ALPHA GEOSCIENCE

Geology
Hydrology
Remediation
Water Supply

December 2, 2005

Mr. Ramanand Pergadia
NYSDEC Region 3
21 South Putt Corners Road
New Paltz, New York 12561-1696

Re: Expanded HRC Injection Plan
and Ground Water Monitoring
Revonak Dry Cleaner Site (No. 356021)

Dear Mr. Pergadia:

Alpha Geoscience (Alpha) has prepared this plan for expanded remediation and ground water monitoring at the Revonak Dry Cleaner site (NYSDEC Site No. 356021) in New Paltz, New York on behalf of the site owner. This plan includes revisions to the October 17, 2005 Conceptual HRC Plan based on a meeting attended by the owner and the involved agencies on November 15, 2005. Hydrogen Releasing Compounds (HRC-X, an extended release HRC formulation) previously were applied in November 2003 to an area immediately east of the dry cleaner facility. Ground water monitoring results previously submitted to NYSDEC indicate that the HRC-X effectively and substantially reduced concentrations of tetrachloroethylene (PCE) and related volatile organic compounds (VOCs) in the ground water in the area of application.

The goal of the expanded HRC remediation is to reduce concentrations of VOCs in ground water sufficiently to allow reclassification of the site from Class 2 to Class 4. Application of HRC-X over a broader area of the site is expected to further reduce the concentration of VOCs and ultimately eliminate or substantially reduce the need for continued ground water monitoring and regulatory oversight. The purpose of this plan is to present the approach for an expanded HRC-X remediation program for the site that will be approved by NYSDEC.

Proposed HRC-X Injection

Figure 1 is a map showing the proposed delivery points to inject the HRC in relation to the PCE-impacted ground water. Approximately 44 injection points are shown in a grid in the area immediately east of the dry cleaner facility and approximately 46 injection points are shown in several rows (known as a "barrier" arrangement) in the downgradient direction. The "barrier" arrangement optimizes the location of injection points by allowing the natural ground water flow to distribute the HRC-X through the subsurface. The farthest downgradient row of injection points is located to allow ground water quality monitoring downgradient of the injection area and upgradient of the site property line.

The spacing of the barriers on 60-foot centers is based on ground water flow velocities calculated from hydraulic conductivity values measured in February 2005. These data indicate that the ground water flow rate ranges from approximately 33 to 105 feet per year. Accordingly, the HRC-X would be distributed between the barrier rows by the natural ground water flow over a period of less than one to approximately 2 years, depending on the hydraulic conductivity of the subsurface. REGENESIS®, the manufacturer of HRC-X, advises that the compound is designed to remain active for a period of 2 to 3 years, depending on site conditions. Monitoring of the initial application at the site suggests that the active life of the HRC-X is more likely in the range of 1.5 to 2 years.

Alpha used the REGENESIS® proprietary spreadsheet and discussions with REGENESIS® technical support personnel to estimate the appropriate volume of HRC-X to be injected as part of the expanded remediation. The spreadsheet calculations recommend injection of approximately 40 pounds of HRC-X per injection point for a total of 3600 pounds, based on the known and estimated site characteristics. The HRC-X will be applied in accordance with the manufacturer's recommendations. The actual volume of HRC-X applied at the site may vary based on field conditions or changes in the location and depth of individual injection points.

Soil Vapor Monitoring

Soil vapor samples will be collected from two soil vapor monitoring points (SV-1 and SV-2) downgradient of the HRC treatment area and upgradient of the property line. The soil vapor monitoring points will be installed prior to, or during the HRC-X injection event. The location of the proposed soil vapor monitoring points is shown on Figure 1. The purpose of the soil vapor monitoring will be to evaluate concentrations of VOCs in the unsaturated (vadose) zone downgradient of the treatment area.

A soil boring will be drilled at each of the soil vapor monitoring point locations to accommodate installation of a soil gas probe. Ground water level measurements in nearby well MW-10 indicate that the depth to ground water varies from approximately 4.5 to 8 feet below ground surface. The actual depth of the slotted screen will be determined in the field based on the PID measurements obtained during the soil screening.

