#6

SUPERFUND STANDBY PROGRAM
New York State
Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

QUALITY ASSURANCE PROJECT PLAN
FOCUSED REMEDIAL INVESTIGATION
PALL CORPORATION SITE

Site No. 1-30-053B
Work Assignment Number
D003060-19

Prepared by

TAMS CONSULTANTS, Inc.
300 Broadacres Drive
Bloomfield, N.J. 07003

and

GZA GeoEnvironmental of New York
364 Nagel Drive
Buffalo, N.Y. 14225

February, 1998

PALL CORPORATION
QUALITY ASSURANCE PROJECT PLAN
TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

TABLE OF CONTENTS (CONT'D)

TABLES

FIGURES

APPENDICES

1.00 INTRODUCTION

1.10 PURPOSE AND OBJECTIVE

The purpose of this Quality Assurance Project Plan (QAPjP) is to document planned investigative activities and establish the criteria for performing these activities at a pre-determined quality, and to review and summarize such work performed by others at the Pall Corporation Site in Glen Cove, Nassau County, New York. The Pall Site is a New York State Department of Environmental Conservation (NYSDEC) Class 2 Inactive Hazardous Waste Site, Site Code 1-30-053B. The work will being completed by GZA GeoEnvironmental of New York (GZA) acting as sub-consultant to TAMS Consultants, Inc. (TAMS) under the TAMS/New York State Department of Environmental Conservation (NYSDEC) Superfund Standby Contract Work Assignment No. D003060-19.

Project work will be conducted in general accordance with the United States Environmental Protection Agency (EPA) Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, October 1988) and the NYSDEC Guidelines for Remedial Investigations/Feasibility Studies, Technical and Administrative Guidance Memorandum HWR-89-4025 (March 31, 1989) and TAGM #4030, Selection of Remedial Activities at Inactive Hazardous Waste Sites.

The objective of this focused remedial investigation (FRI) is to provide a sufficient characterization of the nature and extent of contamination related to the Pall site, either on-site or off-site, in order to provide data for completing a focused feasibility study (FS). The focused FS will identify and evaluate alternatives available for remediation of the Pall site and will be used as the basis for final selection of the appropriate remedial response. A locus plan is included as Figure 1.

1.20 PROJECT MANAGEMENT AND ORGANIZATION

1.20.1 Personnel

The general responsibilities of key project personnel are listed below.

Project Advisor	R. Bruce Fidler, P.E. (TAMS), Program Manager will have responsibility for overall program management and coordination of subcontractors to complete the work.
Project Manager	Mr. Raymond F. Laport, P.E. (GZA), Project Manager, will have responsibility for overall project management and coordination with NYSDEC.

FRI Task Leader	Mr. Ed Knyfd (GZA), will have overall responsibility of implementing and coordinating the Remedial Investigation (Task 2) project activities.
FRI Field Team	Mr. Steve Villianos (GZA), will have overall responsibility for on-site implementation of the Remedial Investigation (Task 2) project activities.
FS Task Manager	Mr. Raymond F. Laport, P.E. (GZA), will be responsible for management, coordination and implementation of the Task 3 Feasibility Study.
QA Officer	Mr. Allen Burton (TAMS) will serve as Quality Assurance Officer, and will be responsible for laboratory and data validation subcontractor procurement and assignment, as well as data usability reports.
H & S Officer	Mr. Donald Redpath (GZA GeoEnvironmental of NY) will be responsible for the preparation of the project health and safety plan, and tracking of its implementation.
Community Participation Coordinator	Ms. Karen Coghlan (TAMS) will oversee the preparation of the community participation plan and its implementation.

Resumes for most of the TAMS and GZA personnel have previously been submitted to the Contract Development Section.

1.20.2 Specific Tasks and Services

TAMS has obtained standby subcontractor specialists for services relating to drilling and monitoring well installation, laboratory/analytical services, data validation services, and field surveying. The planned subcontractors for utilization for the Pall Site are:

Laboratory Analysis -	CompuChem Environmental
Data Validation -	URS Consultants
Drilling Services -	Zebra Environmental, Inc.
Surveying -	YEC, Inc.

2.00 SITE INVESTIGATION PROCEDURES AND RATIONALE

The Pall Site is a suspected source of volatile organic compounds (VOCs) including perchloroethylene (PCE) and trichloroethene (TCE) detected in the soil and groundwater. The field work proposed by TAMS/GZA is focused on supplementing data from previous investigations to obtain a better understanding of site specific conditions. Environmental sampling and other field activities will be performed in general accordance with the appropriate techniques presented in the following guidance documents.

Sampling Guidelines and Protocols, NYSDEC, Division of Water, March 1991.

Compendium of Superfund Field Operations Methods, US EPA, December 1987 (EPA/540/P-87/001).

RCRA Ground-Water Monitoring: Draft Technical Guidance, US EPA, November 1992 (EPA/530-R-93-001).

Soil Sampling Quality Assurance User's Guide (Second Edition), US EPA, March 1989, (EPA/600/8-89/046).

USEPA Region II CERCLA Quality Assurance Manual, Revision 1, USEPA Region II, October 1989.

Appropriate NYSDEC Department of Hazardous Waste Remediation Technical and Administrative Guidance Memoranda (TAGM); #4032 (Disposal of Drill Cuttings; November 1989); and #4047 (Priority Ranking System for Class 2 Inactive Hazardous Waste Sites; December 1992).

Table 1 contains a list of the various media to be sampled and the expected number of samples for each matrix.

Field activities are described in the following sections.

2.10 GROUNDWATER SAMPLING

Groundwater sampling of existing monitoring wells (see Figure 2) includes initial recording of data, purging of the well, and collection of the sample. The text below addresses these items. Groundwater sampling will also be completed from Geoprobe borings. Groundwater sampling from Geoprobe borings is discussed in Section 2.10.2.

2.10.1 Monitoring Wells

Well Evacuation

Groundwater sampling begins by locating the well to be sampled and recording the appropriate field data, as summarized below.

- Observations of the well (conditions of cap, collar, casing, etc.) and the ambient conditions (weather; surrounding area; date and time; sampling crew members and observers if any. See also Section 5.10 for information to be recorded in the field notebook).

- Unlocking the well cover, surveying ambient air, upwind air, and air directly at the top of the well.

- Taking a water level measurement, noting the reference point from which the measurement is made (typically a notch on the inner casing).

- Sounding the bottom of the well and agitating/loosening accumulated silt/sediment (this assumes sounding indicates minimal sediment accumulation and no need for well development).

- The well is then purged of standing water. The purpose of purging is to obtain a representative groundwater sample. If practical, a minimum of three standing water volumes of the well will be purged. However if the well is slow to recover, then the well will be purged until no further water can be removed from the well. If the water level is slow to recharge and does not reach to its pre-purge level within two hours, then samples will be collected after sufficient water has recharged to enable sample collection. Purging may be accomplished by bailing, inertial pumping, or pumping with a peristaltic or submersible centrifugal pump to remove water from the wells.

Prior to removal of the first well volume of water, and after each subsequent well volume of water removed, field parameters (pH, turbidity, temperature and specific conductance) will be measured and recorded to document the presence of representative water in the well (i.e., equilibration to steady readings), or as an indicator that conditions have not reached a steady state. Prior to sample collection, field testing results between successive well volumes should not vary by more than 10% for turbidity and specific conductance, ±0.2 units for pH, and ±0.5 °C for temperature, with a minimum of three well volumes purged, and an upper limit of five volumes. The turbidity objective is less than 50 nephelometric turbidity units (NTU); if parameters are stable but turbidity is still greater than 50 NTU, purging will continue until 50 NTU is achieved, or five well volumes are evacuated (whichever comes first).

Groundwater Collection

Bailers will be used for sample collection and will be equipped with a check-valve. Bailers will be dedicated, disposable Teflon. Due to their light weight and tendency to not sink after entering the top of the water column, disposable bailers will be fitted with weights provided by the vendor for that purpose. Bailers will be clean upon arrival at the site. Site decontamination of bailers will not be necessary. Bailers will be lowered gently with minimal water agitation into the well with dedicated polyethylene or polypropylene line.

The first bailer of water will be collected for volatile organics or other light weight/volatile compound analyses. A portion of the first bailer will also be retained for field measurements of pH, temperature, conductivity, and turbidity.

Two or three (depending on laboratory-specific requirements) 40-ml glass vials (with Teflon septa) will be used to collect samples for volatile organic analysis (VOC). The vials will be filled by gently pouring water from the top of the bailer into the vial until overflowing and a convex meniscus is formed. The vial will then be capped, inverted and inspected for air pockets/bubbles that may be present on the inside surfaces of the vial. If any bubbles or aggregate of bubbles are observed, then a new sample will be obtained either using a new vial or the same vial. In accordance with NYSDEC preference, samples for VOCs will not be chemically preserved (i.e., no HCl will be added).

Subsequently sampled water will be collected for the remaining inorganic parameters as specified in the Field Activities Plan (FAP) (metals, cyanide), and field parameter testing. The remaining sample bottles will be filled sequentially in the following order.

- Extractable organics (semivolatiles);
- Total (unfiltered) metals; and
- Cyanide.

At the conclusion of collection of all analytical samples, a final measurement of field parameters will be made. Sample bottles are discussed in more detail in Section 3.20.

2.10.2 Geoprobe Groundwater Sampling

Groundwater samples will be collected using a SP15 screen point sampler. The proposed Geoprobe sample locations are shown on Figures 4 and 5. To collect groundwater samples using this sampler, a clean unit is threaded onto the leading end of a probe rod and driven to the desired sampling interval. While the sampler is driven to the desired depth, O-ring seals at the drive head and expandable drive point provide a water tight system. Once at the desired depth, the tool string is retracted while the screen is held in-place. The O-ring at the drive head maintains the seal at the top of the screen. As a result, any liquid entering the sampler, must pass through the screen. The screen point sampler utilizes a screen with a slot size of 0.004 inches and an exposed length of up to 41 inches.

The water sample will be brought to the surface using dedicated polyethylene tubing fitted with a stainless steel check valve. By oscillating the tubing up and down, the water will be brought to the surface. The water sample will then be placed in appropriate laboratory supplied containers and placed into a cooler.

2.20 AIR SURVEILLANCE AND MONITORING

Air surveillance screening of volatile compounds for health and safety concerns will be performed with a portable HNU photoionization detector (PID) or equivalent. Monitoring will be done during invasive activities such as Geoprobe drilling, piezometer installation, well development, and sampling. Additional details are presented in the site specific Health and Safety Plan.

2.30 SOIL SAMPLING

An estimated total of 40 soil samples from the Geoprobes and Auger borings will be analyzed for VOCs. In addition, two soil samples will be analyzed for SVOCs and TAL inorganics.

Soil samples for semi-volatile and inorganic analyses will be homogenized using a "coning and quartering" procedure. The soil will be removed from the sampling equipment and transferred to a clean surface (metal foil, steel pan, bowl, etc.) and, with the exception of VOC samples, mixed to provide a more homogeneous sample to the lab. The soil will be scraped from the sides, corners, and bottom of the clean surface, rolled to the middle, and thoroughly mixed until the material appears homogenous. An aliquot of this pile will then be transferred to the required sample containers, slightly tamped down, filled to near the top of the container, and sealed with the appropriate cap. Any soil or sediment on the threads of the container will be wiped off prior to placing the cap on the sample container.

VOC samples will not be mixed but will be placed directly from the sampling equipment into the VOC vial sample container (a 4 oz. wide mouth jar), limiting head space by compacting the soil into the container. Samples for VOC will be placed into the appropriate container immediately (ideally within 15 seconds of collection) prior to making any field measurements or sample homogenization.

Geoprobe soil samples will be sampled by opening the acetate tube (Geoprobes), slicing the core (if intact) vertically down the middle with a sharp knife or similar blade, and scooping sufficient sample from the long axis of the split core with a decontaminated stainless steel spoon or spatula. If the core is not intact, then upon opening the tube, the contents can be scooped directly with the spoon or spatula. Samples for VOCs will be collected and transferred to sample containers immediately after opening and slicing the soil sample. If the sample is not homogeneous, representative portions of each type of material within the sample will be collected. There may also be situations where it will be appropriate to grab-sample specific zones due to textural variations, the presence of apparent staining, or "hot spot" preliminary screening results.

Auger Probes

Drilling through the floor slab will be completed with a rotary hammer drill. The hammer drill will make a nominal 1-1/4 inch diameter hole through the concrete. A 1 inch auger will then be used to retrieve subgrade materials from a depth of approximately 1 to 2 feet below the slab.

Soil samples will be classified by TAMS/GZA in the field by visual examination in accordance with the New York State Department of Transportation Soil Description Procedure as appropriate. A log of each probe hole will be prepared with appropriate stratification lines, sample identification, sample depth interval and recovery, and date.

Selected overburden samples, estimated at six, will be retained for analytical testing. These samples will be placed in certified clean sample containers, placed in an iced cooler and handled in accordance with appropriate Chain-of-Custody protocols as described in the QAPjP.

The auger probe holes will be backfilled with a mix of soil and bentonite clay pellets. The floor slab will be repaired with concrete.

Soil Screening

Soil screening will be performed in two ways: by holding the probe of the PID directly over the sample, and by headspace screening with the PID.

The PID will be calibrated daily, in accordance to manufacturer's requirements using a standard gas. Prior to screening, the soil samples will be allowed to equilibrate to ambient temperature. For headspace screening, a hole will be made in the lid of the sample jar and 30 ml of sample air will be withdrawn from the headspace using a gas tight syringe. The test sample will be immediately injected into the PID and the peak response will be recorded. A response of less than 1 part per million (ppm) above ambient background using this method, is not considered significant and will be reported as not detected. A syringe blank will be run between test samples to check that extraneous contamination was not carried over.

