

C&D POWER SYSTEMS (C&D BATTERIES)

HUGUENOT, NEW YORK

SITE No. 336001

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NYS-DEC
REGION 3-NEW PA

OPERABLE UNIT 2

REMEDIAL INVESTIGATION WORK PLAN ADDENDUM

Prepared for:

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March 2001
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1.0 INTRODUCTION

Pursuant to an Order on Consent (W3-0726-97-11) between C&D Technologies Inc. (C&D) and the New York State Department of Environmental Conservation (NYSDEC), C&D has implemented a Remedial Investigation (RI) at its facility located in the Village of Huguenot, Orange County, New York (Figure 1). Following review of a draft RI and a draft FS report, the NYSDEC has separated the C&D Power Systems (C&D Batteries) Site (Site No. 3-36-001) into two operable units. Operable Unit 2 (OU-2) includes ground water, surface water, sediments and soil (near the former 12" lagoon overflow discharge pipe). The NYSDEC has requested that C&D conduct additional investigation to ascertain the extent of contamination, if any, in the media associated with OU-2.

This work plan details the scope of the OU-2 investigation and documents the methodologies that will be used to implement the field work. A schedule for completion of the field work and submittal of an OU-2 RI report and an amended FS report is provided.

Data were obtained from analysis of samples collected from the media associated with OU-2 during implementation of the initial RI Work Plan (Earth Tech, Albany, New York). A listing of the tasks completed during the initial RI that are associated with OU-2 are summarized below:

- The development of all on-site monitoring wells (August 11 & 12, 1999) and measurement of ground water levels in the wells (August 10 & 27, 1999);
- Two background surface soil samples (6-12') were collected and analyzed for the NYSDEC TCL/TAL parameters. Two surface soil samples were collected from the former railroad tracks and analyzed for barium lead and fluoride.
- In-situ hydraulic conductivity testing of monitoring wells MW-6 through MW-10, MW-12 and MW-13 (August 27, 1999);
- The collection of ground water samples from seven on-site monitoring wells (MW-6, MW-7, MW-8, MW-9, MW-10, MW-12, MW-13) for laboratory analyses (September 9, 1999, January 13, 2000 and March 27, 2000). The September 1999 samples analyzed for barium, lead and fluoride. The MW-6 and MW-7 September 1999 samples were analyzed for the complete NYSDEC TCL/TAL parameters. The January 2000 samples were analyzed for cadmium and PCBs. Because of laboratory PCB contamination of the January 2000 samples, ground water monitoring wells were re-sampled for PCBs in March 2000;
- Collection of a ground water sample from monitoring well MW-11 (March 27, 2000) for PCB analysis.
- Collection of samples from the Swartwout potable well in February 2000 and March 2000; and,

- The collection of sediment samples (SED-1 through SED-4) for laboratory analyses (August 10, 1999).

1.1 Summary of Initial RI Findings

Data collected during the initial RI indicated that PCBs (Aroclor 1254), barium, cadmium, fluoride and lead are the primary Site contaminants. Elevated concentrations of these parameters were detected in the lagoon soils.

The ground water data indicate that fluoride is the only compound consistently detected above the ground water standard in ground water from the on-site monitoring wells. Fluoride was detected in four (MW-7, MW-8, MW-9, MW-10) of the five downgradient monitoring wells at concentrations above the ground water standard (1.5 mg/L).

The metals data from monitoring wells MW-6 and MW-7 indicate that the barium, cadmium, chromium, copper, silver and zinc reported in the lagoon soils has not impacted ground water downgradient of the lagoon. Lead was detected in the total matrix MW-6 ground water sample at a concentration above the ground water standard. However, lead was not detected in the MW-6 field filtered sample at a 3 ug/L reporting limit, indicating that the lead detected in the MW-6 total matrix sample is associated with the sample sediment load and that lead is not currently migrating as a dissolved species in the ground water.

The lead and aroclor 1254 detected in monitoring well MW-6 may be related to the historical mounding within the lagoon. This mounding most likely resulted in the movement of ground water from the lagoon toward monitoring well MW-6. Fluoride concentrations in MW-6 are currently consistent with background concentrations, indicating there is currently not a ground water flow path from the lagoon to MW-6. This indicates that the lead and aroclor 1254 detected in the MW-6 ground water sample are associated with minor residual sorption to saturated zone soils in the vicinity of MW-6 and that there is not any continuing migration of aroclor 1254 and lead from the lagoon to MW-6. The MW-6 lead and aroclor 1254 concentrations are not indicative of the leading edge of a ground water plume and there is not a significant continuing source of lead and aroclor 1254 located in the vicinity of MW-6.

Cadmium was detected in the ground water samples from monitoring wells MW-6, MW-7 and MW-10 at 0.99 ug/L, 1.6 ug/L and 0.88 ug/L, respectively, which is above the background (MW-11, MW-12 and MW-13) concentration of non-detect at 0.33 ug/L. However, all ground water cadmium results were significantly below the ground water standard of 5 ug/L. The cadmium analytical data for the ground water samples collected in January 2000 demonstrate that cadmium present in the lagoon soils has not had a significant impact on ground water quality.

Aroclor 1254 was detected in the March 2000 ground water samples from monitoring wells MW-6 and MW-7. Three samples from monitoring well MW-7 were collected and submitted for analysis, an original and a duplicate to Severn Trent and a triplicate sample to SCI LAB: the results for the three samples were 0.067 ug/L, 0.084 ug/L and 0.090 ug/L. The average MW-7 concentration (0.08 ug/L) was below the NYSDEC ground water standard. The MW-6 aroclor

1254 concentration (0.24 ug/L) was above the NYSDEC ground water standard (0.09 ug/L). However, the reported aroclor 1254 concentration in both monitoring wells was below the NYSDOH drinking water standard (0.5 ug/L). PCBs were not detected at or above the laboratory reporting limit (0.05 ug/L) in the March 2000 samples from either downgradient monitoring wells MW-8, MW-9, MW-10 or the Swartwout potable well.

Collectively, the ground water data demonstrate that PCBs from the lagoon have not significantly impacted ground water quality. Only one of five downgradient monitoring wells exhibited a PCB concentration above the ground water standard and all monitoring well PCB concentrations were less than the drinking water standard.

