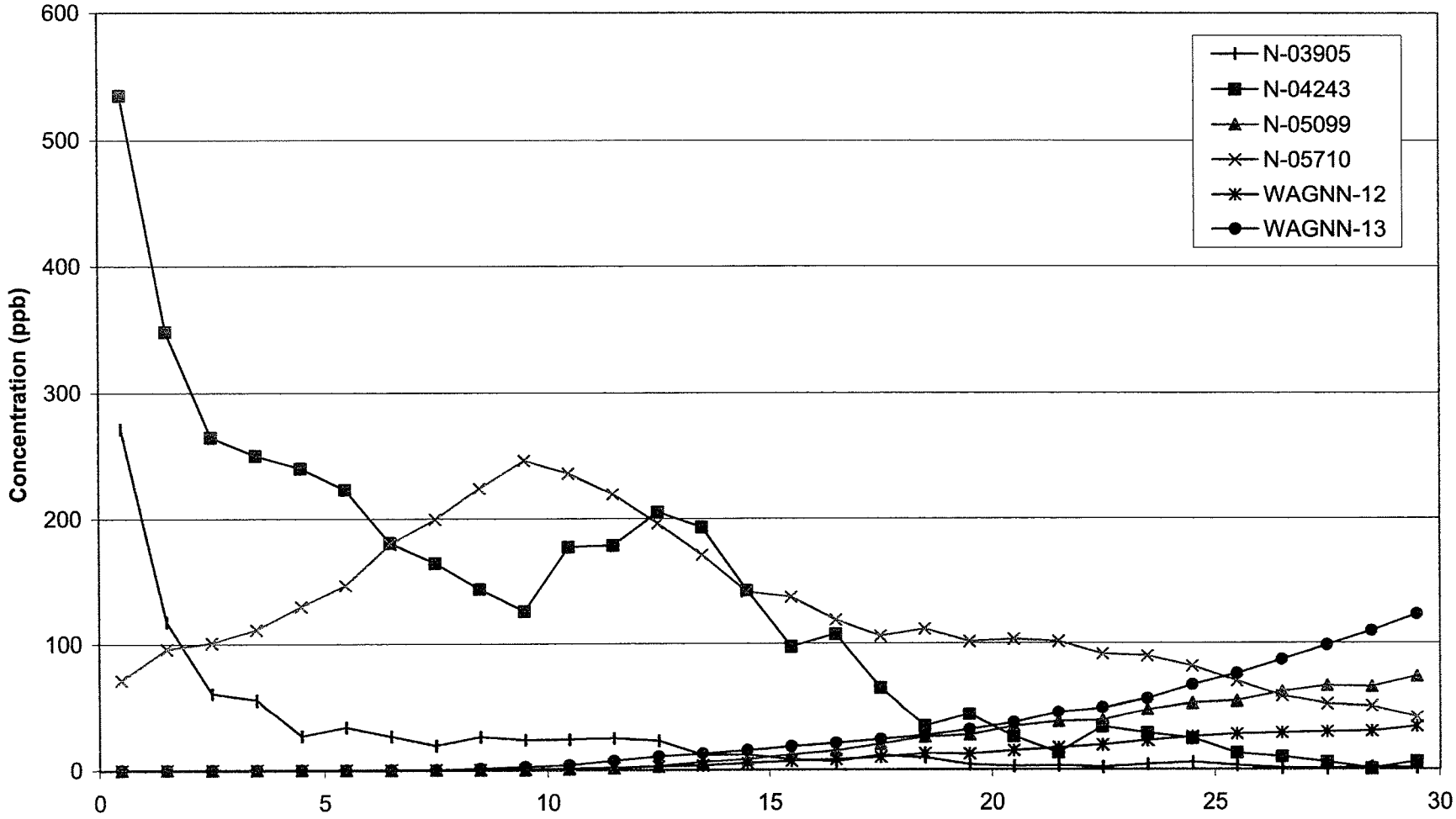
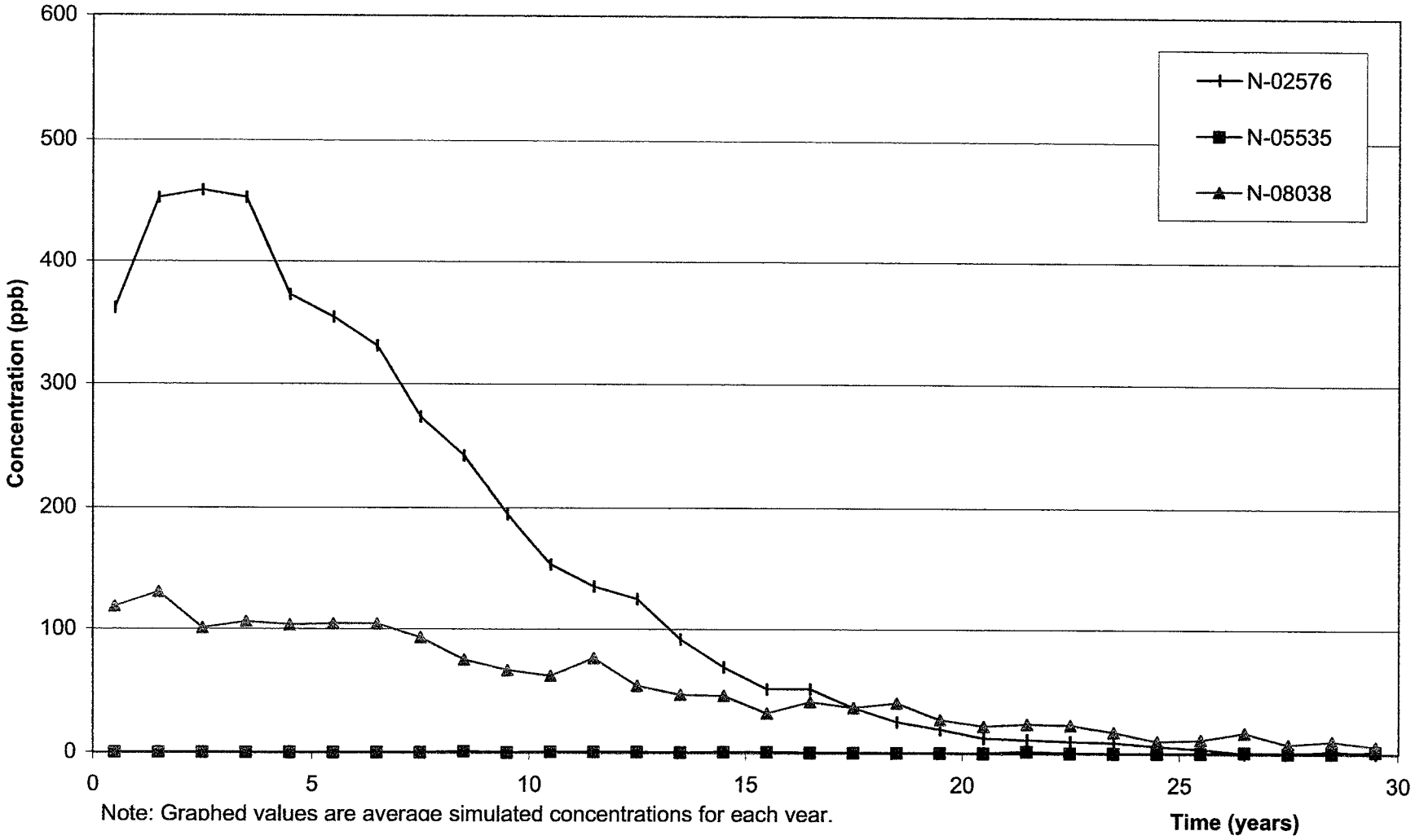
Figure 4-6
Simulated Time History of Influent TVOC Concentrations at Public Supply Wells
No Action Scenario



Note: Graphed values are average simulated concentrations for each year.

Figure 4-7
Simulated Time History of Influent TVOC Concentrations at Non-Municipal Wells
No Action Scenario



Note: Graphed values are average simulated concentrations for each year.

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Appendix K

Baseline Human Health Risk Assessment Report

APPENDIX K

Baseline Human Health Risk Assessment Report

Former Unisys Facility
Operable Unit 2

P R E P A R E D F O R

Lockheed Martin Corporation

Miranda Henning
Principal Scientist

Carlo San Giovanni
Project Manager

Nicholas Valkenburg
Project Director

APPENDIX K

Baseline Human Health Risk Assessment Report

Former Unisys Facility
Operable Unit 2

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Our Ref.:
NY001227.0013.ME001

Date:
November 13, 2000 DRAFT

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1. Introduction

ARCADIS Geraghty & Miller performed a baseline human health risk assessment as part of the Remedial Investigation (RI) for Operable Unit 2 (OU-2) of the former Unisys facility (the site) in Great Neck, New York. OU-2 consists of the off-site areas immediately surrounding the site. The primary purpose of the OU-2 RI is to evaluate the nature and extent of site-related chemicals in off-site groundwater. A baseline risk assessment was previously conducted for the 94-acre on-site project area (Operable Unit 1 or OU-1). The results of that risk assessment suggested that off-site migration of groundwater might pose human health risks (H2M 1997). The purpose of the OU-2 risk assessment is to characterize potential health risks associated with off-site migration of site-related chemicals in groundwater assuming that the current OU-1 Groundwater IRM is turned off and no further remediation is ever undertaken on the groundwater system.

The OU-2 risk assessment was performed in accordance with the numerous guidance documents that have been issued by the U.S. Environmental Protection Agency (USEPA). The most important of these guidance documents are the following:

- *Risk Assessment Guidance for Superfund (RAGS)-Parts A and D* (USEPA 1989, 1998);
- *Supplemental Guidance to RAGS: Calculating the Concentration Term* (USEPA 1992a);
- *Guidelines for Exposure Assessment* (USEPA 1992b);
- *Exposure Factors Handbook* (USEPA 1997a); and
- *Policy for Risk Characterization* (USEPA 1995a).

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The primary components of the risk assessment are:

1. Data Collection and Evaluation - collection and analysis of relevant site data and identification of chemicals of potential concern (COPCs).

2. Exposure Assessment - evaluation of chemical releases, identification of exposed populations and potential exposure pathways, and estimation of exposure point concentrations (EPCs) and doses for each pathway.

3. Toxicity Assessment - compilation of quantitative and qualitative toxicity information and identification of toxicity values descriptive of the dose-response relationship for each COPC.

4. Risk Characterization - estimation and summary of cancer risks and noncancer hazards.

5. Uncertainty Analysis - description of the uncertainty associated with each component of the risk assessment.

The risk assessment components outlined above are presented in Sections 3 through 8 of this report.

2. Site Background and History

The former Unisys facility, located at 365 Lakeville Road, in Great Neck, New York, is currently vacant and unused, except for the operation and maintenance of the various remedial systems, and the renovation of the main building that is currently being conducted by the new property owner (i.park, Lake Success). The facility was previously used for the manufacture of products related to national defense; processes conducted at the site included a foundry, etching, degreasing, plating, painting, machining, and assembly. Halogenated and nonhalogenated organic solvents, cutting oil, paint, and fuel oil were used as part of manufacturing activities at the site. Groundwater was previously used as non-contact cooling water at the facility. Since 1993, an Interim Remedial Measure (IRM) for the removal, treatment, and re-injection of groundwater has been in operation at the site. In addition, a soil-vapor extraction (SVE) system was installed in 1994 for remediation of volatile organic compound (VOC) contamination in the former dry well area. The SVE was upgraded in early 2000 in accordance with the OU-1 ROD of March 1997.

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The New York Department of Environmental Conservation (NYSDEC) has classified the former Unisys facility as Class 2 Site, due to chemicals in soil and groundwater (Site No. 130045, NYSDEC Registry of Inactive Hazardous Waste Disposal sites in New York State). On March 31, 1997, a Record of Decision (ROD) was signed and it describes the selected remedial actions for the 94-acre on-site project area (OU-1). In January 1998, a work plan was proposed for the RI for off-site areas immediately surrounding the site (OU-2) (ARCADIS Geraghty & Miller 1999).

This risk assessment for OU-2 is intended to characterize the nature and extent of potential past, current, and future risks to human health associated with site-related chemicals in off-site groundwater[1]. For all current and future exposure pathways, it was assumed that neither the public water supply wells nor the irrigation wells are treated. The future exposure scenarios also evaluated risks assuming that the current IRM is turned off and no further remedial actions (either on-site or off-site) are taken to reduce chemical concentrations in groundwater. Some municipal drinking water wells and wells supplying nearby golf courses' spray irrigation systems are already affected and/or could be affected by site-related chemicals in groundwater in the future if no further action is undertaken. However, affected wells with concentrations greater than maximum contaminant levels (MCLs) that provide potable water are currently being treated to prevent exposure above the MCL.

While this risk assessment focuses on off-site groundwater as the source of site-related chemicals, those chemicals have the potential to be transferred to both air and surface soil as groundwater is used. This risk assessment evaluates potential risks associated with chemicals in wells that have already been affected or could potentially be affected, as determined by groundwater modeling. Media evaluated include:

- Municipal drinking water from wells in the Manhasset-Lakeville Water District and the Great Neck North Water District that have already been affected or are predicted by groundwater modeling to be affected (Wells N5710, N3905, N4243, N5099, N0022, N12999, and N13000);

[1] Baseline risk assessments do not generally consider risks associated with past exposures. However, NYSDEC has specifically requested that risks be evaluated for past residents who may have watered their vegetable gardens with impacted groundwater.

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- Spray irrigation water for the North Shore Towers Golf Course, Village of Lake Success Golf Course, and Deepdale Golf Course (Wells N2576, N8038, and N5535);
- Air; and
- Surface soil wetted by spray irrigation at the North Shore Towers and Village of Lake Success golf courses.

Table 2-1 summarizes potential exposures associated with these four media.

3. Data Collection and Evaluation

In October and November 1998, 74 groundwater samples were collected from on-site and off-site monitoring wells and analyzed for Target Compound List (TCL) VOCs and Freon 113 using NYSDEC Analytical Services Protocol (ASP) Method 95-1. A detailed description of the groundwater well sampling technique is provided in Section 2.2 of the RI Report. H2M Labs of Melville, New York performed all chemical analyses. Quality Assurance/Quality Control (QA/QC) of laboratory results was conducted according to NYSDEC ASP Method 95-1. All data results from H2M Labs were reviewed by Data Validation Services (DVS), North Creek, New York and performed in accordance with the NYSDEC Remedial Investigation/Feasibility Study (RI/FS) Validation Scope of Work, with guidance from the most current editions of the USEPA Contract Laboratory Program (CLP),"National Functional Guidelines for Organics Data Review" and the USEPA Validation Standard Operating Procedures (SOPs) HW-6. With the exception of sample MW-33GL, the validated sample results met the data quality objectives (DQOs) stated in the OU-2 RI Work Plan (H2M 1998a) and are usable for the project. Since Well MW-33GL was analyzed outside of the required holding times, the possibility exists for false negative results.

In May, June, and July 1999, 76 groundwater samples were collected from on-site and off-site wells. The newly installed monitoring wells (37MU, 37MI, 37ML, 38MU, 38MI, 38ML, 39MU, 39MI, and 39ML) were sampled in September and October of 1999. Non-municipal Supply Well N2576 was sampled in July and August 1999 and Non-municipal Supply Wells N5535 and N8038 were sampled in October 1999. All wells were analyzed for TCL VOCs and Freon 113 using NYSDEC ASP Method 95-1. A detailed description of the groundwater well sampling technique is provided in Section 2.2 of the RI Report. Severn Trent Laboratories in Monroe, Connecticut performed all chemical analyses. QA/QC of laboratory results was conducted

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according to NYSDEC ASP Method 95-1. All data results from Severn Trent Laboratories were reviewed by ARCADIS Geraghty & Miller and performed in accordance with the NYSDEC RI/FS Validation Scope of Work, with guidance from the most current editions of the USEPA CLP," National Functional Guidelines for Organics Data Review" and the USEPA Validation SOPs HW-6.

At the request of the New York State Department of Health (NYSDOH), ambient air was monitored at the North Shore Towers golf Course on August 29 through 31, 2000. The purpose of the monitoring program was to determine if (and the extent to which) COPCs derived from groundwater are present in ambient air during spray irrigation. Testing was conducted in accordance with Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition, Method TO-14A *"Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography"* (USEPA 1999). Summa canisters were used to collect ambient air samples collected over a four-hour period during each day of sampling. Canisters were placed on the golf course before watering began each evening. Two canisters were placed upwind of the general watering area and two canisters and one duplicate were placed downwind of the watering area. Testing was conducted for a continuous period of 4 hours each day. Meteorological data were collected concurrently.

Tables 3-1 and 3-2 summarize the occurrence and distribution of chemicals detected in groundwater at all monitoring wells and groundwater at the spray irrigation supply well, respectively. Table 3-3 summarizes the occurrence and distribution of chemicals detected in ambient air monitored in the vicinity of the spray irrigation system.

4. Identification of COPCs

COPCs for this risk assessment were generally selected based on the frequency of detection in groundwater samples. Compounds were designated COPCs if the detection frequency exceeded five percent. Constituents present in ambient air upwind of the spray irrigation system were excluded from consideration as COPCs because they reflect background conditions. One compound was excluded because it is not present in groundwater at the former Unisys facility. Because none of the detected chemicals are essential nutrients, status as nutrients was not used as a basis to screen out potential COPCs. New York State Standards, Criteria, and Guidance Values (SCGs) were considered potential applicable or relevant and appropriate requirements (ARARs) for the purpose of this risk assessment; however, these criteria were not used to screen chemicals from consideration as COPCs.

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Tables 3-1 and 3-2 present the selection or exclusion of detected chemicals as COPCs in groundwater at both the municipal wells and the spray irrigation well, while Table 3-3 presents the exclusion of detected chemicals as COPCs in ambient air. Because the only constituents detected in ambient air are associated with background conditions or are not site-related, no COPCs are present in ambient air. Because COPCs in soil are assumed to be derived from groundwater, the same COPCs designated for groundwater are designated for soil.

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5. Exposure Assessment

Exposure assessment is the process of measuring or estimating the intensity, frequency, and duration of human exposure to substances present in the environment. The exposure assessment includes: a) identification of potentially exposed populations; b) development of exposure scenarios; c) analysis of exposure pathways; d) definition of exposure points; and e) estimation of EPCs. Together, these elements are used to estimate potential doses under past, current and reasonably foreseeable future uses of off-site groundwater. Dose estimates are subsequently combined with the toxicity values identified in Section 6 to estimate risks associated with past, current and foreseeable exposures, as part of the risk characterization discussed in Section 7. The exposure assessment is a critical component of the risk assessment process, as it qualitatively and quantitatively describes potential contact between COPCs and the people that may be affected by them.

5.1 Exposure Setting

The former Unisys facility is located at the intersection of Marcus Avenue and Lakeville Road within both the Village of Lake Success and the Town of North Hempstead in Nassau County, New York. The area surrounding the facility is comprised of industrial and commercial facilities to the east, northeast and northwest, and residential properties bordering the site to the southeast, south, and southwest.

Lake Success is located approximately 1,600 feet north of the site. Data from the 1990 U.S. Census indicate a population of approximately 20,000 people living within two miles of the site. Six schools and one hospital are also located within two miles of the site. A well survey conducted as part of the OU-1 risk assessment revealed that all properties within one and a half miles of the site are on the public water supply system (H2M 1997).

Exposure to the affected aquifer is influenced by the regional and local hydrogeology, which is described in detail in Section 3.3 of the OU-2 RI report. The public water supply system in the Great Neck Area of Long Island, New York is described in the report, *Great Neck Area Public Water Supply Study* (H2M 1998b). As described in the Public Water Supply Study, there are at least 14 public wells within the vicinity of the site. However, the only wells evaluated in the risk assessment are those wells already affected or predicted by groundwater modeling to be affected in the future. Three golf courses draw water from the affected aquifer for use in irrigation.

The risk assessment for OU-1 provided data on the climatological and meteorological setting for the former Unisys facility (H2M 1997). The mean air temperature is 1.3 °C during the winter months and 21.7°C during the summer months. The maximum monthly precipitation during the spring and late summer is typically 9 to 10 cm. The predominant wind direction is out of the south, with west-northwesterly winds also present at a relatively high frequency. Average wind speeds of approximately 13 miles per hour are routinely encountered.

5.2 Conceptual Site Model

The conceptual site model for the risk assessment describes the chemical sources, receiving media, retention and/or transport of chemicals, and potential exposure profiles for current and foreseeable future uses. During the OU-1 RI, the dry well area of the former Unisys facility was identified as the source of elevated chemical concentrations detected in on-site groundwater; this source area resulted from wastewater disposal practices associated with previous manufacturing operations. The migration of chemicals in groundwater to off-site locations is discussed in detail in Section 6 of the OU-2 RI report.

On February 21, 1997, an investigation was conducted to determine potential migration of groundwater into Lake Success (H2M 1998b). The investigation focused on determining the depth of the lake bottom in comparison to the depth to groundwater. Depth soundings were recorded along three transect lines and confirmed that the depth of the lake ranged from 4 to 71 feet. Data collected from monitoring wells determined that groundwater occurs at approximately 160 feet below grade in the vicinity of Lake Success. Hence, because there is at least 80 to 90 feet vertical distance between the lake bottom and the groundwater table, Lake Success does not intercept the groundwater plume and will not be impacted by the groundwater plume.

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Overall, the available analytical data indicate that chemicals in groundwater have migrated from the former Unisys facility to the residential areas north of the site. Within this area, the COPCs (i.e., chemicals detected in more than 5 percent of groundwater samples) are chloroform; 1,1-dichloroethane (1,1-DCA): 1,1-dichloroethene (1,1-DCE); 1,2-dichloroethene (1,2-DCE); Freon 113; trichloroethene (TCE); tetrachloroethene (PCE); and toluene. Residential properties within this area utilize the public drinking water supply. Although some residential properties overlie the groundwater plume, the depth of the impacted aquifer (more than 80 feet below the surface) suggests that vapor intrusion into residential buildings is implausible.

A groundwater fate and transport model was used to evaluate the potential for site-derived chemicals in groundwater to affect public water supply wells in the future, assuming that the current IRM is turned off and no further groundwater remediation is conducted. In other words it is assumed that the 1998 plume is allowed to migrate without remediation. The results of this model indicate that, during the next 30 years, VOCs may be detected in downgradient water supply wells. At that time, residents in the Great Neck area could potentially be exposed to site-derived chemicals in drinking water. If, however, chemicals were to be detected in public water supply wells above the MCL, treatment would be provided. The groundwater fate and transport model is further described in Section 6 of the OU-2 RI report.

Groundwater modeling was conducted for wells in two water supply districts: Manhasset-Lakeville and Great Neck North. The modeling results indicate that the Manhasset-Lakeville Water District will likely be affected by the plume to a greater extent than the Water Authority of Great Neck North. The predicted 30-year average concentration for the Manhasset-Lakeville wells is 0.076 mg/L compared to 0.014 mg/L for the Great Neck North wells. Therefore, only the modeling data for the Manhasset-Lakeville water district were used in this risk assessment, as this district represents worst-case conditions.

Three golf courses also use irrigation wells that draw groundwater from the impacted aquifer. These include the North Shore Towers golf course (Well N2576), the Village of Lake Success Golf Course (Well N3038), and the Deepdale Golf Club (Well N5535). Of these wells, the one servicing the North Shore Towers golf course is located closest to the most impacted portion of the plume. As such, it represents worst-case conditions for potential exposure to VOCs in irrigation water and, therefore, analytical data from Well N2576 were used to evaluate exposures to irrigation water.

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Exposure profiles were developed for potential receptors in the off-site areas surrounding the former Unisys facility, as summarized in Table 2-1. For this risk assessment, the sources of exposure to groundwater (assuming no remedial action and no treatment) may occur at the impacted municipal supply wells for the Manhasset-Lakeville Water District (Wells N5710, N3905, N4243, and N5099) and at the irrigation well for North Shore Towers golf course (Well N2576). In reality, water from Wells N3905, N4243 and N5710 is already being treated. From these points of exposure, VOCs could theoretically be transferred to air (through volatilization) and/or surface soil (by watering the grass or a garden). However, as discussed below, site-related constituents were not detected in ambient air that was monitored during irrigation activities. Receptors include residents, who may be grouped as either living at the North Shore Towers condominiums or in single-family houses (hereafter referred to as either North Shore Towers residents or residents, respectively), as well as groundskeepers and golfers at the North Shore Towers golf course. All potential exposure scenarios were evaluated using both conservative (high end) and more realistic (central tendency) exposure assumptions. Both children and adults were evaluated for the residential scenarios, while it was assumed that groundskeepers and golfers are adults.

Although the groundwater plume has migrated to the residential area near the site, residents in the Manhasset-Lakeville Water District (i.e., residents) are not currently exposed to chemicals in the groundwater because they rely on the public water supply (which is either not currently impacted or is receiving treatment) and the groundwater plume is more than 80 feet below ground surface. In the future, however, if site-related chemicals in groundwater are detected in the public water supply wells that are not now receiving treatment, adult and child residents would be potentially exposed to COPCs. These receptors could potentially ingest COPCs in tap water, inhale vapors while showering, and absorb COPCs through the skin following dermal contact with tap water.

Because North Shore Towers residents are not served by the Manhasset-Lakeville Water District, but by water from the New York City public drinking water system, they cannot be exposed to COPCs in tap water. However, they may have been exposed to COPCs in 1998 and part of 1999 during gardening activities. North Shore Towers residents can maintain garden plots on the condominium property. The garden plots have only been available for use since the spring of 1998. Each plot is approximately 8 feet by 10 feet in size. On average, about 40% of the plots are ornamental flowers, while 60% of the plots are planted with vegetables. In 1998 and for part of the 1999 growing season, water was supplied to the garden plots from the

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Well N2576, which is also the well that supplies the golf course's irrigation system. During the summer of 1999, the water supplying the garden plots was switched to the municipal water supply, which is provided by New York City. Consequently, between the spring of 1998 and the summer of 1999, North Shore Towers residents may have been exposed to COPCs in groundwater at the irrigation well through dermal contact with water, incidental ingestion of water, dermal contact with surface soil that had been wetted with spray irrigation water, incidental ingestion of surface soil that had been wetted with spray irrigation water, and consumption of homegrown produce that had been watered using water from Well N2576. Given that COPCs were not detected in ambient air monitored during irrigation, it is also unlikely that COPCs were present in air during gardening activities.

As noted above, the source of water supplied to the garden plots was changed from the spray irrigation well to the municipal water supply wells during the summer of 1999. Hence, current North Shore Towers residents no longer face potential exposures to site-related chemicals in groundwater as a result of gardening activities. The inhalation pathway is not complete because no COPCs are currently present in ambient air. Hence, there are no complete exposure pathways for current North Shore Towers residents. As noted above, the golf course continues to be spray irrigate with water containing COPCs. The groundskeeper may begin work on the golf course early in the morning, after spray irrigation has ceased, but while the grass may still be damp. The current and future groundskeeper may contact COPCs in spray irrigation water through dermal contact with spray irrigation water as he or she walks through the damp grass, dermal contact with surface soil wetted by the spray irrigation water, and incidental ingestion of surface soil wetted by the spray irrigation water if any digging or hoeing is necessary.

Given the timing of the spray irrigation and the objective of minimizing disturbance to golfers by spray irrigation, there is very limited potential for golfers to contact COPCs in the spray irrigation water. By the time the golf course opens in the morning, the grass is expected to have dried. However, because soil wetted by spray irrigation may still be damp when the golf course opens, it is conservatively assumed that golfers may be exposed to COPCs through dermal contact with and incidental ingestion of surface soil that has been wetted by spray irrigation water.

5.3 Determination of Exposure Point Concentrations

EPCs are derived in Tables 5-1 through 5-7 for the various combinations of time frames, environmental media and exposure points considered in this risk assessment.

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EPCs were derived in five different ways: a) to estimate future concentrations of COPCs at the municipal drinking water wells and spray irrigation wells, a groundwater fate and transport model was employed; b) a volatilization factor was used to estimate concentrations of COPCs in air as a result of volatilization of VOCs in tap water during showering; c) groundwater monitoring data were used to estimate all other groundwater EPCs; d) in the absence of surface soil data, EPCs for soil were assumed to equal the product of the soil-water partitioning coefficient (Kd) and the EPCs for the spray irrigation well water; and e) EPCs in vegetables were estimated by modeling uptake of COPCs by vegetables. In addition, ambient air monitoring conducted in August 2000 determined that COPCs are not present in ambient air as a result of volatilization of VOCs in spray irrigation water during irrigation. Each of these methods is detailed below.

In accordance with USEPA exposure assessment and risk characterization guidance (USEPA 1992b, 1995a), EPCs were calculated for both high end and central tendency exposure scenarios. The high end scenario describes individuals at the upper end of the population distribution (greater than 90th percentile, but not above the distribution), while the central tendency estimates characterize individuals in the middle of the population distribution (approximately 50th percentile).

5.3.1 EPCs for Future Groundwater

As detailed in Section 6 of the RI report, a groundwater fate and transport model was employed to estimate total VOC (TVOC) concentrations at each water supply well potentially affected in the future by the OU-2 groundwater plume, based on the monitoring data collected in 1998 and assuming that the 1998 plume is not remediated. The model was not re-run using 1999 monitoring data for a number of reasons. First, NYSDEC agreed that use of the 1998 data was appropriate (Personal communication, Girish Desai, September 28, 1999). Second, the mass of TVOC measured in 1998 and 1999 appears to be comparable. Third, assuming that the model is accurate, use of the 1999 data would generate very similar results for a time period that starts and ends one year later in time.

As an initial step in developing EPCs for groundwater for future scenarios, both the 1998 and 1999 monitoring well data were evaluated to determine whether the TVOC concentration is comprised of a consistent contribution of individual COPCs. This was done to determine whether percentage values could be applied to convert the modeled TVOC concentrations to estimate future COPC concentrations at the water supply well exposure point. Table 5-1 presents the percentage of each VOC as compared to the

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TVOC concentration in each monitoring well. On average, the majority of TVOC in groundwater is 1,2-DCE (65%), while TCE (24%), PCE (14%) and toluene (13%) were also present at elevated concentrations and at high frequencies of detection. The other four COPCs (1,1-DCE, 1,1-DCA, chloroform, and Freon 113) comprised considerably lower fractions of TVOC (0.43% to 4.5%), on average.

As previously indicated, the groundwater wells modeled currently service three different water supply districts. Although all wells were modeled, only those wells expected to be impacted were evaluated in the risk assessment. The modeling results therefore, are conservative (i.e., health-protective) surrogates for the actual expected concentrations that may be present in the water supply system (given that some wells are not predicted to be affected), in the absence of remediation. That is, mixing impacted water with unimpacted water in the supply system will result in lower concentrations at the tap than would be observed at the impacted wells. As previously discussed, only modeling results for the affected wells within the Manhasset-Lakeville Water District were included in this risk assessment, because the modeling predicts that these wells will be affected to a greater extent than wells in other water districts.

As presented in Table 5-2, the central tendency EPC was selected as the arithmetic mean of the 30-year mean concentrations for the four impacted wells located within the Manhasset-Lakeville Water District. The high end EPC was selected as the maximum of the modeled 30-year mean concentrations for the four impacted wells in this water district. The maximum of the 30-year mean was viewed as a more appropriate high end EPC than the peak concentration, because the peak concentration is an instantaneous value, in contrast with a long-term concentration. The maximum 30-year mean was selected instead of the 95% upper confidence limit (UCL) on the mean because the relatively small sample size would cause the 95% UCL on the mean to exceed the maximum modeled concentration.

Although individual COPCs were not modeled, EPCs were calculated separately for carcinogenic and noncarcinogenic COPCs. All compounds identified as COPCs have been determined to cause noncancer health effects. As a result, the maximum 30-year average TVOC concentration was used in the high end analysis, while the mean of the 30-year mean concentrations was used in the central tendency analysis (Table 5-2). In contrast, only three COPCs (chloroform, 1,1-DCE and 1,1-DCA) are possible human carcinogens (see Section 6). The maximum concentration of TVOC was measured in monitoring well 17GL (Table 5-1). Carcinogens comprised only 0.22% of the TVOC in this well in 1998 and 0% in 1999. The EPCs used to evaluate cancer risks conservatively assumed that 0.22% of the TVOC concentration was comprised of

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carcinogenic compounds. The mean and maximum concentrations used in the central tendency and high end analyses were adjusted accordingly (Table 5-2). The carcinogenic compounds 1,1-DCE and 1,1-DCA are not consistently detected in monitoring wells with lower TVOC concentrations, suggesting that these chemicals may not actually reach the public drinking water supply wells (Table 5-1). Tap water concentrations used in the ingestion and dermal contact pathways were assumed to be equivalent to either the maximum or mean modeled TVOC concentrations at the water supply wells.

For future exposures to COPCs in spray irrigation water, EPCs were derived using modeling results specific to the spray irrigation well (Table 5-3). For this scenario, the groundwater fate and transport model was run using the conservative assumption that the pumping rate for Well 2576 is increased to 1,000 gpm in the future and that the well had been relocated to its new position west of the old position.

5.3.2 EPCs for Air

Because data are not available on the (future) concentrations of TVOCs in indoor air in the homes of residents, the EPC in the shower was estimated using a volatilization factor (VF) of 0.5 (=0.0005 x 1000) L/m^3. Table 5-4 presents the calculation of concentrations of COPCs in indoor air based on concentrations of COPCs in tap water used for showering.

As previously discussed, ambient air monitoring was conducted in August 2000 upwind and downwind of the spray irrigation system, in an effort to determine whether COPCs are present in ambient air and, if so, at what concentrations. While none of the COPCs for groundwater were detected in ambient air, four other constituents were detected at both upwind and downwind sampling locations. On August 29,2000, 1,2,4-trimethylbenzene was detected at the #2 Green (a downwind location) and the #3 Green (an upwind location). On August 30, 2000, 4-ethyltoluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and m & p-xylenes were detected at the #16 Green (a downwind location). At the #5 Tee (an upwind location) on August 31, 2000, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene were detected. Concentrations at the upwind locations were generally higher than at downwind locations. Xylene, which was also detected in the air samples, is not present in the groundwater at the former Unisys site. For these reasons the compounds above are assumed not to be site-related and are, therefore, not designated as COPCs. Because these constituents are not COPCs, EPCs were not calculated for air.

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Although COPCs are not currently present in ambient air, increased future concentrations may occur if the pumping rate is increased substantially. Consequently, additional ambient air monitoring will be conducted if on-going groundwater monitoring results indicate that concentrations are high enough to potentially trigger inhalation risks from volatilization. The latter condition will be met if TVOC concentrations exceed the triggers of 144 mg/L or if the combined concentrations of chloroform and 1,1-DCE exceed 0.018 mg/L. The triggers were back-calculated using a near-field box model (Pasquill 1975; Horst 1979), a vapor emissions model (Andelman 1984; 1985a,b), and conservative exposure and risk assumptions. Derivation and proposed application of the RBC are described in Attachment A. In the event that ambient air monitoring conducted in the future determines that COPCs are present in ambient air, risks to future North Shore Towers residents via inhalation will be calculated and presented as an addendum to this risk assessment.

5.3.3 EPCs for Past and Current Groundwater

Monitoring data were used to calculate EPCs for past and current exposures to spray irrigation water. Because the only representative and available monitoring data for the spray irrigation well are from 1999, both past and current exposures to spray irrigation water used data from this data set (Table 5-5).

5.3.4 EPCs for Soil

In the absence of surface soil data for the golf course and garden plots, EPCs for soil were estimated based on Equations 1 and 2:

$$Cs = Cw \times Kd \qquad \text{Equation 1}$$

where:

Cs = Concentration of COPC in soil (mg/kg)
Cw = Concentration of COPC in water (mg/L)
Kd = Soil-water partitioning coefficient (L/kg)

$$Kd = Koc \times foc \qquad \text{Equation 2}$$

where:

Koc = Organic carbon partitioning coefficient (unitless)
foc = Fraction of organic carbon (unitless)

A Koc value for 1,2-DCE of 58.88 (from RAIS, 2000) was used because 1,2-DCE makes up the majority (approximately 70%) of the TVOC content of samples collected from N2576. The fraction of organic carbon was assumed to equal 3 percent, based on findings reported in the supplemental RI (H2M, 1996). The resultant EPCs for TVOCs in soil likely overestimate actual concentrations because a substantial fraction of the TVOCs in groundwater likely volatilize upon release from the irrigation system, or shortly thereafter. EPCs for soil are presented in Table 5-6.

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5.3.5 EPCs for Vegetables

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Vegetables that grow both above-ground and below-ground may uptake VOCs in soil through their roots. EPCs reflecting such uptake are presented in Table 5-7, based on the methodology described below. It is worth noting that the model used to derive EPCs for vegetables is based on assumed concentrations of VOCs in soil, which in turn are estimated based on VOC concentrations in groundwater and Kd (as detailed above). Consequently, concentrations of VOCs in vegetables are also overestimated.

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Equation 3 presents the equation for calculating concentrations of chemicals in above-ground vegetables using the "soil to above-ground plant transfer approach" developed by Travis and Arms (1988).

$$Cav = Cs \times Br \qquad \text{Equation 3}$$

F

where:

Cav = concentration in above ground vegetables (mg/kg)

Cs = concentration in soil (mg/kg)

Br = plant-soil bioconcentration factor for produce (unitless)

T

Based on Travis and Arms' (1988) data, Br (on a dry weight basis) can be calculated using Equation 4. To convert from dry weight to wet weight, the moisture content of tomatoes (94%) was used (USEPA 1997a).

$$\log Br = 1.588 - 0.578 \times \log Kow \qquad \text{Equation 4}$$

EPCs for below-ground vegetables were calculated using Equation 5, as described in USEPA (1994a) and USEPA (1995b).

$$Cbv = Cs \times RCF \times VG / Kd \times 1\ kg/L \qquad \text{Equation 5}$$

where:

Cbv = concentration in below ground vegetables (mg/kg)

RCF = root concentration factor (unitless)

VG = empirical correction factor for below ground produce (unitless)

Kd = soil-water partition coefficient (L/kg)

Values for VG and RCF were calculated based on the lipophilicity of the individual COPCs. A VG value of 1.0 was used for all COPCs, because all have logarithms of the octanol-water partitioning coefficient (log Kow) less than 4.0. The RCF (in wet weight) was calculated using Equation 6, as developed by Briggs et al. (1982). The RCF describes the ratio of the COPC concentration in the edible root to the concentration of COPCs in the soil water and was converted to a dry weight basis assuming a moisture content of 87% in root vegetables (USEPA 1997a).

$$\log (RCF - 0.82) = 0.77 \times \log Kow - 1.52 \qquad \text{Equation 6}$$

The logarithm of the octanol-water partitioning coefficient is represented by log Kow. A log Kow value of 1.48 for 1,2-DCE (from RAIS, 2000) was applied because the majority (approximately 70%) of the measured TVOC concentration in well N2576 is 1,2-DCE. The resultant EPCs are presented in Table 5-7.

5.4 Description of Exposure Assumptions and Calculation of Doses

Tables 5-8 through 5-16 present the exposure equations and exposure parameter values used to estimate potential doses of COPCs for all of the various and applicable combinations of land uses, age groups, time frames, exposure points and exposure pathways. When calculating exposure for ingestion and dermal contact, dose is

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presented in units of mg/kg-day, whereas exposure to vapors during showering is expressed as a concentration in mg/m^3.

In all cases, dose is evaluated for both high end and central tendency exposures. High end exposure has been defined by USEPA (1992b) as the "plausible estimate of the individual risk for those persons at the upper end of the risk distribution. The intent of this descriptor is to convey an estimate of risk in the upper range of the distribution, but to avoid estimates which are beyond the true distribution." High end risk estimates may be calculated by "identifying the most sensitive parameters and using maximum or near-maximum values for one or a few of these variables, leaving others at their mean values" (USEPA 1992b). Depending on the receptor, high end variables for the ingestion pathway were selected for two or more of the following parameters: the concentration in water, soil or vegetables, ingestion rate, exposure duration, exposure frequency, exposure time, and fraction of soil ingested from the site. For the dermal contact pathway, high end variables were selected for two or more of the following parameters (again, depending on the receptor): concentration in water, soil or vegetables, surface area, exposure frequency, and exposure time. For the inhalation pathway, high end parameters were selected for two or more of the following parameters (again, depending on the receptor): concentration in air, exposure duration, exposure frequency, and exposure time. In contrast to the high end exposure, central tendency evaluates potential intake for the average exposure. As such, central tendency exposure parameters are generally set at the 50^{th} percentile values.

Chronic and subchronic exposures were evaluated in the risk assessment. Subchronic exposure is defined as occurring for seven years or less and is often an important scenario when evaluating noncarcinogenic risks. Exposures to children were evaluated, because they would be expected to receive higher exposures due to their lower body weights. Chronic toxicity values were used to estimate subchronic risks to children to account for any unique susceptibility in this subpopulation.

6. Toxicity Assessment

Human health risk is a function of both exposure to chemicals in the environment and the toxicity of those chemicals. Quantitative toxicity values are used to evaluate health risks based on the relationship between the dose of chemical received and the incidence or magnitude of the toxic response observed (i.e., the dose-response relationship). Laboratory animal studies are generally used to characterize the dose-response relationship for a chemical, unless adequate human epidemiological data are available.

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In the risk assessment process, a distinction is made between cancer and noncancer health effects. For noncancer effects, the dose-response assessment yields a reference dose (RfD) or reference concentration (RfC), which corresponds to an estimate of the daily exposure likely to be without appreciable risk of adverse noncarcinogenic effects during a lifetime, with uncertainty spanning perhaps an order of magnitude (Dourson and Stara 1983). The RfD is generally calculated by determining the highest dose rate at which there are no observable health effects (NOAEL) and by adjusting this dose using a series of uncertainty factors (UFs) and modifying factors (MFs). UFs are intended to account for the variation in sensitivity within the human population, uncertainty in extrapolating from animals to man, uncertainty in extrapolating from short-term animal studies to chronic exposures in humans, and/or the inability of the toxicological database to address all possible adverse outcomes in humans. MFs may be applied to address specific scientific uncertainties or overall database quality. For studies in which a NOAEL cannot be identified, the lowest dose rate associated with an observable adverse effect (LOAEL) is used and an additional UF is applied to account for the uncertainty of using LOAEL data rather than NOAEL data. RfC values are calculated from inhalation toxicity studies and include parameters to address the structure and function of the respiratory system, applicable species differences, and the physiochemical properties of COPCs (USEPA 1994b).

Tables 6-1 and 6-2 summarize the noncancer toxicity data for the oral/dermal and inhalation pathways, respectively, for the COPCs identified in this risk assessment. For each COPC, the target organ for the critical effect is noted and the magnitude of the combined uncertainty/modifying factor is indicated. Table 6-1 also contains information on the adjustment of oral RfD values for the dermal exposure pathway, using absorption efficiency values specific to the exposure route.

The assessment of cancer health effects generally follows a two-step process consisting of assignment of a qualitative weight of evidence classification and derivation of a quantitative toxicity value when appropriate. The weight of evidence classification scheme includes: known human carcinogens (Group A), probable human carcinogens (Groups B1 and B2), possible human carcinogens (Groups C), chemicals not classified (Group D), and compounds for which there is no evidence of carcinogenicity (Group E). The weight of evidence classification is based on the strength of the data demonstrating carcinogenesis in both laboratory animal studies and human epidemiology studies. Quantitative toxicity values, including cancer slope factors (CSFs) and/or inhalation unit risk (UR) values, are generally derived for Group A and B1/B2 carcinogens. Because USEPA generally favors use of a linear dose-response model, many available CSFs and UR values were derived using the linearized

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multistage model (LMS). These CSFs and UR values usually represent the 95% UCL on the probability of a response per unit intake of a chemical, and are expressed as either $(mg/kg\text{-}day)^{-1}$ or $(ug/m^3)^{-1}$, respectively.

A more recent approach to cancer risk assessment is presented in USEPA's (1996) *Proposed Guidelines for Carcinogen Risk Assessment.* Standard cancer risk descriptors are used instead of the traditional classification scheme and several alternative methods are available for dose-response modeling and low dose extrapolation. It is anticipated that new dose-response assessments will utilize the recently proposed methodology and that some older assessments may undergo re-evaluation to make them consistent with the new guidance. Tables 6-3 and 6-4 summarize the toxicity data for carcinogens identified as COPCs in this risk assessment. For each COPC, the weight of evidence classification and the target organ for cancer is presented.

Sources of toxicity information used in this risk assessment include USEPA's Integrated Risk Information System (IRIS) database, USEPA's Health Effects Assessment Summary Tables (HEAST) (USEPA 1997b), and Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profiles (e.g., ATSDR 1994). The references for all toxicity values are indicated in Tables 6-1 through 6-4.

As described in Section 5, the EPCs for tap water used in this risk assessment represent the future TVOC concentrations (without treatment) at water supply wells, determined by groundwater fate and transport modeling. EPCs are not available for the individual chemicals identified as COPCs in the groundwater plume. To estimate the future risks associated with groundwater exposure to TVOCs, the most conservative toxicity values for each exposure pathway were used. For noncancer effects associated with oral or dermal exposure, the chronic and subchronic oral RfD for 1,1-DCE was used. The chronic RfC for toluene and the subchronic RfC for 1,1-DCA were used to evaluate noncancer effects from inhalation. The oral CSF and inhalation UR values for 1,1-DCE were used to assess cancer risks from TVOC exposure in groundwater. To allow comparisons across scenarios and pathways, the same approach of evaluating TVOC intake relative to the most conservative toxicity values was also used to assess risks and hazards from exposures to COPCs in air, soil, and vegetables.

Oral toxicity values were used to evaluate dermal exposure to groundwater without adjustment to account for differential absorption by distinct exposure routes (relative absorption factor of 1 or 100%; see Tables 6-1 and 6-3). The calculations used to assess dermal exposure to groundwater result in calculation of an internal dose of the

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COPC because skin permeability is taken into account (USEPA 1989). The detected chlorinated solvents are nearly completely absorbed from the gastrointestinal tract (ATSDR 1994); therefore, the applied dose that represents the toxicity value is equivalent to an absorbed dose and no adjustment is necessary for the dermal exposure pathway.

A dermal absorption factor was used to reflect desorption of a chemical from soil and the absorption of the chemical across the skin and into the bloodstream. The dermal absorption factor was assumed to be 0.05% (USEPA 1995c), based on studies by Skowronski et al. (1988) and Franz (1984) that evaluated benzene absorption from soil. USEPA Region 3 recommends this value for use with chlorinated solvents, such as the COPCs in this risk assessment (USEPA 1995c). It is important to note that major uncertainties exist in estimating percutaneous absorption from soil and that the soil matrix may play a role in this process (USEPA 1992c).

7. Risk Characterization

Risk characterization is the final step in the risk assessment process. In this step, the results of the hazard identification, exposure assessment, and toxicity assessment are integrated to yield a quantitative measure of carcinogenic risk and noncarcinogenic hazard. Potential carcinogenic risks and noncarcinogenic hazards were evaluated for the complete exposure pathways identified in Table 2-1.

Hazard quotients (HQs) were calculated by dividing estimated dose of COPCs by the appropriate noncarcinogenic toxicity criteria (RfD or RfC):

$$\text{Hazard Quotient} = \text{Dose} \div \text{RfD or RfC} \qquad \text{Equation 7}$$

Consistent with USEPA policy, the pathway specific HQs were summed to yield hazard indices (HIs) for each scenario. HIs were evaluated relative to a benchmark value of 1. Both central tendency and high end noncancer HQs for all pathways associated with the various exposure scenarios are presented in Tables 7-1 through 7-12.

Carcinogenic risk estimates were calculated by multiplying the estimated dose of COPCs by the appropriate carcinogenic value (CSF or UR):

$$\text{Cancer Risk} = \text{Dose} \times \text{CSF or UR} \qquad \text{Equation 8}$$

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When evaluating potential carcinogenic risks, USEPA has established an acceptable risk range of 1×10^{-4} to 1×10^{-6} (USEPA 1990). In establishing this range, USEPA accepted the policy that a risk range, rather than a single risk value, adequately protects public health and the environment (55 FR 8716). Cancer risks of 1×10^{-6} or less are usually considered insignificant and not a public health concern (i.e., *de minimis*). Cancer risks greater than 1×10^{-4}, on the other hand, typically trigger actions to lower exposures. When cancer risk estimates are between 1×10^{-6} and 1×10^{-4}, a risk management decision is made on a case-by-case basis whether or not to pursue risk reduction measures. Both central tendency and high end cancer risks for all pathways associated with the various exposure scenarios are presented in Tables 7-13 through 7-21.

Risks and hazards associated with different exposure points and exposure pathways are summed and presented in Tables 7-22 through 7-29. None of the HIs (i.e., risk of health effects other than cancer) are predicted to exceed 1, indicating that, even under very conservative estimates of exposure, no adverse chronic or subchronic health effects are expected. The majority of predicted cancer risks are also below 1×10^{-6}, indicating that even very conservative estimates of exposure are unlikely to elevate an individual's risk of developing cancer by more than one chance in one million. The one exception is the high end risk estimate for future adult residents potentially exposed to untreated tap water, which is predicted to equal 2×10^{-6}. In reality, this risk will not occur because treatment will be provided when concentrations of VOCs reach the MCL.

The groundwater fate and transport modeling results were also evaluated to determine whether peak concentrations of VOCs that may occur in the 1998 plume (if the 1998 plume is allowed to migrate unremediated) at any time during the next 30 years are likely to exceed standards, criteria or guidance values (SCGs) or MCLs defined by the Safe Drinking Water Act. Table 7-30 identifies the maximum predicted concentration of TVOCs for each of the wells that have the potential to be used as a drinking water source and are not currently undergoing treatment. The maximum TVOC concentration is then compared to the MCLs and SCGs of each COPC. Wells where TVOCs may exceed MCLs or the SCG in the future may require treatment. Based on this analysis, Wells N0022 and N5535 are not likely to require treatment at any time in the next 30 years to meet these criteria, while Wells N5099, N12999, and N13000 may to require treatment in the future. Groundwater monitoring will determine if treatment may be necessary.

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8. Uncertainty Analysis

An important component of the risk assessment involves recognition of the uncertainties and limitations inherent in the risk assessment process. The primary goal of the uncertainty assessment is to determine the extent to which the risk results may be over or underestimated, and to identify the specific uncertainties associated with the risk estimates. Uncertainties arise primarily from the data quality and quantity, toxicity values, and exposure parameter values, as summarized in Table 8-1 and described below.

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8.1 Data Quality and Quantity

Limitations in the quality and quantity of the analytical data contributed to uncertainty in the risk assessment by affecting the selection of COPCs and determination of EPCs. The groundwater analytical data were collected for the purpose of plume delineation and were subsequently adapted for risk assessment purposes. As a result, the selection of COPCs and the determination of EPCs may be biased if the number and locations of samples are not directly representative of potential exposure frequencies. For the OU-2 risk assessment, analytical data from both on-site and off-site monitoring wells were used to select COPCs. This was done to ensure that all chemicals that could potentially migrate off-site would be evaluated in the baseline risk assessment.

The TVOC results of the groundwater fate and transport model were used to estimate EPCs for future drinking water, in the absence of chemical-specific modeling data. It was conservatively assumed that any of the COPCs selected for groundwater could be present at the water supply wells and contribute to the TVOC concentration. Uncertainties associated with the results and assumptions of the groundwater fate and transport model are described in Section 6 of the OU-2 RI report.

Modeling was also necessary to generate estimates of concentrations of COPCs in air that result from volatilization during showering, as well as concentrations of COPCs in vegetables as a result of uptake from soil. Uncertainty in the estimates of VOCs in vegetable is compounded because the assumed concentration of VOC in soil is not based on any soil samples; rather, it is based on the conservative assumptions regarding partitioning of VOCs between groundwater and soil. In all cases, because models are simplified representations of reality, uncertainty is inevitable. To the greatest extent possible, the simplest yet plausible model was applied using conservative (i.e., health protective) input values. As such, estimated concentrations of COPCs in air and vegetables are expected to be overestimated, which in turn results in overestimates of risk and hazard.

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8.2 Exposure Assumptions

There is considerable uncertainty regarding the likelihood of exposure to a given medium of concern. It is unknown whether all of the exposure pathways modeled are actually complete or whether the individuals evaluated (North Shore Towers residents, residents, groundskeepers, golfers) will actually be exposed to COPCs. For example, for the golfer's soil contact pathways to be complete, the golfer must regularly golf early in the morning while the soil is still damp from the night's irrigation activities, and the golfer must touch and incidentally ingest soil that has been dampened by the irrigation water. In reality, exposure pathways such as these are unlikely to be complete under most circumstances, but were included in the risk assessment for the sake of conservatism (i.e. to be health protective).

For high end exposures to the future resident, it was assumed that the sole source of residential drinking water was the water supply well predicted to have the highest 30-year mean concentration of TVOCs, as estimated from the groundwater modeling. However, water supply districts pump from multiple supply wells at any given time, preferentially drawing from the least impacted wells. This is better described by the central tendency exposure, which uses the average of the 30-year mean TVOC concentration for the water supply wells potentially impacted by the plume. In either the high end or central tendency case, however, the influence of nonimpacted wells within the water district was not considered and only the most impacted water district (Manhasset-Lakeville) was evaluated. In reality, drinking water within the Manhasset-Lakeville Water District should have considerably lower concentrations of TVOCs due to the contributions of nonimpacted wells within that district, treatment on currently impacted wells, and volatilization that occurs upon release of water at the tap. Furthermore, all other water districts are expected to have even lower concentrations of

TVOCs in their water supplies. For these reasons, risks posed to future residents may be significantly overstated.

Many of the exposure parameter values applied are default values determined by USEPA (1989; 1991; 1997a), rather than site-specific values. As such, risk estimates based on these exposure parameters will generally represent conservative estimates. This uncertainty is addressed somewhat, by presentation of both central tendency and high end risk descriptors.

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8.3 Toxicity Values

Significant uncertainty is associated with derivation of RfDs, RfCs, CSFs and UR values. Toxicity values based on human epidemiological studies are not available for most chemicals, and those human studies that are available generally lack exposure data and are confounded by exposure to multiple chemicals, recall bias, and lifestyle issues. Laboratory animal studies are used to derive most toxicity values and the practice of extrapolating from effects in animals to predict human toxic response is a major source of uncertainty in risk assessment.

RfD development is a highly conservative process, which uses a no observable adverse effect level (NOAEL) or a lowest observed adverse effect level (LOAEL) from an animal study, divided by a series of 10-fold UFs. The UFs are intended to account for differences between humans and laboratory animals, variation in sensitivity within the human population, differences between subchronic and chronic exposures, use of a LOAEL versus a NOAEL, and the strength of the toxicology database for a particular chemical. The combination of several UFs results in RfDs that are several orders of magnitude lower than the doses that produce minimal or no effects in animals. Conservative assumptions are also employed when deriving RfC values from inhalation toxicity studies, in order to account for species differences in the structure and function of the respiratory system (USEPA 1994b).

CSFs and UR values contain multiple sources of uncertainty, including the methods of extrapolation from high doses to low doses and from animals to humans. In addition, genetic constitution, diet, occupational and home environments, activity patterns, and other cultural factors influence human susceptibility to cancer. To compensate for this uncertainty, CSFs and UR values generally represent the 95% UCL on the probability of a carcinogenic response at a certain dose rate over a lifetime.

The most conservative toxicity values were used to assess risks associated with exposures to TVOCs. This approach results in an overestimation of future health risk, because it was assumed that all VOCs present were as toxic as the most toxic component. In addition, although TCE was considered a COPC for groundwater, no toxicity values are currently available for this compound. Therefore, TCE was not included in selection of the toxicity values for evaluation of TVOC exposure. The results of the risk assessment would not change significantly if the noncancer toxicity and carcinogenic potency of TCE were similar to the other chlorinated solvents selected as COPCs.

8.4 Risk Characterization

The risk characterization for the OU-2 risk assessment combines overly conservative assessments of both exposure and toxicity resulting in a general overestimation of cancer and noncancer risks. The high end exposure scenarios utilize the maximum concentrations as the EPCs. In addition, for noncancer effects it was assumed that the TVOC concentration was representative of the most toxic COPC identified (1,1-DCE for oral and dermal exposure and PCE for inhalation exposure).

9. Conclusions

The OU-2 risk assessment conducted for the site indicates that there are unlikely to be significant risks to individuals who have been exposed to constituents in groundwater in the past or who may be exposed currently or in the future. For the vast majority of scenarios evaluated, neither cancer risks nor noncancer hazards exceeded the acceptable risk ranges. However, future adult residents potentially exposed to untreated tap water face cancer risks that were predicted to equal 2×10^{-6}. This exposure will not occur in reality because water with concentrations above the MCL will be treated. The scenarios evaluated in the risk assessment are very conservative in that they assume no that the current IRM is turned off and no further remediation (either on-site or off-site) is conducted and worst-case exposures. In reality, individuals are expected to be exposed to concentrations much lower then those estimated and for shorter durations. Modifying exposure assumptions to be more realistic will further reduce estimated cancer risks and noncancer hazards.

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TABLE 2-1
SELECTION OF EXPOSURE PATHWAYS
Former Unisys Facility

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Past	Groundwater	Spray irrigation	Spray irrigation water	North Shore Towers resident	Child	Dermal	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
						Ingestion	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
					Adult	Dermal	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
						Ingestion	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
	Soil	Soil	Surface soil	North Shore Towers resident	Child	Dermal	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
						Ingestion	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
					Adult	Dermal	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
						Ingestion	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
			Produce grown in soil	North Shore Towers resident	Child	Ingestion	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
					Adult	Ingestion	Off-site	Quant	Exposure may have occurred in 1998 and 1999 when affected well supplied water to garden plots.
	Air	Air	Indoor air	North Shore Towers resident	Child	Inhalation	Off-site	None	No COPCs present in air.
					Adult	Inhalation	Off-site	None	No COPCs present in air.
Current	Groundwater	Groundwater	Tap water	Resident	Child	Dermal	Off-site	None	Groundwater plume has not reached public water supply wells or well is receiving treatment.
						Ingestion	Off-site	None	Groundwater plume has not reached public water supply wells or well is receiving treatment.
					Adult	Dermal	Off-site	None	Groundwater plume has not reached public water supply wells or well is receiving treatment.
						Ingestion	Off-site	None	Groundwater plume has not reached public water supply wells or well is receiving treatment.
				North Shore Towers resident	Child	Dermal	Off-site	None	Drinking water supplied by New York City.
						Ingestion	Off-site	None	Drinking water supplied by New York City.
					Adult	Dermal	Off-site	None	Drinking water supplied by New York City.
						Ingestion	Off-site	None	Drinking water supplied by New York City.
			Water vapors at showerhead	Resident	Child	Inhalation	Off-site	None	Groundwater plume has not reached public water supply wells or well is receiving treatment.
					Adult	Inhalation	Off-site	None	Groundwater plume has not reached public water supply wells or well is receiving treatment.
				North Shore Towers resident	Child	Inhalation	Off-site	None	Drinking water supplied by New York City.
					Adult	Inhalation	Off-site	None	Drinking water supplied by New York City.
			Vapor intrusion into basements	Resident	Child	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.
					Adult	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.
				North Shore Towers resident	Child	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.
					Adult	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.

TABLE 2-1
SELECTION OF EXPOSURE PATHWAYS
Former Unisys Facility

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Groundwater	Spray irrigation	Spray irrigation water	North Shore Towers resident	Child	Dermal	Off-site	None	Source of water to garden plots changed to New York City supply.
						Ingestion	Off-site	None	Source of water to garden plots changed to New York City supply.
					Adult	Dermal	Off-site	None	Source of water to garden plots changed to New York City supply.
						Ingestion	Off-site	None	Source of water to garden plots changed to New York City supply.
				Groundskeeper	Adult	Dermal	Off-site	Quant	Contact with spray irrigation water possible during maintenance activities.
						Ingestion	Off-site	Quant	Contact with spray irrigation water possible during maintenance activities.
	Soil	Soil	Surface soil affected by spray irrigation	North Shore Towers resident	Child	Dermal	Off-site	None	Exposures expected to be less than or equal to golfer's and groundskeeper's.
						Ingestion	Off-site	None	Exposures expected to be less than or equal to golfer's and groundskeeper's.
					Adult	Dermal	Off-site	None	Exposures expected to be less than or equal to golfer's and groundskeeper's.
						Ingestion	Off-site	None	Exposures expected to be less than or equal to golfer's and groundskeeper's.
				Groundskeeper	Adult	Dermal	Off-site	Quant	Contact with damp soil possible after irrigation.
						Ingestion	Off-site	Quant	Contact with damp soil possible after irrigation.
				Golfer	Adult	Dermal	Off-site	Quant	Contact with damp soil possible after irrigation.
						Ingestion	Off-site	Quant	Contact with damp soil possible after irrigation.
			Produce grown in soil	North Shore Towers resident	Child	Dermal	Off-site	None	Source of water to garden plots changed to New York City supply.
						Ingestion	Off-site	None	Source of water to garden plots changed to New York City supply.
					Adult	Dermal	Off-site	None	Source of water to garden plots changed to New York City supply.
						Ingestion	Off-site	None	Source of water to garden plots changed to New York City supply.
	Air	Air	Indoor air	Resident	Child	Inhalation	Off-site	None	No COPCs present in air.
					Adult	Inhalation	Off-site	None	No COPCs present in air.
				North Shore Towers resident	Child	Inhalation	Off-site	None	No COPCs present in air.
					Adult	Inhalation	Off-site	None	No COPCs present in air.
			Outdoor air	Groundskeeper	Adult	Inhalation	Off-site	None	No COPCs present in air.
				Golfer	Adult	Inhalation	Off-site	None	No COPCs present in air.
Future	Groundwater	Groundwater	Tap water	Resident	Child	Dermal	Off-site	Quant	Chemicals in groundwater may migrate to off-site public water supply wells.
						Ingestion	Off-site	Quant	Chemicals in groundwater may migrate to off-site public water supply wells.
					Adult	Dermal	Off-site	Quant	Chemicals in groundwater may migrate to off-site public water supply wells.
						Ingestion	Off-site	Quant	Chemicals in groundwater may migrate to off-site public water supply wells.
				North Shore Towers resident	Child	Dermal	Off-site	None	Drinking water supplied by New York City.
						Ingestion	Off-site	None	Drinking water supplied by New York City.
					Adult	Dermal	Off-site	None	Drinking water supplied by New York City.
						Ingestion	Off-site	None	Drinking water supplied by New York City.
			Water vapors at showerhead	Resident	Child	Inhalation	Off-site	Quant	Chemicals in groundwater may migrate to off-site public water supply wells.
					Adult	Inhalation	Off-site	Quant	Chemicals in groundwater may migrate to off-site public water supply wells.
				North Shore Towers resident	Child	Inhalation	Off-site	None	Drinking water supplied by New York City.
					Adult	Inhalation	Off-site	None	Drinking water supplied by New York City.

