COLUMBIA CEMENT COMPANY, INC.
159 HANSE AVENUE
FREEPORT, NEW YORK 11520

SITE # 1-30-052

PHASE I WORK PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

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1.0 INTRODUCTION

1.1 PURPOSE

This document presents a work plan for implementation of a Phase I remedial investigation/feasibility study (RI/FS) for Burmah Castrol (BC) at the Columbia Cement Co., (CCC) site (Site No. 1-30-052) located at 159 Hanse Avenue, Freeport, New York (Figure 1). This RI/FS has been focused on residual impacts due to an April, 1988 spill of 1,1,1-trichloroethane (TCA) which occurred when a delivery truck ruptured at the site. An initial Focused Subsurface Investigation (FSI) performed as part of a property transaction has been completed, the results of which are presented in a report dated July 1997. The July 1997 FSI report was not performed with New York State Department of Environmental Conservation (NYSDEC) oversight. BC entered into a Consent Agreement (Index #W1-0813-98-05) with the NYSDEC on May 29, 1998 to develop and implement an inactive hazardous waste disposal site remedial program for the Site that shall include a Remedial Investigation/Feasibility Study (RI/FS), design and implementation of the selected remedial alternative, and operation, maintenance and monitoring of the selected remedial alternative.

The Phase I RI/FS work plan presented herein describes field activities to be performed during the Phase I RI to confirm data gathered during the FSI and address additional data requirements. Where applicable, data gathered during the FSI will be presented in the RI report. Section 3.0 of this work plan describes procedures for the evaluation of remedial technologies and alternatives that will be developed during the FS.

A Field Health and Safety Plan (FHSP), Sampling and Analysis Plan (SAP) and a Citizen's Participation Plan (CPP) have been developed by Delaware Engineering, P.C. (Delaware) and are provided under separate cover. The site-specific FHSP is intended to ensure the health and safety of workers and the immediate community during performance of the RI. The SAP contains both a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). It outlines data quality objectives and details the specific sampling procedures and the relevant sampling and analytical protocols to ensure that the data collected during the RI are of sufficient quality to support remedial decisions. The CPP outlines activities to ensure adequate involvement of the community in the remedial process.