The Swartwout potable well data indicate that with the exception of fluoride, contaminants associated with the former lagoon have not impacted water quality in the Swartwout potable well. Fluoride was detected in the Swartwout well (10-minute sample) at 3.85 mg/L. This exceeds the New York State Department of Health drinking water standard (2.2 mg/L) and the NYSDEC ground water standard (1.5 mg/L) but does not exceed the United States Environmental Protection Agency (USEPA) National Primary Drinking Water Standard (4.0 mg/L). The Site upgradient monitoring well fluoride concentrations were 0.521 mg/L (MW-12) and 0.642 mg/L (MW-13). These data indicate the former lagoon may have impacted the Swartwout well water quality with respect to fluoride. However, as noted the reported concentration is below the USEPA National Primary Drinking Water Standard.

Fluoride was detected in the sediment sample SED-3 at a concentration above the upstream SED-1 reporting limit. The SED-4 fluoride value was only slightly above the SED-2 reporting limit and well below the SED-1 reporting limit. Data indicates that sediments in the vicinity of SED-4 have not been significantly impacted with respect to fluoride. Barium was also detected in the sediment samples collected from the Site, however, the upgradient sample, SED-1, had the highest concentration of any sample. This suggests that the detected barium concentrations are associated with background conditions and not the lagoon. The data indicate that the lead detected in the SED-4 sample may be related to the former railroad line.

The stream sediment data demonstrate that the Site has not had a significant impact on stream sediment quality with respect to lead or barium. With the possible exception of the SED-3 fluoride value, the data indicate that stream sediments have not been significantly impacted with respect to fluoride.

The upgradient background surface soil sample data revealed that PCBs and cadmium were not present in the upgradient samples at reporting limits of 17 ug/Kg and 0.1 mg/Kg, respectively. The average background soil sample lead concentration was 10.9 mg/Kg. Fluoride was not detected in the two samples from the former railroad bed (reporting limit of 10.19/10.42 mg/Kg) and the results are considered representative of typical background conditions.

Ground water elevation data indicate that ground water flow is primarily to the east. There is an anomaly in the ground water elevation data at monitoring well MW-7 that could potentially represent mounding from the lagoon. However, this is considered unlikely because with the exception of runoff, there is no water discharged to the lagoon.

2.0 SCOPE OF WORK OPERABLE UNIT 2

This section details the scope of work for OU-2. The proposed scope of work consists of the following tasks:

- Ground Water Monitoring Well Installation and Surveying
- Monitoring Well Development and Hydraulic Conductivity Testing
- Ground Water Sample Collection and Analysis
- Surface Water Sample Collection and Analysis
- Sediment Sample Collection and Analysis
- Soil Sample Collection and Analysis
- Remedial Investigation / Feasibility Study Report Addendum.

As noted above, environmental samples will be collected from ground water monitoring wells, surface soil, and stream sediments and surface water. A summary of the samples that will be collected, the proposed analyses and the analytical methods are summarized in Table 1.

2.1 Ground Water Monitoring Well Installation and Survey

One ground water monitoring well will be installed approximately 50 feet downgradient of the lagoon. The well will be installed on the east edge of the existing access road, which is located adjacent to the lagoon. The well will be located along a line between the lagoon and downgradient monitoring well MW-7, which has exhibited the highest fluoride concentrations. The approximate location of the proposed monitoring well (MW-14) is depicted on Figure 2 (Map Pocket).

The monitoring well will be constructed of 2-inch ID, Schedule-40 PVC well screen, flush-threaded into Schedule-40 PVC riser pipe of the same diameter. The size of the screen will be No. 10 slot (i.e., 0.010 inch). The screen length will be ten feet but may be changed based upon site specific conditions as determined by the on-site geologist. The base of the well will be equipped with a threaded bottom plug, while the top of the well will be equipped with a vented, non-threaded cap.

The monitoring well will be drilled using a nominal 4-inch diameter drill casing advanced with drive and wash methods. If bridging of sands is encountered an alternative drilling method, such as conventional mud rotary employing a tricone roller will be utilized. Continuous five foot split spoon samples will be collected and inspected/logged by a geologist.

The boring/monitoring well installation and sub-surface stratigraphic description (split spoon inspection) will be performed by Alpha Geoscience as a sub-contractor to Delaware Engineering. Alpha Geoscience qualifications and resumes of personnel who may be involved in the project are provided in Appendix A.

Split spoon samplers and drilling equipment will be cleaned prior to and following boring/monitoring well installation. The split spoon samples will be cleaned between each use. Drilling equipment and split spoon samplers will be cleaned by brushing off visible material and washing with potable water using a steam cleaner. A decontamination pad will be constructed to collect the water used during the cleaning of equipment. Water generated during the decontamination will be placed in fifty-five gallon drums until monitoring well ground water laboratory analytical data are available. If analytical results indicate that the water does not represent an environmental or public health threat, the water will be discharged directly to the ground. Approval from the NYSDEC will be obtained prior to discharge of the water. If necessary, the water will be either discharged to the on-site treatment plant or transported off-site for treatment/disposal at a permitted facility. Any settled solids will be placed in the lagoon.

The monitoring well will be constructed by gradually introducing sand inside the casing to fill the annular space between the well screen and adjacent casing. The sand pack will extend from the bottom of the boring to approximately two feet above the top of the screen. During placement of the sand pack, casing will be withdrawn in increments so that the formation materials do not collapse against the well casing and/or screen. The sand pack will consist of clean, graded, silica sand with grain size distribution matched to the slot-size of the screen; i.e., a Unimin™ Grade 0 or equivalent sand. A six-inch layer of clean Unimin™ Grade 00 sand will then be placed above the sand pack to preclude migration of sealing material into the sand pack. A bentonite pellet seal will be placed above the sand pack to form a seal at least two-feet thick. Cement-bentonite grout will be placed from the top of the bentonite pellet seal to approximately three feet below grade.

The grout material will consist of Type I Portland cement mixed with either a powdered or granular bentonite to a consistency deemed acceptable by the supervising geologist. The grout will be introduced via a tremie pipe lowered to just above the top of the bentonite pellet seal. As the grout material is pumped into the borehole, the tremie pipe will be removed and the casing withdrawn. A lockable flush mount well cover will be installed on the casing upon completion of the well to protect the well and prevent unauthorized access. The well identification number will be clearly labeled on the outside of each protective casing. An overburden monitoring well construction form will be completed.

The horizontal location and the elevation above mean sea level of the monitoring well will be surveyed. Both the ground elevation and the elevation of the well PVC riser will be determined.