2.40 GROUNDWATER SAMPLE FIELD SCREENING

Groundwater sample field screening will be conducted using a static headspace method on selected water samples. These samples will be tested in the field with a portable gas chromatograph (GC) (Photovac Model 10S50, or similar) standardized for the following target compounds; PCE, TCE, and, 1,1-dichloroethene (DCE). A typical reporting detection limit for these compounds is about 0.01 parts per million (ppm) on a volume basis. The detection limit may vary based on the presence of other compounds in the sample.

Groundwater samples for field screening will be collected in 40 ml vials. The vials will be filled until overflowing, and a convex meniscus is formed. The vials will be capped, inverted, and inspected for the presence of air bubbles. If bubbles are present the vial will be refilled until no bubbles are observed. To prepare the sample for testing, a 15 ml headspace will be created in the vial. The vial will then be placed in a thermostatically controlled water bath at 30 °C. After the sample temperature reaches about 30 °C, the vial will be removed from the water bath. A sample of the headspace gas will be extracted from the vial using a gas tight syringe. The contents of the syringe will be immediately injected into the GC. Compound identification and concentrations will be determined based on comparing the standard results to the sample results.

The following quality control/quality assurance measures will be taken during the field groundwater screening.

Blank Samples

Blank samples of clean air will be run between samples that contain detectable levels of target compounds. The peak area for target compounds will be less than half the area of the reported detection limit.

Standards and Calibration

- A three point calibration will be completed on standard samples for each target compound (i.e., perchloroethylene and trichloroethene), and a correlation coefficient of greater than or equal to 95% will be developed.

- A mid-point calibration will be analyzed once every ten samples or daily whichever is more frequent. The relative percent difference will be less than or equal to 30% compared to the three point calibration.

- The standard samples will be run at a minimum of twice per day to calibrate the instrument (at start and end of work day).

- Duplicate analysis will be run on 10% of the samples.

- Laboratory confirmation will be completed on 10% of the samples field screened with the GC.

2.50 SURFACE WATER AND SEDIMENT

2.50.1 Surface Water

Where possible, sample bottles (unpreserved) will be lowered below the water surface and allowed to fill. Normally, surface water samples will be collected from mid-depth and mid-channel (for flowing bodies such as streams). Sample preservation, where required, will be added to the samples after collection. Generally, surface water samples will be collected with a sediment sample from the same general location. After capping, bottles will be dried with a paper towel.

Surface water samples will be collected prior to the collection of the associated sediment samples. Surface water sampling will be conducted sequentially from the farthest downstream sample to the farthest upstream sample so that disturbed sediments from one sample location are not transported downstream to a subsequent sample.

2.50.2 Sediment

Sediment samples will be collected using a stainless steel spatula or spoon directly from the stream bed. Samples for VOCs will be placed directly into the laboratory container and sealed. The sediment samples for semivolatiles and inorganics will be homogenized as described in Section 2.30 above for soil sampling, transferred to 8 ounce glass jars, allowed to settle for a few minutes, excess water drained (if appropriate), and then screened in accordance with instructions for soil as described above (see Section 2.30).

2.60 HYDRAULIC ASSESSMENT

Hydraulic assessment includes the completion of hydraulic conductivity tests and measurement of water levels in monitoring wells.

Hydraulic conductivity testing will be done using either variable head methods or single well pump test methods if the wells are found to recover rapidly. Variable head tests will be completed using a stainless steel slug to displace water within the well or by removing water from the well with a bailer. The recovery of the initial water level is measured with respect to time. Single well pump tests will be completed by pumping the well at a constant rate and measuring the response of the water level within the well with respect to time. Data obtained using these test procedures will be evaluated using procedures presented in "The Bouwer and Rice Slug Test - An Update", Bouwer, H., Groundwater Journal, Vol. 27, No. 3, May-June 1989.

Water level measurements will include measuring the depth of water within the wells/well points from a monitoring point of known elevation established at the top of the well riser. The depth to surface water will be measured relative to the monitoring point. The water elevations will then be calculated based on the known elevation and measured depth to water. Wells will be allowed to equilibrate a minimum of 24 hours after purging or testing prior to measuring the water level.

2.70 EQUIPMENT DECONTAMINATION

To avoid cross contamination, sampling equipment (defined as any piece of equipment which may contact a sample) will be decontaminated according to the following procedures outlined below.

2.70.1 Non-Dedicated Reusable Equipment

Non-dedicated reusable equipment such as split spoons, stainless steel mixing bowls; pumps used for groundwater evacuation (and sampling, if applicable) etc. will require field decontamination. Acids and solvents will not be used in the field decontamination of such equipment. Decontamination will include scrubbing/washing with a laboratory grade detergent (e.g. alconox) to remove visible contamination, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from any treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute. Equipment should be allowed to dry prior to use. Steam cleaning or high pressure hot water cleaning may be used in the initial removal of gross, visible contamination.

Pumps will be decontaminated by running a large volume (greater than 5 gallons) of potable water through the pump, followed by an analyte-free water rinse. Tubing will not be re-used (new tubing will be used for each well). Submersible pumps and supporting lines and cables will be place in a large plastic garbage can filled with potable water and then run for several minutes (to decontaminate both exterior and interior parts); submersible pumps will also be given a final analyte free water rinse of both interior and exterior parts.

2.70.2 Disposable Sampling Equipment

Disposable sampling equipment includes disposable bailers; and tubing associated with groundwater sampling/purging pumps, etc. Such equipment will not be field-decontaminated; equipment other than bailers may be rinsed with laboratory-provided analyte-free water prior to use. Disposable spoons or spatulas purchased from nonenvironmental equipment vendors (such as restaurant supply houses) will be decontaminated using steam or high pressure hot water rinse, non-phosphate detergent rinse, and an analyte free water rinse. The equipment will be allowed to air dry prior to use.

2.70.3 Piezometer Construction Materials

Piezometer construction materials including screens, well riser and end caps/tailpieces will be cleaned prior to installation by steam cleaning or high pressure hot water rinse.

2.80 STORAGE AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

The sampling methods and equipment have been selected to limit both the need for decontamination and the volume of waste material to be generated. Investigation-derived material (e.g., purge water) generated during this project shall be presumed to be non-hazardous waste based upon the data from previous investigations. However, if observations during the investigation indicate the material is grossly contaminated (e.g., presence of strong vapors or product), the materials will be drummed.

Purge water generated from the monitoring wells or Geoprobe explorations will be disposed into the Nassau County sanitary sewer system.

Personal protective equipment and disposable sampling equipment will be placed in plastic garbage bags for disposal as a non-hazardous waste.

Decontamination Fluids

Wash water and rinse water, including detergent, may be generated during site work. These wastes will be disposed into the on-site sanitary sewer system.

2.90 GEOPROBES

The Geoprobe rig and tools, etc. will be decontaminated between borings at an on-site temporary decontamination pad constructed in an area acceptable to NYSDEC. Decontamination will be accomplished using steam cleaning or high pressure wash equipment. Soil sampling devices will be cleaned manually with non-phosphate detergent wash and potable water followed by a potable water rinse or a second steam cleaning followed by a distilled/deionized water rinse. The equipment will be cleaned prior to leaving the site.

Geoprobes will be advanced into the overburden and soil samples collected using a truck mounted Geoprobe unit equipped with a two inch O.D. by 4 foot long sampler. The Geoprobe unit will include a hydraulic push/hammer that will be used to advance the sampler. No drilling fluids will be used during Geoprobe work.

Soil samples will be classified by GZA in the field by visual examination in accordance with the New York State Department of Transportation Soil Description Procedure. A copy of this procedure is included in Appendix A. Selected samples will be retained for soil index properties testing (grain size distribution and Atterberg limits) to confirm field classification. At the completion of this project, the soil samples will become the property of the NYSDEC. A log of each boring will be prepared with appropriate stratification lines, blow counts, sample identification, sample depth interval, recovery and date.

2.100 PIEZOMETER INSTALLATION

Piezometers will be constructed of 3/4 inch I.D. flush coupled Schedule 40, polyvinylchloride (PVC) riser and screen. The proposed location of piezometers is shown on Figure 3. The actual installation depth of the screen will be selected based upon the intended purpose of the piezometer (the zone to be monitored), observation of subsurface materials and headspace screening test results. The screen will consist of a maximum 10 foot long section. The actual length of the well screen may vary depending upon subsurface conditions encountered. Attempts will be made to limit the well screen to the zone being monitored. A schematic of the piezometer construction details is provided as Figure 6.

Following determination of the monitoring zone and placement of the assembled screen and riser, the borehole will be backfilled. Generally, this will include the placement of a sand filter around the piezometer screen or allowing the borehole to collapse around the screen such that the sand extends a minimum of 1 foot above the top of the screen. A minimum 2 foot layer of bentonite pellets will be placed above the sand filter (to within about 1 foot of ground surface) and allowed to hydrate. The piezometer will be completed by placing a locking road box surface set casing over the riser. Concrete will be then placed in the borehole around the protective casing.

Materials used in piezometer installation will be stockpiled in an on-site storage area (unless there is a possibility for vandalism) for use as necessary. Items will be brought to the site clean and in like-new condition and kept clean, and in satisfactory condition for potential use. Piezometer materials (screen and riser pipe will be cleaned on-site prior to use. The cleaning procedure is described in Section 2.70.5. Following cleaning, piezometer materials will be wrapped in clean plastic sheeting for transportation to the piezometer location. Site personnel handling piezometer equipment after cleaning are required to wear clean gloves.

2.110 SURVEY

A professional land surveyor, YEC, Inc., will be subcontracted to measure the vertical and horizontal locations of the existing piezometers and Geoprobe borings, and the limits of the property. Other site features including structures, tanks, etc., where horizontal and/or vertical measurements are required may also be identified by the field team. These locations will be flagged with survey ribbon or survey flags. Locations will be reviewed with surveyor personnel by a member of the field team.

Vertical measurements at surface water gauging stations, monitoring wells and piezometers will include the ground surface, top of casing and top of riser which will serve as the water level monitoring point. Vertical measurements will be relative to the National Geodetic Vertical Datum. Monitoring point measurements and top of protective casing measurements will be accurate to within 0.01 foot. Other horizontal and vertical measurements will be accurate to within 0.1 foot.

3.00 SAMPLE HANDLING

3.10 SAMPLE IDENTIFICATION/LABELING

Samples will be assigned a unique identification using the sample location or other sample-specific identifier. Sample identification will be limited to seven alphanumeric characters to be consistent with the limitations of the laboratory tracking/reporting software. The general sample identification format follows.

SL-XX

Where:

SL = Location identifier (2 or 3 characters, as below)
    GP = Geoprobe boring (GP) with numeric character indicating boring number from which the sample was obtained.
    AP = Auger probe (AP) with numeric character indicating boring number from which the sample was obtained.
    MW = Groundwater Monitoring Well
    EB = Equipment (Field Rinsate) Blank
    TB = Trip Blank

XX = Numerical sample identifier (2 or 3 characters). This will ordinarily be an arbitrary, sequential number and will correspond to sample location information and numbering. However, for soil borings it will identify from which split spoon the sample was obtained (e.g., S1, S2, etc; the number will be the same as indicated on the boring log).

QC field duplicate samples will be submitted blind to the laboratory; a fictitious sample ID will be created using the same system as the original. The sample identifications (of the original sample and its field duplicate) will be marked in the field book and on the copy of the chain-of-custody kept by the sampler and copied to the project manager. All sample containers will be labeled in the field prior to the collection of samples. Affixed to each sampling container will be a non-removable label on which the following information will be recorded with permanent water-proof ink:

- Site name, location, and job number;
- Sample identification code;
- Date and time;
- Sampler's name;
- Preservative;
- Type of sample (e.g., water, soil, sludge, sediment); and,
- Requested analyses.

3.20 SAMPLE, BOTTLES, PRESERVATION, AND HOLDING TIME

Table 2 specifies the analytical method, matrix, holding time, containers, and preservatives for the various analysis to be completed as part of the FRI. Sample bottle requirements, preservation, and holding times are discussed further below.

3.20.1 Sample Bottles

The selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, potential contaminants of concern, reactivity of container material with the sample, QA/QC requirements and any regulatory protocol requirements. Sample bottles will be provided by the analytical laboratory and will conform to the requirements of USEPA's Specifications and Guidance for Contaminant-Free Sample Containers.

3.20.2 Sample Preservation

Samples will be preserved as indicated below and summarized on Table 2.

Soil Samples

Analytical (all analysis) - cooled to 4 °C; no chemical preservatives added.
Geotechnical - no preservation required .

Aqueous Samples:

Volatile and semivolatile organics - cooled to 4 °C; no chemical preservatives added.
Metals - HNO_3 to pH ≤ 2; cool to 4 °C.
Cyanide - NaOH to pH ≥ 12; cool to 4 °C.

Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory. The pH of samples will be spot-checked in the field and additional preservative will be added as needed. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to TAMS Quality Assurance Officer (QAO). If it appears that the level of chemical preservation added is not adequate, laboratory preservative preparation and addition will be modified or additional preservative will be added in the field by the sampling team.

3.20.3 Holding Times

Holding times are judged from the verified time of sample receipt (VTSR) by the laboratory; samples will be shipped from the field to arrive at the lab no later than 48 hours from the time of sample collection. Holding time requirements will be those specified in the NYSDEC ASP; it should be noted that for some analyses, these holding times are more stringent than the holding time for the corresponding USEPA method. Aqueous samples for volatile organics will not be subject to chemical preservation, and are therefore limited to a seven day holding time from VTSR.

Although trip blanks are prepared in the analytical laboratory and shipped to the site prior to the collection of environmental samples, for the purposes of determining holding time conformance, trip blanks will be considered to have been generated on the same day as the environmental samples with which they are shipped and delivered. Procurement of bottles and blanks will be scheduled to prevent trip blanks from being stored for excessive periods prior to their return to the laboratory; the goal is that trip blanks should be held for no longer than one week prior to use.