TABLE 2-1
SELECTION OF EXPOSURE PATHWAYS
Former Unisys Facility

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Groundwater	Groundwater	Vapor intrusion into basements	Resident	Child	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.
					Adult	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.
				North Shore Towers resident	Child	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.
					Adult	Inhalation	Off-site	None	Exposure unlikely due to 80 ft depth to groundwater.
		Spray irrigation	Spray irrigation water	Groundskeeper	Adult	Dermal	Off-site	Quant	Contact with spray irrigation water possible during maintenance activities.
						Ingestion	Off-site	Quant	Contact with spray irrigation water possible during maintenance activities.
	Surface water	Surface water	Lake Success	Recreational	Child	Dermal	Off-site	None	Affected aquifer does not discharge into Lake Success.
						Ingestion	Off-site	None	Affected aquifer does not discharge into Lake Success.
					Adult	Dermal	Off-site	None	Affected aquifer does not discharge into Lake Success.
						Ingestion	Off-site	None	Affected aquifer does not discharge into Lake Success.
	Soil	Soil	Surface soil affected by spray irrigation	Groundskeeper	Adult	Dermal	Off-site	Quant	Contact with damp soil possible after irrigation.
						Ingestion	Off-site	Quant	Contact with damp soil possible after irrigation.
				Golfer	Adult	Dermal	Off-site	Quant	Contact with damp soil possible after irrigation.
						Ingestion	Off-site	Quant	Contact with damp soil possible after irrigation.
	Air	Air	Indoor air	Resident	Child	Inhalation	Off-site	TBD	Ambient air monitoring to be conducted in future if groundwater concentrations exceed risk-based trigger.
					Adult	Inhalation	Off-site	TBD	Ambient air monitoring to be conducted in future if groundwater concentrations exceed risk-based trigger.
				North Shore Towers resident	Child	Inhalation	Off-site	TBD	Ambient air monitoring to be conducted in future if groundwater concentrations exceed risk-based trigger.
					Adult	Inhalation	Off-site	TBD	Ambient air monitoring to be conducted in future if groundwater concentrations exceed risk-based trigger.
			Outdoor air	Groundskeeper	Adult	Inhalation	Off-site	TBD	Ambient air monitoring to be conducted in future if groundwater concentrations exceed risk-based trigger.
				Golfer	Adult	Inhalation	Off-site	TBD	Ambient air monitoring to be conducted in future if groundwater concentrations exceed risk-based trigger.

Notes : "Quant" indicates pathway evaluated quantitatively in this risk assessment.

TBD = to be determined based on comparison of future groundwater concentrations to risk-based concentration that triggers need for ambient air monitoring

TABLE 3-1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER (POTENTIAL TAP WATER)
Former Unisys Facility

Scenario Timeframe: Current
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap Water

CAS Number	Chemical	Minimum Concentration Detected	Minimum Qualifier	Maximum Concentration Detected	Maximum Qualifier	Units	Location of Maximum Concentration	Year of Max. Conc.	Detection Frequency	Detection Limit	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Chemical Deletion or Selection[1]
71-43-2	Benzene	0.3	J	2	J	ug/L	28MI	1999	4/157	10	1	SCG	No	IFD
78-93-3	2-Butanone	2	J	2	J	ug/L	17MJ, 30MI	1999	2/157	10	50	SCG	No	IFD
75-15-0	Carbon disulfide	0.3	J	79	J	ug/L	28GL	1999	2/157	10	none	SCG	No	IFD
56-23-5	Carbon tetrachloride	0.3	J	0.4	J	ug/L	33ML	1999	2/157	10	5	SCG	No	IFD
67-66-3	Chloroform	0.1	J	20	J	ug/L	28GL	1999	28/157	10	7	SCG	Yes	FD
75-34-3	1,1-Dichloroethane	0.3	J	7	J	ug/L	17GL, 22ML	1998, 1999	18/157	10	5	SCG	Yes	FD
107-06-2	1,2-Dichloroethane	0.4	J	1	J	ug/L	5ML, 37ML	1999	5/157	10	0.6	SCG	No	IFD
75-35-4	1,1-Dichloroethene	0.4	J	15	J	ug/L	25MI	1999	36/157	10	5	SCG	Yes	FD
540-59-0	1,2-Dichloroethene	0.2	J	7200	EJ	ug/L	17GL	1998	133/157	10	5	SCG	Yes	FD
100-41-4	Ethylbenzene	1	J	1	J	ug/L	1GL	1999	1/157	10	5	SCG	No	IFD
76-13-1	Freon 113	0.4	J	180	DJ	ug/L	17GL	1998	81/157	10	5	SCG	Yes	FD
75-09-2	Methylene chloride	0.8	J	43	J	ug/L	17GLB	1999	5/157	10	5	SCG	No	IFD
100-42-5	Styrene	0.3	J	0.3	J	ug/L	1GL	1999	1/157	10	5	SCG	No	IFD
127-18-4	Tetrachloroethene	0.3	J	660	DJ	ug/L	17GL	1998	122/157	10	5	SCG	Yes	FD
108-88-3	Toluene	0.2	J	2	J	ug/L	17ML, 22ML	1999	14/157	10	5	SCG	Yes	FD
71-55-6	1,1,1-Trichloroethane	0.4	J	2	J	ug/L	30MI	1999	6/157	10	5	SCG	No	IFD
79-00-5	1,1,2-Trichloroethane	2	J	2	J	ug/L	17GL	1998	1/157	10	1	SCG	No	IFD
79-01-6	Trichloroethene	0.4	J	540	DJ	ug/L	17GL	1998	129/157	10	5	SCG	Yes	FD
75-01-4	Vinyl chloride	3	J	300	J	ug/L	28GL	1999	6/157	10	2	SCG	No	IFD
1330-20-7	Xylenes (total)	0.3	J	4	J	ug/L	RW2	1998	3/157	10	5	SCG	No	IFD

Notes:

(1) Rationale Codes Selection Reason: Frequent Detection (FD)
Deletion Reason: Infrequent Detection (IFD)

Definitions: N/A = Not Applicable
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
D = Detected at a secondary dilution
E = Detected above calibration range
SCG = State Standards, Criteria, and Guidance Values

TABLE 3-2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER (SPRAY IRRIGATION WELL)
Former Unisys Facility

Scenario Timeframe: Current
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Spray Irrigation Well

CAS Number	Chemical	Minimum Concentration Detected	Minimum Qualifier	Maximum Concentration Detected	Maximum Qualifier	Units	Detection Frequency	Detection Limit	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Chemical Deletion or Selection(1)
75-35-4	1,1-Dichloroethene	0.6	J	0.6	J	ug/L	1/2	10	5	SCG	Yes	FD
540-59-0	1,2-Dichloroethene (total)	54		130		ug/L	2/2	10	5	SCG	Yes	FD
67-66-3	Chloroform	0.4	J	0.4	J	ug/L	1/2	10	7	SCG	Yes	FD
79-01-6	Trichloroethene	11		30		ug/L	2/2	10	5	SCG	Yes	FD
127-18-4	Tetrachloroethene	10		23		ug/L	2/2	10	5	SCG	Yes	FD

Notes:

(1) Rationale Codes Selection Reason: Frequent Detection (FD)
Deletion Reason: Infrequent Detection (IFD)

Definitions: COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
SCG = State Standards, Criteria, and Guidance Values

TABLE 3-3
COMPOUNDS IN AMBIENT AIR EXCLUDED AS CHEMICALS OF POTENTIAL CONCERN
Former Unisys Facility

Scenario Timeframe: Current
Medium: Ambient Air
Exposure Medium: Air
Exposure Point: Indoor and Outdoor Air

CAS Number	Chemical	Minimum Concentration Detected	Minimum Qualifier	Maximum Concentration Detected	Maximum Qualifier	Units	Detection Frequency	Detection Limit	COPC Flag	Rationale for Chemical Deletion or Selection[1]
622-96-8	4-Ethyltoluene	0.090		0.19		mg/m^3	2/15	0.060	No	NSR
95-63-6	1,2,4-Trimethylbenzene	0.060		0.29		mg/m^3	4/15	0.060	No	NSR
108-67-8	1,3,5-Trimethylbenzene	0.080		0.14		mg/m^3	2/15	0.060	No	NSR
108-38-3/106-42-3	m & p-Xylene	0.080		0.14		mg/m^3	2/15	0.120	No	NIG

Notes:

COPC = Chemical of Potential Concern

(1) Rationale Codes: Deletion Reason: Not Site Related (NSR); constituent detected in upwind samples at concentrations higher than in downwind samples
Not in Groundwater (NIG); constituent not present in site groundwater

TABLE 5-1
THE PERCENTAGE OF EACH COMPOUND DETECTED AS COMPARED TO TOTAL VOLATILE ORGANIC COMPOUNDS
Former Unisys Facility

			Percentage of the Total Volatile Organic Compounds Detected																			
SITE	DATE	Total VOCs (ug/L)	Benzene	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chloroform	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1-Dichloro ethene	1,2-Dichloro ethene (total)	Ethyl benzene	Freon 113	Methylene chloride	Styrene	Tetrachloro ethene	Toluene	1,1,1-Tri chloroethane	1,1,2-Tri chloroethane	Trichloro ethene	Vinyl Chonde	Xylene (total)
1GL	10/22/98	198	0	0	0	0	0	0	0	0	75.76	0	3.03	0	0	8.08	0	0	0	13.13	0	0
1GU	10/22/98	6	0	0	0	0	0	0	0	0	33.33	0	0	0	0	0	0	0	0	66.67	0	0
1MI	10/22/98	558	0	0	0	0	0	0	0	0	71.68	0	2.87	0	0	11.65	0	0	0	13.80	0	0
1MI/L	10/22/98	566	0	0	0	0	0	0	0	0.53	56.54	0	4.59	0	0	11.84	0	0	0	26.50	0	0
1ML	10/26/98	155	0	0	0	0	0	0	0	0	61.29	0	3.23	0	0	14.19	0	0	0	21.29	0	0
2GL	10/20/98	37	0	0	0	0	0	0	0	0	72.97	0	0	0	0	13.51	0	0	0	13.51	0	0
2MI	10/20/98	308	0	0	0	0	0	0	0	0	84.42	0	0.97	0	0	4.55	0	0	0	10.06	0	0
2ML	10/20/98	2	0	0	0	0	0	0	0	0	100.00	0	0	0	0	0	0	0	0	0	0	0
2MU	10/20/98	41	0	0	0	0	0	0	0	0	82.93	0	0	0	0	7.32	0	0	0	9.76	0	0
3GL	10/19/98	568	0	0	0	0	0	0	0	0	72.18	0	2.82	0	0	11.27	0	0	0	13.73	0	0
3ML	10/19/98	129	0	0	0	0	0	0	0	0	53.49	0	2.33	0	0	11.63	0	0	0	32.56	0	0
4GL	10/15/98	530	0	0	0	0	0	0	0	0	69.81	0	1.13	0	0	14.91	0	0	0	14.15	0	0
4MI	10/15/98	619	0	0	0	0	0	0	0	0.16	67.85	0	2.91	0	0	17.77	0	0	0	11.31	0	0
5GL	10/20/98	13	0	0	0	0	0	0	0	0	46.15	0	15.38	0	0	23.08	0	0	0	15.38	0	0
5GU	10/19/98	10	0	0	0	0	0	0	0	0	0	0	20.00	0	0	40.00	0	0	0	40.00	0	0
5MI	10/20/98	877	0	0	0	0	0	0	0	0	76.40	0	1.48	0	0	7.30	0	0	0	14.82	0	0
5ML	10/20/98	1078	0	0	0	0	0	0	0	0	71.43	0	2.60	0	0	12.06	0	0	0	13.91	0	0
6GL	10/20/98	4	0	0	0	0	0	0	0	0	50.00	0	50.00	0	0	0	0	0	0	0	0	0
6MI	10/20/98	5	0	0	0	0	0	0	0	0	100.00	0	0	0	0	0	0	0	0	0	0	0
7GL	10/15/98	601	0	0	0	0	0	0	0	0	66.56	0	2.33	0	0	16.64	0	0	0	14.48	0	0
7ML	10/15/98	1356	0	0	0	0	0	0.15	0	0.29	70.06	0	3.69	0	0	11.80	0	0	0	14.01	0	0
8GL	10/14/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8GU	10/14/98	200	0	0	0	0	0	0	0	1.50	46.00	0	8.00	0	0	16.50	0	0	0	28.00	0	0
8ML	10/14/98	26	0	0	0	0	0	0	0	0	42.31	0	3.85	0	0	23.08	0	0	0	30.77	0	0
9GL	10/15/98	88	0	0	0	0	0	0	0	4.55	30.68	0	6.82	0	0	23.86	0	1.14	0	32.95	0	0
10GL	10/20/98	28	0	0	0	0	0	0	0	0	28.57	0	10.71	0	0	28.57	0	0	0	32.14	0	0
11GL	10/20/98	477	0	0	0	0	0	0	0	0	64.99	0	6.08	0	0	13.84	0	0	0	15.09	0	0
11MI	10/20/98	136	0	0	0	0	0	0	0	0	73.53	0	2.21	0	0	11.76	0	0	0	12.50	0	0
12MI	10/14/98	213	0	0	0	0	0	0	0	0	75.12	0	2.35	0	0	10.80	0	0	0	11.74	0	0
12ML	10/15/98	35	0	0	0	0	0	0	0	0	65.71	0	0	0	0	11.43	0	0	0	22.86	0	0
13ML	11/3/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14MI	11/3/98	9	0	0	0	0	0	0	0	0	66.67	0	0	0	0	0	0	0	0	33.33	0	0
15GL	10/29/98	37	0	0	0	0	0	0	0	0	67.57	0	0	0	0	18.92	0	0	0	13.51	0	0
15ML	10/29/98	12	0	0	0	0	0	0	0	0	66.67	0	0	0	0	16.67	0	0	0	16.67	0	0
16GL	11/3/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16ML	11/3/98	188	0	0	0	0	0	0	0	0	51.60	0	4.26	0	0	13.30	0	0	0	30.85	0	0
17GL	11/6/98	8601	0	0	0	0	0	0.08	0	0.14	83.71	0	2.09	0	0	7.67	0	0	0	6.28	0	0
17ML	11/6/98	242	0	0	0	0	0	0	0	0	74.38	0	2.07	0	0	8.26	0	0	0.02	15.29	0	0
18GL	10/30/98	769	0	0	0	0	0	0	0	0	83.22	0	2.47	0	0	14.30	0	0	0	0	0	0
18ML	10/30/98	683	0	0	0	0	0	0	0	0	60.03	0	4.54	0	0	13.47	0	0	0	21.96	0	0
19GU	10/19/98	11	0	0	0	0	0	0	0	0	36.36	0	0	0	0	36.36	0	0	0	27.27	0	0
19MI	10/19/98	932	0	0	0	0	0	0	0	0	70.82	0	2.79	0	0	10.30	0	0	0	16.09	0	0
21GU	10/26/98	5	0	0	0	0	0	0	0	0	40.00	0	20.00	0	0	0	0	0	0	40.00	0	0
22GL	10/30/98	9	0	0	0	0	0	0	0	0	33.33	0	0	0	0	0	0	0	0	66.67	0	0
22ML	10/30/98	736	0	0	0	0	0	0	0	0	42.12	0	5.84	0	0	8.56	0	0	0	43.48	0	0
23GL	10/19/98	24	0	0	0	0	0	0	0	0	0	0	0	0	0	25.00	0	0	0	75.00	0	0
23MI	10/19/98	272	0	0	0	0	0	0	0	0	69.85	0	3.68	0	0	12.13	0	0	0	14.34	0	0
24GL	10/19/98	167	0	0	0	0	0	0	0	0	71.86	0	2.40	0	0	8.38	0	0	0	17.37	0	0
24MI	10/19/98	386	0	0	0	0	0	0	0	0	72.54	0	2.59	0	0	8.81	0	0	0	16.06	0	0
25GL	10/14/98	15	0	0	0	0	0	0	0	0	40.00	0	0	0	0	20.00	0	0	0	40.00	0	0
25MI	10/14/98	2050	0	0	0	0	0	0.10	0	0.29	78.05	0	2.54	0	0	11.71	0	0	0	7.32	0	0
26GL	10/14/98	49	0	0	0	0	0	0	0	2.04	51.02	0	4.08	0	0	12.24	0	0	0	30.61	0	0
26MI	10/14/98	90	0	0	0	0	0	0	0	0	70.00	0	0	0	0	12.22	0	0	0	17.78	0	0
27GL	10/14/98	36	0	0	0	0	0	0	0	0	52.78	0	0	0	0	13.89	0	0	0	33.33	0	0
27MI	10/14/98	27	0	0	0	0	0	0	0	0	55.56	0	0	0	0	14.81	0	0	0	29.63	0	0
28GL	10/14/98	2881	0.03	0	0	0	0	0.10	0	0.35	90.25	0	4.17	0	0	3.47	0	0	0	1.63	0	0
28MI	10/14/98	721	0	0	0	0	0	0	0	0.28	81.83	0	1.94	0	0	9.43	0	0	0	6.52	0	0

TABLE 5-1
THE PERCENTAGE OF EACH COMPOUND DETECTED AS COMPARED TO TOTAL VOLATILE ORGANIC COMPOUNDS
Former Unisys Facility

			Percentage of the Total Volatile Organic Compounds Detected																			
SITE	DATE	Total VOCs (ug/L)	Benzene	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chloroform	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1-Dichloro ethene	1,2-Dichloro ethene (total)	Ethyl benzene	Freon 113	Methylene chloride	Styrene	Tetrachloro ethene	Toluene	1,1,1-Tri chloroethane	1,1,2-Tri chloroethane	Trichloro ethene	Vinyl Chorde	Xylene (total)
29GL	10/19/98	1870	0	0	0	0	0	0.11	0	0.16	85.56	0	1.71	0	0	4.76	0	0	0	5.95	0.75	0
29MI	10/19/98	1258	0	0	0	0	0	0	0	0.16	67.57	0	2.86	0	0	15.10	0	0	0	14.31	0	0
30GL	11/7/98	5	0	0	0	0	0	0	0	0	0	0	0	0	0	60.00	0	0	0	40.00	0	0
30MI	11/7/98	13	0	0	0	0	0	0	0	30.77	23.08	0	0	0	0	7.69	0	0	0	38.46	0	0
30ML	11/7/98	3	0	0	0	0	0	0	0	0	100.00	0	0	0	0	0	0	0	0	0	0	0
31GL	11/4/98	3	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
31MI	11/4/98	2	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
31ML	11/4/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32GL	11/2/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32MI	11/2/98	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32ML	11/6/98	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00	0	0
33GL	11/20/98	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33MI	11/12/98	13	0	0	0	0	0	0	0	0	100.00	0	0	0	0	0	0	0	0	0	0	0
33ML	11/12/98	12	0	0	0	0	0	0	0	0	38.46	0	0	0	0	15.38	0	0	0	46.15	0	0
35GL	11/5/98	2828	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00	0	0
36GL	11/16/98	13	0	0	0	0	0	0	0	0.18	95.47	0	1.70	0	0	0.92	0	0	0	0.99	0.74	0
BAKER	11/20/98	8	0	0	0	0	0	0	0	0	69.23	0	0	0	0	15.38	0	0	0	15.38	0	0
RW2	10/21/98	63	0	0	0	0	0	0	0	0	87.50	0	0	12.5	0	0	0	0	0	0	0	0
1GL	6/1/99	220	0	0	0	0	0	0	0	0	66.67	0	0	0	0	23.81	0	0	0	3.17	0	6.35
1GU	6/1/99	6.8	0	0	0	0	0.14	0.23	0	0.59	77.38	0.46	2.28	0	0.14	5.92	0	0.23	0	10.92	1.37	0.36
1MI	6/1/99	935	0	0	0	0	0	0	0	0	29.41	0	0	0	0	11.76	0	0	0	58.82	0	0
1MI/L	6/9/99	763	0	0	0	0	0.11	0	0	0	71.66	0	2.57	0	0	10.70	0	0	0	14.97	0	0
1ML	6/15/99	109	0	0	0	0	0.27	0	0	0	76.09	0	1.09	0	0	3.53	0	0	0	19.02	0	0
2GL	6/3/99	62	0	0	0	0	0	0	0	0.37	77.70	0	1.83	0	0	3.66	0	0	0	16.45	0	0
2MI	6/7/99	411	0	0	0	0	0	0	0	0	79.03	0	0	0	0	9.68	0	0	0	11.29	0	0
2ML	6/16/99	1.4	0	0	0	0	0.15	0	0	0	77.93	0	0	0	0	9.25	0	0	0	12.66	0	0
2MU	6/7/99	128	0	0	0	0	0	0	0	0	71.43	0	0	0	0	0	0	0	0	28.57	0	0
3GL	6/4/99	439	0	0	0	0	0.16	0	0	0	78.00	0	0	0	0	10.14	0	0	0	11.70	0	0
3ML	6/10/99	79.6	0	0	0	0	0.14	0.14	0.11	0	79.78	0	0	0	0	8.66	0	0	0	11.17	0	0
4GL	6/4/99	369	0	0	0	0	0.75	0	0	0	59.05	0	1.26	0	0	5.03	0	0	0	33.92	0	0
4MI	6/9/99	187	0	0	0	0	0.16	0.16	0	0.22	73.17	0	0	0	0	12.20	0	0	0	14.09	0	0
5GL	6/2/99	5	0	0	0	0	0	0	0	0	80.21	0	1.60	0	0	8.56	0	0	0	9.63	0	0
5GU	6/2/99	9	0	0	0	0	0	0	0	0	60.00	0	0	0	0	20.00	0	0	0	20.00	0	0
5MI	6/2/99	910	0	0	0	0	0	0	0	0	55.56	0	0	0	0	22.22	0	0	0	22.22	0	0
5ML	6/18/99	531	0	0	0	0	0.11	0	0	0	72.53	0	2.42	0	0	9.56	0	0	0	15.38	0	0
6GL*	6/4/99	0.4	0	0	0	0	0.19	0	0.19	0.19	79.10	0	1.51	0	0	3.58	0	0	0	15.25	0	0
6MI	6/16/99	1.9	0	0	0	0	0	0	0	0	100.00	0	0	0	0	0	0	0	0	0	0	0
7GL	6/3/99	376	0.16	0	0	0	0	0	0	0	52.63	0	0	0	0	0	47.37	0	0	0	0	0
7ML	6/11/99	801	0	0	0	0	0	0	0	0.21	74.47	0	1.60	0	0	9.57	0.16	0	0	13.83	0	0
8GL	5/27/99	114.6	0.26	0	0	0	0.12	0	0	0.12	82.40	0	2.00	0	0	4.37	0.12	0	0	10.86	0	0
8GU	5/27/99	2.5	0	0	0	0	0.26	0.61	0	1.75	47.12	0	6.98	0	0	14.83	0.26	0	0	27.92	0	0
8ML	6/10/99	3.4	0	0	0	0	0	0	0	0	0	0	28.00	0	0	20.00	0	0	0	40.00	0	12.00
9GL	6/3/99	20	0	0	0	0	0	0	0	0	58.82	0	0	0	0	11.76	0	0	0	29.41	0	0
10GL	6/2/99	12	0	0	0	0	0	0	0	5.00	40.00	0	0	0	0	20.00	0	0	0	35.00	0	0
11GL	6/2/99	492	0	0	0	0	0	0	0	4.17	33.33	0	0	0	0	25.00	4.17	0	0	33.33	0	0
11MI	6/2/99	38	0	0	0	0	0	0	0	0	71.14	0	5.28	0	0	10.16	0	0	0	13.41	0	0
12MI	6/3/99	16	0	0	0	0	0	0	0	0	81.58	0	0	0	0	7.89	0	0	0	10.53	0	0
12ML	6/17/99	11	0	0	0	0	0	0	0	0	68.75	0	0	0	0	12.50	0	0	0	18.75	0	0
13ML	6/3/99	0.6	0	0	100.00	0	0	0	0	0	72.73	0	0	0	0	0	0	0	0	27.27	0	0
14MI	6/17/99	2.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15GL	6/4/99	120	0	0	0	0	0	0	0	0	10.71	0	0	0	0	0	0	17.86	0	71.43	0	0
15ML	6/11/99	4	0	0	0	0	0	0	0	0	81.67	0	2.50	0	0	7.50	0	0	0	8.33	0	0
16GL	6/8/99	0.8	0	0	0	0	0	0	0	0	75	0	0	0	0	25.00	0	0	0	0	0	0
16ML	6/17/99	138	0	0	0	0	0.72	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
17GLMP	6/23/99	6260	0	0	0	0	0	0	0	0	58.70	0	0	0	0	7.97	0	0	0	32.61	0	0
17ML	7/1/99	229	0	0.87	0	0	0.22	0.13	0.17	0.17	89.46	0	0	0.32	0	5.27	0	0	0	4.95	0	0
18GL	6/8/99	467	0	0	0	0	0.17	0.15	0	0.13	74.37	0	2.19	0	0	4.37	0.87	0	0	16.62	0	0
											72.79	0	1.07	0.43	0	10.49	0	0	0	14.77	0	0

TABLE 5-1
THE PERCENTAGE OF EACH COMPOUND DETECTED AS COMPARED TO TOTAL VOLATILE ORGANIC COMPOUNDS
Former Unisys Facility

			Percentage of the Total Volatile Organic Compounds Detected																			
SITE	DATE	Total VOCs (ug/L)	Benzene	2-Butanone	Carbon disulfide	Carbon tetrachloride	Chloroform	1,1-Dichloro ethane	1,2-Dichloro ethane	1,1-Dichloro ethene	1,2-Dichloro ethene (total)	Ethyl benzene	Freon 113	Methylene chloride	Styrene	Tetrachloro ethene	Toluene	1,1,1-Tri chloroethane	1,1,2-Tri chloroethane	Trichloro ethene	Vinyl Chonde	Xylene (total)
18ML	6/10/99	863	0	0	0	0	0	0	0	0	84.59	0	1.04	0	0	2.78	0	0	0	11.59	0	0
19GU	6/7/99	5	0	0	0	0	0	0	0	0	40.00	0	0	0	0	40.00	0	0	0	20.00	0	0
19MI	6/8/99	607	0	0	0	0	0.16	0	0	0	77.43	0	0.82	0	0	7.25	0	0	0	14.33	0	0
21GU	6/7/99	1.7	0	0	0	0	0	0	0	0	41.18	0	0	0	0	0	11.76	0	0	47.06	0	0
22GL	6/1/99	12.7	0	0	0	0	0	0	0	0	39.37	0	0	0	0	5.51	0	0	0	55.12	0	0
22ML	7/1/99	277	0	0	0	0	0.29	0.14	0.18	0.33	50.61	0	3.62	0	0	4.34	0.72	0	0	39.77	0	0
23GL	6/8/99	89	0	0	0	0	0	0	0	0	68.54	0	1.12	0	0	6.74	0	0	0	23.60	0	0
23MI	6/14/99	1032	0	0	0	0	0	0	0	0	75.58	0	2.13	0	0	10.66	0	0	0	11.63	0	0
24GL	6/7/99	97.4	0	0	0.31	0	0.10	0	0	0	57.49	0	6.16	0	0	10.27	0	0	0	25.67	0	0
24MI	6/15/99	832	0	0	0	0	0	0	0	0.24	74.52	0	2.64	0	0	9.38	0	0	0	13.22	0	0
25GL	6/3/99	29.6	0	0	0	0	0	0	0	6.76	33.78	0	0	0	0	27.03	0	2.03	0	30.41	0	0
25MI	6/15/99	5133	0	0	0	0	0	0	0	0.29	85.72	0	2.34	0	0	7.01	0.16	0	0	4.48	0	0
26GL	6/3/99	70.4	0	0	0	0	0	0.71	0	2.84	49.72	0	0	0	0	17.05	0.71	0.57	0	28.41	0	0
26MI	6/10/99	425	0	0	0	0	0	0.16	0	0.24	84.77	0	0.94	0	0	7.77	0	0	0	6.12	0	0
27GL	6/4/99	74.1	0	0	0	0	0.27	0.67	0	2.70	47.23	0	5.40	0	0	16.19	0.54	0	0	26.99	0	0
27MI	6/14/99	75.5	0	0	0	0	0	0.73	0	3.97	45.00	0	5.29	0	0	18.53	0	0	0	26.48	0	0
28GL*	6/10/99	6030	0	0	0	0	0.33	0	0	0	92.87	0	0	0	0	1.82	0	0	0	1.66	3.32	0
28MI	6/14/99	744	0.27	0	0	0	0.12	0	0	0.40	79.31	0	1.75	0	0	7.93	0.27	0	0	9.95	0	0
29GL	6/8/99	2970	0	0	0	0	0	0	0	0	80.81	0	0.84	0.51	0	8.75	0	0	0	9.09	0	0
29MI	6/15/99	846	0	0	0	0	0.11	0	0	0	75.66	0	2.96	0	0	9.58	0	0	0	11.70	0	0
30GL	6/1/99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30MI	6/1/99	9.1	0	21.98	0	0	0	5.49	0	21.98	0	0	6.59	0	0	0	0	21.98	0	21.98	0	0
30ML	7/2/99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31GL	5/28/99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31MI	5/28/99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31ML	6/15/99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32GL	5/28/99	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100.00	0	0	0	0	0
32MI	6/16/99	8.4	0	0	0	0	0	0	0	0	23.81	0	0	0	0	4.76	0	0	0	71.43	0	0
32ML	6/17/99	95.8	0	0	0	0	0.84	0	0	0	57.41	0	0	0	0	6.26	0	0	0	35.49	0	0
33GL	6/23/99	7.6	0	0	0	0	0	0	0	0	85.71	0	0	0	0	0	14.29	0	0	0	0	0
33MI	6/22/99	11.1	0	0	0	2.70	2.70	0	0	0	1.80	0	0	0	0	2.70	0	0	0	90.09	0	0
33ML	6/22/99	22.8	0	0	0	1.75	1.75	0	0	0	8.77	0	4.39	0	0	4.39	0	0	0	78.95	0	0
35GL	6/16/99	6274	0	0	0	0	0	0	0	0	95.63	0	0.89	0	0	0.59	0	0	0	0.49	2.39	0
36GL	6/9/99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37MU	9/9/99	450	0	0	0	0	0	0	0	0	71.66	0	2.09	0	0	8.60	0	0	0	17.65	0	0
37MI	9/9/99	850	0	0	0	0	0	0	0	0	72.94	0	2.47	0	0	6.94	0	0	0	17.65	0	0
37ML	9/9/99	239	0	0	0	0	0.42	0	0.42	0	62.76	0	3.35	0	0	5.44	0	0	0	27.62	0	0
38MU	9/10/99	21	0	0	0	0	0	0	0	0	66.67	0	0	0	0	4.76	0	0	0	28.57	0	0
38MI	9/10/99	540	0	0	0	0	0	0	0	0	61.11	0	3.89	0	0	7.22	0	0	0	27.78	0	0
38ML	9/10/99	174.9	0	0	0	0	0.51	0	0	0	57.18	0	4.00	0	0	7.43	0	0	0	30.87	0	0
EW1	7/8/99	880.7	0	0	0	0	0.08	0	0	0	77.21	0	2.73	0	0	11.13	0	0	0	8.86	0	0
RW1	7/2/99	233.6	0	0	0	0	0	0.13	0	0.21	85.62	0	0	0	0	5.99	0	0	0	3.90	4.15	0
RW2	7/7/99	18.4	0	0	0	0	0	0	0	0	76.09	0	2.17	0	0	10.87	0	0	0	10.87	0	0
N2576	7/8/99	75	0	0	0	0	0	0	0	0	72.00	0	0	0	0	13.33	0	0	0	14.67	0	0
N2576	8/10/99	184	0	0	0	0	0.22	0	0	0.33	70.65	0	0	0	0	12.50	0	0	0	16.30	0	0
Maximum Percent:			0.27	21.98	100	2.70	2.70	5.49	0.42	30.77	100	0.46	50.00	100	0.14	100	100	21.98	0.02	100	4.15	12.00
Minimum Percent:			0.03	0.00	0.31	1.75	0.00	0.08	0.11	0.12	1.80	0.46	0.82	0.32	0.14	0.59	0.12	0.23	0.02	0.49	0.00	0.36
Average Percent:			0.18	7.62	50.15	2.23	0.39	0.57	0.22	2.59	65.30	0.46	4.48	22.75	0.14	13.73	12.96	7.30	0.02	24.29	1.82	6.24
Frequency of Detection			4/160	2/160	2/160	2/160	29/160	18/160	5/160	37/160	136/160	1/160	81/160	5/160	1/160	125/160	14/160	6/160	1/160	132/160	6/160	3/160
Detection Percent			2.50	1.25	1.25	1.25	18.13	11.25	3.13	23.13	85.00	0.63	50.63	3.13	0.63	78.13	8.75	3.75	0.63	82.50	3.75	1.88

Notes:
ug/L Micrograms per liter
VOCs Volatile Organic Compounds
Duplicate analyses averaged prior to calculating summary statistics.

TABLE 5-2

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (FUTURE TAP WATER)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap Water

Well Location	Modeled Future 30 Year Mean TVOC Concentration	Units	Public Water Supply Yes / No	Summary EPC Values	High End		Central Tendency	
					Medium TVOC EPC Value (mg/L)	Medium TVOC EPC Statistic	Medium TVOC EPC Value (mg/L)	Medium TVOC EPC Statistic
N3905	0.0271	mg/L	Yes					
N4243	0.1292	mg/L	Yes					
N5099	0.0215	mg/L	Yes					
N5710	0.1259	mg/L	Yes					
				Noncancer	0.13	Max	0.076	30 Year Mean
				Cancer	2.8E-04	0.22% of Max	1.7E-04	0.22% of Mean

Notes:

Only wells from most impacted water district (Manhassett-Lakeville) included

Statistics: Max = Maximum modeled value; Mean = modeled 30 year mean concentration

EPCs for cancer risks assumed to be 0.22% of TVOC concentrations because 0.22% of TVOCs are comprised of carcinogenic chemicals

TABLE 5-3

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (FUTURE SPRAY IRRIGATION WELL)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Spray Irrigation Well

Well Location	Modeled Future TVOC Concentration	Units	Public Water Supply Yes / No		Summary EPC Values	High End		Central Tendency	
						Medium TVOC EPC Value (mg/L)	Medium TVOC EPC Statistic	Medium TVOC EPC Value (mg/L)	Medium TVOC EPC Statistic
N2576	0.0284	mg/L	No		Noncancer	0.048	95% UCL	0.028	30 year Mean
					Cancer	1.0E-04	0.22% of 95% UC	6.2E-05	0.22% of Mean

Notes:

Only the most impacted irrigation well evaluated

Statistics: 95% UCL = 95% upper confidence limit of modeled 30 year mean concentration; Mean = modeled 30 year mean concentration

EPCs for cancer risks assumed to be 0.22% of TVOC concentrations because 0.22% of TVOCs are comprised of carcinogenic chemicals

TABLE 5-4

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (FUTURE SHOWER AIR)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Air
Exposure Medium: Air
Exposure Point: Shower

	Modeled Future TVOC Concentration in Tap Water (mg/L)	Volitilization Factor (VF) (L/m^3)	Estimated Future TVOC Concentration in Air at Showerhead (mg/m^3)
High End Exposure			
Noncancer	0.13	0.5	0.065
Cancer	2.8E-04	0.5	1.4E-04
Central Tendency			
Noncancer	0.076	0.5	0.038
Cancer	1.7E-04	0.5	8.4E-05

Notes:

Modeled future TVOC concentration in tap water derived from Table 5-2

Volatilization factor derived from USEPA, 1991

Estimated TVOC = Modeled TVOC x VF

TABLE 5-5

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (PAST AND CURRENT SPRAY IRRIGATION WELL)

Former Unisys Facility

Scenario Timeframe: Past and Current
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Spray Irrigation Well

COPC	High End EPC[1] (mg/L)	Central Tendency EPC[2] (mg/L)
Chloroform	0.0004	0.0004
1,1-Dichloroethene	0.0006	0.0006
1,2-Dichloroethene	0.130	0.092
Tetrachloroethene	0.023	0.017
Trichloroethene	0.030	0.021
TVOC - Noncancer	0.184	0.131
TVOC - Cancer	0.0010	0.0010

Notes:

COPC = Chemical of Potential Concern

(1) High End Exposure EPC is maximum measured concentration

(2) Central Tendency EPC is mean measured concentration

(3) Carcinogenic chemicals include chloroform and 1,1-dichloroethene

TABLE 5-6

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (PAST, CURRENT AND FUTURE SOIL)

Former Unisys Facility

Scenario Timeframe: Past, Current, Future

Medium: Soil

Exposure Medium: Soil

Exposure Point: Garden and Near Irrigation Points[1]

Timeframe	TVOC Concentration in Water	Units	Estimated TVOC Concentration in Soil[2]	Units		Summary EPC Values	High End		Central Tendency	
							Medium TVOC EPC Value (mg/kg)	Medium TVOC EPC Statistic	Medium TVOC EPC Value (mg/kg)	Medium TVOC EPC Statistic
Past and Current[3]	0.131	mg/L	0.232	mg/kg		Noncancer	0.326	maximum measured	0.232	mean measured
						Cancer[5]	7.2E-04	0.22% of maximum measured	5.1E-04	0.22% of mean measured
Future[4]	0.0284	mg/L	0.0503	mg/kg		Noncancer	0.084	95% UCL on modeled data	0.050	30 year modeled mean
						Cancer[5]	1.9E-04	0.22% of 95% UCL on modeled data	1.1E-04	0.22% of modeled mean

Notes:

(1) Only the most impacted irrigation well (N2576) evaluated

(2) Cs = Cw x Kd

where:

Kd = Koc x foc

Cs = concentration in soil (mg/kg)

Cw = concentration in water (mg/L)

Kd = soil-water partitioning coefficient

Koc = organic carbon partitioning coefficient (58.88; RAIS, 2000)

foc = fraction organic carbon (0.03; H2M, 1996)

(3) Based on groundwater monitoring results

(4) Based on groundwater fate and transport modeling

(5) EPCs for cancer risks assumed to be 0.22% of TVOC concentrations because 0.22% of TVOCs are comprised of carcinogenic chemicals

TABLE 5-7

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY (PAST VEGETABLES)

Former Unisys Facility

Scenario Timeframe: Past
Medium: Soil
Exposure Medium: Soil
Exposure Point: Vegetables

Chemical	High End Exposure Soil EPC Cs (mg/kg)	Central Tendency Exposure Soil EPC Cs (mg/kg)	Plant-Soil Bioconcentration Factor Br (unitless)	Root Concentration Factor RCF (unitless)	Correction Factor for Below-Ground Produce[a] VG (unitless)	Soil-Water Partition Coefficient Kd (L/kg)	High End Exposure Above Ground Vegetable Concentration Cav (mg/kg)	High End Exposure Below Ground Vegetable Concentration Cbv (mg/kg)	Central Tendency Above Ground Vegetable Concentration Cav (mg/kg)	Central Tendency Below Ground Vegetable Concentration Cbv (mg/kg)	Total High End Exposure Vegetable Concentration Cv (mg/kg)	Total Central Tendency Vegetable Concentration Cv (mg/kg)
TVOC - Noncancer	0.326	0.232	0.32	9.5	1.0	1.77	0.11	1.76	0.08	1.25	1.86	1.32
TVOC - Cancer	7.16E-04	5.10E-04	0.32	9.5	1.0	1.77	2.32E-04	3.86E-03	1.65E-04	2.75E-03	4.1E-03	2.9E-03

Notes:

a. VG = 0.01 for chemicals with a log Kow greater than four; VG = 1.0 for chemicals with a log Kow less than four

Cav = Cs x Br

Cbv = Cs x RCF x VG/(Kd x 1 kg/L)

Cv = Cav + Cbv

TABLE 5-8

VALUES USED FOR DOSE CALCULATIONS (RESIDENT-CHILD)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater and Air
Exposure Point: Tap Water
Receptor Population: Resident
Receptor Age: Child (1-8 years old)

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-2	chemical-specific	Table 5-2	Dose (mg/kg-day) =
	IR	Ingestion Rate	L/day	1.29	USEPA, 1997a	0.74	USEPA, 1997a	Cw x IR x Ao x EF x ED x 1/BW x 1/AT
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	
	EF	Exposure Frequency	days/year	350	USEPA, 1997a	350	USEPA, 1997a	
	ED	Exposure Duration	years	7	USEPA, 1997a	7	USEPA, 1997a	
	BW	Body Weight	kg	18	USEPA, 1997a	18	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (2)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	2555	USEPA, 1997a	2555	USEPA, 1997a	
Dermal	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-2	chemical-specific	Table 5-2	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	8556	USEPA, 1997a	7555	USEPA, 1997a	Cw x SA x PC x EF x ED x ET x CF x
	PC	Dermal Permeability Constant (1)	cm/hr	1.60E-02	USEPA, 1992c	1.60E-02	USEPA, 1992c	1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	USEPA, 1997a	350	USEPA, 1997a	
	ED	Exposure Duration	years	7	USEPA, 1997a	7	USEPA, 1997a	
	ET	Exposure Time	hrs/day	0.5	USEPA, 1997a	0.21	USEPA, 1997a	
	CF	Conversion Factor	L/cm^3	0.001	N/A	0.001	N/A	
	BW	Body Weight	kg	18	USEPA, 1997a	18	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (2)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	2555	USEPA, 1997a	2555	USEPA, 1997a	
Inhalation	Ca	Concentration in Air	mg/m^3	chemical-specific	Table 5-4	chemical-specific	Table 5-4	Dose (mg/m^3) =
	ET	Exposure Time	hrs/day	0.5	USEPA, 1997a	0.25	USEPA, 1997a	Ca x ET x EF x ED x CF x 1/AT
	EF	Exposure Frequency	days/year	350	USEPA, 1997a	350	USEPA, 1997a	
	ED	Exposure Duration	years	7	USEPA, 1997a	7	USEPA, 1997a	
	CF	Conversion Factor	day/hr	0.042	N/A	0.042	N/A	
	ATc	Averaging Time (Cancer)(2)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	2555	USEPA, 1997a	2555	USEPA, 1997a	

Notes:

(1) PC for 1,1-Dichloroethene was used as a surrogate for TVOC, consistent with the toxicity value used in the risk calculation.

(2) Parameters related to cancer risks are not relevant for the child scenario, because only subchronic noncancer hazards were evaluated.

N/A: Not applicable

TABLE 5-9

VALUES USED FOR DAILY DOSE CALCULATIONS (RESIDENT-ADULT)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater and Air
Exposure Point: Tap Water
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-2	chemical-specific	Table 5-2	Dose (mg/kg-day) =
	IR	Ingestion Rate	L/day	2.35	USEPA, 1997a	1.41	USEPA, 1997a	Cw x IR x Ao x EF x ED x 1/BW x 1/AT
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	
	EF	Exposure Frequency	days/year	350	USEPA, 1997a	350	USEPA, 1997a	
	ED	Exposure Duration	years	30	USEPA, 1997a	9	USEPA, 1997a	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	10950	USEPA, 1997a	3285	USEPA, 1997a	
Dermal	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-2	chemical-specific	Table 5-2	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	20900	USEPA, 1997a	18150	USEPA, 1997a	Cw x SA x PC x EF x ED x ET x CF x
	PC	Dermal Permeability Constant (1)	cm/hr	1.60E-02	USEPA, 1992c	1.60E-02	USEPA, 1992c	1/BW x 1/AT
	EF	Exposure Frequency	days/year	350	USEPA, 1997a	350	USEPA, 1997a	
	ED	Exposure Duration	years	30	USEPA, 1997a	9	USEPA, 1997a	
	ET	Exposure Time	hrs/day	0.5	USEPA, 1997a	0.25	USEPA, 1997a	
	CF	Conversion Factor	L/cm^3	0.001	N/A	0.001	N/A	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	10950	USEPA, 1997a	3285	USEPA, 1997a	
Inhalation	Ca	Concentration in Air	mg/m^3	chemical-specific	Table 5-4	chemical-specific	Table 5-4	Dose (mg/m^3) =
	ET	Exposure Time	hrs/day	0.5	USEPA, 1997a	0.25	USEPA, 1997a	Ca x ET x EF x ED x CF x 1/AT
	EF	Exposure Frequency	days/year	350	USEPA, 1997a	350	USEPA, 1997a	
	ED	Exposure Duration	years	30	USEPA, 1997a	9	USEPA, 1997a	
	CF	Conversion Factor	day/hr	0.042	N/A	0.042	N/A	
	ATc	Averaging Time (Cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	10950	USEPA, 1997a	3285	USEPA, 1997a	

Notes:

(1) PC for 1,1-Dichloroethene was used as a surrogate for TVOC, consistent with the toxicity value used in the risk calculation.

N/A: Not applicable

TABLE 5-10

VALUES USED FOR DOSE CALCULATIONS (NORTH SHORE TOWERS RESIDENT-CHILD GROUNDWATER)

Former Unisys Facility

Scenario Timeframe: Past
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Child (1-8 years old)

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-5	chemical-specific	Table 5-5	Dose (mg/kg-day) =
	IR	Ingestion Rate	L/day	0.43	USEPA, 1997a	0.201	USEPA, 1997a	Cw x IR x Ao x EF x ED x 1/BW x 1/AT
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See note (3)	1.4	See note (3)	
	BW	Body Weight	kg	18	USEPA, 1997a	18	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (2)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	
Dermal	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-5	chemical-specific	Table 5-5	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	3881	USEPA, 1997a	1919	USEPA, 1997a	Cw x SA x PC x EF x ED x ET x CF x
	PC	Dermal Permeability Constant (1)	cm/hr	1.60E-02	USEPA, 1992c	1.60E-02	USEPA, 1992c	1/BW x 1/AT
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See note (3)	1.4	See note (3)	
	ET	Exposure Time	hrs/day	2	assumption	1	assumption	
	CF	Conversion Factor	L/cm^3	0.001	N/A	0.001	N/A	
	BW	Body Weight	kg	18	USEPA, 1997a	18	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (2)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	

Notes:

(1) PC for 1,1-Dichloroethene was used as a surrogate for TVOC, consistent with the toxicity value used in the risk calculation

(2) Parameters related to cancer risks are not relevant for the child scenario, because only subchronic noncancer hazards were evaluated

(3) Duration of time that gardens were supplied with water from well N2576

N/A: not applicable

TABLE 5-11

VALUES USED FOR DOSE CALCULATIONS (NORTH SHORE TOWERS RESIDENT-CHILD SOIL AND VEGETABLES)

Former Unisys Facility

Scenario Timeframe: Past
Medium: Soil
Exposure Medium: Soil and Vegetables
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Child (1-8 years old)

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	IR	Ingestion Rate	mg/day	50	USEPA, 1997a	50	USEPA, 1997a	Cs x IR x Ao x EF x ED x CF x FI
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See Note (2)	1.4	See Note (2)	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	FI	Fraction Ingested from Source	unitless	1.0	assumption	0.5	assumption	
	BW	Body Weight	kg	18	USEPA, 1997a	18	USEPA, 1997a	
	ATc	Averaging Time (Cancer)(1)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	
Dermal	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	3881	USEPA, 1997a	1919	USEPA, 1997a	Cs x SA x AF x EF x ED x ABS x CF x
	AF	Adherence Factor	mg/cm^2-day	0.1	USEPA, 1999	0.1	USEPA, 1999	1/BW x 1/AT
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See Note (2)	1.4	See Note (2)	
	ABS	Absorption Factor	unitless	0.0005	USEPA, 1995c	0.0005	USEPA, 1995c	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	BW	Body Weight	kg	18	USEPA, 1997a	18	USEPA, 1997a	
	ATc	Averaging Time (Cancer)(1)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	
Ingestion of Vegetables	Cv	Concentration in Vegetables	mg/kg	chemical-specific	Table 5-7	chemical-specific	Table 5-7	Dose (mg/kg-day) =
	IR	Ingestion Rate	g/kg-day	6.03	USEPA, 1997a	0.747	USEPA, 1997a	Cv x IR x FI x EF x ED x CF x 1/AT
	FI	Fraction Ingested from Source	unitless	1.0	assumption	1.0	assumption	
	EF	Exposure Frequency	days/year	365	USEPA, 1997a	365	USEPA, 1997a	
	ED	Exposure Duration	years	1.4	See Note (2)	1.4	See Note (2)	
	CF	Conversion Factor	kg/g	1.00E-03	N/A	1.00E-03	N/A	
	ATc	Averaging Time (Cancer)(1)	days	N/A	N/A	N/A	N/A	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	

Notes:

(1) Parameters related to cancer risks are not relevant for the child scenario, because only subchronic noncancer hazards were evaluated

(2) Duration of time that gardens were supplied with water from well N2576

N/A: not applicable

TABLE 5-12

VALUES USED FOR DOSE CALCULATIONS (NORTH SHORE TOWERS RESIDENT-ADULT GROUNDWATER)

Former Unisys Facility

Scenario Timeframe: Past
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-5	chemical-specific	Table 5-5	Dose (mg/kg-day) =
	IR	Ingestion Rate	L/day	0.49	USEPA, 1997a	0.201	USEPA, 1997a	Cw x IR x Ao x EF x ED x 1/BW x 1/AT
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See Note (3)	1.4	See Note (3)	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (2)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	
Dermal	Cw	Concentration in Water	mg/L	chemical-specific	Table 5-5	chemical-specific	Table 5-5	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	5276	USEPA, 1997a	3271	USEPA, 1997a	Cw x SA x PC x EF x ED x ET x CF x
	PC	Dermal Permeability Constant (1)	cm/hr	1.60E-02	USEPA, 1992c	1.60E-02	USEPA, 1992c	1/BW x 1/AT
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See Note (3)	1.4	See Note (3)	
	ET	Exposure Time	hrs/day	2	assumption	1	assumption	
	CF	Conversion Factor	L/cm^3	0.001	N/A	0.001	N/A	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (2)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	

Notes:

(1) PC for 1,1-Dichloroethene was used as a surrogate for TVOC, consistent with the toxicity value used in the risk calculation

(2) Parameters related to cancer risks are not relevant for the child scenario, because only subchronic noncancer hazards were evaluated

(3) Duration of time that gardens were supplied with water from well N2576

N/A: not applicable

TABLE 5-13

VALUES USED FOR DOSE CALCULATIONS (NORTH SHORE TOWERS RESIDENT-ADULT SOIL)

Former Unisys Facility

Scenario Timeframe: Past
Medium: Soil
Exposure Medium: Soil and Vegetables
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	IR	Ingestion Rate	mg/day	50	USEPA, 1997a	50	USEPA, 1997a	Cs x IR x Ao x EF x ED x CF x FI
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See Note (2)	1.4	See Note (2)	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	FI	Fraction Ingested from Source	unitless	1.0	assumption	0.5	assumption	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (1)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	
Dermal	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	5276	USEPA, 1997a	3271	USEPA, 1997a	Cs x SA x AF x EF x ED x ABS x CF x
	AF	Adherence Factor	mg/cm^2-day	0.1	USEPA, 1999	0.1	USEPA, 1999	1/BW x 1/AT
	EF	Exposure Frequency	days/year	64	4 day/wk, 16 wks	32	2 day/wk, 16 wks	
	ED	Exposure Duration	years	1.4	See Note (2)	1.4	See Note (2)	
	ABS	Absorption Factor	unitless	0.0005	USEPA, 1995c	0.0005	USEPA, 1995c	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer) (1)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	
Ingestion of Vegetables	Cv	Concentration in Vegetables	mg/kg	chemical-specific	Table 5-7	chemical-specific	Table 5-7	Dose (mg/kg-day) =
	IR	Ingestion Rate	g/kg-day	6.03	USEPA, 1997a	0.747	USEPA, 1997a	Cv x IR x FI x EF x ED x CF x 1/AT
	FI	Fraction Ingested from Source	unitless	1.0	assumption	1.0	assumption	
	EF	Exposure Frequency	days/year	365	USEPA, 1997a	365	USEPA, 1997a	
	ED	Exposure Duration	years	1.4	See Note (2)	1.4	See Note (2)	
	CF	Conversion Factor	kg/g	1.00E-03	N/A	1.00E-03	N/A	
	ATc	Averaging Time (Cancer)(1)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	511	USEPA, 1997a	511	USEPA, 1997a	

Notes:

(1) Parameters related to cancer risks are not relevant for the child scenario, because only subchronic noncancer hazards were evaluated

(2) Duration of time that gardens were supplied with water from well N2576

N/A: not applicable

TABLE 5-14

VALUES USED FOR DOSE CALCULATIONS (GROUNDSKEEPER-GROUNDWATER)

Former Unisys Facility

Scenario Timeframe: Current and Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cw (C)	Concentration in Water (Current)	mg/L	chemical-specific	Table 5-5	chemical-specific	Table 5-5	Dose (mg/kg-day) =
	Cw (F)	Concentration in Water (Future)	mg/L	chemical-specific	Table 5-3	chemical-specific	Table 5-3	Cw x IR x Ao x EF x ED x 1/BW x 1/AT
	IR	Ingestion Rate	L/day	0.49	USEPA, 1997a	0.201	USEPA, 1997a	
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	
	EF	Exposure Frequency	days/year	112	7 days/wk, 16 wks	112	7 days/wk, 16 wks	
	ED	Exposure Duration	years	6.6	USEPA, 1997a	6.6	USEPA, 1997a	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	2409	USEPA, 1997a	2409	USEPA, 1997a	
Dermal	Cw (C)	Concentration in Water (Current)	mg/L	chemical-specific	Table 5-5	chemical-specific	Table 5-5	Dose (mg/kg-day) =
	Cw (F)	Concentration in Water (Future)	mg/L	chemical-specific	Table 5-3	chemical-specific	Table 5-3	Cw x SA x PC x EF x ED x ET x CF x
	SA	Surface Area	cm^2	5276	USEPA, 1997a	3271	USEPA, 1997a	1/BW x 1/AT
	PC	Dermal Permeability Constant(1)	cm/hr	1.60E-02	USEPA, 1992c	1.60E-02	USEPA, 1992c	
	EF	Exposure Frequency	days/year	112	7 days/wk, 16 wks	112	7 days/wk, 16 wks	
	ED	Exposure Duration	years	6.6	USEPA, 1997a	6.6	USEPA, 1997a	
	ET	Exposure Time	hrs/day	2	assumption	1	assumption	
	CF	Conversion Factor	L/cm^3	0.001	N/A	0.001	N/A	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	2409	USEPA, 1997a	2409	USEPA, 1997a	

Notes:

(1) PC for 1,1-Dichloroethene was used as a surrogate for TVOC, consistent with the toxicity value used in the risk calculation

N/A: not applicable

(C) = current

(F) = future

TABLE 5-15

VALUES USED FOR DOSE CALCULATIONS (GROUNDSKEEPER-SOIL)

Former Unisys Facility

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	IR	Ingestion Rate	mg/day	50	USEPA, 1997a	50	USEPA, 1997a	Cs x IR x Ao x EF x ED x CF x FI
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	112	7 days/wk, 16 wks	112	7 days/wk, 16 wks	
	ED	Exposure Duration	years	6.6	USEPA, 1997a	6.6	USEPA, 1997a	
	FI	Fraction Ingested from Source	unitless	1.0	assumption	0.5	assumption	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (noncancer)	days	2409	USEPA, 1997a	2409	USEPA, 1997a	
Dermal	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	5276	USEPA, 1997a	3271	USEPA, 1997a	Cs x SA x AF x EF x ED x ABS x CF x
	AF	Adherence Factor	mg/cm^2-day	0.1	USEPA, 1999	0.1	USEPA, 1999	1/BW x 1/AT
	EF	Exposure Frequency	days/year	112	7 days/wk, 16 wks	112	7 days/wk, 16 wks	
	ED	Exposure Duration	years	6.6	USEPA, 1997a	6.6	USEPA, 1997a	
	ABS	Absorption Factor	unitless	0.0005	USEPA, 1995c	0.0005	USEPA, 1995c	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (noncancer)	days	2409	USEPA, 1997a	2409	USEPA, 1997a	

Notes:

N/A: not applicable

TABLE 5-16

VALUES USED FOR DOSE CALCULATIONS (GOLFER)

Former Unisys Facility

Scenario Timeframe: Current and Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Golfer
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Ingestion	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	IR	Ingestion Rate	mg/day	50	USEPA, 1997a	50	USEPA, 1997a	Cs x IR x Ao x EF x ED x CF x FI
	Ao	Oral Absorption	unitless	1.0	USEPA, 1997a	1.0	USEPA, 1997a	x 1/BW x 1/AT
	EF	Exposure Frequency	days/year	48	3 days/wk, 16 wks	16	1 day/wk, 16 wks	
	ED	Exposure Duration	years	30	USEPA, 1997a	9	USEPA, 1997a	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	FI	Fraction Ingested from Source	unitless	1.0	assumption	0.5	assumption	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	10950	USEPA, 1997a	10950	USEPA, 1997a	
Dermal	Cs	Concentration in Soil	mg/kg	chemical-specific	Table 5-6	chemical-specific	Table 5-6	Dose (mg/kg-day) =
	SA	Surface Area	cm^2	5276	USEPA, 1997a	3271	USEPA, 1997a	Cw x SA x PC x EF x ED x ET x CF x
	AF	Adherence Factor	mg/cm^2-day	0.1	USEPA, 1999	0.1	USEPA, 1999	1/BW x 1/AT
	EF	Exposure Frequency	days/year	48	3 days/wk, 16 wks	16	1 day/wk, 16 wks	
	ED	Exposure Duration	years	30	USEPA, 1997a	9	USEPA, 1997a	
	ABS	Absorption Factor	unitless	0.0005	USEPA, 1995c	0.0005	USEPA, 1995c	
	CF	Conversion Factor	kg/mg	1.E-06	N/A	1.E-06	N/A	
	BW	Body Weight	kg	71.8	USEPA, 1997a	71.8	USEPA, 1997a	
	ATc	Averaging Time (Cancer)	days	27375	USEPA, 1997a	27375	USEPA, 1997a	
	ATnc	Averaging Time (Noncancer)	days	10950	USEPA, 1997a	10950	USEPA, 1997a	

Notes:

N/A: not applicable

TABLE 6-1

NON-CANCER TOXICITY DATA - ORAL/DERMAL

Former Unisys Facility

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor	Adjusted Dermal RfD	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD	Dates of RfD
Chloroform	chronic	1.0E-02	mg/kg-d	100%	1.0E-02	mg/kg-d	Liver	1,000	IRIS	10/5/99
	subchronic	1.0E-02	mg/kg-d	100%	1.0E-02	mg/kg-d	Liver	1,000	HEAST	07/01/97
1,1-Dichloroethane	chronic	1.0E-01	mg/kg-d	100%	1.00E-01	mg/kg-d	no effects	1,000	HEAST	07/01/97
	subchronic	1.0E+00	mg/kg-d	100%	1.00E+00	mg/kg-d	no effects	100	HEAST	07/01/97
1,1-Dichloroethene	chronic	**9.0E-03**	mg/kg-d	100%	**9.00E-03**	mg/kg-d	Liver	1,000	IRIS	10/5/99
	subchronic	**9.0E-03**	mg/kg-d	100%	**9.00E-03**	mg/kg-d	Liver	1,000	HEAST	07/01/97
1,2-Dichloroethene (total)[1]	chronic	2.0E-02	mg/kg-d	100%	2.00E-02	mg/kg-d	Liver	1,000	IRIS	10/5/99
	subchronic	2.0E-01	mg/kg-d	100%	2.00E-02	mg/kg-d	Liver	100	HEAST	10/5/99
Freon 113	chronic	3.0E+01	mg/kg-d	100%	3.00E+01	mg/kg-d	Nervous system	10	IRIS	10/5/99
	subchronic	3.0E+00	mg/kg-d	100%	3.00E+00	mg/kg-d	Weight	100	HEAST	07/01/97
Tetrachloroethene	chronic	1.0E-02	mg/kg-d	100%	1.00E-02	mg/kg-d	Liver	1,000	IRIS	10/5/99
	subchronic	1.0E-01	mg/kg-d	100%	1.00E-01	mg/kg-d	Liver	100	HEAST	07/01/97
Toluene	chronic	2.0E-01	mg/kg-d	100%	2.0E-01	mg/kg-d	Liver/Kidney	1,000	IRIS	10/5/99
	subchronic	2.0E+00	mg/kg-d	100%	2.00E+00	mg/kg-d	Liver/Kidney	100	HEAST	07/01/97
Trichloroethene	chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

N/A = Not Applicable

(1) Based on trans-1,2-dichloroethene

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

Bold values reflect toxicity criteria applied to TVOC.

TABLE 6-2

NON-CANCER TOXICITY DATA - INHALATION

Former Unisys Facility

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC/RfD	Dates of RfC/RfD
Chloroform	chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane	chronic	5.00E-01	mg/m^3	N/A	N/A	Kidney	1000	HEAST	07/01/97
	subchronic	**5.00E+00**	mg/m^3	N/A	N/A	Kidney	100	HEAST	07/01/97
1,1-Dichloroethene	chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,2-Dichloroethene (total)(1)	chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Freon 113	chronic	3.00E+01	mg/m^3	N/A	N/A	Weight	100	HEAST	07/01/97
	subchronic	3.00E+01	mg/m^3	N/A	N/A	Weight	100	HEAST	07/01/97
Tetrachloroethene	chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Toluene	chronic	**4E-01**	mg/m^3	N/A	N/A	Nervous System	300	IRIS	10/05/99
	subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trichloroethene	chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	subchronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

N/A = Not Applicable

(1) Based on trans-1,2-dichloroethene

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

Bold values reflect toxicity criteria applied to TVOC.