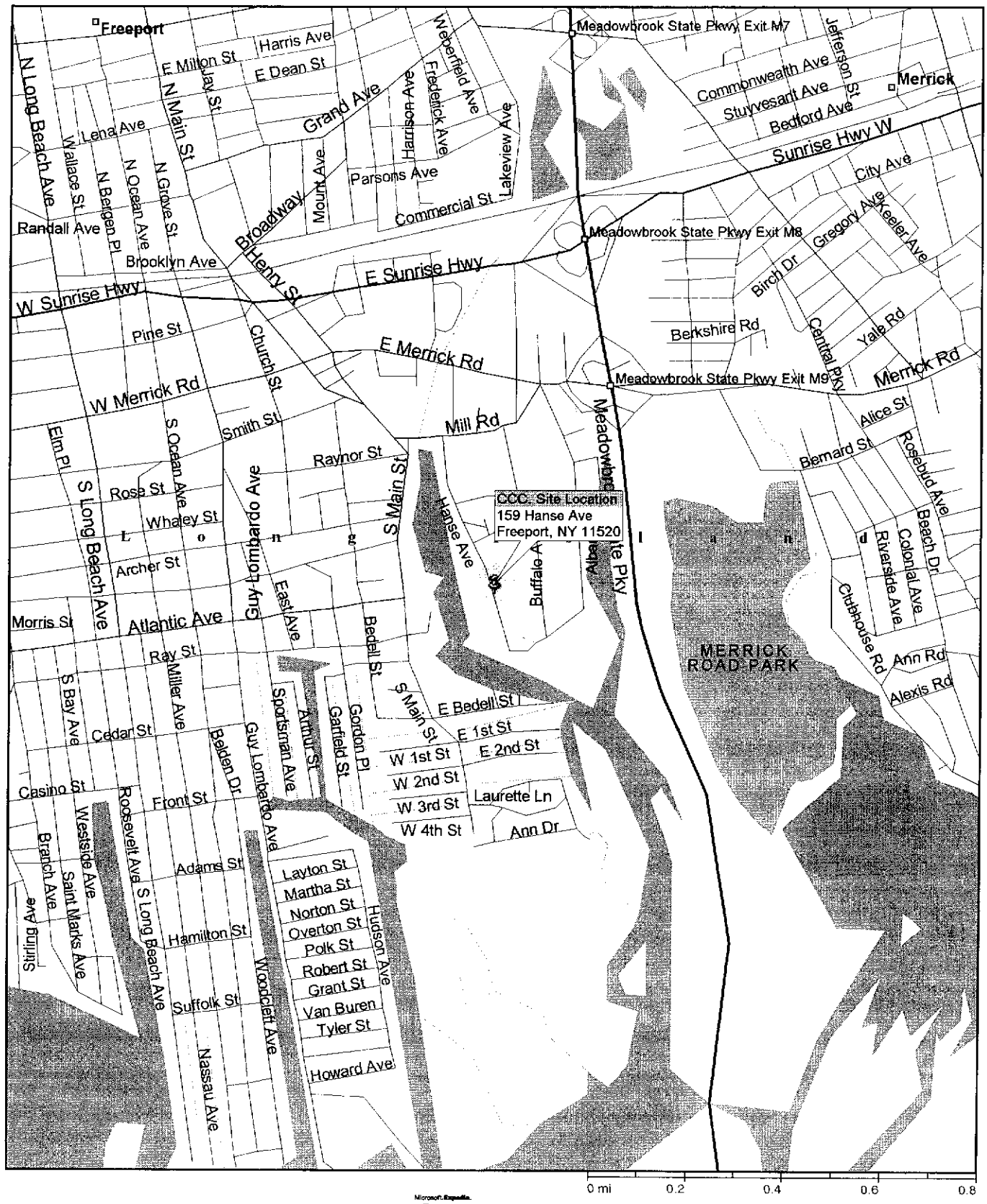
1.2 SITE DESCRIPTION

The approximately two-acre site is located in an extensively developed industrial and commercial area in the Village of Freeport, Nassau County, New York. Site geographic coordinates are 40°38' 45" North latitude and 73°34' 21" West longitude.

On a regional scale, the Site is situated approximately 4,000 feet south of the Sunrise Highway and 2,000 feet west of the Meadowbrook State Parkway. Locally, the Site is east and north of Hanse Avenue, south of Rider Place and west of Buffalo Avenue Extension (Figure 1).

Industrial and commercial facilities bordering the Site include a Columbia Cement warehouse to the north, Lea Ronal Specialty Chemicals Worldwide (224-272 Buffalo Avenue Ext.) to the east, the

Figure 1 Columbia Cement Site Location



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Knickerbocker building to the south and Farber Plastics (162 Hanse Avenue) to the west. The Site is located approximately 500 feet east of the Freeport Creek, approximately 1,000 feet to the west of the Stadium Park Canal (also referred to as the Merrick River), and 4,000 feet to the northwest of Merrick Bay on the southeast shore of Long Island. The local storm-water drainage system, serving CCC, discharges into Freeport Creek approximately 1,000 feet northwest of the Site.
The Site is very flat, sloping gently from north to south, with all elevations greater than 5 feet and less than 10 feet above mean sea level. A survey benchmark was established by Rust Environment & Infrastructure (Rust) on utility pole F34, located along the middle of the eastern property line, and an assumed datum of 100.00 was applied. The range of elevations encountered at the Site is 97.63 to 99.07 feet.

CCC manufactured various grades of contact cement and other industrial/commercial adhesives at this location since 1969. The property is currently owned by Illinois Tool Works. The main building is improved with office space, a mill room, two mixing rooms, two filling rooms, two storage rooms, a hazardous waste containment area, a small warehouse/reuse station, a temporary storage area and an unloading/loading area. Fifteen-foot wide ingress and egress easements are located along the northern and southern property boundaries. A parking lot for employees is located west of the building. The southeastern portion of the Site is paved and serves as an unloading and storage area for process chemicals. Ten 8,000-gallon underground storage tanks (USTs) are present in this area.

1.3 SITE HISTORY

The Village of Freeport operated a municipal landfill within this area of Freeport prior to its development for commercial/industrial use. Representatives of the Village of Freeport indicate that the land filling ceased in the 1960's, and that development of this portion of Freeport began soon thereafter. The CCC operations are the first and only commercial/industrial activity at the Site since the land filling ceased.

Spill Incident

On April 28, 1988, Quadrel Brothers of Rahway, New Jersey delivered approximately 3,500 gallons of TCA to the Site. During delivery, the truck became over pressurized causing the tanker to buckle. As a result, TCA spilled onto the adjacent pavement. The NYSDEC was promptly notified, and emergency response to the spill incident was provided by NYSDEC's Region 1 Spill Response Unit.