3.30 CHAIN OF CUSTODY AND SHIPPING

A chain-of-custody form will trace the path of sample containers from the project site to the laboratory. A sample Chain of Custody is included in Appendix C, Field Forms. Sample/bottle tracking sheets or the chain-of-custody will be used to track the containers from the laboratory to the containers' destination. The project manager will notify the laboratory of upcoming field sampling events and the subsequent transfer of samples. This notification will include information concerning the number and type of samples, and the anticipated date of arrival. Insulated sample shipping containers (typically coolers) will be provided by the laboratory for shipping samples. All sample bottles within each shipping container will be individually labeled with an adhesive identification label provided by the laboratory. Project personnel receiving the sample containers from the laboratory will check each cooler for the condition and integrity of the bottles prior to field work.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in Ziploc plastic bags to prevent leaking) or synthetic ice packs to maintain the samples at 4 °C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic Ziploc bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler and will indicate tampering if the seals are broken before receipt at the laboratory. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be shipped by an overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form.

4.00 DATA QUALITY REQUIREMENTS

4.10 ANALYTICAL METHODS

Analyses for volatile and semivolatile organic compounds, and inorganics (metals and cyanide) will utilize NYSDEC Analytical Services Protocol (ASP) Superfund Contract Laboratory Program (CLP) methods:

CLP Volatile Organics	NYSDEC Method 95-1
CLP Semivolatile Organics	NYSDEC Method 95-2
CLP TAL Inorganics (23)	NYSDEC CLP-M Metals Methods(1)
Total Cyanide	Method 335.2, CLP-M

NOTE:

(1) Analysis for arsenic, lead, selenium, and thallium will be by atomic absorption methods (CLP-M methods 206, 239, 270, and 279, respectively; or trace ICP if contract required detection limits (CRDLs) can be achieved. Analysis for mercury will be by CLP-M Method 245.1 or 245.2 (aqueous samples) or 245.5 (soil/sediment samples). Analysis for other TAL metals will be done by inductively coupled plasma (ICP), Method 200.7, CLP-M or by trace ICP.

Analytical methods used during this project are presented in the NYSDEC Analytical Services Protocol (ASP), October, 1995. Specific methods and references for each parameter are shown above. It is the laboratory's responsibility to be familiar with this document and procedures and deliverables within it pertaining to New York State

Superfund work.

TAMS has obtained analytical laboratories under subcontracts approved by NYSDEC. For the PALL FRI/FS, a single laboratory (CompuChem) will be utilized. CompuChem is certified by the NYSDOH Environmental Laboratory Approved Program (ELAP ID # 10065). CompuChem was confirmed to be in good standing for all the ASP/CLP parameter groups.

4.20 QUALITY ASSURANCE OBJECTIVES

Data quality objectives (DQOs) for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended uses. Data collected and analyzed in conformance with the DQO process described in this QAPjP will be used in assessing the uncertainty associated with decisions related to this site.

4.20.1 Sensitivity

The sensitivity or detection limit desired for each analysis or compound is established by NYSDEC as part of the Analytical Services Protocol (ASP) Superfund Contract Laboratory Program (CLP). It is understood that such limits are dependent upon matrix interferences.

Volatile Organics (ASP method 95-1). The Contract Required Quantitation Limits (CRQLs) for all analytes is 10 µg/L (10 µg/kg for soil). The reporting limit for non-detected analytes is the CRQL. Based on laboratory method detection limit (MDL) studies, detected analytes will be reported down to 1 ug/L; analytes reported at concentrations below the CRQL will be flagged "J" (estimated) by the laboratory.

Semivolatile Organics (ASP method 95-2). The CRQLs for semivolatile organic analytes is 10 µg/L (330 µg/kg for soil) for most analytes. (The CRQLs are 25 µg/L [aqueous] and 800 µg/kg [soil] for a few semivolatiles.) The reporting limit for non-detected analytes is the CRQL. Detected semivolatile analytes will be reported down to about one-tenth of the CRQL; analytes reported at concentrations below the CRQL will be flagged "J" (estimated) by the laboratory.

Inorganics (Metals and Cyanide). The CRDLs for inorganics are analyte-specific. The laboratory is required to perform an instrument detection limit (IDL) study quarterly; the reporting limit for non-detected metals is the IDL. Metals concentrations between the IDL and the CRDL are flagged "J" by the laboratory. For cyanide, the CRDL is the reporting limit for both detected and non-detected results.

4.20.2 Precision

The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on similar samples. Precision is evaluated by the analyses of laboratory and field duplicates. Laboratory duplicate analyses will be performed once for every twenty samples for metals as specified in the NYSDEC ASP-CLP.

Relative Percent Difference (RPD) criteria, prescribed by the NYSDEC, and those determined from laboratory performance data, are used to evaluate precision between duplicates. A matrix spike duplicate will be performed once for every twenty samples for volatile organics.

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation but other estimates such as the coefficient of variation, relative standard deviation, range (maximum value minus minimum value), and relative range are common, and may be used pending review of the data.

The overall precision of measurement data is a mixture of sampling and analytical factors. Analytical precision is easier to control and quantify than sampling precision; there are more historical data related to individual method performance and the "universe" is not limited to the samples received in the laboratory. In contrast, sampling precision is unique to each site or project.

Overall system (sampling plus analytical) precision will be determined by analysis of field duplicate samples. Analytical results from laboratory duplicate samples will provide data on measurement (analytical) precision.

Precision will be determined from field duplicates, as well as laboratory matrix duplicate samples for metals analyses, and matrix spikes and matrix spike duplicates for organic analyses; it will be expressed as the relative percent difference (% RPD):

$$\% \text{ RPD} = 100 \times 2(X_1 - X_2) / (X_1 + X_2)$$

where:

X_1 and X_2 are reported concentrations for each duplicate sample and subtracted differences represent absolute values.

Criteria for evaluation of laboratory duplicates are specified in the applicable methods. The objective for field duplicate precision is ≤ 50% RPD for all matrices.

4.20.3 Accuracy

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical method on similar samples. Percent recovery criteria, published by the NYSDEC as part of the ASP, and those determined from laboratory performance data, are used to evaluate accuracy in matrix (sample) spike and blank spike quality control samples. A matrix spike and blank spike will be performed once for every sample delivery group (SDG) as specified in the ASP-CLP. This will apply to inorganics and volatile and semivolatile organics analyses. Other method-specific laboratory QC samples (such as laboratory control samples for metals, and continuing calibration standards) may also be used in the assessment of analytical accuracy. Sample (matrix) spike recovery is calculated as:

$$\%R = (SSR-SR)/SA \times 100,$$

where

SSR = Spiked sample Result
SR = Sample Result, and
SA = Spike Added

Accuracy measures the bias in a measurement system. It is difficult to measure accuracy for the entire data collection activity. Accuracy will be assessed through use of known QC samples.

Accuracy values can be presented in a variety of ways. Accuracy is most commonly presented as percent bias or percent recovery. Percent bias is a standardized average error, that is, the average error divided by the actual or spiked concentration and converted to a percentage. Percent bias is unitless and allows accuracy of analytical procedures to be compared.

Percent recovery provides the same information as percent bias. Routine organic analytical protocol requires a surrogate spike in each sample. Surrogate recovery will be defined as:

$$\%\ Recovery = (R/S) \times 100$$

where

S = surrogate spike concentration
R = reported surrogate concentration

Recovery criteria for laboratory spikes and other laboratory QC samples through which accuracy may be evaluated are established in the applicable analytical method.

4.20.4 Representativeness

The representativeness of data is only as good as the representativeness of the samples collected. Sampling and handling procedures, and laboratory practices are designed to provide a standard set of performance-driven criteria to provide data of the same quality as other analyses of similar matrices using the same methods under similar conditions. Representativeness will be determined by a comparison of the quality controls for these samples against data from similar samples analyzed at the same time.

4.20.5 Comparability

Comparability of analytical data among laboratories becomes more accurate and reliable when all labs follow the same procedure and share information for program enhancement. Some of these procedures include:

- Instrument standards traceable to National Institute of Standards and Technology (NIST), the U.S. Environmental Protection Agency (EPA), or the New York State Departments of Health or Environmental Conservation;
- Using standard methodologies;
- Reporting results for similar matrices in consistent units;
- Applying appropriate levels of quality control within the context of the laboratory quality assurance program; and,
- Participation in inter-laboratory studies to document laboratory performance.

By using traceable standards and standard methods, the analytical results can be compared to other labs operating similarly. The QA Program documents internal performance. Periodic laboratory proficiency studies are instituted as a means of monitoring intra-laboratory performance.

4.20.6 Completeness

The goal of completeness is to generate the maximum amount possible of valid data. The highest degree of completeness would be to find all deliverables flawless, valid and acceptable. The lowest level of completeness is excessive failure to meet established acceptance criteria and consequent rejection of data. Due to the relatively small number of data points to be generated during the FRI/FS process, the completeness goal is 100% useable data (i.e., no rejected data). However, it is acknowledged that this goal may not be fully achievable; for example, individual analytes (e.g., 2-hexanone) may be rejected within an otherwise acceptable analysis. The impact of rejected or unusable data will be made on a case-by-case basis. If the FRI/FS can be completed without the missing datum or data, no further action would be necessary. However, loss of critical data may require resampling or reanalysis.

4.30 FIELD QUALITY ASSURANCE

Blank water generated for use during this project must be "demonstrated analyte-free". The criteria for analyte-free water is based on the EPA assigned values for the Contract Required Detection Limits (CRDLs) and CRQLs. If the levels of detection needed on a specific site are lower than the CLP CRDLs/CRQLs, then those levels are used to define the criteria for analyte-free water.

Volatile organics	< 10 µg/l
Semivolatile organics	< 10 µg/l or 25 µg/l (analyte specific)
Inorganics	< CRDL

However, specifically for the common laboratory contaminants (acetone and 2-butanone) the allowable limits are five times the respective CRQLs. For methylene chloride, the limit is 2.5 times the CRQL.

The analytical testing required for the water to be demonstrated as analyte free must be performed prior to the start of sample collection; thus, blank water will be supplied by the laboratory.

4.30.1 Equipment (Rinsate) Blanks

Equipment blanks consist of demonstrated, analyte-free water that show if sampling equipment has the potential for contaminant carryover to give a false impression of contamination in an environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if sampling could be biased by contamination from the equipment.

Field Equipment (Rinsate) blanks for bailers: For initial sampling, as well as at subsequent rounds of sampling when bailers are reused, at least one of the bailers used per decontamination batch, will be used to generate equipment (rinsate) blanks during groundwater sampling. Disposable bailers will be obtained from a single vendor for this project. One rinsate blank will be collected for each groundwater sampling event.

One rinsate blank will be collected for every 20 Geoprobe samples collected or one per week whichever is more frequent. The rinsate blanks will be collected from the Geoprobe soil sampler and Geoprobe groundwater sampling equipment.

4.30.2 Field Duplicate Samples

Field duplicate samples are used to assess the variability of a matrix at a specific sampling point and to assess the reproducibility of the sampling method. For soil samples, these samples are separate aliquots of the same sample; prior to dividing the sample into "sample" and "duplicate" aliquots, the samples are homogenized (except for the VOC aliquots, which are not homogenized). Aqueous field duplicate samples are second samples collected from the same location, at the same time, in the same manner as the first, and placed into a separate container (technically, these are co-located samples). Each duplicate sample will be analyzed for the same parameters as the original sample collected that day. The blind field duplicate Relative Percent Difference (RPD) objective will be ±50% percent RPD for all matrices. Field duplicates will be collected at a frequency of 1 per 20 environmental samples for both matrices (aqueous and non-aqueous) and all test parameters.

4.30.3 Split Samples

Split samples are used for performance audits or inter-laboratory comparability of data. A split sample will be defined as at least two separate sub-samples taken from a single original sample which has been thoroughly mixed or homogenized prior to the formation of the split samples. The exception to this is samples for volatile organics analysis which will not be homogenized. Collection of split samples is not planned.

4.30.4 Trip Blanks

The purpose of a VOC trip blank (using demonstrated analyte-free water) is to place a mechanism of control on sample bottle preparation and blank water quality, and sample handling. The trip blank travels from the lab to the site with the empty sample bottles and back from the site with the collected samples. There will be a minimum of one trip blank per shipment containing aqueous samples for volatile organic compounds (VOCs) analysis. Trip blanks will be collected only when aqueous volatile organics are being sampled and shipped; except that a trip blank is not required when the only aqueous samples in a shipment are QC samples (rinsate blanks).

4.40 FIELD TESTING QC

Field testing of groundwater will be performed during purging of wells prior to sampling for laboratory samples. Field QC checks of control limits for pH, specific conductance (conductivity) and turbidity are detailed below. The calibration frequencies discussed below are the minimum. Field personnel can and should check calibration more frequently in adverse conditions, if anomalous readings are obtained, or subjective observations of instrument performance suggest the possibility of erroneous readings.

4.40.1 pH

The pH meter is calibrated twice daily (prior to initial use and midday), using two standards bracketing the range of interest (generally 4.0 and 7.0). If the pH QC control sample (a pH buffer, which may be the same or different than those used to initially calibrate the instrument) exceeds ± 0.1 pH units from the true value, the source of the error will be determined and the instrument recalibrated. If a continuing calibration check with pH 7.0 buffer is off by ± 0.1 pH units, the instrument will be recalibrated. Expired buffer solutions will not be used. A field pH Calibration Form is included in Appendix C.

Note that gel-type probes take longer to equilibrate (up to 15 minutes at near-freezing temperatures); this must be taken into account in calibrating the instrument and reading samples and standards.

4.40.2 Specific Conductivity

A vendor-provided conductivity standard will be used to check the calibration of the conductivity meter twice daily (prior to initial use and midday). Specific conductance QC samples will be on the order of 0.01 or 0.1 molar potassium chloride solutions in accordance with manufacturer's recommendations. A Field Specific Conductance Calibration Form is included in Appendix C.