TABLE 6-3

CANCER TOXICITY DATA - ORAL/DERMAL

Former Unisys Facility

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor	Adjusted Dermal Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Chloroform	6.1E-03	100%	6.1E-03	$(mg/kg\text{-}d)^{-1}$	B2	IRIS	10/5/99
1,1-Dichloroethane	N/A	N/A	N/A	N/A	C	IRIS	10/5/99
1,1-Dichloroethene	**6.0E-01**	100%	**6.0E-01**	$(mg/kg\text{-}d)^{-1}$	C	IRIS	10/5/99
1,2-Dichloroethene	N/A	N/A	N/A	N/A	D (cis isomer)	IRIS	10/5/99
Freon 113	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Toluene	N/A	N/A	N/A	N/A	D	N/A	10/5/99
Trichloroethene	withdrawn	N/A	N/A	N/A	withdrawn	IRIS	10/5/99

Notes:

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

Bold values reflect toxicity criteria applied to TVOC.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 6-4

CANCER TOXICITY DATA - INHALATION

Former Unisys Facility

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source for Unit Risk	Date
Chloroform	2.3E-02	$(mg/m^3)^{-1}$	N/A	8.1E-02	$(mg/kg\text{-}d)^{-1}$	B2	IRIS	10/5/99
1,1-Dichloroethane	N/A	N/A	N/A	N/A	N/A	C	IRIS	10/5/99
1,1-Dichloroethene	**5.0E-02**	$(mg/m^3)^{-1}$	N/A	1.2E+00	$(mg/kg\text{-}d)^{-1}$	C	IRIS	10/5/99
1,2-Dichloroethene	N/A	N/A	N/A	N/A	N/A	D (cis isomer)	IRIS	10/5/99
Freon 113	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tetrachloroethene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Toluene	N/A	N/A	N/A	N/A	N/A	D	IRIS	10/5/99
Trichloroethene	withdrawn	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

Bold values reflect toxicity criteria applied to TVOC.

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

TABLE 7-1
CALCULATION OF NONCANCER HAZARDS (RESIDENT-CHILD)
Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater and Shower Air
Exposure Point: Tap and Shower
Receptor Population: Resident
Receptor Age: Child (1-8 years old)

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose or Concentration (Noncancer)	Dose or Concentration (Noncancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
High End										
Ingestion	TVOCs	0.13	mg/L	8.9E-03	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.99
Dermal	TVOCs	0.13	mg/L	4.7E-04	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.052
Inhalation	TVOCs	0.065	mg/m^3	1.3E-03	mg/m^3	N/A	N/A	4.0E-01	mg/m^3	0.0032
								Total Hazard Index Across All Exposure Routes/Pathways		1
Central Tendency										
Ingestion	TVOCs	0.076	mg/L	3.0E-03	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.33
Dermal	TVOCs	0.076	mg/L	1.0E-04	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.011
Inhalation	TVOCs	0.038	mg/m^3	3.8E-04	mg/m^3	N/A	N/A	4.00E-01	mg/m^3	0.00095
								Total Hazard Index Across All Exposure Routes/Pathways		0.3

TABLE 7-2
CALCULATION OF NONCANCER HAZARDS (RESIDENT-ADULT)
Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater and Shower Air
Exposure Point: Tap and Shower
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
High End										
Ingestion	TVOCs	0.13	mg/L	4.1E-03	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.45
Dermal	TVOCs	0.13	mg/L	2.9E-04	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.032
Inhalation	TVOCs	0.065	mg/m^3	1.3E-03	mg/m^3	N/A	N/A	4.00E-01	mg/m^3	0.0032
									Total Hazard Index Across All Exposure Routes/Pathways	0.5
Central Tendency										
Ingestion	TVOCs	0.076	mg/L	1.4E-03	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.16
Dermal	TVOCs	0.076	mg/L	7.4E-05	mg/kg-d	9.0E-03	mg/kg-d	N/A	N/A	0.008
Inhalation	TVOCs	0.038	mg/m^3	3.8E-04	mg/m^3	N/A	N/A	4.00E-01	mg/m^3	0.00095
									Total Hazard Index Across All Exposure Routes/Pathways	0.2

TABLE 7-3
CALCULATION OF NONCANCER HAZARDS (NORTH SHORE TOWERS RESIDENT-CHILD PAST SPRAY IRRIGATION WATER)
Former Unisys Facility

Scenario Timeframe: Past
Medium: Groundwater
Exposure Medium: Spray Irrigation Water
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Child (1-8 years old)

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.18	mg/L	7.7E-04	mg/kg-d	9.0E-03	mg/kg-d	0.086
Dermal	TVOCs	0.18	mg/L	2.2E-04	mg/kg-d	9.0E-03	mg/kg-d	0.025
								0.1
Central Tendency								
Ingestion	TVOCs	0.13	mg/L	1.3E-04	mg/kg-d	9.0E-03	mg/kg-d	0.014
Dermal	TVOCs	0.13	mg/L	2.0E-05	mg/kg-d	9.0E-03	mg/kg-d	0.0022
								0.02

TABLE 7-4
CALCULATION OF NONCANCER HAZARDS (NORTH SHORE TOWERS RESIDENT-CHILD PAST SOIL/VEGETABLES)
Former Unisys Facility

Scenario Timeframe: Past
Medium: Soil
Exposure Medium: Soil and Vegetables
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Child (1-8 years old)

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion - Soil	TVOCs	0.33	mg/kg	1.6E-07	mg/kg-d	9.0E-03	mg/kg-d	1.8E-05
Dermal - Soil	TVOCs	0.33	mg/kg	6.2E-10	mg/kg-d	9.0E-03	mg/kg-d	6.8E-08
Ingestion - Vegetables	TVOCs	1.9	mg/kg	1.1E-02	mg/kg-d	9.0E-03	mg/kg-d	1.2
								1
Central Tendency								
Ingestion - Soil	TVOCs	0.23	mg/kg	2.8E-08	mg/kg-d	9.0E-03	mg/kg-d	3.1E-06
Dermal - Soil	TVOCs	0.23	mg/kg	1.1E-10	mg/kg-d	9.0E-03	mg/kg-d	1.2E-08
Ingestion - Vegetables	TVOCs	1.3	mg/kg	9.9E-04	mg/kg-d	9.0E-03	mg/kg-d	1.1E-01
								0.1

TABLE 7-5
CALCULATION OF NONCANCER HAZARDS (NORTH SHORE TOWERS RESIDENT-ADULT PAST SPRAY IRRIGATION WATER)
Former Unisys Facility

Scenario Timeframe: Past
Medium: Groundwater
Exposure Medium: Spray Irrigation Water
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.18	mg/L	2.2E-04	mg/kg-d	9.0E-03	mg/kg-d	0.024
Dermal	TVOCs	0.18	mg/L	7.6E-05	mg/kg-d	9.0E-03	mg/kg-d	0.0084
								0.03
Central Tendency								
Ingestion	TVOCs	0.13	mg/L	3.2E-05	mg/kg-d	9.0E-03	mg/kg-d	0.0036
Dermal	TVOCs	0.13	mg/L	8.4E-06	mg/kg-d	9.0E-03	mg/kg-d	0.00093
								0.005

TABLE 7-6
CALCULATION OF NONCANCER HAZARDS (NORTH SHORE TOWERS RESIDENT-ADULT PAST SOIL/VEGETABLES)
Former Unisys Facility

Scenario Timeframe: Past
Medium: Soil
Exposure Medium: Soil
Exposure Point: Garden and Vegetables
Receptor Population: North Shore Towers Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion - Soil	TVOCs	0.33	mg/kg	4.0E-08	mg/kg-d	9.0E-03	mg/kg-d	4.4E-06
Dermal - Soil	TVOCs	0.33	mg/kg	2.1E-10	mg/kg-d	9.0E-03	mg/kg-d	2.3E-08
Ingestion - Vegetables	TVOCs	1.9	mg/kg	1.1E-02	mg/kg-d	9.0E-03	mg/kg-d	1.2
								1
Central Tendency								
Ingestion - Soil	TVOCs	0.23	mg/kg	7.1E-09	mg/kg-d	9.0E-03	mg/kg-d	7.9E-07
Dermal - Soil	TVOCs	0.23	mg/kg	4.6E-11	mg/kg-d	9.0E-03	mg/kg-d	5.1E-09
Ingestion - Vegetables	TVOCs	1.3	mg/kg	9.9E-04	mg/kg-d	9.0E-03	mg/kg-d	0.11
								0.1

TABLE 7-7
CALCULATION OF NONCANCER HAZARDS (GROUNDSKEEPER-CURRENT SPRAY IRRIGATION WATER)
Former Unisys Facility

Scenario Timeframe: Current
Medium: Groundwater
Exposure Medium: Spray Irrigation Water
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.18	mg/L	3.9E-04	mg/kg-d	9.0E-03	mg/kg-d	4.3E-02
Dermal	TVOCs	0.18	mg/L	1.3E-04	mg/kg-d	9.0E-03	mg/kg-d	1.5E-02
								0.06
Central Tendency								
Ingestion	TVOCs	0.13	mg/L	1.1E-04	mg/kg-d	9.0E-03	mg/kg-d	1.3E-02
Dermal	TVOCs	0.13	mg/L	2.9E-05	mg/kg-d	9.0E-03	mg/kg-d	3.3E-03
								0.02

TABLE 7-8
CALCULATION OF NONCANCER HAZARDS (GROUNDSKEEPER-CURRENT SOIL)
Former Unisys Facility

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.33	mg/kg	7.0E-08	mg/kg-d	9.0E-03	mg/kg-d	7.7E-06
Dermal	TVOCs	0.33	mg/kg	3.7E-10	mg/kg-d	9.0E-03	mg/kg-d	4.1E-08
								8E-06
Central Tendency								
Ingestion	TVOCs	0.23	mg/kg	2.5E-08	mg/kg-d	9.0E-03	mg/kg-d	2.8E-06
Dermal	TVOCs	0.23	mg/kg	1.6E-10	mg/kg-d	9.0E-03	mg/kg-d	1.8E-08
								3E-06

TABLE 7-9
CALCULATION OF NONCANCER HAZARDS (GROUNDSKEEPER-FUTURE SPRAY IRRIGATION WATER)
Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Spray Irrigation Water
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.048	mg/L	1.0E-04	mg/kg-d	9.0E-03	mg/kg-d	1.1E-02
Dermal	TVOCs	0.048	mg/L	3.4E-05	mg/kg-d	9.0E-03	mg/kg-d	3.8E-03
								0.01
Central Tendency								
Ingestion	TVOCs	0.028	mg/L	2.4E-05	mg/kg-d	9.0E-03	mg/kg-d	2.7E-03
Dermal	TVOCs	0.028	mg/L	6.4E-06	mg/kg-d	9.0E-03	mg/kg-d	7.1E-04
								0.003

TABLE 7-10
CALCULATION OF NONCANCER HAZARDS (GROUNDSKEEPER-FUTURE SOIL)
Former Unisys Facility

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.084	mg/kg	1.8E-08	mg/kg-d	9.0E-03	mg/kg-d	2.0E-06
Dermal	TVOCs	0.084	mg/kg	9.5E-11	mg/kg-d	9.0E-03	mg/kg-d	1.1E-08
								2E-06
Central Tendency								
Ingestion	TVOCs	0.050	mg/kg	5.4E-09	mg/kg-d	9.0E-03	mg/kg-d	6.0E-07
Dermal	TVOCs	0.050	mg/kg	3.5E-11	mg/kg-d	9.0E-03	mg/kg-d	3.9E-09
								6E-07

TABLE 7-11
CALCULATION OF NONCANCER HAZARDS (GOLFER-CURRENT SOIL)
Former Unisys Facility

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Golfer
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.33	mg/kg	3.0E-08	mg/kg-d	9.0E-03	mg/kg-d	3.3E-06
Dermal	TVOCs	0.33	mg/kg	1.6E-10	mg/kg-d	9.0E-03	mg/kg-d	1.7E-08
								3E-06
Central Tendency								
Ingestion	TVOCs	0.23	mg/kg	1.1E-09	mg/kg-d	9.0E-03	mg/kg-d	1.2E-07
Dermal	TVOCs	0.23	mg/kg	6.9E-12	mg/kg-d	9.0E-03	mg/kg-d	7.7E-10
								1E-07

TABLE 7-12
CALCULATION OF NONCANCER HAZARDS (GOLFER-FUTURE SOIL)
Former Unisys Facility

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Golfer
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Noncancer)	Dose (Noncancer) Units	Reference Dose	Reference Dose Units	Hazard Quotient
High End								
Ingestion	TVOCs	0.084	mg/kg	7.7E-09	mg/kg-d	9.0E-03	mg/kg-d	8.6E-07
Dermal	TVOCs	0.084	mg/kg	4.1E-11	mg/kg-d	9.0E-03	mg/kg-d	4.5E-09
								9E-07
Central Tendency								
Ingestion	TVOCs	0.050	mg/kg	2.3E-10	mg/kg-d	9.0E-03	mg/kg-d	2.6E-08
Dermal	TVOCs	0.050	mg/kg	1.5E-12	mg/kg-d	9.0E-03	mg/kg-d	1.7E-10
								3E-08

TABLE 7-13
CALCULATION OF CANCER RISKS (RESIDENT)
Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater and Shower Air
Exposure Point: Tap and Shower
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose or Concentration (Cancer)	Dose or Concentration (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Unit Risk Factor	Unit Risk Factor Units	Cancer Risk
High-End										
Ingestion	TVOCs	2.8E-04	mg/L	3.6E-06	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	N/A	N/A	2.1E-06
Dermal	TVOCs	2.8E-04	mg/L	2.5E-07	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	N/A	N/A	1.5E-07
Inhalation	TVOCs	1.4E-04	mg/m^3	1.1E-06	mg/m^3	N/A	N/A	5.00E-02	$(mg/m^3)^{-1}$	5.7E-08
								Total Risk Across All Exposure Routes/Pathways		2E-06
Central Tendency										
Ingestion	TVOCs	1.7E-04	mg/L	3.8E-07	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	N/A	N/A	2.3E-07
Dermal	TVOCs	1.7E-04	mg/L	1.9E-08	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	N/A	N/A	1.2E-08
Inhalation	TVOCs	8.4E-05	mg/m^3	1.0E-07	mg/m^3	N/A	N/A	5.00E-02	$(mg/m^3)^{-1}$	5.0E-09
								Total Risk Across All Exposure Routes/Pathways		2E-07

Notes:
N/A = not applicable

TABLE 7-14

CALCULATION OF CANCER RISKS (NORTH SHORE TOWERS RESIDENT-PAST SPRAY IRRIGATION WATER)

Former Unisys Facility

Scenario Timeframe: Past
Medium: Groundwater
Exposure Medium: Spray Irrigation Water
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion	TVOCs	1.0E-03	mg/L	2.2E-08	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	1.3E-08
Dermal	TVOCs	1.0E-03	mg/L	7.7E-09	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	4.6E-09
							Total Risk Across All Exposure Routes/Pathways	2E-08
Central Tendency								
Ingestion	TVOCs	1.0E-03	mg/L	4.6E-09	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	2.7E-09
Dermal	TVOCs	1.0E-03	mg/L	1.2E-09	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	7.2E-10
							Total Risk Across All Exposure Routes/Pathways	3E-09

TABLE 7-15
CALCULATION OF CANCER RISKS (NORTH SHORE TOWERS RESIDENT-PAST SOIL/VEGETABLES)
Former Unisys Facility

Scenario Timeframe: Past
Medium: Soil
Exposure Medium: Soil and Vegetables
Exposure Point: Garden
Receptor Population: North Shore Towers Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion - Soil	TVOCs	7.2E-04	mg/kg	1.6E-12	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	9.8E-13
Dermal - Soil	TVOCs	7.2E-04	mg/kg	8.6E-15	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	5.2E-15
Ingestion - Vegetables	TVOCs	4.1E-03	mg/kg	4.6E-07	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	2.8E-07
							Total Risk Across All Exposure Routes/Pathways	3E-07
Central Tendency								
Ingestion - Soil	TVOCs	5.1E-04	mg/kg	2.9E-13	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	1.7E-13
Dermal - Soil	TVOCs	5.1E-04	mg/kg	1.9E-15	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	1.1E-15
Ingestion - Vegetables	TVOCs	2.9E-03	mg/kg	4.1E-08	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	2.4E-08
							Total Risk Across All Exposure Routes/Pathways	2E-08

TABLE 7-16

CALCULATION OF CANCER RISKS (GROUNDSKEEPER-CURRENT SPRAY IRRIGATION WATER)

Former Unisys Facility

Scenario Timeframe: Current
Medium: Groundwater
Exposure Medium: Spray Irrigation Water
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion	TVOCs	1.0E-03	mg/L	1.8E-07	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	1.1E-07
Dermal	TVOCs	1.0E-03	mg/L	6.3E-08	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	3.8E-08
							Total Risk Across All Exposure Routes/Pathways	1E-07
Central Tendency								
Ingestion	TVOCs	1.0E-03	mg/L	7.6E-08	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	4.5E-08
Dermal	TVOCs	1.0E-03	mg/L	2.0E-08	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	1.2E-08
							Total Risk Across All Exposure Routes/Pathways	6E-08

TABLE 7-17
CALCULATION OF CANCER RISKS (GROUNDSKEEPER-CURRENT SOIL)
Former Unisys Facility

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion	TVOCs	7.2E-04	mg/kg	1.3E-11	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	8.1E-12
Dermal	TVOCs	7.2E-04	mg/kg	7.1E-14	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	4.3E-14
							Total Risk Across All Exposure Routes/Pathways	8E-12
Central Tendency								
Ingestion	TVOCs	5.1E-04	mg/kg	4.8E-12	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	2.9E-12
Dermal	TVOCs	5.1E-04	mg/kg	3.1E-14	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	1.9E-14
							Total Risk Across All Exposure Routes/Pathways	3E-12

TABLE 7-18

CALCULATION OF CANCER RISKS (GROUNDSKEEPER-FUTURE SPRAY IRRIGATION WATER)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Spray Irrigation Water
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion	TVOCs	1.0E-04	mg/L	1.9E-08	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	1.2E-08
Dermal	TVOCs	1.0E-04	mg/L	6.7E-09	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	4.0E-09
							Total Risk Across All Exposure Routes/Pathways	2E-08
Central Tendency								
Ingestion	TVOCs	6.2E-05	mg/L	4.7E-09	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	2.8E-09
Dermal	TVOCs	6.2E-05	mg/L	1.2E-09	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	7.4E-10
							Total Risk Across All Exposure Routes/Pathways	4E-09

TABLE 7-19

CALCULATION OF CANCER RISKS (GROUNDSKEEPER-FUTURE SOIL)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Groundskeeper
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion	TVOCs	1.9E-04	mg/kg	3.5E-12	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	2.1E-12
Dermal	TVOCs	1.9E-04	mg/kg	1.8E-14	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	1.1E-14
							Total Risk Across All Exposure Routes/Pathways	2E-12
Central Tendency								
Ingestion	TVOCs	1.1E-04	mg/kg	1.0E-12	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	6.2E-13
Dermal	TVOCs	1.1E-04	mg/kg	6.8E-15	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	4.1E-15
							Total Risk Across All Exposure Routes/Pathways	6E-13

TABLE 7-20
CALCULATION OF CANCER RISKS (GOLFER-CURRENT SOIL)
Former Unisys Facility

Scenario Timeframe: Current
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Golfer
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion	TVOCs	7.2E-04	mg/kg	2.6E-11	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	1.6E-11
Dermal	TVOCs	7.2E-04	mg/kg	1.4E-13	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	8.3E-14
							Total Risk Across All Exposure Routes/Pathways	2E-11
Central Tendency								
Ingestion	TVOCs	5.1E-04	mg/kg	9.3E-13	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	5.6E-13
Dermal	TVOCs	5.1E-04	mg/kg	6.1E-15	mg/kg-d	6.00E-01	$(mg/kg-d)^{-1}$	3.7E-15
							Total Risk Across All Exposure Routes/Pathways	6E-13

TABLE 7-21
CALCULATION OF CANCER RISKS (GOLFER-FUTURE SOIL)
Former Unisys Facility

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Near Irrigation System
Receptor Population: Golfer
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Dose (Cancer)	Dose (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
High End								
Ingestion	TVOCs	1.9E-04	mg/kg	6.8E-12	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	4.1E-12
Dermal	TVOCs	1.9E-04	mg/kg	3.6E-14	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	2.2E-14
							Total Risk Across All Exposure Routes/Pathways	4E-12
Central Tendency								
Ingestion	TVOCs	1.1E-04	mg/kg	2.0E-13	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	1.2E-13
Dermal	TVOCs	1.1E-04	mg/kg	1.3E-15	mg/kg-d	6.00E-01	$(mg/kg\text{-}d)^{-1}$	8.0E-16
							Total Risk Across All Exposure Routes/Pathways	1E-13

TABLE 7-22
SUMMARY OF RECEPTOR RISKS AND HAZARDS[1] (NORTH SHORE TOWERS RESIDENT-CHILD PAST)
Former Unisys Facility

Scenerio Timeframe: Past
Receptor Population: North Shore Towers Resident
Receptor Age: Child (1-8 years old)

	Medium	Exposure Point	Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Groundwater	Garden	9E-02	2E-02	--	1E-01
	Soil	Garden	2E-05	7E-08	--	2E-05
		Vegetables	1E+00	--	--	1
					Total =	**1**
Central Tendency	Groundwater	Garden	1E-02	2E-03	--	2E-02
	Soil	Garden	3E-06	1E-08	--	3E-06
		Vegetables	1E-01	--	--	1E-01
					Total =	**0.1**

Notes:
(1) Only subchronic noncancer hazards were evaluated for child scenario

TABLE 7-23
SUMMARY OF RECEPTOR RISKS AND HAZARDS (NORTH SHORE TOWERS RESIDENT-ADULT PAST)
Former Unisys Facility

Scenerio Timeframe: Past
Receptor Population: North Shore Towers Resident
Receptor Age: Adult

	Medium	Exposure Point	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total	Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Groundwater	Garden	1E-08	5E-09	--	2E-08	2E-02	8E-03	--	0.03
	Soil	Garden	1E-12	5E-15	--	1E-12	4E-06	2E-08	--	4E-06
		Vegetables	3E-07	--	--	3E-07	1E+00	--	--	1
					Total =	**3E-07**			**Total =**	**1**
Central Tendency	Groundwater	Garden	3E-09	7E-10	--	3E-09	4E-03	9E-04	--	0.005
	Soil	Garden	2E-13	1E-15	--	2E-13	8E-07	5E-09	--	8E-07
		Vegetables	2E-08	--	--	2E-08	1E-01	--	--	0.1
					Total =	**3E-08**			**Total =**	**0.1**

TABLE 7-24
SUMMARY OF RECEPTOR RISKS AND HAZARDS[1] (RESIDENT-CHILD FUTURE)
Former Unisys Facility

Scenerio Timeframe: Future
Receptor Population: Resident
Receptor Age: Child (1-8 years old)

	Medium	Exposure Point	Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Groundwater	Tap Water	1E+00	5E-02	--	1
		Shower	--	--	3E-03	0.003
					Total =	**1**
Central Tendency	Groundwater	Tap Water	3E-01	1E-02	--	0.3
		Shower	--	--	9E-04	0.0009
					Total =	**0.3**

Notes:
(1) Only subchronic noncancer hazards were evaluated for child scenerio

TABLE 7-25
SUMMARY OF RECEPTOR RISKS AND HAZARDS (RESIDENT-ADULT FUTURE)
Former Unisys Facility

Scenerio Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

	Medium	Exposure Point	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total	Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Groundwater	Tap Water	2E-06	2E-07	--	2E-06	5E-01	3E-02	--	0.5
		Shower	--	--	6E-08	6E-08	--	--	3E-03	0.003
					Total =	**2E-06**			**Total =**	**0.5**
Central Tendency	Groundwater	Tap Water	2E-07	1E-08	--	2E-07	2E-01	8E-03	--	0.2
		Shower	--	--	5E-09	5E-09	--	--	9E-04	0.0009
					Total =	**2E-07**			**Total =**	**0.2**

TABLE 7-26
SUMMARY OF RECEPTOR RISKS AND HAZARDS (GROUNDSKEEPER-ADULT CURRENT)
Former Unisys Facility

Scenerio Timeframe:	Current
Receptor Population:	Groundskeeper
Receptor Age:	Adult

	Medium	Exposure Point	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total	Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Groundwater	Near Irrigation System	1E-07	4E-08	--	1E-07	4E-02	1E-02	--	6E-02
	Soil	Near Irrigation System	8E-12	4E-14	--	8E-12	8E-06	4E-08	--	8E-06
					Total =	**1E-07**			**Total =**	**0.06**
Central Tendency	Groundwater	Near Irrigation System	5E-08	1E-08	--	6E-08	1E-02	3E-03	--	2E-02
	Soil	Near Irrigation System	3E-12	2E-14	--	3E-12	3E-06	2E-08	--	3E-06
					Total =	**6E-08**			**Total =**	**0.02**

TABLE 7-27
SUMMARY OF RECEPTOR RISKS AND HAZARDS (GROUNDSKEEPER-ADULT FUTURE)
Former Unisys Facility

Scenerio Timeframe: Future
Receptor Population: Groundskeeper
Receptor Age: Adult

	Medium	Exposure Point	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total	Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Groundwater	Near Irrigation System	1E-08	4E-09	--	2E-08	1E-02	4E-03	--	1E-02
	Soil	Near Irrigation System	2E-12	1E-14	--	2E-12	2E-06	1E-08	--	2E-06
					Total =	**2E-08**			**Total =**	**0.01**
Central Tendency	Groundwater	Near Irrigation System	3E-09	7E-10	--	4E-09	3E-03	7E-04	--	3E-03
	Soil	Near Irrigation System	6E-13	4E-15	--	6E-13	6E-07	4E-09	--	6E-07
					Total =	**4E-09**			**Total =**	**0.003**

TABLE 7-28
SUMMARY OF RECEPTOR RISKS AND HAZARDS (GOLFER-ADULT)
Former Unisys Facility

Scenerio Timeframe:	Current
Receptor Population:	Golfer
Receptor Age:	Adult

	Medium	Exposure Point	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total	Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Soil	Near Irrigation System	2E-11	8E-14	--	2E-11	3E-06	2E-08	--	3E-06
					Total =	**2E-11**			**Total =**	**3E-06**
Central Tendency	Soil	Near Irrigation System	6E-13	4E-15	--	6E-13	1E-07	8E-10	--	1E-07
					Total =	**6E-13**			**Total =**	**1E-07**

TABLE 7-29
SUMMARY OF RECEPTOR RISKS AND HAZARDS (FUTURE GOLFER-ADULT)
Former Unisys Facility

Scenerio Timeframe: Future
Receptor Population: Golfer
Receptor Age: Adult

	Medium	Exposure Point	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient			
			Ingestion	Dermal	Inhalation	Exposure Routes Total	Ingestion	Dermal	Inhalation	Exposure Routes Total
High End	Soil	Near Irrigation System	4E-12	2E-14	--	4E-12	9E-07	5E-09	--	9E-07
					Total =	**4E-12**			**Total =**	**9E-07**
Central Tendency	Soil	Near Irrigation System	1E-13	8E-16	--	1E-13	3E-08	2E-10	--	3E-08
					Total =	**1E-13**			**Total =**	**3E-08**

Table 7-30

COMPARISON OF PREDICTED FUTURE GROUNDWATER CONCENTRATIONS TO DRINKING WATER CRITERIA

Former Unisys Facility

Well Modeled	Max. Predicted TVOC Conc. (ug/L)	Year Max. Predicted to Occur	Exceeded
N0022	1.1	2021	no criteria exceeded
N3003	0.08	2012	no criteria exceeded
N5099	72.95	2023	SCG, MCL
N5535	1.18	2023	no criteria exceeded
N12999	33.22	2023	SCG, MCL
N13000	122.75	2023	SCG, MCL

	SCG (ug/L)	MCL (ug/L)
1,1-DCA	5	--
1,1-DCE	5	7
1,2-DCE[(1)]	5	70
Chloroform	7	--
TCE	5	5
Toluene	5	1000
PCE	5	5
Freon 113	5	--

(1) Value for the cis isomer is used since it is the most conservative.

Notes:

1,1-DCA = 1,1-Dichloroethane

1,1-DCE = 1,1-Dichloroethene

1,2-DCE = 1,2-Dichloroethene

TCE = Trichloroethene

PCE = Tetrachloroethene

SCG = State Standards, Criteria, and Guidance Values

MCL = Maximum Contaminant Level

Only wells potentially providing drinking water and not currently treated are listed

Table 8-1
SUMMARY OF UNCERTAINTY ANALYSIS
Former Unisys Facility

POTENTIAL SOURCE OF UNCERTAINTY	DIRECTION OF EFFECT	JUSTIFICATION
Selection of COPCs based on both on-site and off-site groundwater data.	Overestimate	Some VOCs identified in on-site groundwater may not migrate as far as the water supply wells (exposure point).
Analytical procedures used by laboratories	Overestimate or underestimate	Numerous QA/QC checks were conducted by laboratories; however, one or more chemicals or concentrations may have been misidentified or misread.
Use of modeled TVOC data as EPCs in tap water	Overestimate	Modeling data was not available for individual chemicals. The model assumed the most rapid migration for COPCs.
Unimpacted wells not modeled or included in estimates of future concentrations, even though these unimpacted wells will contribute to the water supply	Overestimate	Lack of data on unimpacted wells prevented their inclusion in the data set. Concentrations to which people will be exposed will reflect both impacted and unimpacted wells.
The maximum of the 30-year average TVOC concentrations obtained from the fate and transport model was used as the EPC for the high end scenario	Overestimate	Residents receive their drinking water from more than one water supply well, reducing the TVOC concentration at the tap. Volatilization at the tap was not accounted for.
Risks were calculated for the water district most highly impacted by the groundwater plume.	Overestimate	Residents may receive drinking water from other water districts with lower concentrations of COPCs
Cancer EPCs assume 0.22% of TVOC is comprised of carcinogenic compounds	Overestimate	Monitoring well data suggests that carcinogenic chemicals may not reach the water supply wells.
Exposure assumptions (frequency, duration, and intensity)	Unknown; probably overestimate	Parameters selected are conservative estimates of exposure; however, in the absence of site-specific data the actual exposure may be greater than evaluated.
A model was used to estimate EPCs for vegetables	Overestimate	Conservative model inputs may result in overestimation of EPCs
Extrapolation of animal toxicity data to humans	Unknown; probably overestimate	Animals and humans differ with respect to absorption, metabolism, distribution, and excretion leading to variations in chemical effects. Animal studies typically involve high-dose exposures, whereas humans are generally exposed to low doses in the environment.
Use of uncertainty factors in the derivation of reference doses	Overestimate or underestimate	Ten-fold uncertainty factors are incorporated to account for various sources of uncertainty (animal to human extrapolation, protection of sensitive human populations, extrapolation from subchronic to chronic data, and use of LOAELs rather than NOAELs). Although some data seem to support the ten-fold factor, its selection is somewhat arbitrary.

Table 8-1
Summary of Uncertainty Analysis
Lockheed Martin - OU-2

Use of a linearized, multi-stage model to derive the cancer slope factor for 1,1-dichloroethene	Overestimate	Model assumes a non-threshold, linear low dose response for carcinogens. Many compounds induce cancer by non-genotoxic mechanisms. Model results in a 95% UCL of the cancer risk. The true risk is unlikely to be higher and may be as low as zero.
The cancer slope factor and unit risk values for chloroform are highly uncertain Note: the chloroform values are presented in the tox. tables, but are not used in the calculations.	No effect	The carcinogenicity assessment for chloroform is undergoing review by EPA's Science Advisory Board. Consideration of a nonlinear mode of action will likely reduce the toxicity values resulting in lower cancer risks.
Application of the most conservative toxicity values to TVOC exposure	Overestimate	The modeled TVOC concentration consists of multiple VOC constituents with differing degrees of toxic potency.
Summation of effects (cancer risks and hazard indices) from multiple substances	Overestimate or underestimate	The assumption that effects are additive ignores potential synergistic and/or antagonistic effects and assumes similarity in mechanism of action, which is not the case for many substances. Compounds may induce tumors or other toxic effects in different systems.
Toxicity values are not available for trichloroethene	No change or underestimate	If the toxic potency of trichloroethene is similar to the other chlorinated solvents selected as COPCs, no significant change in the risk assessment would be anticipated.
The risk characterization combines overestimates of both exposure and toxicity	Overestimate	The use of modeled TVOC data results in overestimation of both exposure and toxicity.

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Attachment A. Derivation and Application of Risk-Based Concentration to Determine Need for Future Ambient Air Monitoring

Risk-based concentrations (RBCs) of total volatile organic compounds (TVOCs) and total carcinogenic VOCs ($TVOC_{carc}s$) were calculated with the objective of defining a screening value that would trigger ambient air monitoring in the future, based on potential risks from inhaling VOCs that volatilize from groundwater during spray irrigation. Toward that end, the concentrations of $TVOC_{carc}s$ in air associated with cancer risks of 1×10^{-6} and TVOCs in air associated with hazard indices (HIs) of 1.0 were first back-calculated for future residents of North Shore Towers. The resultant air concentrations were then entered into a near-field box model (Pasquill 1975; Horst 1979) and vapor emission model (Andelman 1984; 1985a,b) to back-calculate the groundwater concentrations that would be expected to produce those air concentrations. This attachment describes the derivation of the RBCs for groundwater that will trigger future ambient air monitoring results, as well as the proposed method of applying those RBCs.

Table A-1 presents the derivation of RBCs for air based both on cancer and noncancer effects, and based both on high end and central tendency exposure assumptions. Table A-1 lists the equations applied, as well as all assumptions related to exposure and toxicity. Separate calculations for children and adults are not necessary because the equations do not factor in any age-specific assumptions. The resultant RBCs for air are then used to derive RBCs for groundwater using an air release model, as presented in Table A-2 and described below.

$$C_a = (C_{gw} \times Q_{gw} \times E) / (H_b \times W_b \times U_m) \qquad \text{Equation 1}$$

where:

C_a = concentration of VOC in ambient air on-site (mg/m^3).

C_{gw} = concentration of VOC in groundwater (mg/L);

E = efficiency of release of VOC from spray water to air (unitless);

Q_{gw} = pumping rate for non-potable well (L/s);

H_b = downwind height of box in meters (m);

W_b = width of box, crosswind dimension of the affected area (m); and

U_m = average wind speed through the box (m/s).

For purposes of deriving an EPC, however, Equation 1 is solved for C_{gw}:

$$C_{gw} = (C_a \times H_b \times W_b \times U_m) / (Q_{gw} \times E) \qquad \text{Equation 2}$$

The average wind speed through the box (Um) is calculated as:

$$Um = 0.22 \times U10 \times \ln(2.5 \times Hb) \qquad \text{Equation 3}$$

where:

U10 = mean wind speed at 10 m above ground surface.

The efficiency of release of VOCs from spray water to air was calculated using Equation 4 (Andelman 1984; 1985a,b). The efficiency of air release is adjusted for VOCs detected at the site by assuming the efficiency of release from water to air is proportional to the Henry's Law Constant. A maximum efficiency of 1.0 is imposed so that for very volatile constituents no more chemical can be lost than is present in the groundwater.

$$E = (E_{STD} \times H) / H_{STD} \qquad \text{Equation 4}$$

where:

E	= efficiency of release for a VOC (unitless);
E_{STD}	= efficiency of release of standard (radon) from water to air (unitless);
H	= Henry's Law Constant for a VOC (atm-m^3/mol); and
H_{STD}	= Henry's Law Constant for standard (radon).

Parameters used in Equations 1 through 4 are presented in Table A-2. The maximum rate at which water may be pumped from well N2576 is 1,000 gallons/minute (64 L/s) under the new well permit issued by the NYSDEC, which also caps the pumpage at 30 million gallons per year. The irrigation system is assumed to distribute water to ten sprinkler heads at a single green at any given time, resulting in a maximum pump rate per tee or green area of 20 gallons/minute. Since this is the pumping rate that is assumed to occur during irrigation, the annual average pumping rate will be considerably lower.

Like the pumping rate, the "box" is assumed to be associated with a single green. Consistent with the golf course layout, the green and its "box" are assumed to be 60 feet (18.3 m) wide. Distances to the receptor greater than 60 feet will result in lower ambient air concentrations and lower exposure rates. Using wind speed data collected from LaGuardia and Kennedy Airports, wind speed was estimated to be 11.5 miles per hour or approximately 5 m/s.

Under high end exposure conditions, the resultant EPC for TVOCs in groundwater is 144 mg/L, while the EPC for $TVOC_{carc}$s in groundwater is 0.018 mg/L. Under central tendency exposure assumptions, the EPC for TVOCs in groundwater is 288 mg/L, while the EPC for $TVOC_{carc}$s in groundwater is 0.12 mg/L. In other words, risks associated with inhalation of carcinogenic VOCs volatilizing from groundwater during spray irrigation will exceed 1×10^{-6} if the combined concentration of chloroform and 1,1-DCE exceed 0.018 mg/L. Likewise, noncancer hazards associated with inhalation of all VOCs volatilizing from groundwater during spray irrigation will exceed 1 if the combined concentration of all VOCs exceeds 144 mg/L. These findings are based on high end exposure assumptions, including the assumptions that those groundwater concentrations represent the 95 percent upper confidence limit on the mean (95% UCL) over a 30-year residency period and that concentrations of VOCs in air are not diluted as they travel from the golf course to the intakes for the North Shore Towers

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air-conditioning systems. Hence, the theoretical basis of the RBCs implies that RBCs should be compared to long-term groundwater measurements, rather than single point monitoring results. However, in order to ensure protection of human health, any measurement of VOCs in groundwater that exceeds either RBC should trigger ambient air monitoring. When sufficient groundwater analyses are available to yield a reliable 95% UCL (i.e., 95% UCL less than maximum measured value), the 95% UCL should serve as the point of comparison to the RBCs. In the event that COPCs are detected in air during future ambient air monitoring events, risks to future North Shore Towers residents via inhalation will be calculated and presented as an addendum to this risk assessment.

D
R
A
F
T

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TABLE A-1

DERIVATION OF RISK-BASED CONCENTRATIONS FOR AIR (FUTURE NORTH SHORE TOWERS RESIDENTS)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Air
Exposure Medium: Air
Exposure Point: Apartment
Receptor Population: North Shore Towers Resident
Receptor Age: Adult and Child

Exposure Route	Parameter Code	Parameter Definition	Units	High End Value	High End Rationale/ Reference	Central Tendency Value	Central Tendency Rationale/ Reference	Dose Equation/ Model Name
Inhalation	HQ	Hazard Quotient	unitless	1		1		RBCa-tvoc = HQ x ATnc x RfC x 1/ET x 1/EF x 1/ED x 1/CF
	Risk	Cancer Risk	unitless	1E-06		1E-06		
	RfC	Reference Concentration for TVOCs	mg/m^3	0.4	IRIS	0.4	IRIS	
	URF	Unit Risk Factor for Carcinogenic VOCs[a]	$(mg/m^3)^{-1}$	5.0E-02	IRIS	5.0E-02	IRIS	RBCa-cvoc = Risk x ATc x 1/URF x 1/ET x 1/EF x 1/ED x 1/CF
	ATnc	Averaging Time (noncancer)	days	10950	USEPA, 1997	3285	USEPA, 1997	
	ATc	Averaging Time (cancer)	days	27375	USEPA, 1997	27375	USEPA, 1997	
	ET	Exposure Time	hrs/day	4	duration of irrigation	2	duration of irrigation	
	EF	Exposure Frequency	days/year	112	7 days/wk, 16 wks	112	7 days/wk, 16 wks	
	ED	Exposure Duration	years	30	USEPA, 1997	9	USEPA, 1997	
	CF	Conversion Factor	day/hr	0.042		0.042		
	RBCa-tvoc	Risk-based Concentration in Air - TVOCs	mg/m^3	7.8		15.6		
	RBCa-cvoc	Risk-based Concentration in Air - Carcinogenic VOCs[a]	mg/m^3	0.0010		0.007		

Notes:

a. Carcinogenic VOCs historically detected in groundwater are chloroform and 1,1-dichloroethene

TABLE A-2

DERIVATION OF RISK-BASED CONCENTRATIONS FOR GROUNDWATER (FUTURE NORTH SHORE TOWERS RESIDENTS)

Former Unisys Facility

Scenario Timeframe: Future
Medium: Air
Exposure Medium: Air
Exposure Point: Apartment
Receptor Population: North Shore Towers Resident
Receptor Age: Adult and Child

	Risk-Based Concentration in Air RBCa mg/m^3	Pumping Rate[e] Qgw L/s	Efficiency of release of standard from water to air [a] Estd unitless	Henry's Law Constant H Pa-m3/mol	Henry's Law Constant [b] H $atm\text{-}m^3/mol$	Henry's Law Constant for standard [a] Hstd $atm\text{-}m^3/mol$	Efficiency of release E unitless	Downwind height of box [c] Hb m	Width of box, crosswind dimension of the affected area [c] Wb m	Average wind speed 10 m above ground surface U10 m/s	Average wind speed through box Um m/s	Risk-Based Concentration in Water RBCgw mg/L
High End Exposure												
TVOCs	7.8	6.4	0.52	339	3.35E-03	1.90E-02	0.2999	1.4	18.3	5	1.38	144
Carcinogenic VOCs[d]	0.0010	6.4	0.52	339	3.35E-03	1.90E-02	0.2999	1.4	18.3	5	1.38	0.018
Central Tendency												
TVOCs	15.6	6.4	0.52	339	3.35E-03	1.90E-02	0.2999	1.4	18.3	5	1.38	288
Carcinogenic VOCs[d]	0.007	6.4	0.52	339	3.35E-03	1.90E-02	0.2999	1.4	18.3	5	1.38	0.12

Notes:

Cgw = Ca x Hb x Wb x Um x 1/Qgw x 1/E

a. Andelman, 1984, 1985a,b

b. Mackay et al., 1993

c. Estimated

d. Carcinogenic VOCs historically detected in groundwater are chloroform and 1,1-dichloroethene

e. The pumping rate is calculated by dividing the total future pumping rate (64 L/s) by the number of sprinkler heads (10)

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Appendix L

Ambient Air Monitoring Report

AMBIENT AIR MONITORING REPORT
NORTH SHORE TOWERS GOLF COURSE
FLORAL PARK, NEW YORK

October 2000

Prepared for:

Lockheed Martin Corporation
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Prepared by:

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Project Number 00-093

AMBIENT AIR MONITORING REPORT
NORTH SHORE TOWERS GOLF COURSE
FLORAL PARK, NEW YORK

October 2000

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B. USEPA Compendium Method TO-14A

C. Field Data Sheets

D. Meteorological Data

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AMBIENT AIR MONITORING REPORT
NORTH SHORE TOWERS GOLF COURSE
FLORAL PARK, NEW YORK

INTRODUCTION

Under contract to ARCADIS Geraghty & Miller, Inc., Air/Compliance Consultants, Inc. (ACCI) conducted an ambient air-testing program for Lockheed Martin Corporation (LMC) at North Shore Towers golf course located in Floral Park, New York on August 29 through 31, 2000. Testing was conducted for volatile organic compounds (VOCs) and was performed to meet the requirements of the New York State Department of Environmental Conservation's (NYSDEC) and the New York State Department of Health's (NYSDOH) requests for air sampling to confirm the results of a baseline risk assessment. ACCI conducted the measurements in accordance with standard United States Environmental Protection Agency (USEPA) methods. Severn Trent Laboratories, Inc. (STL), located in Carol Stream, Illinois, provided analytical services for air analysis of air samples. A copy of the approved project work plan and relevant correspondence is included in Appendix A.

SOURCE DESCRIPTION

The North Shore Towers golf course is located in Floral Park, New York. Testing was performed to determine if contaminants in the groundwater produced from the golf course irrigation well are present in ambient air as a result of spray irrigation. The spray irrigation system is designed to irrigate the golf course, which borders the North Shore Towers buildings. The irrigation system area is shown in Figure 1. The dashed lines on Figure 1 represent the main water source.

TEST METHODOLOGY

Testing was conducted in accordance with the NYSDEC approved work plan provided in Appendix A. Testing was also conducted in accordance with standard USEPA methods. Detailed sampling methods and analytical procedures for determining contaminants in ambient air are described in the USEPA Compendium of Methods for the Determination of Toxic

Organic Compounds in Ambient Air – Second Edition, Method TO-14A, which is provided in Appendix B.

In accordance with approved procedures, summa canisters were used to collect continuous ambient air samples during a 4-hour period each day of sampling. Canisters were placed on the golf course before watering began each evening. Two canisters were placed upwind of the general watering area and two canisters and one duplicate were placed downwind of the watering area. Table 1 summarizes the upwind and downwind sampling locations. Field data sheets for each sample are located in Appendix C. A field blank for each day was also included when samples were shipped for analysis.

Meteorological data including ambient temperature, soil surface temperature, barometric pressure, wind speed, and wind direction were recorded each day during sampling. Meteorological data, including windrose figures, are provided in Appendix D.

ANALYTICAL PROCEDURES

VOLATILE ORGANIC COMPOUND SAMPLE ANALYSIS

Air samples were analyzed in accordance with the USEPA Method TO-14A *"Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography."* When the canisters arrived from the field they were attached to a pressurized Nitrogen source, with an electronic gauge that measures pressure in millimeters of mercury (mm of Hg) when the canister was opened. The initial pressure was recorded in the log book and then the canisters were pressurized to two atmospheres for analysis.

The sample was introduced into the gas chromatograph by a modified SW846 purge and trap method 5030B. All purge tubes were washed with reagent water and microwaved for a minimum of five minutes prior to use. The gas sample was bubbled through five milliliters of water containing internal an standard/surrogate placed in a specially designed purging chamber at ambient temperature. The vapor was then swept through a sorbent column where the

purgeable compounds are trapped. After purging was completed, the sorbent column was heated and back-flushed with Helium gas to desorb the purgeables. The helium gas containing the VOCs was then introduced in to the mass spectrometer.

Identification of the target analytes was accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantification was accomplished by comparing the response of a major ion relative to an internal standard using a five-point calibration curve. The qualitative identification of each compound determined by this method is based on retention time, and on comparison of the sample mass spectrum, after background correction with characteristic ions in a reference mass spectrum. The laboratory generates the reference mass spectrum.

QUALITY ASSURANCE/QUALITY CONTROL

To insure the generation of sufficiently high quality data from both field sampling and laboratory analysis, the following quality assurance (QA) procedures were observed in addition to the STL Quality Assurance Plan and lab standard operating procedures (SOPs) included in the project work plan, which is provided in Appendix A:

1. Pre- and post-sampling measurements with a certified mass flow controller for flow verification of the sampling system was performed with each test run.
2. Canisters were leak-tested before sample collection, the pressure not varying more than ± 3.8 Kilopascal (kPa) over a 24-hour period.
3. All canisters were certified clean before sample collection.
4. Chain-of-custody forms were used to track samples through all phases of field collection, extraction, and analysis.

TEST RESULTS

The results of analyses of the air samples are summarized in Table 2.

The following compounds were detected at trace levels during the sampling program. On August 29th, 1,2,4-trimethylbenzene was detected at the #2 Green (downwind) and #3 Green

(upwind) sampling locations. On August 30th, 4-ethyltoluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and m & p-xylene were detected at the #16 Green (downwind). At the #5 Tee (upwind) on August 31st, 4-ethyltoluene, 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene were detected. The compounds that were detected were found at both the upwind and downwind locations with the exception of m & p-xylene, indicating that they originate from a source that discharges to air rather than from the groundwater. M & p-xylene was not detected at the former Unisys facility and therefore is not a site related contaminant. There were no compounds detected in any of the field blank samples. Complete analytical reports for all samples are contained in Appendix E.

CONCLUSION

Based on the sampling conducted, there appears to be no significant impact on ambient air quality due to spray irrigation at the North Shore Towers Golf Course. All of the sampling was conducted in accordance with standard USEPA methods and the data yielded is considered to be representative of ambient conditions at the North Shore Towers location.

Table 1. Summary of Sampling Locations for Volatile Organic Compounds (TO14)
North Shore Towers and Golf Course, Floral Park, New York

	Sampling Locations	
Sampling Date	**Upwind**	**Downwind**
8/29/00	#3 Green #15 Green	#2 Green (Duplicate) #16 Green
8/30/00	#3 Green #15 Green	#2 Green (Duplicate) #16 Green
8/31/00	#13 Tee #5 Tee	#17 Green (Duplicate) #1 Tee

Table 2.

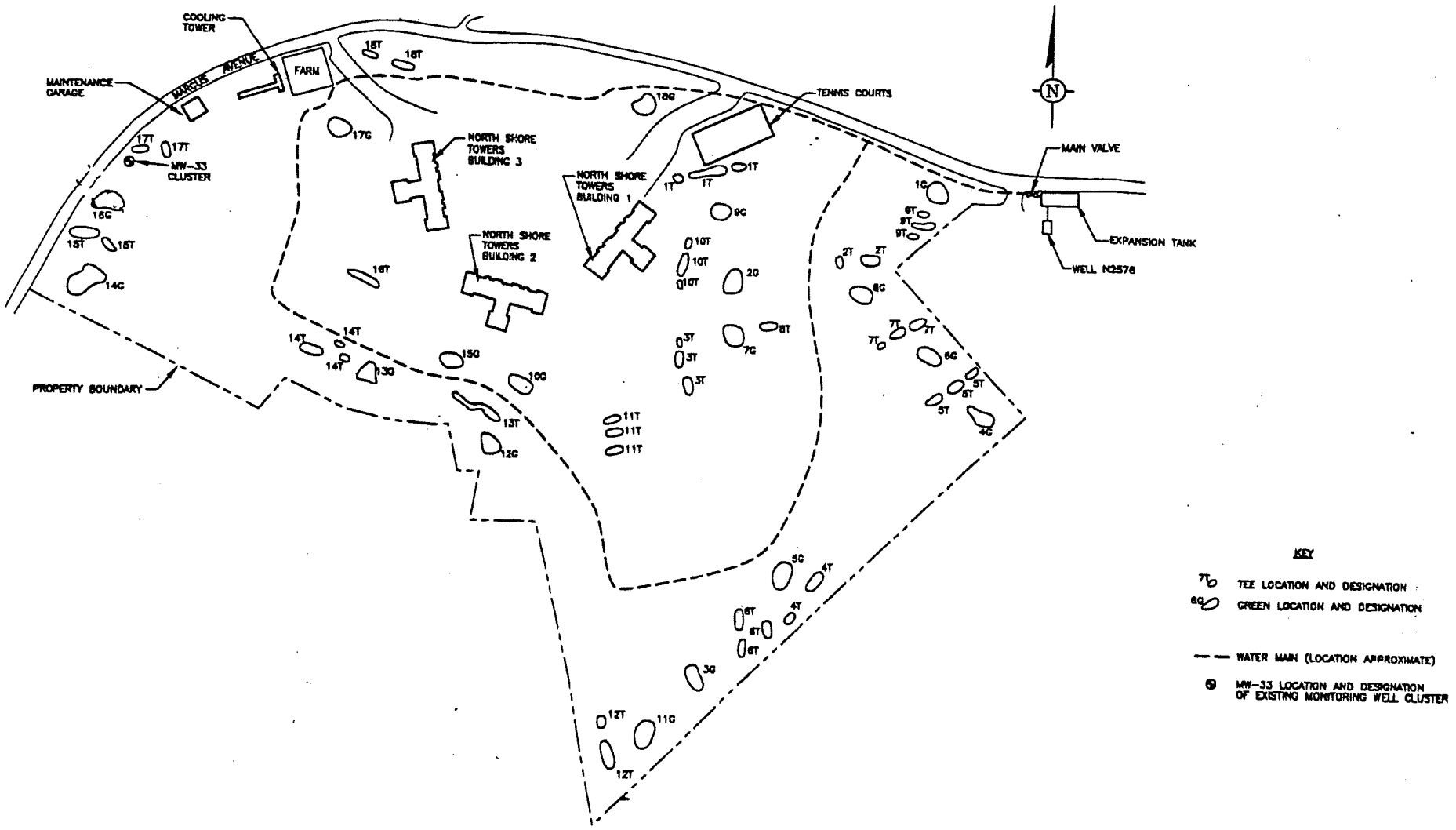
Summary of Analytical Results for Volatile Organic Compounds (TO14) of Concern

North Shore Towers Golf Course, Floral Park, New York.

Sample Date	8/29/00	8/29/00	8/29/00	8/29/00	8/29/00	8/30/00	8/30/00	8/30/00	8/30/00	8/30/00	8/31/00	8/31/00	8/31/00	8/31/00	8/31/00
Canister ID	267	081	076	079	068	159	243	091	161	090	301	054	050	045	043
Location	#2 Green	# 2 Green - Dup	#3 Green	#15 Green	#16 Green	#2 Green-Dup	# 16 Green	# 3 Green	# 2 Green	# 15 Green	# 17 Green	# 13 Tee	# 5 Tee	# 1 Tee	# 17 Green-Dup
	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)	(mg/m^3)
Bezene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Bromodichloromethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Bromoform	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Bromomethane (Methyl bromide)	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Carbon disulfide	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Carbon tetrachloride	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Chlorobenzene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Chloroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Chloroform	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Chloromethane (Methyl chloride)	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
2 - Chlorotolulene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Dibromochloromethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 2 - Dibromomethane (EDB)	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 2 - Dichlorobenzene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 3 - Dichlorobenzene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 4 - Dichlorobenzene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
trans - 1, 4 - Dichloro - 2 - butene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Dichlorodifluoromethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 1 - Dichloroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 2 - Dichloroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 1 - Dichloroethene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
cis - 1, 2-Dichloroethene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
trans - 1, 2-Dichloroethene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 2 - Dichloropropane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
cis - 1, 3-Dichloropropene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
trans - 1, 3-Dichloropropene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Dichlorotetrafluoroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Ethylbenzene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Hexane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
4 - Ethyltoluene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	**0.090**	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	**0.190**	< 0.060	< 0.060
Hexachlorobutadiene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Methylene chloride (Dichloromethane)	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Methyl t - butyl ether (MTBE)	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Styrene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 1, 2, 2 - Tetrachloroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Tetrachloroethene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Toluene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 2, 4 - Trichlorobenzene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 1, 1 - Trichloroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 1, 2 - Trichloroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Trichloroethene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
Trichlorofluoromethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 1, 2 - Trichloro - 1, 2, 2 - trifluoroethane	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
1, 2, 4 - Trimethylbenzene	**0.060**	< 0.060	**0.100**	< 0.060	< 0.060	< 0.060	**0.120**	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	**0.290**	< 0.060	< 0.060
1, 3, 5 - Trimethylbenzene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	**0.080**	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	**0.140**	< 0.060	< 0.060
Vinyl chloride	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
o- Xylene	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060	< 0.060
m & p - Xylene	< 0.120	< 0.120	< 0.120	< 0.120	< 0.120	< 0.120	**0.080**	< 0.120	< 0.120	< 0.120	< 0.120	< 0.120	0.140	< 0.120	< 0.120

Notes:

1. Blank #244 (8/29/00) - no compounds detected
2. Blank #231 (8/30/00) - no compounds detected
3. Blank #080 (8/31/00) - no compounds detected



SCALE: 1"=300'-0"

"LOCKHEED_MARTIN\GREAT_NECK\CAD\GOLF_BASE.DWG 1=300

D:\APROJS\

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NO.	DATE	REVISION DESCRIPTION	BY

ARCADIS GERAGHTY & MILLER

NORTH SHORE TOWERS AND GOLF COURSE
FLORAL PARK, NEW YORK

LOCKHEED MARTIN CORPORATION
GREAT NECK, NEW YORK

DRAWN	DATE
A.B.	9/12/01

PROJECT MANAGER	DEPARTMENT MANAGER
R. BERKOWITZ	
LEAD DESIGN PROF.	CHECKED
	R.B.
PROJECT NUMBER	DRAWING NUMBER
NY001227.002.05	1

APPENDIX A

Work Plan Addendum

ARCADIS GERAGHTY&MILLER

ARCADIS Geraghty & Miller, Inc.
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Melville
New York 11747
Tel 516 249 7600
Fax 516 249 7610

Girish Desai
New York State Department of Environmental Conservation
Building 40, SUNY at Stony Brook
Stony Brook, New York 11790

ENVIRONMENTAL

Subject:
Addendum to Ambient Air Monitoring Work Plan
For the North Shore Towers Golf Course
Former Unisys Inactive Hazardous Waste Site No. 1-30-00-0045
Great Neck, New York
ARCADIS Geraghty & Miller Project No. NY001227.0016.00001

Melville,
28 August, 2000

Contact:
Carlo San Giovanni

Extension:
631.391.5259

Dear Mr. Desai:

This letter will serve as an addendum to the August 2000 Ambient Air Monitoring Work Plan for the North Shore Towers Golf Course and was written in response to the August 11, 2000 comment letter from the New York State Department of Environmental Conservation (NYSDEC). The work plan was prepared by Air/Compliance Consultants, Inc. for ARCADIS Geraghty & Miller, Inc. and the Lockheed Martin Corporation. The work plan is revised as follows as per the NYSDEC's and the New York State Department of Health's comments:

1. For quality assurance/quality control documentation, one duplicate air sample will be collected during each day of sampling. In addition, a trip blank will accompany the sample shipment(s) to the laboratory.

2. Analytical testing will include cis-1,2-dichloroethene and trans-1,2-dichloroethene instead of just total 1,2- dichloroethene.

3. The minimum detection limits for the chemicals of concern are as follows:

Chemical of Concern	Minimum (Method) Detection Limit (in mg/m^3 [milligrams per cubic meter])	Laboratory Reporting Limit (in mg/m^3)
Chloroform	0.017	0.03
1,1-dichloroethene	0.023	0.03
cis-1,2-dichloroethene	0.017	0.03
trans-1,2- dichloroethene	0.018	0.03
Tetrachloroethene	0.019	0.03
Trichlorethene	0.018	0.03

ARCADIS GERAGHTY & MILLER

Please call if you have any questions or wish to discuss this further.

Sincerely,

ARCADIS Geraghty & Miller, Inc.

Carlo San Giovanni

Carlo San Giovanni
Project Manager

Nicholas Valkenburg

Nicholas Valkenburg
Project Director

Copies:
John Lovejoy, Nassau County Department of Health
John Olm, New York Department of Health
Robert McMullen, Lockheed Martin Corporation
Robert Frey, Air/Compliance Consultants, Inc.

AMBIENT AIR MONITORING WORK PLAN
NORTH SHORE TOWERS GOLF COURSE
FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

August 2000

Prepared for:

Lockheed Martin Corporation
Great Neck, New York

Prepared by:

Air/Compliance Consultants, Inc.
1050 William Pitt Way
Pittsburgh, Pennsylvania 15238

Project Number 00-093

AMBIENT AIR MONITORING WORK PLAN
NORTH SHORE TOWERS GOLF COURSE
FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

August 2000

Air/Compliance Consultants, Inc.

Sharon S. Diday
Engineer

Robert N. Frey
Principal Engineer/Vice-President

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FIGURE

1. Irrigation System Area Detail

APPENDIX

A. Severn Trent Laboratories Quality Assurance Plan and SOP

AMBIENT AIR MONITORING WORK PLAN
NORTH SHORE TOWERS GOLF COURSE
FORMER UNISYS FACILITY
GREAT NECK, NEW YORK

INTRODUCTION

Arcadis Geraghty & Miller, Inc. will conduct an ambient air-testing program for Lockheed Martin Corporation (LMC) at North Shore Towers golf course located in Floral Park, New York. Testing will be conducted for the following volatile organic compounds (VOCs): chloroform, 1,1-dichloroethylene, 1,2-dichloroethylene, tetrachloroethylene (perchloroethylene), and trichloroethylene. The testing is a result of the New York State Department of Environmental Conservation's (NYSDEC) and the New York State Department of Health's (NYSDOH) requests for air sampling to confirm the results of a baseline risk assessment. AGM will conduct the measurements in accordance with standard United States Environmental Protection Agency (USEPA) methods. Detailed method sampling and analytical procedures for determining contaminants in ambient air are described in the USEPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition, Method TO-14A. Severn Trent Laboratories, Inc. located in Carol Stream, Illinois will provide analytical services for air analysis of air samples.

SOURCE DESCRIPTION

The North Shore Towers golf course is located in Floral Park, New York. The spray irrigation system is designed to irrigate the golf course, which borders the North Shore Towers buildings. The irrigation system area is shown in Figure 1. The dashed lines represent the main water source. Data on estimated VOC releases were determined as part of the site baseline risk assessment using a combination of a near-field box modeling and a vapor emissions model.

TESTING PARAMETERS

The intent of the testing program is to quantify the potential effects of constituents in spray irrigation water under a variety of meteorological conditions, thereby establishing a reliable database of ambient air quality data. The testing will be a three-day on-site study and will be conducted in each of four quadrants. A test duration of four hours each day will allow more accurate sampling and collection of air volume samples compared to a single grab sample. Testing will be performed both before, during and after sprinkler operation. The sampling location will be near the sixth tee location, the second tee, the fifteenth tee, and the sixteenth tee to ensure coverage of the entire course. The exact testing locations will vary depending on site access and the meteorological conditions during the testing days. Factors that may influence the air testing and the contaminant release would be atmospheric pressure, wind speed, and wind direction. Throughout the day, wind speed and wind direction are generally light and variable in the early morning hours reaching a finite direction of constant speed in the late morning. Under these conditions there is sufficient time to collect data while maintaining upwind/downwind orientation to the sampling test locations. Under the following meteorological conditions sampling will not be performed:

- Ambient temperatures less than 50°F; and
- Significant precipitation during the test period.