The remaining material in the tank trailer (1,740 gallons of TCA) was drained into 55-gallon drums while the spilled material (approximately 1,760 gallons) flowed towards an on-Site dry well. As a result, some entered a storm sewer outlet. The storm water sewerage system ultimately drains into Freeport Creek approximately 1,000 feet to the northwest of the TCA Spill Area. Immediate clean-up activities consisted of: 1) Removing liquid and approximately ten yards of soil from the noted dry well and 2) Removing liquid material from the Village of Freeport storm drain system. The drainage system was purged until sampling results showed concentrations of TCA below 50 parts per billion (ppb). At this time, three exploratory soil borings were advanced and one shallow overburden

monitoring well was installed. Split spoon samples taken from two of the borings revealed TCA concentrations in soil ranging from 67 parts per million (ppm) to 42,649 ppm.

Following the TCA Spill, a new (northern) underground tank farm, comprised of five 8000-gallon tanks, was installed to the north of the aforementioned dry well/storm water basin. After completion of the northern underground tank farm installation, a concrete pad was installed over the northern and southern tank farms. In February of 1989, the concrete pad was removed and replaced with a thicker concrete pad because of cracking noted in the original pad.

1.4 PRIOR INVESTIGATION ACTIVITES

Relevant site conditions and activities, which occurred prior to the 1997 FSI, are summarized below:

- Between 1969 and 1988, there were twenty-two (22) 1,000 gallon underground storage tanks (USTs) located in the southeastern part of the Site. According to Site files, six (6) USTs were used to store toluene, six (6) stored hexane, five (5) stored acetone, three (3) stored Laktane™ (a petroleum-based solvent) and two (2) stored methyl ethyl ketone (MEK). The 22 USTs and piping were removed by Unico Service Corporation of Commack, New York on September 1988;

- Four additional 6,000 gallon USTs, were located to the east of the twenty-two USTs. These tanks were reportedly used to store acetone, hexane, Laktane™ and toluene between 1969 to 1989. These tanks and associated lines were removed by Unico Service Corporation on January 6, 1990; and

- A 6,000 gallon UST used to store floor drain "runoff" from the mixing rooms and filling rooms during the 1969 through 1994 period was present in the southeastern part of the Site. According to Site records, the tank and associated lines were removed by ANS Tank & Environmental Services of West Babylon, New York on March 30, 1994.

The following is a summary of environmental analyses and events since the TCA Spill. Results of water analyses are reported in parts per billion (ppb); soil analyses are reported in parts per million (ppm):

1. 4/29/88: Soils and liquid were removed from the impacted storm water basin by Chemical Pollution Control (CPC), and a plan for further action was submitted to the NYSDEC.

2. 4/30/88: Three borings were drilled by Tyre Environmental. One of these borings was converted into a monitoring well, MW-1S, which still exists. TCA was detected in soil samples from this well. Soil from the two other borings, which were located approximately 8 feet from the storm water basin revealed the presence of TCA at concentrations ranging from 67 ppm at soil sample 1'-3' from boring #2, to 42,649 ppm in soil sample 7'-9' also

collected at boring #2. Methylene chloride, 1,1-dichloroethene, toluene, benzene and xylene were also detected in the soil samples.

3. 11/2/88: A water sample from monitoring well MW-1S indicated a TCA concentration of 7,600 ppb.

4. 5/15/89: Water samples were collected by The American Consulting and Educational Services Company (ACES Co.) from the storm water basin near MW-1S and monitoring well MW-1S. The storm water basin sample revealed a TCA concentration of 319 ppb; methylene chloride; 1,1-dichloroethene; trans 1,2-dichloroethene; toluene; and ethyl benzene were also detected. Sampling of monitoring well MW-1S detected TCA (5,846 ppb) methylene chloride, chloroform, 1,1-dichloroethene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,2-trichloroethane, tetrachloroethylene, trichloroethylene, chlorobenzene and toluene.

5. 9/8/89: ACES Co. drilled four (4) boreholes at the Site. Laboratory analysis of soil samples revealed TCA concentrations ranging from 0.033 ppm to 3.614 ppm.