4.40.3 Turbidity

The turbidity meter should be calibrated using a standard as close as possible to 50 NTU (the critical value for determining effectiveness of well development and evacuation). The turbidimeter will be calibrated/checked twice daily. The turbidity QC sample will be a commercially prepared polymer standard (Advanced Polymer System, Inc., or similar). A Field Turbidity Calibration Form is included in Appendix C.

4.40.4 Temperature

Temperature probes associated with instruments (such as the YSI SCT-33 conductivity and temperature meter) are not subject to field calibration, but the calibration should be checked to monitor instrument performance. It is recommended that the instrument's temperature reading be checked against a NIST-traceable thermometer concurrently with checking the conductivity calibration. The instrument manual will be referenced for corrective actions if accurate readings cannot be obtained. A Temperature Calibration Form is included in Appendix C.

4.50 LABORATORY QUALITY ASSURANCE

4.50.1 Method Blanks

A method blank is laboratory water on which every step of the method is performed and analyzed along with the samples. They are used to assess the background variability of the method and to assess the introduction of contamination to the samples by the method, technique, or instruments as the sample is prepared and analyzed in the laboratory. Method blanks will be analyzed at a frequency of one for every twenty samples analyzed or as otherwise specified in the analytical protocol.

4.50.2 Laboratory Duplicates

Laboratory duplicates are sub-samples taken from a single aliquot of sample after the sample has been thoroughly mixed or homogenized (with the exception of volatile organics), to assess the precision or reproducibility of the analytical method on a sample of a particular matrix. Laboratory duplicates will be performed on spiked samples as a Matrix Spike and a Matrix Spike Duplicate (MS/MSD) for volatile and semivolatile organics, and as a Matrix spike and matrix duplicate for metals and cyanide.

4.50.3 Spiked Samples

Two types of spiked samples will be prepared and analyzed as quality controls: Matrix Spikes and Matrix Spike Duplicates (MS/MSD) are analyzed to evaluate instrument and method performance and performance on samples of similar matrix. MS/MSD will be analyzed at a frequency of one (pair) for every 20 samples. For metals, a matrix spike and matrix duplicate are analyzed for each set of 20 samples. In addition, matrix spike blanks (MSBs) will also be run by the lab as part of the NYSDEC CLP.

5.00 DATA DOCUMENTATION

5.10 FIELD NOTEBOOK

Field notebooks will be initiated at the start of on-site work. Each subcontractor in the field will have a notebook dedicated to record pertinent activities. In addition to any forms that will be filled out summarizing field work (and become part of the project file), legible photocopies of pertinent notebook pages will be submitted by the contractors with their finished written report or product. The field notebook will include the following daily information for all site activities:

- Date;
- Meteorological conditions (temperature, wind, precipitation);
- Site conditions (e.g., dry, damp, dusty, etc.);
- Identification of crew members (TAMS/GZA and subcontractor present) and other personnel (e.g., agency or site owner) present;
- Description of field activities;
- Location(s) where work is performed;
- Problems encountered and corrective actions taken;
- Records of field measurements or descriptions recorded; and,
- Notice of modifications to the scope of work.

During drilling operations, the supervising field engineer/geologist will add the following information:

- Geoprobe rig type;
- Documentation of materials used;
- Downtime;
- Time work is performed at an elevated or lowered level of respiratory protection;
- Description of soil or rock strata; and,
- Diagram of well or piezometer construction.

During sampling of wells and surface water, field samplers will add the following:

- Sampling point locations and test results such as pH, conductance, etc.
- Information about sample collection
- Chain of custody information, and
- Field equipment calibration.

5.20 FIELD REPORTING FORMS

Field reporting forms (or their equivalent) to be utilized in this investigation are presented in Appendix C. These include:

- Geoprobe Boring & Piezometer Installation Log;
- Monitoring Well Field Measurements Log;
- Existing Well Assessment Form;
- Hydraulic Conductivity Test Form;
- Sample Collection Log;
- Chain of Custody Form;
- pH Calibration Log;
- Specific Conductance Calibration Log;
- Turbidity Calibration Log; and,
- Temperature Calibration Log.

These forms, when completed, will become part of the project file.

6.00 EQUIPMENT CALIBRATION AND MAINTENANCE

6.10 STANDARD WATER AND AIR QUALITY FIELD EQUIPMENT

Field equipment used during the collection of environmental samples, includes a turbidimeter (turbidity per EPA Method 180.1), pH meter (pH per EPA Method 150.1), conductivity meter (specific conductance per EPA Method 120.1), thermometer, and photoionization detector. See also Section 4.40 of this QAPjP for additional discussion.

Calibration and standardization for the field water quality tests will be in conformance with the manufacturers recommendations.

The pH meter will be fully recalibrated (two points) at least two times daily and it will be checked with pH 7.0 buffer every five samples, two hours, or every time it has been turned off for more than two hours and then turned on, whichever occurs first.

The calibration of the specific conductance meter will be checked twice daily (at the beginning and in the middle of the work day).

Temperature will be measured with an NBS/NIST traceable thermometer, or with a platinum electrode, factory calibrated and coupled to the conductivity meter, or similar meter.

The HNu-PI 101 (or equivalent organic vapor analyzer) use for soil screening and health and safety air monitoring will be calibrated following the manufacturer's instructions, at the beginning of the day, whenever the instrument is shut off for more than two hours, and at the field technician's discretion.

6.20 LABORATORY EQUIPMENT

Laboratory equipment will be calibrated according to the requirements of the 1995 Revised NYSDEC ASP, Superfund Contract Laboratory Program for each parameter or group of similar parameters, and maintained following professional judgment and the manufacturer's specifications.

7.00 CORRECTIVE ACTIONS

If instrument performance or data fall outside acceptable limits, then corrective actions will be taken. These actions may include recalibration or standardization of instruments, acquiring new standards, replacing equipment, repairing equipment, and reanalyzing samples or redoing sections of work.

Subcontractors providing analytical services should perform their own internal laboratory audits and calibration procedures with data review conducted at a frequency so that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

Situations related to this project requiring corrective action will be documented and made part of the project file. For each measurement system identified requiring corrective action, the responsible individual for initiating the corrective action and also the individual responsible for approving the corrective action, if necessary, will be identified.

As part of its total quality management program, TAMS makes the results of laboratory audits and data validation reports available to the analytical laboratories. The laboratories are therefore made aware of non-critical items and areas where improvement may be made in subsequent NYSDEC ASP work.

8.00 DATA REDUCTION, VALIDATION, AND REPORTING

The guidance followed to perform quality data validation, and the methods and procedures outlined herein and elsewhere in the Work Plan, pertain to initiating and performing data validation, as well as reviewing data validation performed by others (if applicable). An outline of the data validation process is presented here, followed by a description of data validation review summaries.

8.10 LABORATORY DATA REPORTING AND REDUCTION

The laboratory will meet the applicable documentation, data reduction, and reporting protocols as specified in the 1991 revision of the NYSDEC ASP CLP. Laboratory data reports for non-CLP data will conform to NYSDEC Category B deliverable requirements. With full CLP documentation, deliverables will include, but not be limited to:

Organics

- Chains of Custody
- Blanks
- Holding Times
- Internal Standards
- Laboratory Duplicates
- Tentatively Identified Compounds
- GC/MS Instrument Performance Check
- System Monitoring Compound Recovery
- Matrix Spike & Matrix Spike Duplicates
- GC/MS Tuning
- Surrogate Recoveries

Inorganics

- Chains of Custody
- Holding Times
- Blanks
- Furnace AA QC
- CRDL Standards
- ICP Serial Dilutions
- Laboratory Control Samples
- Laboratory Duplicates
- ICP Interference Check
- Spiked Sample Recovery

Copies of the laboratory's generic Quality Assurance Plan (QAP), and the audit performed by TAMS as part of subcontractor procurement are on file at TAMS and with the NYSDEC. The laboratory's QAP or audit will indicate the standard methods and practices for obtaining and assessing data, and how data are reduced from the analytical instruments to a finished report, indicating levels of review along the way.

In addition to the hard copy of the data report, the laboratory will be asked to provide the sample data in spreadsheet form on computer diskette. The diskette will be generated to the extent possible directly from the laboratory's electronic files or information management system to minimize possible transcription errors resulting from the manual transcription of data.

8.20 DATA VALIDATION

CLP data will be validated by a standby subcontractor (URS). Data validation will be performed by following guidelines established in the US EPA Region 2 SOP No. HW-6, "CLP Organics Data Review" (Revision No. 8, January 1992); and SOP No. HW-2, "Evaluation of Metals Data for the Contract Laboratory Program (CLP)" (based on SOW 3/90; January 1992). These documents are check lists which are designed to formally and rigorously assess the quality and completeness of CLP data packages. The use of these USEPA SOPs will be adapted to conform to the specific requirements of the NYSDEC ASP (e.g., NYSDEC/ASP holding times; matrix spike blank requirements). Where necessary and appropriate, supplemental validation criteria may be derived from the EPA Functional Guidelines (USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, Publication 9240.1-05, EPA-540/R-94/012, February, 1993; and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Publication 9240.1-05-01; EPA-540/R-94/013, PB94-963502, February, 1994).

Validation reports will consist of text results of the review and marked up copies of Form I (results with qualifiers applied by the validator). Validation will consist of target and non-target compounds with corresponding method blank data, spike and surrogate recoveries, sample data, and a final note of validation decision or qualification, along with any pertinent footnote references. Qualifiers applied to the data will be documented in the report text.

There may be some analyses for which there is no established USEPA or NYSDEC data validation protocol. In such cases, validation will be based on the Region II SOPs and EPA Functional Guidelines as much as possible, as well as the laboratory's adherence to the technical requirements of the method, and the professional judgment of the validator. The degree of rigor in such validation will correspond to the nature of the data and the significance of the data and its intended use. Unless otherwise requested, non-CLP data (e.g., total organic carbon) is not subject to validation.

8.30 DATA USABILITY

Subsequent to review of the items evaluated in the subcontractor data validator reports and accompanying tables, TAMS' QA staff then prepares a brief data usability summary. The data usability summary, which will be provided as part of the FRI report, encompasses both quantitative and qualitative aspects, although the qualitative element is the most significant.

The quantitative aspect is a summary of the data quality as expressed by qualifiers applied to the data; the percent rejected, qualified (i.e., estimated), missing, and fully acceptable data are reported. As appropriate, this quantitative summary is broken down by matrix, laboratory, or analytical fraction or method.

The qualitative element of the data usability summary is the QA officer's translation and summary of the validation reports into a discussion useful to data users. The qualitative aspect will discuss the significance of the qualifications applied to the data, especially in terms of those most relevant to the intended use of the data. The usability report will also indicate whether there is a suspected bias (high or low) in qualified data, and will also provide a subjective overall assessment of the data quality. If similar analyses are performed by more than one method, a discussion of the extent of agreement among the various methods will be included, as well as discussion of any discrepancies among the data sets. The QAO will also indicate if there is a technical basis for selecting one data type over another for multiple measurements which are not in agreement.

Non-CLP data which has not been validated and field data used for the FRI will be discussed in the data usability summary.

8.40 FIELD DATA

Field chemistry data collected during air monitoring, soil screening (e.g., HNu readings), GC screening results, and water monitoring (i.e., pH, turbidity, specific conductance, and temperature) will be presented in tabular form with any necessary supporting text. Unless activities resulted in significant unexpected results, field data comments can be added as footnotes to the tables.

9.00 PERFORMANCE AND SYSTEM AUDITS

As part of the laboratory subcontractor procurement process under the TAMS/NYSDEC Superfund Standby Contract, the laboratory assigned to this project has been verified to be certified by the NYSDOH Environmental Laboratory Approval Program for the analytical protocols to be used. Therefore, no audit of the laboratory(s) during the FRI will be performed unless warranted by a problem(s) that cannot be resolved by any other means, or at the discretion of TAMS and the NYSDEC. Field audits are not planned.

10.00 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Monthly project status reporting to the NYSDEC will include aspects of quality control that were pertinent during the month's activities. Problems revealed during review of the month's activities will be documented and addressed. These reports will include a description of completed and on-going activities, and an indication how each task is progressing relative to the project schedule.

The project manager, through task managers, will be responsible for verifying that records and files related to this project are stored appropriately and are retrievable.

The laboratory will submit any memoranda or correspondence related to quality control of this project's samples as part of its deliverables package.

TABLES

TABLE 1

ANALYTICAL TESTING PROGRAM
PALL CORPORATION
FRI/FS QAPjP

SAMPLE LOCATION	TEST PARAMETERS		
	VOCs	SVOCS	TAL Inorganics
SOIL SAMPLES			
GEOPROBE BORINGS	34	3	5
AUGER PROBE BORINGS	6		
GROUNDWATER			
MONITORING WELLS	11	3	3
DEEP GEOPROBE BORINGS	7		
SHALLOW GEOPROBE BORINGS	34	3	3
Auger Probes	6		
SURFACE WATER	3		
SEDIMENT	3		
QA/QC SAMPLES			
SOIL SAMPLES			
TRIP BLANKS			
EQUIPMENT RINSATE BLANKS	2		
DUPLICATES	2		
MS/MSD	4		
MONITORING WELLS (water)			
TRIP BLANKS	1		
EQUIPMENT RINSATE BLANKS	1	1	1
DUPLICATES	1	1*	1*
MS/MSD	2	2*	2*
DEEP GEOPROBE BORINGS (water)			
TRIP BLANKS	5		
EQUIPMENT RINSATE BLANKS			
DUPLICATES	1		
MS/MSD	2		
SHALLOW GEOPROBE BORINGS (water)			
TRIP BLANKS	9		
EQUIPMENT RINSATE BLANKS	3**	1**	1**
DUPLICATES	2		
MS/MSD	4		
SURFACE WATER			
TRIP BLANKS			
EQUIPMENT RINSATE BLANKS			
DUPLICATES	1		
MS/MSD	2		
SURFACE WATER SEDIMENT			
TRIP BLANKS			
EQUIPMENT RINSATE BLANKS	1		
DUPLICATES	1		
MS/MSD	2		
TOTALS	150	14	16

Notes: * The monitoring well field duplicate and MS/MSD covers the aqueous matrix.
** Geoprobe rinsate blanks @1 per week, assumes SVOC/inorganics all same week.
1) One trip blank is required per cooler. The actual number of trip blanks will be determined in the field at the time of sampling.

