Report

Operations, Monitoring, & Maintenance Plan Implementation Monitoring Network Installation NYSDEC Site No. 633046 Verona Research Facility Verona, New York

November 2002

Stearns & Wheler
Companies

Operations, Monitoring, & Maintenance Plan Implementation-
Monitoring Network Installation
NYSDEC Site No. 633046
Verona Research Facility
Verona, New York

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Project No. R2122.10

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VERONA RESEARCH FACILITY
OPERATIONS, MONITORING, AND MAINTENANCE PLAN IMPLEMENTATION
MONITORING NETWORK INSTALLATION REPORT

SECTION 1 – INTRODUCTION

This report documents construction activities during implementation of the New York State Department of Environmental Conservation (NYSDEC) approved Operations, Monitoring, and Maintenance (OM&M-Stearns & Wheler, October 2001[Appendix A]) Plan developed for the Rome Laboratory Verona Research Facility (NYSDEC Site ID # 6-33-046). Construction activities included the installation of a monitoring well network for the purposes implementing monitored natural attenuation as a site remedy.

1.1 BACKGROUND

The Rome Laboratory Verona Research Facility (VRF-formerly the Griffiss Air Force Base Verona Test Annex) was established in the early 1950s on 513 acres of former farmland adjacent to Germany Road in the Town of Verona, New York (Figure 1-1 & 1-2). The site consisted of approximately 35 buildings, many of them former electronics laboratories, constructed along a 1-mile long road in the eastern section of the property. The facility was used for electronic research and development since 1952.

The laboratory buildings were heated with individual fuel oil-fired boilers. Each of the boilers was connected to individual fuel oil tanks. As a result of a heating oil replacement project, a groundwater investigation was completed to determine if the previous tanks had leaked (Parsons Engineering Science, 1995). Four groundwater-monitoring wells were installed at each of the several buildings being investigated (Buildings 1203, 1225, 1231, 1245, 1253, and 1277). The wells were installed to monitor the shallow groundwater system in proximity to the tanks.

Groundwater sampling results did not detect the presence of organic compounds associated with fuel oil. However, a number of chlorinated aliphatic compounds were detected which indicated the presence of solvents. Due to the unexpected discovery of

organic compounds not associated with fuel oil, the scope and focus of the investigation was modified to include an interpretation of the chlorinated aliphatic compounds at the site.

In 1996 a Preliminary Site Assessment (PSA) was completed by Stearns & Wheler to investigate the nature and extent of the identified compounds at the VRF. The PSA included the installation of a total of 13 additional groundwater monitoring wells and 3 deep soil borings, at four of the original 6 buildings: 1203, 1231, 1245, and 1253. The new wells were sampled along with the wells previously installed at each of the buildings, to confirm or refute the previous investigation findings.

Groundwater analytical results from the PSA confirmed the presence of chlorinated compounds, including cis-1,2-dischloroethene; trans-1,2-dichloroethene; and tetrachloroethene (PCE) at buildings 1231 and 1253. Groundwater samples from the other two buildings (1203 and 1245) were generally free of these compounds.

The PSA indicated that further assessment was needed at Buildings 1231 and 1253, to determine a proper course of corrective action. Accordingly, a two-year monitoring program was implemented in 1999. The monitoring program included semi-annual sample collection at monitoring wells MW-001 and MW-1231C at Building 1231, monitoring wells MW-002 and MW-004 at Building 1253, and one surface water sample from Brandy Brook, which flows from east to west approximately 120-feet southwest from building 1231. A total of four sampling events were completed over the 2-year period.

The 2-year monitoring program was completed in September 2000. The results of that program, together with data collected from the site since 1996, were reviewed to determine an appropriate groundwater remedy. Because organic compounds were not present in Brandy Brook, it was apparent that impacts from the site were being attenuated before groundwater reached the brook. The groundwater data indicated that the concentrations of chlorinated aliphatic compounds, including PCE, trichloroethene (TCE), and dichloroethene (DCE), were variable over the period, in part due to water table fluctuations. However, the overall pattern in the data indicated that natural attenuation was occurring on site. Lines of evidence included a general decline of the concentrations of the individual compounds, and variation in the ratios of compounds to

their respective degradation by products (e.g. the ratio of TCE to DCE). The data indicated that the compounds were degrading via reductive de-halogenation.

In January 2001 NYSDEC acknowledged their review of the results of the 2-year monitoring program, and indicated that natural attenuation was supported by the analytical data (Appendix B), and monitored natural attenuation was approved as a site remedy. Based on NYSDEC acceptance, Stearns & Wheler developed an OM&M Plan (October 2001) for the implementation of monitored natural attenuation at VRF Buildings 1231 and 1253. The OM&M Plan was accepted by the NYSDEC in a November 20, 2001 letter (Appendix B).

SECTION 2 – SITE CHARACTERISTICS

2.1 – PHYSICAL SETTING

The VRF site is located in the Town of Verona, New York. Site topography is generally flat with an approximate mean elevation of 447 feet above mean sea level.

The VRF site is situated within the Oneida Lake watershed. The majority of surface drainage flows towards Brandy Brook, which passes through the southern section of the site. Brandy Brook drains into Oneida Creek, which in turn drains into Oneida Lake. A small portion of the facility drains into Drum Creek, which is located north of the site. Drum Creek also drains into Oneida Lake, which is approximately 6 miles from the facility.

A soil survey map obtained from the Oneida County office of the US Department of Agriculture Soil Conservation Service indicates that the Verona site soils are primarily Rhinebeck, Canandaigua, Niagara, Collamer, Arkport, Appleton, Palms Muck, and Minoa series.

2.2 - SITE GEOLOGY

The VRF lies on lacustrine silt and clay deposits. This type of sediment is deposited in proglacial lakes during glacial retreat. Soil encountered during well installations was a mixture of silt and fine-grained sand. Glacial till was encountered between approximately 15 and 27 feet deep in soil borings that were advanced during the PSA.

The till was determined to be a confining unit (PSA, Stearns & Wheler, 1997). Site stratigraphy is generally described as clay overlaying silt, which is underlain by the dense glacial till layer.

SECTION 3 – SCOPE OF WORK

Field activities completed at the VRF site to establish a monitoring network were in accordance with the approved OM&M Plan, and included:

1. Installing and developing of ten (10) monitoring wells at VRF buildings 1231 and 1253,
2. In-situ permeability tests performed by the rising head method at 10 newly installed monitoring wells and pre-existing well MW-1231C,
3. Decommission five monitoring wells present at buildings 1245 and 1253 that will not be utilized in monitoring natural attenuation, and
4. Complete a site survey that makes the Building 1231 and 1253 remedial areas two parcels separate from the rest of the VRF facility.

Wells to be utilized for natural attenuation monitoring were placed at buildings 1231 and 1253 according to the following criteria:

1. One well was installed within the source area of the plume.
2. One well was installed downgradient of the source area, but still within the plume.
3. One well was installed at the fringe of the plume, defined as where impacts are below standards, criteria, or guidance (SCGs).
4. One monitoring well was installed downgradient, as a "sentinel" well beyond the impacted groundwater zone.
5. One well was installed downgradient of the source along the centerline of the plume.

3.1 – MONITORING NETWORK

3.1.1 Monitoring Well Installation

Soil borings were completed between April 15 and April 23, 2002 by advancing 4¼ -inch diameter hollow stem augers (HSA) to a depth of 10 to 14 feet below ground surface (bgs). Soil samples were collected continuously using 2-inch stainless steel split-spoon sampling device driven by a 140-pound hammer. Samples were screened for volatile organic vapors using a photo-ionization detector (PID). Soil descriptions and observations were logged by a field hydrogeologist. Upon boring completion, a 2-inch diameter continuous-wrap schedule 40 PVC well screen (0.020 inch slot size) was placed in the borehole. As the augers were withdrawn, a #0 size sand filter pack was placed in the annular space between the boring wall and the well screen. The sand pack was extended one-foot above the top of the well screen. A two-foot bentonite seal was placed above the sand pack to prevent the downward migration of materials. Each well was finished with a protective steel casing and secured with locking covers. Well specific construction diagrams are presented in Appendix C.

3.1.2 Building 1231 Monitoring Network

Figure 3.1 illustrates the locations of the groundwater-monitoring wells at building 1231. Five (5) wells were constructed in a similar manner as discussed above. Well construction diagrams can be found in Appendix C.

MW-1231C (Existing): This well was installed near the upgradient edge of the plume. Well MW-1231C was installed in October 1996 (Stearns & Wheler, 1997) and is screened from 5- to 15-feet deep. The well construction log for MW-1231C is located in Appendix D.

MW-1231E, MW-1231F: These two wells were constructed within and close to the center of the plume. MW-1231E was screened from 4- to 11-feet bgs and MW-1231F was screened from MW-1231F.

MW-1231G: This well was constructed in the centerline of the plume between the source (MW1231F) and the sentinel well (MW1231H) to monitor the fringe of the plume. MW-1231G was screened from 4- to 11-feet bgs.

MW-1231H: This sentinel well was installed approximately 100-feet downgradient in an area unaffected by the plume. Monitoring well MW-1231H is screened from 4- to 10-feet bgs.

MW-1231I: This well was installed upgradient of the source area to monitor ambient groundwater conditions to aid in assessing natural attenuation. Well MW-1231I was screened from 4- to 12-feet bgs.

3.1.3 Building 1253 Monitoring Network

Figure 3.2 illustrates the groundwater-monitoring network at Building 1253. Five (5) wells were constructed at depths of 11 – 14 feet bgs in lacustrine silt and clay (See well construction diagrams in Appendix C).

MW-1253H, MW-1253I: These two wells were installed within and near the centerline of the plume. Both wells were screened from 4- to 14-feet bgs.

MW-1253E: This well was installed along the centerline of the plume midway between the source (MW-1253I) and the guardian well (MW-1253F) to monitor the downgradient fringe of the plume. The screened interval of MW-1253E was placed from 4- to 12-feet bgs.

MW-1253F: This well was placed approximately 100ft downgradient as a sentinel well. Well MW-1252F was screened from 4 to 12-feet bgs.

MW-1253G): This well was installed upgradient of the source area to monitor ambient groundwater conditions to aid in assessing natural attenuation. MW-1253G was screened from 4 to 11-feet bgs.

3.1.4 Surface Water

Three surface water-sampling locations were established along Brandy Brook, which is located south of building 1231. Each location is accessible from the north bank of the brook and is marked with pink flagging (see Figure 3-3).

SW–1 is the up-stream sampling location and is approximately 400 feet west of Germany Road.

SW-2 is adjacent to building 1231 and is located southeast of building 1231.

SW-3 is the downstream surface water sampling location and is located south of the west-access road turn around. It is located to the southwest of building 1231.

3.2 – MONITORING WELL DECOMMISSIONING

Prior to commencing field work, a site reconnaissance was completed to identify existing monitoring wells that would not be utilized for natural attenuation monitoring and consequently were no longer needed. Two monitoring wells were identified at building 1245 and three monitoring wells were identified at building 1253.

The two monitoring wells decommissioned at building 1245 were MW-1245A and MW–1245B and consisted as 2-inch diameter PVC wells. The three wells decommissioned at

building 1253 included a 4-inch PVC monitoring well located in gravel fill near a former UST, and two 2-inch PVC monitoring wells (MW-2 and MW-4).

The five wells were decommissioned by the casing pulling method, as described in NYSDEC Division of Remediation guidance, *Groundwater Monitoring Well Decommissioning Procedures* (October 1996). The well casings were pulled and bentonite/portland cement slurry was placed in the boring using a tremmie pipe, effectively sealing off the boring from the rest of the formation. Well Decommissioning logs are provided in Appendix E.

3.3 – WELL DEVELOPMENT

Following installation, monitoring wells were developed to reduce turbidity. A minimum of 10 volumes of water were either pumped or bailed from each well to remove fine-grained material from the well screen and sand pack.

3.4 – SLUG TESTS

Slug tests were performed at each well using the rising head method. Data loggers were deployed in the well, and a bailer of water was with-drawn from the water column. The data loggers recorded changes in water level over time. This data was analyzed using Aquifer Test 3.01 to determine the hydraulic conductivity of the formation.

3.5 – SITE SURVEY

Upon completion of the well installation, Bryant Associates, P.C. was retained, and completed a field survey. A base map (Figure 1-3) showing site features and monitoring well locations was prepared. In addition, right-of-ways and property corners were set for both building areas (1231 and 1253) under remediation. Topographic limits were set at 250'± x 250'±, and 250'± x 325'±, respectively.

All visible topographic features within the parcels were located and mapped. Property corners were located and established with iron pipe as permanent markers. Spot elevations were taken on a 50'± grid. All monitoring wells in this study were located and elevations were taken at top of the PVC casing for mapping the groundwater gradient. Monitoring well elevations are provided in Table 1.

A stamped site drawing and legal descriptions for both the building a231 and 1253 parcels can be found in Appendix F.

SECTION 4 – SLUG TEST RESULTS

As described in Section 3.4, slug tests were performed in each newly installed monitoring well and well MW-1231**C**. Results of the slug test analyses can be found in Appendix G and summarized in Table 1. The hydraulic conductivity values (Table 1) obtained ranged from 0.227- feet per day (0.0000801 cm/sec.) to 219-feet per day (0.0775 cm/sec.). The geometric mean hydraulic conductivity obtained for the site is 1.77-feet per day (0.0006256 cm/sec.). Based on this hydraulic conductivity, the hydraulic gradient, and assuming a porosity of 30-percent, the estimated average seepage velocity is approximately 0.035-feet per day as determined by the following equation:

$$v = KI / n$$

where:

v = seepage velocity
K = hydraulic conductivity
I = hydraulic gradient
n = effective porosity

Based on this seepage velocity a molecule of water could travel approximately 12-feet in one year, or the distance between well MW-1231E (source well) and MW-1231H (sentinel well) in approximately ten years.

SECTION 5 – CONCLUSIONS

The natural attenuation monitoring network, as required by the approved OM&M Plan for VRF buildings 1231 and 1253, has been installed. Natural attenuation monitoring began in May 2002 and will continue for the two-year period prescribed in the OM&M Plan. At that time, the monitoring results will be reviewed and the monitoring program reevaluated.

SECTION 6 – REFERENCES

Parsons Engineering Science, 1995, *Investigation and Test Report for Underground Storage Tanks (UST's) At Four Off Base Test Annexes, Grifiss AFB, NY, Parsons Engineering Science, Liverpool, NY, September 1995.*

S&W, 2001. *Operations, Monitoring, & Maintenance Plan, Buildings 1231 & 1253, NYSDEC Site #633046, Verona Research Facility, Verona, New York.* S&W Redevelopment, LLC, Cazenovia, NY. October, 2001.

S&W, 1997. *Preliminary Site Assessment, Verona Research Facility, Town of Verona, New York.* Stearns & Wheler, LLC, Cazenovia, NY. February, 1997.

TABLES

TABLE 1

Verona Research Facility

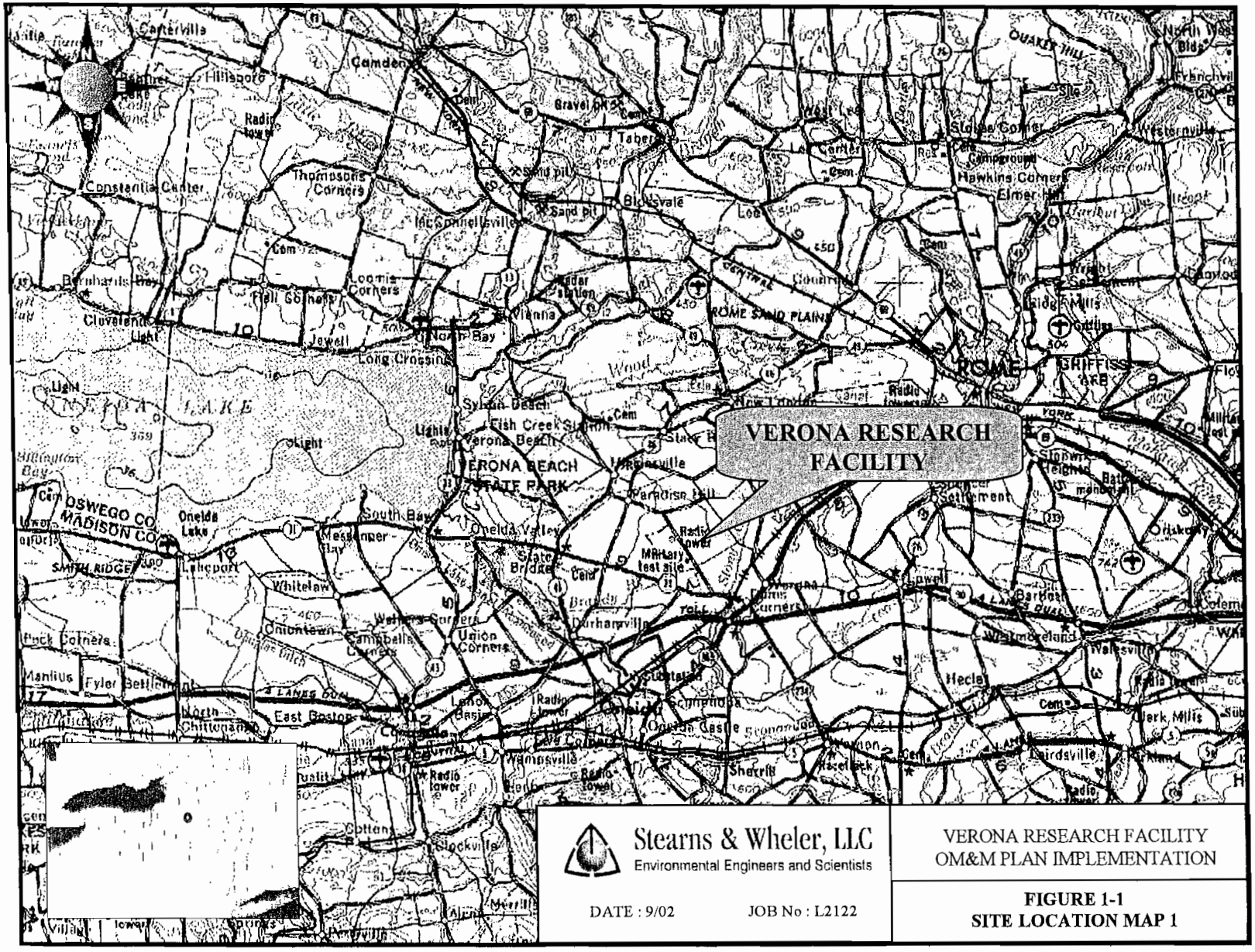
OM&M Plan Implementation

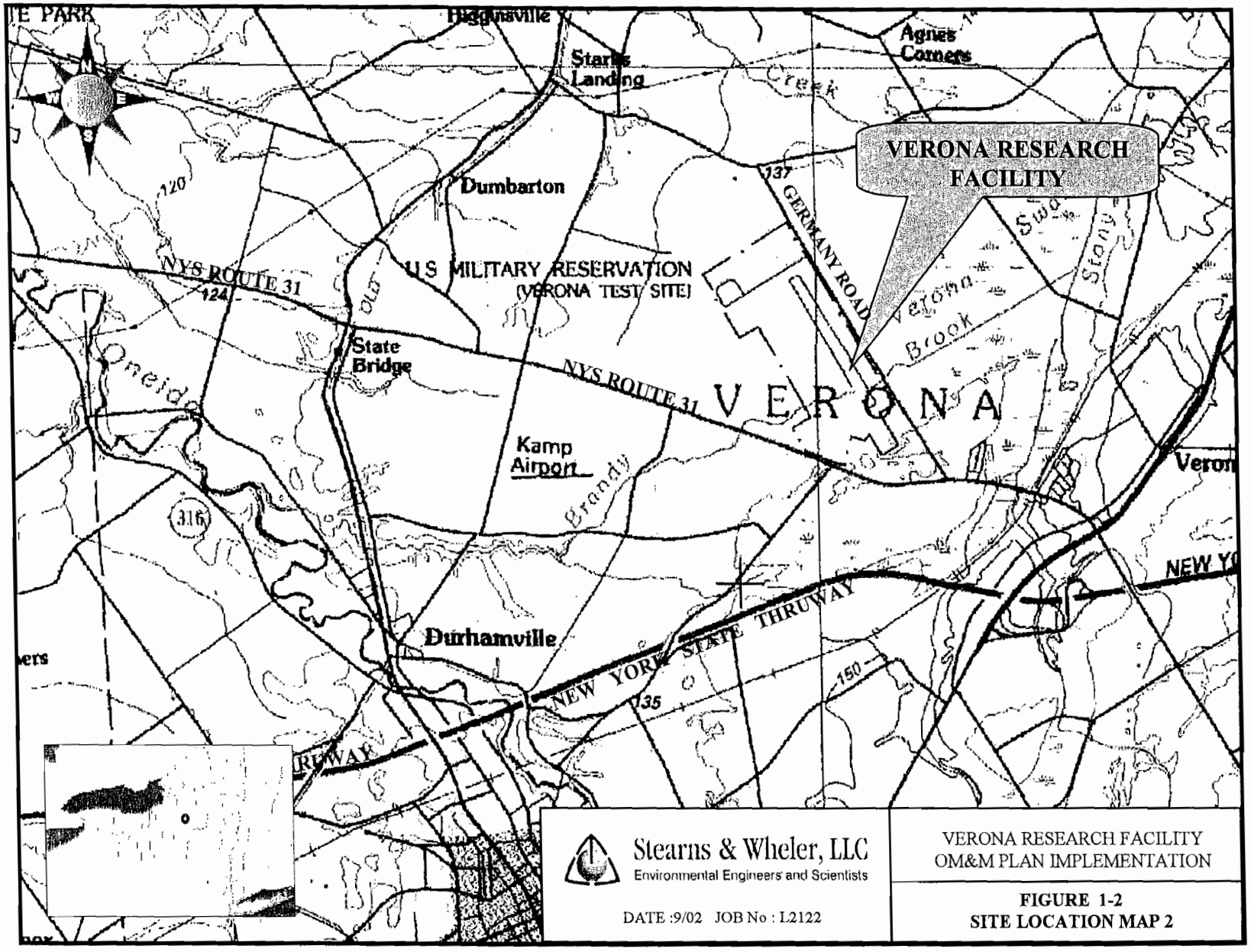
Monitoring Network Installation Documentation Report

Well ID	Ground Elevation (ft)	Reference Point	Reference Elev. (ft)	Depth to Water (ft)	Water Elevevation (ft)	Total Depth of Well (ft)	Screen Elevation (ft.)	Hydraulic Conductivity (cm/sec.)	Hydraulic Conductivity (ft./sec.)	Hydraulic Conductivity (ft./day)	Seepage Velocity
MW-1231C	444.10	Top of PVC	446.64	4.31	442.33	15	429.10	3.70E-03	1.21E-04	10.488	0.210
MW-1231E	443.36	Top of PVC	445.71	3.43	442.28	12	431.36	8.01E-05	2.63E-06	0.227	0.005
MW-1231F	443.61	Top of PVC	445.9	3.68	442.22	12	431.61	1.89E-04	6.20E-06	0.536	0.011
MW-1231G	442.93	Top of PVC	444.43	2.96	441.47	11	431.93	2.23E-03	7.32E-05	6.321	0.126
MW-1231H	442.10	Top of PVC	444.64	2.39	442.25	10	432.10	7.75E-02	2.54E-03	219.685	4.394
MW-12311	442.90	Top of PVC	444.52	2.20	442.32	12	430.90	1.53E-04	5.02E-06	0.434	0.009
MW-1253E	445.57	Top of PVC	448.36	3.34	445.02	12	433.57	1.49E-04	4.89E-06	0.422	0.008
MW-1253F	445.89	Top of PVC	447.76	3.04	444.72	12	433.89	1.43E-04	4.69E-06	0.405	0.008
MW-1253G	445.42	Top of PVC	448.01	2.79	445.22	11	434.42	5.19E-04	1.70E-05	1.471	0.029
MW-1253H	446.58	Top of PVC	448.89	3.54	445.35	14	432.58	8.35E-04	2.74E-05	2.367	0.047
MW-12531	446.58	Top of PVC	448.92	3.71	445.21	14	432.58	4.20E-04	1.38E-05	1.191	0.024
							* Mean Hydraullic Conductivity	6.256E-04	2.052E-05	1.77	
							Average Seepage Velocity:	1.251E-05	4.105E-07	0.035	

* Geometric Mean Hydraulic Conductivity.

FIGURES


VERONA RESEARCH FACILITY
VERONA BEACH STATE PARK
ROME
ROME SAND PLAINS
ONEIDA LAKE
OSWEGO CO
MADISON CO
Stearns & Wheler, LLC
Environmental Engineers and Scientists
DATE : 9/02
JOB No : L2122
VERONA RESEARCH FACILITY
OM&M PLAN IMPLEMENTATION
FIGURE 1-1
SITE LOCATION MAP 1

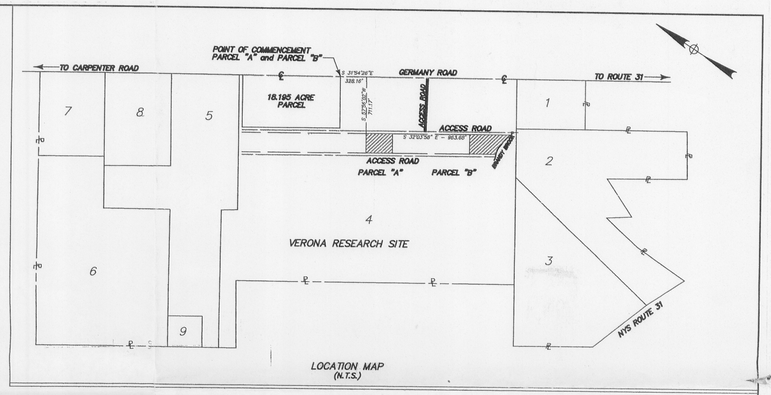


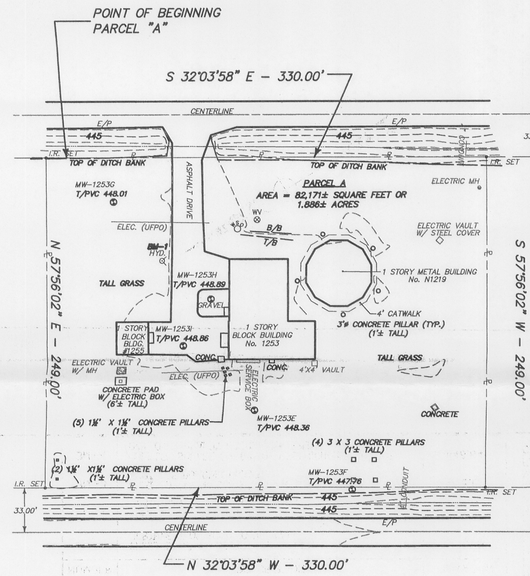
Stearns & Wheler, LLC
Environmental Engineers and Scientists

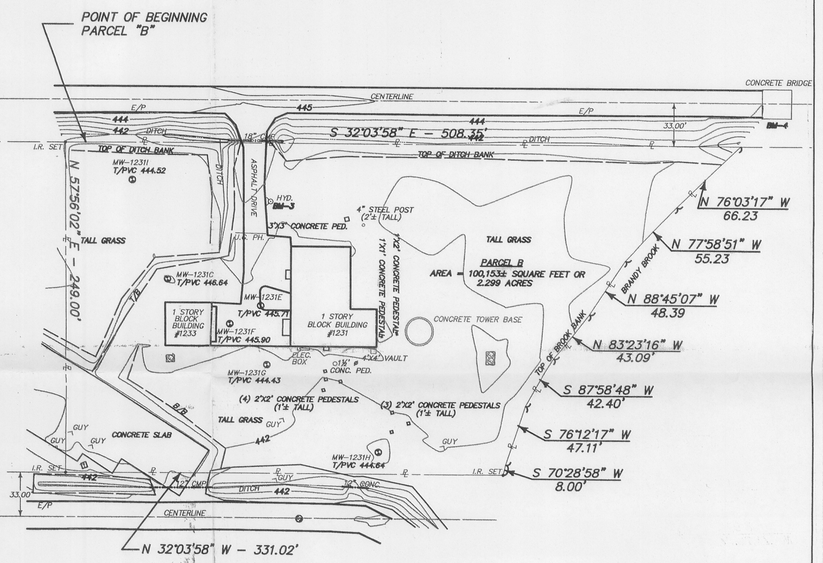
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VERONA RESEARCH FACILITY
OM&M PLAN IMPLEMENTATION

FIGURE 1-2
SITE LOCATION MAP 2







PARCEL "A"
MONITORING WELL ELEVATIONS

NUMBER	GROUND	T/ PVC
MW-1253E	445.57	448.36
MW-1253F	445.89	447.76
MW-1253G	445.42	448.01
MW-1253H	446.58	448.89
MW-1253I	446.58	448.92

PARCEL "B"
MONITORING WELL ELEVATIONS

NUMBER	GROUND	T/ PVC
MW-1231C	444.10	446.64
MW-1231E	443.36	445.71
MW-1231F	443.61	445.90
MW-1231G	442.93	444.43
MW-1231H	442.10	444.64
MW-1231I	442.90	444.52

BENCHMARK LIST

NUMBER	DESCRIPTION	ELEVATION
BM-1	CHISELED "X" ON SOUTH NUT ON HYDRANT 50'± NORTHWEST OF BUILDING No. 1253.	447.88
BM-2	CHISELED "X" ON SOUTH NUT ON HYDRANT 50'± NORTHWEST OF BUILDING No. 1245.	448.33
BM-3	CHISELED "X" ON SOUTH NUT ON HYDRANT 40'± NORTH OF BUILDING No.1231.	445.01
BM-4	CHISELED SQUARE ON TOP OF WEST CONCRETE BRIDGE RAIL OVER BRANDY BROOK (CENTERLINE ± OF CREEK).	446.64

UTILITY NOTE
EXISTING UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE PLANS, RECORDS AND SURVEYS. THEIR LOCATION MUST THEREFORE BE CONSIDERED APPROXIMATE AND NO GUARANTEE IS MADE BY BRYANT ASSOCIATES, P.C. TO THE HORIZONTAL OR VERTICAL LOCATION OF SUCH FACILITIES, STRUCTURES AND UTILITIES. THERE MAY BE OTHERS, THE EXISTENCE OF WHICH IS PRESENTLY UNKNOWN. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL FACILITIES, STRUCTURES AND UTILITIES IN THE FIELD PRIOR TO COMMENCING WORK.

NOTES:

1) BOUNDARY AND TOPOGRAPHIC SURVEY PERFORMED BY BRYANT ASSOCIATES, P.C. JUNE 26–28, 2002.
2) IRON RODS WITH YELLOW CAPS SET JULY 5, 2002.
3) ONLY VISIBLE TOPOGRAPHIC FEATURES AND UTILITIES ARE SHOWN.
4) HORIZONTAL DATUM FROM MAP ENTITLED "PROPERTY SURVEY SPACE COMMAND FACILITY VERONA, AFRL–VERONA RESEARCH SITE" BY LAFAVE, WHITE, & McGIVERN DATED DEC. 17, 1998.
5) VERTICAL DATUM BASED ON INFORMATION SUPPLIED BY OTHERS (FINISHED FLOOR OF BUILDING No. 1253 – 446.79').

SCALE IN FEET
30 0 15 30 60 120

SURVEY BY OTHERS

Unathorized alteration or addition to a survey map bearing a licensed land surveyor's seal is a violation of section 7209, sub–division 2, of the New York State Education Law. Only copies from the original of this survey marked with an original of the land surveyor's embossed seal shall be considered to be valid true copies.

THOMAS W. BOCK, P.E., L.S.
PLS LICENSE No. 049212
FOR BRYANT ASSOCIATES, P.C.