A one-foot length of small diameter (¾-inch) slotted polyvinyl chloride (PVC) well screen will be placed in the boring to a depth that is above the seasonal high water table. Small diameter (approximately ¼-inch) polyethylene tubing will be attached to the slotted screen to extend to the surface. Sand will be added to the annulus of the boring to a level approximately one foot above the top of the slotted screen and a bentonite seal will be placed above the sand pack. The bentonite will be hydrated if granular or pelletized bentonite is used. The purpose of the bentonite seal will be to avoid short circuiting of atmospheric air to the probe during sampling. Figure 2 is a typical soil vapor probe schematic.

One soil vapor sample will be collected from each monitoring point immediately after installation to provide baseline results to compare to future samples. Thereafter, soil vapor samples will be collected semi-annually for two years after the HRC injection, in conjunction with the ground water sampling as shown on the attached table. Sampling will be performed by evacuating a minimum of four dead-volumes of the connecting tubing plus the sampling train and connecting a sampling canister to the sampling tubing and soil gas probe. The canister will be fitted with a flow control valve set to allow sampling at a maximum rate of 0.2 liters per minute, in accordance with the New York State Department of Health (NYSDOH) Draft Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

Field personnel will complete a soil gas sampling form that will include, but not necessarily be limited to, project name and number, date, sampler's name, sample identification, sample location, purging volumes and times, sample start and stop times, ambient PID readings, gage start and stop pressures, analytical parameters or method, and other ambient conditions that may affect sample results.

Monitoring Well Installations

Wells MW-11 and MW-12 will be installed prior to, or during the HRC-X injection event to monitor ground water quality downgradient of the treated area. The proposed location of these new wells is shown on the attached Figure 1.

The soil borings for the overburden monitoring wells will be advanced using the hollow stem auger (4 ¼ inch inside diameter) drilling method. A truck-mounted drill rig will be used to advance the borings to the top of bedrock. Split spoon samples will be obtained by driving a sampler with a 140-pound hammer falling 30 inches until either 24 inches of soil has been penetrated or 100 blows applied with less than six inches of penetration. The number of blows required to advance the split spoon each six-inch interval will be recorded.

Soil samples will be examined and described by the field geologist/hydrogeologist. Samples will be retained in sealed plastic bags for headspace analysis using a calibrated photoionization detector (PID). The results of the PID screening will be recorded on an organic vapor screening log. Drill cuttings from the augers also will be screened using the PID. The drill cuttings will be spread on the ground if PID measurements do not exceed 5 parts per million (ppm) of organic vapors. Drill cuttings and soil samples that exhibit PID measurements greater than 5 ppm will be placed in a container for off-site disposal.

The monitoring wells will be constructed of 2-inch, threaded joint, Schedule 40 PVC pipe with a maximum of ten feet of 10-slot well screen. The annular space from 0.5 foot below to 1.0 foot above the screen will be filled with clean, Grade 1, filter sand pack. A bentonite seal will be installed above the sand pack. The remainder of the borehole annular space will be filled with cement-bentonite grout to the surface. Lockable, steel, protective casings will be cemented over the wells to prevent unauthorized access and provide protection for the wells.

An experienced geologist or hydrogeologist will supervise the soil boring and monitoring well installations and will be responsible for geologic logging of the soil samples, selecting the depth of the well screen, and recording the monitoring well construction details.

Ground Water Monitoring Program

One ground water sample will be collected from monitoring wells MW-11 and MW-12 immediately after installation to provide baseline results for these wells to compare to future samples. Wells MW-2, MW-3, MW-6, MW-9, MW-10, MW-11, and MW-12 will be sampled quarterly during the first year and semi-annually during the second year after the HRC-X injection to evaluate changes in the ground water quality. Water levels will be measured in all accessible monitoring wells during each monitoring event to allow preparation of ground water contour maps. The locations of these wells are shown on Figure 1.

Samples will be collected in accordance with the procedures currently used at the site for the annual sampling. The quarterly and semi-annual ground water samples from these wells will be analyzed for volatile organic compounds (VOCs) by EPA Method 8260 and for inorganic parameters, including sulfate, nitrate, total iron, dissolved iron, and total organic carbon. The inorganic parameters will be used to evaluate the changes in geochemical conditions attributable to the HRC-X.