Selection of the upwind stations will be made in an attempt to characterize the local background ambient air quality for the specific period of time that the samples will be collected. The downwind locations will be chosen to represent air quality downwind of the air spray irrigation system and to reflect the quality of the air impacting the groundskeeper and residents in that area. Depending on site conditions, a downwind location may be selected near a building ventilation and/or air conditioning intake. These upwind/downwind selections will be deferred until the day of testing at which time current meteorological data will be reviewed. By deducting upwind levels (local

background) from downwind concentrations, the true impact of the water spray irrigation system on the ambient air quality may be determined.

During each test period of the on-site ambient air-monitoring program, meteorological data including ambient temperature, soil surface temperature, barometric pressure, wind speed, and wind direction will be recorded at 15-minute intervals. Once testing commences, the test will be temporarily stopped if wind direction shifts, to permit an assessment of the true wind direction. In the event of a sustained shift in average wind direction of greater than a 45-degree angle, the sampling stations will be repositioned to maintain their upwind/downwind orientation with respect to the investigation area.

SAMPLING METHODOLOY

VOLATILE ORGANIC COMPOUND SAMPLING COLLECTION

Target VOCs designated by the test program will be collected in a Summa canister in accordance with the instructions of USEPA Method TO-14A. A canister vacuum is used to "pull" the sample gas into the canister. The Summa canister is attached by a brass plug to a vacuum gauge and the vacuum gauge is attached to the flow controller which is connected to a 10 micron filter in the sampling line. The brass plug ensures that there is no loss of vacuum due to a valve accidentally being opened. The rate in which the gas sample is pulled through the sample line is controlled by the flow meter. A filter is installed to prevent particulate matter from entering the canister. The vacuum gauge is used to measure the initial and final vacuum of the canister and to monitor the filling of the canister when collecting the sample.

To collect the sample the initial vacuum is checked and recorded on the chain-of-custody form, and the flow rate is adjusted to the proper value for a four-hour test period. The canister and vacuum/pressure gauge valves are then opened and the canister is filled with the sample gas. During the sample collection, the maximum, minimum, current interior temperature, and current ambient temperature along with the time period will be

recorded. At the end of the sampling period, the vacuum/pressure gauge valve on the sampler is briefly opened and closed. The canister valve is closed and the sampling line is disconnected from the canister and the canister is removed from the system. The chain-of-custody form is complete and the canister is shipped to the Severn Trent Laboratories, Inc. in Carol Stream, Illinois for analysis.

ANALYTICAL PROCEDURES

VOLATILE ORGANIC COMPOUND SAMPLE ANALYSIS

Sample analysis and VOC determination will be performed in accordance with the USEPA Method TO-14A *"Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography"*. For analysis, the canisters are pressurized to two atmospheres using Nitrogen gas. The canisters are attached to a pressurized Nitrogen source, with an electronic gauge that measures in millimeters of mercury (mm of Hg) and the value when the canister is opened. The initial pressure is recorded in the logbook and the canister is pressurized to two atmospheres.

The sample is introduced into the gas chromatograph by a modified SW846 purge and trap method 5030B. All purge tubes are washed with reagent water and should be microwaved for a minimum of five minutes prior to use. The gas sample is bubbled through five-milliliters of water containing internal standard/surrogate placed in a specially designed purging chamber at ambient temperature. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column is heated and back-flushed with Helium gas to desorb the purgeables that are detected with a mass spectrometer.

Identification of the target analytes is accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using

a five-point calibration curve. The qualitative identification of each compound determined by this method is based on retention time, and on comparison of the sample mass spectrum, after background correction with characteristic ions in a reference mass spectrum. The laboratory generates the reference mass spectrum.

QUALITY ASSURANCE/QUALITY CONTROL

To insure the generation of sufficiently high quality data from both field sampling and laboratory analysis, the following quality assurance (QA) procedures will be observed in addition to the Severn Trent Laboratories, Inc. Quality Assurance Plan and lab standard operating procedures (SOP's) included in Appendix A:

1. Pre and post-sampling measurements with a certified mass flow controller for flow verification of the sampling system will be performed with each test run.
2. Canisters will be leak tested before sample collection, the pressure not varying more than ± 13.8 kPa over a 24-hour period.
3. All canisters will be certified clean before sample collection.
4. Chain-of-custody forms will be initiated by Air/Compliance Consultants, Inc. (ACCI) and shall accompany all field samples and blanks in transit to Severn Trent Laboratories, Inc. located in Carol Stream, Illinois for analysis. The site name, sample location, sample number, date and time of collection will be recorded on the forms. Chain-of-custody forms will track samples through all phases of field collection, extraction, and analysis.

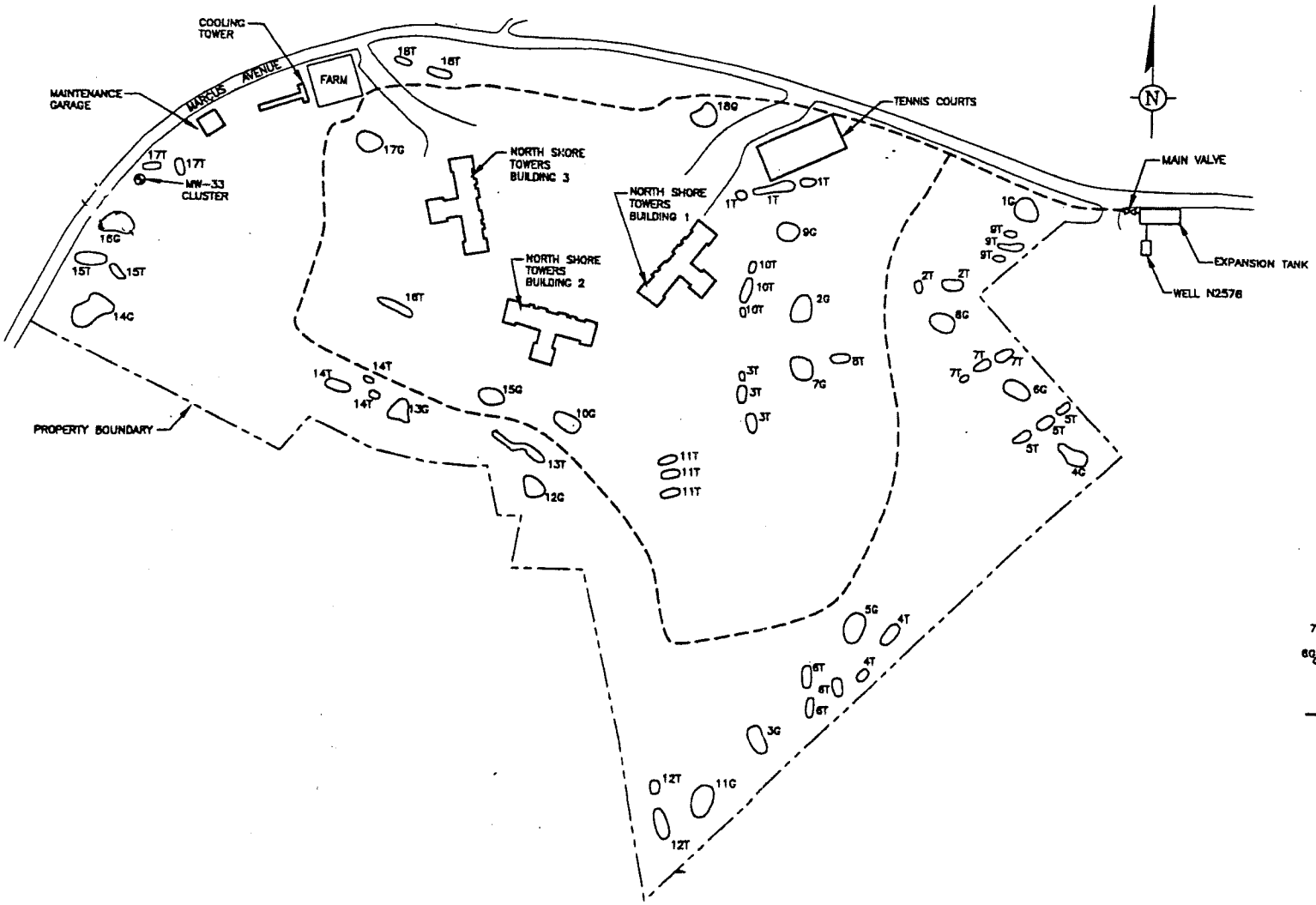
SUMMARY

ARCADIS Geraghty & Miller will conduct ambient air testing for LMC located in Great Neck, New York. The sampling site will be the North Shore Towers golf course located in Floral Park, New York. The testing will be conducted in accordance with a request from the NYSDEC and the NYSDOH. ARCADIS Geraghty & Miller will be testing for the following VOCs: chloroform, 1,1-dichloroethylene, 1,2-dichloroethylene, tetrachloroethylene, and trichloroethylene. These chemicals could potentially be released into the atmosphere from the water spray irrigation system.

The sample collection and analysis of these contaminants will be performed according to USEPA Method TO-14A. The results will be used to further characterize potential impacts to ambient air quality and will be used to reevaluate potential exposure pathways for the risk assessment and update the baseline risk assessment as required. A preliminary testing date has been set for the week of August 14, 2000.

FIGURE 1

Irrigation System Area Detail



KEY

7T — TEE LOCATION AND DESIGNATION

6G — GREEN LOCATION AND DESIGNATION

—— WATER MAIN (LOCATION APPROXIMATE)

MW-33 LOCATION AND DESIGNATION OF EXISTING MONITORING WELL CLUSTER

SCALE: 1"=300'-0"

G:\APPROVED\LOCKHEED_MARTIN\GREAT_NECK\CADD\GOLF_BASE.DWG 1=300

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NO.	DATE	REVISION DESCRIPTION	BY
			CKD

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FLORAL PARK, NEW YORK

LOCKHEED MARTIN CORPORATION
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APPENDIX A

Severn Trent Laboratories, Inc. Quality Assurance Plan and Standard Operating Procedures

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DETERMINATION OF VOLATILE ORGANIC COMPOUNDS IN AIR by MODIFIED METHOD TO14A

1.0 Purpose

To provide the procedures necessary for the determination of a number of the volatile organic compounds listed in TO14A method. The actual analysis is based on a purge and trap GC/MS method.

2.0 Scope

Applies to the analysis of air analyzed within the GC/MS Volatile department. The method includes a list of the compounds that it may be used to determine. The list in the method is lengthy and it is not practical or appropriate to attempt to determine all the analytes simultaneously. The analyte list does not imply a regulatory requirement for the analysis of any or all of the compounds, but rather, indicates the method which may be applicable to those analytes. Compounds not found in the following list will be dealt with on a client specific basis as to whether to TIC for the compounds or to analyze and compare to a one point standard.

The following list of compounds are determined by this SOP simultaneously.

Analyte	CAS NO.	
Acetone	67-64-1	pp
Benzene	71-43-2	
Bromochloromethane	74-97-5	
Bromodichloromethane	75-27-4	
4-Bromofluorobenzene (surr.)	460-00-4	
Bromoform	75-25-2	
Bromomethane	74-83-9	
2-Butanone (MEK)	78-93-3	pp
Carbon disulfide	75-15-0	pp
Carbon tetrachloride	56-23-5	
Chlorobenzene	108-90-7	
Chlorobenzene-d_5 (I.S.)	3114-55-4	
Chlorodibromomethane	124-48-1	
Chloroethane	75-00-3	
Chloroform	67-66-3	
Chloromethane	74-87-3	
2-Chlorotoluene	95-49-8	
1,2-Dibromoethane	106-93-4	
1,2-Dichlorobenzene	95-50-1	
1,3-Dichlorobenzene	541-73-1	
1,4-Dichlorobenzene	106-46-7	
cis-1,4-Dichloro-2-butene	1476-11-5	
Dichlorodifluoromethane	75-71-8	
1,1-Dichloroethane	75-34-3	
1,2-Dichloroethane	107-06-2	
1,2-Dichloroethane-d4 (surr)	17060-07-0	
1,1-Dichloroethene	75-35-4	
cis-1,2-Dichloroethane	156-59-2	
trans-1,2-Dichloroethene	156-60-5	
1,2-Dichloropropane	78-87-5	
cis-1,3-Dichloropropene	10061-01-5	

Analyte	CAS NO.	
trans-1,3-Dichloropropene	10061-02-6	
Dichlorotetrafluoroethane	76-14-2	
1,4-Difluorobenzene (I.S.)	540-36-3	
Ethylbenzene	100-41-4	
4-Ethyl toluene	622-96-8	
Hexachlorobutadiene	87-68-3	
n-Hexane	110-54-3	
2-Hexanone	591-78-6	pp
Iodomethane	74-88-4	
Methylene chloride (DCM)	75-09-2	
4-Methyl-2-pentanone (MIBK)	108-10-1	pp
Methyl-tertbutyl ether		
Styrene	100-42-5	
1,1,2,2-Tetrachloroethane	79-34-5	
Tetrachloroethene	127-18-4	
Toluene	108-88-3	
Toluene-d8 (surr.)	2037-26-5	
1,2,4-Trichlorobenzene	120-82-1	
1,1,1-Trichloroethane	71-55-6	
1,1,2-Trichloroethane	79-00-5	
Trichloroethene	79-01-6	
Trichlorofluoromethane	75-69-4	
1,1,2-Trichlorotrifluoroethane	76-13-1	
1,3,5-Trimethylbenzene	108-67-8	
1,2,4-Trimethylbenzene	95-63-6	
Vinyl acetate	108-05-4	
Vinyl chloride	75-01-4	
o-Xylene	95-47-6	
m-Xylene*	108-38-3	
p-Xylene*	106-42-3	

* = Coeluters
pp - poor purging efficiency resulting in higher reporting limits
I.S. - Internal Standard
surr - surrogate

3.0 Responsibilities

3.1 It is the responsibility of the supervisor to ensure all chemists and technicians are trained and adhere to the guidelines and procedures outlined in this SOP.

3.2 It is the responsibility of all chemists and technicians to adhere to the guidelines and procedures outlined in this SOP.

3.3 It is the responsibility of the supervisor, chemists, and technicians to ensure that this SOP actually reflects what is being performed in the laboratory.

4.0 References

4.1 This SOP is based in part on *Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS), Method 8260B, SW846, 3rd Edition, 3rd Update, December 1996.*

4.2 This SOP is based in part on *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Compendium Method TO14A.*

5.0 Preservation and Holding Time

5.1 See STL-PN SOP 1040 (Sample Preservation and Holding Times) for applicable preservation and holding time requirements.

5.2 The following table summarizes the various preservation and holding times for volatile air samples to be analyzed by GC/MS.

CLP SAMPLE CONTAINERS, SAMPLE VOLUMES, PRESERVATION TECHNIQUES, AND HOLDING TIMES[1]					
PARAMETER	**METHOD**	**MATRIX**	**CONTAINER**	**PRES.**	**MAX HOLD TIME**
Volatiles by GC/MS	TO-14	Air	Summa canister	None	Analysis within 30 days of sampling.
	TO-14	Air	Tedlar bag	None	Analysis within 8 days of sampling.
	TO-14	Air	Tedlar bag (FL)	None	Analysis within 3 days of sampling.

5.3 Avoid exposing Tedlar bags to sunlight.

5.4 See section 10.0 of this SOP for additional information.

6.0 Method Summary

6.1 The volatile compounds are introduced into the gas chromatograph by a modified SW846 purge and trap method 5030B. Identification of target analytes is accomplished by comparing their mass spectra with the electron impact spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using a five-point calibration curve.

6.2 When analyzing air samples, the sample (and/or Helium) gas is bubbled through 5 ml of water containing internal standard/surrogate contained in a specially designed purging chamber at ambient temperature. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column is heated and back-flushed with Helium gas to desorb the purgeables that are detected with a mass spectrometer.

7.0 Interferences

7.1 Organic compounds out-gassing from the plumbing ahead of the trap and solvent vapors in the laboratory account for the majority of contamination problems. Maintenance and corrective action are performed as needed.

7.2 Contamination by carry-over can occur whenever high level and low level samples are sequentially analyzed. To reduce carry-over, the purge tube, autosampler port, and sampling syringe are rinsed with reagent water between sample analyses. Whenever a highly concentrated (>3000 ng) sample is encountered, it is followed by analysis of a reagent water blank tube (in the same autosampler position as the highly concentrated sample) to check for cross contamination. Analysis of the blank to check for cross contamination shall occur during the next autosampler sequence or when convenient. If target compounds are found in samples analyzed after a highly concentrated sample,

those samples will be reanalyzed to determine if the samples were cross contaminated. Following analysis of highly concentrated samples, the analyst may determine that cleaning procedures need to be performed. See Section 18.0 (Maintenance) of this SOP.

7.3 Samples are screened as necessary to reduce the possibility of contaminating the purge and trap and/or autosampler. Results from other departments are noted (if available) before GC/MS analysis of the sample commences to determine if dilution is necessary.

7.4 Purge tubes are cleaned by rinsing with reagent water, scrubbing inside of purge tube with a brush (if necessary) and microwaving at 100% power for a minimum of 5 minutes. This has been shown to remove all target compounds from the purge tubes.

8.0 Equipment

8.1 The equipment necessary to perform analysis consists of a purge and trap device connected to a gas chromatograph which is interfaced to a mass spectrometer.

8.1.1 (1) HP-5971A Mass Spectrometer.

8.1.2 (1) OI 4460A Purge and Trap with MPM-16 Autosampler. All are type "E" traps.

8.1.3 (1) HP 5890 Gas Chromatograph.

8.1.4 (1) Restek DB502.2, 105m, 0.53 μm film, 3 mm ID capillary columns. The capillary column is interfaced to the mass spectrometer source through a jet separator. (Catalog # 10910)

8.1.5 (1) Unit instruments mass flow controller.

8.1.6 Injection port liner (HP Catalog # 5062-3587 or 5181-8818) modified by removing the 0.5 cm plug of glass wool. A 0.53mm ID column is mounted 4 mm into the liner from the oven side of the injection port.

8.2 (1) Microwave (800-1000 watts).

8.3 Microsyringes - 10, 25, 100, 250, 500, and 1,000 μl.

8.4 Syringe valve - Two-way, with Luer ends.

8.5 Syringes - 5 and 25-mL Hamilton.

8.6 Balance - Analytical, capable of weighing 0.0001 g, and top-loading, capable of weighing 0.01g. Calibration of balances are performed per STL-PN SOP 1056 (Calibration of Laboratory Balances and Laboratory Weights).

8.7 Vials - 2 mL with PTFE crimp tops for working standard storage.

8.8 Disposable pipettes - Pasteur.

8.9 Volumetric flasks, Class A - 10 ml, 50 ml and 100-mL, with ground glass stoppers.

8.10 Spatula - stainless steel.

8.11 Purge tubes (Hammet, Tekmar, or CPI - 5ml and 25ml volume size)

9.0 Reagents and Standards

9.1 Reagent water is defined as water free of analyte(s) of interest [i.e., analyte(s) of interest not observed at MDL] when employed in this procedure. See STL-PN SOP 2007 (Reagent-Grade Water).

9.2 Methanol - purge and trap grade or equivalent.

9.3 Standards are prepared, labeled, and stored in accordance with STL-PN SOP 2000 (Preparation, Storage, and Use of Analytical Standards and Reagents). QC Standard traceability is performed in accordance with STL-PN SOP 2009 (Quality Control Standard Traceability) and STL-PN CompQAP Section 9. NIST standards are used whenever requested by the client.

9.4 Stock Solutions

9.4.1 Stock solutions are prepared in methanol from neat and high concentration certified solutions after the glassware has been prepared:

9.4.1.1 Wash a 25 or 50 ml ground glass stoppered volumetric flask and the glass stopper with water and methanol.

9.4.1.2 Microwave the volumetric flask and glass stopper for a minimum of 10 minutes at 100% power.

9.4.1.3 Allow volumetric flask and glass stopper to cool to ambient temperature.

9.4.2 Volume of neat or high concentration standard to add in µl = x

$$\frac{x\ (\mu l)}{\text{conc. required in ppm } (\mu g/ml)} = \frac{\text{volume required (l)}}{\text{Density of neat standard (g/ml)}}$$

9.4.3 Place 10 ml of methanol in the cleaned 25 or 50 ml ground, glass-stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 minutes or until all methanol-wetted surfaces have dried.

9.4.4 Using a syringe, immediately add volume of neat standard to the flask. The liquid must fall directly into the methanol without contacting the neck of the flask.

9.4.5 Dilute to volume, QS to the required muniscus, stopper, and then mix by inverting the flask three times. When compound purity is assayed to be 96% or greater, the volume of standard to add may be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards may be used at any concentration if they are certified by the manufacturer.

9.4.6 Transfer the stock standard solution into a bottle with a PTFE-lined crimp-top cap. Store with minimal headspace and protected from light, at -10 to -20°C. Standards will be returned to the freezer as soon as the analyst has completed mixing or diluting the standards to prevent the evaporation of volatile target compounds.

9.5 Working Standards

9.5.1 Working Standards are prepared in cleaned 25 or 50 ml ground glass-stoppered volumetric flasks. See Sections 9.4.1.1-9.4.1.3 for glassware preparation. Tables 9.0, 9.1, 9.2, 9.3, 9.4, 9.5 and 9.6 show the different working standards which are prepared.

Table 9.0 - Modified TO-14A Calibration Mix

Mix	Final Volume	Parent conc. (ppm) µg/ml	Amount Added (µl)	Final conc. (ppm) µg/ml
TO-14 Custom Mix	50 ml	2500	500	25
Acrolien/Acrylonitrile	50 ml	2500	500	25
Custom Ketones Mix	50 ml	2000	625	25

Table 9.1 - TO-14A Second Source Mix (25 ppm)

Mix	Final Volume	Parent conc. (ppm) µg/ml	Amount added (µl)	Final conc. (ppm) µg/ml
MTBE Standard	50 ml	2000	625	25
502.2 Calibration Mix 1	50 ml	2000	625	25
502A - R mix	50 ml	2000	625	25
M-8260 Add on mix	50 ml	2000	625	25

Note: This mix does not contain the following: Dichlorotetrafluoroethane 4-Ethyl Toluene, n-Hexane, or Trichlorotrifloroethane. It contains Bromochloromethane which is used as an internal standard in this SOP. Ketones are from the same source (at the present time).

Table 9.2 - Modified TO-14A Internal Standard/Surrogate Working Stock Mix (25 ppm)

Mix	Final Volume	Parent Conc. (PPM)	Amount Added	Final Conc. (PPM)
IS (x)	50 ml	2500	500 µl	25
SURR (x)	50 ml	2500	500 µl	25

Table 9.3 - Modifed TO-14A Matrix Spike Working Stock Mix

Mix	Final Volume	Parent Conc. (PPM)	Amount Added	Final Conc. (PPM)
Matrix Spike Mix	25 ml	1000	625 µl	25

9.5.2 Upon client request, project specific spikes will be made for the projects. Control limits for these spikes will come from agreement between STL-PN and client or the results of these spikes will be reported without control limits.

9.5.3 Preparation of Calibration Curve

The initial calibration standards are prepared at 25, 100 or 250, 500, 1000, and 2000 ng. These standards are prepared from the 25 PPM mixes of modified TO-14A working standard and IS/SURR. This is done by adding the appropriate amounts of standards (in µl) to each of 6 purge tubes. (See table 9.4) The final volume is 5 ml. Five mls of water is placed into the syringe before standard mixes are added. The standard mixes are then placed into 5 ml purge tubes (or as appropriate).

Table 9.4 - 8260B/8240BMOD/624mod/OLM03.1 Calibration Curve

Final Conconcentration Calibration Standard (ng)	Amount to Add of Modified TO-14A Working Standard (µl)	Amount Added of Surrogate Standard Mix (µl)
2000	80	10
1000	40	10
500	20	10
250	10	10
100	4	10
50	1	10

*IS/SURR at 250ng

9.5.4 The GC/MS Volatile Standards Cross Reference

Table 9.5 - GC/MS Volatile Standards Cross Reference

Mix Name	Restek Catalog #	Accustandard Catalog #	Supelco Catalog #
VOA Calibration Mix 1	30006	CLP-022K	4-8949
8240 VOA Mix 1	30077	----------	---------
8010 Calibration Mix 2	30056	----------	---------
8010 Calibration Mix 3	30057	----------	---------
Voa Calibration Mix 2	30007	----------	---------
VOA Custom Mix	51732	----------	---------
502.2 Calibration Mix	30042	----------	4-7367
8240 Standard Kit	30079		
Purgeable 8240 IS	30004	CLP-PIPS	4-7357
Purgeable 8240 Surr	30011	CLP-PIPS	4-7076
Purgeable Organic Matrix Spike Solution	30005	CLP-003-R	4-7075-U-40x
Acrolein, neat	----------	----------	4-8501
8260 IS	30074-500	----------	---------
8260 Surr	30240-500	----------	---------

502.2 Calibration mix 1	30042-500	M-502B-10X	4-8799-U
502.2A - R-10X mix		M-502A-R-10X	5-02111
M-8260-Add-10X	54694	M-8260-Add-10X	
M-8240 VOA Kit	30079-500	----------	----------
Methyltertbutyl Ether 2000 ppm	----------	5-078-10X	
Isopropyl ether	----------	----------	----------
TO-14A Custom Mix	----------	----------	20019140
502.2 VOA Calibration Kit	----------	----------	30444-500

9.5.5 The compounds in the GC/MS Volatile standard mixes are listed below:

VOA CALIBRATION MIX #1 (5000 µg/ml ea. in P&T methanol, 1 ml/ampule)	**VOA CALIBRATION MIX #2 (2000 µg/ml ea. in P&T methanol, 1 ml/ampule)**	**8240 Volatiles, MIX #1 (2000 µg/ml ea. in P&T methanol, 1 ml/ampule)**	**502.2 CALIBRATION MIX #1 (2000 µg/ml ea. in P&T methanol, 1 ml/ampule)**
Acetone	Benzene	Acetonitrile	Bromomethane
2-Butanone	Carbon Disulfide	Allyl Chloride	Chloroethane
2-Hexanone	Ethyl Benzene	Ethyl methacrylate	Chloromethane
4-Methyl-2-Pentanone	Toluene	Methacrylonitrile	Dichlorodifluoromethane
	Vinyl Acetate	Methyl methacrylate	Trichlorofluoromethane
	o-xylene	2-Picoline	Vinyl Chloride
	p-xylene	Propionitrile	
		Pyridine	
		Styrene	

8010A CALIBRATION MIX #2 (2000 µg/ml ea. in P&T methanol, 1 ml/ampule)	**8010A CALIBRATION MIX #3 (2000 µg/ml ea. in P&T methanol, 1 ml/ampule)**	**VOLATILES CUSTOM MIX (see below)**	
Benzyl Chloride	Bromobenzene	1,2-Dibromo-3-Chloropropane	2000 µg/ml
Bromodichloromethane	2-Chloroethyl vinyl ether	Cis-1,4-Dichloro-2-Butene	2000 µg/ml
Bromoform	Chloroform	Trans-1,4-Dichloro-2-Butene	2000 µg/ml
Carbon Tetrachloride	Dibromochloromethane	Iodomethane	2000 µg/ml
Chlorobenzene	Dibromomethane	1,2-Dibromoethane	2000 µg/ml
1,2-Dichlorobenzene	1,4-Dichlorobenzene	m-xylene	2000 µg/ml
1,3-Dichlorobenzene	1,1-Dichloroethane	Cis-1,2-Dichloroethene	2000 µg/ml
1,1-Dichloroethene	1,2-Dichloroethane	methyl-tert-butyl ether	2000 µg/ml
Trans-1,2-Dichloroethene	1,2-Dichloropropane	Acrylonitrile	10000 µg/ml
Cis-1,3-Dichloropropene	1,1,1,2-Tetrachloroethane		
Trans-1,3-Dichloropropene	1,1,2,2-Tetrachloroethane		
Methylene Chloride	1,1,1-Trichloroethane		
Tetrachloroethene	1,1,2-Trichloroethane		

Trichloroethene			
1,2,3-Trichloropropane			

M-502A-R-10X - 2.0 mg/mL each in MeOH

Benzene (01)	2,2-Dichloropropane (32)
Bromobenzene (02)	1,1-Dichloropropene
Bromochloromethane (03)	cis-1,3-Dichloropropene (34A)*
Bromodichloromethane (04)	trans-1,3-Dichloropropene (34B)**
Bromoform (05)	Ethylbenzene (35)
n-Butylbenzene (07)	Hexachlorobutadiene (36)
Sec-Butylbenzene (07)	Isopropylbenzene (Cumene) (37)
Tert-Butylbenzene (09)	p-Isopropyltoluene (p-Cymene) (38)
Carbon tetrachloride (10)	Methylene chloride (39)
Chlorobenzene (11)	Napthalene (40)
Chloroform (13)	n-Propylbenzene (41)
2-Chlorotoluene	Styene (42)
4-chlorotoluene (16)	1,1,1,2-Tetrachloroethane (43)
Dibromomethane (20)	1,2,3,-Trichlorobenzene (47)
1,2-Dichlorobenzene (21)	1,2,4-Trichlorobenzene (48)
1,3-Dichlorobenzene (22)	1,1,1-Trichloroethane (49)
1,4-Dichlorobenzene (23)	1,1,2-Trichloroethane (50)
1.1-Dichloroethane (25)	Trichloroethane (51)
1,2-Dichloroethane (26)	1,2,3-Trichloropropane (53)
1,1-Dichloroethene (27)	1,2,4-Trimethylbenzene (54)
Cis-1,2-Dichloroethane (28)	1,3,5-Trimethylbenzene(55)
Trans-1,2-Dichloroethene (29)	o-Xylene (57)
1,2-Dichloropropane	m-Xylene (58)
1,3-Dichlorpropane	p-Xylene (59)

Additional Analytes to Method 8260 - M-8260-ADD-10X (2.0 mg/mL each in MeOH)	**8260 Internal Standard Mix** (2500 ug/ul)	**8260 Surrogate Mix** (2500 µg/ml)	**502.2 Calibration Mix #1** (2000 ug/ul)
Acetone	chlorobenzene-d5	4-bromofluorobenzene	bromoethane
2-Butanone	1,4-dichlorobenzene-d4	dibromofluoromethane	trichlorofluoromethane
Carbon disulfide	1,4-difluorobenzene	1,2-dichloroethane-d4	chloromethane
2-Chloroethyl vinyl ether	pentafluorobenzene	toluene-d8	vinyl chloride
2-Hexanone			chloroethane
Idodmethane			dichlorodifluoromethane
4-Methyl-2-pentanone			
Vinyl acetate			

Modified TO-14A Custom Mix

Benzene	Styrene
Bromodichloromethane	Tetrachloroethene
Bromoform	Toluene
Bromomethane	trans-1,3-Dichloropropene (E)
Carbon Disulfide	trans-1,2-Dichloroethylene
Carbon Tetrachloride	trans-1,4-Dichloro-2-butene
Chlorobenzene	Trichloroethylene
Chloroethane	Trichlorofluoromethane
Chloroform	Vinyl chloride
Chloromethane	1.1-Dichloroethane
cis-1,3-Dichloropropene (z)	1,1-Dichloroethylene
cis-1,2-Dichloroethylene	1,1,1-Trichloroethane
cis-1,4-Dichloro-2-butene	1,1,2-Trichloroethane
Dibromochloromethane	1,1,2,2-Tetrachloroethane
Dichlorodifluoromethane	1,2-Dibromomethane
Ethylbenzene	1,2-Dichlorobenzene
Freon 113	1,2-Dichloroethane
Freon 114	1,2-Dichloropropane
Hexachlorobutadiene	1,2,4-Trichlorobenzene
Hexane	1,2,4-Trimethylbenzene
m-Xylene	1,3-Dichlorobenzene
Methyl tert-butyl ether	1,3,5-Trimethylbenzene
Methylene chloride	1,4-Dichlorobenzene
Napthalene	2-Chlorotoluene
o-Xylene	4-Ethyltoluene
p-Xylene	

10.0 Sample Handling and Chain of Custody

10.1 Samples are received in the laboratory in STL-PN's Sample Control department. Samples are stored in the GC/MS department in a designated area. Sample Control personnel deliver to the GC/MS Volatile department the samples that are intended for Volatile analysis by GC/MS.

10.2 Analysts keep track of VOA samples by means of a sample logbook located in the GCMS laboratory. The analyst logs the samples in the logbook as they are received by the department.

10.3 VOA analysis of Summa canister air samples is to be performed within 30 days of sampling. Tedlar bag samples are to be analyzed within 8 days of sampling (Florida Tedlar bags are to be analyzed within 3 days of sampling). When there are impeding or current problems that are anticipated to prevent analysis within these limits, the analyst is to inform the GCMS Supervisor or project manager.

10.4 For more information see STL-PN SOP 1040 (Sample Preservation and Holding Times).

11.0 GC/MS Computer Libraries

Before analyses are conducted, STL-PN-generated libraries of TCL mass spectra are created. A reverse search of the library that contains all requested target compounds is performed and quantitation follows. Spectra is always verified by a senior mass spectroscopist, the department supervisor, or another technically qualified person to ensure proper identification of compounds. Refer to Table 11.0 for compounds corresponding to Internal Standard for calculation.

Table 11.0 - Modified TO-14A Volatile Internal Standards with corresponding analytes assigned for quantitation.

Bromochloromethane (IS)	1,4-Difluorobenzene (IS)
1,2-Dichloroethane-d4	Toluene-d8
Dichlorodifluoromethane	Benzene
Dichlorotetrafluoroethane	Trichloroethene
Chloromethane	1,2-Dichloropropane
Vinyl Chloride	Bromodichloromethane
Bromomethane	4-methyl-2-pentanone
Chloroethane	cis-1,3-Dichloropropene
Acrolien	Toluene
Acetone	trans-1,3-Dichloropropene
Trichlorofluoromethane	1,1,2-Trichloroethane
1,1,2-Trichlorotrifluoroethane	2-Hexanone
1,1-Dichloroethene	
Iodomethane	Chlorobenzene-d5 (IS)
Methylene chloride	
Acrylonitrile	4-Bromofluorobenzene
Carbon Disulfide	Tetrachloroethane
Methyl tert-butyl ether	Dibromochloromethane
trans-1,2-Dichloroethene	Chlorobenzene
n-Hexane	Ethylbenzene
Vinyl acetate	m,p-Xylene
1,1-Dichloroethane	o-Xylene
2-Butanone	Styrene
cis,-1,2-Dichloroethene	Bromoform
Chloroform	1,1,2,2-Tetrachloroethane
1,1,1-Trichloroethane	1,4-Dichloro-2-butene
Carbon tetrachloride	4-Ethyltoluene
1,2-Dichloroethane	1,3,5-Trimethylbenzene
1,2-Dibromoethane	2-Chlorotoluene
	1,2,4-Trimethylbenzene
	1,3-Dichlorobenzene
	1,4-Dichlorobenzene
	1,2-Dichlorobenzene
	1,2,4-Trichlorobenzene
	Hexachlorobutadiene

12.0 Analysis

12.1 GC/MS operating conditions. These are guideline parameters and may be different per GC/MS system.

Chromatographic conditions	Samples	BFB
Injector temperature	250°C	
Transfer line temperature	120°C	
Separator temperature	215°C	
GC ramp	40°C for 4 minutes then 6°C/min to 165°C then 27°C/min to 250°C then 250°C for 8 min	Finn GC ramp 220°C isocratic or 60°C to 250°C at 25°C per min

OI

Purge & trap conditions

Purge temp	water - ambient (≤ 34°C)
Purge flow	40 ml/min
Purge	12 min. 30 sec.
Dry purge	1 min.
Desorb preheat	135°C
Desorb	4 min.
Desorb temp	210°C
Bake time	5 min
Bake temp	220°C

OI 4460A

Valve oven	150°C
Transfer line	150°C
Standby temp	34°C

Mass spec conditions

Mass range	35-350 amu
Scan time	Set by HP-MSD software
Source temp	approximately 155°C

Column

Restek RTX 502.2, 105m, 3.0 µm film, 0.53 mm id.

12.2 Mass Calibration

12.2.1 The instrument must be calibrated for nominal resolution before samples can be analyzed. The calibration compound, FC43, is used for this purpose. The compound ranges include higher mass units for verification of resolution. Calibration of the instrument should be performed as needed.

12.2.2 If the peaks of the FC43 calibration compound will not meet criteria, the mass spectrometer may require one of the following maintenance items.

12.2.2.1 Autotune for BFB using the HP software.

12.2.2.2 Manually tune by varying the lens source and electron multiplier voltages to produce acceptable mass resolution and sensitivity.

12.2.2.3 Switch filaments.

12.2.2.4 Clean the mass spectrometer source.

12.2.2.5 Call mass spectrometer manufacturer for help in determining and resolving the problem.

12.3 BFB Tuning

12.3.1 The tuning compound for Volatile analysis is 4-Bromofluorobenzene. The tuning masses and qualifications are listed in Table 12.1.

12.3.2 1 µl of a 50ng/µl solution of BFB is directly injected and chromatographed using acquisition parameters listed in Table 12.1. Final relative abundance and isotope resolution is to fulfill criteria in Table 12-1.

Table 12.1

M/E	ION ABUNDANCE CRITERIA
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	Base peak, 100% relative abundance
96	5 to 9% of mass 95
173	Less than 1% of mass 95
174	Greater than 50% of mass 95
175	5 to 9% of mass 174
176	Between 95% and 101% of mass 174
177	5 to 9% of mass 176

12.3.3 The instrument must meet these criteria before sample analysis can begin. The instrument must be tuned every twelve hours.

12.3.4 If the BFB will not meet the ion abundance criteria in Table 12-1 then follow the following steps.

12.3.4.1 Reanalyze BFB without any changes.

12.3.4.2 Use steps 12.2.2.2 through 12.2.2.5

12.3.5 The mass spectrum of BFB is acquired as follows. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and must be accomplished

using a single scan no more than 50 scans prior to or after the elution of BFB. Do not background subtract part of the BFB peak.

NOTE

All subsequent standards, samples, MS/MSDs, LCSs, and blanks associated with a BFB analysis must use identical mass spectrometer instrument conditions.

NOTE

-The BFB and calibration standard may be combined into a single standard as long as both tuning and calibration verification acceptance criteria can be met without interferences.

12.4 Initial Calibration

12.4.1 To prepare the initial calibration, add the appropriate volume of working standard and IS/SURR (see table 9.4) to a 25 µl microsyringe. Inject the working standard and IS/SURR to 5ml of reagent water contained in a 5 ml Luer-lock syringe. A set of five, or more if necessary, calibration standards are used.

12.4.2 The internal standards and their associated compounds and quantitation ions are found in Table 11.1. The compounds are grouped as to which internal standard is the nearest in retention time.

12.4.3 Proceed with the analysis of the calibration standards.

12.4.4 Tabulate the area response of the characteristic ions (see Table 11.1) against the concentration for each target analyte and each internal standard. Calculate response factors (RF) for each target analyte relative to one of the internal standards.

The RF is calculated as follows:

$$RF = \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

where:
A_s = Peak area of the analyte or surrogate.
A_{is} = Peak area of the internal standard.
C_s = Concentration of the analyte or surrogate.
C_{is} = Concentration of the internal standard.

12.4.5 Once the response factors are generated, an average response factor (RF) of the five points from the initial calibration is calculated using the following equation:

$$RF = \frac{(A+B+C+D+E)}{5}$$

A through E are the respective response factors generated in QUAN for the differing concentrations of the VOA standards.

12.4.6 The computer uses software programs that work with the response factors to create daily and initial calibration forms.

12.4.7 In the Initial Calibration, five compounds, System Performance Check Compounds (SPCC), are checked for a minimum average response factor (RF). The SPCC compounds are chloromethane, 1,1-dichloroethane, bromoform, 1,1,2,2-tetrachloroethane, and chlorobenzene. The minimum mean response factors for the volatile SPCCs are as follows:

Chloromethane	0.10
1,1-Dichloroethane	0.10
Bromoform	0.10
Chlorobenzene	0.30
1,1,2,2-Tetrachloroethane	0.30

12.4.7.1 The SPCC compounds are used to measure compound instability, contamination and active sites in the system. Examples of these occurrences are:

12.4.7.1.1 Chloromethane - This compound is the most likely to be lost if the purge flow is too fast.

12.4.7.1.2 Bromoform - This compound is the most likely to be lost if the purge flow is too slow.

12.4.7.1.3 Tetrachlorethene, 1,1-Dichloroethane - these compounds can be deteriorated by contaminated transfer lines in purge and trap systems and/or active sites in trapping materials.

12.4.8 Six compounds, the Calibration Check Compounds (CCCs), are used to evaluate the curve. Calculate the standard deviation (SD) and relative standard deviation (RSD) of the response factors for all target analytes from the initial calibration, as follows:

$$SD = \sqrt{\sum_{i=1}^{N} \frac{(RF_i - \overline{RF})^2}{N-1}} \qquad RSD = \frac{SD}{\overline{RF}} X100$$

where:
RF_i = RF for each of the calibration standards
$\overline{RF}$ = mean RF for each compound from the initial calibration
n = Number of calibration standards, e.g., 5

The % RSD for each individual CCC must be ≤ 30%. The CCC compounds are 1,1-Dichloroethene, Chloroform, 1,2-Dichloropropane, Toluene, Ethyl benzene, and Vinyl Chloride. By method, all non-CCC compounds RSDs should be < 15%. All compounds with an RSD <15% can use the average of the initial calibration, and all compounds with an RSD > 15% should use linear regression from the initial calibration. However, the GC/MS software currently in use at STL-Pensacola cannot use both an average RF for all compounds less than < 15% RSD and linear regression for compounds >15% RSD at the same time. Therefore, whenever a non-CCC compound exceeds the 15% RSD criteria, a corrective action form is completed and submitted to the QA department and attached to the blue sheet along with a copy of the initial calibration. The average RF is used to quantitate from the initial calibration for all compounds.

$$\%RSD = \frac{\text{Standard Deviation}}{\text{mean}} \times 100$$

12.4.9 If an RSD of greater than 30% is measured for any CCC, then corrective action is required before proceeding. The following is a short list of items to check and do before attempting another initial calibration.

12.4.9.1 Verify integrations are correct.

12.4.9.2 Replace injection port liner and gold seal.

12.4.9.3 Clip off first 6 inches of capillary columns.

12.4.9.4 Replace capillary column.

NOTE

Evaluation of retention times - The relative retention times of each target analyte in each calibration standard should agree within 0.06 relative retention time units. Late-eluting compounds usually have much better agreement.

12.5 GC/MS calibration verification (continuing calibration) - Calibration verification consists of three steps that are performed at the beginning of each 12-hour analytical shift.

12.5.1 Prior to the analysis of samples or calibration standards, inject 50 ng of the 4-bromofluorobenzene standard into the GC/MS system. The resultant mass spectra for the BFB must meet the criteria given in Table 12.1 before sample analysis begins. These criteria must be demonstrated each 12-hour shift during which samples are analyzed.

12.5.2 The initial calibration curve (Sec. 12.4) for each compound of interest is verified once every 12 hours prior to sample analysis, using the modified introduction technique used for samples. This is accomplished by analyzing a 250 ng

calibration standard. This consists of 10 µl of Working Stock Mix and 10 µl of IS/SURR. The Continuing Calibration Standard is injected into 5 ml of reagent water and inserted into a purge tube. The sample is purged onto a trap and desorbed on to the GC column to start the GCMS analysis. The results from the calibration standard analysis must meet the following verification acceptance criteria before analysis may continue.

NOTE

The BFB and calibration verification standard may be combined into a single standard as long as both tuning and calibration verification acceptance criteria for the project can be met without interferences.

12.5.2.1 System Performance Check Compounds (SPCCs)

12.5.2.1.1 A system performance check must be made during every 12-hour analytical shift. Each SPCC compound in the calibration verification standard must meet its minimum response factor (see Sec. 12.4.7). This is the same check that is applied during the initial calibration.

12.5.2.1.2 If the minimum response factors are not met, the system must be evaluated, and corrective action must be taken before sample analysis begins. Possible problems include standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, and active sites in the column or chromatographic system. This check must be met before sample analysis begins.

12.5.2.2 Calibration Check Compounds (CCCs)

12.5.2.2.1 After the system performance check is met, the CCCs listed in section 12.4.8 are used to check the validity of the initial calibration. Use percent difference when performing the average response factor model calibration. Use percent drift when calibrating using a regression fit model.

12.5.2.2.2 If the percent difference or drift for each CCC is less than or equal to 20%, the initial calibration is assumed to be valid. If the criterion is not met (i.e., greater than 20% difference or drift), for any one CCC, then corrective action must be taken prior to the analysis of samples. If the CCCs are not included in the list of analytes for a project, and therefore not included in the calibration

standards, then all analytes must meet the 20% difference or drift criterion. If a partial list of the CCCs is requested, then the CCCs must be less than or equal to 20% difference or drift.

12.5.2.2.3 Problems similar to those listed under SPCCs could affect the CCCs. If the problem cannot be corrected by other measures, a new five-point initial calibration must be generated. The CCC criteria must be met before sample analysis begins.

NOTE

The retention times of the target compounds are updated whenever a shift in the retention times of the compounds are noted from the previous continuing calibration (this is done as needed due to GC maintenance.)

12.5.2.3 Internal standard retention time - The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 30 seconds from that in the mid-point standard level of the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and correction must be made, as required. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

12.5.2.4 Internal standard response - If the EICP area for any of the internal standards in the calibration verification standard changes by a factor of two (-50% to + 100%) from that in the mid-point standard level (250 ng) of the most recent initial calibration sequence, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

NOTE

If changes in retention time are due to the technician clipping the column this should be noted and explained in the maintenance log. If the change causes the retention time to shift more than 30 seconds from the initial calibration, and the data is used, a corrective action form will be submitted to the QA department and the client notified.

In summary, for the daily calibration (continuing calibration), the RF average of the initial calibration is compared to the response

factors generated by the continuing calibration standard to give a percent deviation or drift.

$$\%D = \frac{RF(avg) - RF(50)}{RF(avg)} \times 100$$

The limits are listed on HP forms. The daily calibration has the same SPCC limits as the initial calibration (see section 12.4.7) and a 20% drift (D) limit for CCC compounds. If these criteria are met, the continuing calibration standard is considered valid and samples can be analyzed. The average RF from the initial calibration is used for calculating all results.

12.6 Method Blanks

12.6.1 A method blank is analyzed after the calibration standard, or at any time during the analytical shift, to ensure that the total system (introduction device, transfer lines and GC/MS system) is free of contaminants. If the method blank indicates contamination, then it may be appropriate to analyze a solvent blank to demonstrate that the contamination is not a result of carryover from standards or samples.

12.6.1.1 The method blank is analyzed to verify that the instrument is clean before the samples are analyzed. The method blank is 5ml of water with 10 µl of IS/SURR standard added and purged.

12.6.1.2 The air method blank varies in amount according to client specifications. 10 µl of internal standard/surrogate solution are added to 5 ml of reagent water and the blank is purged at 40 ml/minute for 12 minutes and 30 seconds.

12.6.1.3 The method blank for volatile analysis is to contain no greater than five times the detection limit of common laboratory solvents (common laboratory solvents are: methylene chloride, ketones, and toluene).

NOTE

For method blanks associated with samples from South Carolina, the method blank will not be allowed to contain any contaminants above the method detection limit. Blanks associated with South Carolina samples will follow the criteria listed in section 12.6.1.4 below.

12.6.1.4 For all compounds not listed above, the method blank must contain less than the method detection limit of any single analyte. If a laboratory method blank exceeds criteria, the source of the contamination is investigated and appropriate corrective measures are taken before further sample analysis proceeds (see STL-PN SOP 1060). Samples processed with a method

blank that is out of control (i.e. contaminated) are to be repurged and reanalyzed. A method blank is always analyzed following satisfactory Continuing Calibration standard analysis. Corrective measures include the following:

12.6.1.6.1 Reanalyze another blank to check for a contaminated autosampler position.

12.6.1.6.2 Discard previous bottle of internal standard/surrogate solution and use a fresh bottle and repurge another blank.

12.6.1.6.3 Replace syringes and repurge another blank.

12.6.1.6.4 Purge the position with an empty tube and check for airborne contamination.

12.6.1.6.5 Purge the position with water only to check for contamination in the reagent water.

12.6.1.5 Once an acceptable method blank has been confirmed, LCS analysis may begin.

12.7 Laboratory Control Sample and Second Source Validation.

12.7.1 Once an acceptable method blank has been confirmed, analyze a laboratory control sample. Use 10 µl of the 5 component spike solution and 10 µl of internal standard/surrogate solution in 5 ml of water. For full list samples, put 10 µl of the second source spiking solution (see table 9) and 10 µl of IS/surrogate mix into 5 ml of reagent water and purge. The full list spiking solution is also used as a 2nd source calibration verification.

12.7.2 Once the laboratory control sample has been analyzed, compare the % recoveries to inhouse control limits to determine if criteria have been met.

12.7.3 If checking for second source verification, use the limits of 50-150.

NOTE

No limits established yet.

12.7.4 Once an acceptable LCS has been confirmed, sample analysis may begin.

12.8 Sample Analysis

12.8.1 Cannister preparation: Sample Summa canisters are pressurized to 1520 min of Hg (or 2 ATM) using Nitrogen. Canisters are attached to a pressurized

Nitrogen source, with an electronic gauge which measures in mm of Hg and the value on the Summa canister is opened. The initial pressure is recorded in the log book and the canister is pressurized to 1520 mm of Hg.

12.8.2 Air Sample preparation:

NOTE

All purge tubes are washed with reagent water and should be microwaved for a minimum of 5 minutes prior to use.

12.8.2.1 Rinse syringe and plunger using reagent water.

12.8.2.2 Place a gloved finger over the nozzle of the syringe and pour water in until it overflows.

12.8.2.3 Place the plunger into the end of the syringe and place the nozzle up. Adjust volume to 5 ml as per initial calibration. Verify no bubbles are present.

12.8.2.4 Using a 25 µl syringe, inject 10 µl of the IS/SURR solution into the syringe.

12.8.2.5 Promptly place the water into a clean purge tube on the autosampler and close the sample entry valve.

Table 12.2

Dilution	ML of air purged or added
x2	250
x5	100
x10	50 (1)
x20	25 (1)
x25	20 (1)
x40	12.5 (1)
x50	10 (1)
x100	5 (1)
x200	2.5 (2)
x250	2 (2)
x500	1 (2)
x1000	0.5 (2)
x2000	0.25 (3)
x5000	0.1 (3)
x10000	0.05 (3)
x20000	0.025 (4)

Use the following syringes: (1) 60 ml, (2) 3 ml, (3) 250 µl, (4) 25 µl.

12.8.3 Air Sample Introduction.

Air samples are introduced by two methods. Both methods introduce the IS/surrogate mix and LCS compounds just as a water blank and LCS.

12.8.3.1 For gas samples requiring less than 50 ml of sample, withdraw the appropriate ml of air plus 5 ml more from a purge tube connected to the autosampler and close the sample entry valve. Immediately add the sample gas (in an appropriate size syringe) into the purge tube and close valve. Add 5 ml of reagent water with 10 µl of IS/surrogate mix to the purge tube and close sample entry valve.

12.8.3.2 For samples over 50 ml, place 5 ml of reagent water and 10 µl of IS/surrogate mix into a purge tube which has the purge gas inlet attached to a stainless steel line which goes to a T-valve with an inlet connect to a summa canister and a line to the normal purge gas outlet on the front of the autosampler. A mass flow controller has to be connected to the vent for the trap. Set the flow to 40 ml per minute as appropriate. Using a timer, begin the autosampler purge cycle and allow the required volume of gas to purge through the purge tube (500 ml). Then switch the T-valve so only purge gas goes into the purge tube (if < 500 ml of sample is to be purged).

12.8.4 GC/MS file identification: Each sample injection is given a specific file ID.

12.8.5 All sample and blank analyses have spectra printouts made showing the sample spectra of any reportable target compounds. Visual comparisons are made between laboratory generated spectra of the target compounds and sample spectra for confirmation. See Section 13.0 of this SOP for further discussion.

13.0 Qualitative Analysis

13.1 The qualitative identification of each compound determined by this method is based on retention time, and on comparison of the sample mass spectrum, after background correction with characteristic ions in a reference mass spectrum. The reference mass spectrum are generated by the laboratory using the condition of this method. The characteristic ions from the reference mass spectrum are defined to be the three ions of greatest relative intensity, or any ions over 30% relative intensity if less than three such ions occur in the reference spectrum. Compounds are identified as present when the following criteria are met.

13.1.1 The intensities of the characteristic ions of a compound maximize in the same scan or within one scan of each other. Selection of a peak by a data system target compound search routine where the search is based on the presence of

a target chromatographic peak containing ions specific for the target compound at a compound-specific retention time will be accepted as meeting this criterion.

13.1.2 The relative retention time (RRT) of the sample component is within + 0.06 RRT units of the RRT of the standard component.

13.1.3 The relative intensities of the characteristic ions agree within 30% of the relative intensities of these ions in the reference spectrum. (Example: For an ion with an abundance of 50% in the reference spectrum, the corresponding abundance in a sample spectrum can range between 20% and 80%).

13.1.4 Structural isomers that produce very similar mass spectra should be identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 25% of the sum of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs.

13.1.5 Identification is hampered when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analyte. When gas chromatographic peaks obviously represent more than one sample component (i.e., a broadened peak with shoulder(s) or a valley between two or more maxima), appropriate selection of analyte spectra and background spectra is important. Analyst discretion should be used in this situation.

13.1.6 Examination of extracted ion current profiles of appropriate ions can aid in the selection of spectra, and in qualitative identification of compounds. When analytes coelute (i.e., only one chromatographic peak is apparent), the identification criteria may be met, but each analyte spectrum will contain extraneous ions contributed by the coeluting compound.

13.2 For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by client request or analyst discretion. The data system library search routines do not use normalization routines that would misrepresent the library or unknown spectra when compared to each other. Only after visual comparison of sample spectra with the best library search match may the analyst assign a tentative identification. Use the following guidelines for making tentative identifications:

13.2.1 Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.

13.2.2 The relative intensities of major ions should agree within + 20%. (Example: For an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30 and 70%).

13.2.3 Molecular ions present in the reference spectrum should be present in the sample spectrum.

13.2.4 Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.

13.2.5 Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks. Data system library reduction programs can sometimes create these discrepancies.

13.3 All target compounds are reported if the spectra matches the library spectra. The value for the target compound is reported in two significant figures if their value is greater than 10 µg/l. Otherwise, one significant figure is used. Non-target compounds are considered acceptable if they are above 10% of the area of the closest internal standard eluting to it. Given that, the spectra of the compound is reviewed and classified as one of the following:

13.3.1 Unknown Hydrocarbon (carbon range).

13.3.2 Unknown Aromatic Hydrocarbon (carbon range).

13.3.3 Unknown Cyclic Hydrocarbon (carbon range).

13.3.4 Unknown Alkane (carbon range).

13.3.5 Isomer of compound.

13.3.6 Compound name.

13.3.7 The value for non-targeted compounds is reported to one significant figure. All tentatively identified compound names must be written on the tentatively identified quantitation list for clarity's sake.

14.0 Quantitative Analysis

14.1 Once a compound has been identified, the quantitation of that compound will be based on the integrated abundance from the EICP of the primary characteristic ion. The internal standard used shall be the one nearest the retention time of that of a given analyte.

14.2 Sample results are calculated as follows:

$$\text{Air Samples: Amount of compound in ng} = \frac{\text{Area (compound)} \times \text{Amount (IS)}}{\text{Area (IS)} \times \text{RRF}}$$

$$\text{Air Multipler} = \frac{(P2/P1) \times DL}{500} \qquad \text{Amount ppb} = \text{ng} \times \text{Air Multipler}$$

where: IS = Internal Standard
RRF = Relative Response Factor
DL = Dilution Factor
P1 = Initial Pressure
P2 = Final Pressure, and
ng = ng from Quanititation Report

14.3 Where applicable, the concentration of any non-target analytes identified in the sample (Sec. 7.6.2) should be estimated. The same formula should be used with the following modifications: The area A (IS) and A (compound) should be from the total ion chromatograms, and the RF for the compound should be assumed to 1.

14.4 The resulting concentration should be reported indicating: (1) that the value is an estimate, and (2) which internal standard was used to determine concentration. Use the nearest internal standard free of interferences.

15.0 Computer Commands

Commands for the GC/MS are located in the Software Operations handbook.

16.0 Quality Control

16.1 Quality Control deals with the overall quality of the data output. The instrument is monitored each day of use. If a monitored parameter is not acceptable, it is considered out of control. An out of control event may result in reanalysis of client and/or QC samples. Written documentation is required when an unacceptable result is accepted due to matrix affect or other uncontrollable circumstances per STL-PN SOP 1060. See STL-PN SOPs 1060 and 1061 for procedures to follow when QC fails and action to take for situations requiring corrective action forms.

16.2 Samples are prepared and analyzed in QC batches. A QC batch is a group of similar matrices processed together. Samples that do not require digestion, distillation or extraction are batched by the analytical departments. Samples that require digestion, distillation or extraction are batched by the digestion, distillation or extraction departments. Unless specified by the client or regulatory agency, STL-PN allows batches to contain 20 client samples. At a minimum, each QC batch shall also contain a matrix-specific method blank for each day samples that are analyzed or prepared and a matrix-specific Laboratory Control Sample (LCS).

16.3 Internal standards are included in every run in a known amount. They are compared to the area amount of that in the 250 ng Continuing Calibration standard. The control limit for acceptance of internal standard areas is two times or one half of the area in the daily standard. If the internal standards lie outside of this limit, the sample is unacceptable. The sample must be rerun and an Out of Control Events/Corrective Action form completed if the reanalysis confirms matrix interference.

16.4 Surrogates are added to every run in a known amount. These are compared to the surrogates in the daily standard using the following equation:

$$\frac{S(SS) \times 250}{S(R) \times RF} = R \qquad \frac{R}{250} \times 100 = \% \text{ Rec}$$

Where 250 = ng standard to which the surrogate is being referenced. S(R) is the area of the internal standard in the sample, S(SS) is the surrogate in the sample, R is the result, and RF is the surrogate response factor from the daily standard. If the surrogates lie outside of the control limits, they are considered unacceptable. The sample is rerun and an Out of Control Events/Corrective Action form completed if the reanalysis confirms matrix interference.

16.5 A method blank is analyzed at least every twelve hours to insure the instrument is contamination free. The instrument must be considered contaminant free prior to analyzing any samples. Common laboratory contaminants, methylene chloride, toluene, and ketones are acceptable in the blank at five times the reporting limit for those compounds **EXCEPT FOR BLANKS ASSOCIATED WITH SAMPLES FROM SOUTH CAROLINA. SEE SECTION 12.6.1.5.** If they are more than five times the RL, or if any other compounds are more than their respective RLs then the method blank may be considered unacceptable. See STL-PN SOPs 1060 and 1061 for action to be taken when the blank fails acceptance criteria.

16.6 Subtracting blank values from sample results is not permitted. If reporting sample results without correcting for blank values results in what the laboratory feels is a false positive result for a sample, the analyst and/or supervisor will document the event on an Out of Control Events/Corrective Action form.

16.7 An LCS is reagent water to which target compounds at known concentrations are spiked to determine if the preparation and/or analytical process is in control. The LCS is spiked with the same analytes at the same concentrations as the matrix spike and matrix spike duplicate. When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix. See STL-PN SOPs 1060 and 1061 for action to be taken when the LCS fails acceptance criteria.

16.8 Matrix spike compounds at known concentrations are spiked into a sample and duplicated to determine the matrix effects of the sample on recovery of the compounds. To air add 10 µl of Matrix Spike Working Stock Standard and 10 µl of IS/SURR standard to 5 ml of sample or reagent water which will add a 250 ng concentration of Matrix Spike Target Compounds to the sample. Target compounds and concentrations may vary per individual client request. Matrix spikes and matrix spike duplicates are run on 10% of the samples (an MS and MSD per 20 samples). Calculations are as follows for percent recovery and relative percent differences.

NOTE

Matrix spikes are not analyzed on air samples.

$$\% \text{ Recovery} = \frac{\text{AMOUNT (S)} \times 100}{\text{AMOUNT (K)}}$$

$$RPD = \frac{REC(1) - REC(2)}{[REC(1)+REC(2)]/2} \times 100$$

Where AMOUNT(S) is the amount of the compound in the spike sample minus the amount in the original sample. AMOUNT(K) is the amount spiked. For results outside of control limits, samples may be rerun or written up as out of control, if matrix is verified. See STL-PN SOPs 1060 and 1061 for action to be taken when the matrix spike and/or matrix spike duplicate fails acceptance criteria.

16.9 The target compounds in a sample must be less than 2000 ng in order to fall within the linear working range. If the concentration is greater than 2000 ng, the sample is diluted to attempt to fall within the upper linear range (250-2000 ng). See STL-PN SOP 2001 for dilution of samples. Secondary ion quantitation is allowed only when there are sample interferences with the primary ion.

NOTE

When ions from a compound in the sample saturate the detector, the analysis must be followed by the analysis of a reagent water blank. If the blank analysis is not free of interferences, then the autosampler port or system must be decontaminated.

16.10 Method Detection Limit (MDL) studies are calculated annually. See STL-PN SOP 1004 (Analysis, Documentation, and Review of MDL, IDL and P&A Studies). MDL studies are reviewed and maintained on file in STL-PN's QA department.

16.11 Control limits are listed in section 5.0 of STL-PN's CompQAP. Refer to STL-PN SOP 1003 (Calculation of Annual Control Limits). Because control limits may have been updated since the last CompQAP update, the most current departmental control limits are on file in STL-PN's QA department

16.12 QC calculations are discussed in STL-PN CompQAP section 11.

16.13 Reporting limits are listed in STL-PN CompQAP Section 5. Reporting limits may be elevated due to a necessary dilution. See STL-PN SOP 2001 for dilution of samples..