2.2 Monitoring Well Development

The new monitoring well will be developed prior to in-situ hydraulic conductivity testing and sample collection. Monitoring wells are generally developed following installation in order to improve the hydraulic properties of the sand pack and to remove any sediment within the well

and adjacent to the screen/sand pack. Well development will continue until the water is relatively sediment free and the turbidity is less than 50 NTU (if possible). If the 50 NTU goal cannot be achieved, well development will continue until 10 well volumes have been removed. The monitoring well will be developed following the procedures detailed in Attachment B of the previously approved Sampling and Analysis Plan (Earth Tech Remedial Investigation/Feasibility Study Work Plan, April 1999).

Water generated during the development and sampling of the newly installed well will be placed in fifty-five gallon drums until the laboratory analytical data are available. If analytical results indicate that the water does not represent an environmental or public health threat, the water will be discharged directly to the ground. Approval from the NYSDEC will be obtained prior to discharge of the water. If necessary, the water will be either discharged to the on-site treatment plant or transported off-site for treatment/disposal at a permitted facility.

Water generated during sampling of the existing on-site monitoring wells will be discharged directly to the ground surface. Previous analytical data indicate that this water does not represent a significant environmental or public health threat.

2.3 In-Situ hydraulic Conductivity Testing

A hydraulic conductivity (K) test, also called slug or bail tests, will be performed on the new monitoring well to determine the in-situ hydraulic conductivity of the screened hydro-stratigraphic unit. Slug and bail tests involve observing the recovery of water levels toward an equilibrium level after an initial perturbation. The hydraulic conductivity will be performed following the procedures detailed in Attachment B of the previously approved Sampling and Analysis Plan.

2.4 Ground Water Sample Collection and Analysis

Ground water samples will be collected from the existing on-site monitoring wells (upgradient MW-11, MW-12, MW-13 / downgradient MW-6, MW-7, MW-8, MW-9, MW-10) and the new monitoring well (MW-14). All samples will be analyzed for PCBs, barium, cadmium, fluoride and lead. A sample will also be collected from the former Swartwout residence and analyzed for fluoride. Samples will be analyzed by Adirondack Environmental Services, Inc (AES). AES is a New York State Department of Health, ELAP approved laboratory for NYSDEC ASP analyses. A summary of the proposed analyses is provided in Table 1.

Two complete sets of ground water samples will be collected from each monitoring well. The first set of samples will be collected using a low flow micro-purging procedure as described in this section. The second set of samples will be collected after collection of the low flow samples. The second set of samples will be collected following the procedures in the approved work plan (Earth Tech, April 1999), which consisted of using a Waterra pump with dedicated discharge tubing or bailers.

The first set of ground water samples will be collected using a micro-purging technique. Micro-purging consists of a low flow (generally less than 1 liter/minute) purging of a monitoring well

prior to sampling and collection of a sample at the same low flow rate immediately flowing purging. The pumping device will be placed within the bottom half of the screened interval of the well. Micro-purging and low flow sampling minimizes disturbance of stagnant water in the well casing above the screened interval and will reduce the potential for mobilization of particulate or colloidal material which could influence analytical results, particularly total metals concentrations.

Micro-purging will allow collection of representative samples without purging of three well volumes and disturbance of the well casing water column above the well screen. Field parameters (pH, conductivity, temperature and turbidity) will be monitored during the low flow purging procedure. Field parameters will be monitored using either a flow through cell or individual grab samples will be collected at a consistent time interval. When field parameters have stabilized, water in the intake zone of the pump have reached equilibrium with the aquifer and a representative sample can be collected. To the extent possible, the purge flow rate will not exceed the recharge rate of the monitoring well.

The micro-purging/sampling will be performed using either a Grundfos Redi-Flo2 submersible pump or a bladder pump. Dedicated discharge tubing will be used for each monitoring well. The pump, wiring and safety cable will be decontaminated between locations using the following procedures:

- Exterior wash of pump, wiring and safety cable with non-phosphate detergent;
- Potable water rinse; and
- Pump a minimum of two gallons of distilled/deionized water through the pump.

2.5 Surface Water Sample Collection and Analysis

Surface water samples will be collected from the unnamed tributary of the Neversink River, located east of and adjacent to the Site. Six samples will be collected, one upgradient of the lagoon former overflow discharge (12" CMP), four samples between the 12" CMP and the existing non-contact cooling water outfall and one downgradient of the railroad tracks. The samples will be analyzed for PCBs, barium, cadmium, lead and fluoride. Samples will be collected following the procedures detailed in the approved sampling and analysis plan.

2.6 Sediment Sample Collection and Analysis

Surficial sediment samples will be collected from the adjacent tributary to the Neversink River. Two samples will be collected upstream of the 12" CMP, two samples between the 12" CMP and the existing non-contact cooling water outfall and two samples downstream of the railroad tracks. Samples will be analyzed for PCBs, barium, cadmium, lead and fluoride. Samples will be collected following the procedures detailed in the approved sampling and analysis plan.

2.7 Surficial Soil Sample

One surface soil sample (top six inches) will be collected at the former lagoon 12" CMP outfall. This sample will be analyzed for PCBs, barium, cadmium, lead and fluoride. The sample will be collected following the procedures provided in the approved sampling and analysis plan.

2.8 Remedial Investigation / Feasibility Study Report Addendum

An addendum to the initial RI and FS reports will present the results of the Operable Unit 2 remedial investigation and evaluate remedial action objectives and options.

3.0 QUALITY ASSURANCE / QUALITY CONTROL AND SAMPLE HANDLING

Sample identification and labeling, sample containers, sample holding times and chain-of-custody procedures will be consistent with the procedures presented in the previously approved sampling and analysis plan. Four sediment samples were collected during the initial RI. The sediment samples that will be collected during the Operable Unit 2 RI will be numbered beginning with SED-5.

Consistent with the ASP, CLP requirements, a matrix spike and a matrix spike duplicate (PCBs) and a matrix duplicate (metals and fluoride) will be collected at a frequency of five percent for each matrix (aqueous/solid). The sampling and analysis summary, including QA/QC samples, is provided in Table 1.

4.0 SCHEDULE

This section provides a proposed schedule for implementation of the OU-2 field work and preparation of the amended RI and FS reports. Maintaining the schedule is dependent on several factors including but not limited to, weather, availability of the drilling sub-contractor and complying with the review dates by the various organizations. It may be necessary to revise the schedule if any unforeseen events occur.