Ground water quality at the site is currently monitored by sampling nine (9) existing overburden wells and three (3) existing bedrock wells in August of each year. Wells MW-11 and MW-12 will be included in future monitoring events. The first post-injection quarterly monitoring samples will be collected within three months of the HRC-X injection and will be scheduled so that one of the quarterly events will occur in August coincident with the annual sampling event.

The annual sampling event in August will continue to be performed and also will serve as one sampling event during the first year of quarterly monitoring and the second year of semiannual monitoring. A schedule of the proposed sampling program is provided in the following table. This schedule (including the sampling frequency, wells sampled, and types of analyses) may be modified, with the approval of the NYSDEC, based on the ground water sampling results.

Reporting

Alpha Geoscience will prepare a summary report upon completion of the work described herein. The report will provide a description and summary of the remediation activities (i.e., number of injection points, pounds of HRC-X injected, etc.), maps showing the final injection and monitoring point locations, and any initial analytical data. Alpha Geoscience will submit monitoring reports to the agencies after each of the monitoring events described herein. The monitoring reports will describe monitoring activities and methods, a map of the sampling points, summary tables of analytical data, and an interpretation of the analytical results and site conditions.

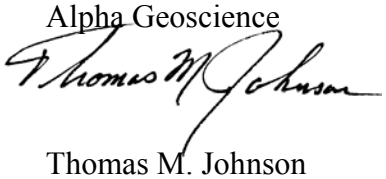
Schedule

Upon receiving agency approval of this plan Alpha Geoscience will proceed with arrangements to initiate the work. We anticipate that the work could begin within approximately three to six weeks of approval of the plan, depending on the availability of contractors and materials. The field work for the HRC-X injection, and installation of monitoring wells and vapor monitoring points is expected to take two to three weeks to complete.

As described above, the ground water monitoring wells (MW-11 and MW-12) and the soil vapor monitoring points (SV-1 and SV-2) will be installed before or during the HRC-X injection to allow collection of baseline ground water and soil vapor samples, respectively, from these locations. The schedule for continued monitoring is described above and in the attached table.

Please feel free to contact me with any questions you have regarding this expanded HRC Injection Plan.

Sincerely,
Alpha Geoscience



Thomas M. Johnson
Hydrogeologist

TMJ/bms

cc: R. Schick
F. Navratil
P. Kempner
K. Young
M. Ryan
J. Rashak
R. Rusinko
R. Schwartz
H. Hordes

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SCHEDULE OF POST-HRC INJECTION MONITORING
Revonak Dry Cleaner Site No. 356021