Table 2
Pall Corporation Site
Quality Assurance Project Plan
Summary of Container, Preservation and Holding Time Requirements

Analysis	Method	Holding Time (days)		Containers		Preservative
		To Extraction	To Analyze	Number	Type	
Soil Samples						
TCL Volatiles	NYSDEC Method 95-1 (a)		7	3	L	Cool
TCL Semivolatiles	NYSDEC 95-2 (a)	5	40	1	J	Cool
Cyanide	US EPA Method 335.2		12	1	I	Cool
TAL Metals	NYSDEC Metals Methods (a)		26/6 mo {c}	1	H	Cool
Aqueous Samples						
TCL Volatiles	NYSDEC Method 95-1 (a)		7	3	G	Cool
TCL Semivolatiles	NYSDEC 95-2 (a)	5	40	1	H	Cool
TAL Metals	NYSDEC Metals Methods (a)		26/6 mo {c}	1	I	HNO3
Cyanide	US EPA Method 335		12	1	I	NaOH

Notes:

Analytical Methods

(a) NYSDEC Analytical Services Protocol (ASP), October, 1995.

(b) Test Methods for Evaluating Solid Waste, November, 1986, SW-846, Third Edition.

Holding Times

{a} Holding Times presented in calendar days unless otherwise specified. Holding times are calculated from verified time of receipt at the laboratory. Samples must be received by the laboratory within 48 hours of sampling.

{b} Where two holding times are presented, separated by "/", the shorter holding time applies only to certain analytes included on the list.

{c} Holding time for mercury is 28 days; all othe inorganics, 6 months.

Container Types

G - 40 ml glass, Teflon septum cap liner
H - 1000 ml glass, Teflon cap liner
I - 1000 ml, polyethylene, Teflon cap liner
J - 8 oz. wide mouth glass, Teflon cap liner
K - 32 oz. wide mouth glass, plastic or metal cap
L - 4 oz. amber, Teflon cap liner

Preservatives

Cool - Cool to 4 degrees Celsius
HNO3 - Nitric Acid to <2 pH
NaOH - Sodium Hydroxide to >12pH

FIGURES

NOTE:

BASE MAP ADAPTED FROM U.S.G.S. QUADRANGLE MAPS SEA CLIFF, N.Y. – 1979 AND HICKSVILLE, N.Y. – 1979.

GZA GeoEnvironmental of New York

DRAWN BY: DEW

DATE: DECEMBER 1997

SCALE IN FEET

0 1000 2000 4000

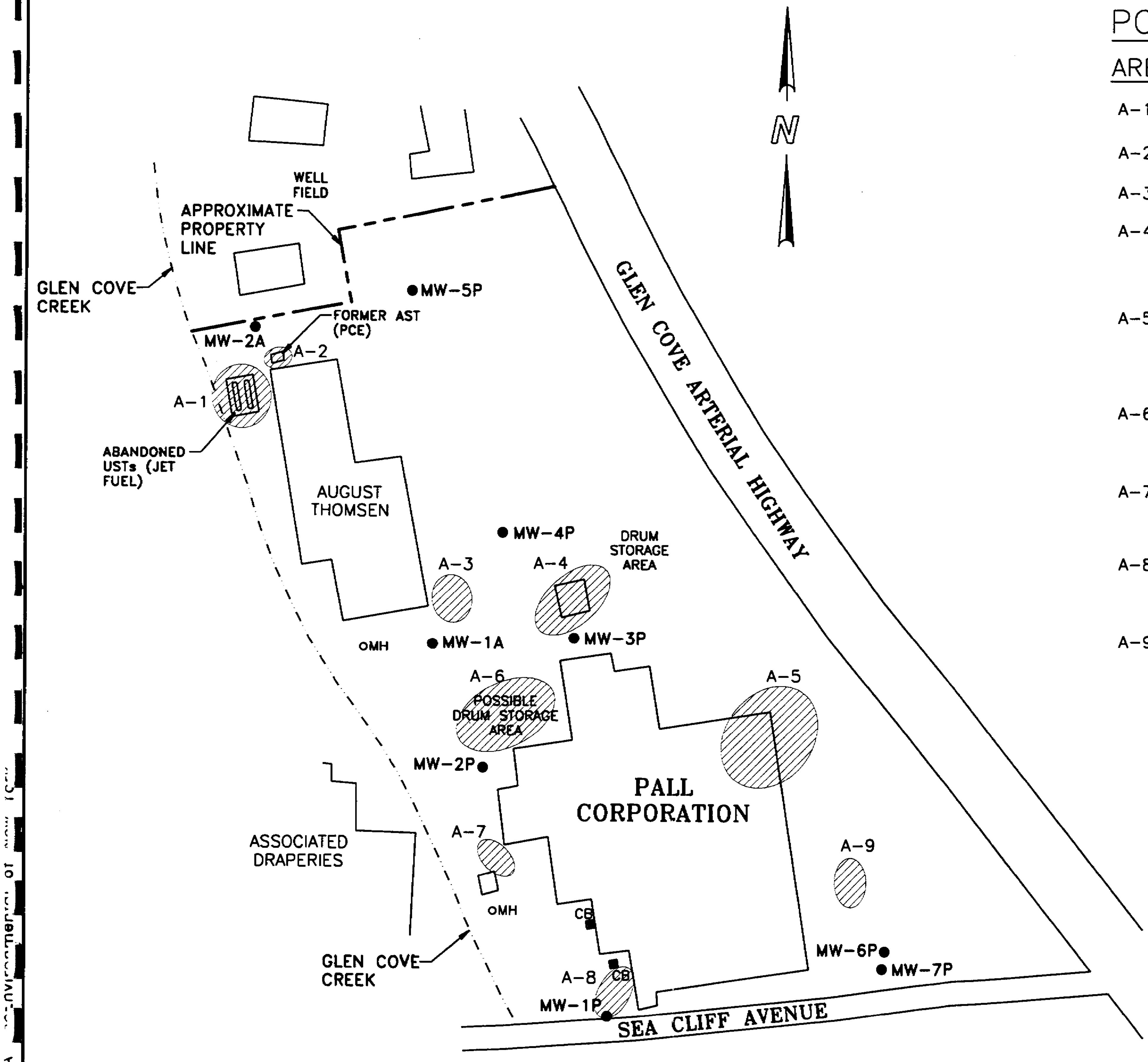
PALL CORPORATION
FOCUSED RI/FS
GLEN COVE, NEW YORK

WORK PLAN

LOCUS PLAN

PROJECT No.
55189

FIGURE No.
1



POTENTIAL SOURCE AREAS

AREA	RATIONALE
A-1	FORMER UST LOCATION & SOIL GAS DATA
A-2	FORMER PCEAST & SOIL GAS DATA
A-3	SOIL GAS DATA FROM LOCATIONS 44 & 45
A-4	DRUM STORAGE AREA & SOIL GAS DATA FROM LOCATION 30
A-5	INFORMATION FROM NYSDEC REGARDING POOR MATERIAL HANDLING PRACTICES
A-6	POSSIBLE DRUM STORAGE AREA AND GROUNDWATER DATA FROM MW-2P
A-7	SOIL GAS DATA FROM LOCATIONS 25 & 26
A-8	FORMER DISPERSING WELL AREA
A-9	SOIL GAS DATA FROM LOCATIONS 46 & 47

LEGEND:

● MW-1P	APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MONITORING WELL
OMH	APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MANHOLE
■ CB	APPROXIMATE LOCATION AND DESIGNATION OF EXISTING CATCH BASIN
A-5 ▨	APPROXIMATE LOCATION AND DESIGNATION OF POTENTIAL SOURCE AREA

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "PALL CORPORATION/AUGUST THOMSON; SITE PLAN", PREPARED BY GROUNDWATER TECHNOLOGY, DATED 12/20/95.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.
3. SOIL GAS DATA FROM H2M GROUP FIGURE DATED JANUARY 13,1992.

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW
DATE: DECEMBER 1997

GZA GeoEnvironmental of New York

SCALE IN FEET
0 50 100 200

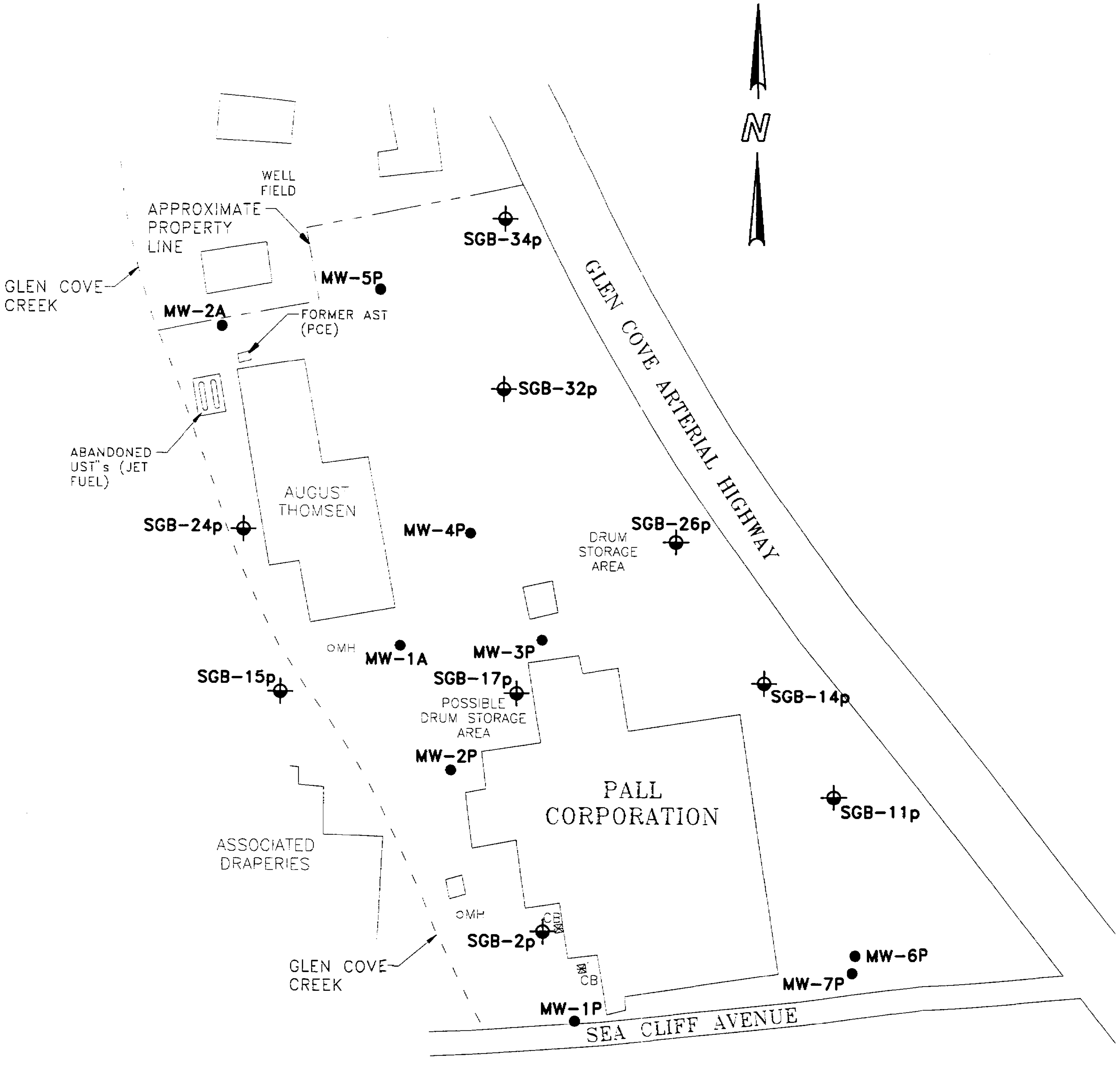
PALL CORPORATION
FOCUSED RI/FS
GLEN COVE, NEW YORK

WORK PLAN

SITE PLAN AND POTENTIAL SOURCE AREAS

PROJECT No.
55189

FIGURE No.
2



LEGEND:

-⌖-SGB-1p APPROXIMATE LOCATION AND DESIGNATION OF PROPOSED "SHALLOW" GEOPROBE SOIL BORING. DEPTH OF THE GEOPROBE TO BE BASED ON FINDINGS IN THE "DEEP" GEOPROBE SOIL BORINGS.

NOTE: THE LETTER "p" FOLLOWING THE GEOPROBE DESIGNATION INDICATES PIEZOMETER TO BE INSTALLED AT THAT LOCATION.