6. 10/5/89: Additional soil samples from the four borings in the area of the TCA Spill, and one water sample from the storm water basin near MW-1S were analyzed. Laboratory results reported by Vulcan Materials Company indicated TCA concentrations ranging from 0.600 to 11.5 ppm in soil. Other compounds detected were 2-bromo-1-chloropropane, 1,1-dichloroethene, trans 1,2-dichloroethene, 1,2-dichloroethane, 1,1,1,2-tetrachloroethane, tetrachloroethylene, trichloroethene, toluene, benzene and xylene. TCA was reported at 2,200 ppb for the water sample from the storm water basin.

7. 6/12/91: The Nassau County Department of Health (NCDOH) issued a letter to NYSDEC concerning the possible "listing" of the Site.

8. 8/9/91: NYSDEC collected a split sample from monitoring well MW-1S and submitted it to NYTEST of Port Washington, New York for analysis. Analytical data indicated approximately 200,000 ppb of TCA, as well as 1,1-dichloroethane, chlorobenzene and toluene.

9. 3/10/92: NYSDEC subsequently classified the Site as a Class 2 site.

10. 5/12/92: Eder Associates collected groundwater samples from monitoring well MW-1S and from temporary observation wells that were installed as part of a limited pumping test. Monitoring well MW-1S was reported to contain 650,000 ppb of TCA, while the temporary observation wells had TCA concentrations ranging from 16 ppb (approximately 70 feet south of the existing monitoring well) to 420 ppb (approximately 40 feet north of the existing monitoring well).

11. 9/25/92: Eder Associates collected groundwater samples during low and high tide to assess the possible variation of TCA concentration in MW-1S due to tidal influence. Results

indicated that little variation was noted. TCA concentrations varied from 290,000 ppb (low tide) to 220,000 ppb (high tide) during non-pumping conditions. The existing monitoring well was pumped at 3 gallons per minute (gpm) for six hours between high tide and low tide. Results acquired during pumping activities also indicated a fairly insignificant change between tidal events. TCA concentrations varied from 370,000 ppb (high tide) to 330,000 ppb (low tide).

12. 8/6/96: Volumetric Techniques sampled and subsequently tested groundwater collected via Geoprobe™ techniques in the northwest and southwest corners of the Site away from the TCA Spill area. Reported TCA concentrations were less than 5 ppb, and chloride concentrations ranged from 54,000 ppb to 81,000 ppb.

13. 10/15/96: Volumetric Techniques sampled and subsequently tested groundwater from monitoring well MW-1S and reported a TCA concentration of less than 5 ppb. Some doubt exists regarding the sampling protocols used for this sample. Chloride concentrations were reported as 333,000 ppb.

During June of 1997, Rust installed eight groundwater monitoring wells (Note: one previously installed monitoring well is still functional) to assess conditions near the spill area and at the property boundaries. Based on the data collected to date, the following observations have been made:

Geology

- The following is a summary of the stratigraphy encountered in the upper 30 feet.

  FILL: This unit is medium dense to dense and consists of reworked native soil and landfill debris. The thickness of this material is variable (3.1 to 22.9') but appears to be thickest in the central and mid-northern portion of the Site.

  TIDAL MARSH SILT: This soft unit consists of a dark brown to dark gray-black organic clayey silt to clay and silt with little medium to fine sand. The organic layer, which represents the natural surface grade, contains frequent amounts of roots and wood with occasional peat remnants.

  GRAVELLY SAND: This medium-dense unit consists of a brown to light gray well-sorted coarse, medium (+) to fine sand with little medium to fine gravel. This shallow overburden unit was observed to be finer-grained and denser with depth.

  GRAY SILT AND CLAY - LOWER: A sequence of stiff gray silt and clay with trace fine sand was identified below the gravelly sand at boring MW-1D-97. Based upon available literature, this unit is reported to be approximately 7 to 13 feet thick in the Region (USGS, 1954). However, it is believed that the increased compaction and finer-grained nature of this unit exhibit some confining properties.

Hydrogeology

- The groundwater in the vicinity of the Site is not used as a drinking water supply source due to the industrial character of the region, the old Village of Freeport Landfill beneath the Site and the published encroachment of saline groundwater;

- Based on water level data gathered on Friday June 13, 1997 (First Quarter Moon) and Thursday, July 17, 1997, the water table at the Site is shallow and the hydraulic gradient appears to be fairly low;

- The groundwater levels at the Site appear to be only slightly influenced by tidal fluctuations and appear to vary approximately one foot, however additional water level monitoring will be performed to confirm this observation;