BRYANT ASSOCIATES, P.C.
Engineers – Surveyors
SYRACUSE EAST AURORA

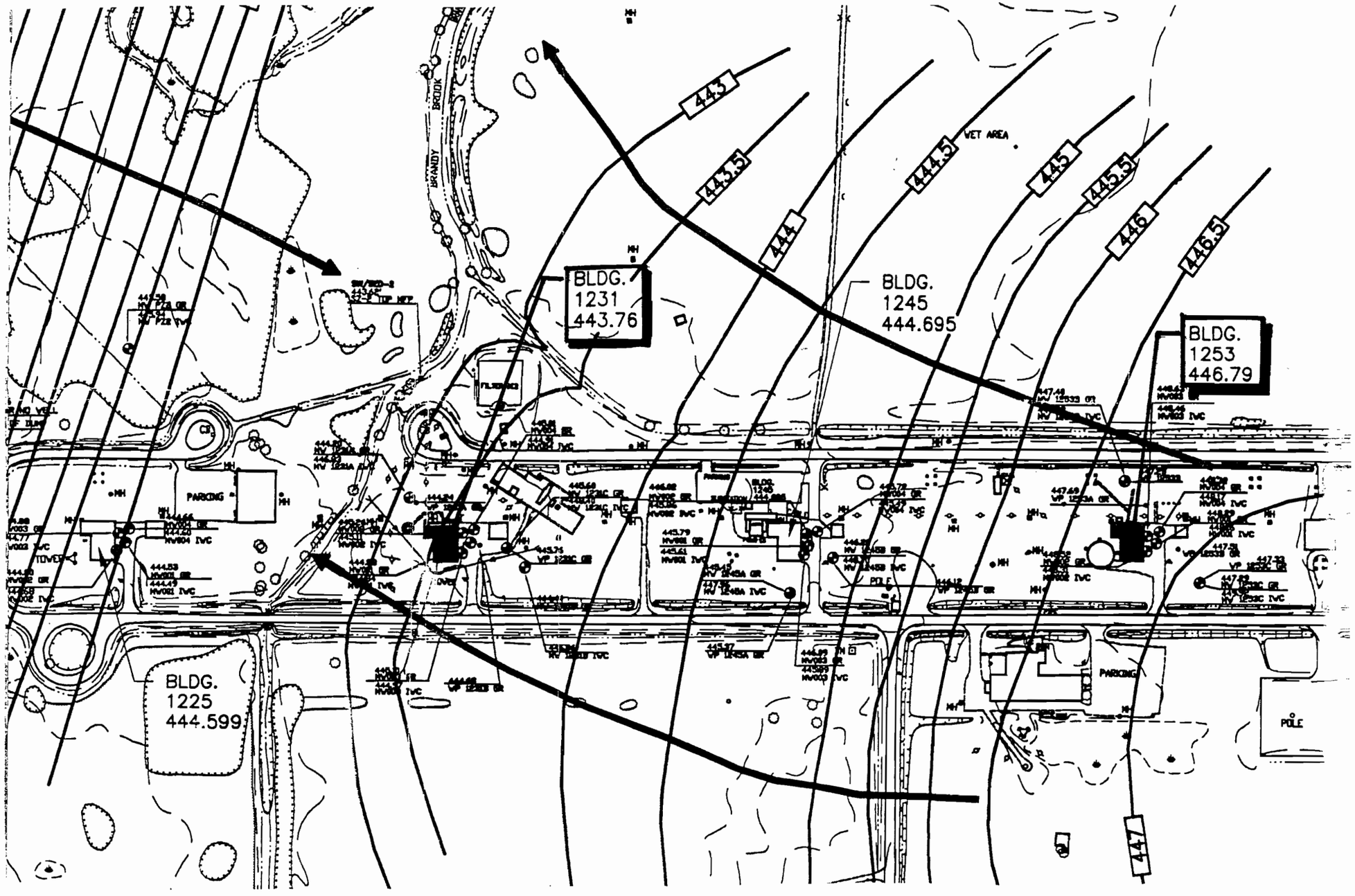
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CAZENOVIA, NEW YORK

DATE: 09/02 JOB No.:20122.10

VERONA RESEARCH FACILITY
OM&M PLAN

FIGURE 1.3
SITE SURVEY MAP

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Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: June 2001 JOB No: L10105

VERONA RESEARCH FACILITY
OM&M PLAN
BUILDINGS 1231 AND 1253

FIGURE 2-1
SHALLOW GROUNDWATER CONTOURS

From Oct. 2001 manual

CONCRETE BRIDGE

BM-4

I.R. SET

MW-1231I
T/PVC 444.52

HYD.
BM-3

MW-1231C
T/PVC 446.64

MW-1231E
T/PVC 445.71

1 STORY
BLOCK
BUILDING
#1233

MW-1231F
T/PVC 445.90

1 STORY
BLOCK BUILDING
#1231

CONCRETE TOWER BASE

PARCEL B
AREA = 100,153± SQUARE FEET OR
2.299 ACRES

MW-1231G
T/PVC 444.43

MW-1231H
T/PVC 444.64

I.R. SET

I.R. SET

1"=40'-0"

40 0 40 80

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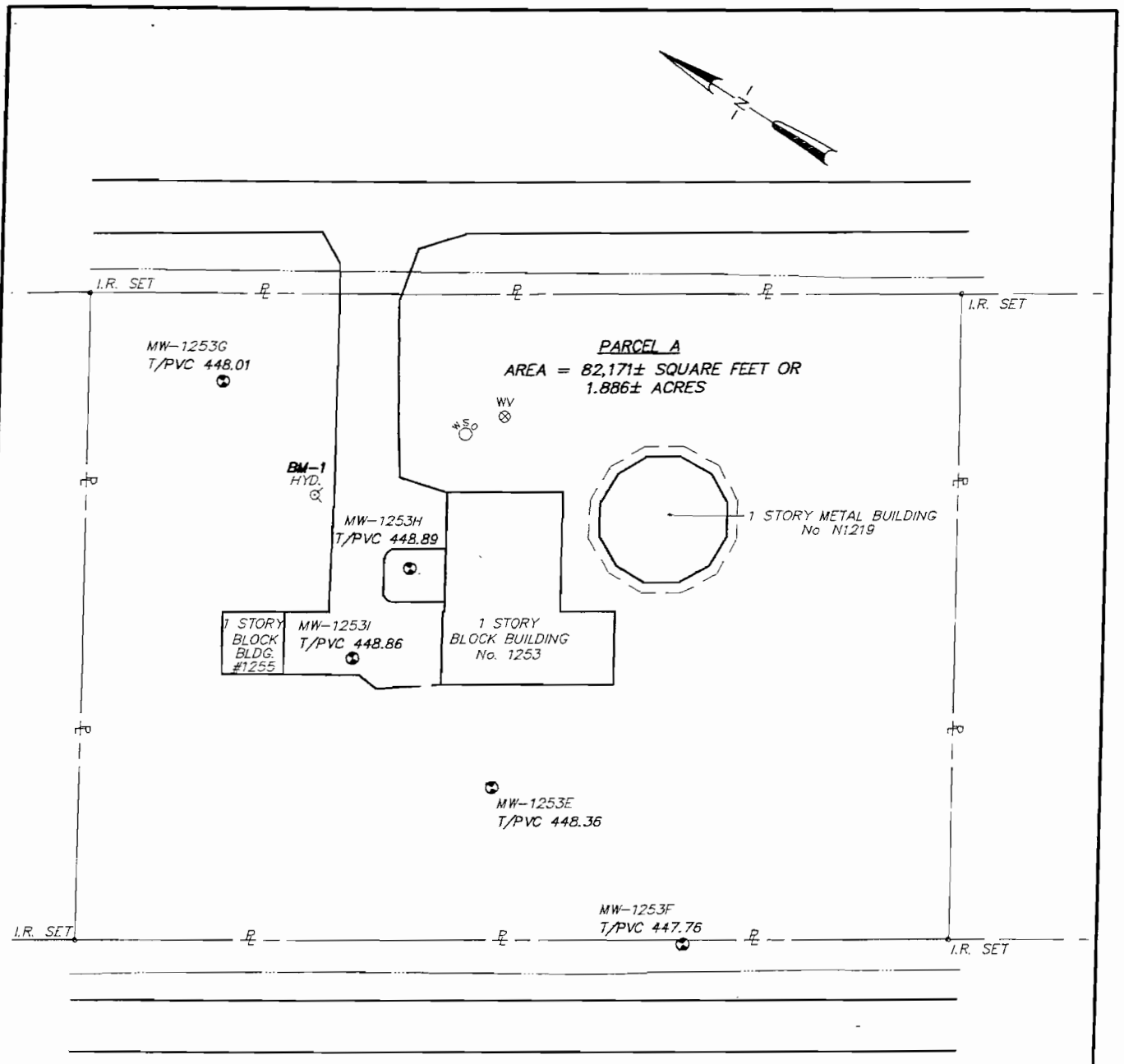
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DATE: 09/02 JOB No.: 20122.10

VERONA RESEARCH FACILITY
OM&M PLAN IMPLEMENTATION
BUILDING 1231

FIGURE 3-1
BUILDING 1231 MONITORING NETWORK



60 0 60 120

1"=60'-0"

Stearns & Wheler, LLC
Environmental Engineers and Scientists

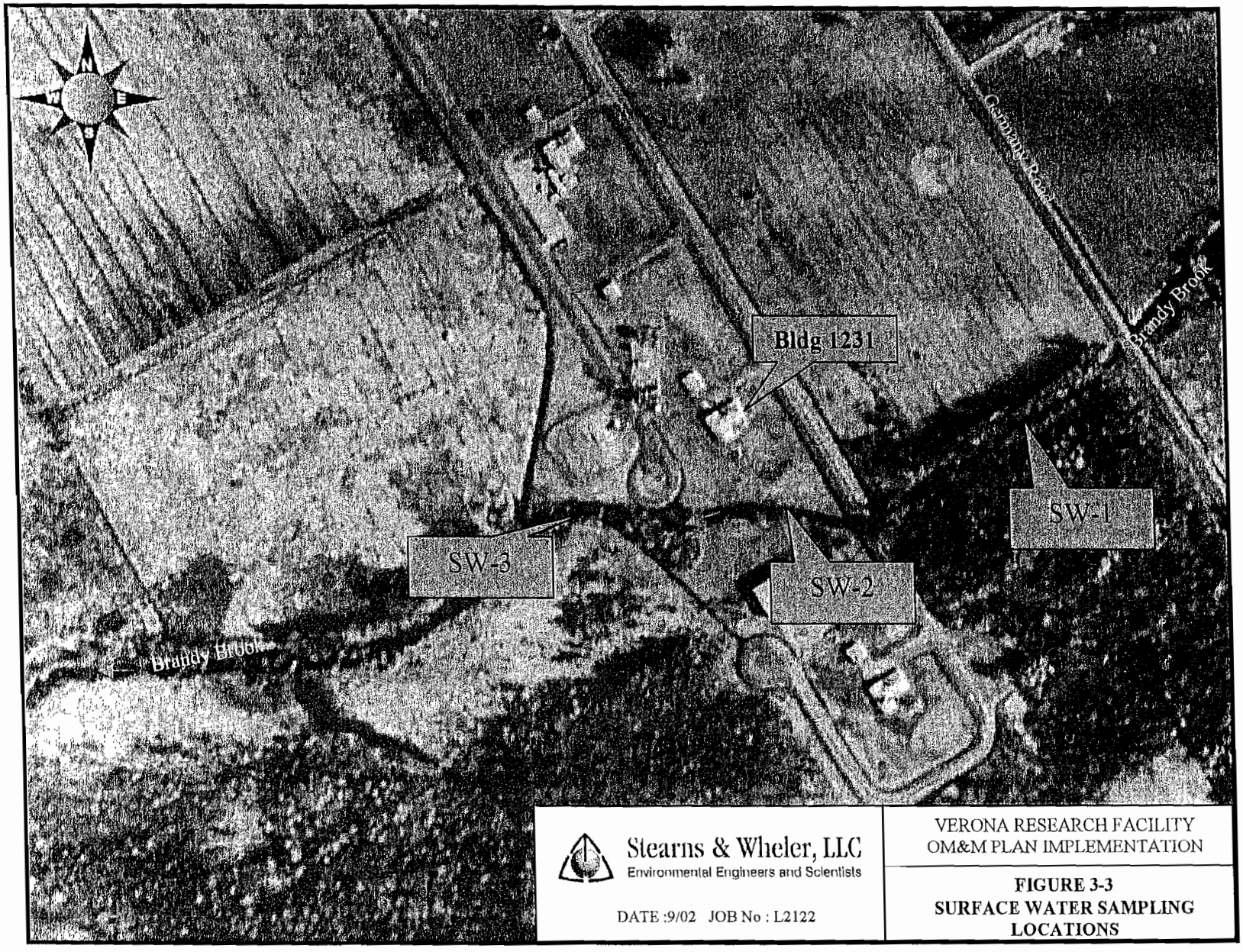
CAZENOVIA, NEW YORK

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VERONA RESEARCH FACILITY
OM&M PLAN IMPLEMENTATION
BUILDING 1253

FIGURE 3.2
BUILDING 1253 MONITORING NETWORK

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Stearns & Wheler, LLC
Environmental Engineers and Scientists

DATE :9/02 JOB No : L2122

VERONA RESEARCH FACILITY
OM&M PLAN IMPLEMENTATION

FIGURE 3-3
SURFACE WATER SAMPLING LOCATIONS

APPENDICES

Appendix A

Operations, Monitoring, & Maintenance Plan

DSS

S&W
Redevelopment LLC

Report

Operations, Monitoring, & Maintenance Plan Buildings 1231 &1253 NYSDEC Site #633046 Verona Research Facility Verona, New York

October 2001

OPERATIONS, MONITORING, AND MAINTENENANCE PLAN

BUILDINGS 1231 & 1253

NYSDEC SITE #633046

VERONA RESEARCH FACILITY

TOWN OF VERONA, NEW YORK

Prepared for

ROME LABORATORY REASEARCH FACILITY

Prepared by

S&W Redevelopment, LLC
One Remington Park Drive
Cazenovia, NY 13035

October 2001

Project No 10105

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OPERATIONS, MONITORING, AND MAINTENANCE PLAN
VERONA RESEARCH FACILITY
BUILDINGS 1231 & 1253
NYSDEC #6-33-046

SECTION 1 – INTRODUCTION

This Operations, Monitoring, and Maintenance (OM&M) Plan has been prepared to govern the implementation of remedial activities at the Verona Research Facility (VRF) Buildings 1231 and 1253 (NYSDEC Site I.D. #6-33-046). Some form of remedial action is warranted in response to the detection of several chlorinated aliphatic compounds in groundwater at those buildings. Investigations regarding the nature of the detected compounds have indicated that they are being naturally degraded, or attenuated, as a result of natural chemical reactions that occur within the groundwater. These reactions are significant enough to rely on natural attenuation monitoring of groundwater as the site remedy. Groundwater will be sampled on an ongoing basis, to demonstrate that detected constituents continue to be degraded. This plan sets forth the sampling procedures, sampling schedule, and analytical and reporting requirements for the natural attenuation monitoring program. The OM&M Plan also lays out the data evaluation criteria that will be used to verify that natural attenuation continues to be an effective site remedy.

1.1 – BACKGROUND

The Rome Laboratory Verona Research Facility (formerly the Griffiss Air Force Base Verona Test Annex) was founded in the early 1950s on 513 acres of former farmland adjacent to Germany Road in the Town of Verona, New York (Figure 1-1). The site consists of approximately 35 buildings, many of them former electronics laboratories, constructed along a 1-mile long road in the eastern section of the property. The facility was used for electronic research and development since 1952.

The laboratory buildings were heated with individual fuel oil-fired boilers. Each of the boilers is connected to individual fuel oil tanks. As a result of a heating oil replacement project several years ago, a groundwater investigation was completed to determine if the previous tanks had leaked (Parsons Engineering Science, 1995). Four groundwater monitoring wells were installed at each of several buildings being investigated (Buildings 1203, 1225, 1231, 1245, 1253, and 1277). The wells were installed to monitor the shallow groundwater system in proximity to the tanks.

Table 1-1
Historical Data - PSA Sampling Results (1997)
OM&M Plan
Verona Research Facility
Buildings 1231 & 1253

BUILDING 1203

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1203A	MW-1203B
Acetone	50G	12 J	7 J	14 J			
Benzene	1					1 J	
Dichlorodifluoromethane	5			13 *			

BUILDING 1231

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1231A	MW-1231C	MW-1231D
Methylene chloride	5		0.8 J					1 J
Acetone	50G	44 J						
cis-1,2-dichloroethene	5	26 *					2 J	
Tetrachloroethene	5						57 *	
Chlorobenzene	5	290 *						
1,4-dichlorobenzene	4.7	6 J *						

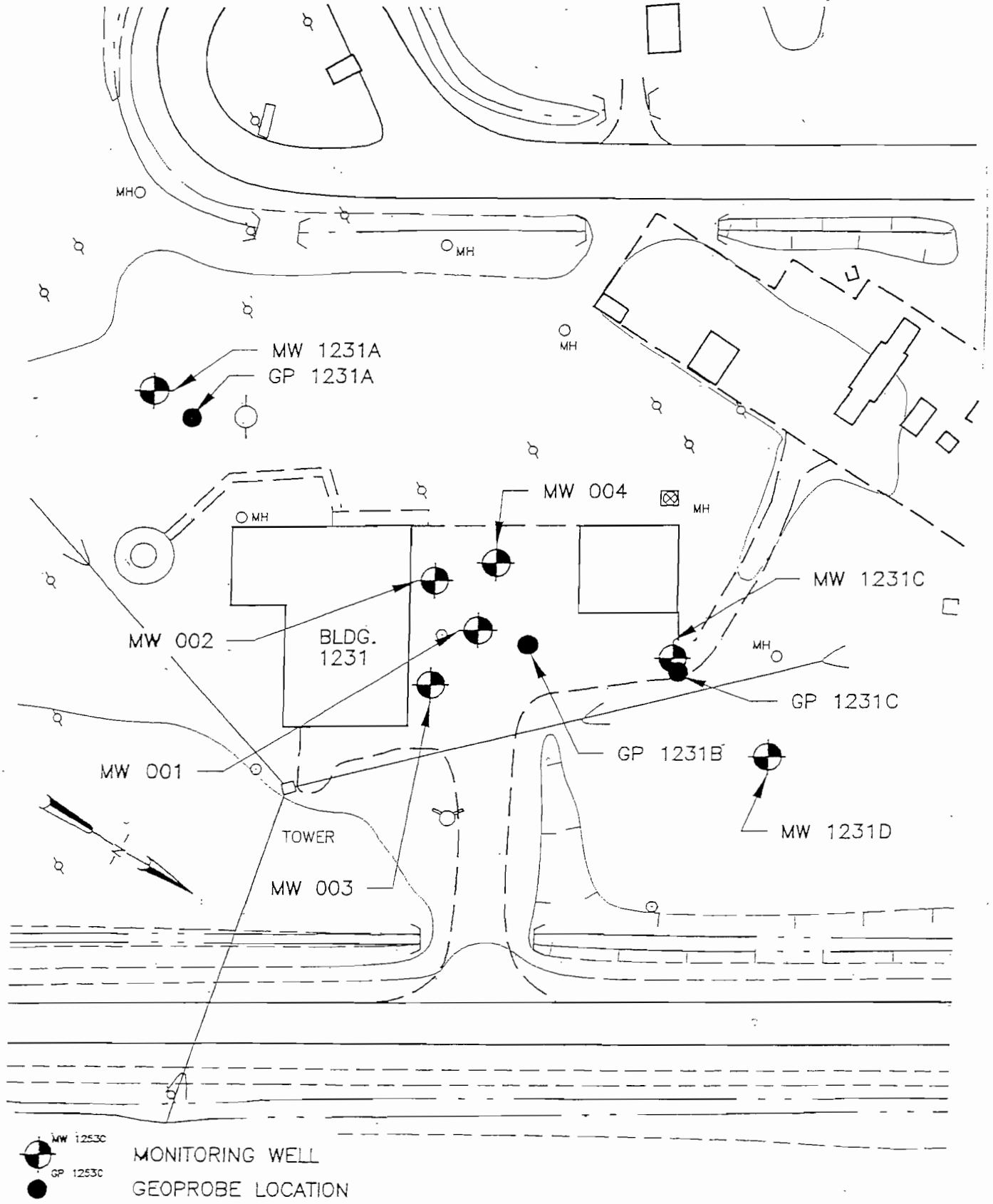
BUILDING 1245

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1245A	MW-1245B
cis-1,2-dichloroethene	5		2 J	4 J			

BUILDING 1253

Analyte (ug/L)	Class GA Std	MW-001	MW-002	MW-003	MW-004	MW-1253C	MW-1253D
Methylene chloride	5	1 J	1 J			2 J	
1,1-dichloroethane	5		9 J *	3 J			
cis-1,2-dichloroethene	5	17 *	3 J	4 J	9 J *		
trans-1,2-dichloroethene	5	10	2 J	9 J *	1 J		
Trichloethene	5		2 J	3 J	7 J *		

Above analyte listings are partial, for convenience of presentation. Only detected compounds are presented.
Blank cells indicate compounds that were anlyzed for, but not detected.
J indicates an estimated value.
* indicates compound present above Class GA water quality standards (NYS TOGS 1.1.1)



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OM&M PLAN
BUILDINGS 1231 AND 1253

FIGURE 1-2
PREVIOUS INVESTIGATION, 1231

being attenuated before groundwater reached the brook. The groundwater data indicated that the concentrations of chlorinated aliphatic compounds, including tetrachloroethene (PCE), trichloroethene (TCE), and dichloroethene (DCE), were variable over the period, in part due to water table fluctuations. However, the overall pattern in the data indicated that natural attenuation was indeed occurring in the groundwater at the sites. Lines of evidence included a general decline of the concentrations of the individual compounds. There was also variation in the ratios of compounds to their respective degradation by products (eg. the ratio of TCE to DCE), which suggested that the compounds might be degrading via reductive de-halogenation.

In January 2001 NYSDEC acknowledged their review of the results of the 2-year monitoring program, and indicated that natural attenuation was supported by the analytical data (Appendix A). To implement a monitored natural attenuation approach, an OM&M Plan was required that set forth the required elements of such a program.

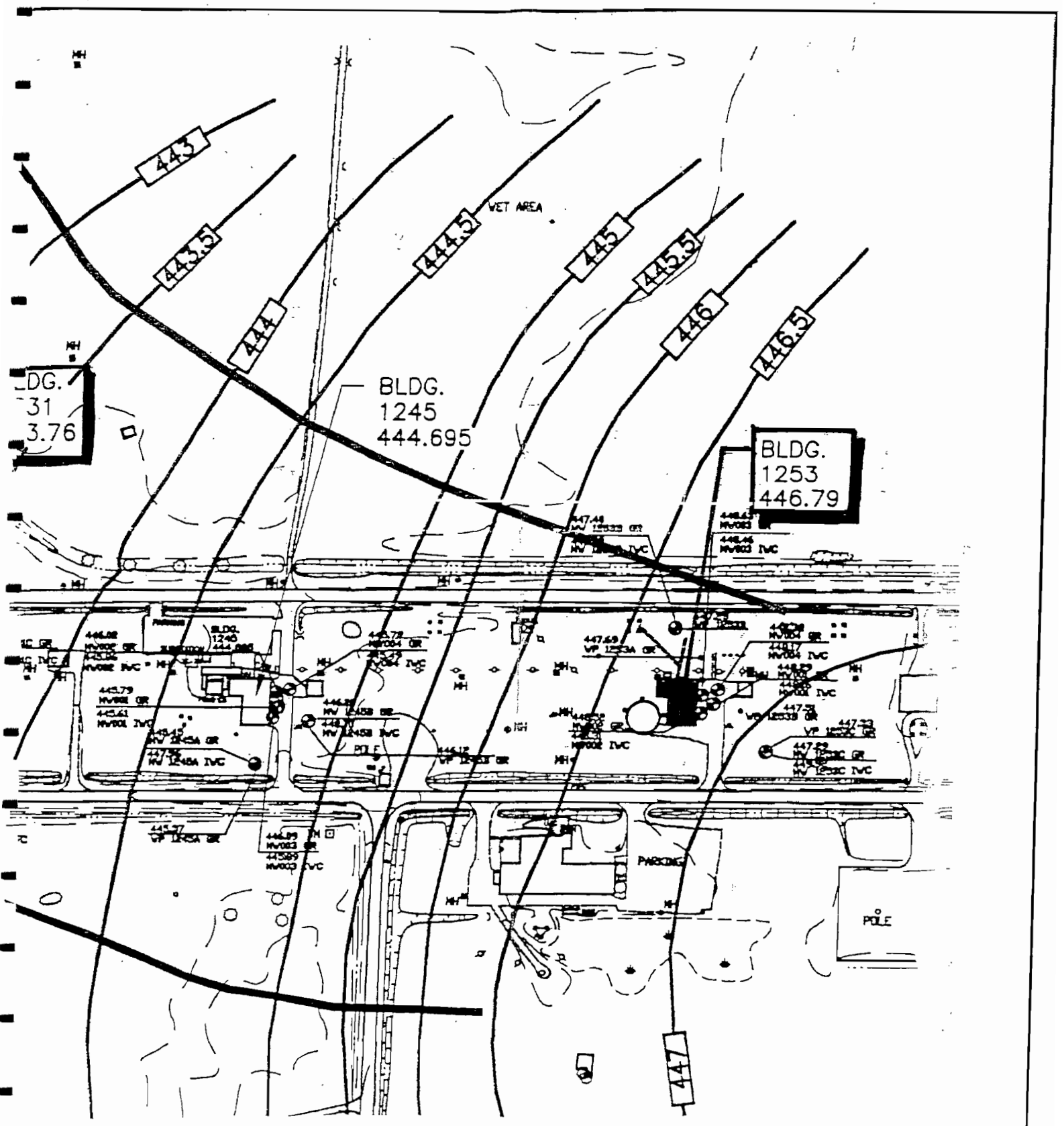
SECTION 2 – SITE CHARACTERISTICS

2.1 – PHYSICAL SETTING

The VRF site is located on approximately 513 acres in the Town of Verona, Oneida County, New York (Figure 1-1). Structural improvements on the site include 54 structures totaling well over 100,000 square feet. Site topography is generally flat with an approximate mean elevation of 447 feet above mean sea level.

The VRF site is situated within the Oneida Lake watershed. The majority of surface drainage flows towards Brandy Brook, which passes through the southern section of the site. Brandy Brook drains into Oneida Creek, which in turn drains into Oneida Lake. A small portion of the facility drains into Drum Creek, which is located north of the site. Drum Creek also drains into Oneida Lake, which is approximately 6 miles from the facility.

A soil survey map obtained from the Oneida County office of the US Department of Agriculture Soil Conservation Service indicates that the Verona site soils are primarily Rhinebeck, Canandaigua, Naigara, Collamer, Arkport, Appleton, Palms Muck, and Minoa series.



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OM&M PLAN
BUILDINGS 1231 AND 1253

FIGURE 2-1
SHALLOW GROUNDWATER CONTOURS

Owing to the low hydraulic gradient the flow velocity across the area is low. The average seepage velocity (determined by the average hydraulic conductivity) is estimated to be approximately 25 feet per year (0.069 ft/day). Groundwater flow in the areas of interest occurs primarily in the silt/sand that overlays the confining till unit.

2.4 – GROUNDWATER USE

Drinking water at the VRF is supplied by the City of Oneida water system. The area downgradient of the sites (Buildings 1231 and 1253) includes undeveloped land north of Brandy Brook. Groundwater flowing under the sites migrates southward towards the brook, which is a local hydrogeologic discharge area, and hence the downgradient limit of groundwater migration from the sites. There are no water supply wells in the area downgradient of the sites. There are, however, a number of area residents that are known to use groundwater as a drinking water supply, via private wells located in areas cross-gradient of the site. Two surveys of residential drinking water wells near the VRF have been completed by the New York State Department of Health (DOH). In the first survey, in June 1990, four residential wells and a mobile home park water supply well were sampled and analyzed for volatile organic compounds (VOCs), including the compounds found on site. These wells are located east of Germany Road, which is not downgradient of the on-site subject areas. Analytical results indicated that the wells were free of site-related impacts. The second survey occurred in May 1996, and included 6 residential wells located along Route 31, west of the intersection of Route 31 and Germany Road. Consistent with the first survey, laboratory analysis showed no evidence of site-related impacts.

SECTION 3 – SITE REMEDIAL ACTION

Operations, monitoring, and maintenance are regarded as the last phase of remediation, and are carried out until remedial action objectives (RAOs) for the project are met. For the areas of interest, including groundwater near Buildings 1231 and 1253, an aggressive groundwater monitoring program will be implemented to meet the principal RAO: to prevent groundwater at Buildings 1231 and 1253, that is impacted by organic compounds above Class GA standards, from migrating off site and into Brandy Brook. A second RAO will be to provide a means for showing when attenuation of on-site impacts has occurred to the point that continued monitoring is no longer required. Both of these RAOs can be achieved by continued groundwater monitoring for natural attenuation. Existing groundwater data indicate that natural attenuation will be sufficient to prevent site-related impacts from affecting off-site areas, including the brook. The monitoring program will provide a means of assuring natural attenuation continues

present in the molecule, the more oxidized the compound becomes. As oxidized molecules, halogenated aliphatics will tend to become reduced as discussed above. Molecules such as PCE (four chlorine atoms) will have a stronger tendency to be reduced than TCE (three chlorine atoms), as so forth.

Aliphatics that undergo reduction reactions are said to be undergoing "reductive de-halogenation" to denote the process by which PCE is degraded to TCE, which is subsequently degraded to DCE. As the aliphatic compounds are degraded (i.e. reduced) there will be electron donors (see above) that become oxidized. Thus, the likelihood that these reactions are occurring can be assessed by looking not only at the levels of aliphatics present, but also the inorganic electron acceptors and donors present in the groundwater.

3.2 BIOLOGICALLY MEDIATED REACTIONS

Although the above redox reactions can occur without biological mediation, biological activity greatly enhances them. In reality, the driving force behind oxidation-reduction reactions resulting in chlorinated aliphatic degradation is microbially-mediated electron transfer (Wiedemeier et al, 1997). Microbes derive energy from electron transfer reactions, which is there essential "food" source. Ordinarily, native carbon serves as an electron donor in these transfer reactions, and common electron acceptors discussed previously (oxygen, nitrate, tri-valanet iron, sulfate) are used as electron acceptors. Chlorinated aliphatic compounds can sometimes be used as electron acceptors in these biologically-mediated reactions.

In some cases, the aliphatic compound is used more directly as an electron donor, in place of native carbon, which causes the compound to be oxidized. This is especially possible for less-halogenated compounds, for example vinyl chloride. Vinyl chloride (VC -- 1 chlorine atom) is eventually produced as DCE (2 chlorine atoms) is reduced, and may subsequently be converted (mineralized) to carbon dioxide via oxidation reactions. However, VC may also be reductively degraded. Thus, it is by a combination of reduction and oxidation that the following degredation sequence can be completed:

PCE → TCE (reduction)
TCE → DCE (reduction)
DCE → VC (reduction)
VC → mineralization (oxidation/reduction)

single well to satisfy this criterion as well as criterion 2 above, depending on site-specific circumstances.

4. At least one monitoring well needs to be located downgradient, as a "sentinel" well beyond the impacted groundwater zone. The groundwater concentrations must remain below standards in the sentinel well for natural attenuation to be considered effective. The sentinel well should be no more than five years' travel time from the source area, based on estimated groundwater flow velocity. The sentinel well will essentially provide evidence that the remedial action objective pertaining to no off-site migration of impacts is met.
5. At least one well needs to be along the center line of the plume.

Additional monitoring wells will need to be installed at buildings 1231 and 1253 to satisfy the above criteria. In addition, Brandy Brook will continue to be monitored.

All new monitoring wells will be installed by NYSDEC-approved methods. The basic well installation approach will include the advancement of borings by 4 ¼ inch diameter hollow stem augers. Soil samples will be collected by split spoon samplers continuously throughout the soil boring. Soil descriptions will be recorded in a field observation log by a hydrogeologist. Upon boring completion, 2-inch diameter continuous-wrap PVC well screen (0.020 inch slot size) will be placed in the borehole. As the augers are withdrawn, a filter sand pack material will be placed in the space between the open borehole wall and the well screen, from the bottom of the boring upward. The sand pack will extend to a minimum of 1 foot above the top of the well screen. A two-foot bentonite plug will be placed on top of the sand pack, and protective steel casings will be cemented in place at ground surface, with locking covers.

A. BUILDING 1231 MONITORING NETWORK

Figure 4-1 illustrates the proposed groundwater monitoring network at Building 1231. From a recent site visit, it is apparent that most of the monitoring wells that had been utilized in the past (Figure 1-2) are no longer there. In general, any existing wells that are not to be included in future monitoring efforts will be decommissioned following approved New York State procedures (Appendix C, NYSDEC 1996). The following six (6) monitoring wells (1 existing, 5 to be installed) are proposed for the OM&M program at Building 1231. All of the wells will be installed to a depth of approximately 15 feet deep, consistent with previous monitoring programs at the site:

MW-1231E, -1231F (To Be Installed). These two wells will be located within and close to the center of the plume, and satisfy criteria 1 and 5 above.

MW-1231G (To Be Installed). A well is proposed between existing wells MW-1231F (source area) and MW-1231H (sentinel well, see below), to serve as a well on the fringe of the plume, to satisfy criteria 2 and 3 above, and oriented along its centerline.

MW-1231H(To Be Installed). This well is located approximately 100 feet downgradient of the source area in an area that is unaffected by the plume. Considering the estimated groundwater flow velocity (25 feet per year), it would take groundwater approximately 4 years to migrate from the source area to well MW-1231H. This well is suitable as a sentinel well, and thus satisfies criterion 4 above.

MW-1231C (Existing). This well exists near the upgradient edge of the plume, and is recommended for inclusion in the monitoring network, as historical data indicates it can provide a good assessment of natural attenuation processes.

MW-1231I (Upgradient, To Be Installed). In addition to the above wells, it is recommended that an upgradient well, MW-1231I, be installed. Having an upgradient background well will be an essential element for evaluating natural attenuation capacity of groundwater, as it will reveal the ambient hydrogeochemical conditions, and enable an assessment of whether natural conditions remain suitable to sustain natural attenuation reactions. Further discussion is provided later regarding the data evaluation techniques that are to be employed.

B. BUILDING 1253 MONITORING NETWORK

Figure 4-2 illustrates the proposed groundwater monitoring network at Building 1253. From a recent site visit, it is apparent that most of the monitoring wells that had been utilized in the past (Figure 1-3) are no longer there. In general, any existing wells that are not to be included in future monitoring efforts will be decommissioned following approved New York State procedures (Appendix C, NYSDEC 1996). The following five (5) monitoring wells (2 existing, 3 to be installed) are proposed for the OM&M program at Building 1253. All of the new wells

will be installed to a depth of approximately 15 feet deep, consistent with previous monitoring programs at the site:

MW- 001, MW-004 (Existing). These two existing wells are located within and close to the center of the plume, and satisfy criteria 1 and 5 above. From a recent site visit, it is apparent that these wells may need to be repaired. The protective casings will need to be replaced, along with the concrete pads. In the event that further inspection reveals more substantial damage, these two wells will be replaced altogether.

MW-1253E (To Be Installed). A single well is proposed to satisfy criteria 2 and 3 above. The well would be located mid-way between existing well MW-004 and proposed sentinel well MW-1253F (see below), and would therefore be at or near the presumed fringe of impact. This well could also be located with respect to the center line of the plume to assist in satisfying criterion 5.

MW-1253F (To Be Installed). This well will be located approximately 100 feet downgradient of the source area in an area that is unaffected by the plume. Considering the estimated groundwater flow velocity (25 feet per year), it would take groundwater approximately 4 years to migrate from the source area to well MW-1253D. This well will be suitable as a sentinel well, and thus will satisfy criterion 4 above.

MW-1253G (Upgradient, To Be Installed). In addition to the above wells, it is recommended that well MW-1253G be installed as an upgradient well. Well MW-1253G will provide useful data for evaluating natural attenuation capacity of site groundwater, as noted above.

At the conclusion of the post-closure monitoring period, all remaining monitoring wells will be decommissioned by appropriate New York State approved methods.

C. BRANDY BROOK

Water samples will be collected from Brandy Brook to verify that no site-related impacts occur there.

4.3 MONITORING WELL INSPECTION AND MAINTENANCE

Each quarter that samples are collected, the sampling personnel will complete a visual inspection of each monitoring well to determine whether repairs or replacement are needed. The inspection will include a visual examination of the following:

locking well covers and well caps to determine whether the wells remain secure;
concrete pad to ensure that it is not excessively cracked;
padlocks in good working condition;
wells areas generally clear of excessive vegetation growth;
wells remain plumb and straight, and the interior is free of obstruction;
bottom of well not accumulating sediments.

Any items in need of attention, repair or replacement will be called out in the quarterly reports (Section 5).



SECTION 5 – REPORTING

Quarterly monitoring reports will be prepared following the completion of each quarterly sampling event. The report will include a discussion of the methods used to collect the samples, as well as field observation sheets (Appendix D). The field observations will include the field parameter measurements. Any needed repairs or maintenance to the monitoring wells will also be described.

Water elevation measurements from the monitoring wells will be used to produce a groundwater contour map for each of the two separate building sites.

Laboratory analysis reports will be included with the quarterly reports. In addition, the analytical results will be presented on summary tables that identify the monitoring locations and results for each parameter, and which highlight the individual parameters that exceed applicable water quality standards. Separate summary tables will be presented for each of the two sites, and will include not only the current analytical results but also the results of previous sampling quarters. This will enable water quality trends to be evaluated.

In the event that contamination is detected in either the Building 1231 or Building 1253 sentinel well, it would be recommended that an additional monitoring well be installed in the direction of groundwater flow and along the approximate center line of the plume, downgradient of the sentinel well. This new well would be installed prior to the next quarterly sampling event, and added to the quarterly monitoring network. Following the completion of the next two quarterly sampling events that include the new well, recommendations will be made concerning further action, if necessary.

APPENDICES

Appendix A

Post-PSA Semi-Annual Monitoring Results

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

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January 10, 2001

Mr. Bruce H. Mero, REM
Air Force Research Laboratories
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semiannual Monitoring Analytical Summary Report
Verona Research Facility
S&W No. 90060.0

Dear Mr. Mero:

This letter report provides a comprehensive summary of the groundwater analytical results for samples collected from the Verona Research Facility from October 1996 to September 2000 (see Figure 1 for site location map). Stearns & Wheler has compiled and reviewed the groundwater analytical data from eight sampling events that occurred during that period. Groundwater sampling was implemented based on the detection of volatile organic compounds, as reported in a February 1997 Preliminary Site Assessment (PSA) report completed by Stearns & Wheler. Groundwater samples were collected from Well MW-001and MW-1231C at Building 1231, and Wells MW-002 and MW-004 at Building 1253 (see Figures 2 and 3 for monitoring well locations). In addition, one sample was collected from Brandy Brook during each sampling event. Analytical results were presented in summary reports prepared by Stearns & Wheler following each of the sampling events. Consistent with those summary reports, this comprehensive summary focuses on four contaminants of concern: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2 dichloroethene (DCE), and chlorobenzene (CB).