- Submit Revised Work Plan to NYSDEC May 29, 2001
- NYSDEC Review Draft Work Plan May 29 to June 11, 2001
- Implement Field Work June 25, to July 6 2001
- Laboratory Analysis July 6, to August 3, 2001
- RI and FS Report Preparation August 3 to Sept.14, 2001
- C&D Technologies and Avnet Review RI/FS Sept. 14 to October 12, 2001
- NYSDEC Review RI/FS October 15 to Nov. 19, 2001

- Submit Final RI/FS to NYSDEC

December 17, 2001

TABLES

Table 1
Sample and Analysis Summary
Operable Unit 2
C&D Power Systems (C&D Batteries) Site

Media	Number of Samples	Analysis
Sediments		
Field Samples	6	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
Matrix Spike (MS)	1	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
MS Duplicate	1	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
Surface Water	6	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
Soil	1	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
Ground Water		
Field Samples****	10	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
Matrix Spike (MS)	1	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
MS Dup/Matrix Dup	1	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***
Field Duplicate	1	PCBs (8082)*, Cadmium, Barium, Lead ** Fluoride ***

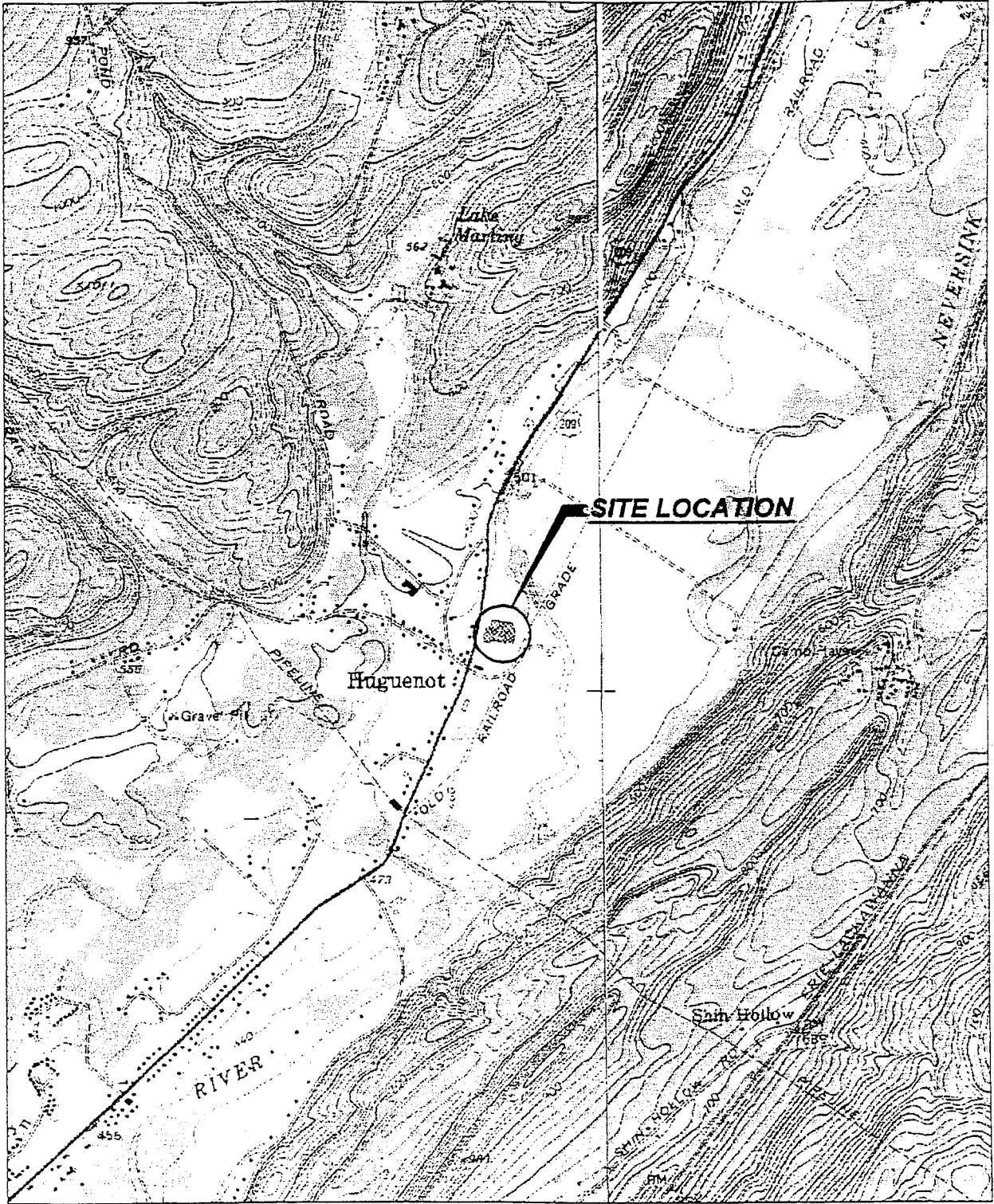
* SW-846 Method 8082 0.065 ug/L reporting limit. NYS Category B Deliverables

** NYS ASP CLP Methods With Full CLP Deliverable Package

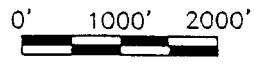
*** EPA Method 340.2 with Category B Deliverable Package. Fluoride in soil and sediment samples will be analyzed on a distilled/deionized water leach of the sample.

**** Sample from Swartwout well for fluoride only

FIGURES



MAP REFERENCE:
PORT JERVIS NORTH & OTISVILLE
USGS QUAD MAPPING



FILENAME: LOCATION.DWG

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SITE LOCATION MAP

C & D TECHNOLOGIES
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MAY 26, 00

APPENDIX A

**ALPHA GEOSCIENCE
QUALIFICATIONS AND RESUMES**

***STATEMENT
OF
QUALIFICATIONS***

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ALPHA GEOSCIENCE

Alpha Geoscience was founded in 1991 to provide specialized professional consulting services in the areas of geology, hydrology and environmental science. The professionals at Alpha have been working as consultants to industry and government since the mid 1970s. Alpha is committed to providing a full range of services that include project planning, field data collection and analysis, preparation of reports, expert testimony, regulatory negotiation and site remediation. Alpha's philosophy is to provide direct and cost-effective solutions while maintaining economic and environmental benefits.

Alpha provides consulting services to clients throughout the United States. Alpha has conducted subsurface investigations, coordinated remedial activities, provided field oversight, and negotiated work scopes for numerous sites and is experienced in the implementation and administration of state and federal Solid Waste, Spills and Hazardous Waste programs, and maintains a good working relationship with regulatory agency personnel. Alpha also provides expert technical support, opinions and testimony for a variety of mining and industrial clients who are dealing with mineral resource, ground water resource, hazardous waste, and environmental impact issues.