16.14 Refer to STL-PN CompQAP Section 12 for data reporting.

16.15 Refer to STL-PN CompQAP Section 12 and STL-PN SOP 2008 (Records Management in the Laboratory) for data storage.

16.16 Refer to STL-PN CompQAP section 7 for sample tracking.

16.17 Refer to STL-PN SOP 2003 for criteria for manual integrations.

16.18 Daily quality control procedures include the following:

16.18.1 The GC/S system must be tuned to meet the BFB specifications in Section 12.3.

16.18.2 There must be an initial calibration of the GC/MS system as described in Section 12.4.

16.18.3 The GC/MS system must meet the SPCC and the CCC criteria in Section 12.5 each 12 hours.

16.18.4 The experience of the analyst performing GC/MS analyses is invaluable to the success of the method. Each day that analysis is performed, the calibration verification standard is evaluated to determine if the chromatographic system is operating properly. Questions that are asked are: Do the peaks look normal? Is the response obtained comparable to the response from previous calibrations? Careful examination of the standard chromatogram can indicate whether the column is still performing acceptably, the injector is leaking, the injector septum needs replacing, etc. If any changes are made to the system (e.g., the column changed), recalibration of the system takes place.

NOTE

See STL-PN CompQAP Section 10.1 for daily or routine maintenance items which do not require recalibration of the system.

17.0 Reporting

The completed data package is verified by the supervisor or an analyst other than the one initially reviewing the data. Any changes are initialed and dated, and the outside cover of the file folder is initialed and dated by the one verifying the data. The GC/MS checklist (located at the end of this SOP) should be used to verify that the information is accurately reported.

18.0 Instrument Maintenance

18.1 Refer to the instrument operating manual for maintenance requirements and suggestions.

18.2 Any problem or non-routine maintenance associated with the GC/MS, autosampler or data system will be recorded in the log book for that GC/MS. Documentation is to include what caused needed maintenance, what maintenance was performed and the result of maintenance. There should also be a statement of return to normal machine performance when successful maintenance is finished. All routine maintenance (clipping column, changing injection port liner, cleaning the injection port, or changing septa shall be noted by checking (✓) the daily maintenance section on the daily run log. When columns are replaced they shall be conditioned as per manufacturer's directions. The quality control chromatograms received with the column will be placed in the log book for that GC/MS.

18.3 Refer to STL-PN CompQAP Section 10 for the maintenance schedule. Refer to STL-PN SOP 2005 (Instrument Maintenance Documentation) for maintenance criteria and maintenance documentation.

19.0 Sample/Waste Management and Pollution Prevention

19.1 Sample and waste disposal is described in STL-PN SOP 1800 (Waste Handling and Disposal). Sample and waste disposal is also discussed in STL-PN CompQAP, sections 7 and 8.

19.2 Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operation. The USEPA has established a prevention hierarchy of environmental management techniques that places pollution prevention as the management option of first choice. Whenever feasible, laboratory personnel should use pollution prevention techniques to address their waste generation. When wastes cannot be feasibly reduced at the source, the agency recommends recycling as the next best option.

19.3 The quantity of chemical purchased should be based on expected usage during its shelf life and disposal cost of unused material. Actual reagent preparation volumes should reflect anticipated usage and reagent stability.

19.4 Departmental employees must ensure that all measures have been taken to reduce the concentration of hazardous substances in the departmental waste (prepare high concentration standards in smaller volumes, etc.)

20.0 Safety

20.1 Gloves, lab glasses and lab coats should be worn while performing this procedure.

20.2 Material Safety Data Sheets (MSDS) should be read prior to working with the reagents and standards used in this procedure.

20.3 See STL-PN's Chemical Hygiene Plan (CHP) for additional safety requirements.

APPENDIX B

USEPA Compendium Method TO-14A

EPA/625/R-96/010b

Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air

Second Edition

Compendium Method TO-14A

Determination Of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography

Center for Environmental Research Information
Office of Research and Development
U.S. Environmental Protection Agency
Cincinnati, OH 45268

January 1999

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Peer Reviewer

- Lauren Drees, U.S. EPA, NRMRL, Cincinnati, OH

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DISCLAIMER

This Compendium has been subjected to the Agency's peer and administrative review, and it has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

METHOD TO-14A

Determination Of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography

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APPENDIX B. Operating Procedures for a Portable Gas Chromatograph Equipped with a Photoionization Detector
APPENDIX C. Installation and Operating Procedures for Alternative Air Toxics Samplers

METHOD TO-14A

Determination Of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters With Subsequent Analysis By Gas Chromatography

1. Scope

1.1 This document describes a procedure for sampling and analysis of volatile organic compounds (VOCs) in ambient air. The method was originally based on collection of whole air samples in SUMMA® passivated stainless steel canisters, but has now been generalized to other specially prepared canisters (see Section 7.1.1.2). The VOCs are separated by gas chromatography and measured by a mass spectrometer or by multidetector techniques. This method presents procedures for sampling into canisters to final pressures both above and below atmospheric pressure (respectively referred to as pressurized and subatmospheric pressure sampling).

1.2 This method is applicable to specific VOCs that have been tested and determined to be stable when stored in pressurized and sub-atmospheric pressure canisters. Numerous compounds, many of which are chlorinated VOCs, have been successfully tested for storage stability in pressurized canisters (1-3). However, minimal documentation is currently available demonstrating stability of VOCs in subatmospheric pressure canisters.

1.3 The Compendium Method TO-14A target list is shown in Table 1. These compounds have been successfully stored in canisters and measured at the parts per billion by volume (ppbv) level. This method applies under most conditions encountered in sampling of ambient air into canisters. However, the composition of a gas mixture in a canister, under unique or unusual conditions, will change so that the sample is known not to be a true representation of the ambient air from which it was taken. For example, low humidity conditions in the sample may lead to losses of certain VOCs on the canister walls, losses that would not happen if the humidity were higher. If the canister is pressurized, then condensation of water from high humidity samples may cause fractional losses of water-soluble compounds. Since the canister surface area is limited, all gases are in competition for the available active sites. Hence an absolute storage stability cannot be assigned to a specific gas. Fortunately, under conditions of normal usage for sampling ambient air, most VOCs can be recovered from canisters near their original concentrations after storage times of up to thirty days.

2. Summary of Method

2.1 Both subatmospheric pressure and pressurized sampling modes typically use an initially evacuated canister and pump-ventilated sample line during sample collection. Pressurized sampling requires an additional pump to provide positive pressure to the sample canister. A sample of ambient air is drawn through a sampling train comprised of components that regulate the rate and duration of sampling into a pre-evacuated specially prepared passivated canister.

2.2 After the air sample is collected, the canister valve is closed, an identification tag is attached to the canister, a chain-of-custody (COC) form completed, and the canister is transported to a predetermined laboratory for analysis.

2.3 Upon receipt at the laboratory, the canister tag data is recorded, the COC completed, and the canister is attached to the analytical system. During analysis, water vapor is reduced in the gas stream by a Nafion® dryer (if applicable), and the VOCs are then concentrated by collection in a cryogenically-cooled trap. The cryogen is then removed and the temperature of the trap is raised. The VOCs originally collected in the trap are

revolatilized, separated on a GC column, then detected by one or more detectors for identification and quantitation.

2.4 The analytical strategy for Compendium Method TO-14A involves using a high-resolution gas chromatograph (GC) coupled to one or more appropriate GC detectors. Historically, detectors for a GC have been divided into two groups: non-specific detectors and specific detectors. The non-specific detectors include, but are not limited to, the nitrogen-phosphorus detector (NPD), the flame ionization detector (FID), the electron capture detector (ECD) and the photo-ionization detector (PID). The specific detectors include the linear quadrupole mass spectrometer (MS) operating in either the select ion monitoring (SIM) mode or the SCAN mode, or the ion trap detector (see Compendium Method TO-15). The use of these detectors or a combination of these detectors as part of the analytical scheme is determined by the required specificity and sensitivity of the application. While the non-specific detectors are less expensive per analysis and in some cases far more sensitive than the specific detectors, they vary in specificity and sensitivity for a specific class of compounds. For instance, if multiple halogenated compounds are targeted, an ECD is usually chosen; if only compounds containing nitrogen or phosphorus are of interest, a NPD can be used; or, if a variety of hydrocarbon compounds are sought, the broad response of the FID or PID is appropriate. In each of these cases, however, the specific identification of the compound within the class is determined only by its retention time, which can be subject to shifts or to interference from other non-targeted compounds. When misidentification occurs, the error is generally a result of a cluttered chromatogram, making peak assignment difficult. In particular, the more volatile organics (chloroethanes, ethyltoluenes, dichlorobenzenes, and various freons) exhibit less well defined chromatographic peaks, leading to possible misidentification when using nonspecific detectors. Quantitative comparisons indicate that the FID is more subject to error than the ECD because the ECD is a much more selective detector and exhibits a stronger response. Identification errors, however, can be reduced by: (a) employing simultaneous detection by different detectors or (b) correlating retention times from different GC columns for confirmation. In either case, interferences on the non-specific detectors can still cause error in identifying compounds of a complex sample. The non-specific detector system (GC/NPD/FID/ECD/PID), however, has been used for approximate quantitation of relatively clean samples. The non-specific detector system can provide a "snapshot" of the constituents in the sample, allowing determination of:

- Extent of misidentification due to overlapping peaks.
- Determination of whether VOCs are within or not within concentration range, thus requiring further analysis by specific detectors (GC/MS/SCAN/SIM) (i.e., if too concentrated, the sample is further diluted).
- Provide data as to the existence of unexpected peaks which require identification by specific detectors.

On the other hand, the use of specific detectors (MS coupled to a GC) allows positive compound identification, thus lending itself to more specificity than the multidetector GC. Operating in the SIM mode, the MS can readily approach the same sensitivity as the multidetector system, but its flexibility is limited. For SIM operation the MS is programmed to acquire data for a limited number of targeted compounds. In the SCAN mode, however, the MS becomes a universal detector, often detecting compounds which are not detected by the multidetector approach. The GS/MS/SCAN will provide positive identification, while the GC/MS/SIM procedure provides quantitation of a restricted list of VOCs, on a preselected target compound list (TCL).

If the MS is based upon a standard ion trap design, only a scanning mode is used (note however, that the Select Ion Storage (SIS) mode of the ion trap has features of the SIM mode). See Compendium Method TO-15 for further explanation and applicability of the ion-trap to the analysis of VOCs from specially prepared canisters.

The analyst often must decide whether to use specific or non-specific detectors by considering such factors as project objectives, desired detection limits, equipment availability, cost and personnel capability in developing an analytic strategy. A list of some of the advantages and disadvantages associated with non-specific and specific detectors may assist the analyst in the decision-making process.

Non-specific Multidetector Analytical System

Advantages

- Somewhat lower equipment cost than GC/MS
- Less sample volume required for analysis
- More sensitive
  - ECD may be 1000 times more sensitive than GC/MS

Disadvantages

- Multiple detectors to calibrate
- Compound identification not positive
- Lengthy data interpretation (1 hour each for analysis and data reduction)
- Interference(s) from co-eluting compound(s)
- Cannot identify unknown compounds
  - outside range of calibration
  - without standards
- Does not differentiate targeted compounds from interfering compounds

Specific Detector Analytical System

GC/MS/SIM

Advantages

- positive compound identification
- greater sensitivity than GC/MS/SCAN
- less operator interpretation than for multidetector GC
- can resolve co-eluting peaks
- more specific than the multidetector GC

Disadvantages

- cannot identify nonspecified compounds (ions)
- somewhat greater equipment cost than multidetector GC
- greater sample volume required than for multidetector GC
- universality of detector sacrified to achieve enhancement in sensitivity

GC/MS/SCAN

- positive compound identification
- can identify all compounds
- less operator interpretation
- can resolve co-eluting peaks

- lower sensitivity than GC/MS/SIM
- greater sample volume required than for multidetector GC
- somewhat greater equipment cost than multidetector GC

The analytical finish for the measurement chosen by the analyst should provide a definitive identification and a precise quantitation of volatile organics. In a large part, the actual approach to these two objectives is subject to equipment availability. Figure 1 indicates some of the favorite options that are used in Compendium Method TO-14A. The GC/MS/SCAN option uses a capillary column GC coupled to a MS operated in a scanning mode and supported by spectral library search routines. This option offers the nearest approximation to

unambiguous identification and covers a wide range of compounds as defined by the completeness of the spectral library. GC/MS/SIM mode is limited to a set of target compounds which are user defined and is more sensitive than GC/MS/SCAN by virtue of the longer dwell times at the restricted number of m/z values. Both these techniques, but especially the GC/MS/SIM option, can use a supplemental general nonspecific detector to verify/identify the presence of VOCs. Finally the option labelled GC-multidetector system uses a combination of retention time and multiple general detector verification to identify compounds. However, interference due to nearly identical retention times can affect system quantitation when using this option.

Due to low concentrations of toxic VOCs encountered in urban air (typically less than 25 ppbv and the majority below 10 ppbv) along with their complicated chromatographs, Compendium Method TO-14A strongly recommends the specific detectors (GC/MS/SCAN/SIM) for positive identification and for primary quantitation to ensure that high-quality ambient data is acquired.

For the experienced analyst whose analytical system is limited to the non-specific detectors, Section 10.3 does provide guidelines and example chromatograms showing typical retention times and calibration response factors, and utilizing the nonspecific detectors (GC/FID/ECD/PID) analytical system as the primary quantitative technique.

Compendium Method TO-15 is now available as a guidance document containing additional advice on the monitoring of VOCs. Method TO-15 contains information on alternative water management systems, has a more complete quality control section, shows performance criteria that any monitoring technique must achieve for acceptance, and provides guidance specifically directed at compound identification by mass spectrometry.

3. Significance

3.1 The availability of reliable, accurate and precise monitoring methods for toxic VOCs is a primary need for state and local agencies addressing daily monitoring requirements related to odor complaints, fugitive emissions, and trend monitoring. VOCs enter the atmosphere from a variety of sources, including petroleum refineries, synthetic organic chemical plants, natural gas processing plants, biogenic sources, and automobile exhaust. Many of these VOCs are toxic so that their determination in ambient air is necessary to assess human health impacts.

3.2 The canister-based monitoring method for VOCs has proven to be a viable and widely used approach that is based on research and evaluation performed since the early 1980s. This activity has involved the testing of sample stability of VOCs in canisters and the design of time-integrative samplers. the development of procedures for analysis of samples in canisters, including the procedure for VOC preconcentration from whole air, the treatment of water vapor in the sample, and the selection of an appropriate analytical finish has been accomplished. The canister-based method was initially summarized by EPA as Method TO-14 in the First Supplement to the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*. The present document updates the original Compendium Method TO-14 with correction of time-sensitive information and other minor changes as deemed appropriate.

3.3 The canister-based method is now a widely used alternative to the solid sorbent-based methods. The method has sub-ppbv detection limits for samples of typically 300-500 mL of whole air and duplicate and replicate precisions under 20 percent as determined in field tests. Audit bias values average within the range of ±10 percent. These performance parameters are generally adequate for monitoring at the 10^{-5} lifetime exposure risk levels for many VOCs.

3.4 Collection of ambient air samples in canisters provides a number of advantages: (1) convenient integration of ambient samples over a specific time period (e.g., 24 hours); (2) remote sampling and central analysis; (3) ease of storing and shipping samples; (4) unattended sample collection; (5) analysis of samples from multiple sites with one analytical system; (6) collection of sufficient sample volume to allow assessment of measurement precision and/or analysis of samples by several analytical systems; and (7) storage stability for many VOCs over periods of up to 30 days. To realize these advantages, care must be exercised in selection, cleaning, and handling sample canisters and sampling apparatus to avoid losses or contamination.

3.5 Interior surfaces of canisters are treated by any of a number of passivation processes, one of which is SUMMA polishing as identified in the original Compendium Method TO-14. Other specially prepared canisters are also available (see Section 7.1.1.2).

3.6 The canister-based method for monitoring VOCs is the alternative to the solid sorbent-based method described in conventional methods such as the Compendium Methods TO-1 and TO-2, and in the new Compendium Method TO-17 that describes the use multisorbent packings including the use of new carbon-based sorbents. It also is an alternative to on-site analysis in those cases where integrity of samples during storage and transport has been established.

4. Applicable Documents

4.1 ASTM Standards

- Method D1356 *Definition of Terms Relating to Atmospheric Sampling and Analysis*
- Method E260 *Recommended Practice for General Gas Chromatography*
- Method E355 *Practice for Gas Chromatography Terms and Relationships*
- Method D31357 *Practice for Planning and Sampling of Ambient Atmospheres*
- Method D5466-93 *Determination of Volatile Organic Chemicals in Atmospheres (Canister Sampling Methodology)*

4.2 EPA Documents

- *Technical Assistance Document for Sampling and Analysis Toxic Organic Compounds in Ambient Air*, U. S. Environmental Protection Agency, EPA-600/4-83-027, June 1983.
- *Quality Assurance Handbook for Air Pollution Measurement Systems*, U. S. Environmental Protection Agency, EPA-600/R-94-038b, May 1994.
- *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air: Method TO-14, Second Supplement*, U. S. Environmental Protection Agency, EPA 600/4-89-018, March 1989.
- *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air: Method TO-15, Second Edition*, U. S. Environmental Protection Agency, EPA 625/R-96-010b, January 1997.
- *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, First Supplement*, U. S. Environmental Protection Agency, Research Triangle Park, NC, EPA-600/4-87-006, September 1997.
- *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air: Method TO-1*, U. S. Environmental Protection Agency, Research Triangle Park, NC, EPA-600/4-84-041, 1986.

4.3 Other Documents

- U. S. Environmental Protection Agency Technical Assistance Document (3).
- Laboratory and Ambient Air Studies (4-17).

5. Definitions

[Note: Definitions used in this document and any user-prepared Standard Operating Procedures (SOPSs) should be consistent with those used in ASTM D1356. All abbreviations and symbols are defined within this document at the point of first use.]

5.1 Absolute Canister Pressure (Pg+Pa)—gauge pressure in the canister (kPa, psi) and Pa = barometric pressure (see Section 5.2).

5.2 Absolute Pressure—pressure measured with reference to absolute zero pressure (as opposed to atmospheric pressure), usually expressed as kPa, mm Hg or psia.

5.3 Cryogen—a refrigerant used to obtain very low temperatures in the cryogenic trap of the analytical system. A typical cryogen is liquid nitrogen (bp –195.8°C) or liquid argon (bp –185.7°C).

5.4 Dynamic Calibration—calibration of an analytical system using calibration gas standard concentrations in a form identical or very similar to the samples to be analyzed and by introducing such standards into the inlet of the sampling or analytical system in a manner very similar to the normal sampling or analytical process.

5.5 Gauge Pressure—pressure measured above ambient atmospheric pressure (as opposed to absolute pressure). Zero gauge pressure is equal to ambient atmospheric (barometric) pressure.

5.6 MS/SCAN—the GC is coupled to a MS programmed in the SCAN mode to scan all ions repeatedly during the GC run. As used in the current context, this procedure serves as a qualitative identification and characterization of the sample.

5.7 MS/SIM—the GC is coupled to a MS programmed to acquire data for only specified ions and to disregard all others. This is performed using SIM coupled to retention time discriminators. The GC/SIM analysis provides quantitative results for selected constituents of the sample gas as programmed by the user.

5.8 Megabore® Column—chromatographic column having an internal diameter (I.D.) greater than 0.50-mm. The Megabore® column is a trademark of the J&W Scientific Co. For purposes of this method, Megabore® refers to chromatographic columns with 0.53-mm I.D.

5.9 Pressurized Sampling—collection of an air sample in a canister with a (final) canister pressure above atmospheric pressure, using a sample pump.

5.10 Qualitative Accuracy—the ability of an analytical system to correctly identify compounds.

5.11 Quantitative Accuracy—the ability of an analytical system to correctly measure the concentration of an identified compound.

5.12 Static Calibration—calibration of an analytical system using standards in a form different from the samples to be analyzed. An example of a static calibration would be injecting a small volume of a high concentration standard directly onto a GC column, bypassing the sample extraction and preconcentration portion of the analytical system.

5.13 Subatmospheric Sampling—collection of an air sample in an evacuated canister at a (final) canister pressure below atmospheric pressure, without the assistance of a sampling pump. The canister is filled as the internal canister pressure increases to ambient or near ambient pressure. An auxiliary vacuum pump may be used as part of the sampling system to flush the inlet tubing prior to or during sample collection.

6. Interferences and Limitations

6.1 Interferences can occur in sample analysis if moisture accumulates in the dryer (see Section 10.1.1.2). An automated cleanup procedure that periodically heats the dryer to about 100°C while purging with zero air eliminates any moisture buildup. This procedure does not degrade sample integrity for Compendium Method TO-14A target compound list (TCL) but can affect some organic compounds.

6.2 Contamination may occur in the sampling system if canisters are not properly cleaned before use. Additionally, all other sampling equipment (e.g., pump and flow controllers) should be thoroughly cleaned to ensure that the filling apparatus will not contaminate samples. Instructions for cleaning the canisters and certifying the field sampling system are described in Sections 11.1 and 11.2, respectively.

6.3 The Compendium Method TO-14A analytical system employs a Nafion® permeable membrane dryer to remove water vapor from the sample stream. Polar organic compounds permeate this membrane in a manner similar to water vapor and rearrangements can occur in some hydrocarbons due to the acid nature of the dryer. Compendium Method TO-15 provides guidance associated with alternative water management systems applicable to the analysis of a large group of VOCs in specially-treated canisters.

7. Apparatus

[Note: Equipment manufacturers identified in this section were originally published in Compendium Method TO-14 as possible sources of equipment. They are repeated in Compendium Method TO-14A as reference only. Other manufacturers' equipment should work as well, as long as the equipment is equivalent. Modifications to these procedures may be necessary if using other manufacturers' equipment.]

7.1 Sample Collection

[Note: Subatmospheric pressure and pressurized canister sampling systems are commercially available and have been used as part of U.S. Environmental Protection Agency's Toxic Air Monitoring Stations (TAMS), Urban Air Toxic Monitoring Program (UATMP), the non-methane organic compound (NMOC) Sampling and Analysis Program, and in the Photochemical Assessment Monitoring Stations (PAMS).]

7.1.1 Subatmospheric Pressure (see Figure 2 Without Metal Bellows Type Pump).

7.1.1.1 Sampling Inlet Line. Stainless steel tubing to connect the sampler to the sample inlet.

7.1.1.2 Specially-Treated Sample Canister. Leak-free stainless steel pressure vessels of desired volume (e.g., 6 L), with valve and passivated interior surfaces. Major manufacturers and re-suppliers are:

- BRC/Ramussen
  17010 NW Skyline Blvd.
  Portland, OR 97321
- Meriter
  1790 Potrero Drive
  San Jose, CA 95124
- Restec Corporation
  110 Benner Circle
  Bellefonte, PA 16823-8812
- XonTech Inc.
  6862 Hayenhurst Avenue
  Van Nuys, CA 91406
- Scientific Instrumentation Specialists
  P.O. Box 8941
  Moscow, ID 83843
- Graseby
  500 Technology Ct.
  Smyrna, GA 30832

7.1.1.3 Stainless Steel Vacuum/Pressure Gauge. Capable of measuring vacuum (–100 to 0 kPa or 0 to 30 in. Hg) and pressure (0–206 kPa or 0–30 psig) in the sampling system, Matheson, P.O. Box 136, Morrow, GA 30200, Model 63-3704, or equivalent. Gauges should be tested clean and leak tight.

7.1.1.4 Electronic Mass Flow Controller. Capable of maintaining a constant flow rate (± 10%) over a sampling period of up to 24 hours and under conditions of changing temperature (20–40°C) and humidity, Tylan Corp., 19220 S. Normandie Ave., Torrance, CA 90502, Model FC-260, or equivalent.

7.1.1.5 Particulate Matter Filter. 2-μm sintered stainless steel in-line filter, Nupro Co., 4800 E. 345th St., Willoughby, OH 44094, Model SS-2F-K4-2, or equivalent.

7.1.1.6 Electronic Timer. For unattended sample collection, Paragon Elect. Co., 606 Parkway Blvd., P.O. Box 28, Twin Rivers, WI 54201, Model 7008-00, or equivalent.

7.1.1.7 Solenoid Valve. Electrically-operated, bi-stable solenoid valve, Skinner Magnelatch Valve, New Britain, CT, Model V5RAM49710, with Viton® seat and o-rings. A Skinner Magnelatch valve is used for purposes of illustration only in Figures 2 and 3.

7.1.1.8 Chromatographic Grade Stainless Steel Tubing and Fittings. For interconnections, Alltech Associates, 2051 Waukegan Rd., Deerfield, IL 60015, Cat. #8125, or equivalent. All such materials in contact with sample, analyte, and support gases prior to analysis should be chromatographic grade stainless steel.

7.1.1.9 Thermostatically Controlled Heater. To maintain temperature inside insulated sampler enclosure above ambient temperature, Watlow Co., Pfafftown, NC, Part 04010080, or equivalent.

7.1.1.10 Heater Thermostat. Automatically regulates heater temperature, Elmwood Sensors, Inc., 500 Narragansett Park Dr., Pawtucket, RI 02861, Model 3455-RC-0100-0222, or equivalent.

7.1.1.11 Fan. For cooling sample system, EG&G Rotron, Woodstock, NY, Model SUZAI, or equivalent.

7.1.1.12 Fan Thermostat. Automatically regulates fan operation, Elmwood Sensors, Inc., Pawtucket, RI, Model 3455-RC-0100-0244, or equivalent.

7.1.1.13 Maximum-Minimum Thermometer. Records highest and lowest temperatures during sampling period, Thomas Scientific, Brooklyn Thermometer Co., Inc., P/N 9327H30, or equivalent.

7.1.1.14 Stainless Steel Shut-Off Valve. Leak free, for vacuum/pressure gauge.

7.1.1.15 Auxiliary Vacuum Pump. Continuously draws ambient air through the inlet manifold at 10 L/min. or higher flow rate. Sample is extracted from the manifold at a lower rate, and excess air is exhausted.

[Note: The use of higher inlet flow rates dilutes any contamination present in the inlet and reduces the possibility of sample contamination as a result of contact with active adsorption sites on inlet walls.]

7.1.1.16 Elapsed Time Meter. Measures duration of sampling, Conrac, Cramer Div., Old Saybrook, CT, Type 6364, P/N 10082, or equivalent.

7.1.1.17 Optional Fixed Orifice, Capillary, or Adjustable Micrometering Valve. May be used in lieu of the electronic flow controller for grab samples or short duration time-integrated samples. Usually appropriate only in situations where screening samples are taken to assess future sampling activity.

7.1.2 Pressurized (see Figure 2 With Metal Bellows Type Pump and Figure 3).

7.1.2.1 Sample Pump. Stainless steel, metal bellows type, Metal Bellows Corp., 1075 Providence Highway, Sharon, MA 02067, Model MB-151, or equivalent, capable of 2 atmospheres output pressure. Pump must be free of leaks, clean, and uncontaminated by oil or organic compounds.

[Note: An alternative sampling system has been developed by Dr. R. Rasmussen, The Oregon Graduate Institute of Science and Technology, 20000 N.W. Walker Rd., Beaverton, Oregon 97006, 503-690-1077, (17,18) and is illustrated in Figure 3. This flow system uses, in order, a pump, a mechanical flow regulator, and a mechanical compensation flow restrictive device. In this configuration the pump is purged with a large sample flow, thereby eliminating the need for an auxiliary vacuum pump to flush the sample inlet. Interferences using this configuration have been minimal.]

7.1.2.2 Other Supporting Materials. All other components of the pressurized sampling system (see Figure 2 with metal bellows type pump and Figure 3) are similar to components discussed in Sections 7.1.1.1 through 7.1.1.16.

7.2 Sample Analysis

7.2.1 GC/MS/SCAN Analytical System (see Figure 4).

7.2.1.1 Gas Chromatograph. Capable of subambient temperature programming for the oven, with other generally standard features such as gas flow regulators, automatic control of valves and integrator, etc. Flame ionization detector optional, Hewlett Packard, Rt. 41, Avondale, PA 19311, Model 5880A, with oven temperature control and Level 4 BASIC programming, or equivalent. The GS/MS/SCAN analytical system must be capable of acquiring and processing data in the MS/SCAN mode.

7.2.1.2 Chromatographic Detector. Mass-selective detector, Hewlett Packard, 3000-T Hanover St., 9B, Palo Alto, CA 94304, Model HP-5970 MS, or equivalent, equipped with computer and appropriate software, Hewlett Packard, 3000-T Hanover St., 9B, Palo Alto, CA 94304, HP-216 Computer, Quicksilver MS software, Pascal 3.0, mass storage 9133 HP Winchester with 3.5 inch floppy disk, or equivalent. The GC/MS is set in the SCAN mode, where the MS screens the sample for identification and quantitation of VOC species.

7.2.1.3 Cryogenic Trap with Temperature Control Assembly. Refer to Section 10.1.1.3 for complete description of trap and temperature control assembly, Graseby, 500 Technology Ct., Smyrna, GA 30082) Model 320-01, or equivalent.

7.2.1.4 Electronic Mass Flow Controllers (3). Maintain constant flow (for carrier gas and sample gas) and to provide analog output to monitor flow anomalies, Tylan Model 260, 0–100 mL/min, or equivalent.

7.2.1.5 Vacuum Pump. General purpose laboratory pump, capable of drawing the desired sample volume through the cryogenic trap, Thomas Industries, Inc., Sheboygan, WI, Model 107BA20, or equivalent.

7.2.1.6 Chromatographic Grade Stainless Steel Tubing and Stainless Steel Plumbing Fittings. Refer to Section 7.1.1.8 for description.

7.2.1.7 Chromatographic Column. To provide compound separation such as shown in Table 5. Hewlett Packard, Rt. 41, Avondale, PA 19311. Typical GC column for this application is OV-1 capillary column, 0.32-mm x 50 m with 0.88-μm crosslinked methyl silicone coating, or equivalent.

7.2.1.8 Stainless Steel Vacuum/Pressure Gauge (Optional). Capable of measuring vacuum (–101.3 to 0 kPa) and pressure (0-206 kPa) in the sampling system, Matheson, P.O. Box 136, Morrow, GA 30200, Model 63-3704, or equivalent. Gauges should be tested clean and tight.

7.2.1.9 Stainless Steel Cylinder Pressure Regulators. Standard, two-stage cylinder pressure gauges for helium, zero air and hydrogen gas cylinders.

7.2.1.10 Gas Purifiers (3). Used to remove organic impurities and moisture from gas streams, Hewlett Packard, Rt. 41, Avondale, PA 19311, P/N 19362 - 60500, or equivalent.

7.2.1.11 Low Dead-Volume Tee (optional). Used to split the exit flow from the GC column, Alltech Associates, 2051 Waukegan Rd., Deerfield, IL 60015, Cat. #5839, or equivalent.

7.2.1.12 Nafion® Dryer. Consisting of Nafion tubing coaxially mounted within larger tubing, Perma Pure Products, 8 Executive Drive, Toms River, NJ 08753, Model MD-125-48, or equivalent. Refer to Section 10.1.1.2 for description.

7.2.1.13 Six-Port Gas Cromatographic Valve. Seismograph Service Corp., Tulsa, OK, Seiscor Model VIII, or equivalent.

7.2.1.14 Chart Recorder (optional). Compatible with the detector output signal to record optional FID detector response to the sample.

7.2.1.15 Electronic Integrator (optional). Compatible with the detector output signal of the FID and capable of integrating the area of one or more response peaks and calculating peak areas corrected for baseline drift.

7.2.2 GC/MS/SIM Analytical System (see Figure 4).

7.2.2.1 The GC/MS/SIM analytical system must be capable of acquiring and processing data in the MS-SIM mode.

7.2.2.2 All components of the GC/MS/SIM system are identical to Sections 7.2.1.1 through 7.2.1.15.

7.2.3 GC-Multidetector Analytical System (see Figure 5 and Figure 6).

7.2.3.1 Gas Chromatograph with Flame Ionization and Electron Capture Detectors (Photoionization Detector Optional). Capable of sub-ambient temperature programming for the oven and simultaneous operation of all detectors, and with other generally standard features such as gas flow regulators, automatic control of valves and integrator, etc., Hewlett Packard, Rt. 41, Avondale, PA 19311, Model 5990A, with oven temperature control and Level 4 BASIC programming, or equivalent.

7.2.3.2 Chart Recorders. Compatible with the detector output signals to record detector response tot he sample.

7.2.3.3 Electronic Integrator. Compatible with the detector output signals and capable of integrating the area of one or more response peaks and calculating peak areas corrected for baseline drift.

7.2.3.4 Six-Port Gas Chromatographic Valve. See Section 7.2.1.13.

7.2.3.5 Cryogenic Trap with Temperature Control Assembly. Refer to Section 10.1.1.3 for complete description of trap and temperature control assembly, Graseby, 500 Technology Ct., Smyrna, GA 30082, Model 320-01, or equivalent.

7.2.3.6 Electronic Mass Flow Controllers (3). Maintain constant flow (for carrier gas, nitrogen make-up gas and sample gas) and to provide analog output to monitor flow anomalies, Tylan Model 260, 0–100 mL/min, or equivalent.

7.2.3.7 Vacuum Pump. General purpose laboratory pump, capable of drawing the desired sample volume through the cryogenic trap (see Section 7.2.1.6 for source and description).

7.2.3.8 Chromatographic Grade Stainless Steel Tubing and Stainless Steel Plumbing Fittings. Refer to Section 7.1.1.8 for description.

7.2.3.9 Chromatographic Column. To provide compound separation such as shown in Table 7, Hewlett Packard, Rt. 41, Avondale, PA 19311. Typical GC column for this application is OV-1 capillary column, 0.32 mm x 50 m with 0.88 um crosslinked methyl silicone coating, or equivalent.

[Note: Other columns (e.g., DB-624) can be used as long as the system meets user needs. The Wider Megabore® column (i.e., 0.53-mm I.D.) is less susceptible to plugging as a result of trapped water, thus eliminating the need for Nafion® dryer in the analytical system. The Megabore® column has sample capacity approaching that of a packed column, while retaining much of the peak resolution traits of narrower columns (i.e., 0.32-mm I.D.).]

7.2.3.10 Vacuum/Pressure Gauges (3). Refer to Section 7.2.1.9 for description.

7.2.3.11 Cylinder Pressure Stainless Steel Regulators. Standard, two-stage cylinder regulators with pressure gauges for helium, zero air, nitrogen, and hydrogen gas cylinders.

7.2.3.12 Gas Purifiers (4). Used to remove organic impurities and moisture from gas streams, Hewlett Packard, Rt. 41, Avondale, PA 19311, P/N 19362 - 60500, or equivalent.

7.2.3.13 Low Dead-Volume Tee. Used to split (50/50) the exit flow from the GC column, Alltech Associates, 2051 Waukegan Rd., Deerfield, IL 60015, Cat. #5839, or equivalent.

7.3 Canister Cleaning System (see Figure 7)

7.3.1 Vacuum Pump. Capable of evacuating sample canister(s) to an absolute pressure of <0.05 mm Hg.

7.3.2 Manifold. Stainless steel manifold with connections for simultaneously cleaning several canisters.

7.3.3 Shut-off Valve(s). Seven (7) on-off toggle valves.

7.3.4 Stainless Steel Vacuum Gauge. Capable of measuring vacuum in the manifold to an absolute pressure of 0.05 mm Hg or less.

7.3.5 Cryogenic Trap (2 required). Stainless steel U-shaped open tubular trap cooled with liquid oxygen or argon to prevent contamination from back diffusion of oil from vacuum pump and to provide clean, zero air to sample canister(s).

7.3.6 Stainless Steel Pressure Gauges (2). 0-345 kPa (0-50 psig) to monitor zero air pressure.

7.3.7 Stainless Steel Flow Control Valve. To regulate flow of zero air into canister(s).

7.3.8 Humidifier. Pressurizable water bubbler containing high performance liquid chromatography (HPLC) grade deionized water or other system capable of providing moisture to the zero air supply.

7.3.9 Isothermal Oven (optional). For heating canisters, Fisher Scientific, Pittsburgh, PA, Model 349, or equivalent.

7.4 Calibration System and Manifold (see Figure 8)

7.4.1 Calibration Manifold. Glass manifold, (1.25-cm I.D. x 66-cm) with sampling ports and internal baffles for flow disturbance to ensure proper mixing.

7.4.2 Humidifier. 500-mL impinger flask containing HPLC grade deionized water.

7.4.3 Electronic Mass Flow Controllers. One 0 to 5 L/min and one 0 to 50 mL/min, Tylan Corporation, 23301-TS Wilmington Ave., Carson, CA 90745, Model 2160, or equivalent.

7.4.4 Teflon® Filter(s). 47-mm Teflon® filter for particulate control, best source.

8. Reagents and Materials

8.1 Gas Cylinders of Helium, Hydrogen, Nitrogen, and Zero Air. Ultrahigh purity grade, best source.

8.2 Gas Calibration Standards. Cylinder(s) containing approximately 10 ppmv of each of the following compounds of interest:

vinyl chloride
vinylidene chloride
1,1,2-trichloro-1,2,2-trifluoroethane
chloroform
1,2-dichloroethane
benzene

toluene
Freon 12
methyl chloride
1,2-dichloro-1,1,2,2-tetrafluoroethane
methyl bromide
ethyl chloride
Freon 11
dichloromethane
1,1-dicholoroethane
cis-1,2-dicholoroethylene
1,2-dichloropropane
1,1,2-trichloroethane
1,2-dibromoethane
tetrachloroethylene
chlorobenzene
benzyl chloride
hexachloro-1,3-butadiene

methyl chloroform
carbon tetrachloride
trichloroethylene
cis-1,3-dichloropropene
trans-1,3-dichloropropene
ethylbenzene
o-xylene
m-xylene
p-xylene
styrene
1,1,2,2-tetrachloroethane
1,3,5-trimethylbenzene
1,2,4-trimethylbenzene
m-dichlorobenzene
o-dichlorobenzene
p-dichlorobenzene
1,2,4-trichlorobenzene

The cylinder should be traceable to a National Institute of Standards and Technology (NIST) Standard Reference Material (SRM). The components may be purchased in one cylinder or may be separated into different cylinders. Refer to manufacturer's specification for guidance on purchasing and mixing VOCs in gas cylinders. Those compounds purchased should match one's own TCL.

8.3 Cryogen. Liquid nitrogen (bp –195.8°C) or liquid argon (bp –185.7°C), best source.

8.4 Gas Purifiers. Connected in-line between hydrogen, nitrogen, and zero air gas cylinders and system inlet line, to remove moisture and organic impurities from gas streams, Alltech Associates, 2051 Waukegan Rd., Deerfield, IL 60015, or equivalent.

8.5 Deionized Water. HPLC grade, ultrahigh purity (for humidifier), best source.

8.6 4-Bromofluorobenzene. Used for tuning GC/MS, best source.

8.7 Hexane. For cleaning sample system components, reagent grade, best source.

8.8 Methanol. For cleaning sampling system components, reagent garde, best source.

9. Sampling System

9.1 System Description

9.1.1 Subatmospheric Pressure Sampling [see Figure 2 (Without Metal Bellows Type Pump)].

9.1.1.1 In preparation for subatmospheric sample collection in a canister, the canister is evacuated to 0.05 mm Hg. When opened to the atmosphere containing the VOCs to be sampled, the differential pressure causes the sample to flow into the canister. This technique may be used to collect grab samples (duration of 10 to 30 seconds) or time-integrated samples (duration of 12-24 hours) taken through a flow-restrictive inlet (e.g., mass flow controller, critical orifice).

9.1.1.2 With a critical orifice flow restrictor, there will be a decrease in the flow rate as the pressure approaches atmospheric. However, with a mass flow controller, the subatmospheric sampling system can maintain a constant flow rate from full vacuum to within about 7 kPa (1.0 psig) or less below ambient pressure.

9.1.2 Pressurized Sampling [See Figure 2 (With Metal Bellows Type Pump)].

9.1.2.1 Pressurized sampling is used when longer-term integrated samples or higher volume samples are required. The sample is collected in a canister using a pump and flow control arrangement to achieve a typical 103-206 kPa (15-30 psig) final canister pressure. For example, a 6-liter evacuated canister can be filled at 10 mL/min for 24 hours to achieve a final pressure of about 144 kPa (21 psig).

9.1.2.2 In pressurized canister sampling,a metal bellows type pump draws in ambient air from the sampling manifold to fill and pressurize the sample canister.

9.1.3 All Samplers.

9.1.3.1 A flow control device is chosen to maintain a constant flow into the canister over the desired sample period. This flow rate is determined so the canister is filled (to about 88.1 kPa for subatmospheric pressure sampling or to about one atmosphere above ambient pressure for pressurized sampling) over the desired sample period. The flow rate can be calculated by

$$F = \frac{P \times V}{T \times 60}$$

where:

F = flow rate, mL/min.

P = final canister pressure, atmospheres absolute. P is approximately equal to

$$\frac{\text{kPa gauge}}{101.2} + 1$$

V = volume of the canister, mL.

T = sample period, hours.

For example, if a 6-L canister is to be filled to 202 kPa (2 atmospheres) absolute pressure in 24 hours, the flow rate can be calculated by

$$F = \frac{2 \times 6000}{24 \times 60} = 8.3 \text{ mL/min}$$

A certified mass flow meter is attached to the inlet line of the manifold, just in front of the filter. The canister is opened. The sampler is turned on and the reading of the certified mass flow meter is compared to the sampler mass flow controller. The valves should agree within ±10%. If not, the sampler mass flow meter needs to be recalibrated or there is a leak in the system. This should be investigated and corrected.

[Note: Mass flow meter readings may drift. Check the zero reading carefully and add or subtract the zero reading when reading or adjusting the sampler flow rate, to compensate for any zero drift.]

After two minutes, the desired canister flow rate is adjusted to the proper value (as indicated by the certified mass flow meter) by the sampler flow control unit controller (e.g., 3.5 mL/min for 24 hr, 7.0 mL/min for 12 hr). Record final flow under "CANISTER FLOW RATE," as provided in Figure 10.

9.2.6 The sampler is turned off and the elapsed time meter is reset to 000.0.

[Note: Any time the sampler is turned off, wait at least 30 seconds to turn the sampler back on.]

9.2.7 The "practice" canister and certified mass flow meter are disconnected and a clean certified (see Section 11.1) canister is attached to the system.

9.2.8 The canister valve and vacuum/pressure gauge valve are opened.

9.2.9 Pressure/vacuum in the canister is recorded on the canister sampling field data sheet (see Figure 10) as indicated by the sampler vacuum/pressure gauge.

9.2.10 The vacuum/pressure gauge valve is closed and the maximum-minimum thermometer is reset to current temperature. Time of day and elapsed time meter readings are recorded on the canister sampling field data sheet.

9.2.11 The electronic timer is set to begin and stop the sampling period at the appropriate times. Sampling commences and stops by the programmed electronic timer.

9.2.12 After the desired sampling period, the maximum, minimum, current interior temperature and current ambient temperature are recorded on the sampling field data sheet. The current reading from the flow controller is recorded.

9.2.13 At the end of the sampling period, the vacuum/pressure gauge valve on the sampler is briefly opened and closed and the pressure/vacuum is recorded on the sampling FTDS. Pressure should be close to desired pressure.

[Note: For a subatmospheric sampling system, if the canister is at atmospheric pressure when the field final pressure check is performed, the sampling period may be suspect. This information should be noted on the sampling FTDS.]

Time of day and elapsed time meter readings are also recorded.

9.2.14 The canister valve is closed. The sampling line is disconnected from the canister and the canister is removed from the system. For a subatmospheric system, a certified mass flow meter is once again connected to the inlet manifold in front of the in-line filter and a "practice" canister is attached to the Magnelatch valve of the sampling system. The final flow rate is recorded on the canister sampling field data sheet (see Figure 10).

[Note: For a pressurized system, the final flow may be measured directly.]

The sampler is turned off.

9.1.3.2 For automatic operation, the timer is wired to start and stop the pump at appropriate times for the desired sample period. The timer must also control the solenoid valve, to open the valve when starting the pump and close the valve when stopping the pump.

9.1.3.3 The use of the Skinner Magnelatch valve avoids any substantial temperature rise that would occur with a conventional, normally closed solenoid valve that would have to be energized during the entire sample period. The temperature rise in the valve could cause outgassing of organic compounds from the Viton valve seat material. The Skinner Magnelatch valve requires only a brief electrical pulse to open or close at the appropriate start and stop times and therefore experiences no temperature increase. The pulses may be obtained either with an electronic timer that can be programmed for short (5 to 60) seconds ON periods, or with a conventional mechanical timer and a special pulse circuit. A simple electrical pulse circuit for operating the Skinner Magnelatch solenoid valve with a conventional mechanical timer is illustrated in Figure 9(a). However, with this simple circuit, the valve may operate unreliably during brief power interruptions or if the timer is manually switched on and off too fast. A better circuit incorporating a time-delay relay to provide more reliable valve operation is shown in Figure 9(b).

9.1.3.4 The connecting lines between the sample inlet and the canister should be as short as possible to minimize their volume. The flow rate into the canister should remain relatively constant over the entire sampling period. If a critical orifice is used, some drop in the flow rate may occur near the end of the sample period as the canister pressure approaches the final calculated pressure.

9.1.3.5 As an option, a second electronic timer (see Section 7.1.1.6) may be used to start the auxiliary pump several hours prior to the sampling period to flush and condition the inlet line.

9.1.3.6 Prior to field use, each sampling system must pass a humid zero air certification (see Section 11.2.2). All plumbing should be check carefully for leaks. The canisters must also pass a humid zero air certification before use (see Section 11.1).

9.2 Sampling Procedure

9.2.1 The sample canister should be cleaned and tested according to the procedure in Section 11.1.

9.2.2 A sample collection system is assembled as shown in Figure 2 (and Figure 3) and must meet certification requirements as outlined in Section 11.2.3.

[Note: The sampling system should be contained in an appropriate enclosure.]

9.2.3 Prior to locating the sampling system, the user may want to perform "screening analyses" using a portable GC system, as outlined in Appendix B, to determine potential volatile organics present and potential "hot spots." The information gathered from the portable GC screening analysis would be used in developing a monitoring protocol, which includes the sampling system location, based upon the "screening analysis" results.

9.2.4 After "screening analysis," the sampling system is located. Temperatures of ambient air and sampler box interior are recorded on the Compendium Method TO-14A field test data sheet (FTDS), as illustrated in Figure 10.

[Note: The following discussion is related to Figure 2.]

9.2.5 To verify correct sample flow, a "practice" (evacuated) canister is used in the sampling system.

[Note: For a subatmospheric sampler, the flow meter and practice canister are needed. For the pump-driven system, the practice canister is not needed, as the flow can be measured at the outlet of the system.]

9.2.15 An identification tag is attached to the canister. Canister serial number, sample number, location, and date are recorded on the tag. Complete the Chain-of-Custody (COC) for the canister and ship back to the laboratory for analysis.

10. Analytical System (see Figures 4, 5 and 6)

[Note: The following section relates to the use of the linear quadrupole MS technology as the detector. The ion-trap technology is as applicable to the detection of VOCs from a specially-treated canister. EPA developed this method using the linear quadrupole MS, as part of it's air toxics field and laboratory monitoring programs over the last several years. Modifications to these procedures may be necessary if other technology is utilized.]

10.1 System Description

10.1.1 GC/MS/SCAN System.

10.1.1.1 The analytical system is comprised of a GC equipped with a mass-selective detector set in the SCAN mode (see Figure 4). All ions are scanned by the MS repeatedly during the GC run. The system includes a computer and appropriate software for data acquisition, data reduction, and data reporting. A 400 mL air sample is collected from the canister into the analytical system. The sample air is first passed through a Nafion® dryer, through the 6-port chromatographic valve, then routed into a cryogenic trap.

[Note: While the GC-multidetector analytical system does not employ a Nafion® dryer for drying the sample gas stream, it is used here because the GC/MS system utilizes a larger sample volume and is far more sensitive to excessive moisture than the GC-multidetector analytical system. Moisture can adversely affect detector precision. The Nafion® dryer also prevents freezing of moisture on the 0.32-mm I.D. column, which may cause column blockage and possible breakage.]

The trap is heated (–160°C to 120°C in 60 sec) and the analyte is injected onto the OV-1 capillary column (0.32-mm x 50-m).

[Note: Rapid heating of the trap provides efficient transfer of the sample components onto the gas chromatographic column.]

Upon sample injection unto the column, the MS computer is signaled by the GC computer to begin detection of compounds which elute from the column. The gas stream from the GC is scanned within a preselected range of atomic mass units (amu). For detection of compounds in Table 1, the range should be 18 to 250 amu, resulting in a 1.5 Hz repetition rate. Six (6) scans per eluting chromatographic peak are provided at this rate. The 10-15 largest peaks are chosen by an automated data reduction program, the three scans nearest the peak apex are averaged, and a background subtraction is performed. A library search is then performed and the top ten best matches for each peak are listed. A qualitative characterization of the sample is provided by this procedure. A typical chromatogram of VOCs determined by GC/MS/SCAN is illustrated in Figure 11(a).

10.1.1.2 A Nafion® permeable membrane dryer is used to remove water vapor selectively from the sample stream. The permeable membrane consists of Nafion® tubing (a copolymer of tetrafluoroethylene and fluorosulfonyl monomer) that is coaxially mounted within larger tubing. The sample stream is passed through the interior of the Nafion® tubing, allowing water (and other light, polar compounds) to permeate through the walls into the dry purge stream flowing through the annular space between the Nafion® and outer tubing.

[Note: To prevent excessive moisture build-up and any memory effects in the dryer, a clean-up procedure involving periodic heating of the dryer (100°C for 20 minutes) while purging with dry zero air (~500 mL/min) should be implemented as part of the user's SOP manual. The clean-up procedure is repeated during each analysis (7). Studies have indicated no substantial loss of targeted VOCs utilizing the above clean-up procedure (7). However, use of the cleanup procedure for compounds other than those on the TCL can lead to loss of sample integrity (19). This clean-up procedure is particularly useful when employing cryogenic preconcentration of VOCs with subsequent GC analysis using a 0.32-mm I.D. column because excess accumulated water can cause trap and column blockage and also adversely affect detector precision. In addition, the improvement in water removal from the sampling stream will allow analyses of much larger volumes of sample air in the event that greater system sensitivity is required for targeted compounds.]

10.1.1.3 The packed metal tubing used for reducing temperature trapping of VOCs is shown in Figure 12. The cooling unit is comprised of a 0.32-cm outside diameter (O.D.) nickel tubing loop packed with 60-80 mesh Pyrex® beads, Nutech Model 320-01, or equivalent. The nickel tubing loop is wound onto a cylindrically formed tube heater (~250 watt). A cartridge heater (~25 watt) is sandwiched between pieces of aluminum plate at the trap inlet and outlet to provide additional heat to eliminate cold spots in the transfer tubing. During operation, the trap is inside a two-section stainless steel shell which is well insulated. Rapid heating (−150 to +100°C in 55 s) is accomplished by direct thermal contact between the heater and the trap tubing. Cooling is achieved by vaporization of the cryogen. In the shell, efficient cooling (+120 to −150°C in 225 s) is facilitated by confining the vaporized cryogen to the small open volume surrounding the trap assembly. The trap assembly and chromatographic valve are mounted on a baseplate fitted into the injection and auxiliary zones of the GC on an insulated pad directly above the column oven for most commercially available GC systems.

[Note: Alternative trap assembly and connection to the GC may be used depending on the user's requirements.]

The carrier gas line is connected to the injection end of the analytical column with a zero-dead-volume fitting that is usually held in the heated zone above the GC oven. A 15-cm x 15-cm x 24-cm aluminum box is fitted over the sample handling elements to complete the package. Vaporized cryogen is vented through the top of the box.

10.1.1.4 As an option, the analyst may wish to split the gas stream exiting the column with a low dead-volume tee, passing one-third of the sample gas (~1.0 mL/min) to the mass-selective detector and the remaining two-thirds (~2.0 mL/min) through an FID, as illustrated as an option in Figure 4. The use of the specific detector (MS/SCAN) coupled with the non-specific detector (FID) enables enhancement of data acquired from a single analysis. In particular, the FID provides the user:

- Semi-real time picture of the progress of the analytical scheme.
- Confirmation by the concurrent MS analysis of other labs that can provide only FID results.
- Ability to compare GC/FID with other analytical laboratories with only GC/FID capability.

10.1.2 GC/MS/SIM System.

10.1.2.1 The analytical system is comprised of a GC equipped with an OV-1 capillary column (0.32-mm x 50-m) and a mass-selective detector set in the SIM mode (see Figure 4). The GC/MS is set up for automatic, repetitive analysis. The system is programmed to acquire data for only the target compounds and to disregard all others. The sensitivity is 0.1 ppbv for a 250 mL air sample with analytical precision of about 5% relative standard deviation. Concentration of compounds based upon a previously installed calibration table is reported

by an automated data reduction program. A Nafion® dryer is also employed by this analytical system prior to cryogenic preconcentration; therefore, many polar compounds are not identified by this procedure.

10.1.2.2 SIM analysis is based on a combination of retention times and relative abundances of selected ions (see Table 2). These qualifiers are stored on the hard disk of the GC/MS computer and are applied for identification of each chromatographic peak. The retention time qualifier is determined to be ± 0.10 minute of the library retention time of the compound. The acceptance level for relative abundance is determined to be ± 15% of the expected abundance, except for vinyl chloride and methylene chloride, which is determined to be ± 25%. Three ions are measured for most of the forty compounds. When compound identification is made by the computer, any peak that fails any of the qualifying tests is flagged (e.g., with an *). All the data should be manually examined by the analyst to determine the reason for the flag and whether the compound should be reported as found. While this adds some subjective judgment to the analysis, computer-generated identification problems can be clarified by an experienced operator. Manual inspection of the quantitative results should also be performed to verify concentrations outside the expected range. A typical chromatogram of VOCs determined by GC/MS/SIM mode is illustrated in Figure 11(b).

10.1.3 GC-Multidetector (GC/FID/ECD) System with Optional PID.

10.1.3.1 The analytical system (see Figure 5) is comprised of a gas chromatograph equipped with a capillary column and electron capture and flame ionization detectors (see Figure 5). In typical operation, sample air from pressurized canisters is vented past the inlet to the analytical system from the canister at a flow rate of 75 mL/min. For analysis, only 35 mL/min of sample gas is used, while excess is vented to the atmosphere. Sub-ambient pressure canisters are connected directly to the inlet and air is pulled through a trap by a downstream vacuum. The sample gas stream is routed through a six port chromatographic valve and into the cryogenic trap for a total sample volume of 490 mL.

[Note: This represents a 14 minute sampling period at a rate of 35 mL/min.]

The trap (see Section 10.1.1.3) is cooled to -150°C by controlled release of a cryogen. VOCs are condensed on the trap surface while N_2, O_2, and other sample components are passed to the pump. After the organic compounds are concentrated, the valve is switched and the trap is heated. The revolatilized compounds are transported by helium carrier gas at a rate of 4 mL/min to the head of the Megabore® OV-1 capillary column (0.53-mm x 30-m). Since the column initial temperature is at -50°C, the VOCs are cryofocussed on the head of the column. Then, the oven temperature is programmed to increase and the VOCs in the carrier gas are chromatographically separated. The carrier gas containing the separated VOCs is then directed to two parallel detectors at a flow rate of 2 mL/min each. The detectors sense the presence of the speciated VOCs, and the response is recorded by either a strip chart recorder or a data processing unit.

10.1.3.2 Typical chromatograms of VOCs determined by the GC/FID/ECD analytical system are illustrated in Figures 11(c) and 11(d), respectively.

10.1.3.3 Helium is used as the carrier gas (~4 mL/min) to purge residual air from the trap at the end of the sampling phase and to carry the revolatilized VOCs through the Megabore® GC column. Moisture and organic impurities are removed from the helium gas stream by a chemical purifier installed in the GC (see Section 7.2.1.11). After exiting the OV-1 Megabore® column, the carrier gas stream is split to the two detectors at rates of ~2 mL/min each.

10.1.3.4 Gas scrubbers containing Drierite® or silica gel and 5A molecular sieve are used to remove moisture and organic impurities from the zero air, hydrogen, and nitrogen gas streams.

[Note: Purity of gas purifiers is checked prior to use by passing humid zero-air through the gas purifier and analyzing according to Section 11.2.2.]

10.1.3.5 All lines should be kept as short as practical. All tubing used for the system should be chromatographic grade stainless steel connected with stainless steel fittings. After assembly, the system should be checked for leaks according to manufacturer's specifications.

10.1.3.6 The FID burner air, hydrogen, nitrogen (make-up), and helium (carrier) flow rates should be set according to the manufacturer's instructions to obtain an optimal FID response while maintaining a stable flame throughout the analysis. Typical flow rates are: burner air, 450 mL/min; hydrogen, 30 mL/min; nitrogen, 30 mL/min; helium, 2 mL/min.

10.1.3.7 The ECD nitrogen make-up gas and helium carrier flow rates should be set according to manufacturer's instructions to obtain an optimal ECD response. Typical flow rates are: nitrogen, 76 mL/min and helium, 2 mL/min.

10.1.3.8 The GC/FID/ECD could be modified to include a PID (see Figure 6) for increased sensitivity (20). In the photoionization process, a molecule is ionized by ultraviolet light as follows: $R + hv \rightarrow R^{+} + e^-$, where R^{+} is the ionized species and a photon is represented by hv, with energy less than or equal to the ionization potential of the molecule. Generally all species with an ionization potential less than the ionization energy of the lamp are detected. Because the ionization potential of all major components of air (O_2, N_2, CO, CO_2, and H_2O) is greater than the ionization energy of lamps in general use, they are not detected. The sensor is comprised of an argon-filled, ultraviolet (UV) light source where a portion of the organic vapors are ionized in the gas stream. A pair of electrodes are contained in a chamber adjacent to the sensor. When a potential gradient is established between the electrodes, any ions formed by the absorption of UV light are driven by the created electric field to the cathode, and the current (proportional to the organic vapor concentration) is measured. The PID is generally used for compounds having ionization potentials less than the ratings of the ultraviolet lamps. This detector is used for determination of most chlorinated and oxygenated hydrocarbons, aromatic compounds, and high molecular weight aliphatic compounds. Because the PID is insensitive to methane, ethane, carbon monoxide, carbon dioxide, and water vapor, it is an excellent detector. The electron volt rating is applied specifically to the wavelength of the most intense emission line of the lamp's output spectrum. Some compounds with ionization potentials above the amp rating can still be detected due to the presence of small quantities of more intense light. A typical system configuration associated with the GC/FID/ECD/PID is illustrated in Figure 6.

10.2 GC/MS/SCAN/SIM System Performance Criteria

10.2.1 GC/MS System Operation.

10.2.1.1 Prior to analysis, the GC/MS system is assembled and checked according to manufacturer's instructions.

10.2.1.2 Table 3.0 outlines general operating conditions for the GC/MS/SCAN/SIM system with optional FID.

10.2.1.3 The GC/MS system is first challenged with humid zero air (see Section 11.2.2).

10.2.1.4 The GC/MS and optional FID system is acceptable if it contains less than 0.2 ppbv of targeted VOCs.

10.2.2 Daily GC/MS Tuning (see Figure 13)

10.2.2.1 At the beginning of each day or prior to a calibration, the GC/MS system must be tuned to verify that acceptable performance criteria are achieved.

10.2.2.2 For tuning the GC/MS, a cylinder containing 4-bromofluorobenzene (4-BFB) is introduced via a sample loop valve injection system.

[Note: Some systems allow auto-tuning to facilitate this process.]

The key ions and ion abundance criteria that must be met are illustrated in Table 4. Analysis should not begin until all those criteria are met.

10.2.2.3 The GC/MS tuning standard could also be used to assess GC column performance (chromatographic check) and as an internal standard. Obtain a background correction mass spectra of 4-BFB and check that all key ions criteria are met. If the criteria are not achieved, the analyst must retune the mass spectrometer and repeat the test until all criteria are achieved.

10.2.2.4 The performance criteria must be achieved before any samples, blanks or standards are analyzed. If any key ion abundance observed for the daily 4-BFB mass tuning check differs by more than 10% absolute abundance from that observed during the previous daily tuning, the instrument must be retuned or the sample and/or calibration gases reanalyzed until the above condition is met.

10.2.3 GC/MS Calibration (see Figure 13)

[Note: Initial and routine calibration procedures are illustrated in Figure 13.]

10.2.3.1 Initial Calibration. Initially, a multipoint dynamic calibration (three levels plus humid zero air) is performed on the GC/MS system, before sample analysis, with the assistance of a calibration system (see Figure 8). The calibration system uses NIST traceable standards [containing a mixture of the targeted VOCs at nominal concentrations of 10 ppmv in nitrogen (see Section 8.2)] as working standards to be diluted with humid zero air. The contents of the working standard cylinder(s) are metered (~2 mL/min) into the heated mixing chamber where they are mixed with a 2-L/min humidified zero air gas stream to achieve a nominal 10 ppbv per compound calibration mixture (see Figure 8). This nominal 10 ppbv standard mixture is allowed to flow and equilibrate for a minimum of 30 minutes. After the equilibration period, the gas standard mixture is sampled and analyzed by the real-time GC/MS system [see Figure 8(a) and Section 7.2.1]. The results of the analyses are averaged, flow audits are performed on the mass flow meters and the calculated concentration compared to generated values. After the GC/MS is calibrated at three concentration levels, a second humid zero air sample is passed through the system and analyzed. The second humid zero air test is used to verify that the GC/MS system is certified clean (<0.2 ppbv of target compounds).

As an alternative, a multipoint humid static calibration (three levels plus zero humid air) can be performed on the GC/MS system. During the humid static calibration analyses, three (3) specially-treated canisters are filled each at a different concentration between 1-20 ppbv from the calibration manifold using a pump and mass flow control arrangement [see Figure 8(c)]. The canisters are then delivered to the GC/MS to serve as calibration standards. The canisters are analyzed by the MS in the SIM mode, each analyzed twice.