RESULTS

A summary of the eight rounds of analytical data is presented in Table 1. Instances when water samples could not be obtained due to dry conditions are indicated with "NS." Figure 4 presents the results for the contaminants of concern.

Brandy Brook

The sampling point for the Brandy Brook sampling location is located approximately 200 feet south (down gradient) of Building 1231. No VOCs were detected in Brandy Brook during the sampling period.

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The variability in the PCE and TCE data reported from MW-1231C and MW-004 tends to obscure chemical evidence of attenuation. It appears that variation may be caused in part by water table fluctuations. For example, in September of 1999 high levels of VOCs in the wells is likely the result of dry conditions and low water table levels. Despite this variability, there is chemical evidence of natural degradation of contaminants of concern. For example, chlorinated compounds are not as easily degraded under aerobic (oxygen rich) conditions as compared to anaerobic (low oxygen) conditions. Figure 5 shows a graphical representation of the ratio of TCE/DCE plotted versus dissolved oxygen. If compounds are being attenuated at the site, one would expect that as dissolved oxygen decreases the ratio of TCE/DCE would decrease also, reflecting the degradation of TCE into DCE. This is observed in Figure 5.

RECOMENDATIONS

- The concentration of compounds detected at the site during the eight sampling events has shown either a decreasing trend or significant variation. There is chemical evidence to support that some degree of natural attenuation is occurring, and site impacts have not been observed in the brook. Given the sites rural setting, limited migration potential, and lack of impact to its groundwater discharge point (Brandy Brook) exposure pathways to contaminants are incomplete. Therefore, Stearns & Wheler recommends that actions at the site be limited to continued monitoring, with a focus on Wells MW-001, MW-1231C (Building 1231), and MW-002 (Building 1253). It is suggested that the above three wells and Brandy Brook undergo continued monitoring, semi-annually for two years. Following two more years of sampling, data can be reevaluated to assess whether there is continued improvement.

If you have any questions regarding the results of this sampling event, please do not hesitate to contact us.

Very truly yours,

David R. Frostclapp
Engineer

DRF/jlb

Enclosures

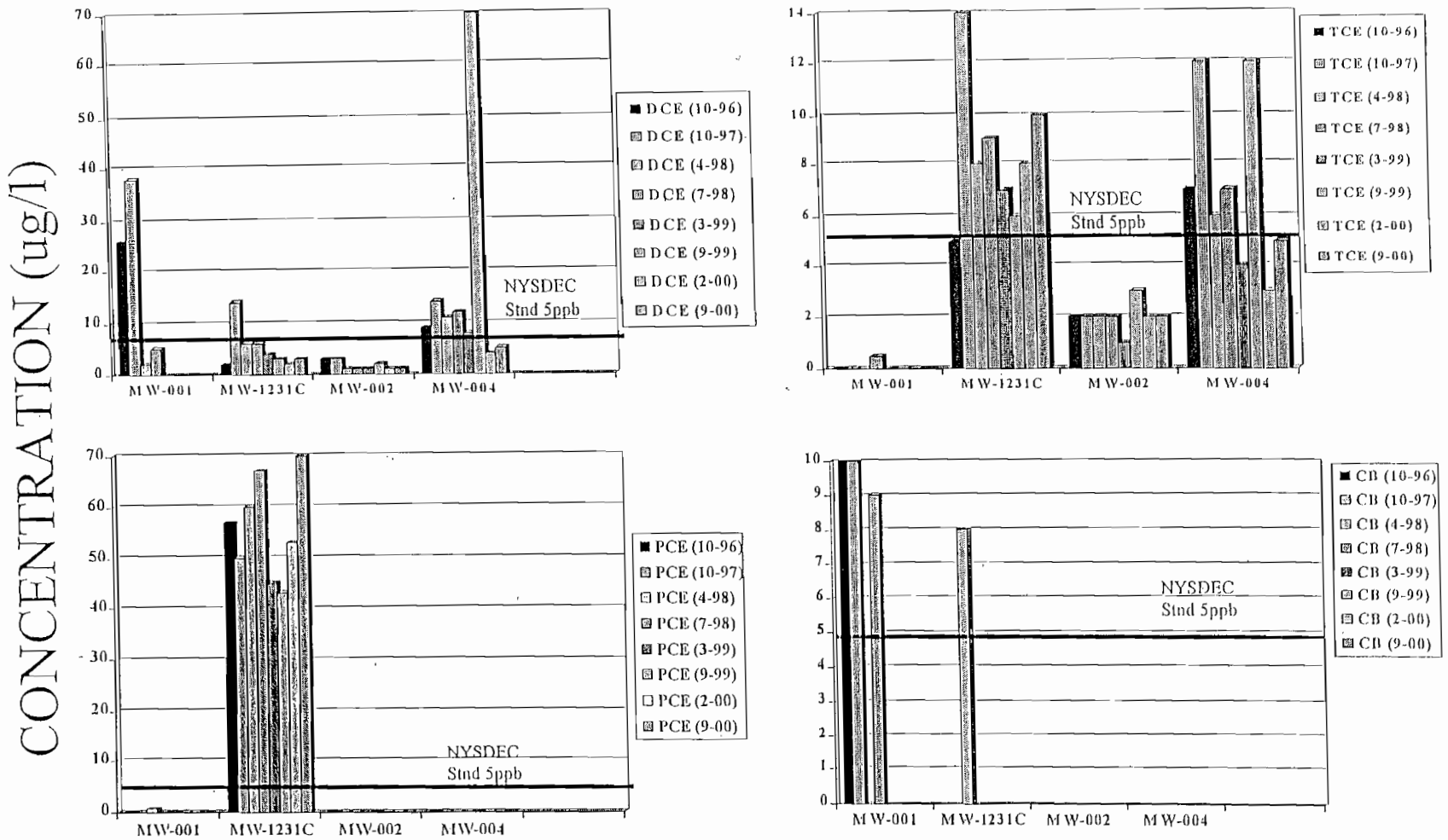
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Table 1 (cont'd)
Historical Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Jan-01

	BUILDING 1253																GW
	MW-001								MW-004								
Compound (ug/l)	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Std.
Chloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50
Bromomethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Vinyl Chloride		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	2
Chloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Methylene Chloride	1 J	U	0.7 J	U	U	U	U	U	U	U	U	U	U	0.7 J	U	0.4 J	5
Acetone		U	16 B	U	U	U	U	U	U	U	U	U	U	2 JB	U	4 J	50G
Carbon Disulfide		U	0.5 J	U	U	U	U	U	U	U	U	U	U	U	U	U	50
Vinyl Acetate		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	NOINE
1,1-Dichloroethene		18	30	26	U	U	U	U	U	U	U	U	U	U	U	U	5
1,1-Dichloroethane	9 J	3 J	2 J	2 J	16	14 J	8	8	U	26	U	U	U	U	U	U	5
cis-1,2-Dichloroethene	3 J	3 J	1 J	1 J	1 J	2 J	1 J	1 J	9 J	7	1	12	8	71	4 J	5	5
trans-1,2-Dichloroethene	2 J	1 J	U	U	U	2 J	0.8 J	0.5 J	1 J	U	2 J	2 J	2 J	15	0.7 J	1 J	5
Chloroform		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6
2-Butanone		U	100	29	U	U	U	U	U	U	U	U	0.8 J	U	U	U	5
1,1,1-Trichloroethane		22	80	U	2 J	1 J	U	U	U	U	U	U	U	U	U	U	5
Carbon Tetrachloride		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Bromodichloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Trichloroethene	2 J	2 J	2 J	2 J	1 J	3 J	2 J	2 J	7 J	12	6 J	7 J	4 J	12	3 J	5	5
Dibromochloromethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
Benzene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4
Bromoform		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
2-Hexanone		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	50G
Tetrachloroethene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Toluene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Chlorobenzene		J	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Ethylbenzene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Styrene		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Xylene (total)		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	5
Total VOCs	16	49	215.5	60	20	22	11.8	11.5	17	45	19	21	14.8	98	7.7	11	
Depth to Groundwater (ft)	4.74	5.52	2.43	2.99	1.55	8.9	1.51	NA	2.88	5.64	2.64	3.56	NA	8.83	1.28	NA	

NS: Not Sampled (1999 well was dry; September 2000 well was not located.
* Treated as UOC
G: NYSDEC guidance value
ND: No Detectable amounts allowed
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998
Shaded areas indicate exceedances of standards
U - not present above detectio limits



Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
Cazenovia, NY
Date: 1/01 JOB No. 90060.10

Verona Research Facility
Town of Verona, New York

FIGURE 4
HISTORICAL TRENDS

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

FILE

One Remington Park Drive • Cazenovia, NY 13035
(315) 655-8161 • fax (315) 655-4180

December 19, 2000

Mr. Bruce H. Mero, REM
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semiannual Groundwater Monitoring
Verona Research Facility
S&W No. 90060.0

Dear Mr. Mero:

This letter report provides a discussion of groundwater sampling results at the Verona Research Facility for the September 2000 sampling event. Groundwater sampling at this site was implemented based on findings of the Preliminary Site Assessment. The objective of these sampling events has been to determine if concentrations of organic compounds are decreasing.

Four monitoring wells were chosen to be sampled semi-annually during the course of two years. These wells were selected because each had a history of being impacted by volatile organic compounds (VOCs). Enclosed are summary tables that include analytical results from the previous five rounds of groundwater sampling. Groundwater samples were collected from Monitoring Wells MW-1231C at Building 1231, and Wells MW-002 and MW-004 at Building 1253. In addition, one surface water sample was collected from Brandy Brook. MW-001 could not be located during the September 2000 sampling event and, therefore, was not sampled. It is believed that Monitoring Well MW-001 was destroyed during excavation activities at the site. In addition to analytical sampling, Stearns & Wheler personnel performed a bail test to aid in determining the hydraulic conductivity of soils around the screened interval in monitoring well MW-1231C. Using the hydraulic conductivity, seepage velocity has been determined for this particular monitoring well.

The results from the September 2000 sampling of the compounds of specific concern (trichloroethene, tetrachloroethene, chlorobenzene, and 1,2-dichloroethene) are summarized below. Laboratory results from Brandy Brook for these specific compounds were non-detects and will not be discussed further.

Table 1
Historical Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Jan-01

	BUILDING 1231																GW
	MW-001								MW-1231C								
Compound (ug/l)	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Oct-96	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Sep-00	Std.
Chloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
Bromomethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Vinyl Chloride	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	2
Chloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	2 J	5
Methylene Chloride	U	UJ	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	5 J	5
Acetone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
Carbon Disulfide	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
Vinyl Acetate	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	NOINE
1,1-Dichloroethene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
1,1-Dichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
cis-1,2-Dichloroethene	26	38 J	2 J	5 J	NS	NS	U	NS	2	14	6 J	6 J	4 J	3 J	2 J	3	5
trans-1,2-Dichloroethene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Chloroform	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	7
1,2-Dichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.6
2-Butanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	0.8 J	U	U	U	5
1,1,1-Trichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Carbon Tetrachloride	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Bromodichloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
1,2-Dichloropropane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
cis-1,3-Dichloropropene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.4
Trichloroethene	5 J	8 J	U	0.5 J	NS	NS	U	NS	5	14	8 J	9 J	7	6	8	10	5
Dibromochloromethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
1,1,2-Trichloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
Benzene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	1
trans-1,3-Dichloropropene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	0.4
Bromoform	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50
4-Methyl-2-Pentanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
2-Hexanone	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	50G
Tetrachloroethene	U	U	0.7 J	U	NS	NS	U	NS	57	50	60	67	45	43	53	70	5
Toluene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Chlorobenzene	290	930 DJ	U	9 J	NS	NS	U	NS	U	U	8 U	U	U	U	U	U	5
Ethylbenzene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Styrene	U	U	U	U	NS	NS	U	NS	U	U	U	U	U	U	U	U	5
Xylene (total)	U	U	U	0.7 J	NS	NS		NS	U	U	U	U	U	U	U	U	5
Total VOCs	321	976	2.7	14.5	-	-	0	-	64	78	82	82	56.8	52	63	90	
Depth to Groundwater (ft.)		6.25	2.48	3.24	DRY	DRY	1.34	NA	NA	9.8	6.01	6.89	4.89	12.89	4.84	NA	

NS: Not Sampled (1999 well was dry; September 2000 well was not located.
* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed.
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards
U - not present above detectio limits
J - reported value is an estimate
NA - information not available

If you have any questions regarding the results of this sampling event, please do not hesitate to contact us.

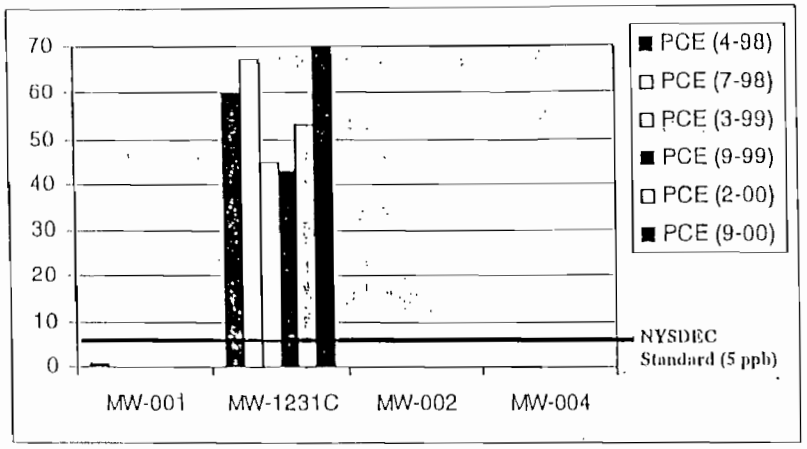
Very truly yours,

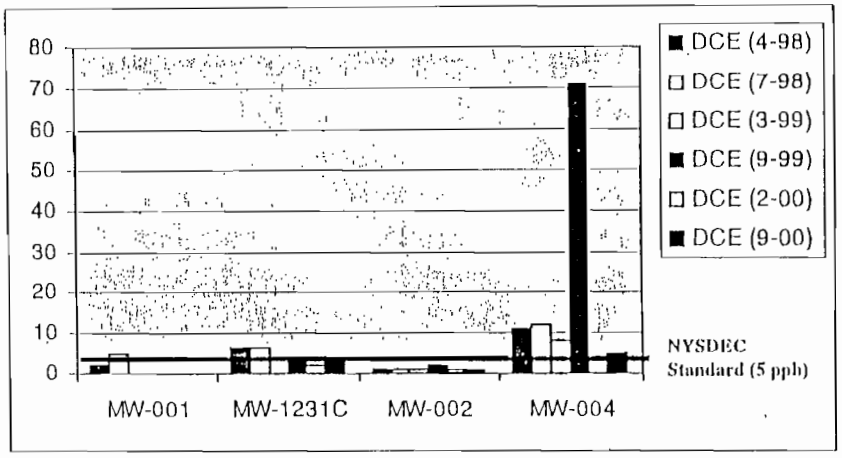
David R. Frostclapp
Engineer

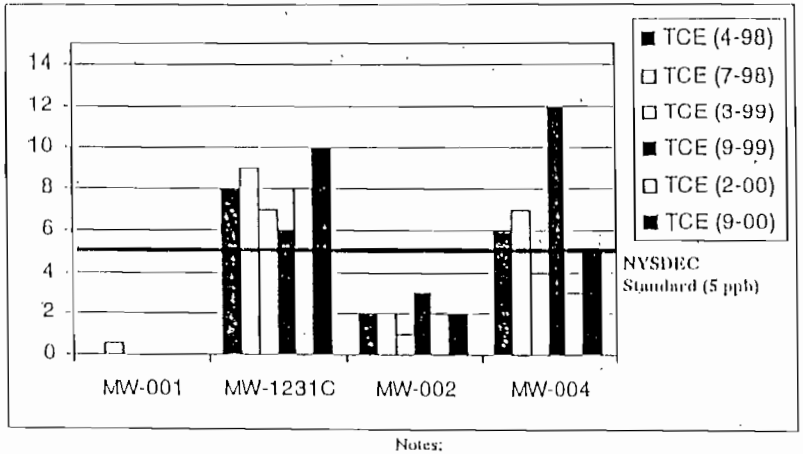
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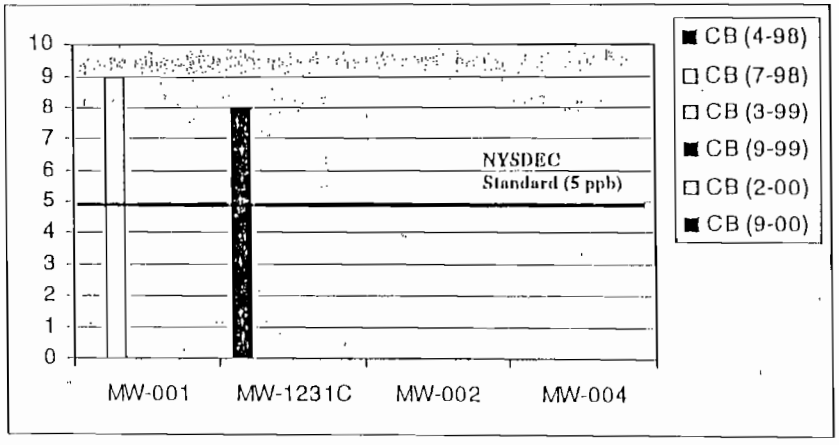
Enclosures

cc: Donald Sorbello, S&W Redevelopment (w/ enc.)









Notes:
1) All measurements are in parts per billion (ppb)
2) TCE - trichloroethene, PCE - tetrachloroethene, DCE- 1,2-dichloroethene, CB - chlorobenzene
3) Due to site conditions, MW-001 was not sampled for 9-99 and 9-00

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
GAZENOVIA, NEW YORK

DATE: 12/00 JOB No: 90060.10

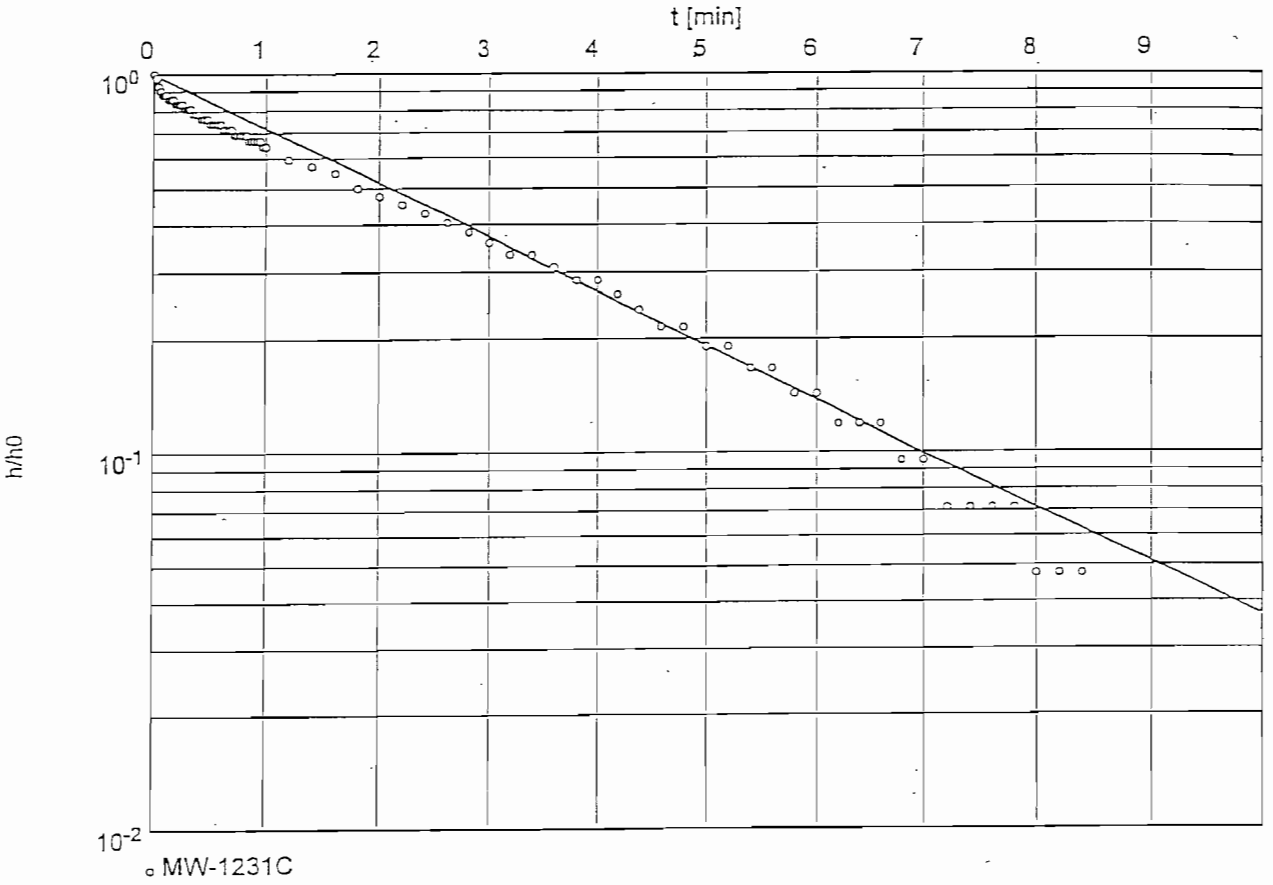
VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Recycled Paper

STEARNS & WHELEF 1 REMINGTON PARK DRIVE CAZENOVIA, NY 13035 ph.(315) 655-8161	slug/bail test analysis BOUWER-RICE's method	Date: 12/03\00	Page 1
		Project: Verona	
		Evaluated by: dss	

Slug Test No. 1	Test conducted on:
MW-1231C	



Hydraulic conductivity [ft/min]: 1.45×10^{-3}

STEARNS & WHELE[illegible] 1 REMINGTON PARK DR[illegible] CAZENOVIA, NY 13035 ph.(315) 655-8161	slug/bail test analysis BOUWER-RICE's method	Date: 12/03\00	Page 3
		Project: Verona	
		Evaluated by: dss	

Slug Test No. 1	Test conducted on:
MW-1231C	MW-1231C

Static water level: 100.00 ft below datum

	Pumping test duration [min]	Water level [ft]	Drawdown [ft]
51	0.62	100.30	0.30
52	0.63	100.30	0.30
53	0.65	100.30	0.30
54	0.67	100.30	0.30
55	0.68	100.30	0.30
56	0.70	100.30	0.30
57	0.72	100.29	0.29
58	0.73	100.29	0.29
59	0.75	100.29	0.29
60	0.77	100.29	0.29
61	0.78	100.29	0.29
62	0.80	100.29	0.29
63	0.82	100.29	0.29
64	0.83	100.29	0.29
65	0.85	100.28	0.28
66	0.87	100.28	0.28
67	0.88	100.28	0.28
68	0.90	100.28	0.28
69	0.92	100.28	0.28
70	0.93	100.28	0.28
71	0.95	100.28	0.28
72	0.97	100.27	0.27
73	0.98	100.27	0.27
74	1.00	100.27	0.27
75	1.20	100.25	0.25
76	1.40	100.24	0.24
77	1.60	100.23	0.23
78	1.80	100.21	0.21
79	2.00	100.20	0.20
80	2.20	100.19	0.19
81	2.40	100.18	0.18
82	2.60	100.17	0.17
83	2.80	100.16	0.16
84	3.00	100.15	0.15
85	3.20	100.14	0.14
86	3.40	100.14	0.14
87	3.60	100.13	0.13
88	3.80	100.12	0.12
89	4.00	100.12	0.12
90	4.20	100.11	0.11
91	4.40	100.10	0.10
92	4.60	100.09	0.09
93	4.80	100.09	0.09
94	5.00	100.08	0.08
95	5.20	100.08	0.08
96	5.40	100.07	0.07
97	5.60	100.07	0.07
98	5.80	100.06	0.06
99	6.00	100.06	0.06
[illegible]	[illegible]	[illegible]	[illegible]

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

One Remington Park Drive • Cazenovia, NY 13035
(315) 655-8161 • fax (315) 655-4180

FILE COPY

90060.0

May 3, 2000

Mr. Bruce H. Mero, REM
Air Force Research Laboratories
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semi-annual Monitoring of Groundwater
At the Verona Research Facility
S&W No. 90060.0

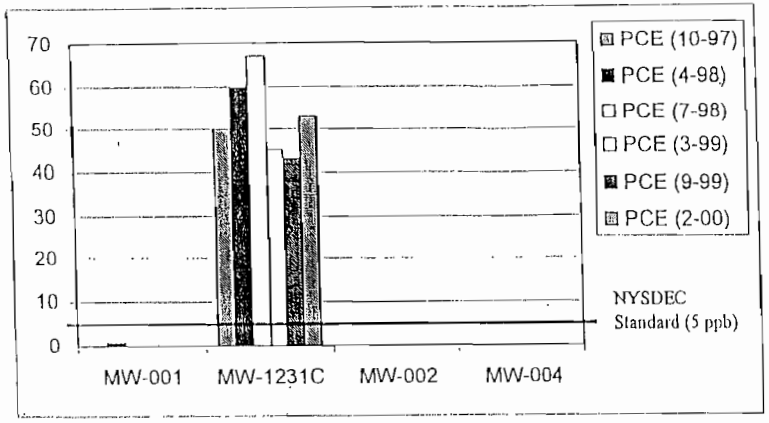
Dear Mr. Mero:

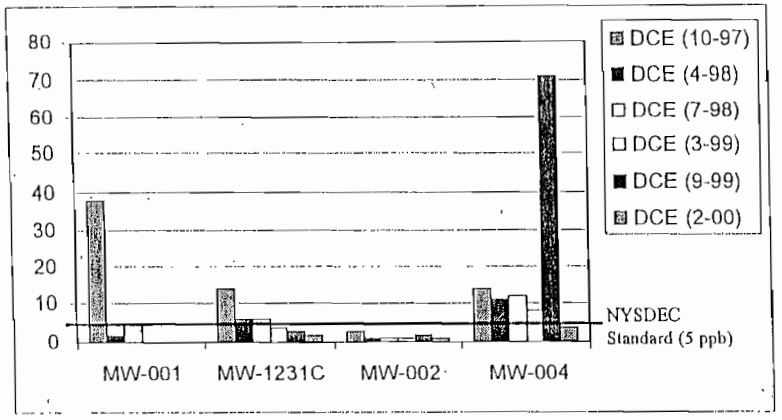
This letter report provides a discussion of the groundwater sampling results at the Verona Research Facility since October 1997. Groundwater sampling has been implemented based on findings of the Preliminary Site Assessment. Four monitoring wells and Brandy Brook (surface water) are to be sampled semi-annually during the course of two years to determine if concentrations of organic compounds are decreasing. The wells were selected because each had a history of being impacted by volatile organic compounds (VOCs). Attached are summary tables of the analytical results from the previous five rounds of groundwater sampling. Groundwater samples were collected from monitoring wells MW-001 and MW-1231C at Building 1231, and wells MW-002 and MW-004 at Building 1253. In addition, one surface water sample was collected from Brandy Brook. This letter report incorporates results from the February 2000 sampling. The final sampling will occur during the fourth quarter of 2000.

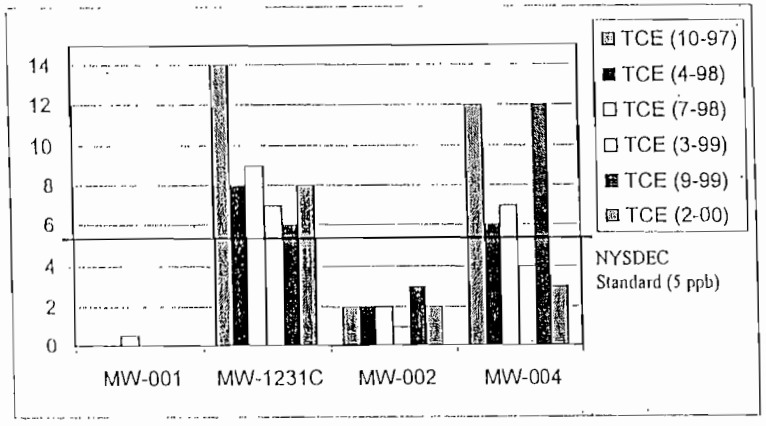
The results from the February 2000 sampling of the compounds of specific concern (trichloroethene [TCE], tetrachloroethene [PCE], chlorobenzene [CB], and 1,2-dichloroethene [DCE]) are summarized below. Laboratory results from Brandy Brook for these specific compounds were non-detects and will not be discussed further.

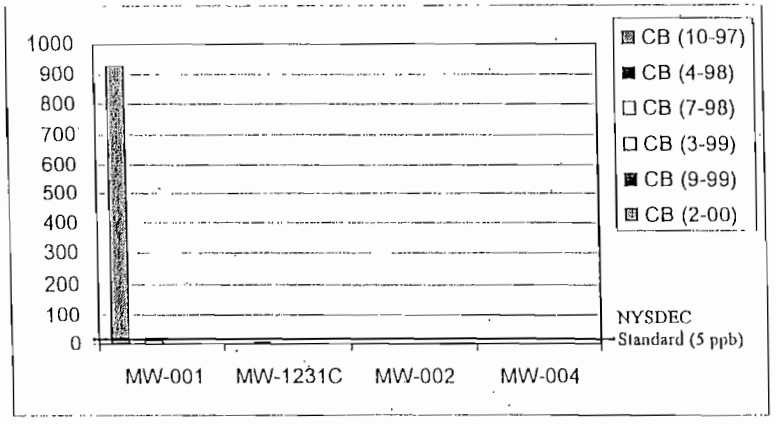
Trichloroethene (TCE): TCE concentrations exceeded the NYSDEC groundwater standard at monitoring well MW-1231C. The reported concentration was 8 ppb. Monitoring wells MW-002 and MW-004 had detectable concentrations of TCE (2 ppb and 3 ppb, respectively); however, both were below the NYSDEC groundwater standard of 5 ppb.

Tetrachloroethene (PCE): PCE was detected above NYSDEC groundwater standards only at monitoring well 1231C, which had a reported concentration of 53 ppb. The concentrations of PCE at the other sampling locations were reported as non-detect.









Notes:
1) All measurements are in parts per billion (ppb)
2) TCE - trichloroethene, PCE - tetrachloroethene, DCE- 1,2-dichloroethene, CB - chlorobenzene
3) Due to dry conditions, MW-001 was not sampled for 9-99

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: 04/00 JOB No: 90060.10

VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Table 1
Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY

	BUILDING 1231													GW
	MW-001						MW-123C							
Compound (ug/l)	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Feb-00		Std
Chloromethane	U	U	U	NS	NS	U	U	U	U	U	U	U		50
Bromomethane	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Vinyl Chloride	U	U	U	NS	NS	U	U	U	U	U	U	U		2
Chloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Methylene Chloride	UJ	U	U	NS	NS	U	U	U	U	U	U	U		5
Acetone	U	U	U	NS	NS	U	U	U	U	U	U	U		50G
Carbon Disulfide	U	U	U	NS	NS	U	U	U	U	U	U	U		50
Vinyl Acetate	U	U	U	NS	NS	U	U	U	U	U	U	U		NOINE
1,1-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U	U	U		5
1,1-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U		5
cis-1,2-Dichloroethene	38 J	2 J	5 J	NS	NS	U	14	6 J	6 J	4 J	3 J	2 J		5
trans-1,2-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Chloroform	U	U	U	NS	NS	U	U	U	U	U	U	U		7
1,2-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U		0.6
2-Butanone	U	U	U	NS	NS	U	U	U	U	0.8 J	U	U		5
1,1,1-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Carbon Tetrachloride	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Bromodichloromethane	U	U	U	NS	NS	U	U	U	U	U	U	U		50G
1,2-Dichloropropane	U	U	U	NS	NS	U	U	U	U	U	U	U		1
cis-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U	U	U		0.4
Trichloroethene	U	U	0.5 J	NS	NS	U	14	8 J	9 J	7	6	8		5
Dibromochloromethane	U	U	U	NS	NS	U	U	U	U	U	U	U		50G
1,1,2-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U		1
Benzene	8 J	U	U	NS	NS	U	U	U	U	U	U	U		1
trans-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U	U	U		0.4
Bromoform	U	U	U	NS	NS	U	U	U	U	U	U	U		50
4-Methyl-2-Pentanone	U	U	U	NS	NS	U	U	U	U	U	U	U		50G
2-Hexanone	U	U	U	NS	NS	U	U	U	U	U	U	U		50G
Tetrachloroethene	U	0.7 J	U	NS	NS	U	50	60	67	45	43	53		5
Toluene	U	U	U	NS	NS	U	U	U	U	U	U	U		5
1,1,2,2-Tetrachloroethane	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Chlorobenzene	930 J	U	9 J	NS	NS	U	U	8 J	U	U	U	U		5
Ethylbenzene	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Styrene	U	U	U	NS	NS	U	U	U	U	U	U	U		5
Xylene (total)	U	U	0.7 J	NS	NS	U	U	U	U	U	U	U		5
Depth to Groundwater (ft.)	6.25	2.48	3.24	DRY	DRY	1.34	9.8	6.01	6.89	4.89	12.89	4.84		

NS: Not Sampled
* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed.
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards

See attachment for other qualifiers

ORGANICS APPENDIX

U - Indicates that the compound was analyzed for but not detected.

J - Indicates that the compound was analyzed for and determined to be present in the sample. The mass spectrum of the compound meets the identification criteria of the method. The concentration listed is an estimated value, which is less than the specified minimum detection limit but is greater than zero.

B - This flag is used when the analyte is found in the blanks as well as the sample. It indicates possible sample contamination and warns the data user to use caution when applying the results of this analyte.

M - Indicates that the compound was analyzed for but not requested as an analyte. Value will not be listed on tabular result sheet.

S - Estimated due to surrogate outliers.

X - Matrix spike compound.

(1) - Cannot be separated.

(2) - Decomposes to azobenzene. Measured and calibrated as azobenzene.

A - This flag indicates that a TIC is a suspected aldol condensation product.

E - Indicates that it exceeds calibration curve range.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

C - Confirmed by GC/MS.

T - Compound present in TCLP blank.

P - This flag is used for a pesticide/aroclor target analyte when there is a greater than 25 percent difference for detected concentrations between the two GC columns (see Form X).

90060.0 255

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

COPY

December 21, 1999

Mr. Bruce H. Mero, REM
Air Force Research Laboratories
Rome Research Site
150 Electronics Parkway
Rome, NY 13441-4516

Re: Semi-annual Monitoring of Groundwater
at the Verona Research Facility
S&W No. 90060.0

Dear. Mr. Mero:

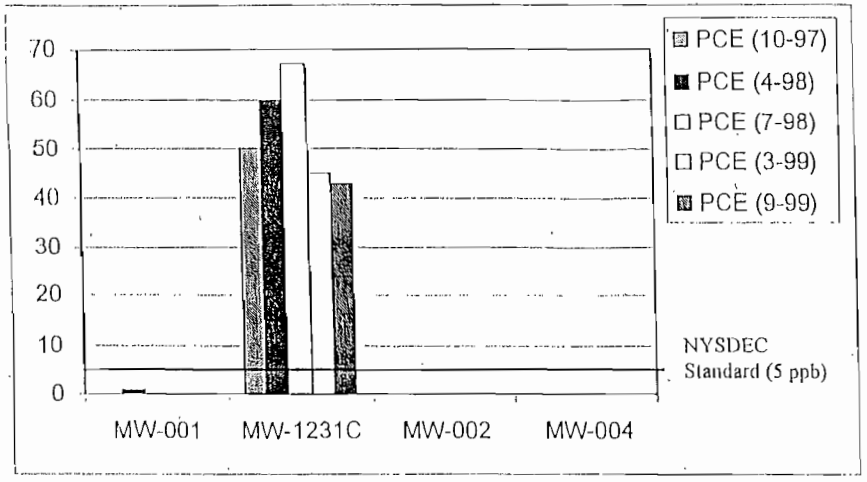
This letter report provides a discussion of the groundwater sampling results at the Verona Research Facility since October 1997. Groundwater sampling has been implemented based on findings of the Preliminary Site Assessment. Four monitoring wells are to be sampled semi-annually during the course of two years to determine if concentrations of organic compounds are decreasing. The wells were selected because each had a history of being impacted by volatile organic compounds (VOCs). Groundwater samples were collected from well MW-1231C at Building 1231 and wells MW-002 and MW-004 at Building 1253. Samples were supposed to be collected from MW-001 (at Building 1231) and from Brandy Brook; however, due to dry conditions, there was not enough water at MW-001 or Brandy Brook for sampling during the September 1999 semi-annual sampling event.