Samuel W. Gowan is the President and a Senior Geologist. Dr. Gowan has twenty years of professional experience including the siting of municipal, hazardous, and industrial waste facilities; and evaluating the geology and hydrogeologic conditions associated with mining operations and contaminated sites. Dr. Gowan provides expert analysis and testimony in the areas of geology, hydrogeology, hydrology and air photographic interpretation for mines, siting studies, property transfers and hazardous waste sites. He is a Certified Professional Geologist with the American Institute of Professional Geologists and is a Registered Geologist in Pennsylvania.

Thomas M. Johnson is a Vice President and a Senior Hydrogeologist. Mr. Johnson has twenty two years of experience in the areas of contaminant hydrology, water supply studies, landfill investigations, petroleum remediation, and hazardous and solid waste management and remediation. Mr. Johnson provides strength in the areas of site management, project management, expert representation and regulatory negotiation for investigations and remediation of hazardous waste sites and petroleum contaminated sites. Mr. Johnson's capabilities range from site data collection through data analysis and reporting. He is a Certified Professional Geologist and is a Registered Geologist in Virginia.

Jean M. Neubeck is a Senior Hydrogeologist. Ms. Neubeck has eighteen years of professional experience in the areas of designing and implementing site investigations for water supply, solid waste, petroleum spills, and hazardous waste projects; performing assessments for property transactions; preparing Environmental Impact Statements; providing technical oversight of remediation activities for petroleum and hazardous waste contaminated sites; and supervising the removal and closure of underground, petroleum storage tanks. She is a Registered Geologist in Arkansas and Wyoming, and is licensed to perform petroleum work in New Jersey.

Michael D. Palleschi is a Senior Hydrogeologist. Mr. Palleschi has fourteen years of experience specializing in the development of ground water resources, and conducting environmental, hazardous waste, hydrologic and remedial investigations. Mr. Palleschi has extensive project management experience and has provided contractor oversight, coordination of technical staff, client liaison, technical guidance and review, QA/QC and interaction with regulatory agencies. He is a Certified Professional Geologist with the American Institute of Professional Geologists and is a Registered Geologist in Pennsylvania.

Kevin J. Phelan is a Senior Hydrogeologist. Mr. Phelan has twenty-one years of hydrogeologic, engineering geologic and geophysical experience in investigating sites for siting of critical facilities; evaluating the extent and sources of contaminants at petroleum spills, hazardous waste sites and solid waste sites; and assessments of environmental conditions for litigation and property transfers. Mr. Phelan has managed the repairs and upgrades of secondary containments at several petroleum tank farms; directed the closure of over 50 underground storage tanks, and implemented cost-effective investigations and cleanups at dozens of petroleum spill sites. Mr. Phelan has been called upon to provide expert opinions in litigation involving the sources of petroleum contamination in ground water.

**ALPHA PROVIDES GEOLOGIC AND HYDROLOGIC SERVICES
IN THE AREAS OF:**

- Environmental Assessments for Property Transactions
- Solid, Industrial and Hazardous Waste Investigation and Remediation
- Petroleum Storage Tank Removal, Spill Investigations, and Site Remediation
- Mining Hydrology, Exploration and Permitting Support
- Water Supply Evaluation and Development
- Siting Studies and Environmental Impact Statements

ALPHA'S SERVICES INCLUDE:

- Technical Oversight & Representation for Site Work and Regulatory Negotiations
- Expert Testimony & Expert Opinion
- Remediation Oversight
- Air Photography Analysis
- Identification of Environmental Issues
- Subsurface Investigation and Interpretation
- Ground Water Monitoring & Analysis
- Surface Water Monitoring & Quantification
- Aquifer Testing & Analysis
- Production and Monitoring Well Design
- Well Performance Evaluations
- Data Validation
- Laboratory Audits

Alpha works closely with its associates to provide related expertise in the areas of engineering, remediation construction, air resources, biology, cultural resources, and chemistry.

ALPHA GEOSCIENCE PROJECT EXPERIENCE SUMMARY

ALPHA GEOSCIENCE'S PROJECT EXPERIENCE INCLUDES:

- ▶ **Environmental Assessments for Property Transfers**
- ▶ **Solid, Hazardous and Industrial Waste Site Investigations and Remediation**
- ▶ **Expert Opinions for Mines, Hazardous Waste Sites, Petroleum Contaminated Sites, and Other Environmental Issues**
- ▶ **Petroleum Investigations, Assessments, and Remediation**
- ▶ **Water Supply and Water Resource Investigations**
- ▶ **Solid and Hazardous Waste/Siting Studies**
- ▶ **Mining Hydrology, Permitting and EIS Issues**
- ▶ **Air Photograph Interpretation**

ALPHA GEOSCIENCE

PROJECT EXPERIENCE SUMMARY



Expert Opinions for Hazardous Waste Sites, Petroleum Contaminated Sites, Mines, and Other Environmental Issues

Alpha Geoscience is called upon to provide expert opinions and testimony on a variety of hydrogeologic, environmental and geological resource projects. The expert support has been in the general areas of air photograph interpretation, geologic investigations and hydrogeologic investigations. The expert opinions have been provided for issues relating to mines, hazardous waste sites, petroleum contaminated sites, other environmental contamination, and damages to property and natural resources. The following are some of the more significant projects:

Hazardous Waste

- ▶ Provided site investigation, expert report and technical support in a damages suit between a homeowner and a dry cleaner involving PCE contamination of ground water. A settlement was successfully negotiated based on Alpha's site characterization.
- ▶ Provided expert opinions and prepared trial exhibits for PRP litigation regarding cost recovery at the Renovak Dry Cleaners facility in New Paltz Plaza. The case settled prior to litigation.
- ▶ Provided technical review of hydrogeologic and air photographic data and submitted an expert report for Transport Insurance Company in insurance litigation with the St. Johnsbury Trucking Company. The issues involved the distribution and timing of movement of coal gasification waste in the ground water and surface water from the Pine Street Canal Superfund site in Burlington, Vermont. The case settled following report submission.

Air Photographic Interpretation

- ▶ Currently providing analysis of historical air photographs and an expert opinion relative to chrome waste disposal and movement for AlliedSignal corporation in PRP litigation with PP&G Industries.
- ▶ Provided analysis of historical air photographs, and an expert report for AlliedSignal in a legal action against Exxon regarding the disposal and movement of chrome waste in Jersey City, New Jersey. The case was settled prior to the scheduled court date.
- ▶ Provided expert analysis of historical air photographs regarding the movement, storage and recycling of waste and by-products for an aluminum refining operation at a Superfund site. The work was in support of litigation for an insurance claim.
- ▶ Provided expert air photographic analysis and submitted an expert report for PSN Corporation in litigation of an insurance claim regarding waste removal costs. A deposition has been given, and a trial is pending.