- The upper three geologic units (i.e., fill, organic tidal layer and gravelly sands) comprise the shallow overburden groundwater flow zone. Based on review of water level data, it appears that monitoring wells MW-1S and MW-1D-97, which screen the upper and lower portion of the gravelly sand unit, respectively, are hydraulically connected;

- Groundwater flow pattern, as noted during reportedly low tide conditions (July 17, 1997), appears to vary considerably more on the eastern half than the western side of the Site. Shallow overburden groundwater appears to flow in a westerly direction with a slight southwesterly component beneath the western half of the Site, and may ultimately discharges toward Freeport Creek. Groundwater along the eastern half of the Site may ultimately discharge toward the Stadium Park Canal (Merrick River) during low tide conditions. In the area of the TCA Spill, the shallow overburden groundwater appears to flow to the west. These observations will be confirmed during the remedial investigation.

Subsurface Soil Quality

- The monitoring well and test boring soil analytical data indicates that the gravelly sand unit, located below the tidal marsh silt unit and above the silt and clay unit, does not appear to have been significantly impacted with respect to VOCs, however, this will be further evaluated during the RI;

- The data from the MW-1D-97 (36'-38') boring sample suggests that a TCA DNAPL "pool" is not present beneath the site, however this will be evaluated during the RI;

- The available data from borings TB-97-1 and TB-97-2 indicate that there appears to be no TCA DNAPL layer located within or on top of the peat layer and this will be evaluated during the RI; and,

- The available data indicates that subsurface soils appear not to have been significantly impacted with respect to semiVOCs, pesticides/PCB's and/or metals/cyanides.

Groundwater Quality

- The groundwater analytical data indicate that there has been considerable natural biotic degradation of TCA;

- The impacts to groundwater appear to be limited in areal extent and this will be evaluated during the RI. Groundwater concentrations of the TCA degradation products significantly decrease with increasing distance from the TCA Spill zone and this will be further evaluated during the RI;

- The apparent low water table gradient may limit the potential for off-site migration and this will be evaluated during the RI; and,

- The chlorobenzene detected in the MW-97-1S, MW-97-2S and MW-97-3S groundwater samples is not likely related to the TCA Spill. It may be related to the former landfill or an off-site source.

1.5 REMEDIAL INVESTIGATION PROJECT ORGANIZATION

Burmah Castrol Trading Limited has retained Delaware to perform the RI/FS investigation at the Columbia Cement Site. The Delaware personnel involved in the project have extensive experience in conducting environmental investigations. Delaware will sub-contract with Mr. Mark Williams (Rust) to perform the sub-surface drilling and monitoring well installation oversight. The project organization is provided below. Resumes are presented in Appendix A, with the exception of the Toxicon Project Manager and Toxicon QA officer, which are presented in the Toxicon Quality Assurance Plan (Appendix C of the Sampling and Analysis Plan).

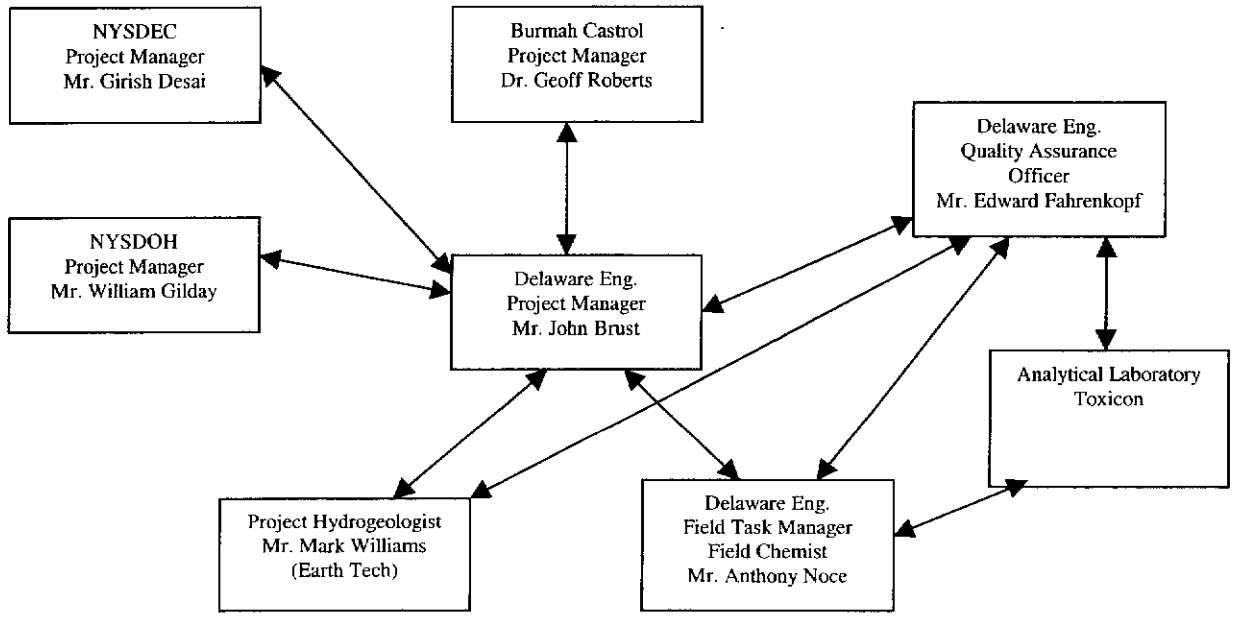
Mr. John Brust will be the RI/FS project manger for Delaware Engineering. Mr. Brust will be responsible for overall coordination and implementation of the project. Mr. Brust will report to the Burmah Castrol project manager (Dr. Geoff Roberts) on a routine basis. Mr. Brust or his designee will keep the NYSDEC (Mr. Girish Desai) and the NYSDOH (Mr. William Gilday) updated on the status of the RI/FS.