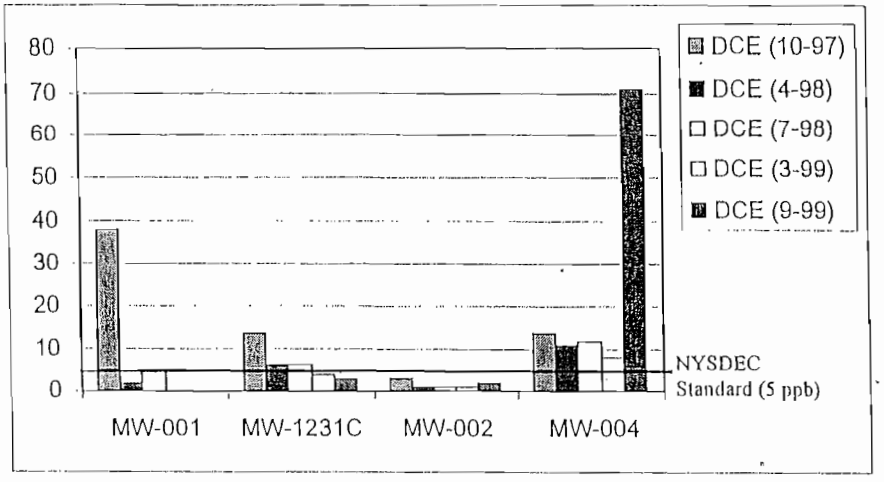
The results of the compounds of specific concern (trichloroethene [TCE], tetrachloroethene [PCE], chlorobenzene [CB], and 1,2-dichloroethene [DCE]) are summarized below.

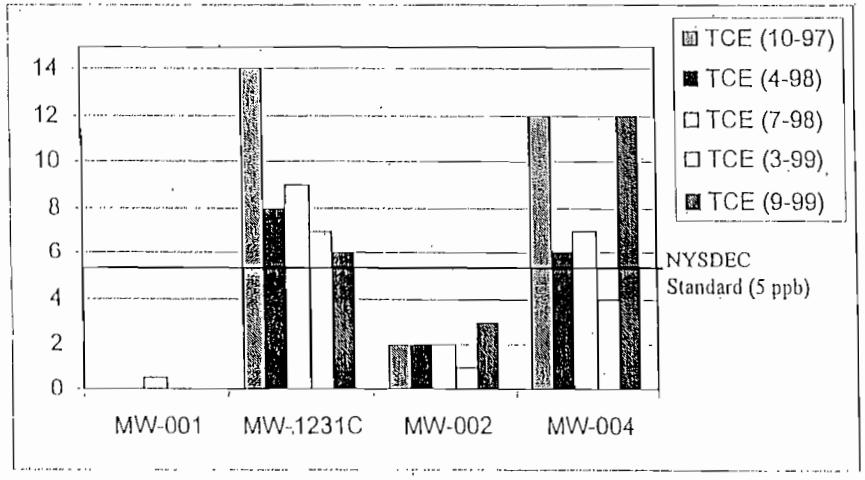
Trichloroethene (TCE): TCE concentrations exceed the NYSDEC groundwater standard at wells MW-1231C and MW-004. The concentration at the two wells were 6 ppb (part per billion) and 12 ppb, respectively, versus the NYSDEC groundwater standard of 5 ppb.

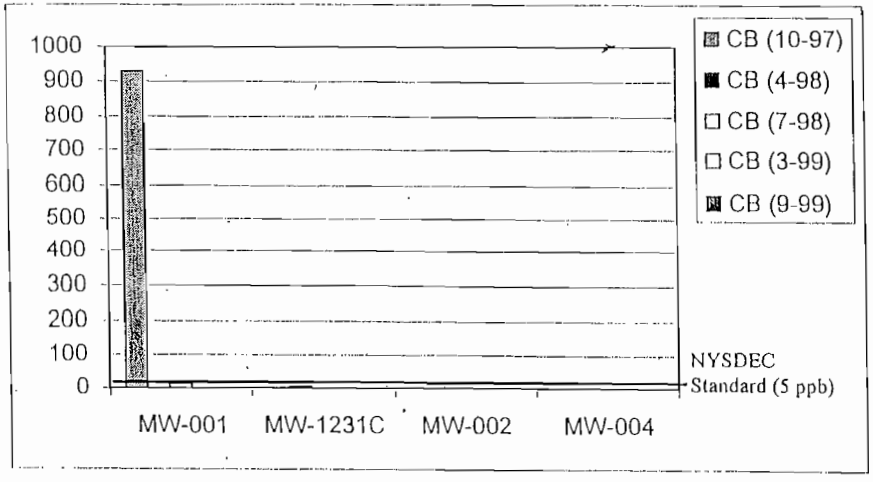
Tetrachloroethene (PCE): The concentration of PCE (12 ppb) at well MW-1231C continues to exceed NYSDEC groundwater standards (NYSDEC TOGS, June 1998). Concentrations of PCE at the other wells tested are below groundwater standards. The NYSDEC groundwater standard is 5 ppb.

One Remington Park Drive
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(315) 655-8161 Fax (315) 655-4180









Notes:
1) All measurements are in parts per billion (ppb)
2) TCE - trichloroethene, PCE - tetrachloroethene, DCE- 1,2-dichloroethene, CB - chlorobenzene
3) Due to dry conditions, MW-001 was not sampled for 9-99

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: 12/99 JOB No: 90060.10

VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Table 1
Groundwater Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY

	BUILDING 1231											GW
	MW-001					MW-1231C						
Compound (µg/l)	Oct-97	Apr-98	Jul-98	Mar-99	Sep-99	Oct-97	Apr-98	Jul-98	Mar-99	Sept-99		Std.
Chloromethane	U	U	U	NS	NS	U	U	U	U	U		50
Bromomethane	U	U	U	NS	NS	U	U	U	U	U		5
Vinyl Chloride	U	U	U	NS	NS	U	U	U	U	U		2
Chloroethane	U	U	U	NS	NS	U	U	U	U	U		5
Methylene Chloride	UJ	U	U	NS	NS	U	U	U	U	U		5
Acetone	U	U	U	NS	NS	U	U	U	U	U		50G
Carbon Disulfide	U	U	U	NS	NS	U	U	U	U	U		50
Vinyl Acetate	U	U	U	NS	NS	U	U	U	U	U		NOTNE
1,1-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U		5
1,1-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U		5
cis-1,2-Dichloroethene	38 J	2 J	5 J	NS	NS	14	6 J	6 J	4 J	3 J		5
trans-1,2-Dichloroethene	U	U	U	NS	NS	U	U	U	U	U		5
Chloroform	U	U	U	NS	NS	U	U	U	U	U		7
1,2-Dichloroethane	U	U	U	NS	NS	U	U	U	U	U		0.6
2-Butanone	U	U	U	NS	NS	U	U	U	0.8 J	U		5
1,1,1-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U		5
Carbon Tetrachloride	U	U	U	NS	NS	U	U	U	U	U		5
Bromodichloromethane	U	U	U	NS	NS	U	U	U	U	U		50G
1,2-Dichloropropane	U	U	U	NS	NS	U	U	U	U	U		1
cis-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U		0.4
Trichloroethene	U	U	0.5 J	NS	NS	14	8 J	9 J	7	6		5
Dibromochloromethane	U	U	U	NS	NS	U	U	U	U	U		50G
1,1,2-Trichloroethane	U	U	U	NS	NS	U	U	U	U	U		1
Benzene	8 J	U	U	NS	NS	U	U	U	U	U		1
trans-1,3-Dichloropropene	U	U	U	NS	NS	U	U	U	U	U		0.4
Bromoform	U	U	U	NS	NS	U	U	U	U	U		50
4-Methyl-2-Pentanone	U	U	U	NS	NS	U	U	U	U	U		50G
2-Hexanone	U	U	U	NS	NS	U	U	U	U	U		50G
Tetrachloroethene	U	0.7 J	U	NS	NS	50	60	67	45	43		5
Toluene	U	U	U	NS	NS	U	U	U	U	U		5
1,1,2,2-Tetrachloroethane	U	U	U	NS	NS	U	U	U	U	U		5
Chlorobenzene	930 J	U	9 J	NS	NS	U	8 J	U	U	U		5
Ethylbenzene	U	U	U	NS	NS	U	U	U	U	U		5
Styrene	U	U	U	NS	NS	U	U	U	U	U		5
Xylene (total)	U	U	0.7 J	NS	NS	U	U	U	U	U		5
Depth to Groundwater (ft.)	6.25	2.48	3.24	DRY	DRY	9.8	6.01	6.89	4.89	12.89		

NS: Not Sampled
* Treated as UOC
G: NYSDEC guidance value
ND: No Detectable amounts allowed.
All values in this table are based upon NYSDEC TOGS (October 1993) Revised June 1998.
Shaded areas indicate exceedances of standards

See attachment for other qualifiers

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS

FILE COPY

May 24, 1999

Mr. Bruce H. Mero, REM
Rome Laboratories
150 Electronic Parkway
Rome, NY 13441-4516

Re: Semiannual Monitoring of Groundwater
at the Verona Research Facility
S&W No. 90060.0

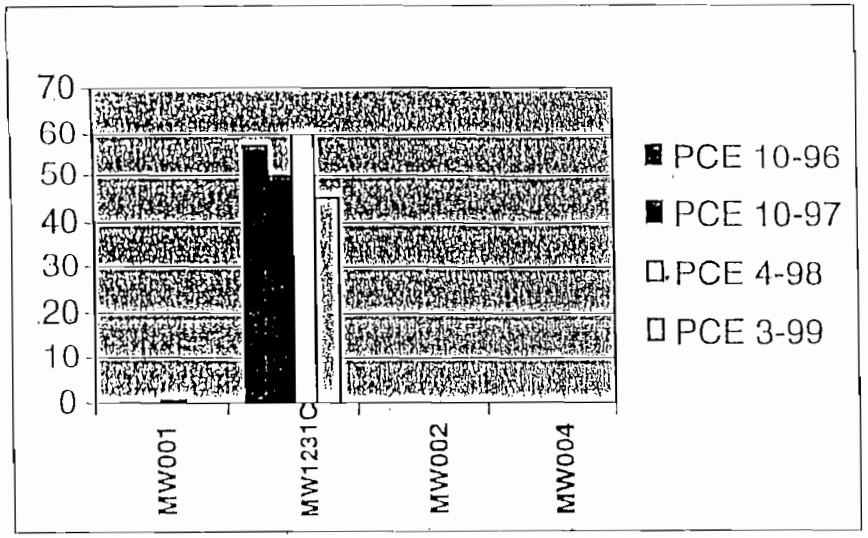
Dear Mr. Mero:

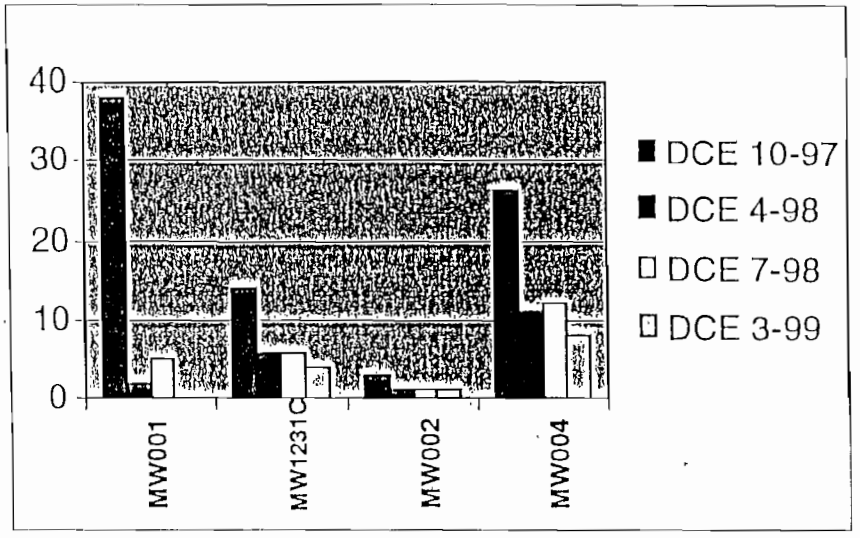
Following is a discussion of the results of the first of four rounds of groundwater sampling to be completed at the Verona Research Facility. This semiannual sampling requirement is the result of the completion of the Preliminary Site Assessment, which required that four monitoring wells be sampled during the course of two years to determine if concentrations of organic compounds are decreasing. The wells were selected because each had a history of being impacted by VOCs. Attached are summary tables of the analytical results from the first round of groundwater monitoring being completed at the Verona Research Facility. Included in the results are graphs of the trends of specific compounds of concern (trichloroethene, tetrachloroethene, chlorobenzene, and 1,2-dichloroethene). As noted on Figure 1, the concentrations have been monitored since October 1996.

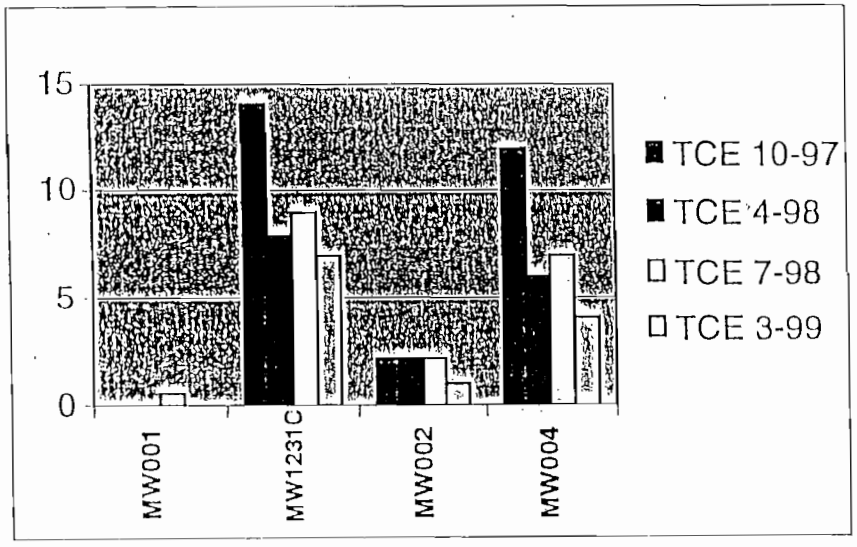
Groundwater samples were collected from well MW-1231C at Building 1231 and wells MW-002 and MW-004 at Building 1253. A sample was supposed to be collected from well MW-001 at Building 1231, however, due to snowplow damage to the well, the top portion of the water column was exposed and frozen, prohibiting the collection of a sample. In addition to groundwater, a single surface water sample, (SW-1) was collected near the outfall of the chlorine dosing chamber/sand filter to determine if impacted groundwater was migrating to Brandy Brook.

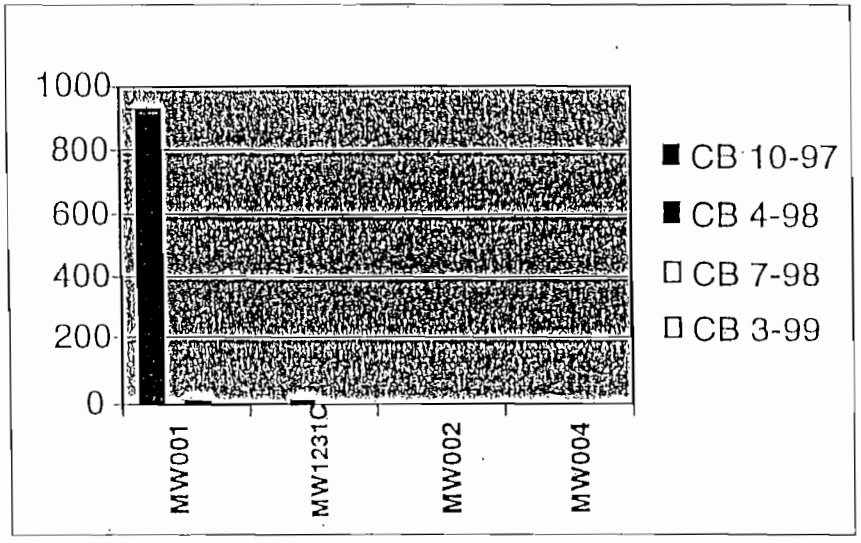
Table 1 illustrates the results of the groundwater analysis. The March 1999 results indicate that concentrations of TCE (7 ppb) and PCE (45 ppb) at well MW-1231C exceed groundwater standards (NYSDEC June 1998). Analytical results of the sample collected from well MW-002 at Building 1253 indicate that the concentration of 1,1-DCA (16 ppb) was above groundwater

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Note:
1. All measurements are in parts per billion (ppb)
2. TCE - trichloroethene PCE - tetrachloroethene
   DCE - 1,2-dichloroethene CB - chlorobenzene

Stearns & Wheler, LLC
ENVIRONMENTAL ENGINEERS & SCIENTISTS
CAZENOVIA, NEW YORK

DATE: 4/99 JOB No: 90060.10

VERONA RESEARCH FACILITY
VERONA, NY

FIGURE 1
Concentrations of VOCs in Groundwater

Table 1 (continued)
Groundwater
Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Mar-99

	Building 253										
Compound (ug/L)	MW-002/Oct-96	MW-002/Oct 97	MW-002/Apr-98	MW-002/Jul-98	MW-002/Mar-99	MW-004/Oct-96	MW-004/Oct 97	MW-004/Apr-98	MW-004/Jul-98	MW-004/Mar-99	
Chloromethane	U	10U	U	U	U	UJ	10U	U	U	U	50
Bromomethane	U	10U	U	U	U	U	10U	U	U	U	5
Vinyl Chloride	U	10U	U	U	U	U	10U	U	U	U	2
Chloroethane	UJ	10U	U	U	U	UJ	10U	U	U	U	5
Methylene Chloride	1J	10U	7J	U	U	U	10U	U	U	U	5
Acetone	UJ	10U	16B	U	U	UJ	10U	U	U	U	50G
Carbon Disulfide	U	10U	5J	U	U	U	10U	U	U	U	50
Vinyl Acetate	U	10U	U	U	U	U	10U	U	U	U	NONE
1,1-Dichloroethene	U	10U	3J**	2J**	U	U	10U	U	U	U	5
1,1-Dichloroethane	9J	18**	2J	2J	16**	U	10U	U	U	U	5
cis-1,2-Dichloroethene	3J	3J	1J	1J	U	9J	26**	11**	12**	8**	5
Trans-1,2-Dichloroethene	2J	1J	U	U	U	1J	7J**	2J	2J	2J	5
Chloroform	U	10U	U	U	U	U	10U	U	U	U	7
1,2-Dichloroethane	U	10U	U	U	U	U	10U	U	U	U	5
2-Butanone	U	10U	100**	29**	U	U	10U	U	U	U	5
1,1,1-Trichloroethane	U	2J**	180**	U	2J	U	10U	U	U	U	5
Carbon Tetrachloride	U	10U	U	U	U	U	10U	U	U	U	5
Bromodichloromethane	U	10U	U	U	U	U	10U	U	U	U	50G
1,2-Dichloropropane	U	10U	U	U	U	U	10U	U	U	U	5
cis-1,3-Dichloropropene	U	10U	U	U	U	U	10U	U	U	U	5
Trichloroethene	2J	2J	2J	2J	1J	7J	12**	6J	7J**	4J	5
Dibromochloromethane	U	10U	U	U	U	U	10U	U	U	U	5
1,1,2-Trichloroethane	U	10U	U	U	U	U	10U	U	U	U	50G
Benzene	U	10U	U	U	U	U	10U	U	U	U	5
trans-1,3-Dichloropropene	U	10U	U	U	U	U	10U	U	U	U	0.7
Bromoform	U	10U	U	U	U	U	10U	U	U	U	5
4-Methyl-2-Pentanone	U	10U	U	U	U	U	10U	U	U	U	50G
2-Hexanone	UJ	10U	U	U	U	UJ	10U	U	U	U	50
Tetrachloroethene	U	10U	U	U	U	U	10U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	10U	U	U	U	U	10U	U	U	U	5
Toluene	U	10U	U	U	U	U	10U	U	U	U	5
Chlorobenzene	U	10U	U	U	U	U	10U	U	U	U	5
Ethylbenzene	U	10U	U	U	U	U	10U	U	U	U	5
Styrene	U	10U	U	U	U	U	10U	U	U	U	5
Xylene (total)	U	10U	U	U	U	U	10U	U	U	U	5
Dichlorodifluoromethane	U	10U	U	U	U	U	10U	U	U	U	5
1,4-Dichlorobenzene	U	10U	U	U	U	U	10U	U	U	U	4.7
Depth to groundwater (ft)	1.58	5.52	2.43	2.99	1.55	1.31	5.64	2.64	3.56	NA	

* Treated as UOC
G: NYSDEC guidance value.
ND: No Detectable amounts allowed.
All groundwater standards in this table are based upon NYSDEC standards as of June 1998.
**Indicate increase in concentration

Table 2
Surface Water
Analytical Results
Volatile Organic Compounds
Verona Research Facility
Verona, NY
Mar-99

Compound (ug/l)	Sample ID SW1	SW Std.
Chloromethane	U	NS
Bromomethane	U	5
Vinyl Chloride	U	.3G
Chloroethane	U	5
Methylene Chloride	.7	5
Acetone	U	50G
Carbon Disulfide	U	NS
Vinyl Acetate	U	NS
1,1-Dichloroethene	U	.7G
1,1-Dichloroethane	U	5
cis-1,2-Dichloroethene	U	5
Trans-1,2-Dichloroethene	U	5
Chloroform	U	7
1,2-Dichloroethane	U	0.6
2-Butanone	U	50G
1,1,1-Trichloroethane	U	5
Carbon Tetrachloride	U	.4G
Bromodichloromethane	U	50G
1,2-Dichloropropane	U	1
cis-1,3-Dichloropropene	U	5
Trichloroethene	U	40**
Dibromochloromethane	U	50G
1,1,2-Trichloroethane	U	1
Benzene	U	10
trans-1,3-Dichloropropene	U	NS
Bromoform	U	50G
4-Methyl-2-Pentanone	U	NS
2-Hexanone	U	50G
Tetrachloroethene	U	1**
1,1,2,2-Tetrachloroethane	U	.2G
Toluene	U	6000**
Chlorobenzene	U	400**
Ethylbenzene	U	17G
Styrene	U	5G
Xylene (total)	U	5
Dichlorodifluoromethane	U	5G
1,4-Dichlorobenzene	U	5

*Class A water standard (NYSDEC, June 1998)
**Class, B,C,D water standard (NYSDEC, June 1998)
All standards in this table are based upon NYSDEC standards as of June 1998.

Appendix B

Site Boring Logs

ENGINEERING–SCIENCE DRILLING RECORD

BORING SB001W (MW001)

Contractor: North Star Drilling
Driller: Dave Lyons
Inspector: Scott Dillman
Rig Type: CME 45
Method: Hollow Stem Auger

PROJECT NAME Griffiss AFB, Verona Test Annex
Building 1231
PROJECT NUMBER SY43L02.01

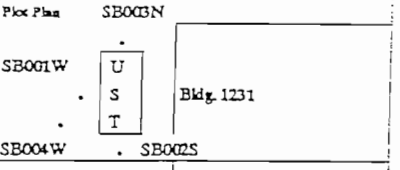
Location: West of tank

GROUNDWATER OBSERVATIONS

Water Level	SEE APPENDIX B			
Date				
Time				
Meas. From				

Weather mid 30's, cloudy, winds 5–10 mph
Date/Time Start 12/6/93 13:45
Date/Time Finish 12/6/93 15:09

Plot Plan



Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL SCHEMATIC	COMMENTS
		2					
							inside lock on PVC, no outer lock, flushmount bolts down
		1					
		0	.	A	0		
40+ NR			–	SS			concrete, 0–0.75'
		1		6	gray FILL, sand and gravel, little clay		2" pvc riser, 0.5–2', lock. cap
				8			bent. pellets, 0.75–1.75
		2		5	reddish brown SILT, some–little clay		
40+ NR			75	5	reddish brown SILT, little clay, trace gray silt, trace brown rust stain, moist		
		3		4	slow streaming cut		
				5			
		4		5			
–			80	6	reddish brown SILT, littl–trace clay, wet, trace brown rust stain		sand pack, 1.75–12'
		5		5			
				6			
		6		6			
18.2			60	4	reddish brown SILT.		
		7		6			2", 0.01 slot pvc screen
				9			2–12'
		8		7	fine SAND		
29	SB001W-		50	2	reddish brown SILT and fine SAND, wet (saturated), black mineral bands		
	1231B	9		2			
				5			
		10		7			
20			75	5	reddish brown SILT, trace fine sand, wet (saturated)		
		11		6			
				8			
		12		10			threaded PVC end cap
					boring terminated at 12'		TD 12'

STANDARD PENETRATION TEST
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED
NR = NOT RELIABLE (due to moisture and temperature)

SUMMARY:
0–1.3': FILL
1.3–7.9': SILT
7.9–8': SAND
8–10': SILT and SAND
10–12': SILT

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/3/98 Time 1600
Finish
Date 10/3/98 Time 1730

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1231A

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 35F, HARD FROST

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date :
Casing Depth: 11.0
Boring Depth: 12
Water Depth :

(ft)	Blow Counts	Samples	Graphic Log	PID (ppm)	Sample Description
	0 100			0 100	
					4" topsoil
					Brown, moist SILT, trace f sand
					Brown, moist SILT, trace f sand
					Gray, wet, m-c SAND and f-m GRAVEL
					Bottom of boring

Well Diagram

2" PVC Schedule 40 Riser
4" Schedule 40 Sleeve
2" PVC Schedule 40 0.01" slot screen
Bentonite Pellets/Portland Cement
Morie #0 Sand Pack

5
10
15
20

- sample attempt
- sample recovered
- grain size analysis performed, results tabulated elsewhere in report
- core attempt

Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/4/96 Time 1130
Finish
Date 10/4/96 Time 1345

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1231D

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 35F, HARD FROST

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date :
Casing Depth: 15.0
Boring Depth: 15
Water Depth :

(ft)	Blow Counts	Samples	Graphic Log	PID (ppm)	Sample Description
0	0 100			0 100	
					Dark brown, damp SILT (topsoil), grading to Red-brown, moist, SILT and f SAND
5					Red-brown, wet, silty f SAND,
					Gray, wet, loose, silty f SAND
					Gray, wet, loose, silty f SAND
					Bottom of boring
20					

Well Diagram

2" PVC Schedule 40 Riser
4" Schedule 40 PVC Sleeve
Bentonite Pellets
Portland Cement
2" PVC Schedule 40 0.01" slot screen
Morie #0 Sand Pack

5
10
15
20

– sample attempt
– sample recovered
– grain size analysis performed, results tabulated elsewhere in report
– core attempt

Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

ENGINEERING–SCIENCE DRILLING RECORD

BORING SB004W (MW004)

Contractor: North Star Drilling
Driller: Dave Lyons
Inspector: Scott Dillman
Rig Type: CME 45
Method: Hollow Stem Auger

PROJECT NAME Griffiss AFB, Verona Test Annex
Building 1253
PROJECT NUMBER SY43L02.01

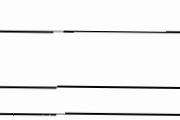
Location: West of tank

GROUNDWATER OBSERVATIONS

Water Level	SEE APPENDIX B		
Date			
Time			
Meas. From			

Weather Clear, 30's
Date/Time Start 12/9/93 15:04
Date/Time Finish 12/9/93 15:26

Plot Plan SB002N



Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL SCHEMATIC	COMMENTS
		2					inside lock on PVC, no outer lock, flushmount bolts down
		1					
		0		A	0		
				SS			concrete, 0–0.75'
13.1		1	50	7	FILL, tan gravel, some sand, little silt, upper 2" stained		2" pvc riser, 0.5–2', lock, cap
				7	SILT, some clay, black stained		bent. pellets, 0.75–1.75
		2		5			
24.1	SB004W1243A	3	80	4	reddish brown SILT, little clay,		
				5			
				4	reddish brown very fine SAND		
		4		6			
12.6			70	6	reddish brown SILT, little clay, wet		sand pack, 1.75–12'
		5		6			
				2			
		6		2			
2.5			75	3	greenish gray SILT, plant material, little–trace clay, moist–wet, slight halo cut		
		7		4			2", 0.01 slot pvc screen 2–12'
				6			
		8		7	reddish brown SILT and very fine SAND		
2.2			65	2	greenish gray SILT, plant material, wet		
		9		3			
				3	reddish brown SILT and very fine SAND		
		10		3			
23			75	3	reddish brown SILT and very fine SAND, wet		
		11		6			
				8			
		12		9			threaded PVC end cap
					boring terminated at 12'		TD 12'

STANDARD PENETRATION TEST
SS = SPLIT SPOON
A = AUGER CUTTINGS
C = CORED
NR = NOT RELIABLE (due to moisture and temperature)

SUMMARY:

	0–1.75': FILL	7.5–8': SILT and SAND
	1.75–3': SILT	8–9': SILT
	3–4': SAND	9–12': SILT and SAND
	4–7.5': SILT	

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/7/96 Time 1047
Finish
Date 10/7/96 Time 1212

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1253D

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 45F

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date : 10/9/96
Casing Depth: 15.0
Boring Depth: 15
Water Depth : 5.72

(ft)	Blow Counts	Samples	Graphic Log	PID (ppm)	Sample Description
0	100			0 100	
					Red-brown, mottled, moist, f sandy SILT
5					Dark brownto red-brown, wet, stiff, f sandy SILT to SAND and SILT
					Red-brown, wet, stiff, SILT and f SAND
					Dark brown, wet, stiff SILT trace little f sand
					Bottom of boring

Well Diagram

2" PVC Schedule 40 Riser
4" Schedule 40 PVC Sleeve
Bentonite Pellets
Portland Cement
2" PVC Schedule 40 0.01" slot screen
Morie #0 Sand Pack

5 10 15 20

= sample attempt
= sample recovered
= grain size analysis performed, results tabulated elsewhere in report
= core attempt

Descriptions in log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

Appendix C

Well Decommissioning Procedures

DECOMMISSIONING PROCEDURES

NYS SUPERFUND STANDBY CONTRACT
WORK ASSIGNMENT D002852-10

NPL SITE MONITORING WELL DECOMMISSIONING

NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION

MAY 1995
Revised October 1996

- Casing pulling.
- Overdrilling.
- Grouting the casing in-place.
- Perforating the casing followed by grouting in-place.

A general discussion of each decommissioning procedure is presented in Sections 2.1 through 2.4.

2.1 CASING PULLING

In general, casing pulling is the preferred method for decommissioning wells where: no contamination is present; contamination is present but the well does not penetrate a confining layer; and when both contamination and a confining layer are present but the contamination cannot cross the confining layer. Additionally, the well construction materials and well depth must be such that pulling can be effected without breaking the riser.

Casing pulling involves removing the well casing by lifting. The procedure for removing the casing must allow grout to be added during pulling. The grout will fill the space once occupied by the material being withdrawn. Grout mixing and placement must be performed according to the procedures in Section 9.0.

An acceptable procedure to remove casing involves puncturing the bottom of the casing, flushing with water to remove sand (if necessary to mitigate lock-up of the casing during pulling), filling the casing with grout tremied from the bottom of the well, using jacks to free casing from the hole, and lifting the casing out by using a drill rig, backhoe, crane, or other suitable equipment. Additional grout must be added to the casing as it is withdrawn. In wells or wellpoints in which the bottom cannot be punctured, the casing or screened interval will be perforated prior to being filled with grout. This procedure should be followed for wells installed in collapsible formations or for highly contaminated wells. At site locations in which the borehole does not collapse it may not be necessary to perforate the well casing prior to pulling the well (i.e., grouting the borehole can be completed after the well materials have been removed). However, measurements of the borehole depth must

be taken before and after the well is pulled to ensure that no collapse of well construction or formation materials occurred.

In the event that the casing or well screen is severed during casing pulling or if borehole collapse occurs, the remaining materials can be removed by overdrilling using the conventional augering method described in Section 2.2. In situations where well materials such as PVC screens and risers are suspected to sever, and removal of all well materials is required (i.e., at wells that are contaminated or those that penetrate an aquiclude), the contractor should install rods inside the well so that the rods would serve as a steel guide pipe for advancing augers during overdrilling.

At sites in which well casings have been grouted into a rock socket the casing pulling procedure may not be feasible. An alternative procedure involving overdrilling into the bedrock, pulling the casing, and subsequently grouting the openhole interval may be employed. For uncontaminated wells or wells with low levels of contamination, overdrilling, grinding on the rock, and grouting inside and outside of the well should be acceptable if the casing cannot be pulled. When this procedure is not acceptable and the casing must be pulled from a contaminated well, a spin and flush drilling technique may be used to advance flushpoint casing equipped with a diamond cutting shoe to the bottom of the casing socket. Water used during the spin and flush casing advancement will be controlled by the use of oversized casing, a coupling and a drilling tee. Drilling water will be containerized and disposed of in accordance with the site specific Material Handling and Disposal Plan.

2.2 OVERDRILLING

Overdrilling is used where casing pulling is determined to be unfeasible, or where installation of a temporary casing is necessary to prevent cross-contamination, such as when a confining layer is present and contamination in the deeper aquifer could migrate to the upper aquifer as the well was pulled (see Section 2.5). The overdrilling method should:

- Follow the original well bore.
- Create a borehole of the same or greater diameter than the original boring.
- Remove all of the well construction materials.

tively, the soil within the annular space may be removed by raising the augers to allow the soil to fall out and re-advance the augers to the original target depth. Grout should then be tremied within the annular space between the augers and well casings. The grout level in the borehole should be maintained as the drilling equipment and well materials are sequentially removed. After overdrilling is completed, the borehole must be grouted according to the procedures in Section 9.0 and the upper five feet of borehole must be restored according to the procedures in Section 10.0.