● MW-1P APPROXIMATE LOCATION AND DESIGNATION OF EXISTING MONITORING WELL

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "PALL CORPORATION/AUGUST THOMSON; SITE PLAN", PREPARED BY GROUNDWATER TECHNOLOGY, DATED 12/20/95.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW
DATE: DECEMBER 1997

SCALE IN FEET
0 50 100 200

GZA GeoEnvironmental of New York

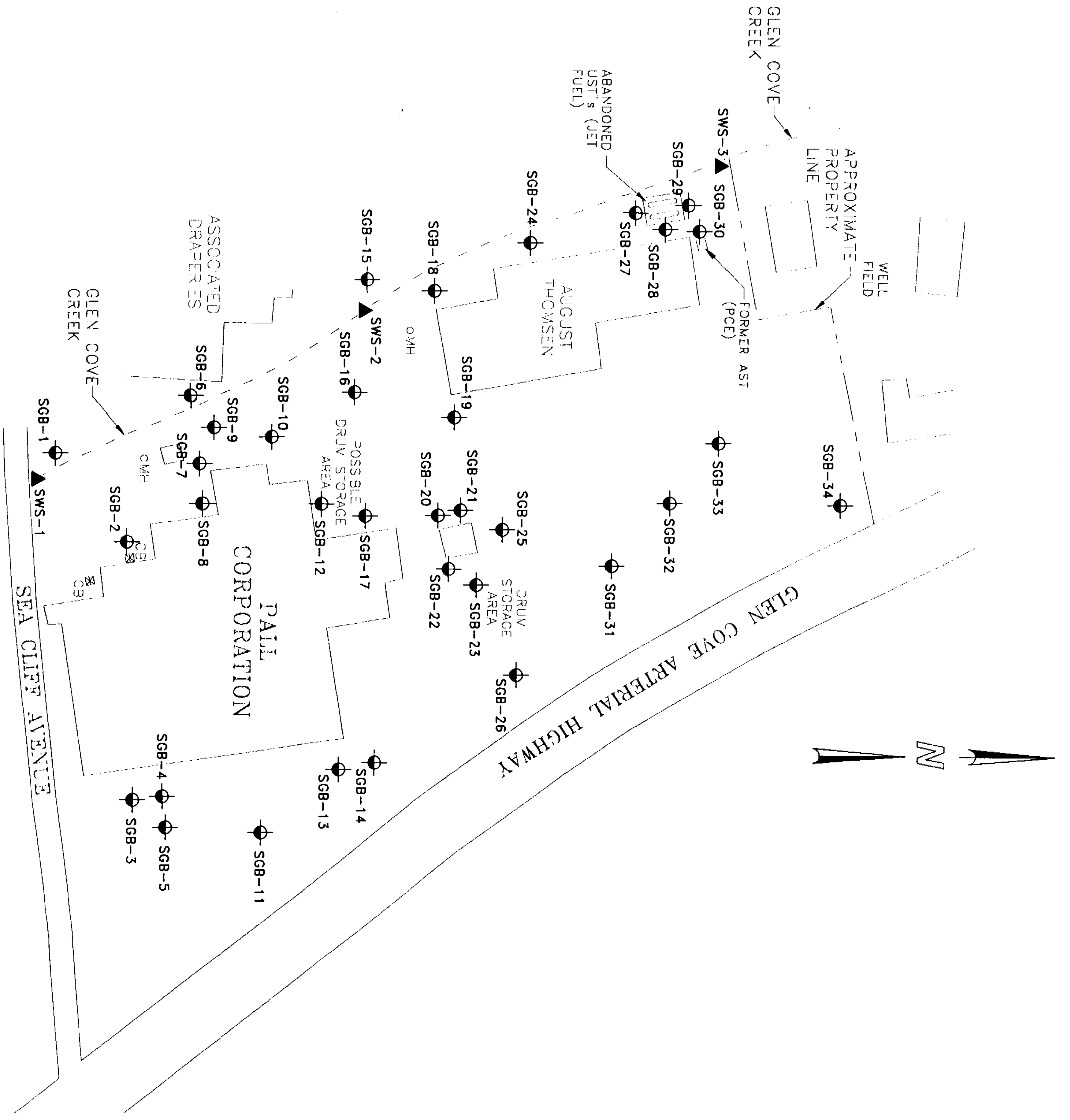
PALL CORPORATION
FOCUSED RI/FS
GLEN COVE, NEW YORK

WORK PLAN

EXISTING MONITORING WELL AND PROPOSED PIEZOMETER LOCATION PLAN

PROJECT No.
55189

FIGURE No.
3



LEGEND:

SGB-1	APPROXIMATE LOCATION AND DESIGNATION OF PROPOSED "SHALLOW" GEOPROBE SOIL BORING. DEPTH OF THE GEOPROBE TO BE BASED ON FINDINGS IN THE "DEEP" GEOPROBE SOIL BORINGS.
▲ SWS-1	APPROXIMATE LOCATION AND DESIGNATION OF PROPOSED SURFACE WATER AND SEDIMENT SAMPLE

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "PALL CORPORATION/AUGUST THOMSON: SITE PLAN", PREPARED BY GROUNDWATER TECHNOLOGY, DATED 12/20/95.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

REV No.	DESCRIPTION

BY | DATE

PALL CORPORATION
FOCUSED RI/FS
GLEN COVE, NEW YORK

WORK PLAN

PROPOSED "SHALLOW" GEOPROBE AND SURFACE WATER SAMPLE LOCATION PLAN

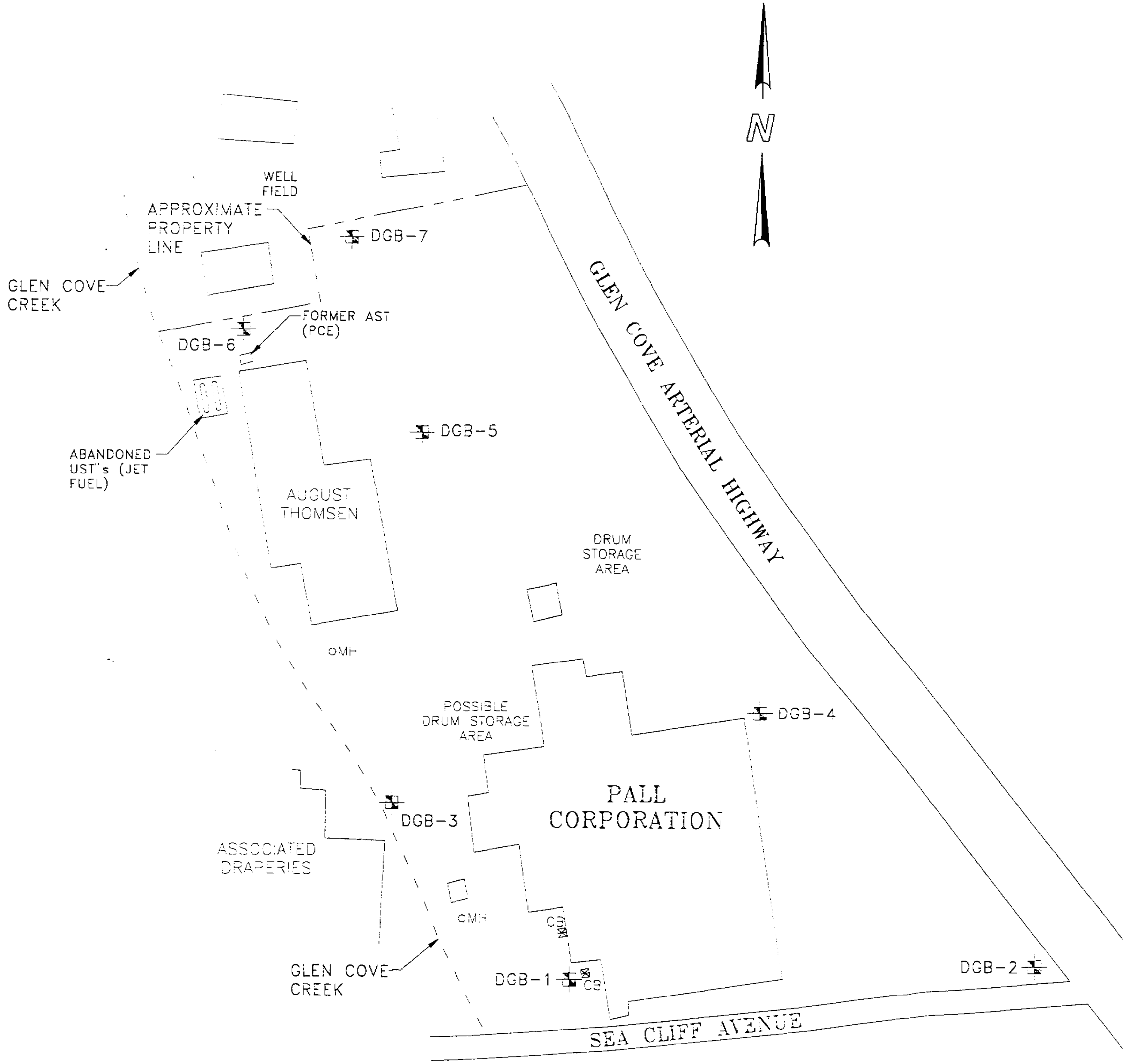
SCALE IN FEET
0 50 100 200

DRAWN BY: DEW
DATE: DECEMBER 1997

GZA GeoEnvironmental of New York

PROJECT No. 55189

FIGURE No. 4



LEGEND:

DGB-1	APPROXIMATE LOCATION AND DESIGNATION OF PROPOSED "DEEP" GEOPROBE SOIL BORING. 3 BORINGS TO BE COMPLETED AT EACH LOCATION TO NOMINAL DEPTHS OF 20, 40 AND 60 FEET DEEP. THE TOTAL DEPTH OF THE DEEP GEOPROBE BORING WILL BE DETERMINED BASED ON THE SITE CONDITIONS.

NOTES:

1. BASE MAP ADAPTED FROM A PLAN ENTITLED, "PALL CORPORATION/AUGUST THOMSON; SITE PLAN", PREPARED BY GROUNDWATER TECHNOLOGY, DATED 12/20/95.
2. THE SIZE AND LOCATION OF EXISTING SITE FEATURES SHOULD BE CONSIDERED APPROXIMATE.

REV No.	DESCRIPTION	BY	DATE

DRAWN BY: DEW
DATE: DECEMBER 1997

GZA GeoEnvironmental of New York

SCALE IN FEET
0 50 100 200

PALL CORPORATION
FOCUSED RI/FS
GLEN COVE, NEW YORK

WORK PLAN

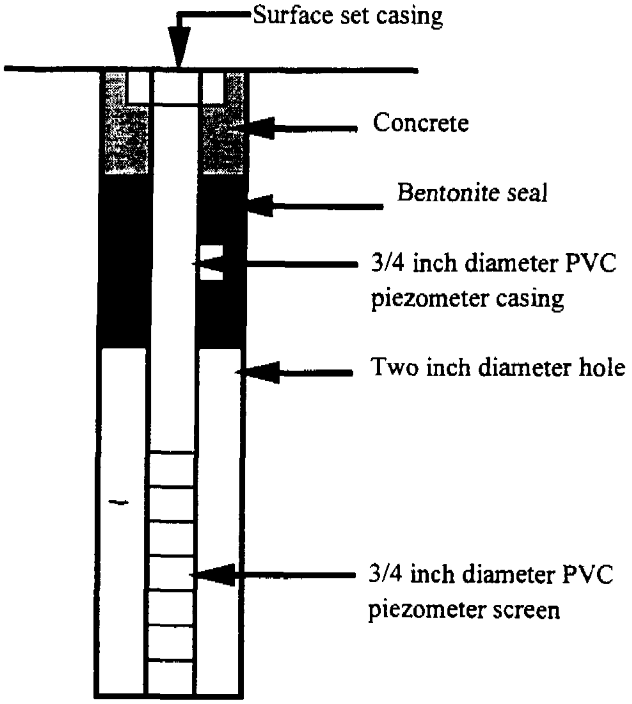
PROPOSED "DEEP" GEOPROBE SOIL BORING LOCATION PLAN

PROJECT No.
55189

FIGURE No.
5

FIGURE 6
PALL CORPORATION
FRI/FS
GLEN COVE, NEW YORK

PIEZOMETER SCHEMATIC



Note: Not to scale

GZA

APPENDIX A

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
SOIL DESCRIPTION PROCEDURE

[illegible]

STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION
RAYMOND T. SCHULER, COMMISSIONER

SOIL DESCRIPTION PROCEDURE

OFFICIAL ISSUANCE NO. 7.41-5STP 2/75

SOIL MECHANICS BUREAU
SOIL TEST PROCEDURE STP-2

MAY 1, 1973

O:

ENGINEERING BULLETIN

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: ADDENDUM TO STP-2, SOIL DESCRIPTION PROCEDURE

Subject Code 7.41-5 STP2/75

istribution: [30] Main Office [32] Regions ☐ Special

Code: EB 88-17

Date: May 5, 1988

Supersedes:

PPROVED:

Wesley P. Moody, Director, Soil Mechanics Bureau

This Engineering Bulletin Expires N/A

Effective immediately, add the following to page 10 of STP-2, SOIL DESCRIPTION PROCEDURE, dated May 1, 1975:

RULES FOR WRITING THE WORD PICTURE

The primary component is to be written in all capital letters; the color and all other components have only the first letter written in capitals. The apparent moisture and plasticity abbreviations are written in all capital letters.

e.g. Gray Silty CLAY, Sandy M-PL

This format is to be used whenever a visual description is used on Departmental forms or in other written communications such as memorandums, reports, drawings, etc.

INTRODUCTION

This manual presents a procedure for describing soil samples obtained for earth and foundation engineering purposes by the New York State Department of Transportation. The procedure involves visually and manually examining soil samples with respect to texture, plasticity and color. A method is presented for preparing a "word picture" of a sample for entering on a subsurface exploration log or other appropriate data sheet. The procedure applies to soil descriptions made in the field or laboratory.

It should be understood that the soil descriptions are based upon the judgment of the individual making the description. Classification tests are not intended to be used to verify the description, but to provide further information for analysis of soil design problems or for possible use of the soil as a construction material.

It is the intent of this system to describe only the constituent soil sizes that have a significant influence on the visual appearance and behavior of the soil. This description system is intended to provide the best word description of the sample to those involved in the planning, design, construction, and maintenance processes.

DEFINITION OF TERMS

Boulder - A rock fragment, usually rounded by weathering or abrasion, with an average dimension of 12 inches or more.

Cobble - A rock fragment, usually rounded or subrounded, with an average dimension between 3 and 12 inches.

Gravel - Rounded, subrounded, or angular particles of rock that will pass a 3 inch square opening sieve (76.2 mm) and be retained on a Number 10 U.S. standard sieve (2.0 mm).