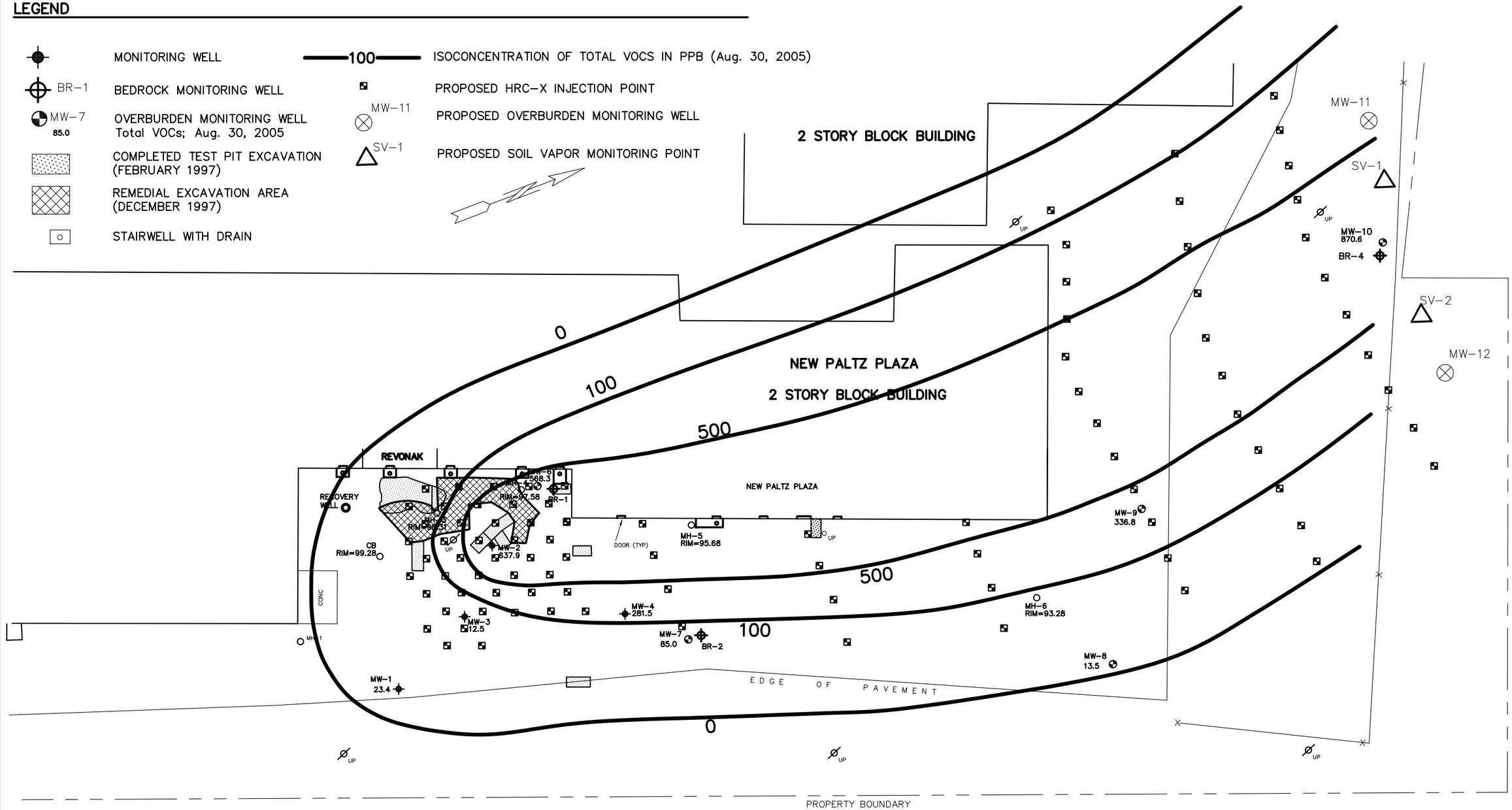
Event:	First Year Quarterly		Second Year Semi-Annual		Annual	
Parameters:	**VOCs [1]**	**Indictors [2]**	**VOCs [1]**	**Indicators [2]**	**VOCs [1]**	**Indicators [2]**
Ground Water						
MW-1					X	
MW-2	X	X	X	X	X	X
MW-3	X	X	X	X	X	X
MW-4					X	
MW-6	X	X	X	X	X	X
MW-7					X	
MW-8					X	
MW-9	X	X	X	X	X	X
MW-10	X	X	X	X	X	X
MW-11	X	X	X	X	X	X
MW-12	X	X	X	X	X	X
BR-1					X	
BR-2					X	
BR-4					X	
Soil Vapor						
SV-1	X [3]		X			
SV-2	X [3]		X			

Notes:

1) VOCs will be analyzed by EPA Method 8260 (ground water) or Method TO-15 (vapor).
2) Indicator parameters to monitor HRC-X effects in ground water include sulfate, nitrate, total iron, dissolved iron, and total organic carbon.
3) Soil Vapor samples will be collected only on the second and fourth quarterly sampling events (i.e., semi-annually for the first year.
4) The annual ground water monitoring event in August of each year also will serve as one sampling event during the first year of quarterly monitoring and the second year semi-annual monitoring.
5) The first post-injection quarterly monitoring samples will be collected within three months of the HRC-X injection and will be scheduled so that one of the quarterly events will occur in August coincident with the annual sampling event.

LEGEND

- MONITORING WELL
- BR-1 — BEDROCK MONITORING WELL
- MW-7 (85.0) — OVERBURDEN MONITORING WELL Total VOCs; Aug. 30, 2005
- COMPLETED TEST PIT EXCAVATION (FEBRUARY 1997)
- REMEDIAL EXCAVATION AREA (DECEMBER 1997)
- STAIRWELL WITH DRAIN
- 100 — ISOCONCENTRATION OF TOTAL VOCS IN PPB (Aug. 30, 2005)
- PROPOSED HRC-X INJECTION POINT
- MW-11 — PROPOSED OVERBURDEN MONITORING WELL
- SV-1 — PROPOSED SOIL VAPOR MONITORING POINT



SOURCES: "SURVEY PREPARED FOR NEW PALTZ PLAZA ASSOCIATES" DATED 4/17/86 BY JOHN H. DIPPEL AND "GROUNDWATER CONTOUR MAP" DATED 9/91 BY ENVIRONMENTAL PRODUCTS & SERVICES, INC.