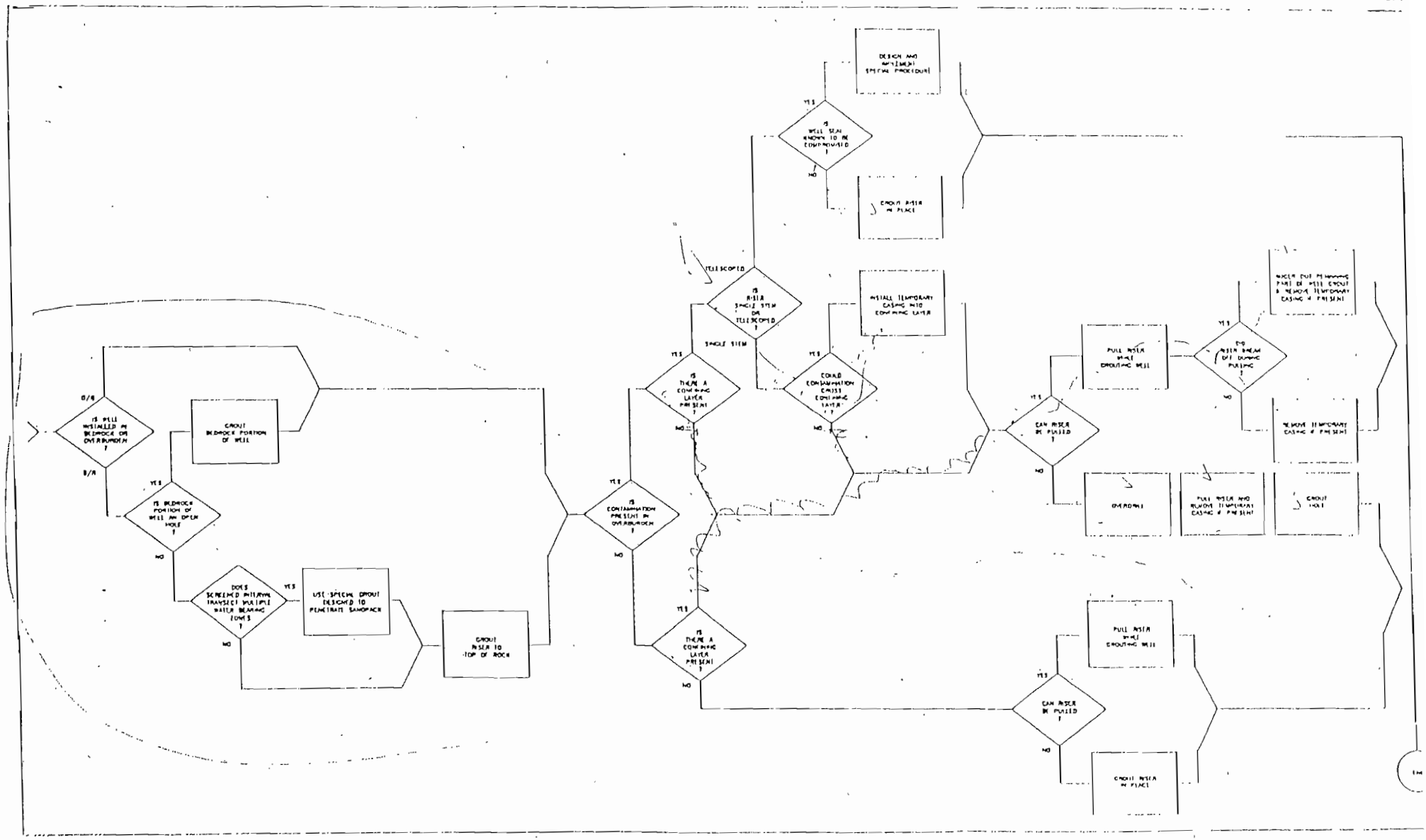
2.3 GROUTING IN-PLACE

Grouting in-place is the simplest decommissioning procedure, but offers the least long-term protection of all the methods. As discussed in Section 2.5, however, this method is preferred for the bedrock portion of bedrock wells, and is used for decommissioning cased wells in certain situations. For cased wells, the procedure involves filling the casing with grout to a level of five feet below the land surface, cutting the well casing at the five-foot depth, and removing the top portion of the casing and associated well materials from the ground. The casing must be grouted according to the procedures in Section 9.0. In addition, the upper five feet of the borehole is filled to land surface and restored according to the procedures described in Section 10.0.

For wells installed in bedrock, the procedure involves filling the casing (or open hole) with grout to the top of rock according to the procedures in Section 9.0. The grout mix, however, will vary according to the hydrogeological conditions as discussed in Section 2.5.

It should be noted that for wells located on landfills regulated under 6NYCRR Part 360, the screened interval of the well must be sealed separately and hydrostatically tested to ensure its adequacy before sealing the remaining borehole. The Standard Operating Procedure (SOP) for the hydrostatic test has been included under Appendix D.

PLA



MULTIPLE NPL SITES
WELL DECOMMISIONING
DECOMMISSIONING PROCEDURE SELECTI
FLOWCHART

NYSDEC

MARCH

well can be pulled without breaking. If the well cannot be pulled, such as in the case that a bedrock portion of the well has already been grouted in place, or if the well materials and depth prohibit pulling or will likely result in breakage, the well should be grouted in-place as accordance with Section 2.3 (if the casing is less than 4-inch in diameter) or Section 2.4 (if the casing diameter is 4-inches or larger).

If the overburden portion of the well penetrates a confining layer, the casing should be removed by pulling (if possible) in accordance with Section 2.1. If the casing cannot be removed by pulling, the well should be removed by overdrilling. The overdrilling method used will depend on the site-specific conditions and requirements. If pulling is attempted and fails (i.e., a portion of the riser breaks) the remaining portion of the well should be removed by using the conventional augering procedure identified in Section 2.2. In all cases, after the well construction materials have been removed, the borehole will be grouted in accordance with Section 9.0 and the upper five feet will be restored in accordance with Section 10.0.

2.5.4 Contaminated Overburden Wells

If an overburden well or the overburden portion of a bedrock well is contaminated as evidenced by historical sampling results, the first decision point in selecting a decommissioning procedure is whether the well penetrates a confining layer. If the well does not penetrate a confining layer, the selection process follows the same pathway as for uncontaminated wells that penetrate a confining layer (i.e., the casing is pulled, if possible; otherwise the well is overdrilled - see Section 2.5.3). Plastic sheeting should be placed around the well surface to contain contaminated materials displaced during removal of the well.

For overburden wells that are contaminated and which penetrate a confining layer, the next selection criteria is whether the well riser is a single stem or is telescoped inside one or more outer casings. The procedures to be followed in determining the decommissioning method are presented for both situations below.

Appendix D

Field Sampling and Analysis Plan

comparison of QC data with laboratory control charts for each test.

E. **Data Validation.** In certain cases, and as required by NYSDEC, analytical data collected during this project may be subject to data validation. The purpose of data validation is twofold: 1) to determine whether proper analytical procedures have been followed and can be documented; and 2) to determine whether the data are technically reasonable.

The parameters discussed above (precision, accuracy, representativeness, comparability, and completeness) will be integrated with the geochemical analysis and site characterization in order to assess the technical reasonableness of the results.

SECTION 1

DATA QUALITY OBJECTIVES AND QA/QC

Analytical procedures will be performed by a New York State Department of Health - Environmental Laboratory Approval Program (NYSDOH-ELAP) certified laboratory and in accordance with NYSDEC Analytical Services Protocol (ASP). Field blanks and duplicate samples will be collected for QA purposes according to NYSDEC requirements. Number and frequency of blanks and duplicates is itemized by matrix group in SAP Section 2, Field Sampling Procedures (FSP).

Special consideration will be given to the method detection limits for each parameter to ensure that promulgated maximum contaminant levels (MCLs) are within the detectable range wherever possible.

The quality assurance/quality control objectives for measurement data include completeness, representativeness, comparability, precision, and accuracy.

A. **Completeness.** The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study, as specified in Section 4 of the operations, Monitoring, and Maintenance (OM&M) Plan for the site.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. The data quality objective for this project is 100 percent completeness with the work plan.

B. **Representativeness.** Representative samples of the population will be obtained, and where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where volatile organic parameters are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory,

boring logs and/or a comparison of groundwater elevations if the well is part of a cluster. Any problems noted on the boring logs pertaining to the well seal, such as bridging of bentonite pellets or running sands, or disparities between field notes (if available) and the well log would indicate the potential for a poor well seal. Alternatively, if the well is part of a cluster a comparison of groundwater elevations between the shallow and deep wells should also be performed. By observing trends at other clusters it may be possible to identify inconsistencies in groundwater elevations at the well slated for decommissioning, thereby indicating a poor well seal.

If there is no evidence that the well seal integrity is compromised, the riser should be grouted in-place in accordance with Section 2.3 or 2.4, depending on the diameter of the well casing, and the upper 5 feet of the well surface should be restored in accordance with Section 10.0. If indications are that the well seal is not competent, it will be necessary to design and implement a special procedure to remove the well construction materials, as the presence and configuration of the outer casing(s) will be specific in the individual wells and will be a key factor in the decommissioning approach. The special procedure should be designed to mitigate the potential for cross-contamination during removal of the well construction materials, and should be designed prior to initiating field work.

3.0 PREPARATION OF A SITE-SPECIFIC HEALTH AND SAFETY PLAN

Prior to initiating decommissioning activities at a site, it is necessary to prepare a site-specific health and safety plan (HASP) in accordance with the requirements of 29 CFR 1910.120. Accordingly, the HASP should include:

- The names of key personnel responsible for site health and safety, including an appointed site health and safety officer.
- A safety and health risk analysis for each site task and operation.
- Employee training requirements.
- Personal protective equipment (PPE) to be used by employees for each of the site tasks and operations being conducted.

Fluids generated during the decommissioning program will generally be contained in 55-gallon drums unless extremely large volumes are expected; in this case 5,000-gallon tankers or other suitable temporary storage may be used. All drums will be initially labeled according to the wastewater source(s) and will be assumed to contain the same contaminants as the groundwater measured by the particular monitoring well being decommissioned. All 55-gallon drums containing fluids should be sealed and temporarily stored at the decontamination pad until final off-site disposal at an approved treatment facility.

4.1.3 Characterization

Hazardous waste characterization is necessary to determine the nature of the waste materials, to verify whether the materials are hazardous, and to determine proper disposition. Characterization of waste materials will be conducted at each of the sites to determine the appropriate disposal requirements. The decision as to the number, location and types of samples to be collected will be site specific and will depend on factors such as the quantity of waste generated and type of containers used, the nature of the waste, and the distribution of contaminant types across the site with respect to the origin of the waste materials. In general, the sample collection program will be designed to ensure that analytical data representative of all the materials to be disposed will be generated from the minimal number of samples. This may be accomplished by means such as:

- collection of composite samples for contaminants such as metals and PCBs (compositing is not typically acceptable for volatile organic compound analyses).
- collection of grab samples from select drums/containers suspected of elevated contaminant concentrations based on visual observation (e.g., soil staining, liquid sheen or non-aqueous product) or PID screening

Sample analysis will be based on site history and the requirements of the disposal facility. At a minimum, the samples should be analyzed for the parameters of concern indicated by past monitoring well analytical results, as well as the hazardous waste

waste land disposal facility. For each shipment the generator is required to provide the following manifest information:

- Hazardous Waste Code(s)
- Corresponding concentration-based or technology-based treatment standards.
- Manifest number.
- Waste analysis data.
- Certification Statement per 40 CFR 268.7(a)(2)(D)(ii).

In addition, the generator is required to maintain the records specified in 40 CFR Part 268.7(a)(7) for a minimum of 5 years.

6) If the waste fails to meet any of the treatment standards listed in 40 CFR Part 268, it must be sent to a treatment, storage, or recycling facility. If the waste's treatment standard is technology-based, it must be treated in accordance with the specified method. Land disposal is not allowable unless the waste is eligible for a National Capacity Variance (40 CFR Subpart C) and meets the California List standards. In all cases, the notification and recordkeeping requirements identified above must be fulfilled by the generator.

The hazardous waste will be transported in accordance with DOT regulations (49 CFR Parts 172-173) to either a secure hazardous waste landfill or TSDF, as appropriate. The contractor will be responsible for arranging for proper transportation and the disposal of the wastes. The Engineer will sign a hazardous waste manifest, as an agent of the Owner.

SECTION 2

FIELD SAMPLING PROCEDURES

The sampling program for the site consists of representative sampling of groundwater, surface water, leachate, and gas. The sampling program has been developed in order to assess the impacts of landfill-related activities on the environment, if any. Samples will be handled in accordance with these Field Sampling Procedures and the Quality Assurance Plan.

Completed laboratory information and chain-of-custody sheets will be provided by the laboratory. The minimum information to be included on the chain-of-custody form is as presented on the attached standard form. The laboratory staff will insert preservation chemicals into sample bottles prior to sample collection and provide the state documentation regarding holding times and sample preservation techniques.

A. **Bottle Preparation.** It is important to use the proper sample containers in order to protect against the alteration of the groundwater chemistry between the field and the laboratory. Sample containers will be prepared by the laboratory. Proper preservation will be performed, the jars tagged, and the chain-of-custody initiated prior to shipping.

B. **Sample Designation.** Sampling locations of a particular matrix type (surface water, groundwater) will be given a unique sample designation. The sample designation consists of matrix type, location, site name, date and time of sampling. Sample matrices are identified by a short alphanumeric prefix to the sample location number. A list of prefixes for various matrices is shown below:

MW - Groundwater
SW - Surface water

Sample bottles will be labeled individually. Each label will identify the site name, depth, matrix and sample location (i.e., MW-1, SW-1) and date and time of sample collection. Chain-of-custody forms and field log book entries should refer to each sample in the same manner. No two samples will carry the same sample designation.

C. Monitoring Well Sampling Techniques.

To avoid being splashed during decontamination, the sampler shall wear a Tyvek suit, goggles and a pair of nitrile gloves over PVC gloves. Outer gloves must undergo decontamination procedures simultaneously with equipment.

3. **Procedure.**

a. Wash in alconox and water; use bottle brush on inside of bailers; use bottle brush or scrub brush as necessary; wipe with paper towel.

b. Rinse with tap water; be sure to rinse hands (collect rinse solution in wash bucket).

c. Rinse with methanol or hexane and allow to air dry; rinse hands.

d. Rinse with deionized water; air dry.

e. Dispose of rinse water properly.

4. **Groundwater Sampling by Bailer.** Below are listed step-by-step procedures for sampling monitoring wells using bailers. The protocol is designed to provide representative samples while reducing the chances for cross contamination between sampling points. Toward this end, disposable or dedicated bailers should be used. In addition, sampling shall proceed from the least likely to the most likely contaminated locations.

5. **Bailer Sampling Procedure.**

a. **Preparation.**

1) Review sampling plan.

2) Order sample bottles from laboratory.

3) Notify interested parties (regulators, client) of sampling event.

4) Receive bottles. Check for proper bottles and chain-of-custody information.

7) Clean the well cap with a clean towel, remove the well cap, and plug, placing both on the plastic sheet. Do not use petroleum products or aerosol lubricants to free.

8) Measure water levels in all monitoring wells prior to purging any of the wells. Using an electric water level indicator, measure the depth to the water table to the nearest 0.01 foot. If free-phase product is present, use an oil-water interface probe or a clear bottom-valve bailer to determine the thickness of the free product. Record this information in the field book.

9) Clean the well depth probe and rinse it with deionized water after use.

10) Compute the volume of water in the well and record this volume in the field book.

11) Attach enough polypropylene rope to a bailer to reach the bottom of the well and lower the bailer slowly into the well, making certain to submerge it only far enough to fill it one-half full. The purpose of this is to recover any oil film if one is present on the water table. If floaters or sinkers are present in the well, then thoroughly describe the color, appearance, thickness, and odor in the field book. The need for and type of chemical analysis will be determined on an as needed basis depending on the nature of the non-aqueous phase liquid.

12) Pull the bailer out of the well, keeping the polypropylene rope on the plastic sheet. Empty the groundwater from the bailer into a clean glass quart container and observe its appearance. Note: This sample will not undergo laboratory analysis and is collected to observe the physical appearance of the groundwater only.

13) Record the physical appearance of the groundwater in the field book.

14) Initiate bailing the well from the top of the water column, making certain to keep the polypropylene rope on the plastic sheet. Groundwater should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well. The purged water should be screened with the photoionization

this information in the field book. The beaker must then be rinsed with distilled water prior to reuse.

21) Begin the chain-of-custody record. A separate entry is required for each well with the required analysis listed individually.

22) Replace the well cap and lock the well protection assembly before leaving the well location.

23) Place the polypropylene rope and disposable bailer, gloves, rags and plastic sheeting into a plastic bag for disposal.

6. **Surface Water Sampling.** When sampling from surface water bodies, care must be exercised to collect a representative sample. The sample should cause as little disturbance to the water body as possible. Avoid taking a sample of water which shows evidence of sediment, debris or other material which may have been stirred up by the presence of the sampler.

The surface water samples should not contain bottom sediment. In shallow moving water, downstream samples will be collected first to avoid disturbing the sediment bottom.

7. **Surface Water Sampling Procedure.**

a. **Preparation.**

1) Design sampling plan.

2) Order sample bottles from laboratory.

3) Notify interested parties (regulators, client) of sampling event.

4) Receive bottles. Check for proper bottles and chain-of-custody information.

5) Attend pre-sampling meeting.

D. **Corrective Action.** The field sampling procedure will be followed as described in this document. In the event of a problem, any corrective measures taken will be documented in the sampling report submitted to the NYSDEC. The documentation will include a description of the deficiency, the corrective action taken, and the persons responsible for implementing the corrective action. Any alterations to the field sampling procedures shall be included as an amendment to the SAP.

E. **Field QA/QC.** In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses. The blanks will consist of 40ml VOA vials as follows:

1. **Trip Blank.** A trip blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, deionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for volatiles is planned (water matrix only). The trip blank will be analyzed for volatile organic compounds as a measure of the internal laboratory procedures and their effect on the results.

2. **Field (Wash) Blanks.** Field wash blanks are analyzed to check the effectiveness of decontamination. Each sample consists of distilled deionized water (prepared by the laboratory) poured through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure prior to sampling of a monitoring well. The wash blank can be analyzed for all or some of the compounds which the subsequent monitoring well sample is scheduled for. In the event dedicated sampling equipment (i.e., disposable bailers) is used such that decontamination procedures are not warranted, field blanks will not be included for analysis.

3. **Duplicate Samples.** One duplicate sample will be collected during each sampling event. The duplicate sample will be collected from one of the monitoring wells sampled in that event, and will be analyzed for either routine, baseline, or expanded parameters, consistent with whichever parameter list is being targeted for that particular sampling event. The sample containers for the duplicate sample will not reveal the identity of the well from which the sample is collected. The results of the duplicate analyses will be used to check for analytical integrity.

k. Separate sampler's copy of chain-of-custody and keep with field notes.

l. Tape paperwork (COC, manifest, return address) in ziplock bag to inside cooler lid.

m. Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.

n. Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

2. **Shipping.** Because holding times are very important for accurate laboratory analyses, it is imperative that samples arrive at the lab as soon as possible following sampling. Samples must be hand delivered on the same day as sampling or sent via overnight mail. When using a commercial carrier, follow the steps below.

a. Securely package samples and complete paperwork.

b. Weigh coolers for air transport.

c. Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.

d. Keep customer copy of air bill with field notes and chain-of-custody form.

e. When coolers have been released to transporter, call receiving laboratory and give information regarding samplers' names, method of shipment, cooler identification numbers, and expected time of arrival.

f. Call lab on day following shipment to be sure samples arrived intact. If bottles are broken, locations can be determined from chain-of-custody and resampled.

SECTION 3

LABORATORY QUALITY ASSURANCE PLAN

The quality assurance plan of the analytical laboratory will be included as Section 3 of the Field Sampling and Analysis Plan (Appendix D - Verona Research Facility OM&M Plan) and subject to approval by NYSDEC. The analytical laboratory will carry NYSDOH-ELAP certification, and will provide NYSDEC ASP Category B deliverables. Laboratory QA/QC procedures will ensure that complete and thorough data validation can be carried out for all sampling events.

The ambient water quality standards and guidance values have been determined by the NYSDEC in order to protect the State's waters. The minimum detection limit for water parameters will be specified as the practical quantitation limits (PQLs). The PQLs are the lowest concentration of analytes in groundwater that can be reliably determined under normal laboratory practices. For any water quality parameter, if the PQL is less than the water quality standard, the minimum detection limit for the parameter will be the PQL. But if the PQL is greater than the water quality standard, the minimum detection limit will be the water quality standard.

The analytical quality assurance (AQA) and analytical quality control (AQC) interpretations for the sampling program will be provided by the laboratory analyzing the samples. The laboratory will provide a discussion the AQA/AQC programs, including AQA/AQC goals and procedures for environmental monitoring. This discussion will include such items as: 1) quality objectives of project; 2) laboratory employee qualifications; 3) AQC procedures; and 4) standard operating procedures for all aspects of environmental monitoring, including sample bottle preparation, sample preservation, holding times, and analytical methods.

Should circumstances require, specific laboratory standard operating procedures will be submitted to the NYSDEC regarding the following:

1. Receipt, storage, and handling of samples.
2. Sample scheduling to ensure holding times are met.
3. Reagent and standard preparation.
4. General laboratory techniques.
5. Description of analytical performance.
6. Equipment calibration.

SECTION 4

DATA QUALITY ASSESSMENT AND USEABILITY ANALYSIS

Data validation and data useability analyses may be performed on the analytical data at the request of NYSDEC.

The QA/QC objectives for the site data are as follows:

A. **Completeness.** The analyses performed must be appropriate and inclusive. The parameters selected for analysis are chosen to meet the objectives of the study, as specified in Section 4 of the OM&M Plan.

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and validated. The data quality objective for this project is 100 percent completeness with the work plan.

B. **Representativeness.** Representative samples of the population will be obtained, and where appropriate, the population will be characterized statistically to express the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process, or environmental condition.

Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with pesticide-grade methanol, followed by a thorough rinse with distilled water. Specific cleaning techniques are described in the Field Sampling Procedure. Two types of blank samples will accompany each sample set where volatile organic parameters are to be analyzed (water matrix only). A trip blank, consisting of a 40 ml VOA vial of organic-free water prepared by the laboratory, will accompany each set of sample bottles from the laboratory to the field and back. This bottle will remain sealed throughout the shipment and sampling process. This blank will be analyzed for volatile organic compounds along with the groundwater samples to ensure that contamination with volatile compounds has not occurred during the bottle preparation, shipment and sampling phase of the project. In order to check for contaminant carryover when non-dedicated sampling equipment is used, a rinsate blank will be submitted to the laboratory. This blank will also be analyzed for volatile organic compounds.

with the geochemical analysis and site characterization in order to assess the technical reasonableness of the results.

Data validation by the laboratory will be allowed for routine sampling events, but will be performed by a person other than the laboratory for baseline or expanded sampling events.

Data useability analyses will include a discussion of data quality objectives, a comparison of current data with data from previous sampling events, an evaluation of field blank and trip blank analytical results, an evaluation of possible matrix effects, and integration of the data with known hydrogeological and meteorological data.

The data validator will be trained in appropriate data validation methodology, and will, at a minimum, be proficient at completing validation pursuant to the guidelines set forth in SW-846. In general, the validator will note the following information as part of the validation process:

1. Check all chains and supplied paperwork (notebooks, logs, etc.).
2. Check the chromatograms. (Do they look reasonably clear and exhibit good peaks?)
3. Check the retention times. (Is there a drift?)
4. Calculate the response factors (RF) and relative response factors (RRF).
5. Check integration method. (If available, peak area or peak height?)
6. Check verification standard. (Does it pass?)
7. Check tune (GC/MS only. Does it pass?)
8. Check quantification ion. (GC/MS only. Is the right one being used?)
9. Percent probability. (GC/MS only for TICs. Is it reasonable?)
10. Check alternate column verification. (GC only. Was it run? Was it required?)
11. Other verification standards. (Do they pass? LCS? QC STD? SPCC? CCC?)
12. Is the RF and RRF drifting?
13. Check matrix spike (MS) and matrix spike duplicate (MSD).
14. Check sample and sample duplicate.
15. Check the surrogates and their RF and RRF.
16. Are blanks free of contamination?

Appendix E

Site Health and Safety Plan

SUBSTANCE	MATERIAL (MATERIAL NAME, E.G., VITON)
1,4 dichlorobenzene	Level D, Respirator
chlorobenzene	Level D, Respirator

NO CHANGE TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE PROJECT TEAM LEADER.

G. SITE HEALTH AND SAFETY PLAN.

1. **Emergency Medical Care.** Oneida City Hospital is located 10 minutes from this location. A route map to this facility will available at the field vehicle. Directions are attached.

   First aid equipment is available on site at the following locations:

   First aid kit Field vehicle

   List of emergency phone numbers:

AGENCY/FACILITY	PHONE NUMBER
Police (Oneida County Sheriff)	911
Fire	911
Ambulance	911
Hospital (Oneida City Hospital)	(315) 363-1437

2. **Environmental Monitoring.** The following environmental monitoring instruments shall be used on site at the specified intervals:

   - MiniRAE photoionization detector (PID). Continuous during installation of soil gas monitoring probes.

3. **Emergency Procedures.** The following standard procedures will be used by on-site personnel. The Site Safety Officer shall be notified of any on-site emergencies and be responsible for ensuring that the appropriate procedures are followed:

   a. **Personnel Injury in the Work Zone.** Upon notification of an injury in the Work Zone, the designated emergency signal, a continuous horn blast, shall be sounded. A rescue team will enter the Work Zone (if required) to remove the injured person to safety. Appropriate first aid shall be initiated and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall re-enter the Work Zone until the cause of the injury or symptoms is determined.

   b. **Fire/Explosion.** Upon notification of a fire or explosion on site, the designated emergency signal, a continuous horn blast, shall be sounded and all site personnel assembled at the decontamination line. The fire department shall be alerted and all personnel moved to a safe distance from the involved area.

ROUTE TO ONEIDA CITY HOSPITAL

From VRF entrance, turn LEFT on Route 31.

After approximately 1 mile, turn RIGHT on Route 365 West

After approximately 5 miles, turn RIGHT on Route 365A.

After approximately 1 mile, turn RIGHT on Route 46. Hospital is 1.2 miles after turn.

SUBSTANCE	MATERIAL (MATERIAL NAME, E.G., VITON)
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Appendix F

Spill Prevention Control and Countermeasure Plan

OIL SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN VERONA RESEARCH FACILITY

Prepared for

ARFL/IFOCV

Prepared by

Lu Engineers
2230 Penfield
Penfield, New York 14526

September 1999

Project No. 13118

GENERAL INFORMATION

1. Name of Facility: Verona Research Facility

2. Type of Facility: Onshore-aboveground and underground bulk storage facility

3. Location of Facility: Germany Road, Verona, NY 13478

4. County: Oneida

5. Distance and Direction to Nearest Town:

   Verona Station, approximately 1 mile southeast

6. Name and Address of Owner:

   Name: AFRL/IFOCV c/o Mr. Bruce H. Mero
   Address: 150 Electronic Parkway, Rome, NY 13441

7. Designated person accountable for facility spill prevention:

   Name and Title: Mr. Eugene McDonald, Real Property Manager
   Site Address: 5887 Germany Road, Verona, NY 13478

   Mailing Address. Rome Research Corp., 314 S. Jay Street, Rome, NY 13440

8. Facility has not experienced a reportable petroleum spill event during the previous 12 months.

9. Potential Spill Sources, Flow Predictions, and Controls: See Tables 5 and 6.

10. Personnel and Hours of Operation:

    7:00 a.m. - 5:00 p.m., Monday through Friday.

    Approximately 4 full-time personnel.

MANAGEMENT APPROVAL

This Spill Prevention Control and Countermeasure Plan is fully supported by Rome Research Site/IFOCV management, who will implement the Plan and amend it as needed due to facility expansions, modifications, and improvements

Signature: _____

Name: Mr. Bruce H. Mero, REM

Title: Chief Environmental Safety and Occupational Health Office

CERTIFICATION

I hereby certify that the above facility has been examined, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared under my general supervision in accordance with good engineering practices.

Robert J. Elliott, P.E.
Printed Name of Registered Engineer

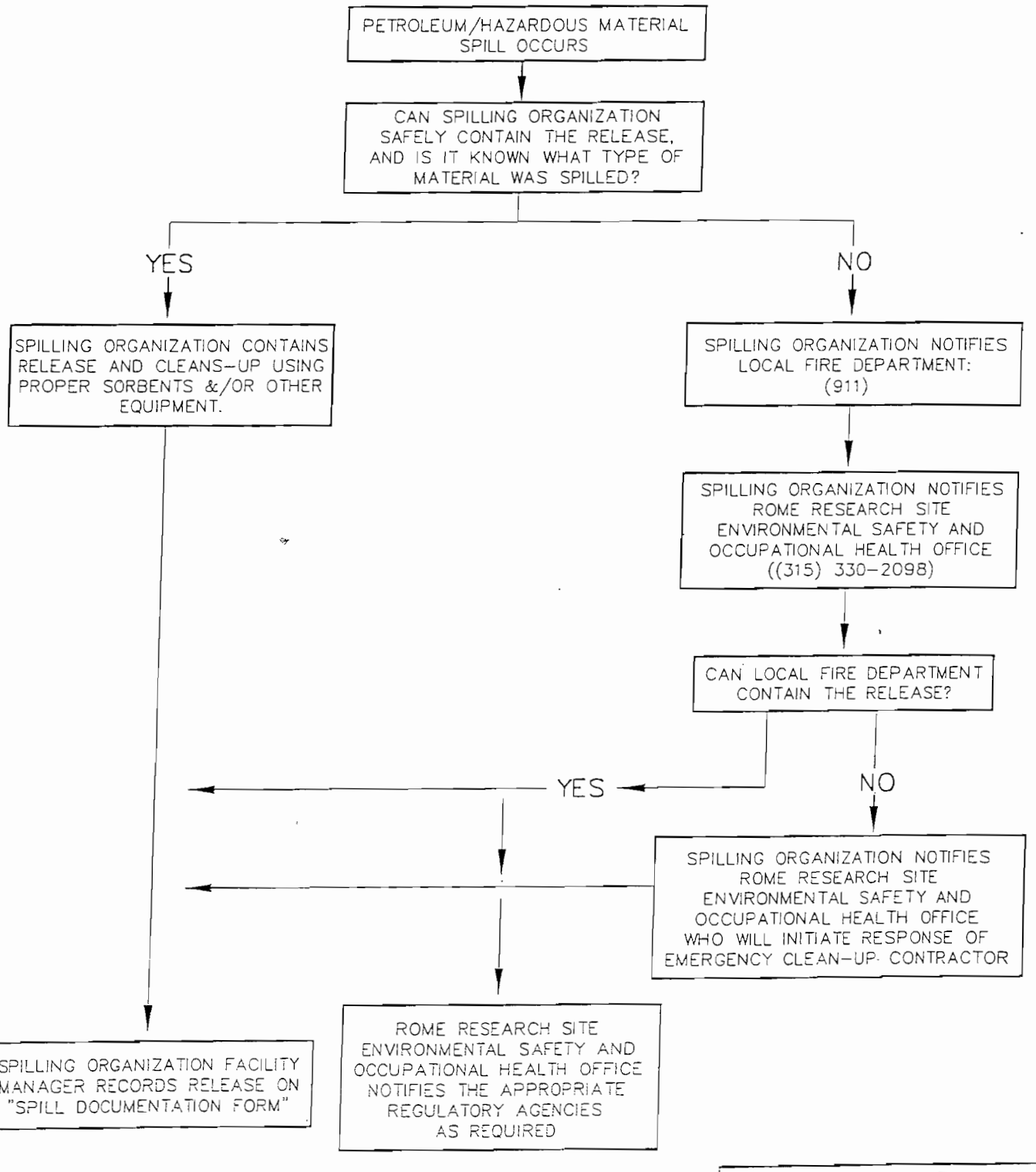
_____
Signature of Registered Engineer

Date: 10/26/99

License No.: 61038

State: New York

ROME RESEARCH SITE SPILL RESPONSE CHART VERONA



LU ENGINEERS
Civil and Environmental

13118\ENV\RESPONSECHART

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CHAPTER 1

SPCC PLAN APPLICABILITY

Oil spills and spill prevention are primarily regulated under the United States Code of Federal Regulations (CFR), Title 40, Part 112, and Article 12 of the New York State Navigation Law. Under 40 CFR, Part 112-Oil Pollution Prevention, a Spill Prevention Control and Countermeasure (SPCC) Plan must be prepared by the owner or operator of a facility engaged in the storage, transfer, distribution, or consumption of oil and oil products in quantities above regulated thresholds. For the purposes of this plan, *oil* is defined as oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, oil refuse, sludge and oil mixed with wastes other than dredged spoils [40 CFR Part 112]. Additional definitions are provided in the "Key Terms" section of this Plan (Appendix F).

The quantity thresholds for SPCC Plan applicability are as follows:

- Total facility aboveground storage capacity of more than 1,320 gallons, or if a single aboveground container has a volume of more than 660 gallons.

- Total facility underground storage capacity of more than 42,000 gallons.

The facility SPCC Plan establishes procedures, methods, and equipment to be used in the prevention of and response to the discharge of oil from the facility into navigable waters or groundwaters of New York State in accordance with 40 CFR 112. In addition to preparing this SPCC Plan, Rome Research Site must be able to demonstrate to the New York State Department of Environmental Conservation (NYSDEC) and/or the United States Environmental Protection Agency (USEPA) that the Plan is being implemented at the facility. A complete copy of the Plan must be maintained at the facility and be readily available to personnel. Under 40 CFR 112, an SPCC Plan must be reviewed by a registered professional engineer every three years.

The SPCC Plan must be recertified and submitted to the USEPA and/or NYSDEC if the facility undergoes a substantial modification, the facility experiences two oil spills in a 12-month period, if an individual spill of more than 1,000 U.S. gallons occurs, or the Plan certification is more than three years old.

Although hazardous materials/waste spill prevention and response are not covered in federal or New York State SPCC regulations, they are addressed herein. Many of the specified practices and procedures for oil spill prevention and response are applicable to hazardous materials/wastes.

The purpose of this Plan is to specify the prevention, response, and reporting procedures associated with spills of petroleum and hazardous materials at the Verona Research Facility.

1.1 PLAN AVAILABILITY

A. **Facility.** A copy of this SPCC Plan shall be maintained in the site manager's office at the Verona Research Facility. The Plan shall be readily available for use and review by Rome Research Corporation employees, Rome Research Site personnel, contractors, and fuel truck operators.

B. **Local Emergency Departments.** The local police and fire departments, ambulance services, hospitals, and other applicable emergency services shall be informed that this SPCC Plan has been prepared for the Verona Research Facility. At a minimum, a copy of the facility Spill Contingency Plan (Chapter 9 of the SPCC) shall be submitted to all local and state emergency response teams that may be called upon to provide emergency services associated with a petroleum or hazardous substance spill. A complete copy of the SPCC Plan will be made available for review or recordkeeping by local emergency organizations upon request.

CHAPTER 2

SITE SUMMARY DESCRIPTION

The Verona Research Facility is owned by the Department of the Air Force Research Laboratory, Rome Research Site (AFRL), and is operated by the Rome Research Corporation. Rome Research Corporation primarily performs testing of precision antenna systems and aircraft navigation equipment at the Verona site. The site consists of 30 buildings and 513 acres of land. The site is divided into two distinct facilities: Verona Research Facility (operated by Rome Research Corporation) and Space Command. The Space Command facility, formerly operated by the federal government, was recently acquired by Rome Research Site and is currently vacant. The site is located in Oneida County, Verona, NY (Figure 1).

Petroleum bulk storage primarily consists of underground and aboveground tank systems at the Verona Research Facility. The tanks mainly store No. 2 fuel oil for building boilers. Portable containers of flammable/hazardous materials are also stored indoors on site.

Building interior floor drains are connected to an on-site septic system that ultimately discharges to Brandy Brook, which flows westerly through the site (Figure 2). There are no storm drains at the facility. Drainage ditches along the facility access roads are the main designated diversionary systems for precipitation runoff. Exterior surface drainage generally runs off paved surfaces to grassed areas (e.g., ditches) and ultimately discharges to Brandy Brook. General flow directions in petroleum bulk storage fill areas are approximately as shown in Figure 2.