Mr. Edward Fahrenkopf will serve as the Quality Assurance Officer for Delaware Engineering. As necessary, Mr. Fahrenkopf will perform a field and sampling audit and interface with both laboratory and field personnel. Field personnel and the laboratory will bring any quality assurance/quality control concerns to Mr. Fahrenkopf's attention. Mr. Fahrenkopf will work with the Delaware project chemist and data validator to develop a project specific data usability report.

Mr. Anthony Noce will serve as the project field task manager, project chemist and site safety officer. Mr. Noce will be responsible for the collection of environmental samples and shipment of the samples to the laboratory. Mr. Noce will also be responsible for data validation associated with preparation of the data usability report. As necessary, Mr. Noce will work with the NYSDEC project manager to ensure that the required data are obtained. Mr. Noce will keep both the Delaware project manager and quality assurance officer up dated on field activities.

Mr. Mark Williams will serve as the project hydrogeologist. Mr. Williams will be responsible oversight of the soil boring and monitoring well installations and the hydraulic conductivity testing. Mr. Williams will also be responsible for interpretation of sub-surface geology and hydrogeology. Mr. Williams will report to the Delaware project manager and quality assurance officer on an as needed basis. Mr. Williams will work with the NYSDEC project manager and the Delaware field task manager to ensure that the required data are obtained.

ORGANIZATION CHART



2.0 REMEDIAL INVESTIGATION

Although significant investigation activities have been completed, several areas of additional investigation are required; these include:

- The condition of shallow and deep groundwater quality to the east of the spill area;
- The condition of deeper groundwater quality downgradient of the site to the west-southwest and west northwest;
- The degree to which shallow soils in the area of the spill remain impacted;
- The possible contamination of shallow soils, not necessarily related to the TCA spill, in the vicinity of MW-97-1S based on high field PID readings at this location;
- The extent of impacted soils, if any, in the drywell located immediately south of the spill area and in the storm drain within the spill zone;
- Sediment quality in the on-site dry wells;
- Volatile organic concentrations in the vadose zone soil gas;
- Confirmation of groundwater flow direction during low and high tide; and,
- Further confirmation of the absence of DNAPL in the tidal marsh silt unit and the gray silt and clay unit.

To address these data requirements, we propose to:

- Drill three borings near the spill area (SB-98-1, SB-98-3, SB-98-4), one in the storm drain located in the spill area (SB-98-2) and one (SB-98-5) in the dry well located south of the spill area, and collect soil samples for VOC field screening and laboratory analysis;
- Drill and install one shallow and one deep monitoring well to the east of the spill area, including the collection of continuous split spoon soil samples, field photoionization (PID) screening of all samples and laboratory analysis of selected soil samples;
- Drill and install two deep monitoring wells, one at the west-southwest corner of the site adjacent to existing shallow monitoring well MW-97-1S and one a the west-northwest corner adjacent to MW-97-2S. Collect continuous split spoon soil samples with field PID screening and laboratory analysis of selected soil samples;