(The term "gravel" in this system denotes a particle size range and should not be confused with "gravel" used to describe a type of geologic deposit or a construction material.)

Sand - Particles that will pass the Number 10 U.S. standard sieve and be retained on the Number 200 U.S. standard sieve (0.074 mm).

*Silt - Material passing the Number 200 U.S. standard sieve that is nonplastic and exhibits little or no strength when dried.

*Clay - Material passing the Number 200 U.S. standard sieve that can be made to exhibit plasticity (putty like property) within a wide range of water contents and exhibits considerable dry strength.

Fines - The portion of a soil passing a Number 200 U.S. standard sieve.

Marl - Unconsolidated white or dark gray calcium carbonate deposit.

Muck - Finely divided organic material containing various amounts of mineral soil.

Peat - Organic material in various stages of decomposition.

Organic Clay - Clay containing microscopic size organic matter. May contain shells and/or fibers.

Organic Silt - Silt containing microscopic size organic matter. May contain shells and/or fibers.

*Note - When applied to gradation test results, silt size is defined as that portion of the soil finer than the No. 200 U.S. standard sieve and coarser than 0.002 mm. Clay size is that portion of soil finer than 0.002 mm. For the visual-manual procedure the identification will be based on plasticity characteristics.

Coarse-Grained Soil - Soil having a predominance of gravel and/or sand.

Fine-Grained Soil - Soil having a predominance of silt and/or clay.

Mixed-Grained Soil - Soil having significant proportions of both fine-grained and coarse-grained sizes.

VISUAL - MANUAL IDENTIFICATION

Gravel - Identified by particle size. The particles may have an angular, rounded, or subrounded shape. Gravel size particles usually occur in varying combinations with other particle sizes.

Sand - Identified by particle size. Gritty grains that can easily be seen and felt. No plasticity or cohesion. Size ranges between gravel and silt.

Silt - Identified by behavior. Fines that have no plasticity. May be rolled into a thread but will easily crumble. Has no cohesion. When dry, can be easily broken by hand into powdery form.

Clay - Identified by behavior. Fines that are plastic and cohesive when in a moist or wet state. Can be rolled into a thin thread that will not crumble. When dry, forms hard lumps which cannot be readily broken by hand.

Clay is often encountered in combination with other soil sizes. If a sample exhibits plasticity or cohesion it contains clay. The amount of clay can be related to the degree of plasticity or cohesiveness; the higher the clay content the greater the plasticity.

Marl - A white or gray calcium carbonate paste. May contain granular spheres, shells, organic material or inorganic soils. Reacts with weak hydrochloric acid.

Muck - Black or dark brown finely divided organic material mixed with various proportions of sand, silt, and clay. May contain minor amounts of fibrous material such as roots, leaves, and sedges.

Peat - Black or dark brown plant remains. The visible plant remains range from coarse fibers to finely divided organic material.

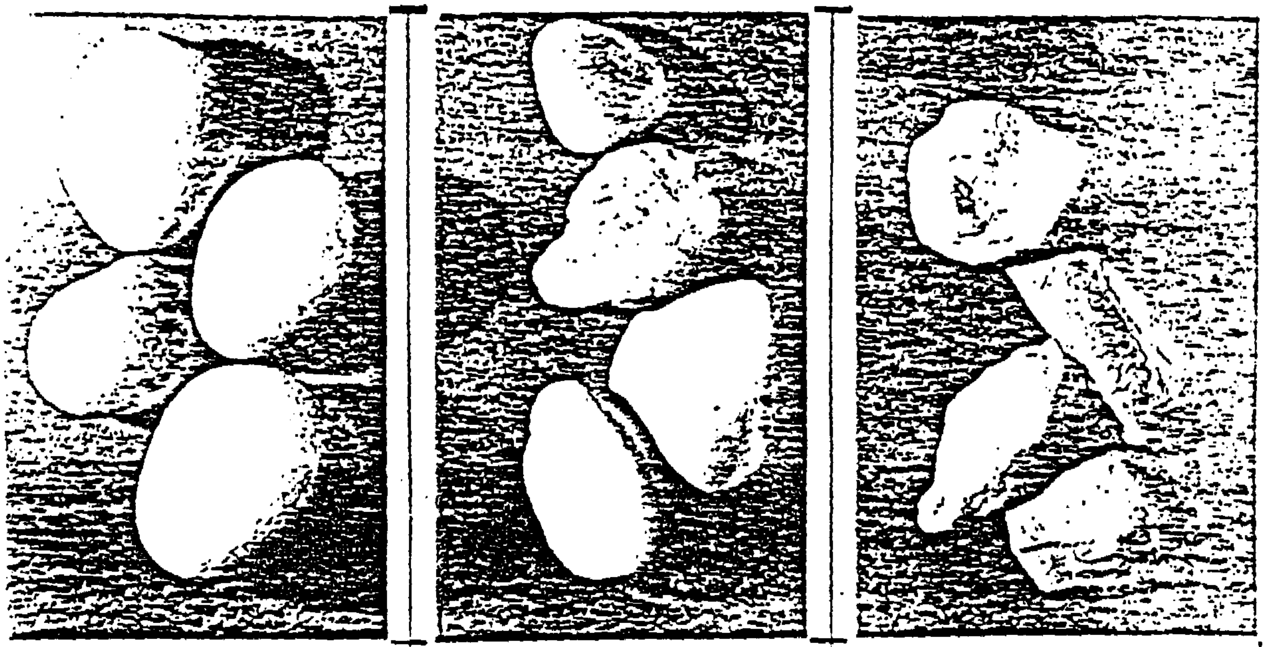
Organic Clay - Dark gray clay with microscopic size organic material dispersed throughout. May contain shells and/or fibers. Has weak structure which exhibits little resistance to kneading.

Organic Silt - Dark gray silt with microscopic size organic material dispersed throughout. May contain shells and/or fibers. Has weak structure which exhibits little resistance to kneading.

Fill - Man-made deposits of natural soils and/or waste materials. Document the components carefully since presence and depth of fill are important engineering considerations.

BOULDER		COBBLE		GRAVEL				SAND				SILT		CLAY
				Coarse		Fine		Coarse		Fine				
SIEVE SIZES	12"		3"		1"		#10		#40		#200			
PARTICLE SIZE - mm	304.8		76.2		25.4		2.00		0.42		0.074		0.002	

PARTICLE SIZE LIMITS



ROUNDED SUBROUNDED ANGULAR

EXAMPLES OF PARTICLE SHAPES

IDENTIFICATION PROCEDURE CHART

COARSE-GRAINED SOILS
(Identify by Size of Particle)

BOULDERS
Greater than 12"

COBBLES
12" to 3"

GRAVEL
3" to No. 10
Coarse - 3" to 1"
Fine - 1" to No. 10

SAND
No. 10 to No. 200
Coarse - No. 10 to No. 40
Fine - No. 40 to No. 200

FINE-GRAINED SOILS
(Identify by Behavior-Individual Particles Not Visible)

SILT

1) Nonplastic
2) Powders easily when dry
3) Dries rapidly
4) Free water appears when shaken
5) Wire cut surface - rough

CLAY

1) Plastic, acts like putty when moist and wet
2) High dry strength
3) Dries slowly - sticky
4) No free water when shaken
5) Wire cut surface - smooth

MIXED-GRAINED SOILS

Significant proportions of coarse-grained and fine-grained sizes. Make judgment on whether fine-grained or coarse-grained predominates in behavior.

ORGANIC SOILS

(Identify by Appearance, Behavior, Color, etc.)

PEAT

MUCK

MARL

ORGANIC SILT

ORGANIC CLAY

SOIL SAMPLE IDENTIFICATION PROCEDURE

1st Decision -

Is sample coarse-grained, fine-grained, mixed-grained or organic?

If mixed-grained, decide whether coarse-grained or fine-grained predominates.

2nd Decision -

What is principal component?

Use as noun in soil description.
Example: Sand

3rd Decision -

What is secondary component?

Use as adjective in soil description.
Example: Silty Sand

4th Decision -

Are there additional components?

Use as additional adjective.
Example: Silty Sand, Gravelly

EXAMPLES OF DESCRIPTIONS OF THE SOIL COMPONENTS

Sand - Describes a sample that consists of both fine and coarse sand particles.

Gravel - Describes a sample that consists of both fine and coarse gravel particles.

Silty Fine Sand - Major component fine sand, with nonplastic fines.

Sandy Gravel - Major component gravel size, with fine and coarse sand. May contain small amount of fines.

Gravelly Sand - Major component sand, with gravel. May contain small amount of fines.

Gravelly Sand, Silty - Major component sand, with gravel and nonplastic fines.

Gravelly Sand, Clayey - Major component sand, with gravel and plastic fines.

Sandy Gravel, Silty - Major component gravel size, with sand and nonplastic fines.

Sandy Gravel, Clayey - Major component gravel size, with sand and plastic fines.

Silty Gravel - Major component gravel size, with nonplastic fines. May contain sand.

Clayey Gravel - Major component gravel size, with plastic fines. May contain sand and silt.

Clayey Silt - Major component silt size, with sufficient clay to impart plasticity and considerable strength when dry.

Silty Clay - Major component clay, with silt size. Higher degree of plasticity and higher dry strength than clayey silt.

The above system may be expanded where necessary to provide meaningful descriptions of the sample.

Examples:

Shale fragments - Cobble and gravel size, silty

Decomposed rock - Gravel size

OTHER INFORMATION FOR DESCRIBING SOILS

1. COLOR OF THE SAMPLE - Brown, Gray, Red, Black, etc.

2. MOISTURE CONDITION - Dry, Moist, Wet. Judge by appearance of sample before manipulating.

3. PLASTICITY - Plastic, Low Plastic, Nonplastic. Note: Sample must be in moist or wet condition for plasticity determination. For dry samples requiring wetting make note in description. Example - "plastic (low or nonplastic) when wet."

   Plasticity not required for marl, muck and peat.

4. STRUCTURE - Fissured, Blocky, Varved, Layered. (Indicate approximate thickness of layers) The description of layering for coarse-grained soils must be made from field observations before sample is removed from sampler.

5. PARTICLE SHAPE - Angular, Rounded, Subrounded

6. Other words, phrases, notes or remarks that will add to the meaningfulness of the complete soil description.

PREPARING THE WORD PICTURE

The word-picture is the description of the soil sample as determined by the visual-manual procedure. Where applicable, the following are to be included in the word-picture:

PERTINENT INFORMATION	EXAMPLE
1. Color of the sample	Brown
2. Description of Soil Components	Silty Gravel
3. Moisture Condition	moist
4. Plasticity	nonplastic
5. Structure	
6. Particle shape	angular
7. Other	cemented

The written description for the given example is:
Brown Silty angular Gravel, moist, nonplastic, cemented

EXAMPLES OF COMPLETE SOIL DESCRIPTIONS

Light Gray Silty Clay, moist, plastic, with 1/2 inch layers of wet, gray Silt, nonplastic

Red brown Clayey Silt with 1/4 inch layers of Silty Clay, moist, plastic

Brown Silty fine Sand, wet, nonplastic

Gray Sandy rounded Gravel, dry, nonplastic

Gray Sandy angular Gravel, Clayey, moist, low plastic

Dark Brown Silty Sand, wet, nonplastic

Red Brown Sand, dry, nonplastic, with roots

Fill - Brown Sandy subrounded Gravel, with pieces of brick and cinders, wet, nonplastic

Fill containing cinders, paper, garbage, and glass, wet

Dark Gray Organic Clay, with shells and roots, moist, plastic

Light Brown Sand, wet, nonplastic

Gray Clayey Sand with angular Gravel, moist, low plastic

Black Sandy Muck, wet

Dark brown fibrous Peat, wet

Dark brown Peat, wet

TRAINING SUGGESTIONS

The following sequence is suggested for training personnel in the use of the system:

1. Learn definition of terms (pages 1 and 2).

2. Provide individual samples of gravel, sand and silt and clay. Include complete range of sizes for gravel and sand. This allows visual calibration of size limits of coarse-grained soils and experience in identifying fine-grained soils by behavior. Refer to visual-manual identification (pages 3 and 4) and Identification Procedure (pages 5 and 6).