Facility petroleum spill prevention includes electronic tank alarms, fill port catch basins, and tank secondary containment. Portable flammable/hazardous liquid containers are generally stored in dedicated steel cabinets.

Spill response at the facility may require the manual application of sorbent materials and the construction of temporary containment structures to prevent spilled material from reaching unpaved surfaces and facility drainage systems. Verona Research Facility personnel shall be committed to spill prevention and response activities to support this Plan, with the exception that no person shall be subjected to unsafe conditions. Spill response and reporting procedures shall be in accordance with the procedures specified in this Plan (Chapter 9).

2.1 SPILL OCCURRENCES AND CORRECTIVE MEASURES

No reportable spills have occurred at this facility in the past 12 months.

CHAPTER 3

FACILITY DRAINAGE

3.1 INTERIOR DRAINAGE

A. **Floor Drains.** Building floor drains are connected to the on-site septic system (Figure 2). In the event of an uncontrolled leak or spill of flammable/hazardous materials or petroleum, product could flow into a floor drain. There are no indoor petroleum bulk storage facilities at the site, however, fuel piping is located in building boiler areas. All facility boiler rooms have floor drains.

3.2 EXTERIOR SURFACE DRAINAGE

Surface drainage from oil storage areas generally flows as shown on Figure 2.. In the event of a large petroleum surface spill, it is likely that the material would run off the paved surfaces surrounding tank filling locations onto grassed areas. The majority of anticipated spills (e.g., drips during filling) should be collected in the spill catch basin and/or dike that contains each tank fill port. To prevent oil from reaching navigable waters, it is imperative that sorbent materials be applied immediately to contain spilled product. Refer to "Commitment of Manpower and Resources." Frequent visual observations of the fuel system areas are required to check for leaks and spills.

3.3 DIKED STORAGE AREAS

Steel dikes provide secondary containment of the aboveground petroleum storage tanks at the Verona Research Facility. The diked tanks are located outdoors and are shielded from precipitation by steel canopies. The canopies do not fully enclose the tank; therefore, there is opportunity for precipitation to enter the dikes. Drainage from the diked containment areas is restrained by valves to prevent product releases. Tank containment areas (e.g., dikes) may be drained by valves, manual pumps, or ejectors. Extra care must be taken when using manual pumps or ejectors to ensure that petroleum is not spilled.

The master flow and drain valves or other controls (e.g., plugs) that permit direct outward flow of tank contents (including secondary containment areas) to the surface must be locked in a "closed" position when not in operation or in non-standby status.

Control and drainage of stormwater that accumulates in containment areas must meet the requirements of 6 NYCRR Part 613.3(c)(6). Stormwater that is drained from containment areas must be uncontaminated and free of sheen prior to discharge. Contaminated water shall be disposed of in accordance with all applicable local, New York State, and federal regulations. If there is a question as to whether the collected stormwater is contaminated, contact the Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office.

3.4 UNLOADING AREAS

Drainage from fuel unloading areas for aboveground and underground tanks is not controlled by permanent diversionary structures. A spill catch basin and/or steel dike contains each tank fill port. Additionally, impervious concrete slabs overlie each underground storage tank (UST). The fuel delivery driver shall be responsible for preventing spills and overfills during tank filling. Oil spills in unloading areas at all Rome Laboratory facilities shall be prevented through implementation of the unloading procedures specified in the facility SPCC Plan (Section 8.6). Spills in fuel transfer areas shall be controlled using the procedures specified in the Spill Contingency Plan of the facility SPCC Plan (Chapter 9).

Surface drainage directions from the fuel unloading areas are shown on the attached site plan (see Figure 2).

In the event of a spill during filling, the fuel delivery driver shall immediately contact the Facility Manager, who will initiate spill response and reporting procedures in accordance with NYSDEC and USEPA regulations. Sorbent materials shall be applied immediately (when it is safe to do so) to prevent product from reaching streets, grassed areas, drainage structures, or other potential routes of migration to water bodies.

CHAPTER 4

PETROLEUM STORAGE

All aboveground and underground petroleum storage facilities with a combined storage capacity of more than 1,100 gallons are subject to NYSDEC petroleum bulk storage (PBS) regulations (6NYCRR Parts 612, 613, and 614). The PBS regulations include requirements for tank registration, monitoring, and design. All Rome Research Sites shall strive toward full compliance with the PBS regulations.

4.1 ABOVEGROUND TANKS

There are six registered aboveground petroleum storage tanks currently at the Verona Research Facility.

TABLE 1

ABOVEGROUND STORAGE FACILITIES

TANK NO.	CAPACITY (GALLONS)	PRODUCT	MATERIALS OF CONSTRUCTION	SECONDARY CONTAINMENT	USAGE
# 1226	1,000	Gasoline	Steel	Steel Dike	Generator and vehicles
# 1250	3,000	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel
# 1261	1,000	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel
#1266	550	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel
#1277*	1,000	No. 2 fuel oil	Steel	Steel Dike	Boiler fuel

* Moved to Building 1285
Updated 07/19/00

The listed tanks are constructed of materials that are compatible with the stored product. The tanks are equipped with product level gauges and vent whistles. The tanks shall be operated and maintained in accordance with all applicable PBS regulations.

4.2 UNDERGROUND TANKS

There are currently seven registered underground fuel storage tanks at the Verona Research Facility.

TABLE 2

UNDERGROUND STORAGE FACILITIES

TANK NO.	CAPACITY (GALLONS)	PRODUCT	MATERIALS OF CONSTRUCTION	SECONDARY CONTAINMENT	USAGE
# 1259C	6,000	No. 2 fuel oil	FRP	Double-walled	Formerly boiler fuel*
# 1259D	6,000	No. 2 fuel oil	FRP	Double-walled	Formerly boiler fuel*

* Out of service
Updated 07/19/00

The listed tanks are constructed of materials that are compatible with the stored product. The facility PBS registration indicates that the tanks are cathodically protected and have electronic leak detection systems. The tanks shall be operated and maintained in accordance with all applicable PBS regulations.

4.3 FUEL PUMPS AND PIPING

A. **Facility.** Aboveground and underground petroleum piping is used to distribute fuel between storage facilities and building boilers. The PBS registration indicates that copper underground fuel lines currently do not have external protection or leak detection. Underground fill and/or vent lines do not normally hold product. The aboveground piping is located outdoors and indoors (e.g., in boiler room). Indoor aboveground piping and pumps are located in rooms with concrete walls and floors. The majority of outdoor aboveground piping is associated with ASTs and located on paved surfaces. Fuel pumps are located on boiler burners.

B. **Aboveground Piping.** Aboveground piping shall be examined regularly for leaks and evidence of deterioration. Periodic testing (minimum 10 years) should be done on lines that would result in a spill event if ruptured. All lines removed from service should be capped or blank-flanged and marked to identify origin. Additionally, all loading/unloading pipeline connections must be securely capped or blank-flanged when not in service (or during standby

TABLE 3

POTENTIAL PETROLEUM SPILL SOURCES, PREDICTIONS AND CONTROLS
VERONA RESEARCH FACILITY

POTENTIAL SPILL SOURCE	LOCATION*	ESTIMATED TOTAL STORAGE (GALLONS)	MEANS OF SECONDARY CONTAINMENT	LIKELY SPILL CAUSE(S)	ESTIMATED MAXIMUM QUANTITY OF SPILL AND RATE OF FLOW	MEANS TAKEN TO PREVENT SPILL	PREDICTED SPILL FLOW PATH*
AST 1226	Building #1226	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1245	Building #1245	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1250	Building #1250	3,000	Steel dike	Tank/dike seam failure	3,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1261	Building #1261	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1266	Building #1266	500	Steel dike	Tank/dike seam failure	500 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
AST 1277	Building #1285	1,000	Steel dike	Tank/dike seam failure	1,000 gallons variable rate	Periodic inspection and maintenance	Northerly across paved surfaces to grassed areas
UST 1225	Building #1225	1,000	Double-walled	Tank system failure	1,000 gallons variable rate	Electronic leak detection, cathodic protection, vent whistle	Surrounding subsurface soils

TABLE 3 (continued)

POTENTIAL SPILL SOURCE	LOCATION*	ESTIMATED TOTAL STORAGE (GALLONS)	MEANS OF SECONDARY CONTAINMENT	LIKELY SPILL CAUSE(S)	ESTIMATED MAXIMUM QUANTITY OF SPILL AND RATE OF FLOW	MEANS TAKEN TO PREVENT SPILL	PREDICTED SPILL FLOW PATH*
Underground fuel piping	Buildings #1225, #1231, #1253, #1259 #1269, #1285	--	None	Joint failure, corrosion	Variable quantity and rate	Periodic testing and maintenance	Surrounding subsurface
Boiler fuel pumps	Buildings #1225, #1231, #1245, #1250, #1253, #1259, #1261, #1269, #1277, #1285	--	None	Leaking seal	Variable rate, 5 gpm	Periodic inspection and maintenance	Across building floor to floor drain
Portable containers (e.g., gasoline)	Building #1226	20	None	Container mishandling	Variable rate, 5 gpm	Proper storage and handling	Across building floor to floor drain

*Refer to attached site plan and/or floor plan(s).

UST = Underground storage tank
AST = Aboveground storage tank
gpm = Gallons per minute

CHAPTER 5

HAZARDOUS MATERIALS AND WASTE

5.1 DESIGNATED HAZARDOUS MATERIALS STORAGE AREAS

Portable containers of flammable and/or hazardous materials are primarily stored in steel "flammables cabinets" located within facility buildings (Table 4). Cabinet locations are shown on the floor plans located in Appendix E. Materials stored in the flammables cabinets typically include paints, thinners, lubricants, and miscellaneous sprays. Additional larger (e.g., 5-gallon) portable containers of paints are maintained in Building #1226 in a designated storage room.

TABLE 4

FLAMMABLE/HAZARDOUS MATERIALS STORAGE CABINETS

BUILDING	NO. OF CABINETS
#1226 (Butler Building)	8
#1245	1
#1250	1
#1285	3

Approximately 8 gallons of ethylene glycol is located in the pedestal of the inactive radar system in Building #1219.

5.2 HAZARDOUS WASTE ACTIVITIES

Small quantities of hazardous wastes are normally generated at the Verona Research Facility. Generated wastes that could be considered hazardous typically consist of used lubricating and insulating oils, spent paint thinners, and spent antifreeze. Such waste materials are primarily stored at the hazardous waste storage lockers between buildings #1255 and #1261 (Figure 2).

All petroleum and non-petroleum hazardous wastes generated on site shall be safely stored and disposed of, or treated by a properly licensed facility. The facility manager shall ensure that significant quantities of used oil and other wastes are not accumulated on site by periodically contacting Rome Research Site, Air Force Research Laboratory Information Directorate, Environmental Safety and Occupational Health Office, at (315) 330-2098 (Table 13 in Chapter 9). The Environmental Safety and Occupational Health Office will arrange for the waste pickup.

All hazardous waste storage, handling, and disposal shall be in accordance with the facility Hazardous Waste Management Plan.

CHAPTER 6

PREDICTED SPILL FLOWS AND SOURCES

Potential sources of oil and hazardous materials spills are identified and summarized in this chapter. Additional facility-specific details are indicated in Table 5.

6.1 PETROLEUM SOURCES

The primary sources of potential spills and releases of petroleum products are as follows:

1. Underground and aboveground fuel tanks and associated piping.
2. Aboveground boiler fuel lines and associated pumps.
3. Fuel truck unloading areas.

6.2 HAZARDOUS MATERIAL/WASTE SPILL SOURCES

The primary source of potential hazardous waste releases/spills at the site would be in the area of the Arctic Tower. There is potential for hazardous/flammable materials spills/releases associated with the flammables cabinets located in the buildings listed in Table 4, and the PCB induction regulators and cooling system in Building #1253.

6.3 EMERGENCY PROCEDURES

Spill prevention, response, and reporting shall be in accordance with this SPCC Plan. In the event of a petroleum spill or hazardous material/waste emergency (e.g., spill or fire), the procedures specified in Chapter 9, Spill Contingency Plan, should be followed.

TABLE 5

HAZARDOUS SUBSTANCE SPILL SOURCES, PREDICTIONS, AND CONTROLS
VERONA RESEARCH FACILITY

POTENTIAL SPILL SOURCE	LOCATION	ESTIMATED TOTAL STORAGE (GALLONS)	MEANS OF SECONDARY CONTAINMENT	LIKELY SPILL CAUSE(S)	ESTIMATED MAXIMUM QUANTITY OF SPILL AND RATE OF FLOW	MEANS TAKEN TO PREVENT SPILL	PREDICTED SPILL FLOW PATH*
Flammables cabinets [miscellaneous portable containers of liquid cleaners, paints, and lubricants (typical)]	Buildings #1245, #1226, #1250, #1285	45 (per cabinet)	Steel cabinet with raised door sill*	Container failure, mishandling	5 gallons instantaneous	Proper storage and handling	Cabinet bottom, building floor
Radar Pedestal	Building #1219 (Arctic Tower)	8	None	Pedestal	8 gallons instantaneous	Proper storage and handling	Across wood floor to cracks; then to soils below raised floor
Radar cooling system	Building #1253	15	None	Hose rupture and/or connection failure	Variable quantity at 9 gpm	Periodic inspection and maintenance	Across room floor to concrete cable floor trench

*If all seams are liquid tight, the bottom of each flammables cabinet would provide approximately 8.5 gallons of containment.

CHAPTER 7

GROUNDWATER CONTINGENCY PLAN

7.1 SITE SOILS AND DEPTH TO WATER TABLE[1]

Soils at the Verona Research Facility generally consist of silty fine to coarse sand with some medium to coarse gravel, to an approximate depth of 25 feet. Subsurface soils gradually change to medium to fine sand at depths of more than 25 feet. Based on available soil boring logs, the depth to the water table is at approximately 2 feet below the land surface.

7.2 SPILL PREDICTIONS

Petroleum spills that are most likely to occur at the Verona Research Facility would be associated with the aboveground and underground storage tanks. The following are typical spills or releases related to bulk petroleum storage systems:

1. Leaks in tanks and/or piping.
2. Transfer accidents (e.g., overfills or hose failure).

If the above-referenced spills occurred at the facility, there is potential for spilled or released petroleum to enter soils in the vicinity of the tanks. The ground surface in the majority of tank filling areas is paved.

7.3 GROUNDWATER IMPACT CONTINGENCY

All petroleum spills and releases shall be cleaned up in accordance with this SPCC Plan. If spills are promptly reported and adequately abated, there will be little opportunity for released petroleum to reach the water table beneath the site. Relatively small spills will primarily move downward through the soil column as a result of gravity and then gradually lose momentum due to soil adsorption and exhaustion of product. If, however, spills were repeatedly ignored or releases were continuously undetected (e.g., malfunctioning monitors), petroleum could potentially reach the

[1]Information and data relative to site soils and depth to groundwater were supplied by Rome Research Site.

water table. In most instances, a "worst case scenario" would be necessary for a petroleum spill or release to impact the water table. A typical worst case would involve scenarios that may include disregard for spill prevention and response procedures specified in this SPCC Plan, malfunctioning cathodic protection systems, and inoperative tank leak detection monitors.

For reference purposes, the estimated time for spilled petroleum to reach the water table under "worst case" conditions is provided below (Table 7).

The following equations and assumptions were used to estimate vertical velocities of the petroleum products typically stored on site. The equations assume that a spill of significant magnitude has occurred and cannot be adsorbed in soil (i.e., "worst case").

The vertical velocity of water in soil can be calculated by the following equation:

$$V_w = K_v i/n$$

where:

V_w = Velocity of water
K_v = Vertical coefficient of permeability* = 10^{-4} cm/sec
i = Hydraulic gradient = 1.0 for vertical flow (routine assumption)
n = Effective porosity* = 0.37

*Source: Freeze, R.A. and J.A. Cherry, *Groundwater* (1979), Prentice-Hall, Inc., NJ.

The vertical velocity of petroleum products in soil is related to the vertical velocity of water. The method used in the above evaluation is based on a NYSDEC Guidance Paper entitled "Method for Evaluating the Acceptability of a Diking System and Recommended Permeability Standards for Secondary Containment of Gasoline, #2 Fuel Oil, #4 Fuel Oil, and #6 Fuel Oil," dated June 21, 1988.

CHAPTER 8

SPILL PREVENTION EQUIPMENT AND PROCEDURES

8.1 SPILL RESPONSE CAPABILITY

Since spill response at this facility will require the manual application of sorbent materials to prevent product from reaching drainage structures, grassed areas, etc., Verona personnel shall be committed to spill prevention and response activities to support this plan, with the exception that no person shall be subjected to unsafe conditions.

All facility personnel must be knowledgeable in the use and storage locations of spill response equipment.

8.2 EMERGENCY SPILL RESPONSE EQUIPMENT

As part of the SPCC Plan, Verona Research Facility personnel will be prepared to recover a spill at the site. The necessary equipment shall be maintained and appropriately located at the facility. Equipment necessary for spill recovery is anticipated to include:

- Absorbent solids (e.g., "Speedi-Dry")
- Absorbent socks
- Absorbent pillows
- Absorbent sheets
- Absorbent wipes
- Disposal bags/containers

Appropriate sorbent materials will be selected and maintained by the Facility Manager, who will appropriately locate the equipment on site and be prepared for its proper use during a spill event. These materials should be used in accordance with sound judgment and the manufacturer's specifications.

All Rome Research Sites that generate spill residue are responsible for obtaining NYSDOT-approved steel, snap-lid type containers through the Air Force Research Laboratory

Information Directorate, Environmental Safety and Occupational Health Office. In addition, all Rome Research Sites that could incur a spill are responsible for obtaining and replenishing their own supply of sorbent materials. Containers and sorbent materials are to be prepositioned near storage and transfer areas for use in the event of a spill.

A. **Spill Prevention Equipment.** Petroleum storage tanks at the Verona Research Facility are equipped with a minimum of the following spill prevention mechanisms.

TABLE 8

FUEL STORAGE FACILITY SPILL PREVENTION EQUIPMENT

TANK	MECHANISM/EQUIPMENT*
ASTs	Steel dike, level gauge, vent whistle
USTs	Double-wall, level gauge, vent whistle (no whistles at Space Command)

*Based on facility NYSDEC PBS registration application.

B. **Spill Control and Response Equipment.** Verona Research Facility shall maintain an inventory of spill control and response equipment appropriately located at the site.

TABLE 9

SPILL EMERGENCY EQUIPMENT

EMERGENCY EQUIPMENT	LOCATION
Sorbent materials	Near petroleum transfer locations and hazardous material storage cabinets and/or areas.
Facility firefighting equipment, including carbon dioxide and dry powder fire extinguishers located according to need	Throughout facility.
Building fire alarm system	Pullboxes throughout facility.
Telephone	Buildings 1226, 1235, 1250, 1253, 1261 and 1285.

repaired within 30 days. Any tank or piping system with a non-working monitoring system must be tested for tightness within one year and retested every five years thereafter until the tank is permanently closed.

C. **Emergency Equipment.** All facility communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment (where required) must be tested and maintained as necessary to assure its proper operation during an emergency.

8.4 SECURITY

The Verona site is patrolled regularly (e.g., every four hours) by Rome Research Site security.

The majority of the site is not enclosed by fencing. The Space Command facility is fully encompassed by a chain link fence. All fencing and gates at the Verona Research Site shall be maintained in good working condition. Entrance gates must be locked when the facility is unattended.

To protect against releases caused by unauthorized persons and vandalism, all tank fill ports and valves that could permit direct outward flow of oil to the environment shall be locked when not in use.

8.5 PERSONNEL, TRAINING, AND SPILL PREVENTION PROCEDURES

During the training of new employees, oral instruction is given in the proper operation of equipment necessary for his or her job function. As dictated by the work being performed, the employee shall be instructed in the general importance of controlling, containing, and cleaning up diminius discharges of oil. All contractors or temporary personnel whose work could cause a spill shall be instructed in facility oil and hazardous materials spill prevention procedures.

There are seven levels of training that may be required based on personnel job functions and responsibilities. They are summarized in Table 10.

APPENDIX B

NYSDEC CORRESPONDANCE –November 20, 2001
(OM&M Plan Acceptance Letter)

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Hazardous Site Control, 11th Floor
625 Broadway, Albany, New York 12233-7014
Phone: (518) 402-9551 • **FAX:** (518) 402-9020
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

November 20, 2001

Mr. Ours, C.P.G.
S&W Redevelopment of North America
430 East Genesee St, Ste 401
Syracuse, NY 13202

Dear Mr. Ours:

RE: Verona Research Facility, Buildings 1231 & 1253
NYS DEC Site # 633046

The Department has received and reviewed the revised Operation, Maintenance and Monitoring (OM&M) Manual dated October 2001. The Manual is approved and should be implemented, including monitoring and reporting as specified, within 6 months. The Department will subsequently be sending a letter to be co-signed by the Responsible Party, outlining the conditions for the site to be designated as a Class 4 site (the site is properly closed, but requires continued management) in the New York State Registry of Inactive Hazardous Waste Disposal Sites, which include implementing the OM&M Manual and possibly a deed restriction and an access agreement.

If you have any questions, please feel free to call me at 518-402-9640.

Sincerely,

Susan M Lasdin

Susan M. Lasdin, P.E.

cc: Darrell Sweredoski
Fred Conover

APPENDIX C

BORING LOGS

Stearns & Wheler, LLC
Environmental Engineers and Scientists

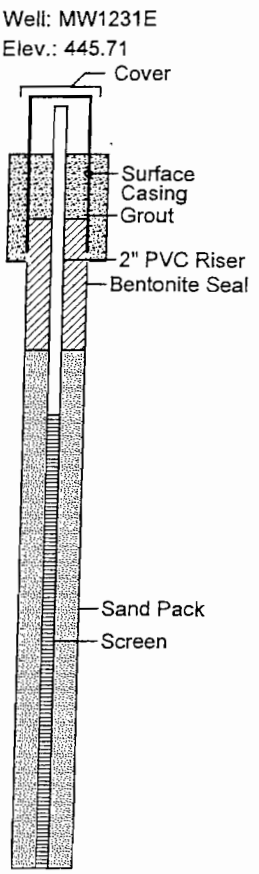
LOG OF BORING MW1231E

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/16/02	Field Rep.	: jlk
Date Completed	: 4/16/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: former UST area
Drilling Method	: H.S.A.		: Bldg. 1231
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 443.36	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0	443		14	moist, soft, brown SILT/clay, with grass	0	0
				wet, soft, mottled grey/green/brown SILT/clay, some fine-med. gravel		
2	441		8	wet, soft- med. stiff, mottled pink/brown/grey SILT/clay	2	2.1
4	439		20		4	1.8
6	437		10	wet, med. stiff-stiff, pinkish grey SILT/clay	6	5.9
8	435		14		8	0
10	433		24	moist, med. stiff, pinkish grey SILT/clay	10	31.2
12	431			1.5" concrete in nose of spoon END BORING	12	
14	429				14	
16	427				16	
18	425				18	
20					20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

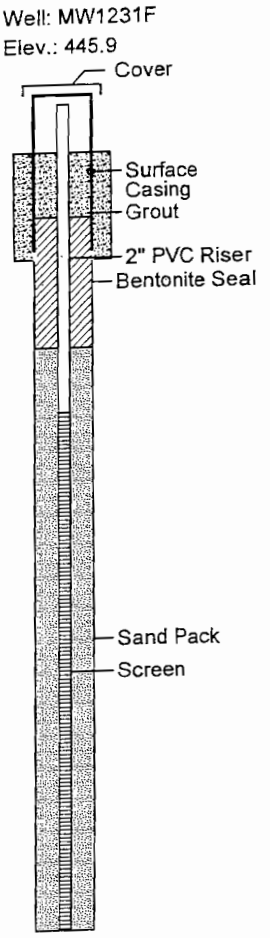
LOG OF BORING MW1231F

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/17/02	Field Rep.	: jlk
Date Completed	: 4/17/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: in front of utility Bldg
Drilling Method	: H.S.A.		: Bldg. 1231
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 443.61	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0	443		12	Asphalt Pavement fine-coarse GRAVEL, some silt/clay	0	1.9
2	441		15	wet, soft- med. stiff mottled pink/brown SILT/clay	2	0.9
4	439		18		4	2.9
6	437		20		6	5.1
8	435		22	wet, soft-med. stiff pinkish grey SILT/clay, trace med. sand	8	10.0
10	433		20	wet, med. stiff pinkish grey SILT/clay	10	15.1
12	431			END BORING	12	
14	429				14	
16	427				16	
18	425				18	
20					20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

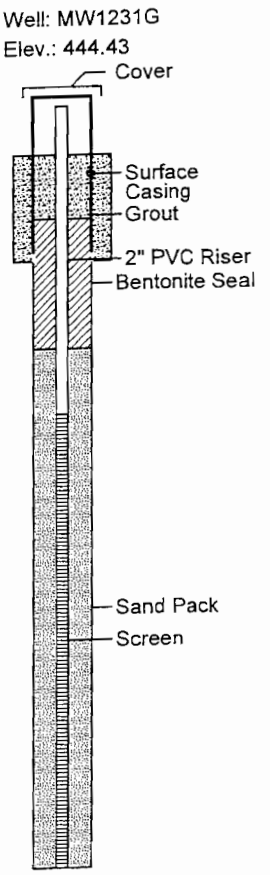
LOG OF BORING MW1231G

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/17/02	Field Rep.	: jlk
Date Completed	: 4/17/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: 20' northwest of Bldg. 1231
Drilling Method	: H.S.A.		
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 442.93	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0				moist, soft brown SILT/clay, with grass, pink mottling	0	
2	442		16	wet, med. stiff, mottled grey/brown/pink SILT/clay, some fine-med. gravel	2	0.5
4	440		12		4	0.2
6	438		24	wet, soft, pinkish grey SILT/clay	6	0.4
8	436		16		8	0.8
10	434		18	moist, stiff, pinkish grey SILT/clay	10	1.8
12	432		20	weathered shale	12	0.9
14	430			END BORING	14	
16	428				16	
18	426				18	
20	424				20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

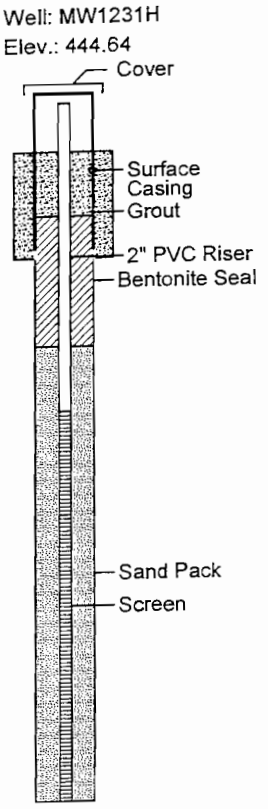
LOG OF BORING MW1231H

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/24/02	Field Rep.	: jlk
Date Completed	: 4/24/02	Logged By	: jlk
Hole Diameter	. 4-1/4	Boring Location	: near drainage ditch
Drilling Method	: H.S.A.		. southwest of Bldg. 1231
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 442.1	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0	442			moist, soft-med. stiff, brown SILT/clay, grass	0	
			8	wet, soft- med. stiff, mottled pink/grey/brown SILT/clay		4.0
2	440				2	
			20			4.0
4	438				4	
			22			4.2
6	436			wet, soft-med.stiff, pink SILT/clay, no-some fine sand	6	
			20			4.6
8	434				8	
			20	wet, med.stiff, pinkish grey SILT/clay		4.0
10	432			shale END BORING	10	
12	430				12	
14	428				14	
16	426				16	
18	424				18	
20					20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

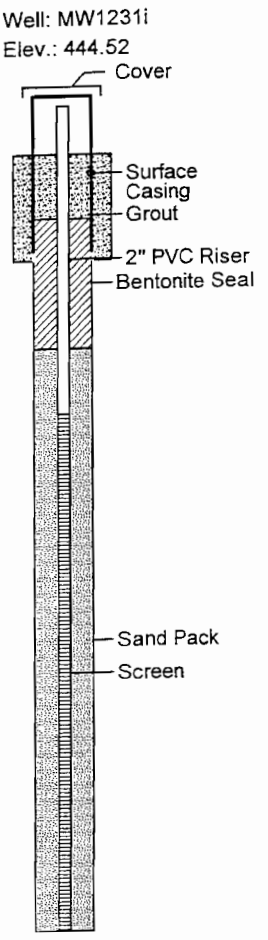
LOG OF BORING MW1231i

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/24/02	Field Rep.	: jlk
Date Completed	: 4/24/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: 180' northwest of : Bldg. 1253
Drilling Method	: H.S.A.		
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 442.9	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0				moist, soft-med. stiff, brown SILT/clay, grass	0	
	442		10	wet, soft- med. stiff, mottled pink/grey/brown SILT/clay		3.4
2					2	
	440		10			3.1
4				wet, soft-med.stiff, pink/brown SILT/clay, trace fine sand	4	
	438		22			3.1
6				moist, soft, pinkish grey SILT/clay	6	
	436		15			4.7
8					8	
	434		20			3.6
10				SAA, some fine sand	10	
	432		20	wet, med.stiff, pinkish grey SILT/clay		3.0
12				END BORING	12	
	430					
14					14	
	428					
16					16	
	426					
18					18	
	424					
20					20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

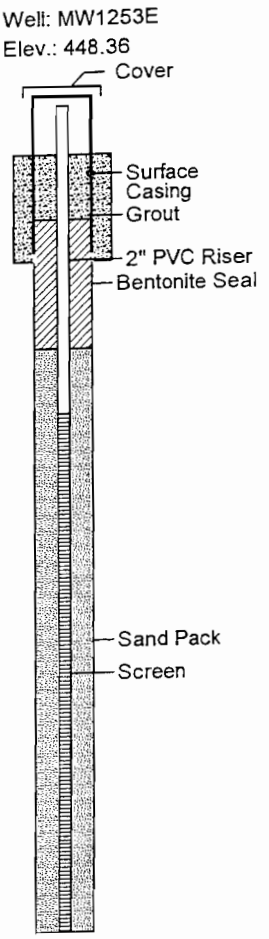
LOG OF BORING MW1253E

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/16/02	Field Rep.	: jlk
Date Completed	: 4/16/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: 30' west of Bldg. 1253
Drilling Method	: H.S.A.		
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 445.57	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0	445		16	moist, soft, brown SILT/clay, with grass	0	0
2	443		18	wet, soft-med. stiff, mottled pink/grey SILT/clay	2	0.3
4	441		18		4	0.7
6	439		20	wet, soft, pinkish grey SILT/clay	6	0.3
8	437		14		8	0.9
10	435		16	moist, med. stiff, pinkish grey SILT/clay	10	0.5
12	433			END BORING	12	
14	431				14	
16	429				16	
18	427				18	
20					20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

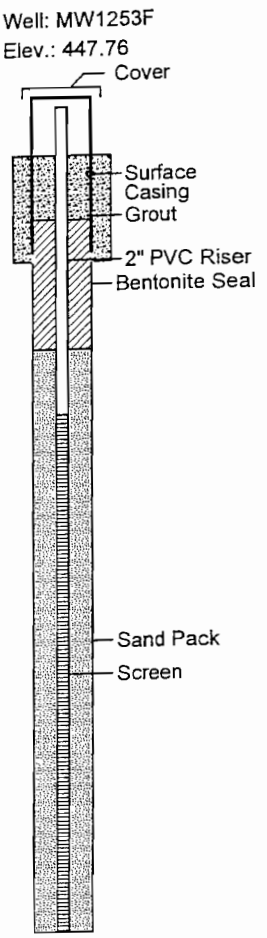
LOG OF BORING MW1253F

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/24/02	Field Rep.	: jlk
Date Completed	: 4/24/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: near drainage ditch
Drilling Method	: H.S.A.		: southwest of Bldg. 1253
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 445.89	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0				moist, soft, brown SILT/clay, grass	0	
	445		6	wet, soft- med. stiff, mottled pink/grey/brown SILT/clay		0.8
2					2	
	443		14			2.3
4					4	
	441		18			2.1
6				wet, soft, pinkish grey SILT/clay	6	
	439		22			2.0
8					8	
	437		22			2.8
10				moist, soft-med. stiff, pinkish grey SILT/clay	10	
	435		22			2.7
12				END BORING	12	
	433					
14					14	
	431					
16					16	
	429					
18					18	
	427					
20					20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

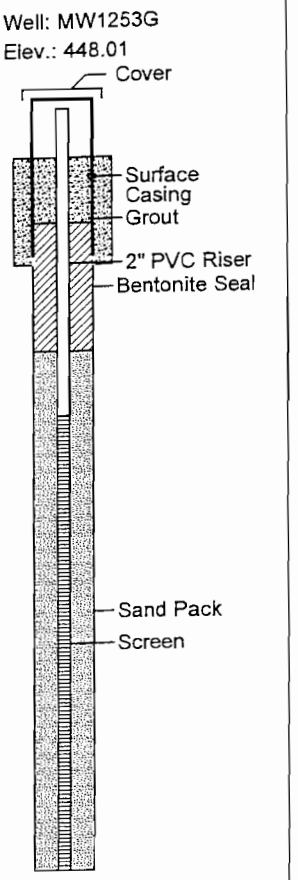
LOG OF BORING MW1253G

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/16/02	Field Rep.	: jlk
Date Completed	: 4/16/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: 150' northeast of : Bldg. 1253
Drilling Method	: H.S.A.		
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 445.42	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0	445		15	moist, soft, brown SILT/clay, with grass	0	0.9
2	443		15	wet, soft-med. stiff, mottled pink/grey SILT/clay	2	0.3
4	441		22	wet, soft, pinkish grey SILT/clay	4	0.3
6	439		20	wet, med. stiff, pinkish grey SILT/clay	6	0
8	437		22		8	1.4
10	435		22		10	0.5
12	433			wet, fine-medium, SAND, some fine-med. gravel, little grey silt/clay	12	
				END BORING		
14	431				14	
16	429				16	
18	427				18	
20					20	



Stearns & Wheler, LLC
Environmental Engineers and Scientists

LOG OF BORING MW1253H

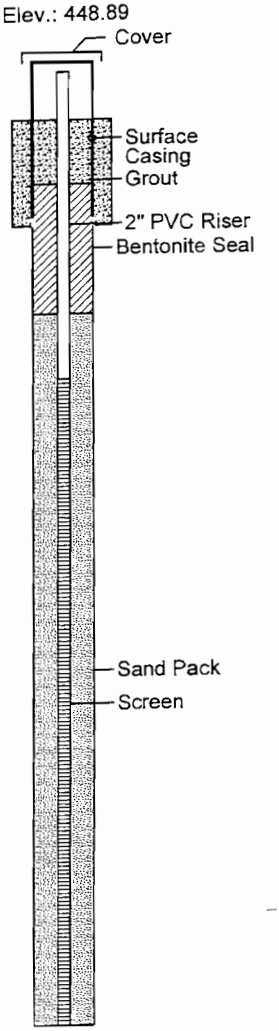
Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/15/02	Field Rep.	: jlk
Date Completed	: 4/15/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: Former Tank Area
Drilling Method	: H.S.A.		: Bldg. 1253
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 446.58	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0	446		10"	wet, fine-coarse GRAVEL, some brown silt/clay, little fine brown sand	0	0
2	444		8"	wet, brown fine SAND, and silt/clay	2	0.2
4	442		4"		4	0
6	440		0	wet, fine-coarse SAND & gravel, trace silt/clay	6	
8	438		12"	wet, med. soft, pink SILT/clay, some fine sand	8	0
10	436		10"	moist, med stiff, pink SILT/clay, some fine sand	10	1.0
12	434		16"		12	2.6
14	432			END BORING	14	
16	430				16	
18	428				18	
20					20	

Well: MW1253H
Elev.: 448.89



Stearns & Wheler, LLC
Environmental Engineers and Scientists

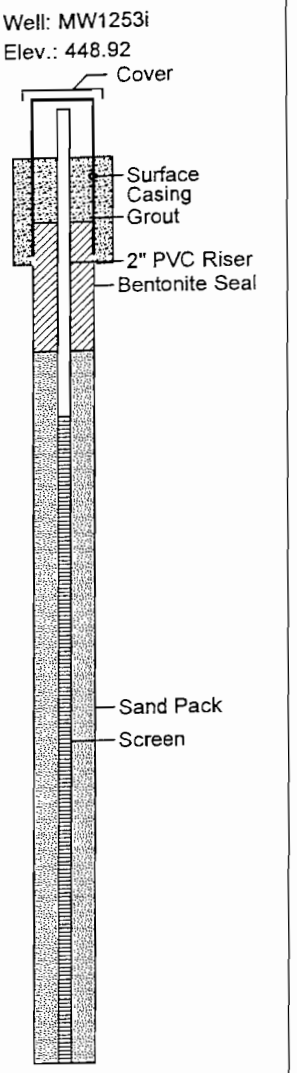
LOG OF BORING MW1253I

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, New York

Job No. R2010. 10.