The expected retention time and ion abundance (see Table 2 and Table 5) are used to verify proper operation of the GC/MS system. A calibration response factor is determined for each analyte, as illustrated in Table 5, and the computer calibration table is updated with this information, as illustrated in Table 6. The relative standard deviation (RSD) of the response factors should be <30% for the curve to be acceptable. If the RSD is >30%, recalibration is required. The samples are calculated using the mean of the response factors.

10.2.3.2 Routine Calibration. The GC/MS system is calibrated daily (and before sample analysis) with a one-point calibration. The GC/MS system is calibrated either with the dynamic calibration procedure [see Figure 8(a)] or with a 6-L specially prepared passivated canister filled with humid calibration standards from the calibration manifold (see Section 10.2.3.2). After the single point calibration, the GC/MS analytical system is challenged with a humidified zero gas stream to insure the analytical system returns to specification (<0.2 ppbv of selective organics). The relative percent difference (RPD) of each response factor from the mean response factor of the initial calibration curve should be <30% for continued use of the mean response factors. If the RPD is >30%, recalibration is required.

10.3 GC/FID/ECD System Performance Criteria (With Optional PID System) [see Figure 14])

10.3.1 Humid Zero Air Certification

10.3.1.1 Before system calibration and sample analysis, the GC/FID/ECD analytical system is assembled and checked according to manufacturer's instructions.

10.3.1.2 The GC/FID/ECD system is first challenged with humid zero air (see Section 11.2.2) and monitored.

10.3.1.3 Analytical systems contaminated with <0.2 ppbv of targeted VOCs are acceptable.

10.3.2 GC Retention Time Windows Determination (see Table 7)

10.3.2.1 Before analysis can be performed, the retention time windows must be established for each analyte.

10.3.2.2 Make sure the GC system is within optimum operating conditions.

10.3.2.3 Make three injections of the standard containing all compounds for retention time window determination.

[Note: The retention time window must be established for each analyte every 72 hours during continuous operation.]

10.3.2.4 Calculate the standard deviation of the three absolute retention times for each single component standard. The retention window is defined as the mean plus or minus three times the standard deviation of the individual retention times for each standard. In those cases where the standard deviation for a particular standard is zero, the laboratory must substitute the standard deviation of a closely-eluting, similar compound to develop a valid retention time window.

10.3.2.5 The laboratory must calculate retention time windows for each standard (see Table 7) on each GC column, whenever a new GC column is installed or when major components of the GC are changed. The data must be noted and retained in a notebook by the laboratory as part of the user SOP and as a quality assurance check of the analytical system.

10.3.3 GC Calibration

[Note: Initial and routine calibration procedures are illustrated in Figure 14.]

10.3.3.1 Initial Calibration. Initially, a multipoint dynamic calibration (three levels plus humid zero air) is performed on the GC/FID/ECD system, before sample analysis, with the assistance of a calibration system (see Figure 8). The calibration system uses NIST traceable standards or [containing a mixture of the targeted VOCs at nominal concentrations of 10 ppmv in nitrogen (see Section 8.2)] as working standards to be diluted with humid zero air. The contents of the working standard cylinders are metered (2 mL/min) into the heated mixing chamber where they are mixed with a 2-L/min humidified zero air stream to achieve a nominal 10 ppbv per compound calibration mixture (see Figure 8). This nominal 10 ppbv standard mixture is allowed to flow and equilibrate for an appropriate amount of time. After the equilibration period, the gas standard mixture is sampled and analyzed by the GC/MS system [see Figure 8(a)]. The results of the analyses are averaged, flow audits are performed on the mass flow controllers used to generate the standards and the appropriate response factors (concentration/area counts) are calculated for each compound, as illustrated in Table 5. The relative standard deviation (RSD) of the response factors should be <30% for the curve to be acceptable. If the RSD is >30%, recalibration is required. The samples are calculated using the mean of the response factors.

[Note: GC/FIDs are linear in the 1-20 ppbv range and may not require repeated multipoint calibrations; whereas, the GC/ECD will require frequent linearity evaluation.]

Table 5 outlines typical calibration response factors and retention times for 40 VOCs. After the GC/FID/ECD is calibrated at the three concentration levels, a second humid zero air sample is passed through the system and analyzed. The second humid zero air test is used to verify that the GC/FID/ECD system is certified clean (<0.2 ppbv of target compounds).

10.3.3.2 Routine Calibration. A one point calibration is performed daily on the analytical system to verify the initial multipoint calibration (see Section 10.3.3.1). The analyzers (GC/FID/ECD) are calibrated (before sample analysis) using the static calibration procedures (see Section 10.2.3.2) involving pressurized gas cylinders containing low concentrations of the targeted VOCs (~10 ppbv) in nitrogen. After calibration, humid zero air is once again passed through the analytical system to verify residual VOCs are not present. The relative percent difference (RPD) of each response factor from the mean response factor of the initial calibration curve should be <30% for continued use of the mean response factors. If the RPD is >30%, recalibration is required.

10.3.4 GC/FID/ECD/PID System Performance Criteria

10.3.4.1 As an option, the user may wish to include a PID to assist in peak identification and increase sensitivity.

10.3.4.2 This analytical system has been used in U.S. Environmental Protection Agency's Urban Air Toxic Monitoring Program (UATMP).

10.3.4.3 Preparation of the GC/FID/ECD/PID analytical system is identical to the GC/FID/ECD system (see Section 10.3).

10.3.4.4 Table 8 outlines typical retention times (minutes) for selected organics using the GC/FID/ECD/PID analytical system.

10.4 Analytical Procedures

10.4.1 Canister Receipt

10.4.1.1 The overall condition of each sample canister is observed. Each canister should be received with an attached sample identification tag and FTDS. Complete the canister COC.

10.4.1.2 Each canister is recorded in the dedicated laboratory logbook. Also noted on the identification tag are date received and initials of recipient.

10.4.1.3 The pressure of the canister is checked by attaching a pressure gauge to the canister inlet. The canister valve is opened briefly and the pressure (kPa, psig) is recorded.

[Note: If pressure is <83 kPa (<12 psig), the user may wish to pressurize the canisters, as an option, with zero grade nitrogen up to 137 kPa (20 psig) to ensure that enough sample is available for analysis. However, pressurizing the canister can introduce additional error, increase the minimum detection limit (MDL), and is time consuming. The user should weigh these limitations as part of his program objectives before pressurizing.]

Final cylinder pressure is recorded on the canister FTDS (see Figure 10).

10.4.1.4 If the canister pressure is increased, a dilution factor (DF) is calculated and recorded on the sampling data sheet.

$$DF = \frac{Y_a}{X_a}$$

where:

X_a = canister pressure absolute before dilution, kPa, psia.
Y_a = canister pressure absolute after dilution, kPa, psia.

After sample analysis, detected VOC concentrations are multiplied by the dilution factor to determine concentration in the sampled air.

10.4.2 GC/MS/SCAN Analysis (With Optional FID System)

10.4.2.1 The analytical system should be properly assembled, humid zero air certified (see Section 11.3), operated (see Table 3), and calibrated for accurate VOC determination.

10.4.2.2 The mass flow controllers are checked and adjusted to provide correct flow rates for the system.

10.4.2.3 The sample canister is connected to the inlet of the GC/MS/SCAN (with optional FID) analytical system. For pressurized samples, a mass flow controller is placed on the canister and the canister valve is opened and the canister flow is vented past a tee inlet to the analytical system at a flow of 75 mL/min so that 35 mL/min is pulled through the Nafion® dryer to the six-port chromatographic valve.

[Note: Flow rate is not as important as acquiring sufficient sample volume.]

Sub-ambient pressure samples are connected directly to the inlet.

10.4.2.4 The GC oven and cryogenic trap (inject position) are cooled to their set points of -50°C and -150°C, respectively.

10.4.2.5 As soon as the cryogenic trap reaches its lower set point of -150°C, the six-port chromatographic valve is turned to its fill position to initiate sample collection.

10.4.2.6 A 10 minute collection period of canister sample is utilized.

[Note: 40 mL/min x 10 min = 400 mL sampled canister contents.]

10.4.2.7 After the sample is preconcentrated in the cryogenic trap, the GC sampling valve is cycled to the inject position and the cryogenic trap is heated. The trapped analytes are thermally desorbed onto the head of the OV-1 capillary column (0.31-mm I.D. x 50-m length). The GC oven is programmed to start at -50°C and after 2 min to heat to 150°C at a rate of 8°C per minute.

10.4.2.8 Upon sample injection onto the column, the MS is signaled by the computer to scan the eluting carrier gas from 18 to 250 amu, resulting in a 1.5 Hz repetition rate. This corresponds to about 6 scans per eluting chromatographic peak.

10.4.2.9 Primary identification is based upon retention time and relative abundance of eluting ions as compared to the spectral library stored on the hard disk of the GC/MS data computer.

10.4.2.10 The concentration (ppbv) is calculated using the previously established response factors (see Section 10.2.3.2), as illustrated in Table 5.

[Note: If the canister is diluted before analysis, an appropriate multiplier is applied to correct for the volume dilution of the canister (see Section 10.4.1.4).]

10.4.2.11 The optional FID trace allows the analyst to record the progress of the analysis.

10.4.3 GC/MS/SIM Analysis (With Optional FID System).

10.4.3.1 When the MS is placed in the SIM mode of operation, the MS monitors only preselected ions, rather than scanning all masses continuously between two mass limits.

10.4.3.2 As a result, increased sensitivity and improved quantitative analysis can be achieved.

10.4.3.3 Similar to the GC/MS/SCAN configuration, the GC/MC/SIM analysis is based on a combination of retention times and relative abundances of selected ions (see Table 2 and Table 5). These qualifiers are stored on the hard disk of the GC/MS computer and are applied for identification of each chromatographic peak. Once the GC/MS/SIM has identified the peak, a calibration response factor is used to determine the analyte's concentration.

10.4.3.4 The individual analyses are handled in three phases: data acquisition, data reduction, and data reporting. The data acquisition software is set in the SIM mode, where specific compound fragments are monitored by the MS at specific times in the analytical run. Data reduction is coordinated by the postprocessing macro program that is automatically accessed after data acquisition is completed at the end of the GC run. Resulting ion profiles are extracted, peaks are identified and integrated, and an internal integration report is generated by the program. A reconstructed ion chromatogram for hardcopy reference is prepared by the program and various parameters of interest such as time, date, and integration constants are printed. At the completion of the macro program, the data reporting software is accessed. The appropriate calibration table (see Table 9) is retrieved by the data reporting program from the computer's hard disk storage and the proper retention time and response factor parameters are applied to the macro program's integration file. With reference to certain pre-set acceptance criteria, peaks are automatically identified and quantified and a final summary report is prepared, as illustrated in Table 10.

10.4.4 GC/FID/ECD Analysis (With Optional PID System)

10.4.4.1 The analytical system should be properly assembled, humid zero air certified (see Section 12.2) and calibrated through a dynamic standard calibration procedure (see Section 10.3.2). The FID detector is lit and allowed to stabilize.

10.4.4.2 Sixty-four minutes are required for each sample analysis: 15 min for system initialization, 14 min for sample collection, 30 min for analysis, and 5 min for post-time, during which a report is printed.

[Note: This may vary depending upon system configuration and programming.]

10.4.4.3 The helium and sample mass flow controllers are checked and adjusted to provide correct flow rates for the system. Helium is used to purge residual air from the trap at the end of the sampling phase and to carry the revolatilized VOCs from the trap onto the GC column and into the FID/ECD. The hydrogen, burner air, and nitrogen flow rates should also be checked. The cryogenic trap is connected and verified to be operating properly while flowing cryogen through the system.

10.4.4.4 The sample canister is connected to the inlet of the GC/FID/ECD analytical system. The canister valve is opened and the canister flow is vented past a tee inlet to the analytical system at 75 mL/min using a mass flow controller. During analysis, 35 mL/min of sample gas is pulled through the six-port chromatographic valve and routed through the trap at the appropriate time while the extra sample is vented. The VOCs are condensed in the trap while the excess flow is exhausted through an exhaust vent, which assures that the sample air flowing through the trap is at atmospheric pressure.

10.4.4.5 The six-port valve is switched to the inject position and the canister valve is closed.

10.4.4.6 The electronic integrator is started.

10.4.4.7 After the sample is preconcentrated on the trap, the trap is heated and the VOCs are thermally desorbed onto the head of the capillary column. Since the column is at -50°C, the VOCs are cryofocussed on the

column. Then, the oven temperature (programmed) increases and the VOCs elute from the column to the parallel FID/ECD assembly.

10.4.4.8 The peaks eluting from the detectors are identified by retention time (see Table 7 and Table 8), while peak areas are recorded in area counts. Typical response of the FID and ECD, respectively, for the forty (40) targeted VOCs identified in Compendium Method TO-14A are illustrated in Figures 15 and 16, respectively.

[Note: Refer to Table 7 for peak number and identification.]

10.4.4.9 The response factors (see Section 10.3.3.1) are multiplied by the area counts for each peak to calculate ppbv estimates for the unknown sample. If the canister is diluted before analysis, an appropriate dilution multiplier (DF) is applied to correct for the volume dilution of the canister (see Section 10.4.1.4).

10.4.4.10 Each canister is analyzed twice and the final concentrations for each analyte are the averages of the two analyses.

10.4.4.11 However, if the GC/FID/ECD analysis shows unexpected peaks which need further identification and attention or overlapping peaks are discovered, eliminating possible quantitation, the sample should then be subjected to a GC/MS/SCAN for positive identification and quantitation.

11. Cleaning and Certification Program

11.1 Canister Cleaning and Certification

11.1.1 All canisters must be clean and free of any contaminants before sample collection.

11.1.2 All canisters are leak tested by pressurizing them to approximately 206 kPa (~30 psig) with zero air.

[Note: The canister cleaning system in Figure 7 can be used for this task. The initial pressure is measured, the canister value is closed, and the final pressure is checked after 24 hours. If leak tight, the pressure should not vary more than ± 13.8 kPa (± 2 psig) over the 24 hour period.]

11.1.3 A canister cleaning system may be assembled as illustrated in Figure 7. Cryogen is added to both the vacuum pump and zero air supply traps. The canister(s) are connected to the manifold. The vent shut-off valve and the canister valve(s) are opened to release any remaining pressure in the canister(s). The vacuum pump is started and the vent shut-off valve is then closed and the vacuum shut-off valve is opened. The canister(s) are evacuated to <0.05 mm Hg (for at least one hour).

[Note: On a daily basis or more often if necessary, the cryogenic traps should be purged with zero air to remove any trapped water from previous canister cleaning cycles.]

11.1.4 The vacuum and vacuum/pressure gauge shut-off valves are closed and the zero air shut-off valve is opened to pressurize the canister(s) with humid zero air to approximately 206 kPa (~30 psig). If a zero gas generator system is used, the flow rate may need to be limited to maintain the zero air quality.

11.1.5 The zero shut-off valve is closed and the canister(s) is allowed to vent down to atmospheric pressure through the vent shut-off valve. The vent shut-off valve is closed. Repeat Sections 11.1.3 through 11.1.5 two additional times for a total of three (3) evacuation/pressurization cycles for each set of canisters.

11.1.6 At the end of the evacuation/pressurization cycle, the canister is pressurized to 206 kPa (30 psig) with humid zero air. The canister is then analyzed by a GC/MS or GC/FID/ECD analytical system. Any canister that has not tested clean (compared to direct analysis of humidified zero air of <0.2 ppbv of targeted VOCs) should not be used. As a "blank" check of the canister(s) and cleanup procedure, the final humid zero air fill of 100% of the canisters is analyzed until the cleanup system and canisters are proven reliable (<0.2 ppbv of targeted VOCs). The check can then be reduced to a lower percentage of canisters.

11.1.7 The canister is reattached to the cleaning manifold and is then reevacuated to <0.05 mm Hg and remains in this condition until used. The canister valve is closed. The canister is removed from the cleaning system and the canister connection is capped with a stainless steel fitting. The canister is now ready for collection of an air sample. An identification tag is attached to the neck of each canister for field notes and chain-of-custody purposes.

11.1.8 As an option to the humid zero air cleaning procedures, the canisters could be heated in an isothermal oven to 100°C during the procedure described in Section 11.1.3 to assist in removing less volatile VOCs from the walls of the canister.

[Note: Do not heat the values of the canister during this sequence.]

Once heated, the canisters are evacuated to 0.05 mm Hg. At the end of the heated/evacuated cycle, the canisters are pressurized with humid zero air and analyzed by the GC/FID/ECD system. Any canister that has not tested clean (<0.2 ppbv of targeted compounds) should not be used. Once tested clean, the canisters are reevacuated to 0.05 mm Hg and remain in the evacuated state until used.

11.2 Sampling System Cleaning and Certification

11.2.1 Cleaning Sampling System Components

11.2.1.1 Sample components are disassembled and cleaned before the sampler is assembled. Nonmetallic parts are rinsed with HPLC grade deionized water and dried in a vacuum oven at 50°C. Typically, stainless steel parts and fittings are cleaned by placing them in a beaker of methanol in an ultrasonic bath for 15 minutes. This procedure is repeated with hexane as the solvent.

11.2.1.2 The parts are then rinsed with HPLC grade deionized water and dried in a vacuum oven at 100°C for 12 to 24 hours.

11.2.1.3 Once the sampler is assembled, the entire system is purged with humid zero air for 24 hours.

11.2.2 Humid Zero Air Certification

[Note: In the following sections, "certification" is defined as evaluating the sampling system with humid zero air and humid calibration gases that pass through all active components of the sampling system. The system is "certified" if no significant additions or deletions (<0.2 ppbv of targeted compounds) have occurred when challenged with the test gas stream.]

11.2.2.1 The cleanliness of the sampling system is determined by testing the sampler with humid zero air without an evacuated gas cylinder, as follows.

11.2.2.2 The calibration system and manifold are assembled, as illustrated in Figure 8. The sampler (without an evacuated gas cylinder) is connected to the manifold and the zero air cylinder activated to generate a humid gas stream (~2 L/min) to the calibration manifold [see Figure 8(b)].

11.2.2.3 The humid zero gas stream passes through the calibration manifold, through the sampling system (without an evacuated canister) to a GC/FID/ECD analytical system at 75 mL/min so that 35 mL/min is pulled

through the six-port valve and routed through the cryogenic trap (see Section 10.2.2.1) at the appropriate time while the extra sample is vented.

[Note: The exit of the sampling system (without the canister) replaces the canister in Figure 4.]

After the sample (~400 mL) is preconcentrated on the trap, the trap is heated and the VOCs are thermally desorbed onto the head of the capillary column. Since the column is at -50°C, the VOCs are cryofocussed on the column. Then, the oven temperature (programmed) increases and the VOCs begin to elute and are detected by a GC/MS (see Section 10.2) or the GC/FID/ECD (see Section 10.3). The analytical system should not detect greater than 0.2 ppbv of targeted VOCs in order for the sampling system to pass the humid zero air certification test. Chromatograms of a certified sampler and contaminated sampler are illustrated in Figures 17(a) and (b), respectively. If the sampler passes the humid zero air test, it is then tested with humid calibration gas standards containing selected VOCs at concentration levels expected in field sampling (e.g., ~0.5 to 2 ppbv) as outlined in Section 11.2.3.

11.2.3 Sampler System Certification with Humid Calibration Gas Standards.

11.2.3.1 Assemble the dynamic calibration system and manifold as illustrated in Figure 8.

11.2.3.2 Verify that the calibration system is clean (less than 0.2 ppbv of targeted compounds) by sampling a humidified gas stream, *without* gas calibration standards, with a previously certified clean canister (see Section 12.1).

11.2.3.3 The assembled dynamic calibration system is certified clean if <0.2 ppbv of targeted compounds are found.

11.2.3.4 For generating the humidified calibration standards, the calibration gas cylinder(s) (see Section 8.2) containing nominal concentrations of 10 ppmv in nitrogen of selected VOCs, are attached to the calibration system, as outlined in Section 10.2.3.1. The gas cylinders are opened and the gas mixtures are passed through 0 to 10 mL/min certified mass flow controllers and blended with humidified zero air to generate ppbv levels of calibration standards.

11.2.3.5 After the appropriate equilibrium period, attach the sampling system (containing a certified evacuated canister) to the manifold, as illustrated in Figure 8(a).

11.2.3.6 Sample the dynamic calibration gas stream with the sampling system according to Section 9.2.1.

[Note: To conserve generated calibration gas, bypass the canister sampling system manifold and attach the sampling system to the calibration gas stream at the inlet of the in-line filter of the sampling system so the flow will be less than 500 mL/min.]

11.2.3.7 Concurrent with the sampling system operation, realtime monitoring of the calibration gas stream is accomplished by the on-line GC/MS or GC-multidetector analytical system [Figure 8(b)] to provide reference concentrations of generated VOCs.

11.2.3.8 At the end of the sampling period (normally same time period used for anticipated sampling), the sampling system canister is analyzed and compared to the reference GC/MS or GC-multi-detector analytical system to determine if the concentration of the targeted VOCs was increased or decreased by the sampling system.

11.2.3.9 A recovery of between 90% and 110% is expected for all targeted VOCs.

12. Performance Criteria and Quality Assurance

12.1 Standard Operating Procedures (SOPs)

12.1.1 SOPs should be generated in each laboratory describing and documenting the following activities: (1) assembly, calibration, leak check, and operation of specific sampling systems and equipment used; (2) preparation, storage, shipment, and handling of samples; (3) assembly, leak-check, calibration, and operation of the analytical system, addressing the specific equipment used; (4) canister storage and cleaning; and (5) all aspects of data recording and processing, including lists of computer hardware and software used.

12.1.2 Specific stepwise instructions should be provided in the SOPs and should be readily available to and understood by the laboratory personnel conducting the work.

12.2 Method Relative Accuracy and Linearity

12.2.1 Accuracy can be determined by injecting VOC standards (see Section 8.2) from an audit cylinder into a sampler. The contents are then analyzed for the components contained in the audit canister. Percent relative accuracy is calculated:

$$\% \text{ Relative Accuracy} = \frac{X - Y}{X} \times 100$$

where:

Y = concentration of the targeted compound recovered from sampler, ppbv.
X = concentration of VOC targeted compounds in the NIST-SRM audit cylinders, ppbv.

12.2.2 If the relative accuracy does not fall between 90 and 110 percent, the field sampler should be removed from use, cleaned, and recertified according to initial certification procedures outlined in Sections 11.2.2 and 11.2.3. Historically, concentrations of carbon tetrochloride, tetrachloroethylene, and hexachlorobutadiene have sometimes been detected at lower concentrations when using parallel ECD and FID detectors. When these three compounds are present at concentrations close to calibration levels, both detectors usually agree on the reported concentrations. At concentrations below 4 ppbv, there is a problem with nonlinearity of the ECD. Plots of concentration versus peak area for calibration compounds detected by the ECD have shown that the curves are nonlinear for carbon tetrachloride, tetrachloroethylene, and hexachlorobutadiene, as illustrated in Figures 18(a) through 18(c). Other targeted ECD and FID compounds scaled linearly for the range 0 to 8 ppbv, as shown for chloroform in Figure 18(d). For compounds that are not linear over the calibration range, area counts generally roll off between 3 and 4 ppbv. To correct for the nonlinearity of these compounds, an additional calibration step is performed. An evacuated stainless steel canister is pressurized with calibration gas a nominal concentration of 8 ppbv. The sample is then diluted to approximately 3.5 ppbv with zero air and analyzed. The instrument response factor (ppbv/area) of the ECD for each of the three compounds is calculated for the 3.5 ppbv sample. Then, both the 3.5 ppbv and the 8 ppbv response factors are entered into the ECD calibration table. Most commercial analytical systems have software designed to accommodate multilevel calibration entries, so the correct response factors are automatically calculated for concentrations in this range.

12.3 Method Modification

12.3.1 Sampling

12.3.1.1 The sampling system for pressurized canister sampling could be modified to use a lighter, more compact pump. The pump currently being used weights about 16 kilograms (~35 lbs). Commercially available pumps that could be used as alternatives to the prescribed sampler pump are described below. Metal Bellow MB-

41 pump: These pumps are cleaned at the factory; however, some precaution should be taken with the circular (~4.8 cm diameter) Teflon® and stainless steel part directly under the flange. It is often dirty when received and should be cleaned before use. This part is cleaned by removing it from the pump, manually cleaning with deionized water, and placing in a vacuum oven at 100°C for at least 12 hours. Exposed parts of the pump head are also cleaned with swabs and allowed to air dry. These pumps have proven to be very reliable; however, they are only useful up to an outlet pressure of about 137 kPa (~20 psig). Neuberger Pump: Viton gaskets or seals must be specified with this pump. The "factory direct" pump is received contaminated and leaky. The pump is cleaned by disassembling the pump head (which consists of three stainless steel parts and two gaskets), cleaning the gaskets with deionized water and drying in a vacuum oven, and remachining (or manually lapping) the sealing surfaces of the stainless steel parts. The stainless steel parts are then cleaned with methanol, hexane, deionized water and heated in a vacuum oven. The cause for most of the problems with this pump has been scratches on the metal parts of the pump head. Once this rework procedure is performed, the pump is considered clean and can be used up to about 240 kPa (~35 psig) output pressure. This pump is utilized in the sampling system illustrated in Figure 3.

12.3.1.2 Alternative Sampler Configuration. The sampling system described in Compendium Method TO-14A can be modified as described in Appendix C (see Figure C-1). Originally, this configuration was used in EPA's FY-88 Urban Air Toxics Pollutant Program.

12.3.2 Analysis.

12.3.2.1 Inlet tubing from the calibration manifold could be heated to 50°C (same temperature as the calibration manifold) to prevent condensation on the internal walls of the system.

12.3.2.2 The analytical strategy for Method TO-14A involves positive identification and quantitation by GC/MS/SCAN/SIM mode of operation with optional FID. This is a highly specific and sensitive detection technique. Because a specific detector system (GC/MS/SCAN/SIM) is more complicated and expensive than the use of non-specific detectors (GC/FID/ECD/PID), the analyst may want to perform a screening analysis and preliminary quantitation of VOC species in the sample, including any polar compounds, by utilizing the GC-multidetector (GC/FID/ECD/PID) analytical system prior to GC/MS analysis. This system can be used for approximate quantitation. The GC/FID/ECD/PID provides a "snap-shot" of the constituents in the sample, allowing the analyst to determine:

- Extent of misidentification due to overlapping peaks.
- Whether the constituents are within the calibration range of the anticipated GC/MS/SCAN/SIM analysis or does the sample require further dilution.
- Are there unexpected peaks which need further identification through GC/MS/SCAN or are there peaks of interest needing attention?

If unusual peaks are observed from the GC/FID/ECD/PID system, the analyst then performs a GC/MS/SCAN analysis. The GC/MS/SCAN will provide positive identification of suspect peaks from the GC/FID/ECD/PID system. If no unusual peaks are identified and only a select number of VOCs are of concern, the analyst can then proceed to GC/MS/SIM. The GC/MS/SIM is used for final quantitation of selected VOCs. Polar compounds, however, cannot be identified by the GC/MS/SIM due to the use of a Nafion® dryer to remove water from the sample prior to analysis. The dryer removes polar compounds along with the water. The analyst often has to make this decision incorporating project objectives, detection limits, equipment availability, cost and personnel capability in developing an analytical strategy. The use of the GC/FID/ECD/PID as a "screening" approach, with the GC/MS/SCAN/SIM for final identification and quantitation, is outlined in Figure 20.

12.4 Method Safety

This procedure may involve hazardous materials, operations, and equipment. This method does not purport to address all of the safety problems associated with its use. It is the user's responsibility to establish appropriate safety and health practices and determine the applicability of regulatory limitation prior to the implementation of this procedure. This should be part of the user's SOP manual.

12.5 Quality Assurance (see Figure 21)

12.5.1 Sampling System

12.5.1.1 Section 9.2 suggests that a portable GC system be used as a "screening analysis" prior to locating fixed-site samplers (pressurized or subatmospheric).

12.5.1.2 Section 9.2 requires pre and post-sampling measurements with a certified mass flow controller for flow verification of sampling system.

12.5.1.3 Section 11.1 requires all canisters to be pressure tested to 207 kPa ± 14 kPa (30 psig ± 2 psig) over a period of 24 hours.

12.5.1.4 Section 11.1 requires that all canisters be certified clean (<0.2 ppbv of targeted VOCs) through a humid zero air certification program.

12.5.1.5 Section 11.2.2 requires all field sampling systems to be certified initially clean (<0.2 ppbv of targeted VOCs) through a humid zero air certification program.

12.5.1.6 Section 11.2.3 requires all field sampling systems to pass an initial humidified calibration gas certification [at VOC concentration levels expected in the field (e.g., 0.5 to 2 ppbv)] with a percent recovery of greater than 90.

12.5.2 GC/MS/SCAN/SIM System Performance Criteria

12.5.2.1 Section 10.2.1 requires the GC/MS analytical system to be certified clean (<0.2 ppbv of targeted VOCs) prior to sample analysis, through a humid zero air certification.

12.5.2.2 Section 10.2.2 requires the daily tuning of the GC/MS with 4-BFB and that it meet the key ions and ion abundance criteria (10%) outlined in Table 5.

12.5.2.3 Section 10.2.3 requires both an initial multipoint humid static calibration (three levels plus humid zero air) and a daily calibration (one point) of the GC/MS analytical system.

12.5.3 GC-Multidetector System Performance Criteria

12.5.3.1 Section 10.3.1 requires the GC/FID/ECD analytical system, prior to analysis, to be certified clean (<0.2 ppbv of targeted VOCs) through a humid zero air certification.

12.5.3.2 Section 10.3.2 requires that the GC/FID/ECD analytical system establish retention time windows for each analyte prior to sample analysis, when a new GC column is installed, or major components of the GC system altered since the previous determination.

12.5.3.3 Section 8.2 requires that all calibration gases be traceable to NIST-SRMs.

12.5.3.4 Section 10.3.2 requires that the retention time window be established throughout the course of a 72-hr analytical period.

12.5.3.5 Section 10.3.3 requires both an initial multipoint calibration (three levels plus humid zero air) and a daily calibration (one point) of the GC/FID/ECD analytical system with zero gas dilution of NIST traceable gases.

13. Acknowledgements

The determination of VOCs in ambient air is a complex task, primarily because of the wide variety of compounds of interest and the lack of standardized sampling and analytical procedures. While there are numerous procedures for sampling and analyzing VOCs in ambient air, this method draws upon the best aspects of each one and combines them into a standardized methodology. In many cases, the individuals listed in the acknowledgement table contributed to the research, documentation and peer review of the original Compendium Method TO-14 and now revised as Compendium Method TO-14A. In some cases, new names appear as likely sources of new information.

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TABLE 1. COMPENDIUM METHOD TO-14A VOC TCL DATA SHEET

COMPOUND (SYNONYM)	FORMULA	MOLECULAR WEIGHT	BOILING POINT (°C)	MELTING POINT (°C)	CAS NO.
Freon 12 (Dichlorodifluoromethane)	CCl_2F_2	120.91	-29.8	-158.0	75-71-8
Methyl chloride (Chloromethane)	CH_3Cl	50.49	-24.2	-97.1	74-87-3
Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)	$ClCF_2CClF_2$	170.93	4.1	-94.0	76-14-2
Vinyl chloride (Chloroethylene)	CH_2=CHCl	62.50	-13.4	-1538.0	75-01-4
Methyl bromide (Bromomethane)	CH_3Br	94.94	3.6	-93.6	74-83-9
Ethyl chloride (Chloroethane)	CH_3CH_2Cl	64.52	12.3	-136.4	75-00-3
Freon 11 (Trichlorofluoromethane)	CCl_3F	137.38	23.7	-111.0	75-69-4
Vinylidene chloride (1,1-Dichloroethene)	$C_2H_2Cl_2$	96.95	31.7	-122.5	75-35-4
Dichloromethane (Methylene chloride)	CH_2Cl_2	84.94	39.8	-95.1	75-09-2
Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	CF_2ClCCl_2F	187.38	47.7	-36.4	76-13-1
1,1-Dichloroethane (Ethylidene chloride)	CH_3CHCl_2	98.96	57.3	-97.0	74-34-3
cis-1,2-Dichloroethylene	CHCl=CHCl	96.94	60.3	-80.5	156-59-2
Chloroform (Trichloromethane)	$CHCl_3$	119.38	61.7	-63.5	67-66-3
1,2-Dichloroethane (Ethylene dichloride)	$ClCH_2CH_2Cl$	98.96	83.5	-35.3	107-06-2
Methyl chloroform (1,1,1-Trichloroethane)	CH_3CCl_3	133.41	74.1	-30.4	71-55-6
Benzene (Cyclohexatriene)	C_6H_6	78.12	80.1	5.5	71-43-2
Carbon tetrachloride (Tetrachloromethane)	CCl_4	153.82	76.5	-23.0	56-23-5
1,2-Dichloropropane (Propylene dichloride)	$CH_3CHClCH_2Cl$	112.99	96.4	-100.4	78-87-5
Trichloroethylene (Trichloroethene)	ClCH=CCl_2	131.29	87	-73.0	79-01-6
cis-1,3-Dichloropropene (cis-1,3-dichloropropylene)	CH_3CCl=CHCl	110.97	104.3	---	542-75-6
trans-1,3-Dichloropropene (trans-1,3-Dichloropropylene)	$ClCH_2CH$=CHCl	110.97	112.0	---	542-75-6
1,1,2-Trichloroethane (Vinyl trichloride)	$CH_2ClCHCl_2$	133.41	113.8	-36.5	79-00-5
Toluene (Methyl benzene)	$C_6H_5CH_3$	92.15	110.6	-95.0	108-88-3
1,2-Dibromoethane (Ethylene dibromide)	$BrCH_2CH_2Br$	187.88	131.3	9.8	106-93-4
Tetrachloroethylene (Perchloroethylene)	Cl_2C=CCl_2	165.83	121.1	-19.0	127-18-4
Chlorobenzene (Phenyl chloride)	C_6H_5Cl	112.56	132.0	-45.6	108-90-7
Ethylbenzene	$C_6H_5C_2H_5$	106.17	136.2	-95.0	100-41-4
m-Xylene (1,3-Dimethylbenzene)	$1,3-(CH_3)_2C_6H_4$	106.17	139.1	-47.9	108-38-3
p-Xylene (,14-Dimethylxylene)	$1,4-(CH_3)_2C_6H_4$	106.17	138.3	13.3	106-42-3
Styrene (Vinyl benzene)	C_6H_5CH=CH_2	104.16	145.2	-30.6	100-42-5
1,1,2,2-Tetrachloroethane	$CHCl_2CHCl_2$	167.85	146.2	-36.0	79-34-5
o-Xylene (1,2-Dimethylbenzene)	$1,2-(CH_3)_2C_6H_4$	106.17	144.4	-25.2	95-47-6
1,3,5-Trimethylbenzene (Mesitylene)	$1,3,5-(CH_3)_3C_6H_3$	120.20	164.7	-44.7	108-67-8
1,2,4-Trimethylbenzene (Pseudocumene)	$1,2,4-(CH_3)_3C_6H_3$	120.20	169.3	-43.8	95-63-6
m-Dichlorobenzene (1,3-Dichlorobenzene)	$1,3-Cl_2C_6H_4$	147.01	173.0	-24.7	541-73-1
Benzyl chloride (α-Chlorotoluene)	$C_6H_5CH_2Cl$	126.59	179.3	-39.0	100-44-7
o-Dichlorobenzene (1,2-dichlorobenzene)	$1,2-Cl_2C_6H_4$	147.01	180.5	-17.0	95-50-1
p-Dichlorobenzene (1,4-dichlorobenzene)	$1,4-Cl_2C_6H_4$	147.01	174.0	53.1	106-46-7
1,2,4-Trichlorobenzene	$1,2,4-Cl_3C_6H_3$	181.45	213.5	17.0	120-82-1
Hexachlorobutadiene (1,1,2,3,4,4-Hexachloro-1,3-butadiene)	C_4Cl_6	260.8	186 (sublimes)	-21.0	87-68-3

TABLE 2. ION/ABUNDANCE AND EXPECTED RETENTION TIME FOR SELECTED COMPENDIUM METHOD TO-14A VOCs ANALYZED BY GC/MS/SIM

COMPOUND (SYNONYM)	Ion/Abundance (amu/% base peak)	Expected Retention Time (min)
Freon 12 (Dichlorodifluoromethane)	85/100 87/31	5.01
Methyl chloride (Chloromethane)	50/100 52/34	5.69
Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)	85/100 135/56 87/33	6.55
Vinyl chloride (Chloroethene)	62/100 27/125 64/32	6.71
Methyl bromide (Bromomethane)	94/100 96/85	7.83
Ethyl chloride (Chloroethane)	64/100 29/140 27/140	8.43
Freon 11 (Trichlorofluoromethane)	101/100 103/67	9.97
Vinylidene chloride (1,1-Dichloroethene)	61/100 96/55 63/31	10.93
Dichloromethane (Methylene chloride)	49/100 84/65 86/45	11.21
Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	151/100 101/140 103/90	11.60
1,1-Dichloroethane (Ethylidene chloride)	63/100 27/64 65/33	12.50
cis-1,2-Dichloroethylene	61/100 96/60 98/44	13.40
Chloroform (Trichloromethane)	83/100 85/65 47/35	13.75
1,2-Dichloroethane (Ethylene dichloride)	62/100 27/70 64/31	14.39
Methyl chloroform (1,1,1-Trichloroethane)	97/100 99/64 61/61	14.62

TABLE 2. (continued)

COMPOUND (SYNONYM)	Ion/Abundance (amu/% base peak)	Expected Retention Time (min)
Benzene (Cyclohexatriene)	78/100 77/25 50/35	15.04
Carbon tetrachloride (Tetrachloromethane)	117/100 119/97	15.18
1,2-Dichloropropane (Propylene dichloride)	63/100 41/90 62/70	15.83
Trichloroethylene (Trichloroethene)	130/100 132/92 95/87	16.10
cis-1,3-Dichloropropene	75/100 39/70 77/30	16.96
trans-1,3-Dichloropropene (cis-1,3 Dichloropropylene)	75/100 39/70 77/30	17.49
1,1,2-Trichloroethane (Vinyl trichloride)	97/100 83/90 61/82	17.61
Toluene (Methyl benzene)	91/100 92/57	17.86
1,2-Dibromoethane (Ethylene dibromide)	107/100 109/96 27/115	18.48
Tetrachloroethylene (Perchloroethylene)	166/100 164/74 131/60	19.01
Chlorobenzene (Phenyl chloride)	112/100 77/62 114/32	19.73
Ethylbenzene	91/100 106/28	20.20
m,p-Xylene (1,3/1,4-Dimethylbenzene)	91/100 106/40	20.41
Styrene (Vinyl benzene)	104/100 78/60 103/49	20.81
1,1,2,2-Tetrachloroethane (Tetrachlorethane)	83/100 85/64	20.92
o-Xylene (1,2-Dimethylbenzene)	91/100 106/40	20.92
4-Ethyltoluene	105/100 120/29	22.53

TABLE 2. (continued)

COMPOUND (SYNONYM)	Ion/Abundance (amu/% base peak)	Expected Retention Time (min)
1,3,5-Trimethylbenzene (Mesitylene)	105/100 120/42	22.65
1,2,4-Trimethylbenzene (Pseudocumene)	105/100 120/42	23.18
m-Dichlorobenzene (1,3-Dichlorobenzene)	146/100 148/65 111/40	23.31
Benzyl chloride (α-Chlorotoluene)	91/100 126/26	23.32
p-Dichlorobenzene (1,4-dichlorobenzene)	146/100 148/65 111/40	23.41
o-Dichlorobenzene (1,2-dichlorobenzene)	146/100 148/65 111/40	23.88
1,2,4-Trichlorobenzene	180/100 182/98 184/30	26.71
Hexachlorobutadiene (1,1,2,3,4,4 Hexachloro-1,3-butadiene)	225/100 227/66 223/60	27.68

TABLE 3. GENERAL GC AND MS OPERATING CONDITIONS FOR COMPENDIUM METHOD TO-14A

Chromatography	
Column	General OV-1 crosslinked methyl silicone (50-m x 0.31-mm I.D., 17 um film thickness), or equivalent
Carrier Gas	Helium (~2.0 mL/min at 250°C)
Injection Volume	Constant (1-3 µL)
Injection Mode	Splitless
Temperature Program	
Initial Column Temperature	-50°C
Initial Hold Time	2 min
Program	8°C/min to 150°C
Final Hold Time	15 min
Mass Spectrometer	
Mass Range	18 to 250 amu
Scan Time	1 sec/scan
EI Condition	70 eV
Mass Scan	Follow manufacturer's instruction for selecting mass selective detector (MS) and selected ion monitoring (SIM) mode
Detector Mode	Multiple ion detection
FID System (Optional)	
Hydrogen Flow	~30 mL/minute
Carrier Flow	~30 mL/minute
Burner Air	~400 mL/minute

TABLE 4. 4-BFB KEY IONS AND ION ABUNDANCE CRITERIA

Mass	Ion Abundance Criteria
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	Base Peak, 100% Relative Abundance
96	5 to 9% of mass 95
173	<2% of mass 174
174	>50% of mass 95
175	5 to 9% of mass 174
176	>95% but< 101% of mass 174
177	5 to 9% of mass 176

TABLE 5. COMPENDIUM METHOD TO-14A RESPONSE FACTORS (ppbv/area count) AND EXPECTED RETENTION TIME FOR GC/MS/SIM ANALYTICAL CONFIGURATION

Compounds	Response Factor (ppbv/area count)	Expected Retention Time (minutes)
Freon 12	0.6705	5.01
Methyl chloride	4.093	5.64
Freon 114	0.4928	6.55
Vinyl chloride	2.343	6.71
Methyl bromide	2.647	7.83
Ethyl chloride	2.954	8.43
Freon 11	0.5145	9.87
Vinylidene chloride	1.037	10.93
Dichloromethane	2.255	11.21
Trichlorotrifluoroethane	0.9031	11.60
1,1-Dichloroethane	1.273	12.50
cis-1,2-Dichloroethylene	1.363	13.40
Chloroform	0.7911	13.75
1,2-Dichloroethane	1.017	14.39
Methyl chloroform	0.7078	14.62
Benzene	1.236	15.04
Carbon tetrachloride	0.5880	15.18
1,2-Dichloropropane	2.400	15.83
Trichloroethylene	1.383	16.10
cis-1,3-Dichloropropene	1.877	16.96
trans-1,3-Dichloropropene	1.338	17.49
1.1,2-Trichloroethane	1.891	17.61
Toluene	0.9406	17.86
1,2-Dibromoethane (EDB)	0.8662	18.48
Tetrachloroethylene	0.7357	19.01
Chlorobenzene	0.8558	19.73
Ethylbenzene	0.6243	20.20
m,p-Xylene	0.7367	20.41
Styrene	1.888	20.80
1,1,2,2-Tetrachloroethane	1.035	20.92
o-Xylene	0.7498	20.92
4-Ethyltoluene	0.6181	22.53
1,3,5-Trimethylbenzene	0.7088	22.65
1,2,4-Trimethylbenzene	0.7536	23.18
m-Dichlorobenzene	0.9643	23.31
Benzyl chloride	1.420	23.32
p-Dichlorobenzene	0.8912	23.41
o-Dichlorobenzene	1.004	23.88
1,2,4-Trichlorobenzene	2.150	26.71
Hexachlorobutadiene	0.4117	27.68

TABLE 6. COMPENDIUM METHOD TO-14A
GC/MS/SIM CALIBRATION TABLE
*** External Standard ***

Operator: JDP 8 Jan 97 10:02 am
Sample Info: SYR 1
Misc Info:
Integration File Name: DATA:SYR2AO2A.I

Sequence Index: 1 Bottle Number: 2
Last Update: 8 Jan 87 8:13 am
Reference Peak Window: 5.00 Absolute Minutes
Non-Reference Peak Window: 0.40 Absolute Minutes
Sample Amount: 0.000 Uncalibrated Peak RF: 0.000 Multiplier: 1.667

Peak No.	Type	Int Type	Ret Time	Signal Description		Compound Name	Area	Amount	
1	I	PP	5.020	Mass	85.00 amu	FREON 12	12893	4011	pptv
2	I	PP	5.654	Mass	50.00 amu	METHYLCHLORI	4445	2586	pptv
3	I	BP	6.525	Mass	85.00 amu	FREON 114	7067	1215	pptv
4	I	PB	6.650	Mass	62.00 amu	VINYLCHLORID	2892	1929	pptv
5	I	BP	7.818	Mass	94.00 amu	METHYLBROMID	2401	1729	pptv
6	I	BB	8.421	Mass	64.00 amu	ETHYLCHLORID	2134	2769	pptv
7	I	BV	9.940	Mass	101.00 amu	FREON 11	25069	6460	pptv
8	I	BP	10.869	Mass	61.00 amu	VINDENECHLOR	5034	1700	pptv
9	I	BP	11.187	Mass	49.00 amu	DICHLOROMETH	4803	2348	pptv
10	I	PP	11.225	Mass	41.00 amu	ALLYCHLORID	761	8247	pptv
11	I	BP	11.578	Mass	151.00 amu	3CHL3FLUETHA	5477	1672	pptv
12	I	BP	12.492	Mass	63.00 amu	1,1DICHLOETH	5052	1738	pptv
13	I	VP	13.394	Mass	61.00 amu	c-1,2DICHLET	4761	1970	pptv
14	I	PH	13.713	Mass	83.00 amu	CHLOROFORM	5327	1678	pptv
15	I	BP	14.378	Mass	62.00 amu	1,2DICHLETHA	5009	2263	pptv
16	I	PB	14.594	Mass	97.00 amu	METHCHLOROFO	6656	2334	pptv
17	I	VP	15.009	Mass	78.00 amu	BENZENE	8352	2167	pptv
18	I	VP	15.154	Mass	117.00 amu	CARBONTETRAC	5888	1915	pptv
19	I	BB	15.821	Mass	63.00 amu	1,2DICHLPROP	3263	1799	pptv
20	I	BB	16.067	Mass	130.00 amu	TRICHLETHENE	4386	2109	pptv
21	I	PB	16.941	Mass	75.00 amu	c-1,3DICHLPR	2228	987.3	pptv
22	I	BP	17.475	Mass	75.00 amu	t-1,3DICHLPR	1626	689.2	pptv
23	I	BB	17.594	Mass	97.00 amu	1,1-2CHLETHA	2721	1772	pptv
24	I	BV	17.844	Mass	91.00 amu	TOLUENE	14417	2733	pptv
25	I	PB	18.463	Mass	107.00 amu	EDB	4070	1365	pptv
26	I	PH	18.989	Mass	166.00 amu	TETRACHLETHE	6874	2065	pptv
27	I	PB	19.705	Mass	112.00 amu	CHLOROBENZEN	5648	1524	pptv
28	I	BP	20.168	Mass	91.00 amu	ETHYLBENZENE	11084	1842	pptv
29	I	PB	20.372	Mass	91.00 amu	m,p-XYLENE	17989	3790	pptv

TABLE 6. (continued)

Peak No.	Type	Int Type	Ret Time	Signal Description	Compound Name	Area	Amount
30	I	BV	20.778	Mass 104.00 amu	STYRENE	3145	1695 pptv
31	I	BH	20.887	Mass 83.00 amu	TETRACHLETHA	4531	1376 pptv
32	I	BP	20.892	Mass 91.00 amu	o-XYLENE	9798	2010 pptv
33	I	VV	22.488	Mass 105.00 amu	4-ETHYLTOLUE	7694	1481 pptv
34	I	VB	22.609	Mass 105.00 amu	1,3,5METHBEN	6781	1705 pptv
35	I	BB	23.144	Mass 105.00 amu	1,2,4METHBEN	7892	2095 pptv
36	I	BV	23.273	Mass 146.00 amu	m-DICHLBENZE	3046	1119 pptv
37	I	VV	23.279	Mass 91.00 amu	BENZYLCHLORI	3880	1006 pptv
38	I	VB	23.378	Mass 146.00 amu	p-DICHLBENZE	6090	2164 pptv
39	I	BP	23.850	Mass 146.00 amu	o-DICHLBENZE	2896	1249 pptv
40	I	BB	26.673	Mass 180.00 amu	1,24CHLBENZ	562	767.1 pptv
41	I	BB	27.637	Mass 225.00 amu	HEXACHLBUTAD	6309	1789 pptv

TABLE 7. COMPENDIUM METHOD TO-14A TYPICAL RETENTION TIME (MIN) AND CALIBRATION RESPONSE FACTORS (ppbv/area count) FOR TARGETED VOCs ASSOCIATED WITH FID AND ECD ANALYTICAL SYSTEM

			FID	ECD
Peak No.[1]	Compound	Retention Time (RT), minutes	Response Factor, (RF) (ppbv/area count)	Response Factor (ppbv/area count x 10^{-5})
1	Freon 12	3.65	3.465	13.89
2	Methyl chloride	4.30	0.693	
3	Freon 114	5.13	0.578	22.32
4	Vinyl chloride	5.28	0.406	
5	Methyl bromide	6.44		26.34
6	Ethyl chloride	7.06	0.413	
7	Freon 11	8.60	6.367	1.367
8	Vinylidene chloride	9.51	0.347	
9	Dichloromethane	9.84	0.903	
10	Trichlorotrifluoroethane	10.22	0.374	3.955
11	1,1-Dichloroethane	11.10	0.359	
12	cis-1,2-Dichloroethylene	11.99	0.368	
13	Chloroform	12.30	1.059	11.14
14	1,2-Dichloroethane	12.92	0.409	
15	Methyl chloroform	13.12	0.325	3.258
16	Benzene	13.51	0.117	
17	Carbon tetrachloride	13.64	1.451	1.077
18	1,2-Dichloropropane	14.26	0.214	
19	Trichloroethylene	14.50	0.327	8.910
20	cis-1,3-Dichloropropene	15.31		
21	trans-1,3-Dichloropropene	15.83		
22	1,1,2-Trichloroethane	15.93	0.336	
23	Toluene	16.17	0.092	
24	1,2-Dibromoethane (EDB)	16.78	0.366	5.137
25	Tetrachloroethylene	17.31	0.324	1.449
26	Chlorobenzene	18.03	0.120	
27	Ethylbenzene	18.51	0.092	
28	m,p-Xylene	18.72	0.095	
29	Styrene	19.12	0.143	
30	1,1,2,2-Tetrachloroethane	19.20		9.856
31	o-Xylene	19.23		
32	4-Ethyltoluene	20.82	0.100	
33	1,3,5-Trimethylbenzene	20.94	0.109	
34	1,2,4-Trimethylbenzene	21.46	0.111	
35	m-Dichlorobenzene	21.50		
36	Benzyl chloride	21.56		
37	p-Dichlorobenzene	21.67	0.188	
38	o-Dichlorobenzene	22.12	0.188	
39	1,2,4-Trichlorobenzene	24.88	0.667	
40	Hexachlorobutadiene	25.82	0.305	1.055

[1]Refer to Figures 15 and 16 for peak location.

TABLE 8. TYPICAL RETENTION TIME (minutes) FOR SELECTED ORGANICS USING GC/FID/ECD/PID ANALYTICAL SYSTEM FOR COMPENDIUM METHOD TO-14A[1]

Compound	Retention Time (minutes)		
	FID	ECD	PID
Acetylene	2.984	--	--
1,3-Butadiene	3.599	--	3.594
Vinyl chloride	3.790	--	3.781
Chloromethane	5.137	--	--
Chloroethane	5.738	--	--
Bromoethane	8.154	--	--
Methylene Chloride	9.232	--	9.218
trans-1,2-Dichloroethane	10.077	--	10.065
1,1-Dichloroethane	11.190	--	--
Chloroprene	11.502	--	11.491
Perfluorobenzene	13.077	13.078	13.069
Bromochloromethane	13.397	13.396	13.403
Chloroform	13.768	13.767	13.771
1,1,1-Trichloroethane	14.151	14.153	14.158
Carbon Tetrachloride	14.642	14.667	14.686
Benzene/1,2-Dichloroethane	15.128	--	15.114
Perfluorotoluene	15.420	15.425	15.412
Trichloroethylene	17.022	17.024	17.014
1,2-Dichloropropene	17.491	17.805	17.522
Bromodichloromethane	18.369	--	--
trans-1,3-Dichloropropylene	19.694	19.693	19.688
Toluene	20.658	--	20.653
cis-1,3-Dichloropropylene	21.461	21.357	21.357
1,1,2-Trichloroethane	21.823	--	--
Tetrachloroethylene	22.340	22.346	22.335
Dibromochloromethane	22.955	22.959	22.952
Chlorobenzene	24.866	--	24.861
m/p-Xylene	25.763	--	25.757
Styrene/o-Xylene	27.036	--	27.030
Bromofluorobenzene	28.665	28.663	28.660
1,1,2,2-Tetrachloroethane	29.225	29.227	29.228
m-Dichlorobenzene	32.347	32.345	32.342
p-Dichlorobenzene	32.671	32.669	32.666
o-Dichlorobenzene	33.885	33.883	33.880

[1]Varian® 3700 GC equipped with J & W Megabore® DB 624 Capillary Column (30 m x 0.53 I.D. mm) using helium carrier gas.

TABLE 9. GC/MS/SIM CALIBRATION TABLE FOR COMPENDIUM METHOD TO-14A

Last Update: 18 Dec 96 7:54 am
Reference Peak Window: 5.00 Absolute Minutes
Non-Reference Peak Window: 0.40 Absolute Minutes
Sample Amount: 0.000 Uncalibrated Peak RF: 0.000 Multiplier: 1.000

Ret Time	Pk#	Signal Description	Amt pptv	Lvl	[Area]	Pk-Type	Partial Name
5.008	1	Mass 85.00 amu	13620	1	72974	1	FREON 12
5.690	2	Mass 50.00 amu	12720	1	36447	1	METHYLCHLORID
6.552	3	Mass 85.00 amu	8380	1	81251	1	FREON 114
6.709	4	Mass 62.00 amu	8050	1	20118	1	VINYLCHLORIDE
7.831	5	Mass 94.00 amu	12210	1	28265	1	METHYLBROMIDE
8.431	6	Mass 64.00 amu	12574	1	16149	1	ETHYLCHLORIDE
9.970	7	Mass 101.00 amu	12380	1	80088	1	FREON 11
10.927	8	Mass 61.00 amu	7890	1	38954	1	VINDENECHLORI
11.209	9	Mass 49.00 amu	12760	1	43507	1	DICHLOROMETHA
11.331	10	Mass 41.00 amu	12650	1	1945	1	ALLYLCHLORIDE
11.595	11	Mass 151.00 amu	7420	1	40530	1	3CHL3FLUETHAN
12.502	12	Mass 63.00 amu	12710	1	61595	1	1,1DICHLOETHA
13.403	13	Mass 61.00 amu	12630	1	50900	1	c-1,2DICHLETH
13.747	14	Mass 83.00 amu	7670	1	40585	1	CHLOROFORM
14.387	15	Mass 62.00 amu	9040	1	33356	1	1,2DICHLETHAN
14.623	16	Mass 97.00 amu	8100	1	38503	1	METHCHLOROFOR
15.038	17	Mass 78.00 amu	10760	1	69119	1	BENZENE
15.183	18	Mass 117.00 amu	8340	1	42737	1	CARBONTETRACH
15.829	19	Mass 63.00 amu	12780	1	38875	1	1,2DICHLPROPA
16.096	20	Mass 130.00 amu	8750	1	30331	1	TRICHLETHENE
16.956	21	Mass 75.00 amu	4540	1	17078	1	c-1,3DICHLPRO
17.492	22	Mass 75.00 amu	3380	1	13294	1	t-1,3DICHLPRO
17.610	23	Mass 97.00 amu	12690	1	32480	1	1,1-2CHLETHAN
17.862	24	Mass 91.00 amu	10010	1	88036	1	TOLUENE
18.485	25	Mass 107.00 amu	6710	1	33350	1	EDB
19.012	26	Mass 166.00 amu	7830	1	43454	1	TETRACHLETHEN
19.729	27	Mass 112.00 amu	7160	1	44224	1	CHLOROBENZENE
20.195	28	Mass 91.00 amu	12740	1	127767	1	ETHYLBENZENE
20.407	29	Mass 91.00 amu	25400	1	200973	1	m,p-XYLENE
20.806	30	Mass 104.00 amu	12390	1	38332	1	STYRENE
20.916	31	Mass 83.00 amu	11690	1	64162	1	TETRACHLETHAN
20.921	32	Mass 91.00 amu	11085	1	90096	1	o-XYLENE
22.528	33	Mass 105.00 amu	12560	1	108747	1	4-ETHYLTOLUEN
22.648	34	Mass 105.00 amu	12620	1	83666	1	1,3,5METHBENZ
23.179	35	Mass 105.00 amu	12710	1	79833	1	1,2,4METHBENZ
23.307	36	Mass 146.00 amu	12650	1	57409	1	m-DICHLBENZEN
23.317	37	Mass 91.00 amu	7900	1	50774	1	BENZYLCHLORID
23.413	38	Mass 146.00 amu	12390	1	58127	1	p-DICHLBENZEN
23.885	39	Mass 146.00 amu	13510	1	52233	1	o-DICHLBENZEN
26.714	40	Mass 180.00 amu	15520	1	18967	1	1,24CHLBENZE
27.680	41	Mass 225.00 amu	7470	1	43920	1	HEXACHLBUTADI

TABLE 10. EXAMPLE OF HARD-COPY OF GC/MS/SIM ANALYSIS BY COMPENDIUM METHOD TO-14A

Quantitation Report

Data File : C:\HPCHEM\1\DATA\6D25M03.D
Acq On : 25 Apr 96 12:50 pm
Sample : AUDIT SAMPLE #239-54 250ML
Misc :
Quant Time: Apr 25 16:39 1996

Vial: 3
Operator: DANIELS
Inst : 5972 - In
Multiplr: 2.00

Method : C:\HPCHEM\1\METHODS\AUDIT.M
Title : Initial Calibration 4/8/96 Std #4026-94
Last Update : Thu Apr 25 16:36:11 1996
Response via : Continuing Calibration
CCal File : C:\HPCHEM\1\DATA\6D25M01.D

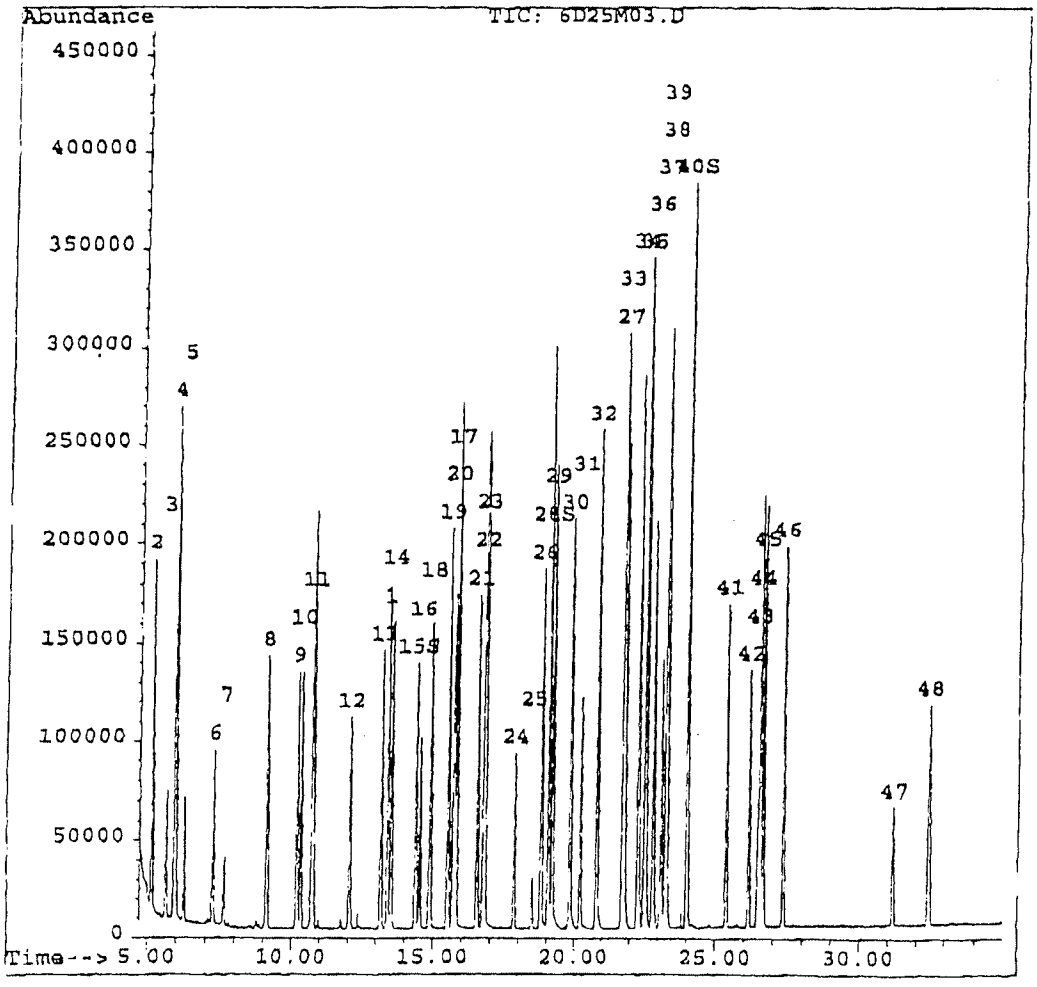


TABLE 10. (continued)

Internal Standards	R.T.	QIon	Response	Conc	Units	Dev(min)
1) BROMOCHLOROMETHANE	13.40	49	173440	4.80	PPBV	0.00
17) 1,4-DIFLUOROBENZENE	15.79	114	383363	4.80	PPBV	0.00
27) CHLOROBENZENE-D5	21.73	117	346909	4.80	PPBV	0.00
System Monitoring Compounds						**%Recovery**
15) 1,2-DICHLOROETHANE-D4	14.39	65	177334	4.82	PPBV	100.33%
28) TOLUENE-D8	19.07	98	393347	4.78	PPBV	99.61%
40) BROMOFLUOROBENZENE	24.01	95	310217	4.61	PPBV	95.94%
Target Compounds						**Qvalue**
2) Freon 12	5.17	85	295965	7.67	PPBV	99
3) Chloromethane	5.65	50	113926	7.96	PPBV #	100
4) Freon 114	5.94	85	376276	7.88	PPBV	97
5) Chloroethene	6.25	62	113201	8.60	PPBV	100
6) Bromomethane	7.26	94	106443	8.74	PPBV	96
7) Chloroethane	7.64	64	57451	7.48	PPBV	99
8) Freon 11	9.13	101	266209	7.77	PPBV	98
9) 1,1-Dichloroethene	10.21	61	186189	8.03	PPBV	99
10) Methylene Chloride	10.35	49	158173	8.40	PPBV	99
11) Freon 113	10.75	101	225115	7.85	PPBV	99
12) 1,1-Dichloroethane	12.05	63	211903	7.80	PPBV	99
13) cis-1,2-Dichloroethene	13.16	61	170091	8.55	PPBV	99
14) Chloroform	13.54	83	236380	8.15	PPBV	98
16) 1,2-Dichloroethane	14.53	62	144398	7.92	PPBV	100
18) 1,1,1-Trichloroethane	14.89	97	208233	7.72	PPBV	99
19) Benzene	15.51	78	329475	8.45	PPBV	100
20) Carbon Tetrachloride	15.70	117	215628	7.87	PPBV	99
21) 1,2-Dichloropropane	16.52	63	135206	7.80	PPBV	99
22) Bromodichloromethane	16.74	83	275403	8.98	PPBV	98
23) Trichloroethene	16.80	95	139564	7.76	PPBV	100
24) cis-1,3-Dichloropropene	17.84	75	97972	4.79	PPBV	98
25) trans-1,3-Dichloropropene	18.49	75	27930	1.61	PPBV	100
26) 1,1,2-Trichloroethane	18.81	97	120253	7.66	PPBV	98
29) Toluene	19.22	91	334990	7.69	PPBV	97
30) Dibromochloromethane	19.85	129	243321	8.35	PPBV	99
31) 1,2-Dibromoethane	20.23	107	173047	7.17	PPBV	100
32) Tetrachloroethene	20.81	166	145120	7.91	PPBV	99
33) Chlorobenzene	21.80	112	253495	7.80	PPBV	97
34) Ethylbenzene	22.28	91	454612	8.32	PPBV	99
35) m,p-Xylene	22.53	91	581168	12.91	PPBV	99
36) Bromoform	22.80	173	210707	8.71	PPBV	100
37) Styrene	23.09	104	133812	5.06	PPBV	99
38) 1,1,2,2-Tetrachloroethane	23.24	83	268481	6.70	PPBV	99
39) o-Xylene	23.28	91	257133	5.29	PPBV	100
41) 1,3,5-Trimethylbenzene	25.37	105	198466	4.39	PPBV	99
42) 1,2,4-Trimethylbenzene	26.15	105	160459	3.49	PPBV	99
43) Benzyl chloride	26.47	91	107854	6.40	PPBV	99
44) 1,3-Dichlorobenzene	26.55	146	186397	6.44	PPBV	99
45) 1,4-Dichlorobenzene	26.66	146	180374	6.04	PPBV	99
46) 1,2-Dichlorobenzene	27.36	146	164427	6.03	PPBV	99
47) 1,2,4-Trichlorobenzene	31.19	180	42255	2.96	PPBV	99
48) Hexachlorobutadiene	32.45	225	56763	3.47	PPBV	99

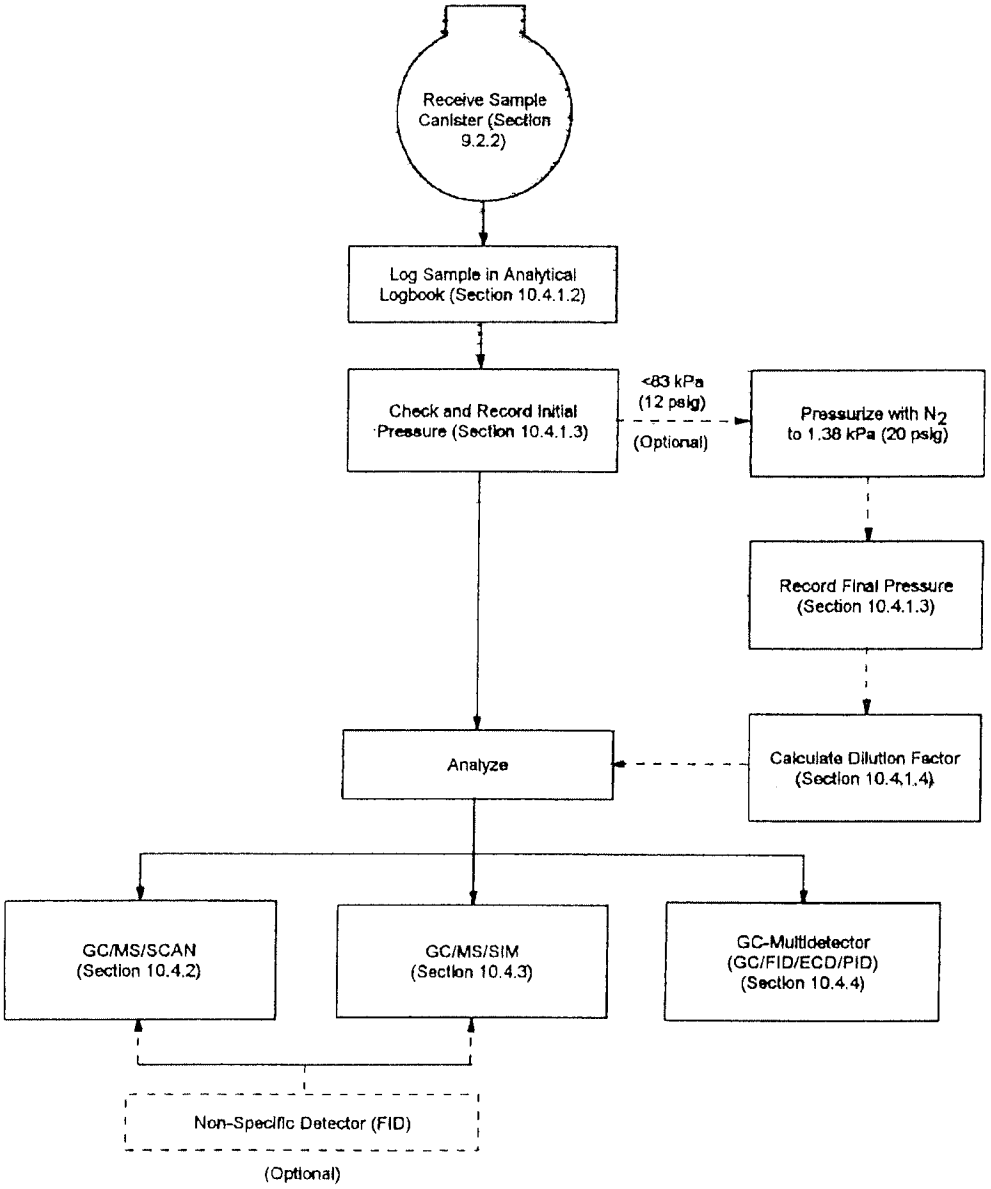


Figure 1. Analytical systems available for canister VOC identification and quantitation as part of Compendium Method TO-14A.