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SCALE IN FEET

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FIGURE 1

Proposed Expanded HRC Injection Program Grid and 60 ft. Barrier Spacing

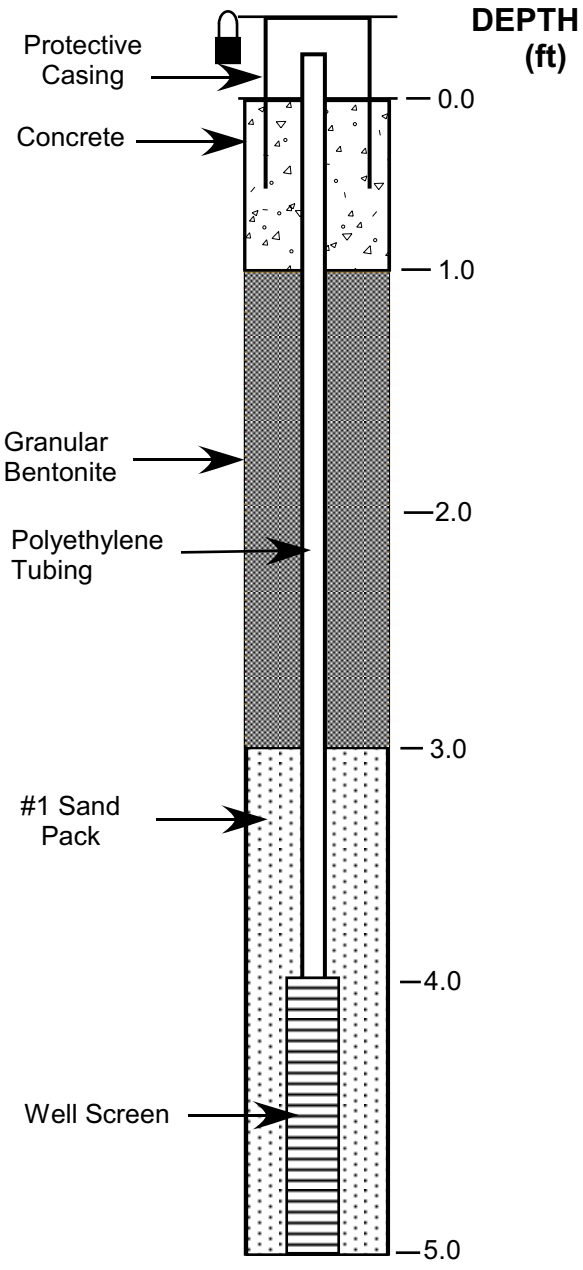
December 2005

PROJECT 95141 NEW PALTZ, NY

2005 HRC Proposed–60 ft. barrier.DWG

ALPHA GEOSCIENCE
679 Plank Road
Clifton Park, New York
(518) 348-6995

Well SV-1
Project Revonak Dry Cleaners
Project No. 95141
Client New Paltz Plaza
Date Drilled
Date Purged:



Not to Scale

INSPECTION NOTES

Geologist
Drilling Contractor
Type of Well Soil Vapor
Static Water Level NA Date
Measuring Point NA
Total Well Depth 5.0 ft.

Tubing
Material Polyethylene Diameter 3/8" OD
Length ~5.0' Joint Type NA

Screen
Material PVC Diameter 3/4" ID
Slot Size No. 10 Length 1.0'
Stratigraphic Unit Screened Gravel, Sand, and Silt

Packing
Sand #1 Gravel Natural
Amount Interval 3.0 - 5.0'

Seal Granular Bentonite
Type Concrete Interval 1.0 - 3.0'

Locking Case: Steel Yes [X] No [ ]
Diameter 4" O.D.

Notes:
Valve installed on top of tubing.

FIGURE 2
SOIL VAPOR WELL COMPLETION LOG

Revonak Dry Cleaners
New Paltz, New York