- ▶ Provided expert analysis of air photographs and a rebuttal report for Weyerhaeuser for sites in Everett Wood Washington and Port Newark New Jersey.

Environmental Contamination

- ▶ Provided technical review and hydrogeologic opinions regarding metal contamination from a C&D landfill in a personal injury litigation. The work is being performed on behalf of the plaintiff.
- ▶ Provided expert analyses and opinions regarding ground water contamination from municipal salt storage areas for two towns in Upstate New York.
- ▶ Provided expert opinion and support to a Town regarding environmental contamination by pesticides from a commercial pest control facility.
- ▶ Provided expert review and opinions in a personal injury suit involving alleged contamination of a building by petroleum-derived benzene vapors. The work was performed on behalf of the defendants.
- ▶ Currently providing technical review and hydrogeologic opinions regarding the presence and movement of contamination associated with a former coal gasification plant.
- ▶ Currently providing technical review and expert support for a city accused of contaminating underground facility by discharge of contaminated runoff into a Karst aquifer system.

Mine Related Issues

- ▶ Provided expert testimony at public hearings, issues conferences and adjudicatory hearings for a proposed sand and gravel mine and several proposed rock quarries. The technical issues involved impacts to residential wells, a community water supply, trout streams, springs and wetlands.
- ▶ Provided expert testimony at an issues conference for Akzo Nobel Salt Inc. in support of the permitting of a large underground salt mine.
- ▶ Provided expert witness support in an insurance litigation concerning the failure of a large underground mine. The expert support was in the technical areas of geology and hydrogeology. The case settled during discovery prior to trial.
- ▶ Currently providing an assessment of mineral resource at a mine for property tax litigation.

Petroleum Contamination

- ▶ Provided expert review and support for an insurance company's defense of a gasoline station owner being sued by the state for cost recovery in a petroleum remediation project. Also provided technical support to the insurance company in a civil action brought against the same client.
- ▶ Currently providing a review and expert analysis of ground water contamination of a commercial facility by an adjacent petroleum storage facility in central New York.

Property and Environmental Damages

- ▶ Investigated topsoil conditions and provided expert testimony on behalf of Niagara Mohawk for a dispute along a power transmission line. Sampled soils, documented site conditions with photographs, described soils, prepared a report of findings and testified in New York State Supreme Court.
- ▶ Reviewed consulting reports and provided technical support to counsel for Aetna Insurance in litigation on a claim involving the in filling and subsequent removal of sediment from a pond downstream from a construction site. The case settled prior to trial.
- ▶ Provided support in a personal injury suit and property damage claim involving a mudslide at a commercial property.
- ▶ Conducted an investigation and provided an expert opinion to an insurance carrier regarding the causes of a retaining wall failure.
- ▶ Currently evaluating the potential impacts on a municipal water supply reservoir by sand and clay excavation at an adjacent commercial facility.

Other Environmental Projects

- ▶ Evaluated the geology, hydrogeology and surface water conditions at the proposed site of the Laredo Fireman Training Facility in Laredo Texas, and assessed the potential for impacts to the water resources in the event of a release at the facility.

Solid, Hazardous, and Industrial Waste Site Investigations and Remediation

Alpha Geoscience has conducted numerous projects that involve the design and implementation of investigations for the characterization of soil, rock, surface water, and ground water contamination at waste sites; and for the remediation of waste sites. These investigations have involved a variety of contaminants including; metals, solvents, petroleum products, pesticides, and PCBs. Selected projects are summarized as follows:

Metal Contamination

- ▶ Designed and implemented the site investigation for a NYS listed inactive hazardous waste site containing metal sludges. Prepared a feasibility assessment of remedial alternatives for submittal to NYSDEC (subconsultant).
- ▶ Performed an assessment of potential environmental liability associated with a delisted hazardous waste site containing metals from tannery wastes and pesticides.
- ▶ Currently evaluating the movement of lead and other metal contaminants in the soil and ground water adjacent to a C&D landfill.

Solvents

- ▶ Designed and conducted a bedrock aquifer investigation at a NYS listed inactive hazardous waste site contaminated by chlorinated solvents.
- ▶ Designed and implemented a Phase II soil and ground water investigation at a manufacturing site contaminated by chlorinated solvents and petroleum.
- ▶ Implemented a soil vapor extraction treatment system at an active commercial site contaminated by gasoline and dry cleaning solvents.
- ▶ Provided third party review and critique of an RI/FS at a dry cleaning facility listed as a NYS hazardous waste site. Prepared site remedial plan and cost estimate on behalf of potential purchaser. Currently implementing the remedial plan after assisting with cost recovery from the dry cleaning facility.
- ▶ Conducted hydrogeologic investigation of a property adjacent to a dry cleaning facility listed as a NYS hazardous waste site. Investigation results allowed the client to successfully negotiate a settlement agreement with the waste site owner.

PCBs

- ▶ Designed and implemented an investigation of surface soil and shallow ground water quality at an active commercial metal recycling facility that is a listed NYS hazardous waste site (on-going).

- ▶ Performed a review of an RI/FS on a commercial scrap yard site contaminated by PCBs and petroleum to evaluate ground water flow paths related to underground bulk storage.
- ▶ Conducted a technical review of soil and ground water data associated with a commercial site in Alabama impacted by PCBs, solvents and petroleum contaminants from an adjacent industrial facility.

Hazardous and Solid Waste

- ▶ Currently a subconsultant to the NYSDOT (1996) on a three-year term agreement to conduct Phase II hazardous waste investigations at NYSDOT sites and right-of-ways located in eastern New York.
- ▶ Reviewed hydrogeologic data and evaluated potential hazardous waste liability associated with a site containing solid wastes and pesticides.
- ▶ Performed evaluation and documentation of buried drums of hazardous waste discovered during a foundation excavation. Drums were successfully removed and disposed allowing completion of construction activities.
- ▶ Performed an assessment to identify potential hazardous waste disposal at a former highway maintenance garage facility scheduled for development as an office complex.
- ▶ Supervised a hazardous and solid waste disposal project for a municipal maintenance facility. Provided services including contractor selection, disposal/recycling options and cost analysis.