APPENDIX C

Field Data Sheets

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: Aug 29, 2000
Operator: Brenda Douglass
Site: North Shore Target's Golf Course
Sampling Location: #2 Green Fairway
Canister # 367

Sampling Time:

Start: 5:40
Stop: 9:25

Canister Vacuum:

Start: 15
Stop: 5

Observations:

Vacuum gage not quite right

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00 093

Date: 8/29/00
Operator: Brenda Douglass
Site: N. Shore Towers Golf Course
Sampling Location: #2 Green / Fairway - Duplicate
Canister # C81

Sampling Time:

Start: 5:43
Stop: 9:25

Canister Vacuum:

Start: 12
Stop: 30

} Gauge bad - could feel vacuum, sample collected

Observations:

Vacuum gauge strange

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-29-00
Operator: BCD
Site: N Shore Towers Golf Course
Sampling Location: #3 Green
Canister # 076

Sampling Time:

Start: 5:50
Stop: 9:35

Canister Vacuum:

Start: 14
Stop: 30

Observations:

Vacuum gauge not functioning properly

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-29-00
Operator: BCD
Site: N. Shore Towers Golf Course.
Sampling Location: #15 Green
Canister #: 079

Sampling Time:

Start: 5:55
Stop: 9:40

Canister Vacuum:

Start: NA
Stop: NA.

NO Gauge

Observations:

Set flow @ 70

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: CC-093

Date: 8-29-CC
Operator: BCD
Site: N Shore Towers Golf Course
Sampling Location: Flg Green
Canister # CA08

Sampling Time:

Start: 604
Stop: 9:45

Canister Vacuum:

Start: NA
Stop: NA

Observations:

No gauge provided - grab sampling every 1/2 hr
6:04 - 1st sample ~ 20 sec
6:50 - 2nd ~ 20 sec.
7:10 - 3rd ~ 30 sec
7:35 - 4th ~ 25 sec.
8:00 - 5th ~ 30 sec.

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-30-00
Operator: Brenda Douglass
Site: N. Shore Towers Golf Course
Sampling Location: #2 Green
Canister # 161

Sampling Time:

Start: 5:15
Stop: 9:10

Canister Vacuum:

Start: 0
Stop: 0

~~No vacuum gauge provided.~~

Observations: vacuum gauge not functioning properly.

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-30-00
Operator: Brenda Douglass
Site: N. Shore Tavern Golf Course
Sampling Location: #2 Green - Dup
Canister # 159

Sampling Time:

Start: 5:15
Stop: 1:10

Canister Vacuum:

Start: NA
Stop: NA

no gauge provided.

Observations:

- set flow @ 20

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-30-00
Operator: Brenda Douglass
Site: N. Shore Towers Golf Course
Sampling Location: #3 Green
Canister # 091

Sampling Time:

Start: 5:20
Stop: 9:15

Canister Vacuum:

Start: 15 ?
Stop: 30

Observations:

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-30-00
Operator: Brenda Douglass
Site: N. Shore Towers Golf Course
Sampling Location: #15 Green
Canister # 090

Sampling Time:

Start: 5:23
Stop: 9:18

Canister Vacuum:

Start: 15 ?
Stop: 27

Observations:

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-30-00
Operator: Brenda Douglass
Site: N. Shore Towers Golf Course.
Sampling Location: #16 Green
Canister # 243

Sampling Time:

Start: 5:24
Stop: 9:20

Canister Vacuum:

Start: NA
Stop: NA

NC gauge or flow controller provided

Observations:

5:24 - 1st sample ~ 20 sec
6:30 - 2nd ~ 25 sec
6:51 - 3rd ~ 21 sec.
7:50 - 4th ~ 15 sec
8:30 - 5th ~ 25 sec.
9:20 - 6th ~ 15 sec

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-31-00
Operator: Brenda Douglass
Site: N. Shore Towers Golf Course
Sampling Location: #17 Green
Canister # 301

Sampling Time:

Start: 4:30 am
Stop: 8:25

Canister Vacuum:

Start: NA no gauge provided.
Stop: NA

Observations:

1st sample @ 4:30 - 15 sec.
2nd @ 5:20 - 20 sec.
3rd @ 6:30 - 20sec.
4th @ 7:00 - 15 sec.
5th @ 7:25 - 15sec.
6th @ 7:55 - 20 sec.
7th @ 8:25 - 10 sec

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-31-00
Operator: Brenda Douglass
Site: N. Shore Talons Golf Course
Sampling Location: #13 Tee
Canister # C54

Sampling Time:

Start: 4:40
Stop: 8:35

Canister Vacuum:

Start: 30
Stop: 30

Observations:

vacuum gauge not functioning properly

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 3-31-00
Operator: Brenda Douglass
Site: N Shore Tower Golf Course
Sampling Location: #5 Tee
Canister #: C50

Sampling Time:

Start: 4:45
Stop: 8:40

Canister Vacuum:

Start: NA
Stop: NA NO gauge

Observations:

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-31-00
Operator: Brenda Douglass
Site: Al Shore Towers Golf Course
Sampling Location: #1 Tee
Canister # 045

Sampling Time:

Start: 4:47
Stop: 5:45

Canister Vacuum:

Start: 30
Stop: _____

Observations:

Vacuum gauge not functioning properly

Air/Compliance Consultants, Inc.

TO-14A Data Record

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-31-00
Operator: Brenda Douglass
Site: N. Shore Towers Golf Course
Sampling Location: #17 Green - Dup
Canister # C43

Sampling Time:

Start: 4:30
Stop: 8:35

Canister Vacuum:

Start: 5
Stop: 5

Observations:

Vacuum gauge not functioning properly

APPENDIX D

Meteorological Data

Air/Compliance Consultants, Inc.

Meteorological Data Summary Sheet

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-29-00 Time:

Operator: BCD. From: 5:30 pm.

Location: N Shore Towers Golf Course. To: 9:30 pm.

Average Values During Time Interval

METSTAT.

Elapsed Time (min)	Barometric Pressure	Wind Speed (MPH)	Wind Direction	Ambient Temp.	Sky Condition	Surface Temp.
5:30	30.03	SEE	SEE	76	Sunny	79
		MET	MET			
6:30					Sunny	79
6:50	30.03			74	getting cloudy	~~75~~ 79
7:15	30.03			71		78
8:45	30.03			70	dark	78

Comments: _____

_____

_____

Air/Compliance Consultants, Inc.

Meteorological Data Summary Sheet

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-30-00 Time:

Operator: Brenda Douglass From: 5:30

Location: N Shore Towers Golf Course To:

Average Values During Time Interval

Elapsed Time (min)	Barometric Pressure	Wind Speed (MPH)	Wind Direction	Ambient Temp.	Sky Condition	Surface Temp.
5:30	30.03	MET	STATION	75	cloudy	79
7:50	30.03	↓	↓		dusk.	78
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		Varied	SE	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓
		↓	↓	↓	↓	↓

Comments: _____

_____

_____

Air/Compliance Consultants, Inc.

Meteorological Data Summary Sheet

Project Name: Lockheed Martin Project Number: 00-093

Date: 8-31-00 Time:

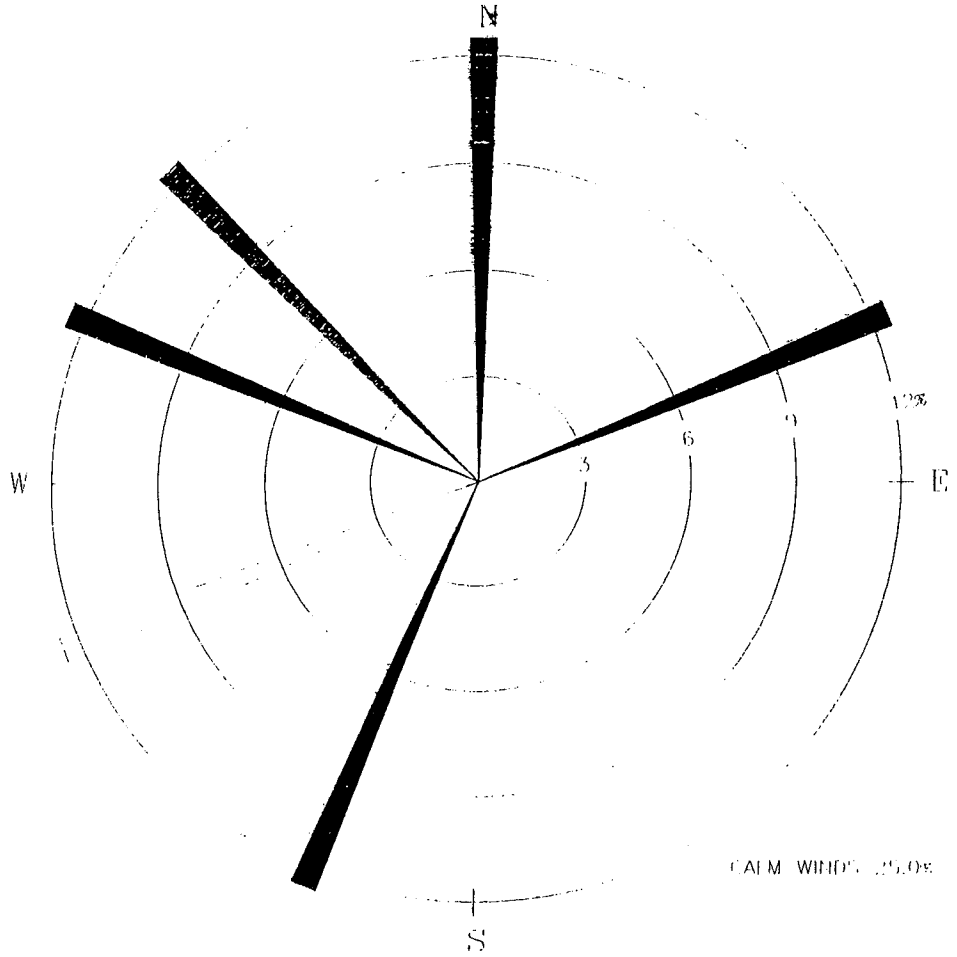
Operator: Brenda Douglass From: 5:00 am.

Location: N Shore Tweeks Golf Course, To: _____

Average Values During Time Interval

Elapsed Time (min)	Barometric Pressure	Wind Speed (MPH)	Wind Direction	Ambient Temp.	Sky Condition	Surface Temp.
5:00	30.03	MET	STATION	66	dark	76
6:30	30.03			73	hazy	76
7:15	30.03			75	cloudy	76
8:00	30.03			76	cloudy	76

Comments: _____

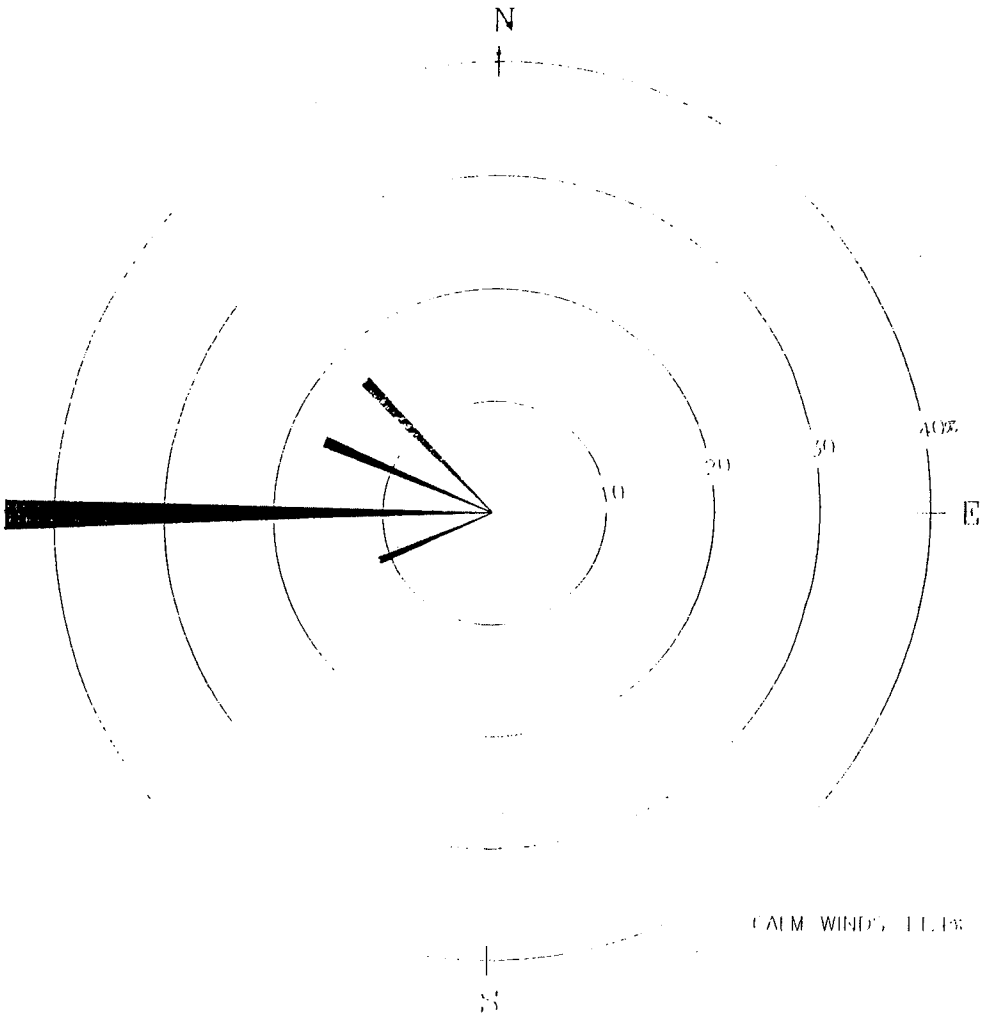


WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

FIGURE 1
WINDROSE

NOTES
DIAGRAM OF THE FREQUENCY OF OCCURRENCE OF EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE — WIND IS BLOWING FROM THE NORTH 12.5 PERCENT OF THE TIME.

BEE-LINE

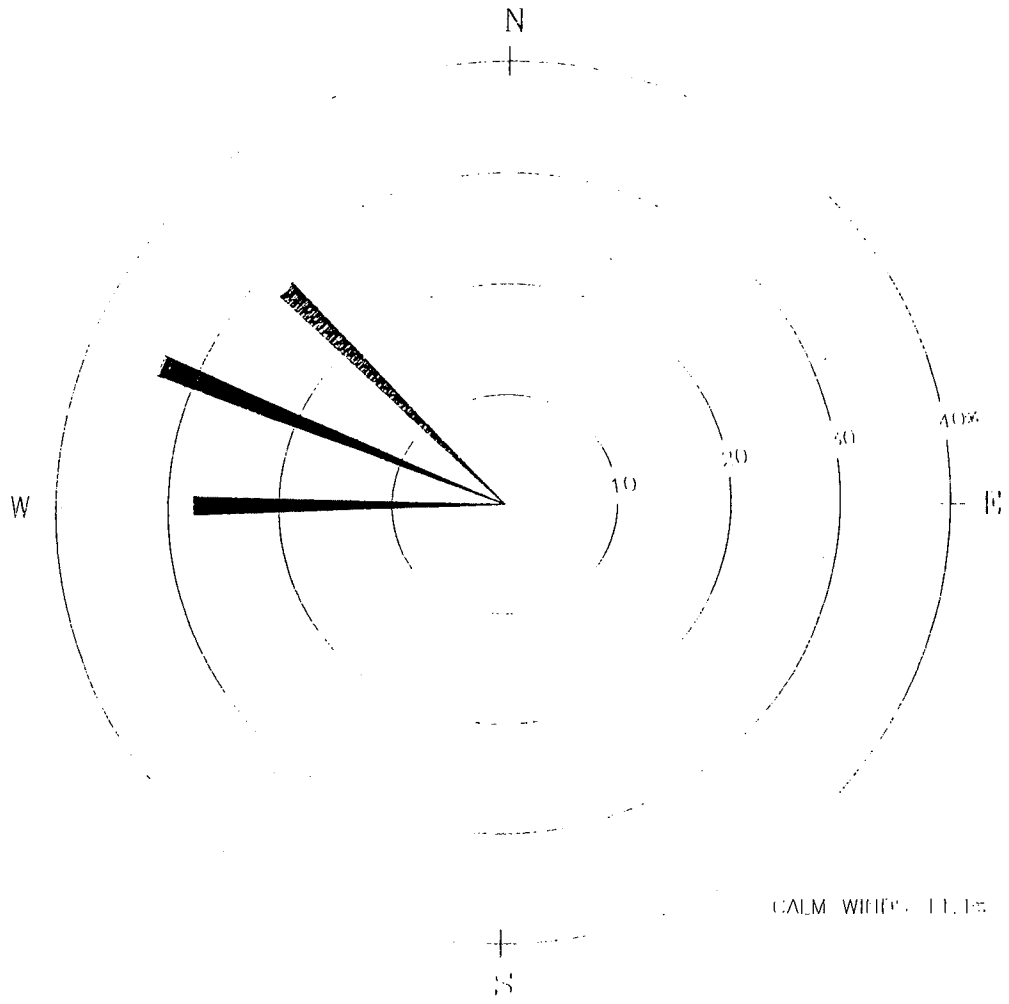


CALM WINDS, 11.1%

WIND SPEED CLASS BOUNDARIES
(MILES/HOUR)

FIGURE 1
WINDROSE

NOTES
DIAGRAM OF THE FREQUENCY OF
OCCURRENCE OF EACH WIND DIRECTION
WIND DIRECTION IS THE DIRECTION
FROM WHICH THE WIND IS BLOWING.
EXAMPLE WIND IS BLOWING FROM THE
NORTH 0 PERCENT OF THE TIME.



CALM WINDS 11.1%

FIGURE 1
WINDROSE

NOTES:
DIAGRAM OF THE FREQUENCY OF
OCCURRENCE OF EACH WIND DIRECTION.
WIND DIRECTION IS THE DIRECTION
FROM WHICH THE WIND IS BLOWING
EXAMPLE WIND IS BLOWING FROM THE
NORTH 0 PERCENT OF THE TIME

August 31

APPENDIX E

Analytical Reports

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09039-1	267-#2 GREEN	08-29-00
09039-2	081-#2 GREEN - Dup.	08-29-00
09039-3	076-#3 GREEN	08-29-00
09039-4	079-#15 GREEN	08-29-00
09039-5	068-#16 GREEN	08-29-00

PARAMETER	09039-1	09039-2	09039-3	09039-4	09039-5
Volatile Organic Compounds in Air (TO14)					
Benzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,4-Dichloro-2-butene , mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09039-1	267-#2 GREEN	08-29-00
09039-2	081-#2 GREEN	08-29-00
09039-3	076-#3 GREEN	08-29-00
09039-4	079-#15 GREEN	08-29-00
09039-5	068-#16 GREEN	08-29-00

PARAMETER	09039-1	09039-2	09039-3	09039-4	09039-5
Dichlorodifluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloropropane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dichlorotetrafluoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Ethylbenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Hexane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
4-Ethyltoluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Hexachlorobutadiene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methylene chloride (Dichloromethane), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methyl t-butyl ether (MTBE), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Styrene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2,2-Tetrachloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Tetrachloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Toluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09039-1	267-#2 GREEN	08-29-00
09039-2	081-#2 GREEN	08-29-00
09039-3	076-#3 GREEN	08-29-00
09039-4	079-#15 GREEN	08-29-00
09039-5	068-#16 GREEN	08-29-00

PARAMETER	09039-1	09039-2	09039-3	09039-4	09039-5
1,2,4-Trichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,1-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichlorofluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2,4-Trimethylbenzene, mg/m3	0.06	<0.060	0.10	<0.060	<0.060
1,3,5-Trimethylbenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Vinyl chloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
o-Xylene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
m&p-Xylene, mg/m3	<0.12	<0.12	<0.12	<0.12	<0.12
Surrogate - 1,2-Dichloroethane-d4	107 %	123 %	123 %	122 %	107 %
Surrogate - Toluene-d8	103 %	102 %	101 %	101 %	104 %
Surrogate - 4-Bromofluorobenzene	107 %	102 %	101 %	99 %	105 %
Dilution Factor	1	1	1	1	1
Analysis Date	09.07.00	09.07.00	09.07.00	09.08.00	09.08.00
Batch ID	MAB168	MAB168	MAB168	MAB169	MAB169
Analyst	BDH	BDH	BDH	BDH	BDH

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09039-6	244-BLANK	08-29-00

PARAMETER	09039-6		
Volatile Organic Compounds in Air (TO14)			
Benzene, mg/m3	<0.030		
Bromodichloromethane, mg/m3	<0.030		
Bromoform, mg/m3	<0.030		
Bromomethane (Methyl bromide), mg/m3	<0.030		
Carbon disulfide, mg/m3	<0.030		
Carbon tetrachloride, mg/m3	<0.030		
Chlorobenzene, mg/m3	<0.030		
Chloroethane, mg/m3	<0.030		
Chloroform, mg/m3	<0.030		
Chloromethane (Methyl chloride), mg/m3	<0.030		
2-Chlorotoluene, mg/m3	<0.030		
Dibromochloromethane, mg/m3	<0.030		
1,2-Dibromoethane (EDB), mg/m3	<0.030		
1,2-Dichlorobenzene, mg/m3	<0.030		
1,3-Dichlorobenzene, mg/m3	<0.030		
1,4-Dichlorobenzene, mg/m3	<0.030		
trans-1,4-Dichloro-2-butene, mg/m3	<0.030		
Dichlorodifluoromethane, mg/m3	<0.030		
1,1-Dichloroethane, mg/m3	<0.030		
1,2-Dichloroethane, mg/m3	<0.030		
1,1-Dichloroethene, mg/m3	<0.030		
cis-1,2-Dichloroethene, mg/m3	<0.030		
trans-1,2-Dichloroethene, mg/m3	<0.030		
1,2-Dichloropropane, mg/m3	<0.030		
cis-1,3-Dichloropropene, mg/m3	<0.030		

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09039-6	244-BLANK	08-29-00

PARAMETER	09039-6				
trans-1,3-Dichloropropene, mg/m3	<0.030				
Dichlorotetrafluoroethane, mg/m3	<0.030				
Ethylbenzene, mg/m3	<0.030				
Hexane, mg/m3	<0.030				
4-Ethyltoluene, mg/m3	<0.030				
Hexachlorobutadiene, mg/m3	<0.030				
Methylene chloride (Dichloromethane), mg/m3	<0.030				
Methyl t-butyl ether (MTBE), mg/m3	<0.030				
Styrene, mg/m3	<0.030				
1,1,2,2-Tetrachloroethane, mg/m3	<0.030				
Tetrachloroethene, mg/m3	<0.030				
Toluene, mg/m3	<0.030				
1,2,4-Trichlorobenzene, mg/m3	<0.030				
1,1,1-Trichloroethane, mg/m3	<0.030				
1,1,2-Trichloroethane, mg/m3	<0.030				
Trichloroethene, mg/m3	<0.030				
Trichlorofluoromethane, mg/m3	<0.030				
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.030				
1,2,4-Trimethylbenzene, mg/m3	<0.030				
1,3,5-Trimethylbenzene, mg/m3	<0.030				
Vinyl chloride, mg/m3	<0.030				
o-Xylene, mg/m3	<0.030				
m&p-Xylene, mg/m3	<0.060				
Surrogate - 1,2-Dichloroethane-d4	111 %				
Surrogate - Toluene-d8	103 %				
Surrogate - 4-Bromofluorobenzene	103 %				
Dilution Factor	1				
Analysis Date	09.08.00				
Batch ID	MAB169				
Analyst	BDH				

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09039-7	Method Blank	
09039-8	Lab Control Standard % Recovery	

PARAMETER	09039-7	09039-8
Volatile Organic Compounds in Air (TO14)		
Benzene, mg/m3	<0.030	104 %
Bromodichloromethane, mg/m3	<0.030	---
Bromoform, mg/m3	<0.030	---
Bromomethane (Methyl bromide), mg/m3	<0.030	---
Carbon disulfide, mg/m3	<0.030	---
Carbon tetrachloride, mg/m3	<0.030	---
Chlorobenzene, mg/m3	<0.030	104 %
Chloroethane, mg/m3	<0.030	---
Chloroform, mg/m3	<0.030	---
Chloromethane (Methyl chloride), mg/m3	<0.030	---
2-Chlorotoluene, mg/m3	<0.030	---
Dibromochloromethane, mg/m3	<0.030	---
1,2-Dibromoethane (EDB), mg/m3	<0.030	---
1,2-Dichlorobenzene, mg/m3	<0.030	---
1,3-Dichlorobenzene, mg/m3	<0.030	---
1,4-Dichlorobenzene, mg/m3	<0.030	---
trans-1,4-Dichloro-2-butene, mg/m3	<0.030	---
Dichlorodifluoromethane, mg/m3	<0.030	---
1,1-Dichloroethane, mg/m3	<0.030	---
1,2-Dichloroethane, mg/m3	<0.030	---
1,1-Dichloroethene, mg/m3	<0.030	88 %
cis-1,2-Dichloroethene, mg/m3	<0.030	---
trans-1,2-Dichloroethene, mg/m3	<0.030	---
1,2-Dichloropropane, mg/m3	<0.030	---

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09039-7	Method Blank	
09039-8	Lab Control Standard % Recovery	

PARAMETER	09039-7	09039-8	
cis-1,3-Dichloropropene, mg/m3	<0.030	---	
trans-1,3-Dichloropropene, mg/m3	<0.030	---	
Dichlorotetrafluoroethane, mg/m3	<0.030	---	
Ethylbenzene, mg/m3	<0.030	---	
Hexane, mg/m3	<0.030	---	
4-Ethyltoluene, mg/m3	<0.030	---	
Hexachlorobutadiene, mg/m3	<0.030	---	
Methylene chloride (Dichloromethane), mg/m3	<0.030	---	
Methyl t-butyl ether (MTBE), mg/m3	<0.030	---	
Styrene, mg/m3	<0.030	---	
1,1,2,2-Tetrachloroethane, mg/m3	<0.030	---	
Tetrachloroethene, mg/m3	<0.030	---	
Toluene, mg/m3	<0.030	103 %	
1,2,4-Trichlorobenzene, mg/m3	<0.030	---	
1,1,1-Trichloroethane, mg/m3	<0.030	---	
1,1,2-Trichloroethane, mg/m3	<0.030	---	
Trichloroethene, mg/m3	<0.030	105 %	
Trichlorofluoromethane, mg/m3	<0.030	---	
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.030	---	
1,2,4-Trimethylbenzene, mg/m3	<0.030	---	
1,3,5-Trimethylbenzene, mg/m3	<0.030	---	
Vinyl chloride, mg/m3	<0.030	---	
o-Xylene, mg/m3	<0.030	---	
m&p-Xylene, mg/m3	<0.060	---	
Surrogate - 1,2-Dichloroethane-d4	110 %	110 %	

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 10330091S

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09039-7	Method Blank	
09039-8	Lab Control Standard % Recovery	

PARAMETER	09039-7	09039-8
Surrogate - Toluene-d8	99 %	100 %
Surrogate - 4-Bromofluorobenzene	100 %	101 %
Dilution Factor	1	1
Analysis Date	09.07.00	09.07.00
Batch ID	MAB168	MAB168
Analyst	BDH	BDH

These test results meet all the requirements of NELAC. All questions regarding this test report should be directed to the STL Project Manager who signed this test report.

Rick Hayes, Project Manager

Final Page Of Report

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-1	#159-#2 GREEN DUP	08-30-00
09065-2	#243-#16 GREEN	08-30-00
09065-3	#091-#3 GREEN	08-30-00
09065-4	#161-#2 GREEN	08-30-00
09065-5	#090-#15 GREEN	08-30-00

PARAMETER	09065-1	09065-2	09065-3	09065-4	09065-5
Volatile Organic Compounds in Air (TO14)					
Benzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,4-Dichloro-2-butene , mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 103300915

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09039-7	Method Blank	
09039-8	Lab Control Standard % Recovery	

PARAMETER	09039-7	09039-8		
cis-1,3-Dichloropropene, mg/m3	<0.030	---		
trans-1,3-Dichloropropene, mg/m3	<0.030	---		
Dichlorotetrafluoroethane, mg/m3	<0.030	---		
Ethylbenzene, mg/m3	<0.030	---		
Hexane, mg/m3	<0.030	---		
4-Ethyltoluene, mg/m3	<0.030	---		
Hexachlorobutadiene, mg/m3	<0.030	---		
Methylene chloride (Dichloromethane), mg/m3	<0.030	---		
Methyl t-butyl ether (MTBE), mg/m3	<0.030	---		
Styrene, mg/m3	<0.030	---		
1,1,2,2-Tetrachloroethane, mg/m3	<0.030	---		
Tetrachloroethene, mg/m3	<0.030	---		
Toluene, mg/m3	<0.030	103 %		
1,2,4-Trichlorobenzene, mg/m3	<0.030	---		
1,1,1-Trichloroethane, mg/m3	<0.030	---		
1,1,2-Trichloroethane, mg/m3	<0.030	---		
Trichloroethene, mg/m3	<0.030	105 %		
Trichlorofluoromethane, mg/m3	<0.030	---		
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.030	---		
1,2,4-Trimethylbenzene, mg/m3	<0.030	---		
1,3,5-Trimethylbenzene, mg/m3	<0.030	---		
Vinyl chloride, mg/m3	<0.030	---		
o-Xylene, mg/m3	<0.030	---		
m&p-Xylene, mg/m3	<0.060	---		
Surrogate - 1,2-Dichloroethane-d4	110 %	110 %		

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09039
Received: 01 SEP 00
Reported: 15 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 10330091~~5~~

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09039-7	Method Blank	
09039-8	Lab Control Standard % Recovery	

PARAMETER	09039-7	09039-8
Surrogate - Toluene-d8	99 %	100 %
Surrogate - 4-Bromofluorobenzene	100 %	101 %
Dilution Factor	1	1
Analysis Date	09.07.00	09.07.00
Batch ID	MAB168	MAB168
Analyst	BDH	BDH

These test results meet all the requirements of NELAC. All questions regarding this test report should be directed to the STL Project Manager who signed this test report.

Rick Hayes, Project Manager

Final Page Of Report

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-1	#159-#2 GREEN DUP	08-30-00
09065-2	#243-#16 GREEN	08-30-00
09065-3	#091-#3 GREEN	08-30-00
09065-4	#161-#2 GREEN	08-30-00
09065-5	#090-#15 GREEN	08-30-00

PARAMETER	09065-1	09065-2	09065-3	09065-4	09065-5
Volatile Organic Compounds in Air (TO14)					
Benzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,4-Dichloro-2-butene , mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

09/21/00 11:21 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 003

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-1	#159-#2 GREEN DUP	08-30-00
09065-2	#243-#16 GREEN	08-30-00
09065-3	#091-#3 GREEN	08-30-00
09065-4	#161-#2 GREEN	08-30-00
09065-5	#090-#15 GREEN	08-30-00

PARAMETER	09065-1	09065-2	09065-3	09065-4	09065-5
Dichlorodifluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloropropane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dichlorotetrafluoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Ethylbenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Hexane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
4-Ethyltoluene, mg/m3	<0.060	0.09	<0.060	<0.060	<0.060
Hexachlorobutadiene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methylene chloride (Dichloromethane), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methyl t-butyl ether (MTBE), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Styrene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2,2-Tetrachloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Tetrachloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Toluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

09/21/00 11:21 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 004

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-1	#159-#2 GREEN DUP	08-30-00
09065-2	#243-#16 GREEN	08-30-00
09065-3	#091-#3 GREEN	08-30-00
09065-4	#161-#2 GREEN	08-30-00
09065-5	#090-#15 GREEN	08-30-00

PARAMETER	09065-1	09065-2	09065-3	09065-4	09065-5
1,2,4-Trichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,1-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichlorofluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloro-1,2,2-trifl uoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2,4-Trimethylbenzene, mg/m3	<0.060	0.12	<0.060	<0.060	<0.060
1,3,5-Trimethylbenzene, mg/m3	<0.060	0.08	<0.060	<0.060	<0.060
Vinyl chloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
o-Xylene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
m&p-Xylene, mg/m3	<0.12	0.08	<0.12	<0.12	<0.12
Surrogate - 1,2-Dichloroethane-d4	113 %	120 %	118 %	118 %	117 %
Surrogate - Toluene-d8	100 %	101 %	102 %	101 %	101 %
Surrogate - 4-Bromofluorobenzene	103 %	100 %	101 %	101 %	104 %
Dilution Factor	1	1	1	1	1
Analysis Date	09.08.00	09.08.00	09.08.00	09.08.00	09.12.00
Batch ID	MAB169	MAB169	MAB169	MAB169	MAB172
Analyst	BDH	BDH	BDH	BDH	BDH

09/21/00 11:22 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 005

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-6	#231-BLANK	08-30-00
09065-7	#301-#17 GREEN	08-31-00
09065-8	#054-#13 TEE	08-31-00
09065-9	#050-#5 TEE	08-31-00
09065-10	#045-#1 TEE	08-31-00

PARAMETER	09065-6	09065-7	09065-8	09065-9	09065-10
Volatile Organic Compounds in Air (TO14)					
Benzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,4-Dichloro-2-butene , mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

09/21/00 11:22 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 006

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-6	#231-BLANK	08-30-00
09065-7	#301-#17 GREEN	08-31-00
09065-8	#054-#13 TEE	08-31-00
09065-9	#050-#5 TEE	08-31-00
09065-10	#045-#1 TEE	08-31-00

PARAMETER	09065-6	09065-7	09065-8	09065-9	09065-10
Dichlorodifluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloropropane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dichlorotetrafluoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Ethylbenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Hexane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
4-Ethyltoluene, mg/m3	<0.060	<0.060	<0.060	0.19	<0.060
Hexachlorobutadiene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methylene chloride (Dichloromethane), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methyl t-butyl ether (MTBE), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Styrene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2,2-Tetrachloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Tetrachloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Toluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

09/21/00 11:23 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 007

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-6	#231-BLANK	08-30-00
09065-7	#301-#17 GREEN	08-31-00
09065-8	#054-#13 TEE	08-31-00
09065-9	#050-#5 TEE	08-31-00
09065-10	#045-#1 TEE	08-31-00

PARAMETER	09065-6	09065-7	09065-8	09065-9	09065-10
1,2,4-Trichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,1-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichlorofluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloro-1,2,2-trifl uoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2,4-Trimethylbenzene, mg/m3	<0.060	<0.060	<0.060	0.29	<0.060
1,3,5-Trimethylbenzene, mg/m3	<0.060	<0.060	<0.060	0.14	<0.060
Vinyl chloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
o-Xylene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
m&p-Xylene, mg/m3	<0.12	<0.12	<0.12	0.14	<0.12
Surrogate - 1,2-Dichloroethane-d4	108 %	125 %	113 %	119 %	123 %
Surrogate - Toluene-d8	102 %	101 %	103 %	102 %	101 %
Surrogate - 4-Bromofluorobenzene	106 %	99 %	102 %	103 %	100 %
Dilution Factor	1	1	1	1	1
Analysis Date	09.12.00	09.12.00	09.12.00	09.12.00	09.12.00
Batch ID	MAB172	MAB172	MAB172	MAB172	MAB172
Analyst	BDH	BDH	BDH	BDH	BDH

09/21/00 11:23 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 008

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-11	#043-#17 GREEN DUP	08-31-00
09065-12	#080-BLANK	08-31-00

PARAMETER	09065-11	09065-12
Volatile Organic Compounds in Air (TO14)		
Benzene, mg/m3	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060
trans-1,4-Dichloro-2-butene, mg/m3	<0.060	<0.060
Dichlorodifluoromethane, mg/m3	<0.060	<0.060
1,1-Dichloroethane, mg/m3	<0.060	<0.060
1,2-Dichloroethane, mg/m3	<0.060	<0.060
1,1-Dichloroethene, mg/m3	<0.060	<0.060
cis-1,2-Dichloroethene, mg/m3	<0.060	<0.060
trans-1,2-Dichloroethene, mg/m3	<0.060	<0.060
1,2-Dichloropropane, mg/m3	<0.060	<0.060

09/21/00 11:23 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 009

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-11	#043-#17 GREEN DUP	08-31-00
09065-12	#080-BLANK	08-31-00

PARAMETER	09065-11	09065-12
cis-1,3-Dichloropropene, mg/m3	<0.060	<0.060
trans-1,3-Dichloropropene, mg/m3	<0.060	<0.060
Dichlorotetrafluoroethane, mg/m3	<0.060	<0.060
Ethylbenzene, mg/m3	<0.060	<0.060
Hexane, mg/m3	<0.060	<0.060
4-Ethyltoluene, mg/m3	<0.060	<0.060
Hexachlorobutadiene, mg/m3	<0.060	<0.060
Methylene chloride (Dichloromethane), mg/m3	<0.060	<0.060
Methyl t-butyl ether (MTBE), mg/m3	<0.060	<0.060
Styrene, mg/m3	<0.060	<0.060
1,1,2,2-Tetrachloroethane, mg/m3	<0.060	<0.060
Tetrachloroethene, mg/m3	<0.060	<0.060
Toluene, mg/m3	<0.060	<0.060
1,2,4-Trichlorobenzene, mg/m3	<0.060	<0.060
1,1,1-Trichloroethane, mg/m3	<0.060	<0.060
1,1,2-Trichloroethane, mg/m3	<0.060	<0.060
Trichloroethene, mg/m3	<0.060	<0.060
Trichlorofluoromethane, mg/m3	<0.060	<0.060
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.060	<0.060
1,2,4-Trimethylbenzene, mg/m3	<0.060	<0.060
1,3,5-Trimethylbenzene, mg/m3	<0.060	<0.060
Vinyl chloride, mg/m3	<0.060	<0.060
o-Xylene, mg/m3	<0.060	<0.060
m&p-Xylene, mg/m3	<0.12	<0.12
Surrogate - 1,2-Dichloroethane-d4	123 %	124 %

09/21/00 11:24 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 010

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-11	#043-#17 GREEN DUP	08-31-00
09065-12	#080-BLANK	08-31-00

PARAMETER	09065-11	09065-12
Surrogate - Toluene-d8	101 %	102 %
Surrogate - 4-Bromofluorobenzene	100 %	100 %
Dilution Factor	1	1
Analysis Date	09.12.00	09.12.00
Batch ID	MAB172	MAB172
Analyst	BDH	BDH

09/21/00 11:24 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 011

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09065-13	Method Blank	
09065-14	Lab Control Standard % Recovery	

PARAMETER	09065-13	09065-14
Volatile Organic Compounds in Air (TO14)		
Benzene, mg/m3	<0.030	105 %
Bromodichloromethane, mg/m3	<0.030	---
Bromoform, mg/m3	<0.030	---
Bromomethane (Methyl bromide), mg/m3	<0.030	---
Carbon disulfide, mg/m3	<0.030	---
Carbon tetrachloride, mg/m3	<0.030	---
Chlorobenzene, mg/m3	<0.030	106 %
Chloroethane, mg/m3	<0.030	---
Chloroform, mg/m3	<0.030	---
Chloromethane (Methyl chloride), mg/m3	<0.030	---
2-Chlorotoluene, mg/m3	<0.030	---
Dibromochloromethane, mg/m3	<0.030	---
1,2-Dibromoethane (EDB), mg/m3	<0.030	---
1,2-Dichlorobenzene, mg/m3	<0.030	---
1,3-Dichlorobenzene, mg/m3	<0.030	---
1,4-Dichlorobenzene, mg/m3	<0.030	---
trans-1,4-Dichloro-2-butene, mg/m3	<0.030	---
Dichlorodifluoromethane, mg/m3	<0.030	---
1,1-Dichloroethane, mg/m3	<0.030	---
1,2-Dichloroethane, mg/m3	<0.030	---
1,1-Dichloroethene, mg/m3	<0.030	88 %
cis-1,2-Dichloroethene, mg/m3	<0.030	---
trans-1,2-Dichloroethene, mg/m3	<0.030	---
1,2-Dichloropropane, mg/m3	<0.030	---

09/21/00 11:25 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 012

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09065-13	Method Blank	
09065-14	Lab Control Standard % Recovery	

PARAMETER	09065-13	09065-14			
cis-1,3-Dichloropropene, mg/m3	<0.030	---			
trans-1,3-Dichloropropene, mg/m3	<0.030	---			
Dichlorotetrafluoroethane, mg/m3	<0.030	---			
Ethylbenzene, mg/m3	<0.030	---			
Hexane, mg/m3	<0.030	---			
4-Ethyltoluene, mg/m3	<0.030	---			
Hexachlorobutadiene, mg/m3	<0.030	---			
Methylene chloride (Dichloromethane), mg/m3	<0.030	---			
Methyl t-butyl ether (MTBE), mg/m3	<0.030	---			
Styrene, mg/m3	<0.030	---			
1,1,2,2-Tetrachloroethane, mg/m3	<0.030	---			
Tetrachloroethene, mg/m3	<0.030	---			
Toluene, mg/m3	<0.030	105 %			
1,2,4-Trichlorobenzene, mg/m3	<0.030	---			
1,1,1-Trichloroethane, mg/m3	<0.030	---			
1,1,2-Trichloroethane, mg/m3	<0.030	---			
Trichloroethene, mg/m3	<0.030	106 %			
Trichlorofluoromethane, mg/m3	<0.030	---			
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.030	---			
1,2,4-Trimethylbenzene, mg/m3	<0.030	---			
1,3,5-Trimethylbenzene, mg/m3	<0.030	---			
Vinyl chloride, mg/m3	<0.030	---			
o-Xylene, mg/m3	<0.030	---			
m&p-Xylene, mg/m3	<0.060	---			
Surrogate - 1,2-Dichloroethane-d4	113 %	112 %			

09/21/00 11:25 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 013

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09065-13	Method Blank	
09065-14	Lab Control Standard % Recovery	

PARAMETER	09065-13	09065-14
Surrogate - Toluene-d8	100 %	101 %
Surrogate - 4-Bromofluorobenzene	100 %	99 %
Dilution Factor	1	1
Analysis Date	09.08.00	09.08.00
Batch ID	MAB169	MAB169
Analyst	BDH	BDH

These test results meet all the requirements of NELAC. All questions regarding this test report should be directed to the STL Project Manager who signed this test report.

Rick Hayes, Project Manager

Final Page Of Report

09/21/00 11:26 FAX 516 249 7610 ARCADIS GERAGHTY&MILLER 014

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-1	#159-#2 GREEN DUP	08-30-00
09065-2	#243-#16 GREEN	08-30-00
09065-3	#091-#3 GREEN	08-30-00
09065-4	#161-#2 GREEN	08-30-00
09065-5	#090-#15 GREEN	08-30-00

PARAMETER	09065-1	09065-2	09065-3	09065-4	09065-5
Volatile Organic Compounds in Air (TO14)					
Benzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,4-Dichloro-2-butene , mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-1	#159-#2 GREEN DUP	08-30-00
09065-2	#243-#16 GREEN	08-30-00
09065-3	#091-#3 GREEN	08-30-00
09065-4	#161-#2 GREEN	08-30-00
09065-5	#090-#15 GREEN	08-30-00

PARAMETER	09065-1	09065-2	09065-3	09065-4	09065-5
Dichlorodifluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloropropane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dichlorotetrafluoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Ethylbenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Hexane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
4-Ethyltoluene, mg/m3	<0.060	0.09	<0.060	<0.060	<0.060
Hexachlorobutadiene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methylene chloride (Dichloromethane), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methyl t-butyl ether (MTBE), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Styrene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2,2-Tetrachloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Tetrachloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Toluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-1	#159-#2 GREEN DUP	08-30-00
09065-2	#243-#16 GREEN	08-30-00
09065-3	#091-#3 GREEN	08-30-00
09065-4	#161-#2 GREEN	08-30-00
09065-5	#090-#15 GREEN	08-30-00

PARAMETER	09065-1	09065-2	09065-3	09065-4	09065-5
1,2,4-Trichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,1-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichlorofluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloro-1,2,2-trifl uoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2,4-Trimethylbenzene, mg/m3	<0.060	0.12	<0.060	<0.060	<0.060
1,3,5-Trimethylbenzene, mg/m3	<0.060	0.08	<0.060	<0.060	<0.060
Vinyl chloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
o-Xylene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
m&p-Xylene, mg/m3	<0.12	0.08	<0.12	<0.12	<0.12
Surrogate - 1,2-Dichloroethane-d4	113 %	120 %	118 %	118 %	117 %
Surrogate - Toluene-d8	100 %	101 %	102 %	101 %	101 %
Surrogate - 4-Bromofluorobenzene	103 %	100 %	101 %	101 %	104 %
Dilution Factor	1	1	1	1	1
Analysis Date	09.08.00	09.08.00	09.08.00	09.08.00	09.12.00
Batch ID	MAB169	MAB169	MAB169	MAB169	MAB172
Analyst	BDH	BDH	BDH	BDH	BDH

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-6	#231-BLANK	08-30-00
09065-7	#301-#17 GREEN	08-31-00
09065-8	#054-#13 TEE	08-31-00
09065-9	#050-#5 TEE	08-31-00
09065-10	#045-#1 TEE	08-31-00

PARAMETER	09065-6	09065-7	09065-8	09065-9	09065-10
Volatile Organic Compounds in Air (TO14)					
Benzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,4-Dichloro-2-butene , mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-6	#231-BLANK	08-30-00
09065-7	#301-#17 GREEN	08-31-00
09065-8	#054-#13 TEE	08-31-00
09065-9	#050-#5 TEE	08-31-00
09065-10	#045-#1 TEE	08-31-00

PARAMETER	09065-6	09065-7	09065-8	09065-9	09065-10
Dichlorodifluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,2-Dichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2-Dichloropropane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
cis-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
trans-1,3-Dichloropropene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Dichlorotetrafluoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Ethylbenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Hexane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
4-Ethyltoluene, mg/m3	<0.060	<0.060	<0.060	0.19	<0.060
Hexachlorobutadiene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methylene chloride (Dichloromethane), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Methyl t-butyl ether (MTBE), mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Styrene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2,2-Tetrachloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Tetrachloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Toluene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060

SEVERN TRENT SERVICES

STL Pensacola
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Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-6	#231-BLANK	08-30-00
09065-7	#301-#17 GREEN	08-31-00
09065-8	#054-#13 TEE	08-31-00
09065-9	#050-#5 TEE	08-31-00
09065-10	#045-#1 TEE	08-31-00

PARAMETER	09065-6	09065-7	09065-8	09065-9	09065-10
1,2,4-Trichlorobenzene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,1-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichloroethene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
Trichlorofluoromethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,1,2-Trichloro-1,2,2-trifl uoroethane, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
1,2,4-Trimethylbenzene, mg/m3	<0.060	<0.060	<0.060	0.29	<0.060
1,3,5-Trimethylbenzene, mg/m3	<0.060	<0.060	<0.060	0.14	<0.060
Vinyl chloride, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
o-Xylene, mg/m3	<0.060	<0.060	<0.060	<0.060	<0.060
m&p-Xylene, mg/m3	<0.12	<0.12	<0.12	0.14	<0.12
Surrogate - 1,2-Dichloroethane-d4	108 %	125 %	113 %	119 %	123 %
Surrogate - Toluene-d8	102 %	101 %	103 %	102 %	101 %
Surrogate - 4-Bromofluorobenzene	106 %	99 %	102 %	103 %	100 %
Dilution Factor	1	1	1	1	1
Analysis Date	09.12.00	09.12.00	09.12.00	09.12.00	09.12.00
Batch ID	MAB172	MAB172	MAB172	MAB172	MAB172
Analyst	BDH	BDH	BDH	BDH	BDH

SEVERN TRENT SERVICES

STL Pensacola
LOG NO: C0-09065
Received: 05 SEP 00
Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-11	#043-#17 GREEN DUP	08-31-00
09065-12	#080-BLANK	08-31-00

PARAMETER	09065-11	09065-12
Volatile Organic Compounds in Air (TO14)		
Benzene, mg/m3	<0.060	<0.060
Bromodichloromethane, mg/m3	<0.060	<0.060
Bromoform, mg/m3	<0.060	<0.060
Bromomethane (Methyl bromide), mg/m3	<0.060	<0.060
Carbon disulfide, mg/m3	<0.060	<0.060
Carbon tetrachloride, mg/m3	<0.060	<0.060
Chlorobenzene, mg/m3	<0.060	<0.060
Chloroethane, mg/m3	<0.060	<0.060
Chloroform, mg/m3	<0.060	<0.060
Chloromethane (Methyl chloride), mg/m3	<0.060	<0.060
2-Chlorotoluene, mg/m3	<0.060	<0.060
Dibromochloromethane, mg/m3	<0.060	<0.060
1,2-Dibromoethane (EDB), mg/m3	<0.060	<0.060
1,2-Dichlorobenzene, mg/m3	<0.060	<0.060
1,3-Dichlorobenzene, mg/m3	<0.060	<0.060
1,4-Dichlorobenzene, mg/m3	<0.060	<0.060
trans-1,4-Dichloro-2-butene, mg/m3	<0.060	<0.060
Dichlorodifluoromethane, mg/m3	<0.060	<0.060
1,1-Dichloroethane, mg/m3	<0.060	<0.060
1,2-Dichloroethane, mg/m3	<0.060	<0.060
1,1-Dichloroethene, mg/m3	<0.060	<0.060
cis-1,2-Dichloroethene, mg/m3	<0.060	<0.060
trans-1,2-Dichloroethene, mg/m3	<0.060	<0.060
1,2-Dichloropropane, mg/m3	<0.060	<0.060

SEVERN TRENT SERVICES

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Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-11	#043-#17 GREEN DUP	08-31-00
09065-12	#080-BLANK	08-31-00

PARAMETER	09065-11	09065-12
cis-1,3-Dichloropropene, mg/m3	<0.060	<0.060
trans-1,3-Dichloropropene, mg/m3	<0.060	<0.060
Dichlorotetrafluoroethane, mg/m3	<0.060	<0.060
Ethylbenzene, mg/m3	<0.060	<0.060
Hexane, mg/m3	<0.060	<0.060
4-Ethyltoluene, mg/m3	<0.060	<0.060
Hexachlorobutadiene, mg/m3	<0.060	<0.060
Methylene chloride (Dichloromethane), mg/m3	<0.060	<0.060
Methyl t-butyl ether (MTBE), mg/m3	<0.060	<0.060
Styrene, mg/m3	<0.060	<0.060
1,1,2,2-Tetrachloroethane, mg/m3	<0.060	<0.060
Tetrachloroethene, mg/m3	<0.060	<0.060
Toluene, mg/m3	<0.060	<0.060
1,2,4-Trichlorobenzene, mg/m3	<0.060	<0.060
1,1,1-Trichloroethane, mg/m3	<0.060	<0.060
1,1,2-Trichloroethane, mg/m3	<0.060	<0.060
Trichloroethene, mg/m3	<0.060	<0.060
Trichlorofluoromethane, mg/m3	<0.060	<0.060
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.060	<0.060
1,2,4-Trimethylbenzene, mg/m3	<0.060	<0.060
1,3,5-Trimethylbenzene, mg/m3	<0.060	<0.060
Vinyl chloride, mg/m3	<0.060	<0.060
o-Xylene, mg/m3	<0.060	<0.060
m&p-Xylene, mg/m3	<0.12	<0.12
Surrogate - 1,2-Dichloroethane-d4	123 %	124 %

SEVERN TRENT SERVICES

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88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , AIR SAMPLES	DATE/ TIME SAMPLED
09065-11	#043-#17 GREEN DUP	08-31-00
09065-12	#080-BLANK	08-31-00

PARAMETER	09065-11	09065-12
Surrogate - Toluene-d8	101 %	102 %
Surrogate - 4-Bromofluorobenzene	100 %	100 %
Dilution Factor	1	1
Analysis Date	09.12.00	09.12.00
Batch ID	MAB172	MAB172
Analyst	BDH	BDH

SEVERN TRENT SERVICES

STL Pensacola
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Reported: 18 SEP 00

Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09065-13	Method Blank	
09065-14	Lab Control Standard % Recovery	

PARAMETER	09065-13	09065-14
Volatile Organic Compounds in Air (TO14)		
Benzene, mg/m3	<0.030	105 %
Bromodichloromethane, mg/m3	<0.030	---
Bromoform, mg/m3	<0.030	---
Bromomethane (Methyl bromide), mg/m3	<0.030	---
Carbon disulfide, mg/m3	<0.030	---
Carbon tetrachloride, mg/m3	<0.030	---
Chlorobenzene, mg/m3	<0.030	106 %
Chloroethane, mg/m3	<0.030	---
Chloroform, mg/m3	<0.030	---
Chloromethane (Methyl chloride), mg/m3	<0.030	---
2-Chlorotoluene, mg/m3	<0.030	---
Dibromochloromethane, mg/m3	<0.030	---
1,2-Dibromoethane (EDB), mg/m3	<0.030	---
1,2-Dichlorobenzene, mg/m3	<0.030	---
1,3-Dichlorobenzene, mg/m3	<0.030	---
1,4-Dichlorobenzene, mg/m3	<0.030	---
trans-1,4-Dichloro-2-butene, mg/m3	<0.030	---
Dichlorodifluoromethane, mg/m3	<0.030	---
1,1-Dichloroethane, mg/m3	<0.030	---
1,2-Dichloroethane, mg/m3	<0.030	---
1,1-Dichloroethene, mg/m3	<0.030	88 %
cis-1,2-Dichloroethene, mg/m3	<0.030	---
trans-1,2-Dichloroethene, mg/m3	<0.030	---
1,2-Dichloropropane, mg/m3	<0.030	---

SEVERN TRENT SERVICES

STL Pensacola
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Mr. Glenn Netuschil
ARCADIS Geraghty & Miller, Inc.
88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09065-13	Method Blank	
09065-14	Lab Control Standard % Recovery	

PARAMETER	09065-13	09065-14
cis-1,3-Dichloropropene, mg/m3	<0.030	---
trans-1,3-Dichloropropene, mg/m3	<0.030	---
Dichlorotetrafluoroethane, mg/m3	<0.030	---
Ethylbenzene, mg/m3	<0.030	---
Hexane, mg/m3	<0.030	---
4-Ethyltoluene, mg/m3	<0.030	---
Hexachlorobutadiene, mg/m3	<0.030	---
Methylene chloride (Dichloromethane), mg/m3	<0.030	---
Methyl t-butyl ether (MTBE), mg/m3	<0.030	---
Styrene, mg/m3	<0.030	---
1,1,2,2-Tetrachloroethane, mg/m3	<0.030	---
Tetrachloroethene, mg/m3	<0.030	---
Toluene, mg/m3	<0.030	105 %
1,2,4-Trichlorobenzene, mg/m3	<0.030	---
1,1,1-Trichloroethane, mg/m3	<0.030	---
1,1,2-Trichloroethane, mg/m3	<0.030	---
Trichloroethene, mg/m3	<0.030	106 %
Trichlorofluoromethane, mg/m3	<0.030	---
1,1,2-Trichloro-1,2,2-trifluoroethane, mg/m3	<0.030	---
1,2,4-Trimethylbenzene, mg/m3	<0.030	---
1,3,5-Trimethylbenzene, mg/m3	<0.030	---
Vinyl chloride, mg/m3	<0.030	---
o-Xylene, mg/m3	<0.030	---
m&p-Xylene, mg/m3	<0.060	---
Surrogate - 1,2-Dichloroethane-d4	113 %	112 %

SEVERN TRENT SERVICES

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Reported: 18 SEP 00

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88 Duryea Road
Melville, NY 11747

Project: LOCKHEED MARTIN
Sampled By: Client
Code: 095700918

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR AIR SAMPLES	DATE/ TIME SAMPLED
09065-13	Method Blank	
09065-14	Lab Control Standard % Recovery	

PARAMETER	09065-13	09065-14
Surrogate - Toluene-d8	100 %	101 %
Surrogate - 4-Bromofluorobenzene	100 %	99 %
Dilution Factor	1	1
Analysis Date	09.08.00	09.08.00
Batch ID	MAB169	MAB169
Analyst	BDH	BDH

These test results meet all the requirements of NELAC. All questions regarding this test report should be directed to the STL Project Manager who signed this test report.