- Measurement of groundwater levels in all on-site monitoring wells (at least two separate events) during different seasons of the year than the existing data;
- Development of the four new monitoring wells;
- Perform in-situ hydraulic conductivity testing in the four new monitoring wells;
- Collect groundwater samples from all thirteen on-site monitoring wells for laboratory analysis;
- Field PID screening of sediments in all on-site dry wells and collection and laboratory analysis of sediment samples. Also, confirm dry well discharge (i.e., are the dry wells interconnected) and storm water discharge points;
- Drill a shallow soil boring (SB-98-6) in the vicinity of former boring TB-97-6 for field PID screening and laboratory analysis;
- Drill a soil boring (BSB-98-7) in a background location to be selected by Delaware Engineering and NYSDEC personnel. Collection and laboratory analysis of background soil boring samples;
- Collection of vadose zone soil gas samples with field PID screening and laboratory analysis of twenty percent of the samples. Collection and analysis of a background ambient air sample; and
- If DNAPL is observed in the peat layer in any of the Phase I or Phase II RI borings, then an evaluation of existing wells will be performed. If necessary the wells will be properly abandoned to eliminate a potential conduit for DNAPL to the lower sand and gravel zone. Also if DNAPL is observed an interim remedial measure (IRM) consisting of a source removal program will be developed and implemented.

The sampling and analysis proposed in the Phase I RI will also address potential impacts related to the underground storage of acetone, hexane and Laktane. Laktane is the trade name for a petroleum based product; a copy of the MSDS sheet for this product is included in the health and safety plan. The sub-surface soil and groundwater volatile analyses proposed for the Site will be able to detect any potential sub-surface impacts related to these compounds.

The following sections detail the data collection tasks that will be implemented during the RI. If during implementation of the RI the field conditions indicate a need for additional information, Delaware Engineering will confer with Burmah Castrol on the collection and analysis of additional samples.

2.1 SUB-SURFACE BORINGS

Our objective will be to determine the presence, nature, and extent of volatile organic compounds (VOCs) in the general vicinity of the reported 1988 TCA spill. Currently existing monitoring wells, historical boring locations and borings/monitoring wells proposed under this supplemental investigation are depicted in Figure 2.

A qualified geologist will coordinate the drilling operations at all times. The geologist will:

- collect split-spoon samples;
- prepare boring logs based on sample observations;
- perform field screening (PID) of split-spoon samples;
- properly label, package and handle any samples for laboratory analysis;
- supervise monitoring well installation; and
- complete daily drilling records.

Soil Sampling

Three soil borings will be advanced in the vicinity of the spill area (SB-98-1, SB-98-3 and SB-98-4), one in the storm drain located in the spill area (SB-98-2), and one (SB-98-5) in the immediate vicinity of boring TB-97-6.

One background boring (BSB-98-7) will be drilled in an area to be selected by Delaware Engineering and NYSDEC personnel.

The borings will be advanced using a truck-mounted drill rig. With the exception of boring SB-98-5, each boring will be advanced to the top of the gray silt and clay unit. Continuous two-foot split spoon samples will be collected from the ground surface to this unit. Boring SB-98-5 will be advanced to a depth of 14 feet below grade with collection of continuous two-foot split spoon samples.

At completion soil borings will be properly sealed with a cement-bentonite grout to prevent a conduit for potential downward migration of contaminants in the future. At the completion of the boring, the boring will be sealed by pumping a cement-bentonite grout mixture directly to the bottom of the hollow stem augers using a tremie pipe until grout returns to the surface. Augers will then be extracted incrementally and the grout will be topped off. The grout material will consist of Type I Portland cement mixed with powdered bentonite, prepared using 6 to 7 gallons of water and 3.5 to 4.0 pounds of powdered bentonite for each 94-pound bag of cement. If DNAPL is observed in the