*RESUMÉS OF
KEY PERSONNEL*



**THOMAS M. JOHNSON, C.P.G.
HYDROGEOLOGIST**

EDUCATION: MS Geology, State University of NY Fredonia, 1982
BS Geology, State University of NY Cortland, 1976

SPECIAL TRAINING: Certified 40-Hour OSHA Health and Safety
Certified 8-Hour OSHA Supervisory Course

PROFESSIONAL REGISTRATION: Certified Professional Geologist
Registered Certified Professional Geologist, Virginia

EXPERIENCE SUMMARY:

Mr. Johnson has twenty-two years of experience conducting a variety of contaminant hydrology, waste management and remedial projects. He has broad experience in CERCLA and RCRA projects since the inception of those programs. Mr. Johnson also has a strong practical background in field investigation, data interpretation, evaluation of remedial needs, management of site remediation and report preparation. He has designed and implemented extensive field investigations primarily for private sector clients, with combined billings of several million dollars and managed these projects through to final remediation. He is experienced in all aspects of project implementation including conceptualization and budgeting, agency negotiations, work plan development and contracting.

SELECTED PROJECT EXPERIENCE:

Hazardous and Solid Waste

Mr. Johnson has designed, implemented and performed hundreds of investigative and remedial projects at sites involving hazardous waste, solid waste or releases of petroleum. He is familiar with federal and state regulations governing such sites and is particularly experienced with the CERCLA (Superfund) process. He utilizes his technical expertise to focus the investigative stages of a project on tasks necessary to select effective and cost-efficient remedial solutions. Significant projects include:

- ▶ Investigation and remediation of a Brownfields site for redevelopment as a regional shopping center. Mr. Johnson coordinated the efforts of engineers, architects, environmental consultants, and the construction contractor to complete the project in conjunction with construction activities. The project was performed in accordance with New York and USEPA CERCLA requirements. The site was subsequently delisted as a hazardous waste site.
- ▶ Evaluation of a completed RI/FS at a municipal landfill CERCLA site and development of an alternate remediation plan to support a Record of Decision. The alternate plan provided

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Qualifications & Experience*

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the client with an effective solution at a cost of millions less than the option specified in the feasibility study.

- ▶ Managed a project to prepare and submit RCRA closure plans for storage tanks, incinerator, and surface impoundment at an inactive Union Carbide chemical manufacturing plant in Brownsville, Texas. Surface impoundment closure consisted of collecting data to support closure of the basin. Tanks and incinerators were closed by decontamination and decommissioning in accordance with regulations.

Petroleum/Tank Investigation and Remediation

Mr. Johnson has designed, implemented and performed hundreds of investigative and remedial projects at sites involving petroleum releases. He is familiar with federal and state regulations governing such sites and is particularly experienced with the New York State requirements for petroleum-contaminated sites. He utilizes his technical expertise to focus the investigative stages of a project on tasks necessary to select effective and cost-efficient remedial solutions. Significant projects include:

- ▶ Developed and implemented remedial and monitoring plans for eleven petroleum contaminated properties associated with the Palisades Center Mall near New York City. Site closure letters were provided by regulatory agencies based on successful remediation, thereby allowing unencumbered project financing.
- ▶ Evaluated the investigation and remedial approach of major oil storage facilities owned by Mobil, SUN, Citgo and Coastal in Syracuse, N.Y. for a major northeast developer. Acted as intermediary for the developer, oil companies and regulatory agencies to develop remedial strategies consistent with proposed redevelopment of petroleum contaminated properties.
- ▶ Performed investigation and developed remediation plans for numerous NYS Office of General Services sites contaminated by petroleum from underground storage tanks. Obtained closure letters from the regulatory agency at sites where contamination was reduced to acceptable levels during tank removal, and assisted project engineers with treatment system design, operation, and monitoring where longer term remedial measures were required.

Expert Testimony/Opinion

Mr. Johnson has spent nearly 20 years as an environmental consultant performing hydrogeologic/geologic investigations and remediating petroleum releases and hazardous waste sites. His expertise and experience form the basis for his credentials as an expert witness. He has worked with attorneys representing both plaintiffs and defendants on cases which have been tried in court and which have been successfully settled without litigation. Significant projects include:

- ▶ Evaluated the approach and effectiveness of an aquifer/water supply remedial project completed by another consultant, on behalf of a major insurance company. The evaluation

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revealed the use of inappropriate investigative methods and installation of an ineffective remedial system. The insurance company successfully challenged and minimized claims.

- ▶ Provided technical support, conducted a hydrogeologic investigation and prepared expert reports for attorneys at a site where the plaintiffs water supply was impacted by contamination from an adjacent dry cleaning facility. The case was settled out of court with plaintiff receiving payment for property damage and medical costs.
- ▶ Interpreted, reviewed and critiqued plaintiff's hydrogeologic expert testimony in defense of a claim against an insurance company. Provided expert testimony contesting plaintiff's assertions regarding the migration of petroleum from an underground storage tank through fractured bedrock. The case was decided in favor of the insurance company (defendant).
- ▶ Provided technical support to defendant's counsel, and reviewed and analyzed information in a case to allocate cleanup costs between two parties that had allegedly contaminated a sand and gravel aquifer on Long Island, N.Y. Information from the analysis was used to achieve a settlement.

PROFESSIONAL AFFILIATIONS: American Institute of Professional Geologists
Association of Groundwater Scientists and Engineers
(National Water Well Association)

EMPLOYMENT: 1994- Present, Alpha Geoscience
1993-1994, RUST Environment & Infrastructure
1986-1993, Dunn Corporation (merged into RUST)
1985-1986, ERT, Inc./ENSR
1979-1985, D'Appolonia/IT Corp.
1976-1977, U.S. Geological Survey

**STEVEN M. TRADER
GEOLOGIST**

EDUCATION: B.S. Geology, 1988, Virginia Polytechnic Institute & State University
Blacksburg, Virginia

33 hours Graduate Credit in Geological Sciences
Old Dominion University
Norfolk, Virginia

SPECIAL TRAINING: Certified 40-Hour OSHA Health and Safety
8-Hour OSHA Supervisory Training Course
8-Hour Annual Health and Safety Refresher Courses

EXPERIENCE SUMMARY:

Mr. Trader's experience includes coordinating and conducting geological/hydrogeological field work for solid waste landfill siting studies, UST site investigations, subsurface mine siting structures, and various other subsurface investigations. He has experience in monitoring well installation, analysis of borehole geophysics, aquifer testing, groundwater and soil sampling, soil and rock logging, and aerial photo interpretation. He has an extensive background in the analysis of geological and hydrogeological data through the preparation and interpretation of isopach maps, geologic cross-sections, groundwater contour maps, drawdown curves and flow nets. Mr. Trader has prepared UST work plans, closure reports, spill investigation reports, and SPDES permit applications.