Rick Hayes, Project Manager

Final Page Of Report

Severn Trent Laboratories, Inc.
Pensacola, FL 32514
Tel: (850) 474-1001
Fax: (850) 478-2671

Committed to *Your* Success

Data Qualifiers for Final Report

STL-Pensacola Inorganic/Organic	
B1	The analyte was detected in the associated method blank (sample itself is flagged even though sample is ND).
B2	The analyte was detected in the sample(s) and in the associated method blank analyzed on the day samples were extruded; however, this analyte was not detected in the blank analyzed with the samples.
B3	The analyte was found in the associated blank as well as in the associated sample(s) (qualifier is applied to the sample, notto the blank).
B4	Sample results were corrected due to contaminants in Fractionation Blank
D	Diluted out (surrogate or spike due to sample dilution)
E	Compound concentration exceeds the upper calibration range of the instrument.
F	The reported value is < STL-Pensacola RL and > the STL-Pensacola MDL; therefore, the quantitation is estimation (The STL-PN RL is at or above lowest calibration standard in the initial calibration curve).
G	Sample and/or duplicate result is at or below 5 X (times) the STL Reporting Limit and the absolute difference between the sample and duplicate result is at or below the STL reporting limit; therefore, the results are "in control".
H1	Sample and/or duplicate is below 5 X (times) the STL Reporting Limit and the absolute difference between the results exceeds the STL Reporting Limit; therefore, the results are "out of control"
H2	Sample and duplicate (or MS and MSD) RPD is above control limit.
J (description)	The analyte was positively identified, the quantitation may be an estimation
J4	(For positive results)Temperature limits exceeded (≤2°C or ≥ 6°C), non-reportable for NDPES compliance monitoring.
J6	(For positive results) LCS or Surrogate %R is > upper control limit (UCL), results may be biased high
J7	The reported value is > the laboratory MDL and < lowest calibration standard; therefore, the quantitation is an estimation (this qualifier should only be used when the STL-PN RL is below the lowest calibration standard in the initial calibration).
J8	Matrix spike and post spike recoveries are outside control limits. See out of Control Events/Corrective Action Form.
J9	(For positive results) LCS or Surrogate %R is < lower control limit (LCL), results may be biased low
M1	A matrix effect was present ([1]sample, MS or MSD was analyzed twice to confirm surrogate/spike failure, [2]sample and/or MS/MSD chromatogram(s) had interfering peaks, [3]sample result was > 4 X spike added, [4]metals serial dilution was performed, or [5]metals post spike is < 40% R)
M2	The MS and/or MSD %R or RPD was outside upper or lower control limits; not necessarily due to matrix effect.
N/C	Not Calculable; Sample spiked is > 4X spike concentration (may also use this flag in place of negative numbers)
NH	Sample and duplicate results are "out of control". The sample is nonhomogeneous.
NoMS	Not enough sample provided to prepare and/or analyze a method-required matrix spike (MS) and/or duplicate (MSD)
Q	The analytical (post digestion) spike is reported due to the percent recovery being outside limits on the matrix (pre-digestion) spike.
R (description)	The data may be unusable due to deficiencies in the ability to analyze the sample and meet QC criteria
R1	(For nondetects) Temperature limits exceeded (≤2°C or ≥ 6°C); non-reportable for NDPES compliance monitoring
R2	Improper preservation, no preservative present or insufficient amounts of preservative in sample upon receipt, non-reportable for NDPES compliance monitoring
R3	Improper preservation, incorrect preservative present in sample upon receipt, non-reportable for NPDES compliance
R4	Holding time exceeded, non-reportable for NDPES compliance monitoring.
R5	Collection requirements not met, improper container used for sample
R6	LCS or surrogate %R is < LCL and analyte is not detected or surrogate %R is < 10% for detects/nondetects.
R7	Internal standard area outside –50% to +100% of calibration verification standard.
R8	Initial calibration or any calibration verification exceeds acceptance criteria.
R9	Not filtered and preserved at time of collection.
R10	Headspace >1/4" in diameter in volatile vials, non-reportable for NPDES compliance monitoring
R11	Samples were filtered and preserved within 4 hours of collection.
R12	Analysis performed outside the 12-hour tune or not within tune criteria.
S1	The Method of Standard Additions (MSA) has been performed on this sample.
S2	Incorrect sample amount was submitted to the laboratory for analysis
S3 (Flashpoint)	This method is not designed for solids and the results may not be accepted by any regulator for such purposes.
T	Second-column or detector confirmation exceeded the SW-846 criteria of 40% RPD for this compound.
TIC	The compound is not within the initial calibration curve. It is searched for qualitatively or as a Tentatively Identified Compound.
U	The reported value is ≤ Laboratory MDL (value for result will be the MDL, never below the MDL)
W	Post-digestion spike for Furnace AA is out of control limits (85-115%), while sample absorbance is less than 50% spike absorbance.
@	Adjusted reporting limit due to sample composition, not due to overcal (dilution prior to digestion and/or analysis).
#	Elevated reporting limit due to insufficient sample size
1 pt	The compound has been quantitated against a one point calibration.
* (Metals & Wet Chem)	Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis)

SEVERN TRENT LABORATORIES, INC. - PENSACOLA, FLORIDA
STATE CERTIFICATIONS

Alabama Department of Environmental Management, Laboratory ID No. 40150 (Drinking Water by Reciprocity with FL)

Arizona Department of Health Services, Lab ID No. AZ0589 (Hazardous Waste & Wastewater)

Arkansas Department of Pollution Control and Ecology, (No Laboratory ID No. assigned by state) (Environmental)

State of California, Department of Health Services, Laboratory ID No. 2338 (Hazardous Waste and Wastewater)

State of Connecticut, Department of Health Services, Connecticut Lab Approval No. PH-0697 (Drinking Water, Hazardous Waste and Wastewater)

Delaware Health & Social Services, Division of Public Health, Laboratory ID No. FL094 (Drinking Water by Reciprocity with FL)

Florida DOH Laboratory ID No. E81010 (Drinking Water, Hazardous Waste and Wastewater)

Florida, Radioactive Materials License No. G0733-1

Foreign Soil Permit, Permit No. S-37599

Kansas Department of Health & Environment, Laboratory ID No. E10253 (Wastewater and Hazardous Waste)

Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Laboratory ID No. 90043 (Drinking Water)

State of Louisiana, DHH, Office of Public Health Division of Laboratories, Laboratory ID No. LA000017 (Drinking Water)

State of Maryland, DH&MH Laboratory ID No. 233 (Drinking Water by Reciprocity with Florida)

Commonwealth of Massachusetts, DEP, Laboratory ID No. M-FL094 (Hazardous Waste and Wastewater)

State of Michigan, Bureau of E&OccH, Laboratory ID No.9912 (Drinking Water by Reciprocity with Florida)

New Hampshire DES ELAP, Laboratory ID No. 250599A (Wastewater)

State of New Jersey, Department of Environmental Protection & Energy, Laboratory ID No. 49006 (Wastewate and Hazardous Waster)

New York State, Department of Health, Laboratory ID No. 11503 (Wastewater and Solids/Hazardous Waste)

North Carolina Department of Environment & Natural Resources, Laboratory ID No. 314 (Hazardous Waste and Wastewater)

North Dakota DH&Consol Labs, Laboratory ID No. R-108 (Hazardous Waste and Wastewater by Reciprocity with Florida)

State of Oklahoma, Oklahoma Department of Environmental Quality, Laboratory ID No. 9810 (Hazardous Waste and Wastewater)

Commonwealth of Pennsylvania, Department of Environmental Resources, Laboratory ID No. 68-467 (Drinking Water)

South Carolina DH&EC, Laboratory ID No. 96026 (Wastewater by Reciprocity with FL and Solids/Hazardous Waste by Reciprocity with CA)

Tennessee Department of Health & Environment, Laboratory ID No. 02907 (Drinking Water)

Tennessee Division of Underground Storage Tanks Approved Laboratory

Virginia Department of General Services, Laboratory ID No. 00008 (Drinking Water by Reciprocity with FL)

State of Washington, Department of Ecology, Laboratory ID No. C282 (Hazardous Waste and Wastewater)

West Virginia Division of Environmental Protection, Office of Water Resources, Laboratory ID No. 136 (Hazardous Waste and Wastewater by Reciprocity with FL)

American Industrial Hygiene Association (AIHA) Accredited Laboratory, Laboratory ID No. 100704

CHAIN OF CUSTODY

1062

Severn Trent Laboratories
3355 McLemore Drive • Pensacola, FL 32514
Tel: (850) 474-1001 • Fax: (850) 474-4789

Committed To *Your* Success

LAB ACCESSION # C009065

PART 1 - Bottle Shipment Information

CLIENT: Air/Compliance Consultants | **CLIENT PROJECT NUMBER:** 00-093

QUANTITY OF SAMPLE CONTAINERS SHIPPED	PRESERVATIVE							PLASTIC CONTAINERS							GLASS CONTAINERS									NOTES
	H_2SO_4	HNO3	HCL	Zn Acetate	$Na_2S_2O_3$	Unpreserved	NaOH	8 oz.	16 oz.	32 oz.	½ gallon	1 gallon	Whirl-pak	100-ML Cup	120 ml (A)	1 liter (A)	1 liter (C)	40 ml Vial	4 oz. wm	8 oz. wm	16 oz. wm	32 oz. wm	D.I. Trip Blank	

Relinquished By:	Time	Date	Received By:	Time	Date

PART 2 - Sample/Project Information

SAMPLE MATRIX CODES

DW	DRINKING WATER	AI	AIR	SW	SURFACE WATER
WW	WASTEWATER	SO	SOIL	SL	SLUDGE
GW	GROUNDWATER	OI	OIL	ST	STORMWATER

SAMPLE I.D.	SAMPLE DATE	SAMPLE TIME	MATRIX	PARAMETERS AND PRESERVATIVES REQUESTED: TO-14A	TOTAL # OF BOTTLES
#159 - #2 Green-Dup	8/30/00		AI	X	1
243 - #16 Green	8/30/00		AI	X	2
241 - #3 Green	8/30/00		AI	X	3
#161 - #2 Green	8/30/00		AI	X	4
#090 - #15 Green	8/30/00		AI	X	5
#231 - Blank	8/30/00		AI	X	6

Total Number of Bottles/Containers:

Relinquished By	Date	Time	Received By	Date	Time
Brenda Douglass	8/31/00	5:20a.	Mark Swafford STL PNS	9/5/00	0905

Client	Air/Compliance Consultants		Purchase Order Number
Address	1050 William Pitt Way		Project Number 00-093
City	Pittsburgh	State PA / Zip 15238	Project Name Lockheed Martin
Phone Number	(412) 826-3636	Fax Number (412) 826-3640	Project Location N Shore towers Golf Course
Project Manager	Bob Frey		Sampled By Brenda Douglass

TURNAROUND TIMES	check below	SPECIAL INSTRUCTIONS
ndard - 14-21 days	X	see enclosed sheet for analysis instructions. call Bob Frey w/ th any questions.
RUSH (must be approved in advance)		
<-- 48 hours - 2x standard price		
3-7 days - 1.5x standard price		
TCLP - 1 week rush 1.5x standard price		
QC Level none I II III IV (circle one)		Copies of report needed _____

FORM #12604 WHITE - LAB CANARY - REPORT PINK - CLIENT

STL
Committed To *Your* Success

Severn Trent Laboratories
3355 McLemore Drive • Pensacola, FL 32514
Tel: (850) 474-1001 • Fax: (850) 474-4789

CHAIN OF CUSTODY

2062

LAB ACCESSION # C009065

PART 1 - Bottle Shipment Information

CLIENT: Air Compliance Consultants | **CLIENT PROJECT NUMBER:** 00-093

QUANTITY OF SAMPLE CONTAINERS SHIPPED	PRESERVATIVE							PLASTIC CONTAINERS							GLASS CONTAINERS									NOTES
	H_2SO_4	HNO3	HCL	Zn Acetate	$Na_2S_2O_3$	Unpreserved	NaOH	8 oz.	16 oz.	32 oz.	½ gallon	1 gallon	Whirl-pak	100-ML Cup	120 ml (A)	1 liter (A)	1 liter (C)	40 ml Vial	4 oz. wm	8 oz. wm	16 oz. wm	32 oz. wm	D.I. Trip Blank	

Relinquished By:	Time	Date	Received By:	Time	Date
Brenda Douglass		8/31/00			

PART 2 - Sample/Project Information

SAMPLE MATRIX CODES

DW	DRINKING WATER	AI	AIR	SW	SURFACE WATER
WW	WASTEWATER	SO	SOIL	SL	SLUDGE
GW	GROUNDWATER	OI	OIL	ST	STORMWATER

PARAMETERS AND PRESERVATIVES REQUESTED

SAMPLE I.D.	SAMPLE DATE	SAMPLE TIME	MATRIX	TO-14A													TOTAL # OF BOTTLES
#301 - 17 Green	8/31/00		AI	X												7	
054 - 13 Tee	8/31/00		AI	X												8	
050 - 5 Tee	8/31/00		AI	X												9	
#045 - 1 Tee	8/31/00		AI	X												10	
#043 - 17 Green-Dup	8/31/00		AI	X												11	
#080 - Blank	8/31/00		AI													12	
#300 - unused canister - no analysis requested																	

Total Number of Bottles/Containers:

Relinquished By	Date	Time	Received By	Date	Time
Brenda Douglass	8/31/00	9:00	Mark Swafford STL PNS	9/5/00	0905

Client	Air Compliance Consultants Inc.			Purchase Order Number	
Address	1050 William Pitt Way			Project Number	00-093
City	Pittsburgh	State	PA	Zip	15238
Phone Number	(412) 826-3636	Fax Number	(412) 826-3640	Project Name	Lockheed Martin
Project Manager	Bob Frey			Project Location	N Shore Towers Golf Course
				Sampled By	Brenda Douglass

TURNAROUND TIMES	check below	SPECIAL INSTRUCTIONS
andard - 14-21 days	X	see enclosed memo regarding analysis. Call Bob Frey with any questions.
RUSH (must be approved in advance)		
<-- 48 hours - 2x standard price		
3-7 days - 1.5x standard price		
TCLP - 1 week rush 1.5x standard price		
QC Level none I II III IV (circle one)		Copies of report needed _____

FORM NO 2604 WHITE — LAB CANARY — REPORT PINK — CLIENT

Severn Trent Laboratories of Florida
PROJECT SAMPLE INSPECTION FORM

Lab Order #: C009065 Date Received: 9/5/00

1.	Was there a Chain of Custody?	(Yes)	No+		
2.	Was Chain of Custody properly filled out and relinquished?	(Yes)	No+		
3.	Were samples received cold? (Criteria: 2° - 6°C: STL-SOP 1055)	Yes	No+	(N/A)	
4.	Were all samples properly labeled and identified?	Yes	(No+)		
5.	Did samples require splitting or compositing♦? Req By: PM Client Other♦	Yes+	(No)		
6.	Were samples received in proper containers for analysis requested?	(Yes)	No+		
7.	Were all sample containers received intact?	(Yes)	No+		
8.	Were samples checked for preservative? *(Check pH of all H_2O requiring preservative (STL-PN SOP 917) except VOA vials that require zero headspace)+*	Yes	No+	(N/A)	
9.	Is there sufficient volume for analysis requested?	(Yes)	No+	(N/A) (Can)	
10.	Were samples received within Holding Time? (REFER TO STL-SOP 1040)	(Yes)	No+		
11.	Is Headspace visible > ¼" in diameter in VOA vials?* If any headspace is evident, comment in out-of-control section.	Yes*	No	(N/A)	
12.	If sent, were matrix spike bottles returned?	Yes	No+	(N/A)	
13.	Was Project Manager notified of problems? (initials:_____)	Yes	No+	(N/A)	

Airbill Number(s): 8184 8157 8992

Shipped By: Fed Ex

Cooler Number(s): Boxes CANS 159, 243, 091, 161, 090, 231, 301, 054, 050,

Cooler Weight(s): 045, 043, 080. 91#

Shipping Charges: N/A

Cooler Temp(s) (°C): N/A

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

Out of Control Events and Inspection Comments:

#4 Sample 054-13 Tee for analysis TO14A was not labeled, however The can number matches for that sample. MHS 9/5/00

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS) ☞

Inspected By: MHS **Date:** 9/5/00 **Logged By:** PHC **Date:** 9/5/00

♣ *Note all Out-of-Control and/or questionable events on Comment Section of this form.*

♦ *If Other, note who requested the splitting or compositing of samples on the Comment Section of this form. All volatile samples requested to be split or composited must be done in the Volatile Lab. Document: "Volatile sample values may be compromised due to sample splitting (compositing)"*

\+ *All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (STL-SOP 938, section 2.2.9).*

* *According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, STL makes it policy to record any headspace as out-of-control (STL-SOP 938, section 2.2.12).*

DRAFT

Appendix M

OU-1 Remedial Construction Data

ARCADIS GERAGHTY & MILLER

Sample/Core Log

y/Well VPB-RWIR Project/No. LMC/NY/001227.0003.00002 Page 1 of ____

Site Location GREAT NECK, NY Drilling Started 12.9.99 Drilling Completed ____

Total Depth Drilled ____ Feet Hole Diameter 6 1/2 inches Type of Sample/Coring Device SPLIT SPOON 10 FT. (100-140)

Length and Diameter of Coring Device 2' x 2" Sampling Interval CONTINUOUS feet (140-270)

Land-Surface Elev. ____ feet ☐ Surveyed ☐ Estimated Datum ____

Drilling Fluid Used WATER Drilling Method HSA-3 1/4" I.D.

Drilling Contractor DELTA WELL AND PUMP CO., INC. Driller RICH Helper JOHN

Prepared By CHRISTOPHER KERN Hammer Weight 140 lbs. Hammer Drop 30 ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery ~~(feet)~~ (IN.)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	PID (ppm)
98	100	4	100+(6")	SW - WELL GRADED SAND, FINE TO COARSE, BROWN, ~5% GRAVEL, WET, NO ODOR; GRAVEL IN BASE of CUTTING SHOE	0.0
98 (RESAMPLE)	100	6	23/28/21/32	SW - WELL GRADED SAND, FINE TO COARSE, DARK BROWN/GRAYISH, SOME SILT, WET, NO ODOR	0.0
109	111	10	6/11/38/23	SW - WELL GRADED SAND, FINE TO COARSE, LIGHT BROWN, ~5% GRAVEL, WET, NO ODOR	0.0
119	121	24	5/7/8/6	SP - POORLY GRADED SAND, FINE, TAN/YELLOW, TRACE SILT, WET, NO ODOR; WHITE CLAYEY SILTY SAND, FINE IN BASE of CUTTING SHOE	0.0
129	131	24	8/10/28/34	CL - CLAY, LIGHT GRAY/WHITISH, SOME SILT, VERY STIFF, OXIDE STAINING PRESENT, NO ODOR	0.0
139	141	18	8/17/34/32	SP - POORLY GRADED SAND, FINE TO MEDIUM, PALE BROWN, WET, NO ODOR; CLAY IN BOTTOM 3" of SPLIT SPOON	0.0

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well VP3-RW3R

Page 2 of ____

Prepared by J. Banstead

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet) ~~Inches~~	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	PID (PPM)
142	144	18	8/10/18/21	Tan/Lt. Brown m-c SAND, trace F sand + silt, wet, no odor, hints of black sand, unsorted	1.8
144	146	12	7/10/15/20	Tan fm SAND, trace c SAND + silt, wet, unsorted, no odor	3.5
146	148	24"	24/26/28/35	Tan fm SAND, trace c SAND + silt, wet, unsorted, no odor, @ 146' + ~147.5' white clay lens, plastic, gritty	4.2
148	150	18"	9/10/9/10	Top 6", white CLAY, red + orange laminations Next 8" Brown/white fm SAND, Firm, orange/red laminations (1 mm) Bottom 4" Same as Top 6" (CLAY)	8.9
150	152	24"	7,19,31,34	White CLAY, very plastic, red/orange laminations, wet, no odor, near bottom 1" seam of c SAND, red/orange, trace black coarse gravel, dense	8.2
152	154	3	7,14,15,15	CLAY, brown/white, little recovery, very wet, soupy	5.7
154	156	2"	8,19,9,12	CLAY, brown/white, little recovery, very wet, soupy, trace fm sand	0.0
156	158	24	25,25,20,21	Top 12" CLAY, white, brown + orange laminations, trace F sand, plastic Next 6" CLAY and fm SAND, plastic, no odor Bottom 6" Tan/Red fm SAND, trace c sand + silt, loose to dense.	8.7
158	160	18	17,60,34	Top 2" CLAY, white, plastic. Bottom 12" white CLAY to tan fm SAND, dense, trace red F sand + silt	5.5

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well VPB RW3R

Page 3 of ___

Prepared by J. Banstead

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	PID
160	162	24	6,9,16,34	Tan/Brown fm SAND, wet, trace silt, soupy	13.7
162	164	18	3,6,12,16	Tan fm SAND, wet, trace silt, soupy, @ ~162' 1/2" layer of clayey sand	11.3
164	166	24	4,9,13,22	Top 6" Brown fm SAND + CLAY, plastic Bottom Brown/orange fm SAND, trace silt + clay, moist, plastic	22.4
166	168	24	10,15,30,50	Brown/Tan/Orange fm SAND, trace white clay interlayered, slightly plastic, unsorted	20.4
168	170	24	3,5,7,12	Brown/Tan/White fm SAND, trace silt, plastic, wet	20.5
170	172	24	11,17,23,31	Tan fm SAND, orange/red/white striations, trace silt, plastic, wet	11.4
172	174	18	30,53,20	Tan fm SAND, orange/white striations, trace silt, firmer, wet	18.6
174	176	1	10,20,30,34	Tan fm SAND, wet, poor recovery	4.4
176	178	3	20,17,17,15	Same as 174-176'	13.9
178	180	6	7,14,24,30	Tan/white fm SAND, trace c SAND, wet	13.4
180	182	12	10,10,15,20	Tan/white fm SAND, loose, wet	11.9
182	184	12	5,5,25,30	Tan/white fm SAND, trace silt, wet	10.5
184	186	18	10,20,30,30	Tan/white fm SAND, trace silt, bottom .4" reel/orange clayey sand laminations	13.5
186	188	18	15,35,40,50	Tan/white Fm SAND, trace silt, wet. Near bottom 4" dk. brown 1 mm laminations	12.4
188	190	18	5,17,20,40	Tan/white Fm SAND, compact, moist	12.1
190	192	2	19,26,20,26	Tan fm SAND, little recovery, soupy	6.5

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well VPB-RW-1R

Page 4 of ____

Prepared by J. Barstel

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet/inches)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	PID
192	194	3	5,10,20,15	Tan fm SAND, trace silt, wet, runny	11.2
194	196	24	10,25,30,30	Tan/Gray fm SAND, denser, wet	12.0
196	198	18	10,30,29,20	Tan/Gray fm SAND, denser, firm, wet	13.6
198	200	12	8,15,10,25	Tan/Gray fm SAND, dense, laminated, trace orange sand near bottom	12.9
200	202	6	5,35,30,34	Brown/Tan fm SAND, dense, trace silt	6.4
202	204	18	7,19,30,36	Tan/White fm SAND, looser, trace silt, wet, some rose sand near bottom	7.7
204	206	24	17,21,23,31	Tan/Gray fm SAND, denser, trace silt, bottom 3", black/orange laminated sand	8.8
206	208	24	7,10,26,23	Same as 204-206' interval (with bottom 3" laminated sand)	10.6
208	216	16	7,13,19,22	Gray/Tan/Black fm SAND, trace orange sand, dense, no odors	7.8
210	212	6	11,17,23,31	Tan/Burnt Orange fm SAND, wet, runny	4.4
212	214	12	9,11,17,23	White/Gray/Tan fm SAND, trace clay, plastic	5.9
214	216	12	8,15,20,20	Same as 212-214', some orange sand intervals, @ ~215.5' 2" clay lens	5.2
216	218	24	5,10,25,50	Gray CLAY, firm, some tan/gray fm SAND w/ orange streaks, dense.	7.9
218	220	24	5,5,10,30	Gray CLAY, some orange/gray sand, firm	2.5
220	222	18	5,7,15,35	Top 12" Gray CLAY, some fn tan sand, firm	
				Bottom 6" Tan/White fm SAND, looser	2.6
222	224	18	10,25,30,40	Tan/Gray fm SAND, trace fm orange sand, looser, wet	0.0

ARCADIS GERAGHTY & MILLER

ample/Core Log (Cont.d)

Boring/Well VPB-RW1R

Prepared by J. Bonstedl

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet) (inches)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	PID
224	226	24	10,15,30,46	Top 4" Gray CLAY, plastic to firm Bottom Tan fm SAND, trace orange/white sand, dense	2.5
226	228	24	5,20,20,20	Tan/Gray fm SAND, trace clay + silt, plastic, some orange sand.	1.9
228	230	24	7,15,20,25	Tan/Gray SAND grading to CLAYEY SAND, orange sand intermixed, plastic	2.3
230	232	24	7,13,15,15	Tan/Gray fm CLAYEY SAND, laminated w/ black + orange striations, firm	2.1
232	234	12	55,10,10	Gay fm SAND, trace clay, plastic	1.4
234	236	18	5,5,10,20	Tan/Gray SAND, looser, trace silt + clay, runny	
236	238	6	6,12,17,20	Brown SAND (fm), loose, very wet	3.2
238	240	6	3,10,12,15	Brown/Tan fm SAND, trace silt + c sand, loose	
240	242	12	3,10,20,15	Tan/Orange fm SAND, loose, wet	6.5
242	244	12	10,12,17,20	Tan/Gray fm SAND, trace black sand, loose, wet	6.1
244	246	12	3,10,19,15	Tan/Gray fm SAND, trace rose sand, loose, unsorted.	4.2
246	248	12	5,10,25,13	Tan fm SAND, trace silt, unsorted	5.7
248	250	18	4,7,20,19	Tan fm SAND, uniform, looser	1.2
250	252	24	4,8,15,20	Tan fm SAND, trace f gray sand	1.9
252	254	24	2,10,12,30	Tan/Gray fm SAND, no odor	1.7
254	256	24	5,12,20,25	Tan/Gray fm SAND, no odor	2.3
256	258	24	10,20,20,20	Tan/Gray fm SAND, dk. brown sand laminations in bottom 12"	25

ARCADIS GERAGHTY & MILLER

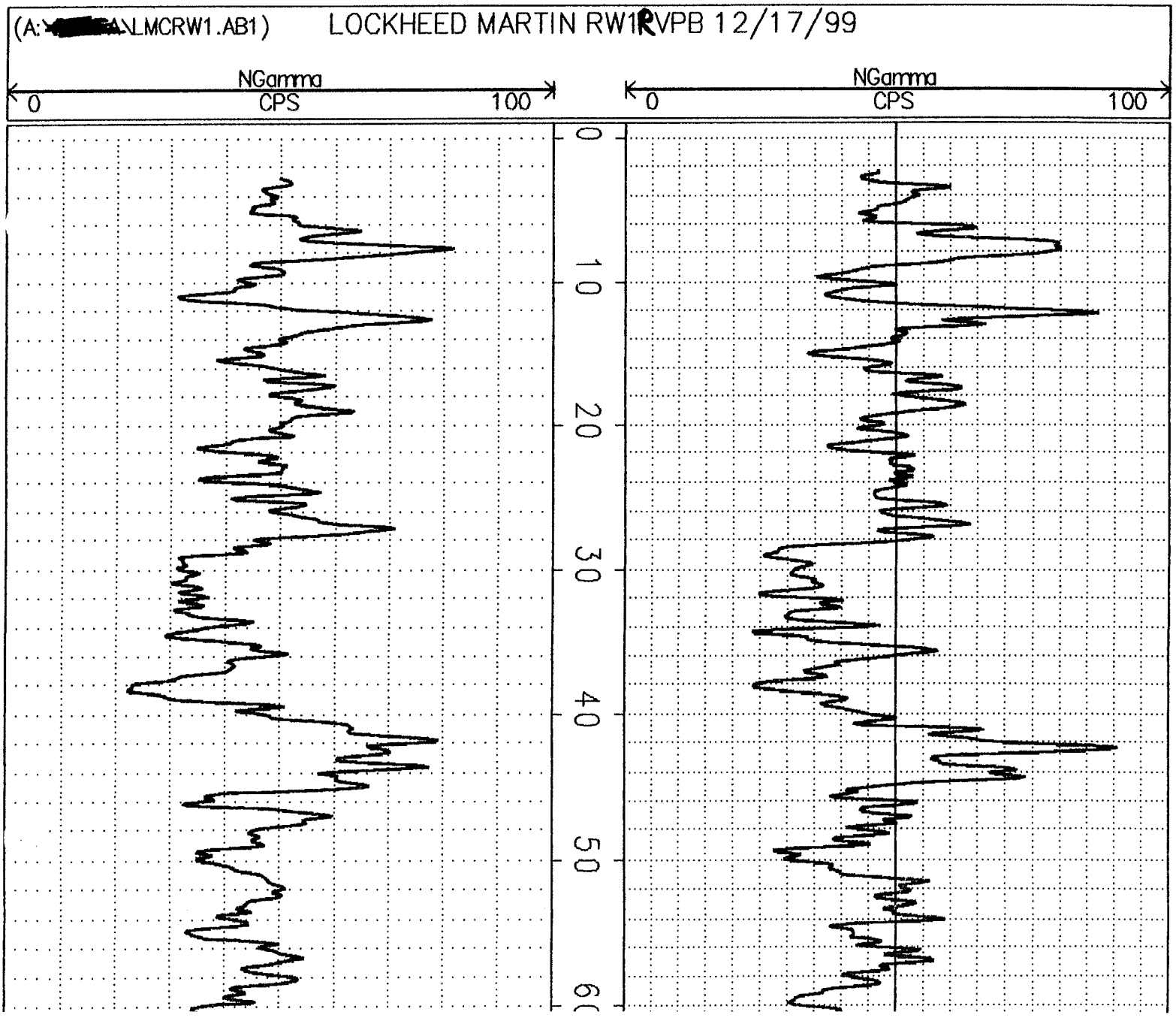
Sample/Core Log (Cont.d)

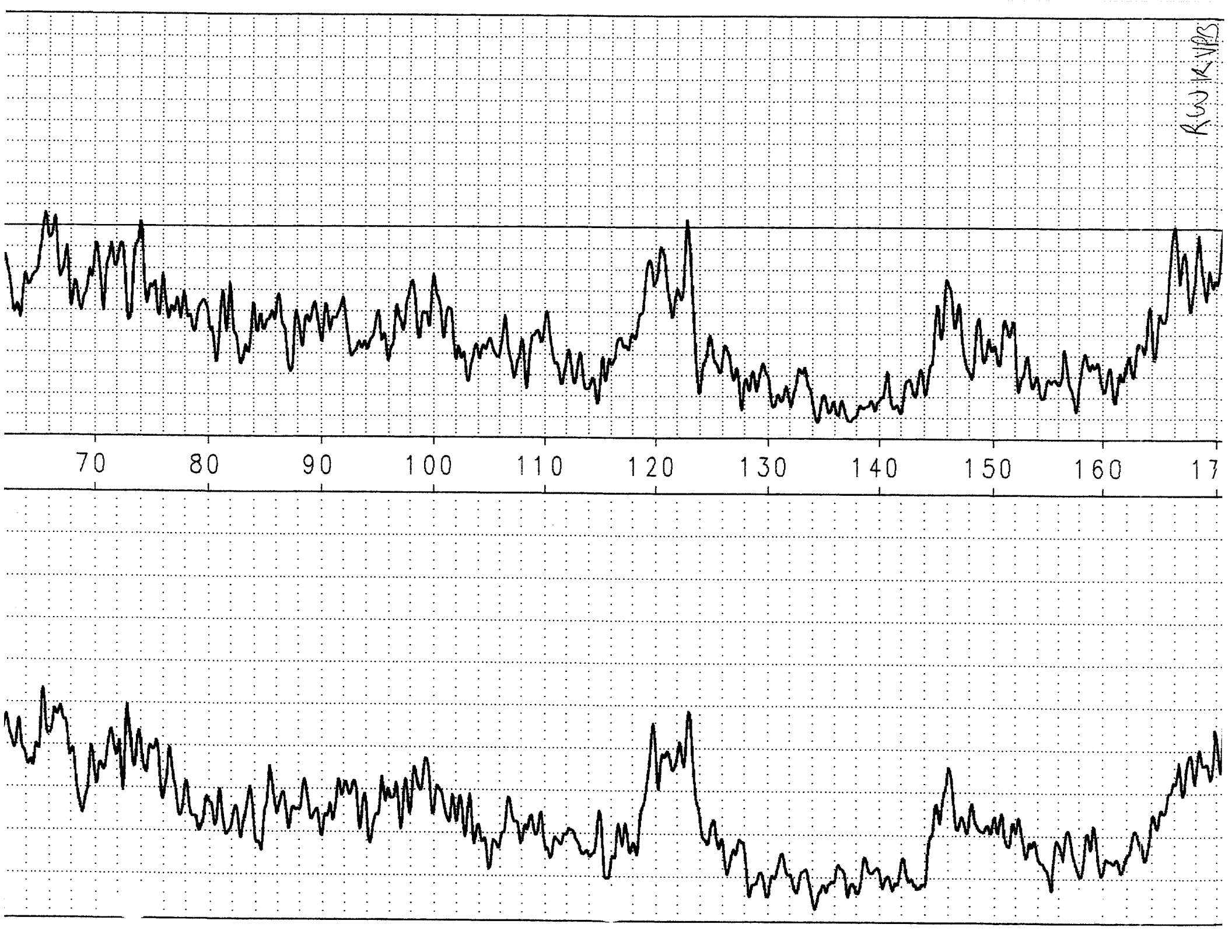
Boring/Well VPB-RW1R

Prepared by J. Bonsteel

From	To	Sample/Core Depth (feet below land surface)	Core Recovery (feet) inches	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description	PID
258	260	24	5,12,15,25	Gray/white fine SAND, dk. brown/red laminations, denser, wet		1.0
260	262	18	19,10,18,30	Gay to Dk. Gray f-m SAND, purple/brown laminations, firm		0.0
262	264	24	22,35,30	Purple/Gray/white/orange layers of f-m SAND, firm, wet		0.9
264	266	4	5,15,19,20	Gray f-m SAND, very wet, soupy		0.0
266	268	24	4,23,27,23	Intermittent layers of Gray/Brn/orange f-m SAND, loose to compact, no odors, sorted		0.0
268	270	24	7,13,17,17	Gay/Tan f-m SAND, layers of orange + purple f-m sand, sorted, compact, wet		0.0

DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 516-981-2255 FAX 516-981-2369

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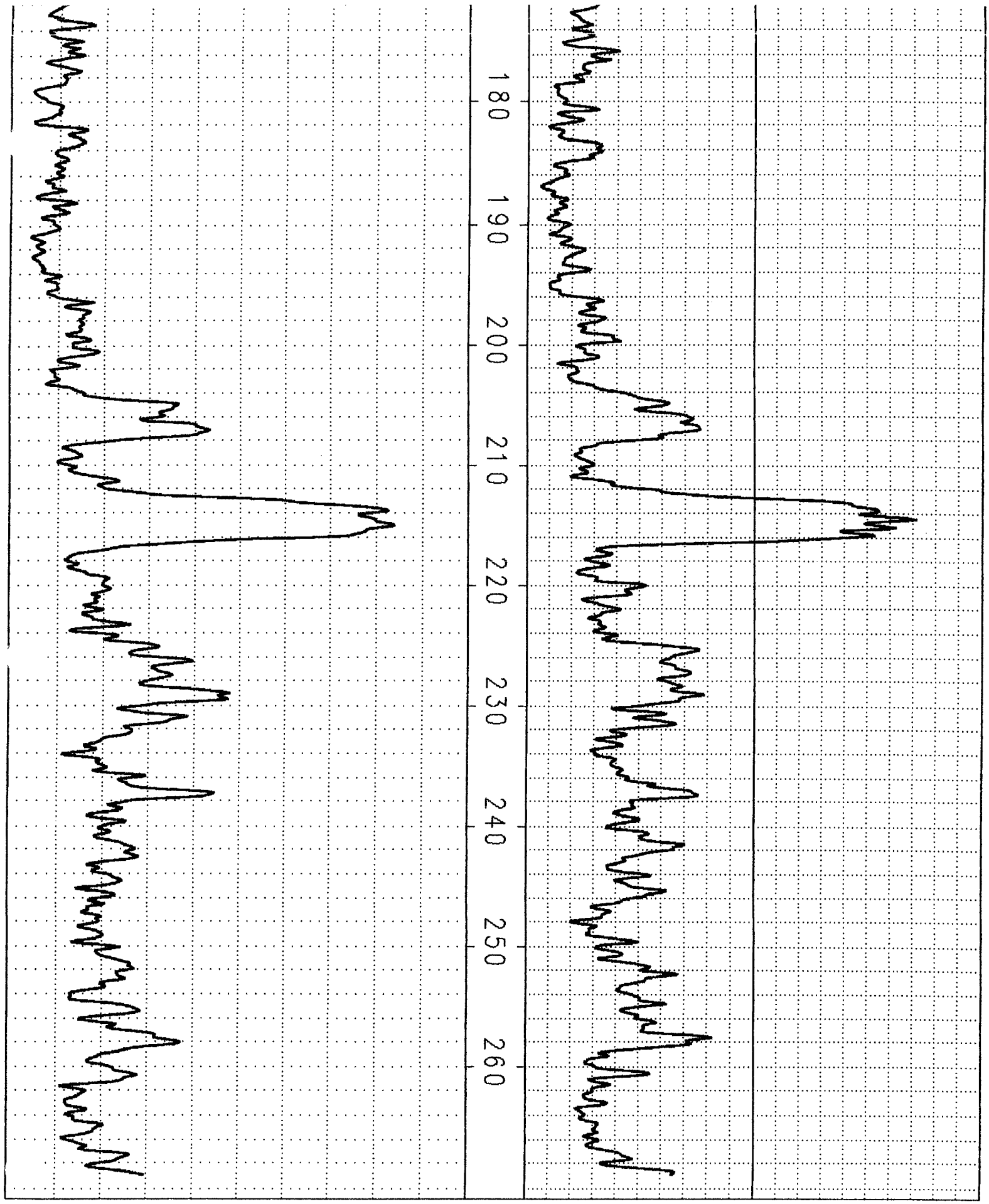

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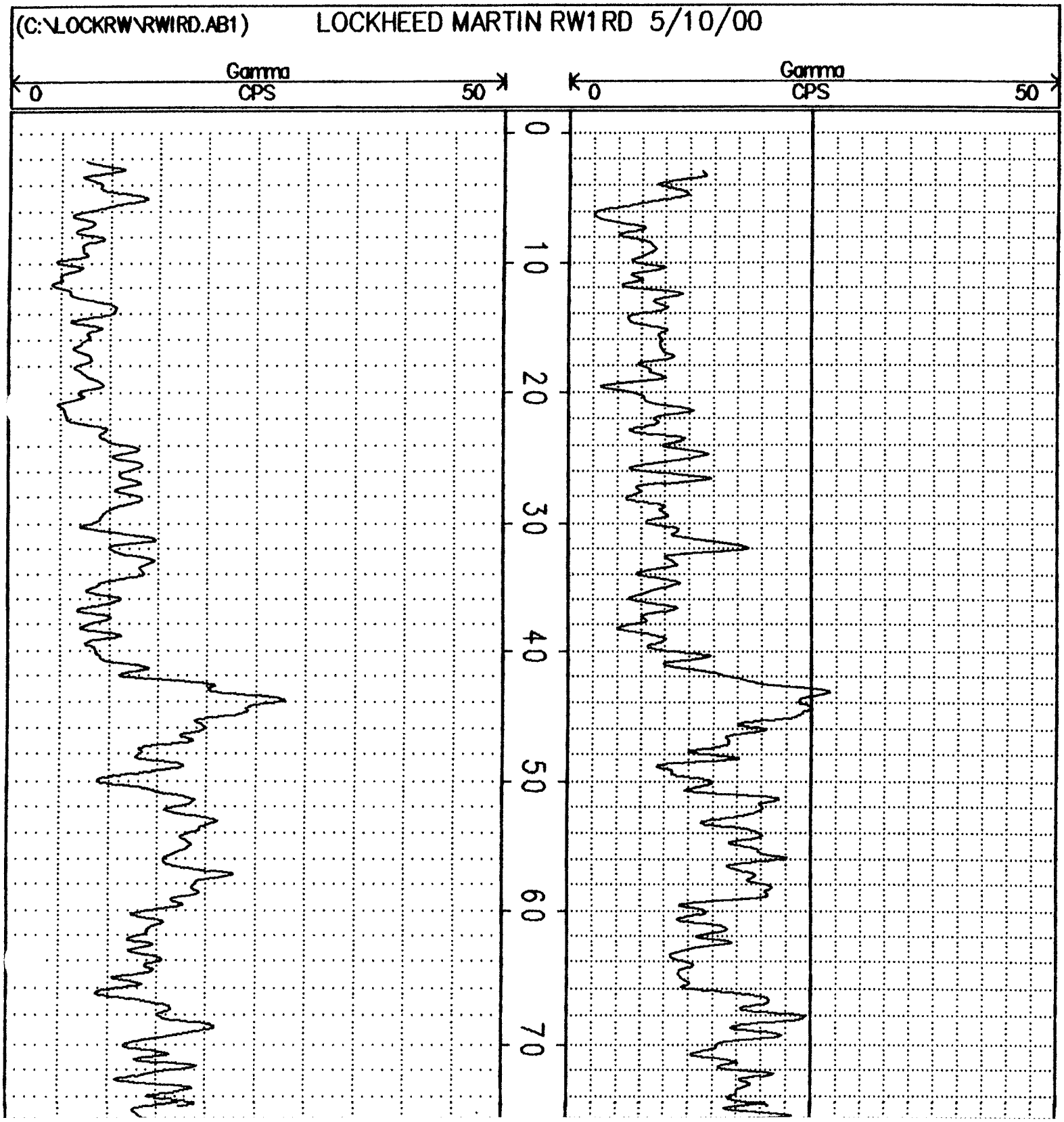
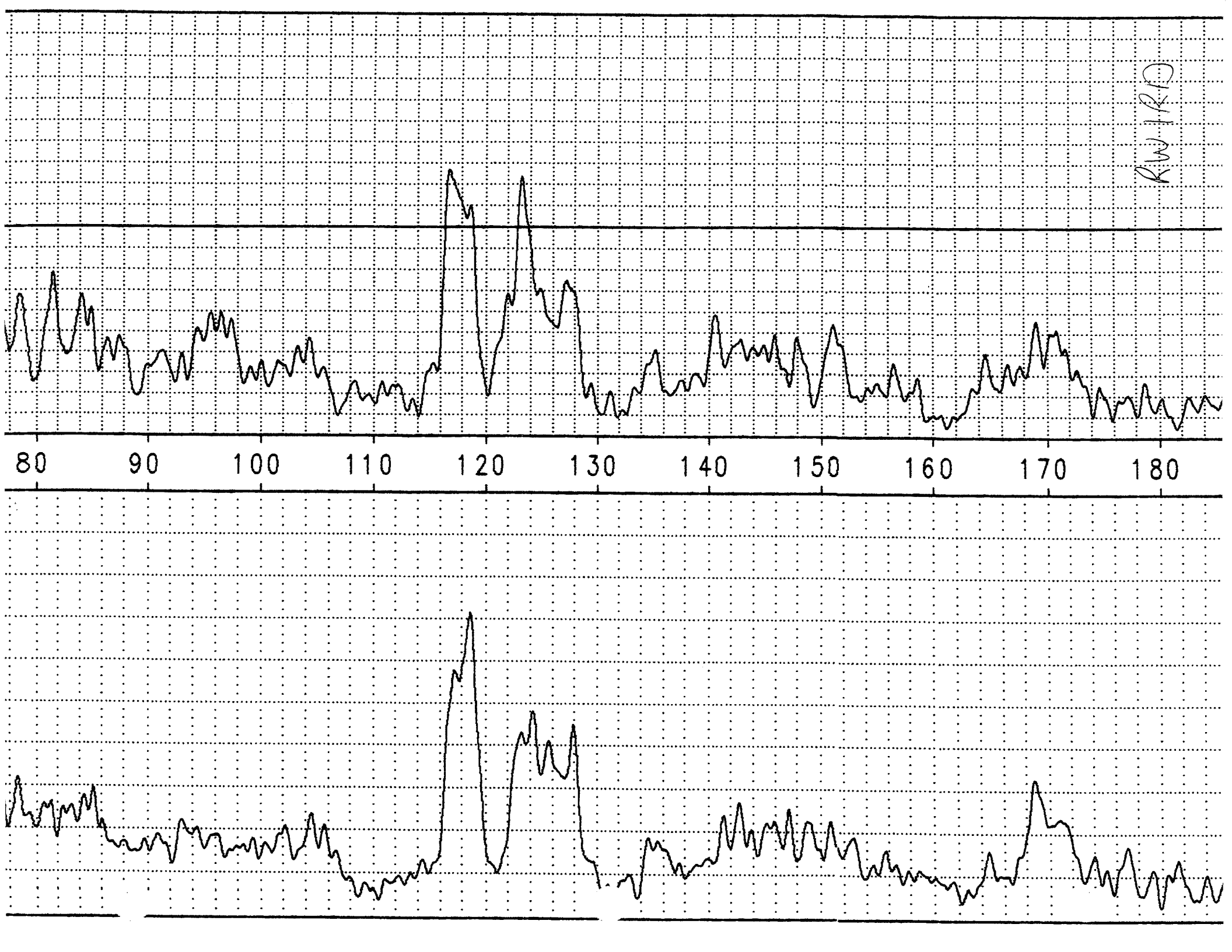
(A:\[redacted]\LMCRW1.AB1) LOCKHEED MARTIN RW1R VPB 12/17/99

DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 631 981-2255 FAX 631 981-2369

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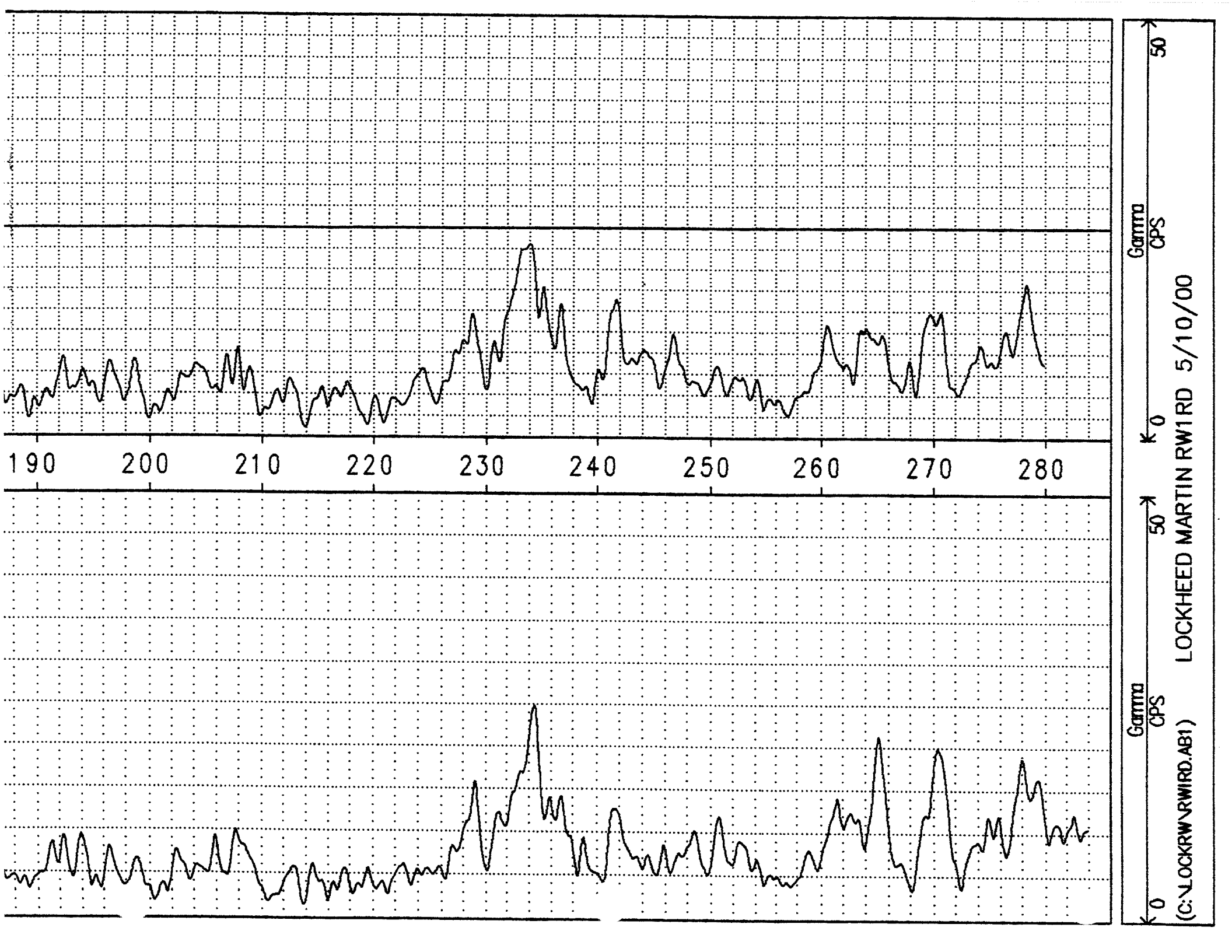
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LOCKHEED MARTIN RW1RD 5/10/00
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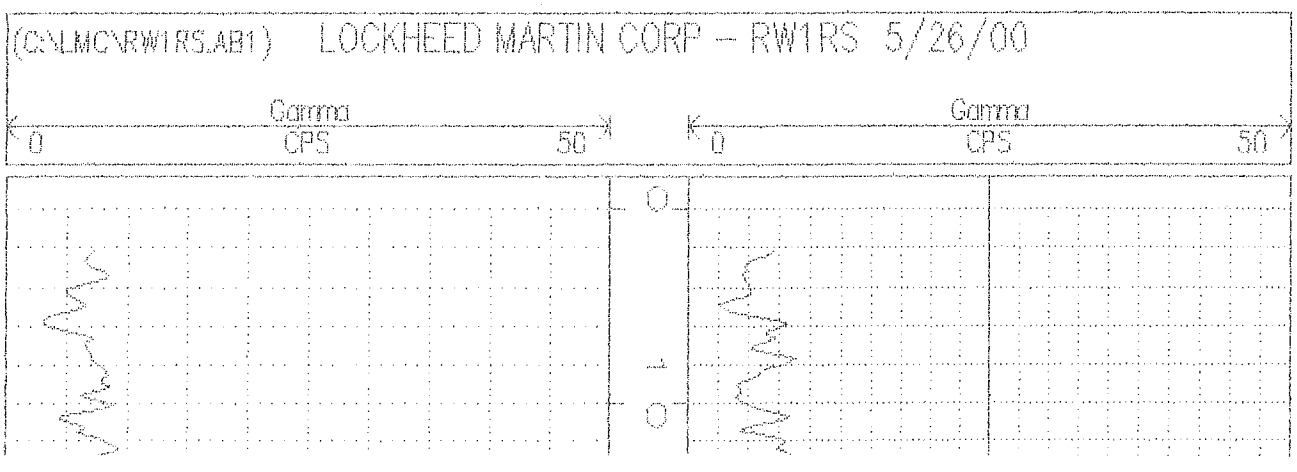
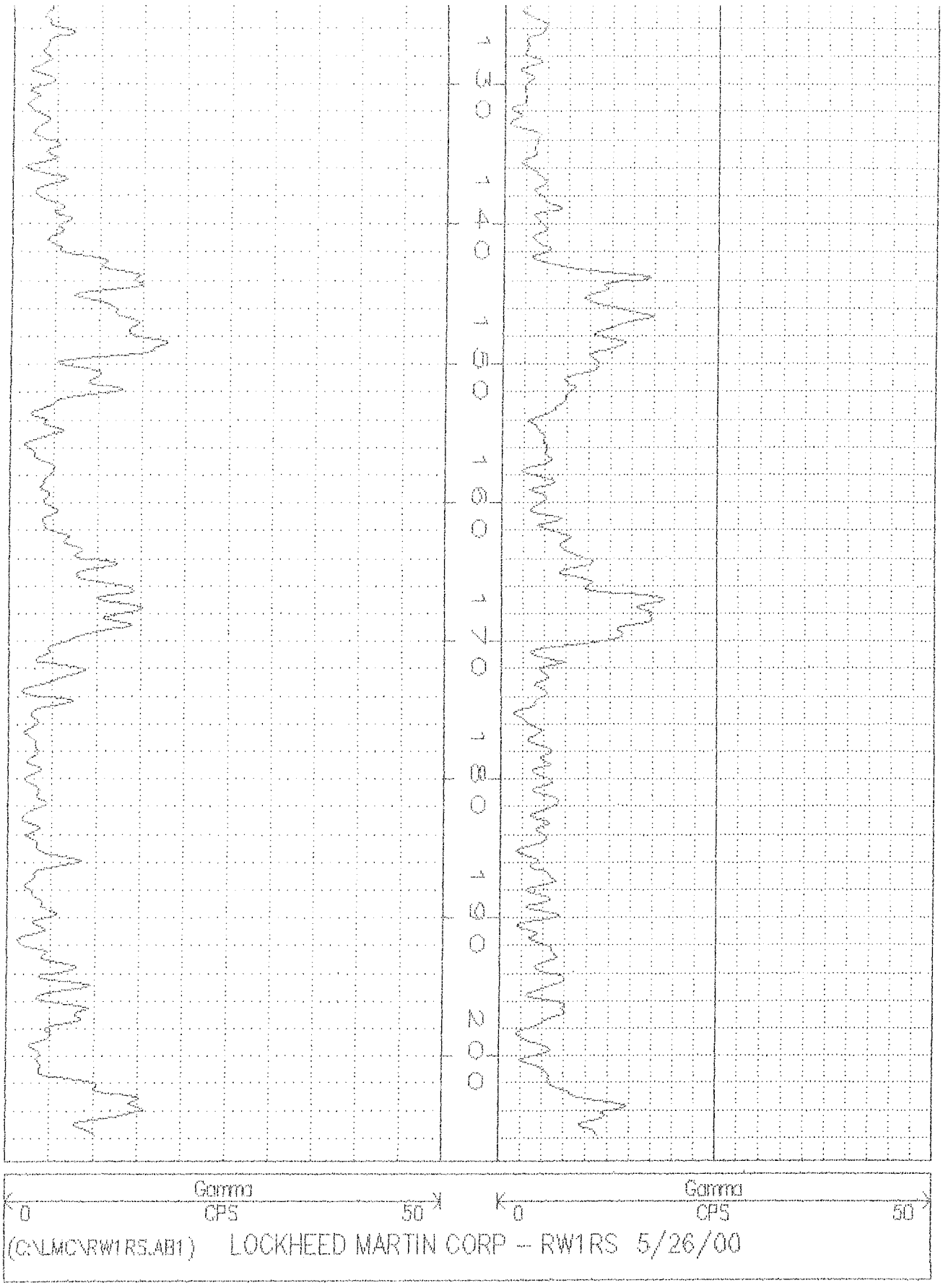
DELTA WELL & PUMP CO., INC.
97 UNION AVE
PO BOX 1309
RONKONKOMA NY 11779
TEL 631 981-2255 FAX 631 981-2369



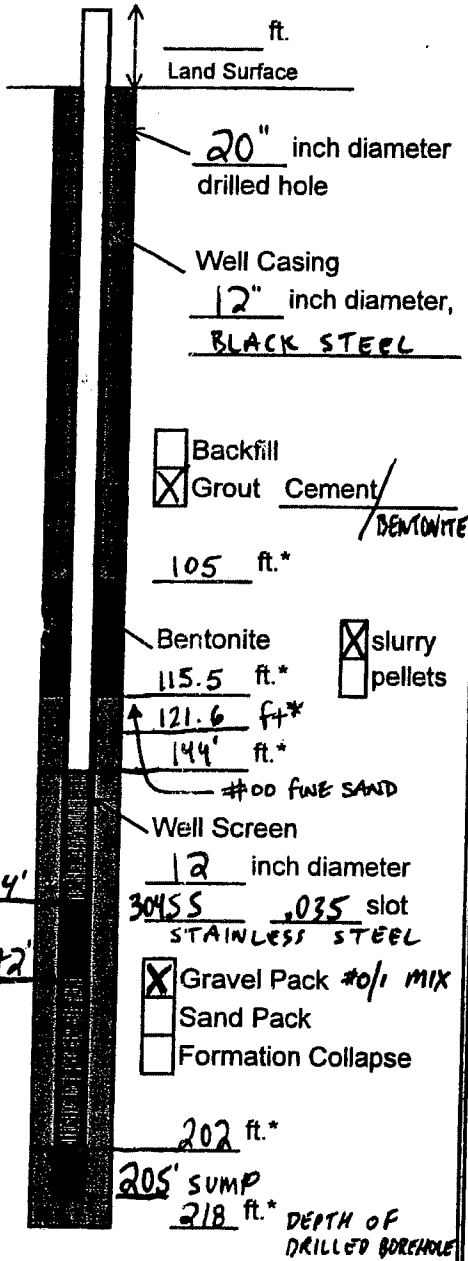
RW-1RS



(C:\LMC\RW1RS.AB1) LOCKHEED MARTIN CORP -- RW1RS 5/26/00

WELL CONSTRUCTION LOG

(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface

Project LOCKHEED MARTIN Well RW-1RS

Town/City GREAT NECK

County NASSAU State NEW YORK

Permit No. N13126

Land-Surface Elevation and Datum _____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/26/00 to 7/10/00

Drilling Method REVERSE ROTARY

Drilling Contractor DELTA WELL AND PUMP CO.

Drilling Fluid WATER (POTABLE)

Development Technique(s) and Date(s)

Fluid Loss During Drilling _____ gallons

Water Removed During Development 925,000 gallons

Static Depth to Water 102.8 feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft.

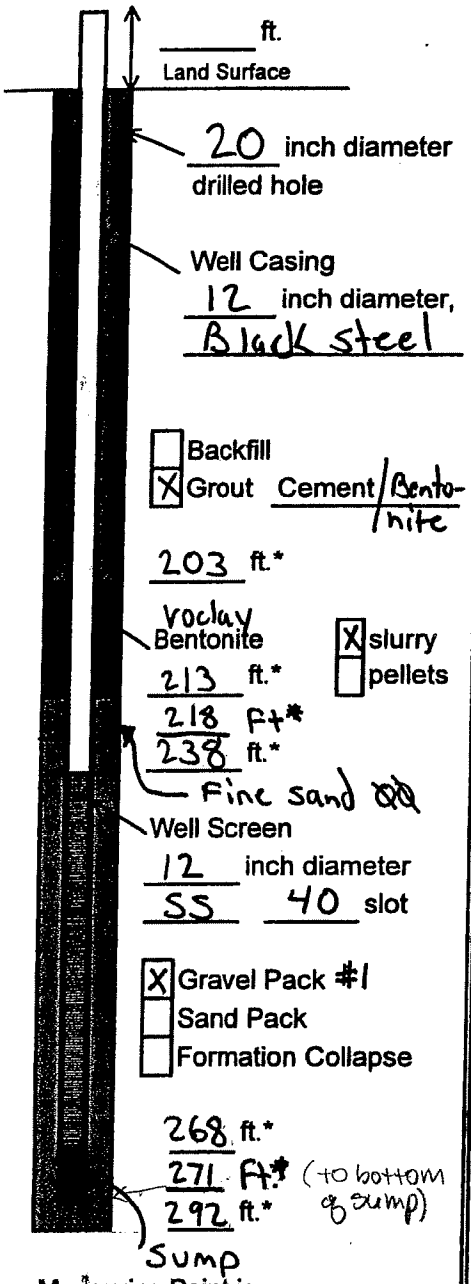
Well Purpose RECOVERY WELL (OU-1)

Remarks

Prepared by C. KEEN / M. ENGELMANN / N. BENOWITZ

WELL CONSTRUCTION LOG

(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

* Depth Below Land Surface

Project Lockheed Martin Well RW-1RD

Town/City Lake Success

County Nassau State NY

Permit No. N-13125

Land-Surface Elevation and Datum _____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) 5/8/00 to 5/13/00

Drilling Method Reverse rotary

Drilling Contractor Delta Well and Pump

Drilling Fluid water (potable)

Development Technique(s) and Date(s)

Fluid Loss During Drilling _____ gallons

Water Removed During Development 475,000 gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft.

Well Purpose OU-1 Recovery Well

Remarks

Prepared by Neil Benowitz / Jeff Bonstee