3. Provide coarse-grained and fine-grained samples to practice identification and description of soil components.

4. Provide mixed-grained samples for identification and procedure.

5. Provide organic soils for description.

APPENDIX B

FIELD FORMS

GZA GEOENVIRONMENTAL OF NEW YORK
364 NAGEL DRIVE, BUFFALO, NEW YORK

ENGINEERS AND SCIENTISTS

PROJECT
Pall Corporation
Glen Cove, New York

BORING No.
SHEET 1 OF 1
FILE No.
CHECKED BY :

CONTRACTOR
DRILLER
START DATE END DATE
BORING LOCATION
GROUND SURFACE ELEVATION DATUM
GZA GEOENVIRONMENTAL REPRESENTATIVE

WATER LEVEL DATA

DATE	TIME	WATER	CASING	NOTES

TYPE OF DRILL RIG
Geoprobe Drilling Methodology

DEPTH	SAMPLE					SAMPLE DESCRIPTION	EQUIPMENT DESCRIPTION		OVM (ppm)
		NO.	DEPTH (FT)		RECOVERY (%)				
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									

NOTES:

General Notes:
1) Stratification lines represent approximate boundary between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

File: 55189

Page:

Pall Corporation

Summary of Field Groundwater Quality Measurements

Well Identification

Monitoring Well :

Installation Date:

Installed By:

Well Elevation

Ground Surface Elevation:

Protective Casing Elevation:

Monitoring Point Elevation:

Elevation Datum:

Well Construction

Riser/Screen Material:

Top of Intake Depth:

Bottom of Intake Depth:

Date	Time	Depth to Water	Cumulative Volume Purged	pH (Standard Units)	Specific Conductance (mhos/cm)	Temperature (^{o}C)	Turbidity (NTU)	Color	Notes

File: 55189 Page:

Pall Corporation
Hydraulic Conductivity Test - __________

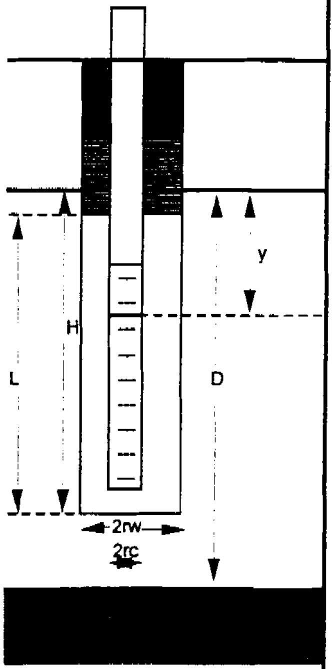
Well Identification		Test Information		Well Construction	
Monitoring Well :		GZA Representative:		Top of Intake Depth:	
Installation Date:		Test Date:		Bottom of Intake Depth:	
Installed By:		Weather Conditions:		Screened Zone:	
				Confined/Unconfined	

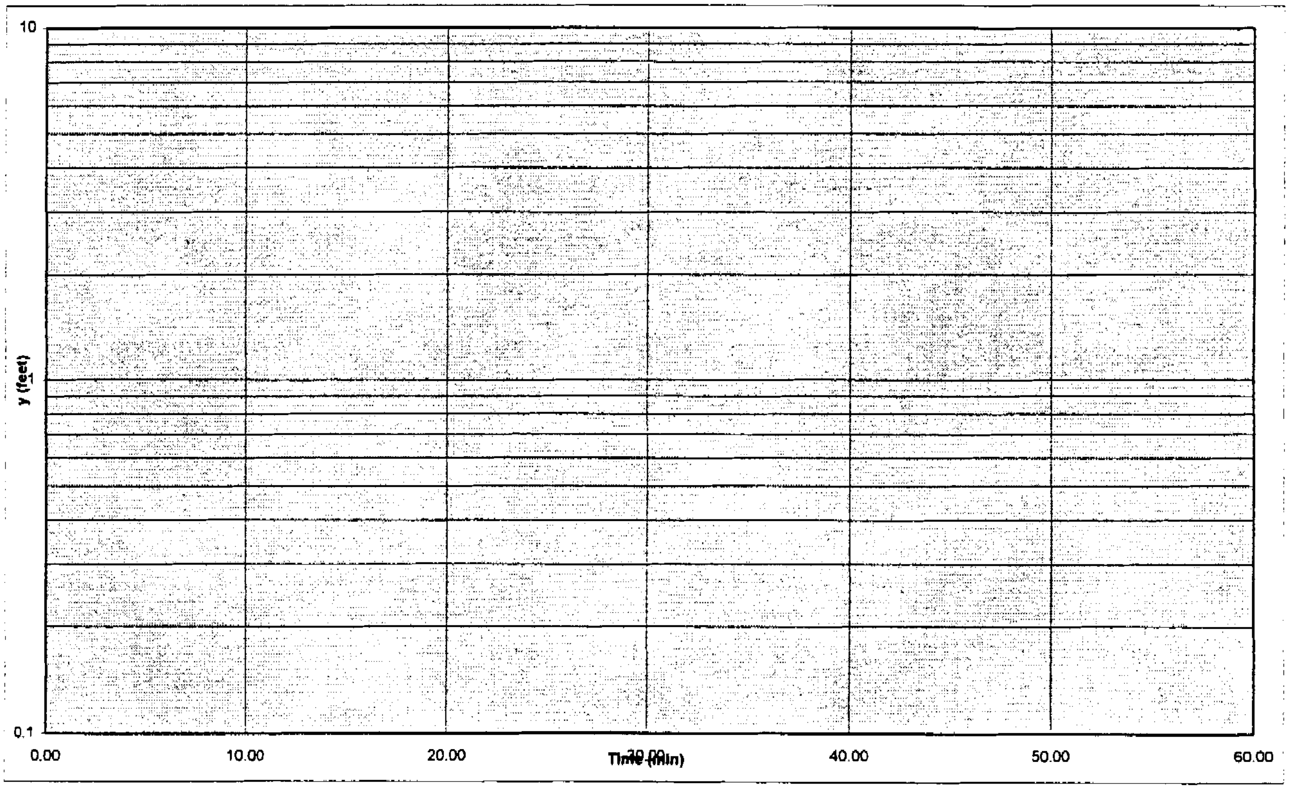
Test Data

Time (hr/min/sec)			Time (min)	Water Level (feet)	Drawdown = y (feet)

Well Configuration

L (ft) =	
H (ft) =	
D (ft) =	
rw (ft) =	
rc (ft) =	





File: 55189

Page:

Pall Corporation

Existing Well Assessment -

Historic Information

Boring Log Available (yes/no/attached):

Installation Log Available (yes/no/attached)

Summary

Monitoring Well :

Installation Date:

Installed By:

Ground Surface Elevation:

Protective Casing Elevation:

Monitoring Point Elevation:

Elevation Datum:

Riser/Screen Material:

Top of Intake Depth:

Bottom of Intake Depth:

Previous Field measurement Information Available (yes/no/attached)

Ranges of Previous Field Measurements

Depth to Water (ft)	pH (Standard Units)	Specific Conductance (uMhos/cm)	Temperature (°C)	Turbidity (NTU)	Color

Notes:

Field Observations

Exterior Observations:

Interior Observations

Signs of Damage/Tampering:

Locked (yes/no)	Well Cap (yes/no)	Surface Seal Intact (yes/no)	PID Measurement:	Odors:

Well Development

Date	Time	Depth to Water	Cumulative Volume Purged	pH (Standard Units)	Specific Conductance (uMhos/cm)	Temperature (°C)	Turbidity (NTU)	Color	Notes

File: 55189

Page

Pall Corporation
Sample Collection Log

Sample Identification

Sample Location
Sample Type
Sample Code
Date
Time
GZA Representatives:

Miscellaneous

Weather Conditions
Chain-of-Custody Completed (yes/no)
Sample Containers Labeled (yes/no)
Shipping Containers Sealed (yes/no)
Trip Blank Identification
Field Blank Identification

General

Sample Collection Equipment

Decontamination Procedure

Sample Collection Procedure

Field Measurement Equipment Used and Calibration Information

pH
Specific Conductance
Temperature
Turbidity
Other Equipment

Requested Testing

Container	Preservative	TCL VOCs	TCL Semi-VOCs	TCL PCBs	TCL Pesticides	TAL Metals														

Summary of Field Measurements

Depth to Water	Cumulative Volume Purged	pH (Standard Units)	Specific Conductance (uMhos/cm)	Temperature (°C)	Turbidity (NTU)	Other

Notes

COMPUCHEM
ENVIRONMENTAL
a division of Liberty Analytical Corp.

CHAIN-OF-CUSTODY RECORD

No. 01605

1-1-98
~~4600 Silicon Drive~~ 501 Madison Ave
~~Durham, NC~~ 27703 Cary, NC 27513
~~1-800-833-5097~~ 919-379-4000

Ship to:	Project Name:	Field Point-of-Contact:
	Sampler Name:	Telephone No.: Sampling for project complete? Y or N (See Note 1)
Carrier: Airbill No.:	Sampler Signature:	Project-specific (PS) or Batch (B) QC: ______

BOX #1 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil / Sediment / Sludge 6. Trip Blank 7. Oil 8. Waste 9. Other ______	**Box #2:** A. HCl B. HNO_3 C. $NaHSO_4$ D. $Na_2S_2O_3$ E. Ice Only O. Other ______ N. Not Preserved	**Box #3:** F. Filtered U. Unfiltered	**Box #4:** C. CLP 3/90 S. SW-846 W. CWA 600-series L. Low Conc. CLP R. Radiological T. TCLP O. Other ______	**Box #5:** H. - High M. - Medium L. - Low

			Box #1	**Box #2**	**Box #3**	**Box #4**	**Box #5**			**Organic Analysis**							**Inorganics**				**Other**						
Sample ID (Organics: 9 characters max, Inorganics: 6 characters; See Note 2)	Date: Year: 19___	Time	Matrix	Preservative	Filtered/Unfiltered	Method	Expect. Conc.	No. of Bottles	Use for Lab QC (MS or DUP)	VOA-GC / MS	SV-GC / MS	Pest / PCB-GC	Herb-GC	VOA-GC			Metals	Mercury	Cyanides		Radiologicals		TOC / TOX	O&G / TPH	Phenols	Other	**Remarks / Comments**
	/	:																									
	/	:																									
	/	:																									
	/	:																									
	/	:																									
	/	:																									
	/	:																									
	/	:																									
	/	:																									
	/	:																									

Client's Special Instructions:

Lab: Received in Good Condition? Y or N **Describe Problems, If Any:**

#1 Relinquished By: (Sig)	Date:	#2 Relinquished By: (Sig)	Date:	#3 Relinquished By: (Sig)	Date:	Sample storage time requested? ______ (In days, see Note 3)
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:	
#1 Received By: (Sig.)	Date:	#2 Received By: (Sig.)	Date:	#3 Received By: (Sig.)	Date:	DESTROY or RETURN data after five years of archival? (Circle choice; see Note 4)
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:	

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now. **Note (2):** If CLP Inorganics diskette required, ID limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. **Note (4):** All lab copies of data destroyed after five years unless client requests and pays for return of copies; annual storage fee billed in January of year six.

pH Meter Calibration Worksheet

Project:	**GZA File :**
Location:	**Sample Collection Date:**

pH Meter Model:

Calibration (1)

Date	Set Points (2) (pH units)	Target Value (3) (pH units)	Actual Reading (4) (pH units)	Analyst's Initials	Remarks

Notes:

1) These calibrations were done in accordance with the NYSDOH's Environmental Laboratory Approval Program (ELAP manual, item 231 revised as of April 1, 1986).

2) For a one point calibration, the set point is the pH of the standard buffer solution used to initially calibrate the meter. For a two point calibration, the set points are the pH of the standard buffers used to calibrate the slope of the pH meter.

3) For a one point calibration, the target values are the pH of the standard buffers used to check the slope of the pH meter. For a two point calibration, the target value is the pH of the standard buffer used to check the initial calibration.

4) The accepted accuracy for the readings using a one point calibration is +/- 0.2 pH units. The accepted accuracy for the actual reading using a two point calibration is +/- 0.05 pH units of the target value.

Conductivity Meter Calibration Worksheet

Project:	**GZA File :**
Location:	**Sample Collection Date:**

Conductivity Meter Model:

Calibration (1)

Date	Temperature (C)	Target Value (2) (uMhos/cm)	Actual Reading (uMhos/cm)	Analyst's Initials	Remarks

Notes:

1) Calibrations done in accordance with manufacturers recommendations and are completed by adjusting the meter to a standard of known specific conductance. The standard is selected to be as close to the sample measurement as possible.
2) Target value is the specific conductance of the standard solution.

Turbidity Meter Calibration Worksheet

Project:	**GZA File :**
Location:	**Sample Collection Date:**

Turbidity Meter Model:

Calibration (1)

Date	Target Value (2) (uMhos/cm)	Actual Reading (uMhos/cm)	Analyst's Initials	Remarks

Notes:

1) Calbration done in accordance with manufacturers recommendations.
2) Target value of standards provided by manufacturer.

Thermometer Calibration Worksheet

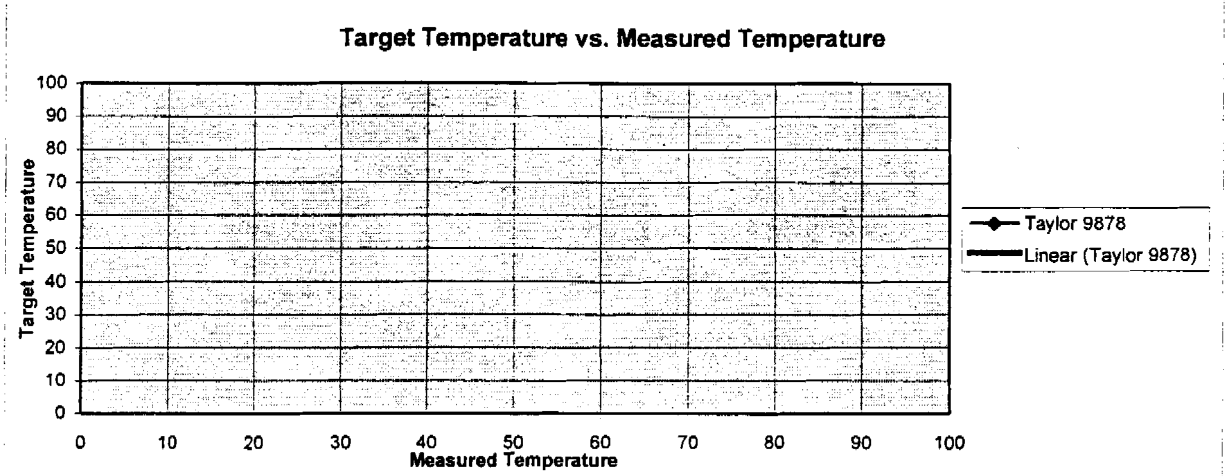
Project: **GZA File :**

Location: **Sample Collection Date:**

Thermometer Model:

Calibration (1)

Date	Target Temperature (C)	Observed Temperature (C)	Analyst's Initials	Remarks



Notes:

1) These calibrations were done in accordance with the NYSDOH's Environmental Laboratory Approval Program (ELAP manual, item 231 revised as of April 1, 1986).
2) Target temperature is the temperature of the National Bureau of Standards (NBS) traceable thermometer. The NBS thermometer was certified on July 11, 1985 and checked at the ice point on September 19, 1988.
3) The observed tempertature is the tempeature of the calibrated thermometer.
4) The correction factor of the calibrated thermometer is:

Corrected tamperature =1.0467 X Observed Temperature -0.8587