PROJECT EXPERIENCE:

Petroleum and Storage Tank Investigations/Remediation

Mr. Trader has involvement in a multitude of UST closures and petroleum spill investigations in New York State. He has participated as a hydrogeologist in the field and as a project manager. He has broad experience in writing work plans, tank closure reports, and spill investigation reports that may be needed to obtain site closure with the NYSDEC. He is particularly familiar with the New York State regulations that govern UST removals and petroleum-contaminated sites. Mr. Trader draws on his ten years of technical geological and hydrogeological experience to evaluate site conditions effectively in order to efficiently remediate a site.

- ▶ On-site hydrogeologist for scores of UST closures at commercial and municipal facilities. Provided oversight of excavation, performed soil sampling, installed ground water monitoring wells, and collected ground water samples. Prepared work plans, closure reports, and subsurface investigation reports for submittal to the NYSDEC.

- ▶ Coordinator and on-site hydrogeologist (sub-consultant) to New York State Office of General Services on two term agreements (1994-1999) for dozens of UST closures and site investigations at NYS-owned facilities in eastern New York State. Provided oversight of excavation and remedial activities, performed soil and ground water sampling, and environmental monitoring. Prepared tank closure reports and spill investigation reports for submittal to the NYSDEC on behalf of client State agencies, and acted as NYSDEC liaison.
- ▶ Performed numerous site investigations of underground storage tank locations at commercial facilities and private residences as part of property transactions. Conducted power auger borings; collected split spoon soil samples, and conducted environmental monitoring.
- ▶ On-site coordinator for a remediation project in New York involving the removal of approximately 900 cubic yards of soil contaminated with petroleum compounds. Screened soil using a photoionization detector, delineated contaminated soil, conducted soil sampling, and supervised soil removal from site.
- ▶ Performed sampling of petroleum-contaminated soil for waste characterization associated with UST closures at NYS-owned facilities and privately owned commercial properties.

Geologic and Hydrogeologic Investigations

Mr. Trader participates in geological and hydrogeological site characterizations for municipalities, developers, mines, and commercial facilities. The work involves defining site geology, assessing ground water and surface water conditions, mineral evaluations and evaluating environmental impacts.

- ▶ Performed rock logging of more than 18,000 feet of rock core collected for Akzo Nobel Salt, Inc. at their proposed deep salt mine in Hampton Corners. Identified rock type and unit, fracture density, structural features, rock strength characteristics, calculated RQD, and correlated stratigraphy. Provided field oversight of coring activities and geophysical well logging. The mine is currently being operated by American Rock Salt, Inc.
- ▶ Reviewed and evaluated the geology and hydrogeology of the northern Genessee River Valley in New York to address issues of potential aquifer connection to a nearby subsurface mine collapse.
- ▶ Conducted gamma ray and electrical conductivity borehole geophysical investigations of glacial till overburden and bedrock aquifers in support of an EIS for a proposed tri-county municipal solid waste landfill site.
- ▶ Coordinated and conducted field work for stratigraphic studies of the Cretaceous Mesaverde Formation and equivalents in Wyoming and Montana. Work included logging stratigraphic sections, performing stratigraphic correlations, and paleo-current analysis.

- ▶ Calculated Wollastonite ore reserves at the Seventy Road and Oak Hill Mines of NYCO Minerals. The work included the analysis of core hole data and yearly topographic surveys. The results were used in a tax evaluation case in New York State Supreme Court.

PROFESSIONAL AFFILIATIONS: Member, Hudson-Mohawk Professional Geologists Association
Member, New York State Council of Professional Geologists

EMPLOYMENT: 1994- Present, Alpha Geoscience
1993-1994, Smith & Mahoney, P.C.
1992-1993, Applied Marine Research Laboratories
1990-1992, Old Dominion University Research Foundation
1989-1990, Old Dominion University, Dept. of Geological Sciences
1984-1986, Union Camp Paper Corporation (summers)

**JOHN NADEAU
HYDROGEOLOGIST**

EDUCATION: MS Geological Sciences, State University of NY Albany, 2000
BS Geological Sciences, State University of NY Albany, 1998
Associate Degree Math and Science, Hudson Valley Community College, 1997

SPECIAL TRAINING: Certified 40-Hour OSHA Health and Safety
Certified 8-Hour OSHA Supervisory Course

EXPERIENCE SUMMARY:

Mr. Nadeau is a hydrogeologist with experience in geologic and hydrogeologic investigations ranging from water supply development and aquifer impact analysis, to hazardous waste and petroleum impacted site investigations. He has developed field skills for a variety of data collection tasks including, but not necessarily limited to, logging soil boreholes, monitoring well installations, hydraulic conductivity testing, water supply well installation and development, ground water sampling and measurements, and soil screening for volatile organic vapors. Mr. Nadeau's academic research involved the study of seasonal variations of aquifer recharge and tracing ground water movement by oxygen isotope analysis. He routinely utilizes his extensive computer skills for compilation and evaluation of geologic, hydrogeologic, and ground water quality data.

SELECTED PROJECT EXPERIENCE:

- ▶ Supervised the drilling and installation of soil borings and monitoring wells at the Sudakow Landfill inactive hazardous waste site in Central New York. Prepared geologic boring logs and screened samples for the presence of suspected contamination.
- ▶ Compiled and evaluated geologic and hydrogeologic data from hundreds of boring and well logs to characterize the hydrogeologic conditions of the Great Flats sole source aquifer in Schenectady County, New York. Constructed geologic maps and cross sections to depict subsurface conditions as part of the effort to evaluate potential impacts of withdrawing four million gallons per day from the aquifer for a proposed power generation facility.
- ▶ Measured water levels, purged monitoring wells, and collected ground water samples for laboratory analysis of petroleum related compounds. Properly preserved samples and completed field and sample custody documentation.
- ▶ Provided field oversight for a hydrogeologic investigation to develop and expand the water supply system for an IBM facility in East Fishkill, New York. The project included test

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borings to identify appropriate production well locations and construction, supervision of production well installation, pumping tests to determine aquifer characteristics, and production well development.

- ▶ Researched availability of historic maps and information sources for a Preliminary Environmental Assessment at a former military landfill area of Stewart Airport. The work was performed for the NYSDOT.

PROFESSIONAL AFFILIATIONS: The Geological Society of America
American Geophysical Union

EMPLOYMENT: 2000- Present, Alpha Geoscience

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