Date Started	: 4/15/02	Field Rep.	: jlk
Date Completed	: 4/15/02	Logged By	: jlk
Hole Diameter	: 4-1/4	Boring Location	: Utility Bldg.
Drilling Method	: H.S.A.		: Bldg. 1253
Sampling Method	: Split Spoon		

Depth in Feet	Surf. Elev. 446.58	Blow Count Graph (10 50)	Recovery (inches)	DESCRIPTION	Depth in Feet	PID (ppm)
0	446		6	Asphalt pavement wet, soft, mottled green/brown SILT/clay, little fine-med. gravel	0	0.2
2	444		12		2	1.0
4	442		16	wet, soft-med. stiff, mottled pink/grey SILT/clay	4	0.1
6	440		24	wet, fine brown SAND, some silt/clay wet soft-med. stiff pink SILT/clay, some fine sand	6	0.3
8	438		12		8	1.7
10	436		18	moist stiff pink SILT/clay, some fine sand	10	4.9
12	434		24		12	4.1
14	432			END BORING	14	
16	430				16	
18	428				18	
20					20	



APPENDIX D

MW-1231C Boring Log
(Preliminary Site Assessment-Stearns & Wheler, February 1997)

Project Name: VERONA RES. FACILITY

Job No. 43189ZA

Start
Date 10/4/98 Time 0830

Finish
Date 10/4/98 Time 1010

Stearns and Wheler

Environmental
Engineers and Scientists

Boring ID: MW-1231C

Drilling Company: PARRATT WOLFF

Driller: JIM LANSING

S&W Inspector: S&W--SLG

Drill Rig Type: CME

Drilling Method: 4.25" I.D. HSA

Weather: SUNNY, 35F, HARD FROST

Elevation

X coord: feet
Y coord: feet

Groundwater Observations
Time :
Date :
Casing Depth: 15.0
Boring Depth: 15
Water Depth :

(ft)	Blow Counts	Samples	Graphic Log	PID (ppm)	Sample Description
	0 100			0 100	
					3" topsoil, f-c SAND and GRAVEL, some silt, FILL
					Red-brown, wet, loose, silty f SAND, some mottling, some coarser sand layers
					Gray, wet, loose, silty f SAND
					Bottom of boring

Well Diagram

2" PVC Schedule 40 Riser
4" PVC Schedule 40 Sleeve
Bentonite Pellets
Portland Cement
2" PVC Schedule 40 0.01" slot screen
Morie #0 Sand Pack

5
10
15
20

= sample attempt
= sample recovered
= grain size analysis performed, results tabulated elsewhere in report
= core attempt

Descriptions on log have been generalized for clarity of presentation. Significant changes in lithology have been noted. Original well logs are available from Stearns and Wheler files.

APPENDIX E

Well Decommission Logs

Stearns & Wheler, LLC
Environmental Engineers and Scientists

One Remington Park Drive
Cazenovia, NY 13035
tel. (315) 655-8161
fax. (315) 655-4180
web. www.stearnswheler.com

November 12, 2002

Mr. Fred Conover
Rome Research Lab
150 Electronics Parkway
Rome, NY 13441-4516

Re: Well De-Commissioning
S&W Redevelopment File No. R2122.10

Dear Mr. Conover:

We have prepared a report summarizing field work activities related to de-commissioning of five (5) monitoring wells at the Verona Research Facility in Verona, NY. The final report summarizes field work activities, and presents boring logs, slug test data, and surveyed well location maps.

The purpose of this letter is to provide certification that the five wells have been de-commissioned.

If you have any questions, please call Don Sorbello at 315-422-4949, or the undersigned.

Very truly yours,

STEARNS & WHELER, LLC

Wayne E. McFarland, P.E., DEE
Principal



cc: Mr. Don Sorbello, S&W Redevelopment of North America

H:\MVL\DESKTOP\WEM\LTRS\2002\Conover,Fred-Rome Research Lab.doc/mvl

Stearns & Wheler, LLC
Environmental Engineers and Scientists

Well DECOMMISSION LOG MW-1245A

Verona Research Facility
OM&M Plan Implementation
Verona, NY

R2010.10

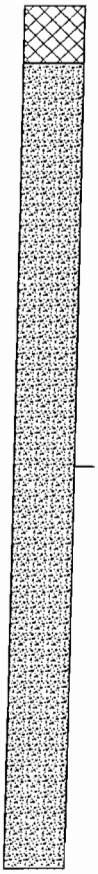
Date Started	: 4/24/02	Company Rep.	: JLK
Date Completed	: 4/24/02	Drilling Contractor	: Parratt-Wolff
Hole Diameter	: 6 1/4-inch	Driller	: Doug Toma
Drilling Method	: HSA	Driller Assistant	: Josh Richmond
Sampling Method	: Not Applicable	Logged By	: JLK

Depth in Feet | Surf. Elev. 444.7 | REMARKS

0 — 444
5 — 439
10 — 434
15 — 429
20

The casing was removed from the boring. The boring was then filled with an approximate 12:0.5:1 mix of Type I Portland Cement to bentonite powder to water.

Well: MW-1245A
Elev.:



Depth in Feet | Well Construction Information

0
5
10
15
20

WELL DECOMMISSION

Date Compl.	: 4/24/02
Hole Diameter	: 6 1/4-inch
Drill. Method	: HSA
Company Rep.	: JLK

WELL CASING

Material	: PVC
Diameter	: 2-inch
Status	: Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Opening	: 0.01-inch
Status	: Removed

SAND PACK : #0 - Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Cap	:

NOTES:

The well was decommissioned using the "Casing Pulling" method, as described in the NYSDEC, Division of Environmental Remediation October 1996 "Groundwater Monitoring Well Decommissioning Procedures".

Notes:

*Surface elevation based on elevation of the building 1245 concrete slab, not on actual monitoring well elevation information.

Stearns & Wheler, LLC
Environmental Engineers and Scientists

Well DECOMMISSION LOG MW-1245B

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, NY

R2010.10

Date Started	: 4/24/02	Company Rep.	: JLK
Date Completed	: 4/24/02	Drilling Contractor	: Parratt-Wolff
Hole Diameter	: 6 1/4-inch	Driller	: Doug Toma
Drilling Method	: HSA	Logged By	: JLK
Sampling Method	: Not Applicable	Location	: VRF Bldg 1245

Depth in Feet

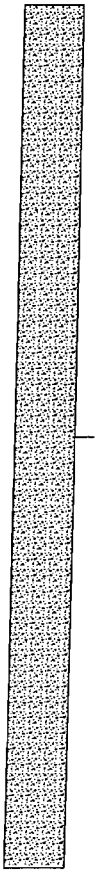
Surf. Elev. 444.7*

0
444
5
439
10
434
15
429
20

REMARKS

The casing was removed from the boring. The boring was then filled with an approximate 12:0.5:1 mix of Type I Portland Cement to bentonite powder to water.

Well: MW-1245B
Elev.: 444.7*



Depth in Feet

0
5
10
15
20

Well Construction Information

WELL DECOMMISSION

Date Compl.	: 4/24/02
Hole Diameter	: 6 1/4-inch
Drill. Method	: HSA
Company Rep.	: JLK

WELL CASING

Material	: PVC
Diameter	: 2-inch
Status	: Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Opening	: 0.01-inch
Status	: Removed

SAND PACK : #0 - Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Cap	:

NOTES:

The well was decommissioned using the "Casing Pulling" method, as described in the NYSDEC, Division of Environmental Remediation October 1996 "Groundwater Monitoring Well Decommissioning Procedures".

Notes:

*Surface elevation based on elevation of the building 1245 concrete slab, not on actual monitoring well elevation information.

Stearns & Wheler, LLC
Environmental Engineers and Scientists

WELL DECOMMISSION LOG MW-002

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, NY
R2010.10

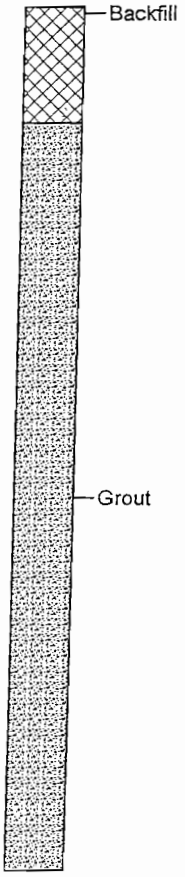
Date Started	: 4/24/02	Company Rep.	: JLK
Date Completed	: 4/24/02	Drilling Contractor	. Parratt-Wolff
Hole Diameter	: 6 1/4-inch	Driller	: Doug Toma
Drilling Method	: HSA	Logged By	: JLK
Sampling Method	: Not Applicable	Location	: VRF Bldg 1253

Depth in Feet | Surf. Elev. 446.8* | REMARKS

0 — 446
5 — 441
10 — 436
15 — 431
20

The casing was removed from the boring. The boring was then filled with an approximate 12:0.5:1 mix of Type I Portland Cement to bentonite powder to water.

Well: MW-002
Elev.: 446.8*



Depth in Feet | Well Construction Information

0 —
5 —
10 —
15 —
20

WELL DECOMMISSION

Date Compl.	: 4/24/02
Hole Diameter	: 6 1/4-inch
Drill. Method	: HSA
Company Rep.	: JLK

WELL CASING

Material	: PVC
Diameter	: 2-inch
Status	: Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Opening	: 0.01-inch
Status	: Removed

SAND PACK : #0 - Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Cap	:

NOTES:

The well was decommissioned using the "Casing Pulling" method, as described in the NYSDEC, Division of Environmental Remediation October 1996 "Groundwater Monitoring Well Decommissioning Procedures".

Notes:

*Surface elevation based on elevation of the building 1253 concrete slab, not on actual monitoring well elevation information.

Stearns & Wheler, LLC
Environmental Engineers and Scientists

WELL DECOMMISSION LOG MW-004

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, NY

R2010.10

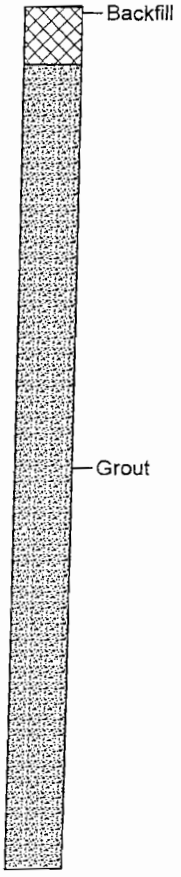
Date Started	: 4/24/02	Company Rep.	: JLK
Date Completed	: 4/24/02	Drilling Contractor	: Parratt-Wolff
Hole Diameter	: 6 1/4-inch	Driller	: Doug Toma
Drilling Method	: HSA	Logged By	: JLK
Sampling Method	. Not Applicable	Location	: VRF Bldg 1253

Depth in Feet | Surf. Elev. 446.8* | REMARKS

0 — 446
5 — 441
10 — 436
15 — 431
20

The casing was removed from the boring. The boring was then filled with an approximate 12:0.5:1 mix of Type I Portland Cement to bentonite powder to water.

Well: MW-004
Elev.: 446.8*



Depth in Feet | Well Construction Information

0 —
5 —
10 —
15 —
20

WELL DECOMMISSION

Date Compl.	. 4/24/02
Hole Diameter	: 6 1/4-inch
Drill. Method	: HSA
Company Rep.	: JLK

WELL CASING

Material	: PVC
Diameter	: 2-inch
Status	: Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Opening	: 0.01-inch
Status	: Removed

SAND PACK : #0 - Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Cap	:

NOTES:

The well was decommissioned using the "Casing Pulling" method, as described in the NYSDEC, Division of Environmental Remediation October 1996 "Groundwater Monitoring Well Decommissioning Procedures".

Notes:

*Surface elevation based on elevation of the building 1253 concrete slab, not on actual monitoring well elevation information.

Stearns & Wheler, LLC
Environmental Engineers and Scientists

WELL DECOMMISSION LOG UST Area Well

Verona Research Facility
OM&M Plan Implementation
Monitoring Network Installation
Verona, NY

R2010.10

Date Started	: 4/24/02	Company Rep.	: JLK
Date Completed	. 4/24/02	Drilling Contractor	: Parratt-Wolff
Hole Diameter	: 6 1/4-inch	Driller	: Doug Toma
Drilling Method	: HSA	Logged By	: JLK
Sampling Method	: Not Applicable	Location	: VRF Bldg 1253

Depth in Feet

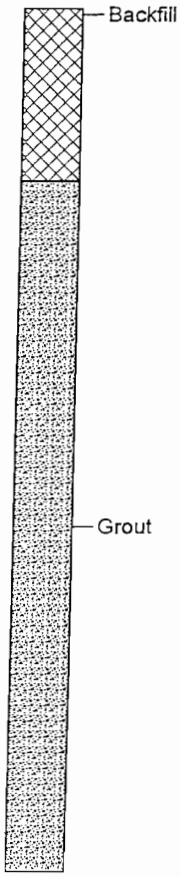
Surf. Elev. 446.8*

0
446
5
441
10
436
15
431
20

REMARKS

The casing was removed from the boring. The boring was then filled with an approximate 12:0.5:1 mix of Type I Portland Cement to bentonite powder to water.

Well: UST Area Well
Elev.: 446.8*



Depth in Feet

Well Construction Information

0

WELL DECOMMISSION

Date Compl.	: 4/24/02
Hole Diameter	: 6 1/4-inch
Drill. Method	: HSA
Company Rep.	: JLK

WELL CASING

Material	: PVC
Diameter	: 2-inch
Status	: Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Opening	: 0.01-inch
Status	: Removed

5

SAND PACK : #0 - Removed

WELL SCREEN

Material	: PVC
Diameter	: 2-inch
Cap	:

10

NOTES:

The well was decommissioned using the "Casing Pulling" method, as described in the NYSDEC, Division of Environmental Remediation October 1996 "Groundwater Monitoring Well Decommissioning Procedures".

15

20

Notes:

*Surface elevation based on elevation of the building 1253 concrete slab, not on actual monitoring well elevation information.

APPENDIX F

Property Survey & Proposed Legal Description

PROPOSED DESCRIPTION
OF LANDS TO BE
RETAINED BY
THE UNITED STATES OF AMERICA

PARCEL A

ALL THAT TRACT OR PARCEL OF LAND situate in Great Lot 157 of the Late Oneida Reservation in the Town of Verona, County of Oneida, State of New York and being more particularly described as follows:

COMMENCING at a point in the centerline of Germany Road, said point being the easterly corner of an 18.195 acre parcel as shown on a map by LaFave, White, & McGivern, L.S., P.C. entitled "Property Survey Space Command Facility, AFRL-Verona Research Site" dated Dec. 17, 1998, file No. 98-A3-Ro; thence S 31° 54' 26" E - 328.16 feet along the centerline of Germany Road to a point; thence S 57° 56' 02" W - 711.17 feet to an iron rod set, said rod being the northeast corner of Parcel "A" and the point of beginning; thence the following (4) four courses and distances through the lands of the United States of America, reputed owner, as recorded in the Oneida County Clerk's Office in Liber 1355 at page 273

1) S 32° 03' 58" E - 330.00 feet parallel to and 33.00 feet southwesterly from the centerline of an access road on said property to an iron rod set; thence
2) S 57° 56' 02" W - 249.00 feet to an iron rod set; thence
3) N 32° 03' 58" W - 330.00 feet parallel to and 33.00 feet northeasterly from the centerline of a second access road on said property to an iron rod; thence
4) N 57° 56' 02" E - 249.00 feet to the point of beginning, containing 82,171± square feet or 1.886± acres of land, more or less.

Being a portion of the lands of the United States of America as recorded in the Oneida County Clerk's Office in Liber 1355 at page 273.

Subject to easements and restrictions of record.

The above described property is as shown on a map entitled, "Lands to be Retained by the United States of America" by Bryant Associates, P.C. dated July 18, 2002.

PROPOSED DESCRIPTION
OF LANDS TO BE
RETAINED BY
THE UNITED STATES OF AMERICA

PARCEL B

ALL THAT TRACT OR PARCEL OF LAND situate in Great Lot 157 of the Late Oneida Reservation in the Town of Verona, County of Oneida, State of New York and being more particularly described as follows:

COMMENCING at a point in the centerline of Germany Road, said point being the easterly corner of an 18.195 acre parcel as shown on a map by LaFave, White, & McGivern, L.S., P.C. entitled "Property Survey Space Command Facility, AFRL-Verona Research Site" dated Dec. 17, 1998, file No. 98-A3-Ro; thence S 31° 54' 26" E - 328.16 feet along the centerline of Germany Road to a point; thence S 57° 56' 02" W - 711.17 feet to an iron rod set, said rod being the northeast corner of Parcel "A" ; thence S 32° 03' 58" E - 1293.68 feet parallel and 33.00 feet southwesterly of the centerline of an access road on lands on the United States of America, reputed owner, as recorded in the Oneida County Clerk's Office in Liber 1355 at page 273 to the point of beginning; thence continuing S 32° 03' 58" E - 508.35 feet to a point on the top of the northerly bank of Brandy Brook; thence the following (7) seven courses and distances along the top of said northerly bank;

1) N 76° 03' 17" W - 66.23 feet to a point; thence
2) N 77° 58' 51" W - 55.23 feet to a point; thence
3) N 88° 45' 07" W - 48.39 feet to a point; thence
4) N 83° 23' 16" W - 43.09 feet to a point; thence
5) S 87° 58' 48" W - 42.40 feet to a point; thence
6) S 76° 12' 17" W - 47.11 feet to a point; thence
7) S 70° 28' 58" W - 8.00 feet to an iron rod set in the top of the northerly bank of Brandy Brook; thence

N 32° 03' 58" W - 331.02 feet parallel to and 33.00 feet northeasterly from the centerline of a second access road on said lands to an iron rod set; thence N 57° 56' 02" E - 249.00 feet to the point of beginning, containing 100,153± square feet or 2.299 acres of land, more or less.

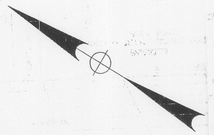
Being a portion of the lands of the United States of America as recorded in the Oneida County Clerk's Office in Liber 1355 at page 273.

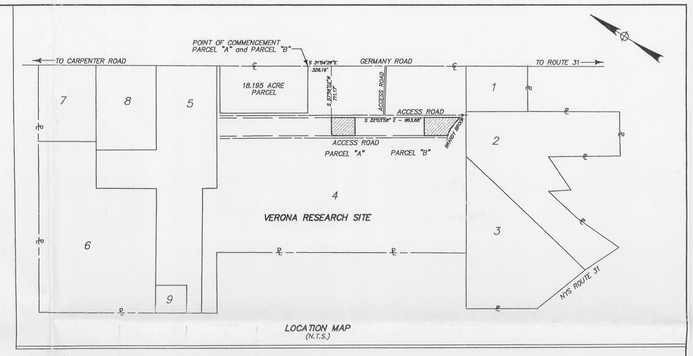
Subject to easements and restrictions of record.

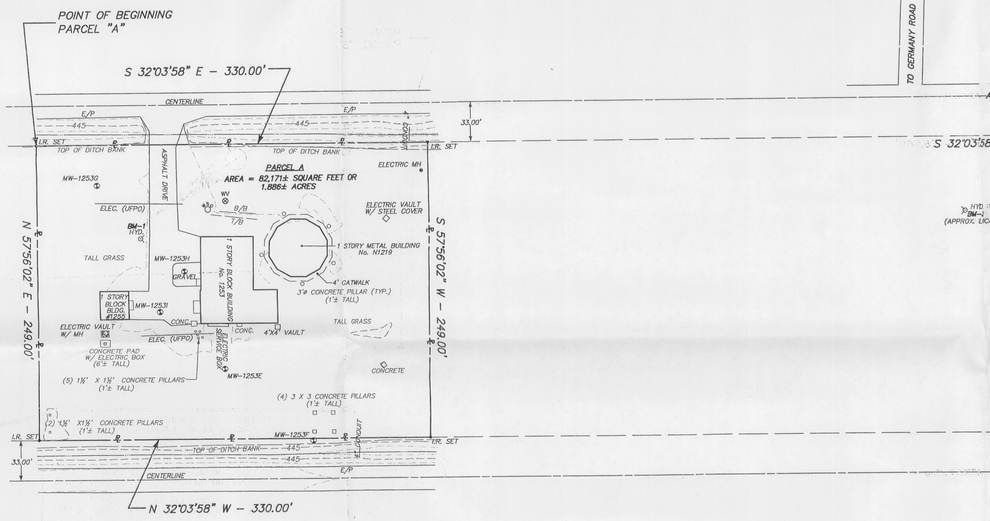
The above described property is as shown on a map entitled, "Lands to be Retained by the United States of America" by Bryant Associates, P.C. dated July 18, 2002.

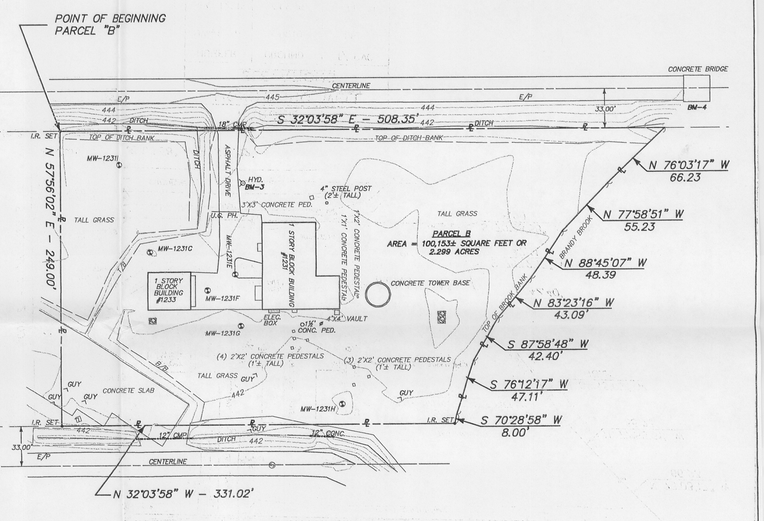
SHEET 1 OF 1 SHEET

ONEIDA COUNTY









PARCEL "A"
MONITORING WELL ELEVATIONS

NUMBER	GROUND	T/ PVC
MW-1253E	445.57	448.36
MW-1253F	445.89	447.76
MW-1253G	445.42	448.01
MW-1253H	446.58	448.89
MW-1253I	446.58	448.92

PARCEL "B"
MONITORING WELL ELEVATIONS

NUMBER	GROUND	T/ PVC
MW-1231C	444.10	446.64
MW-1231E	443.36	445.71
MW-1231F	443.61	445.90
MW-1231G	442.93	444.43
MW-1231H	442.10	444.64
MW-1231I	442.90	444.52

BENCHMARK LIST

NUMBER	DESCRIPTION	ELEVATION
BM-1	CHISELED "X" ON SOUTH NUT ON HYDRANT 50'± NORTHWEST OF BUILDING No. 1253.	447.88
BM-2	CHISELED "X" ON SOUTH NUT ON HYDRANT 50'± NORTHWEST OF BUILDING No. 1245.	448.33
BM-3	CHISELED "X" ON SOUTH NUT ON HYDRANT 40'± NORTH OF BUILDING No.1231.	445.01
BM-4	CHISELED SQUARE ON TOP OF WEST CONCRETE BRIDGE RAIL OVER BRANDY BROOK (CENTERLINE ± OF CREEK).	446.64

UTILITY NOTE
EXISTING UNDERGROUND FACILITIES, STRUCTURES, AND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE PLANS, RECORDS AND SURVEYS. THEIR LOCATION MUST THEREFORE BE CONSIDERED APPROXIMATE AND NO GUARANTEE IS MADE BY BRYANT ASSOCIATES, P.C. TO THE HORIZONTAL OR VERTICAL LOCATION OF SUCH FACILITIES, STRUCTURES AND UTILITIES. THERE MAY BE OTHERS, THE EXISTENCE OF WHICH IS PRESENTLY UNKNOWN. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL FACILITIES, STRUCTURES AND UTILITIES IN THE FIELD PRIOR TO COMMENCING WORK.

NOTES:

1) BOUNDARY AND TOPOGRAPHIC SURVEY PERFORMED BY BRYANT ASSOCIATES, P.C. JUNE 26–28, 2002.
2) IRON RODS WITH YELLOW CAPS SET JULY 5, 2002.
3) ONLY VISIBLE TOPOGRAPHIC FEATURES AND UTILITIES ARE SHOWN.
4) HORIZONTAL DATUM FROM MAP ENTITLED "PROPERTY SURVEY SPACE COMMAND FACILITY VERONA, AFRL–VERONA RESEARCH SITE" BY LAFAVE, WHITE, & McGIVERN DATED DEC. 17, 1998.
5) VERTICAL DATUM BASED ON INFORMATION SUPPLIED BY OTHERS (FINISHED FLOOR OF BUILDING No. 1253 – 446.79').

SCALE IN FEET
30 0 15 30 60 120

Unauthorized alteration or addition to a survey map bearing a licensed land surveyor's seal is a violation of section 7209, sub-division 2, of the New York State Education Law.

Only copies from the original of this survey marked with an original of the land surveyor's embossed seal shall be considered to be valid true copies.

STATE OF NEW YORK
THOMAS W. BOCK
49212
LICENSED LAND SURVEYOR

I HEREBY CERTIFY THAT THIS IS AN ACCURATE MAP MADE FROM AN ACCURATE SURVEY PREPARED UNDER MY DIRECTION

August 1, 2007

THOMAS W. BOCK, P.E., L.S.
PLS LICENSE No. 049212
FOR BRYANT ASSOCIATES, P.C.

BRYANT ASSOCIATES, P.C.
Engineers – Surveyors
SYRACUSE EAST AURORA

LANDS TO BE RETAINED BY THE UNITED STATES OF AMERICA REPUTED OWNER

BOUNDARY AND TOPOGRAPHIC SURVEY

MAP 1 PARCEL 1

J:\PROJECTS\ONEIDA_VERONA_AIRPORT\PLOTTING\2707A01.DWG 7-14-08 JMZ

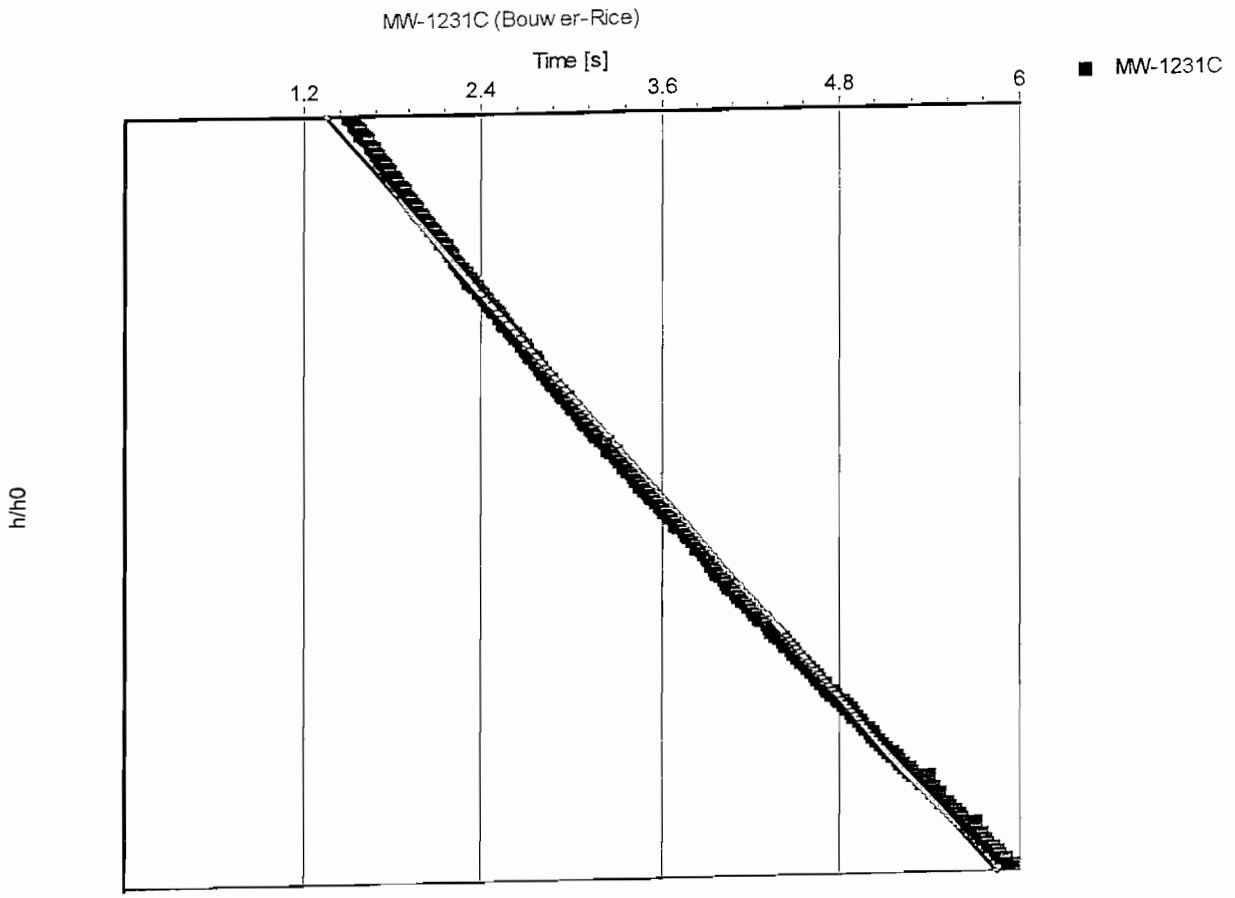
APPENDIX G

Slug Test Analyses

S&W Redevelopment of N.A.
430 East Genesee Street
Syracuse, New York
Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1231C**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 3.70E-3 [cm/s]

Test parameters:

Test well:	MW-1231C	Aquifer thickness:	10 [ft]
Screen radius:	0.25 [ft]	Gravel pack Porosity (%)	25
Screen length:	10 [ft]		
Casing radius:	0.08 [ft]		
r(eff):	0.143 [ft]		

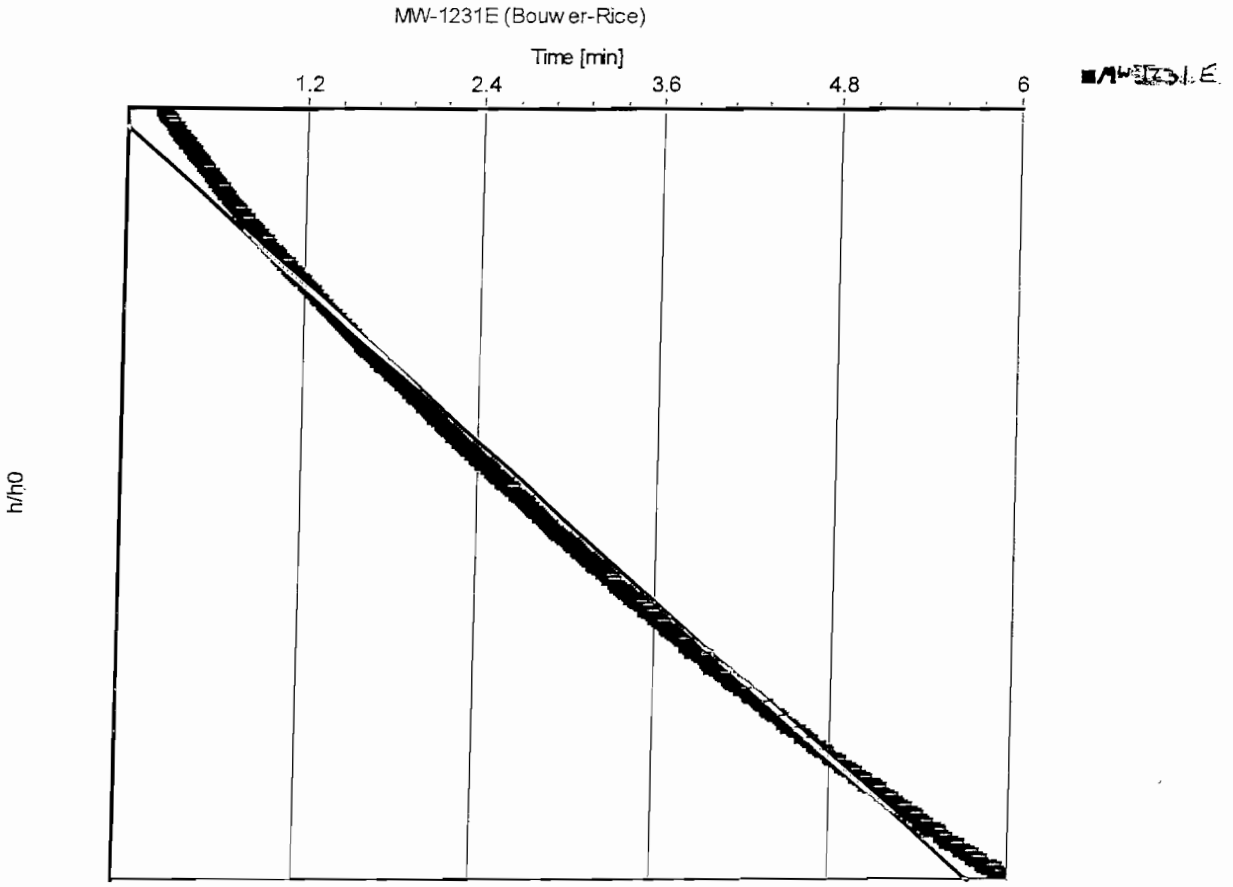
Comments:

Evaluated by: dss
Date: 9/16/02

S&W Redevelopment of N.A.
430 East Genesee Street
Syracuse, New York
Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1231E**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 8.01E-5 [cm/s]

Test parameters:

Test well:	MW-1253E	Aquifer thickness:	11 [ft]
Screen radius:	0.25 [ft]	Gravel pack Porosity (%)	25
Screen length:	9 [ft]		
Casing radius:	0.083 [ft]		
r(eff):	0.144 [ft]		

Comments: .0583 to 6 minutes

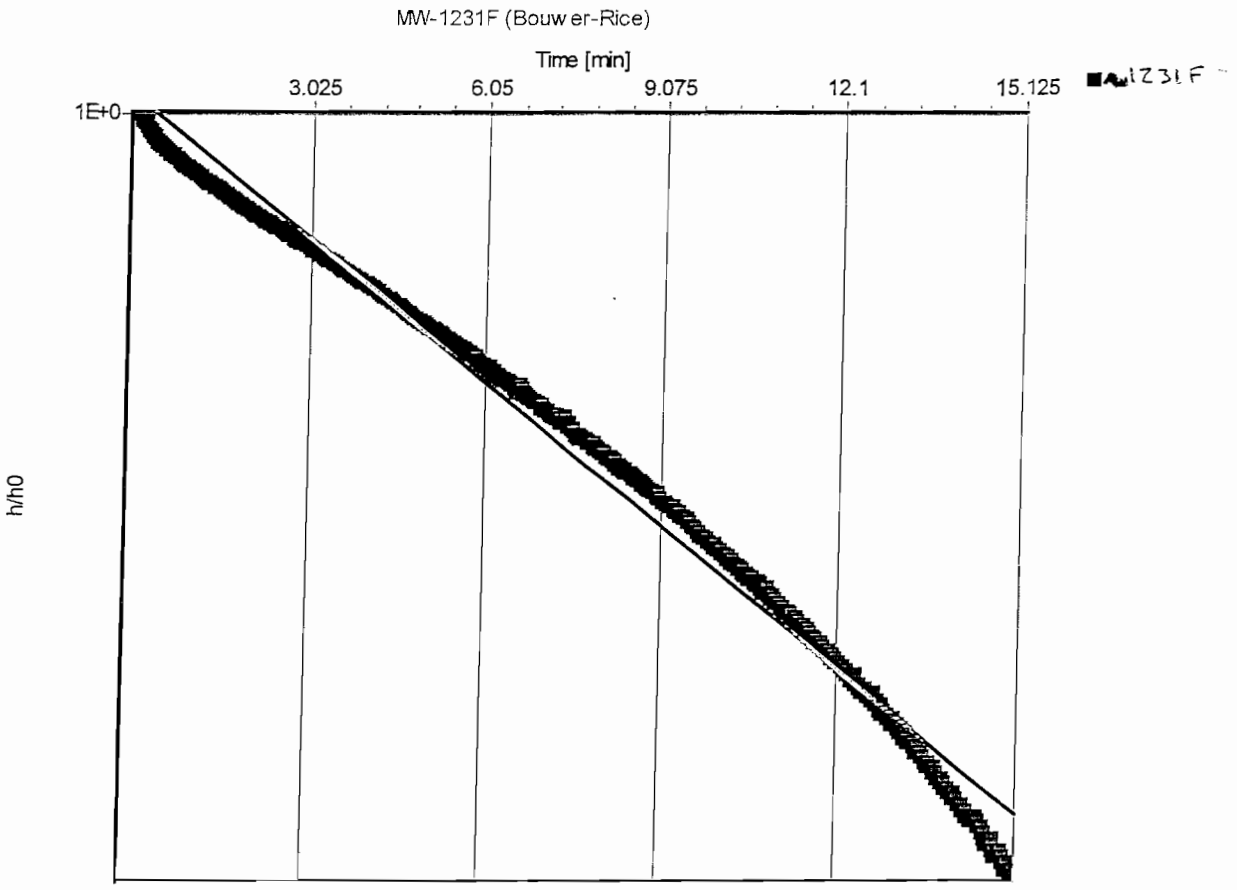
Evaluated by: dss

Date: 8/22/02

S&W Redevelopment of N.A.
430 East Genesee Street
Syracuse, New York
Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1231F**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 1.89E-4 [cm/s]

Test parameters:

Test well:	MW-1253F	Aquifer thickness:	11 [ft]
Screen radius:	0.5 [ft]	Gravel pack Porosity (%)	25
Screen length:	9 [ft]		
Casing radius:	0.1667 [ft]		
r(eff):	0.289 [ft]		

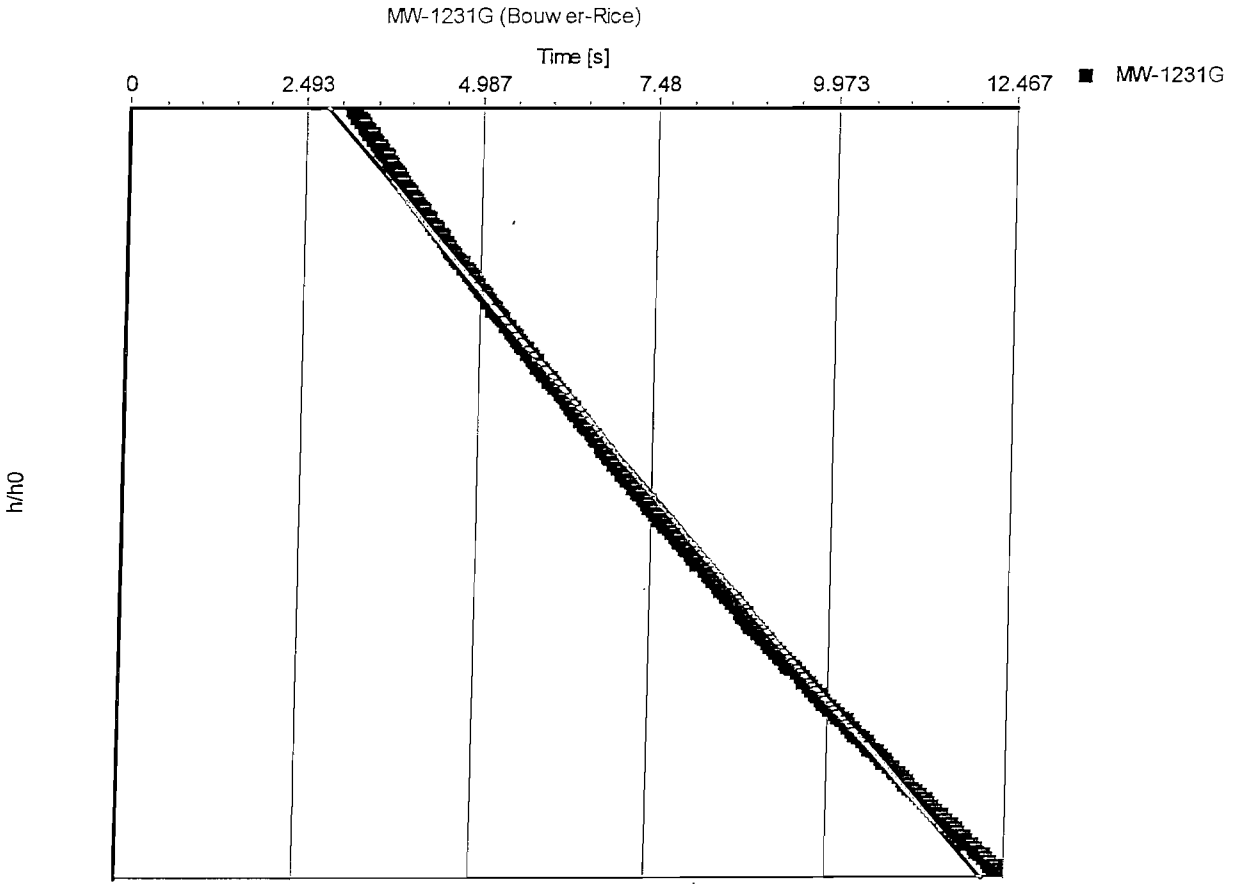
Comments:

Evaluated by: dss
Date: 8/22/02

S&W Redevelopment of N.A.
430 East Genesee Street
Syracuse, New York
Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1231G**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 2.23E-3 [cm/s]

Test parameters:

Test well:	MW-1231G	Aquifer thickness:	11 [ft]
Screen radius:	0.25 [ft]	Gravel pack Porosity (%)	25
Screen length:	5.56 [ft]		
Casing radius:	0.08 [ft]		
r(eff):	0.143 [ft]		

Comments: Line fit between 3.117 and 12.467 minutes.

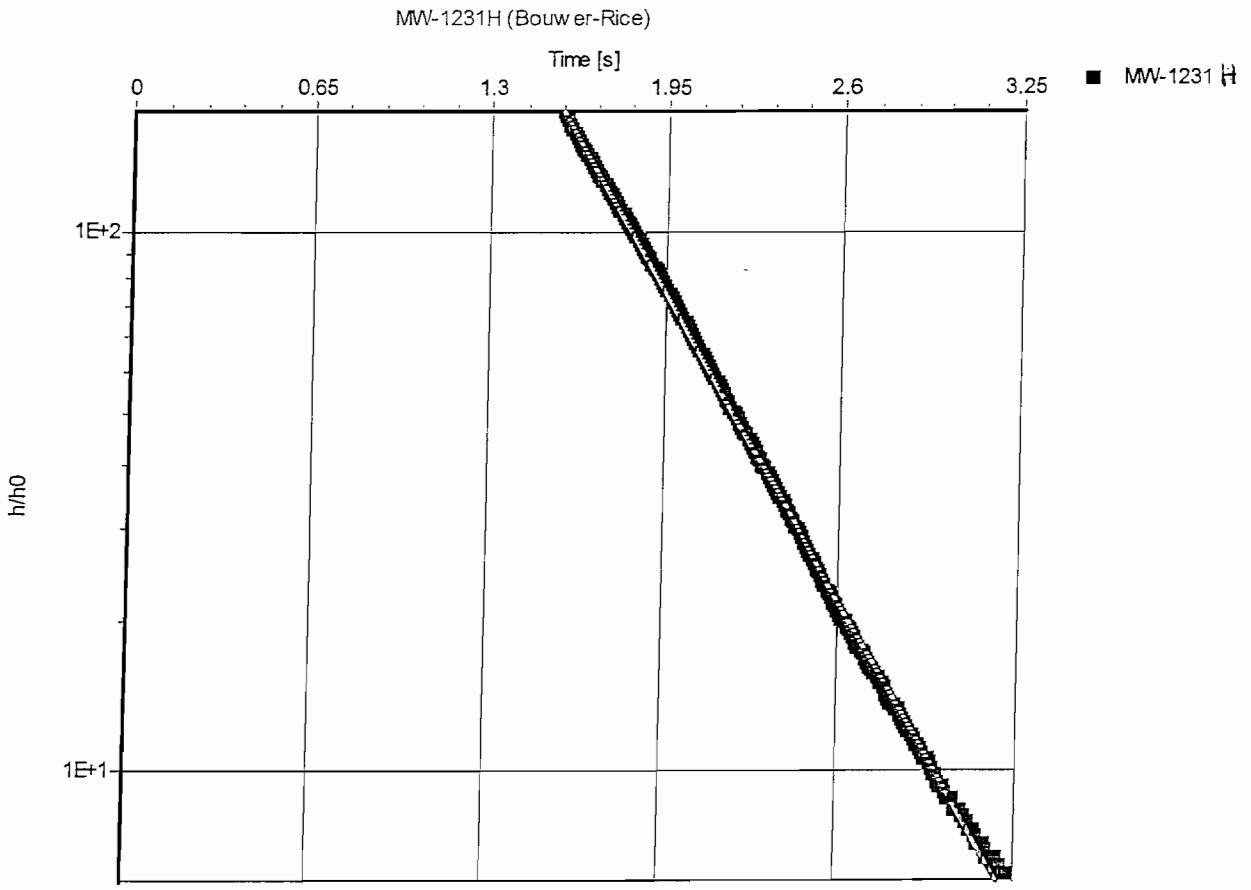
Evaluated by: dss

Date: 8/22/02

S&W Redevelopment of N.A.
430 East Genesee Street
Syracuse, New York
Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1231H**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 1.77E-1 [cm/s]

Test parameters:

Test well:	MW-1253H	Aquifer thickness:	11 [ft]
Screen radius:	0.5 [ft]	Gravel pack Porosity (%)	25
Screen length:	11 [ft]		
Casing radius:	0.1667 [ft]		
r(eff):	0.289 [ft]		

Comments:

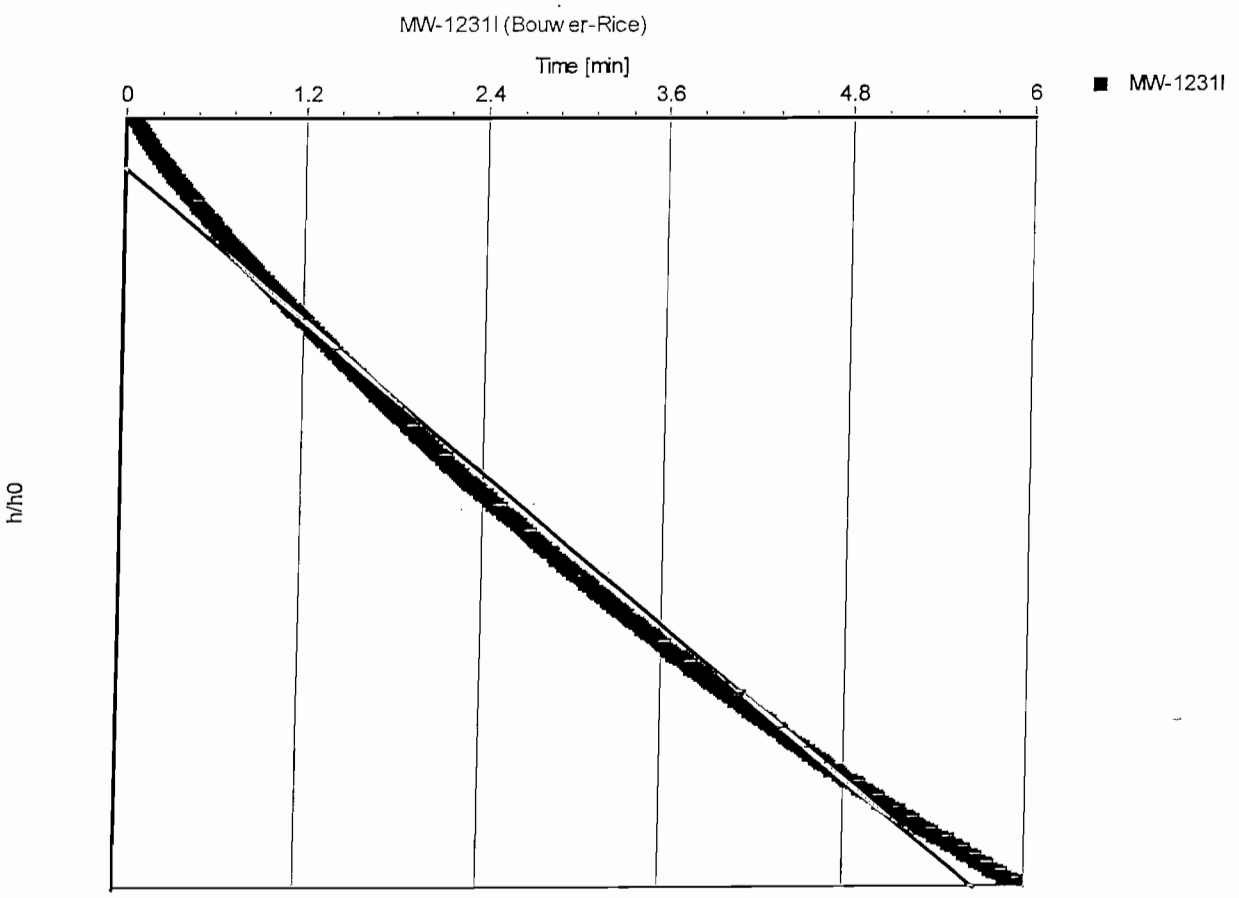
Evaluated by: dss

Date: 9/16/02

S&W Redevelopment of N.A.
430 East Genesee Street
Syracuse, New York
Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1231I**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 1.53E-4 [cm/s]

Test parameters:

Test well:	MW-1231I	Aquifer thickness:	11 [ft]
Screen radius:	0.25 [ft]	Gravel pack Porosity (%)	25
Screen length:	6.44 [ft]		
Casing radius:	0.08 [ft]		
r(eff):	0.143 [ft]		

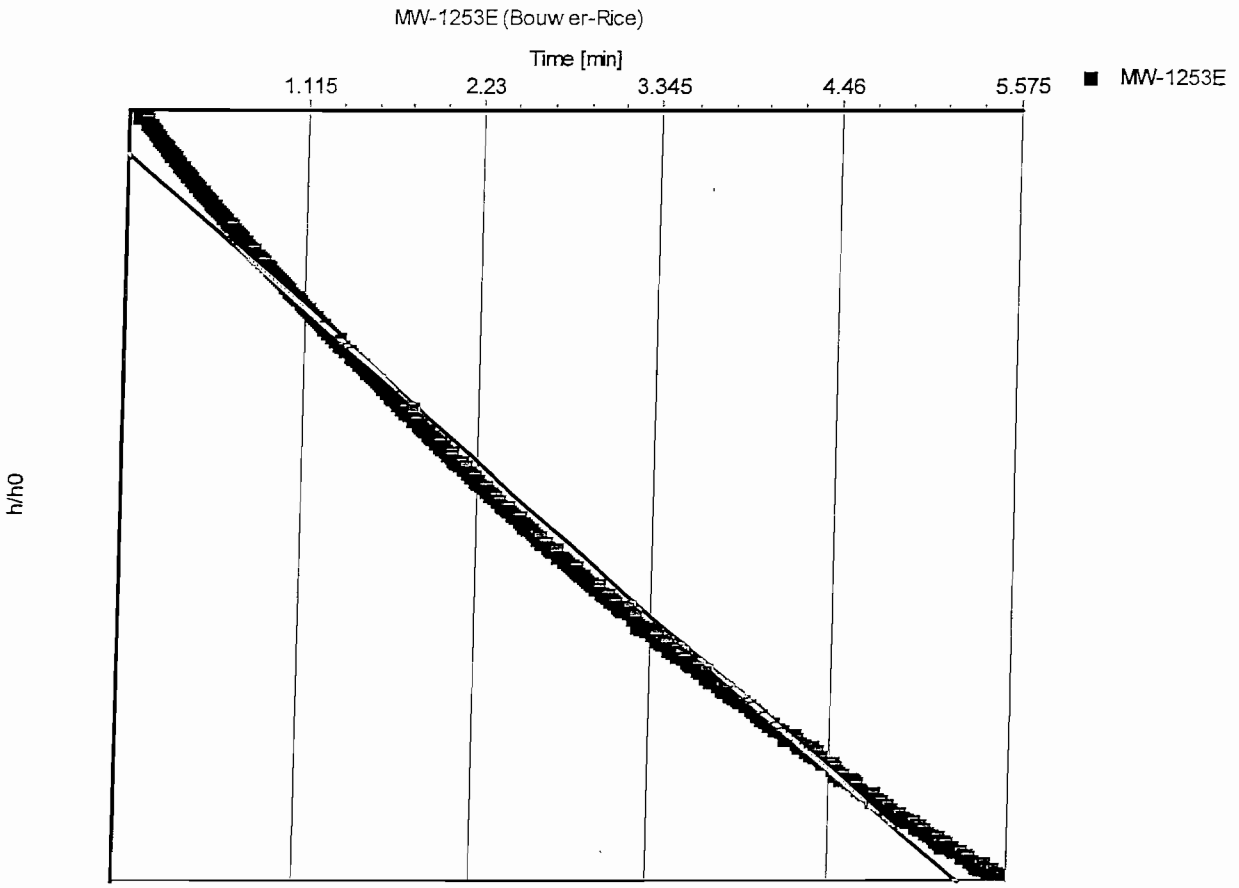
Comments:

Evaluated by: dss
Date: 8/22/02

S&W Redevelopment of N.A.
430 East Genesee Street
Syracuse, New York
Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1253E**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 1.49E-4 [cm/s]

Test parameters:

Test well:	MW-1253E	Aquifer thickness:	11 [ft]
Screen radius:	0.25 [ft]	Gravel pack Porosity (%)	25
Screen length:	9 [ft]		
Casing radius:	0.083 [ft]		
r(eff):	0.144 [ft]		

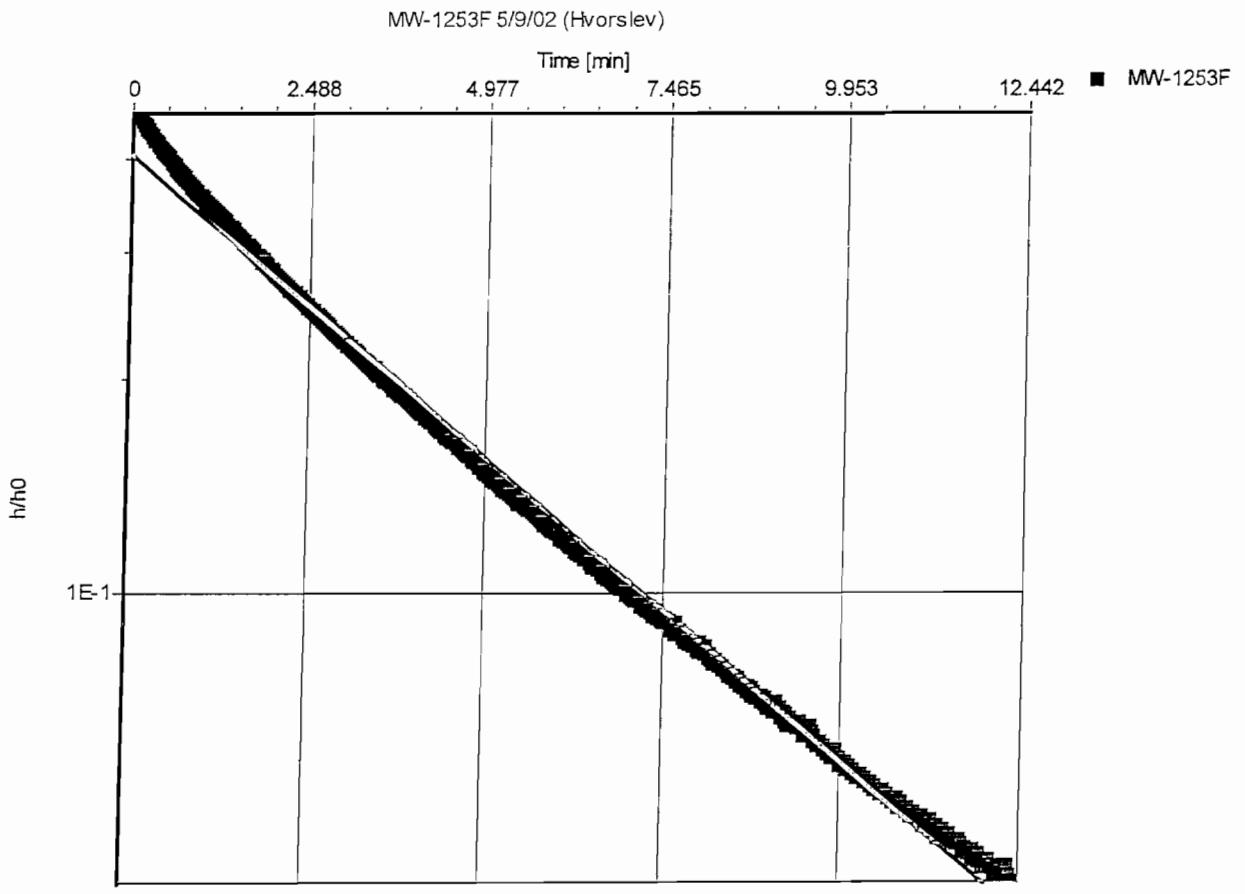
Comments:

Evaluated by: dss
Date: 8/21/02

S&W Redevelopment of N.A.
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Phone 315-422-4949

Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1253F**

Analysis method: **Hvorslev**

Analysis results:

Conductivity: 1.43E-4 [cm/s]

Test parameters:

Test well:	MW-1231E	Aquifer thickness:	10.64 [ft]
Screen radius:	0.25 [ft]		
Screen length:	7 [ft]		
Casing radius:	0.08 [ft]		

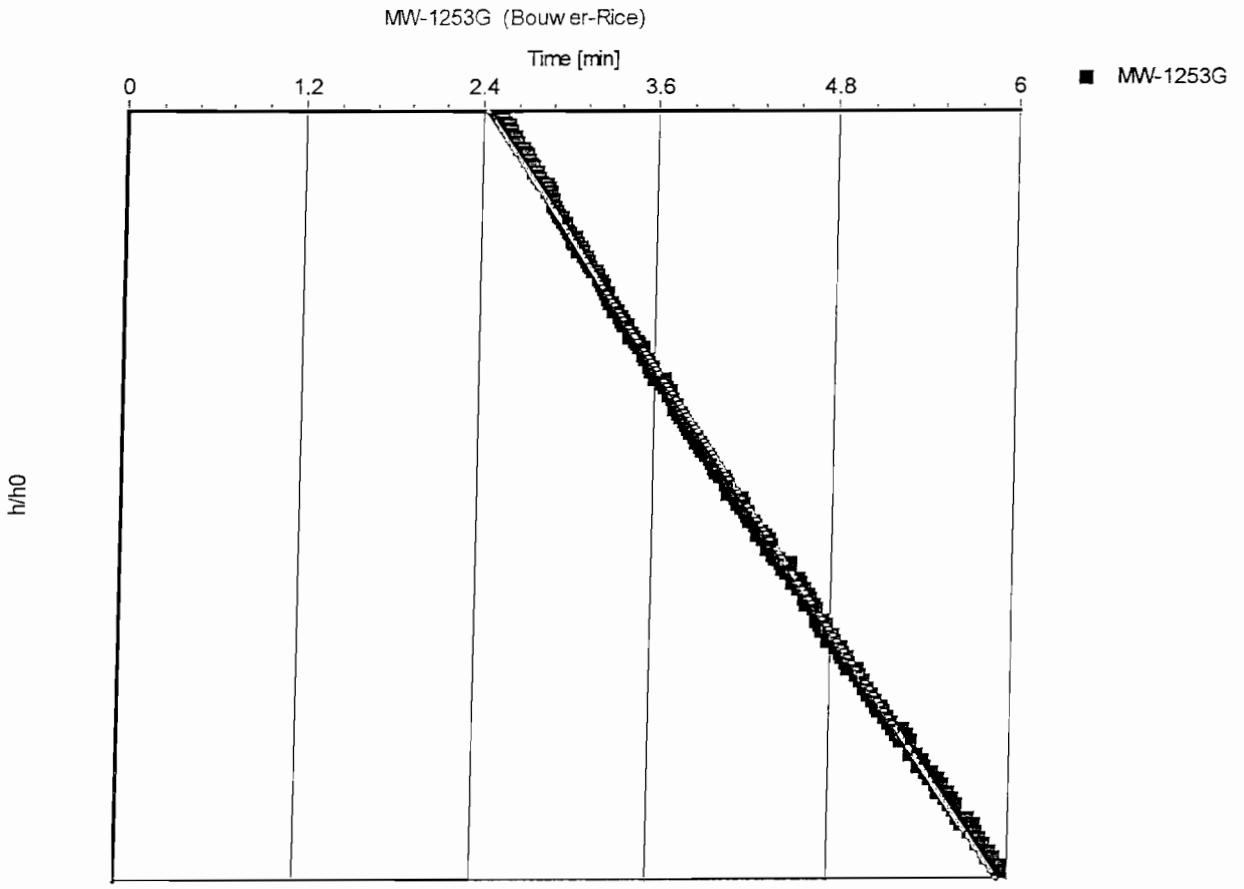
Comments: Fit to all data from 0.1 to 12.5 min.

Evaluated by: BMc
Date: 7/10/02

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Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1253G**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 5.19E-4 [cm/s]

Test parameters:

Test well:	MW-1253G	Aquifer thickness:	10.26 [ft]
Screen radius:	0.5 [ft]	Gravel pack Porosity (%)	25
Screen length:	8 [ft]		
Casing radius:	0.1667 [ft]		
r(eff):	0.289 [ft]		

Comments:

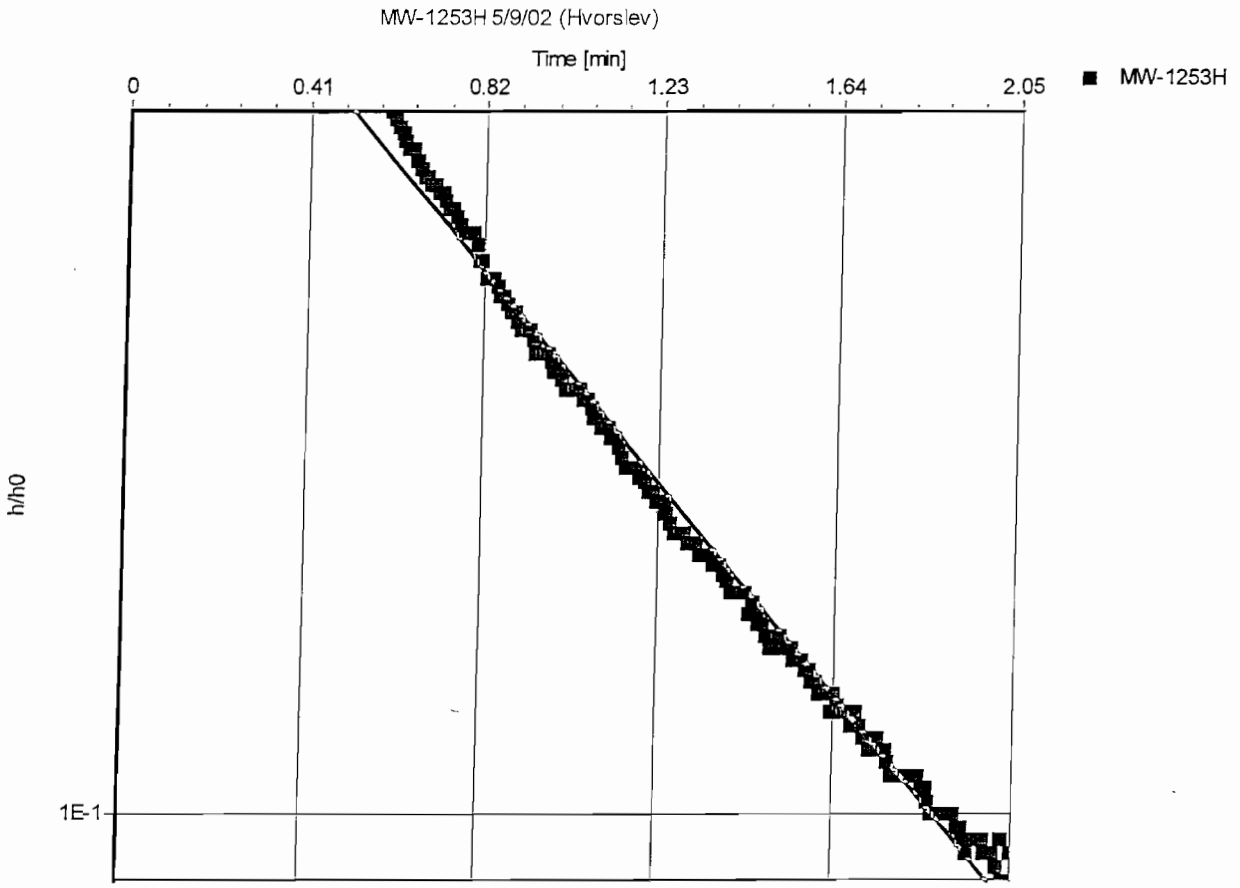
Evaluated by: BMc

Date: 9/16/02

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Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1253H**

Analysis method: **Hvorslev**

Analysis results:

Conductivity: 8.35E-4 [cm/s]

Test parameters:

Test well:	MW-1253H	Aquifer thickness:	12.89 [ft]
Screen radius:	0.5 [ft]		
Screen length:	11 [ft]		
Casing radius:	0.1667 [ft]		

Comments: Fit to all data from 0.2 to 17 min.

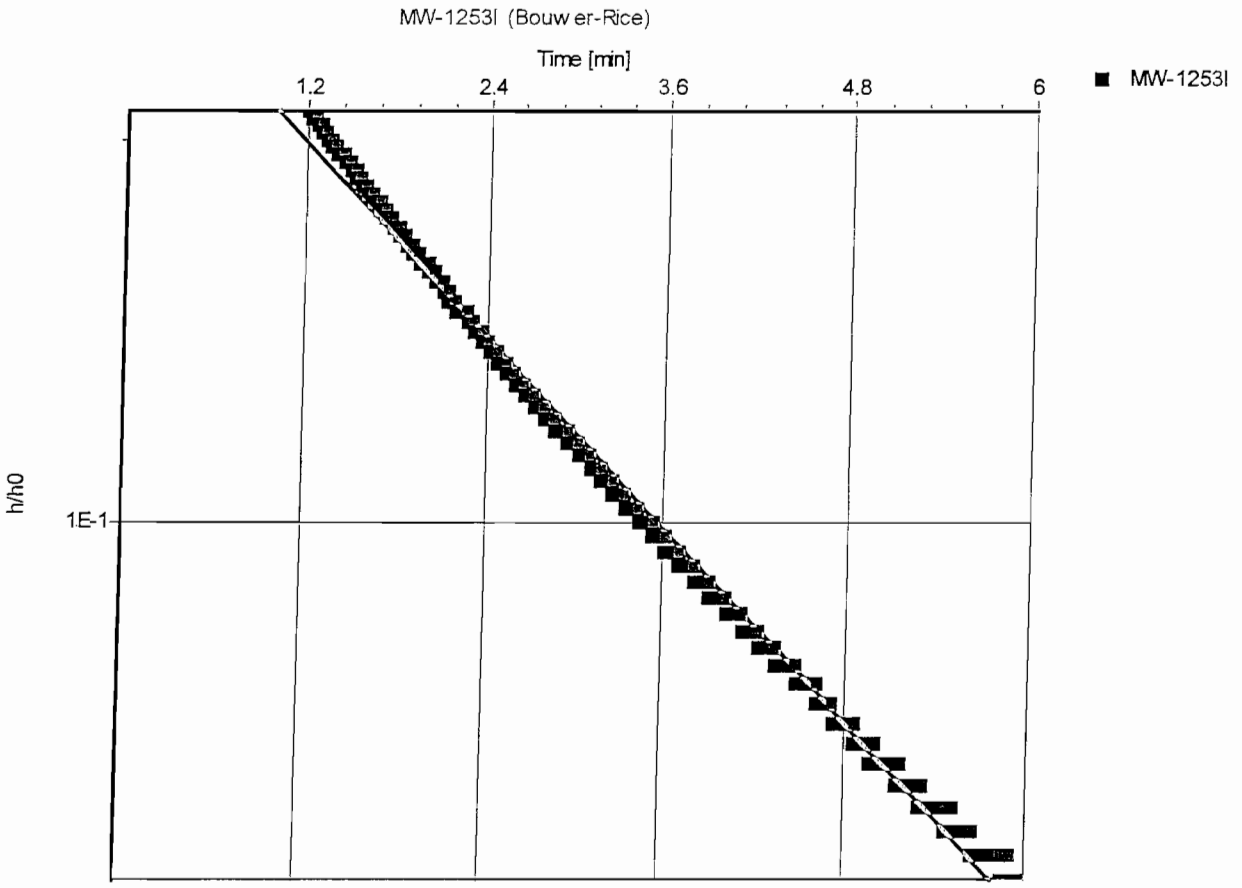
Evaluated by: BMc

Date: 7/10/02

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Slug Test Analysis Report

Project:	VRF OM&M Construction
No:	R2010.10.1400
Client:	Air Force Research Lab



Test name: **MW-1253I**

Analysis method: **Bouwer-Rice**

Analysis results:

Conductivity: 4.20E-4 [cm/s]

Test parameters:

Test well:	MW-1253I	Aquifer thickness:	12.52 [ft]
Screen radius:	0.5 [ft]	Gravel pack Porosity (%)	25
Screen length:	11 [ft]		
Casing radius:	0.1667 [ft]		
r(eff):	0.289 [ft]		

Comments:

Evaluated by: dss
Date: 9/16/02