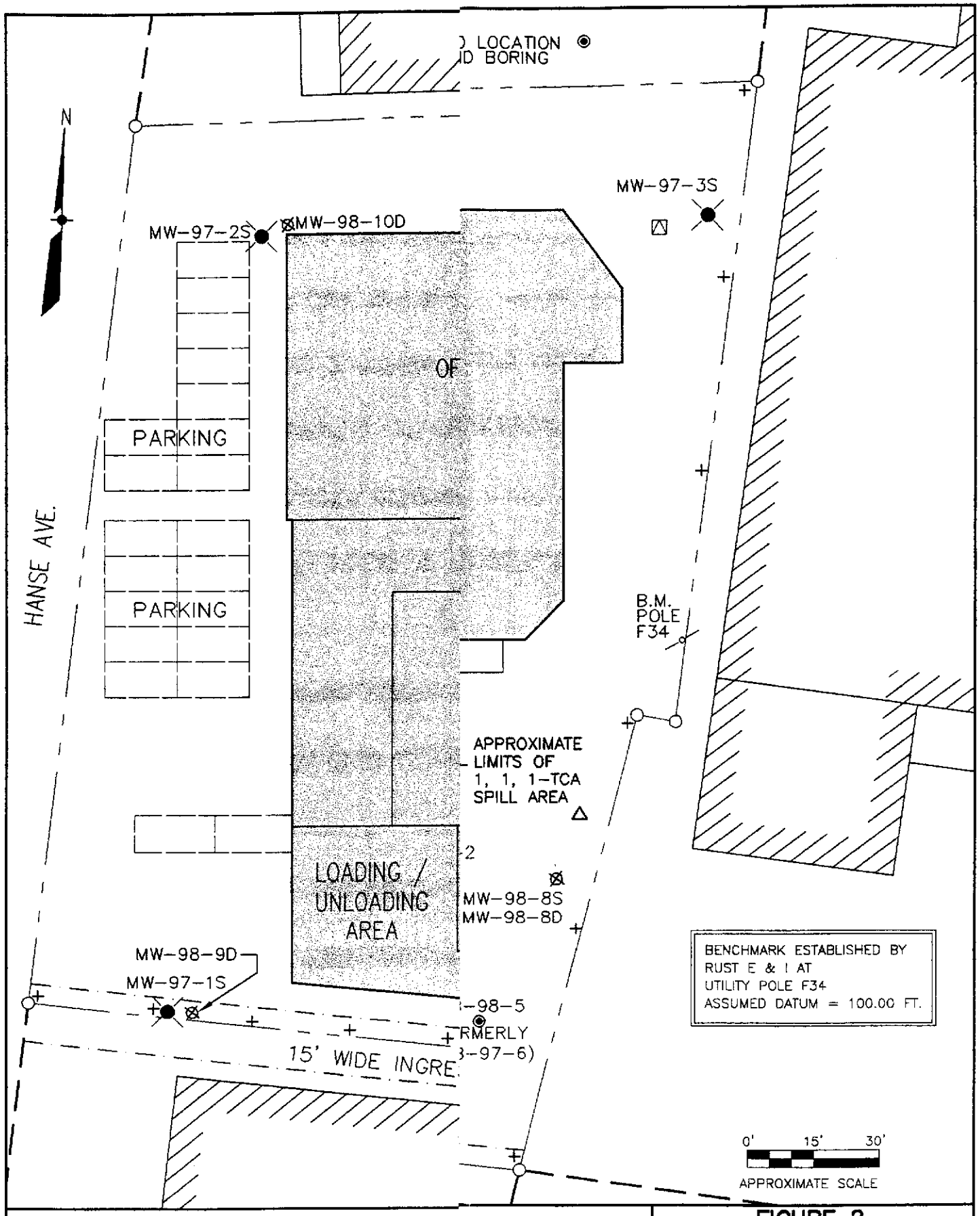


FIGURE 2

PHASE 1 – RI SAMPLING LOCATIONS & EXISTING MONITORING WELL LOCATION PLAN

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split spoon from the soil borings at the peat layer, the boring will be terminated and the procedures detailed in Section 2.2.1 will be implemented to ensure that a conduit for DNAPL is not created.

Soil samples will be obtained utilizing a split-spoon sampler according to the American Society for Testing Materials (ASTM) Method D-1586 in advance of the hollow stem augers. Samples will be characterized and logged, and the headspace of all samples will be field screened for VOCs using a PID equipped with and 11.2 ev lamp. Procedures for collecting the split spoon samples and the field PID screening are provided in the Sampling and Analysis Work Plan that is provided under separate cover. Soil characteristics will be described using the Modified Burmister and the Unified Soil Classification systems. Boring logs describing the stratigraphy and subsurface materials encountered in the shallow overburden borings will be prepared as described in the Sampling and Analysis Work Plan.

From boring SB-98-2 the sample that exhibits the highest field PID reading will be analyzed for the full NYSDEC Target Compound List (TCL) and Target Analyte List (TAL) parameters, using NYSDEC Analytical Services Protocol (ASP), Contract Laboratory Program (CLP) methods. Also the sample that exhibits the highest field PID reading from either SB-98-01 or SB-98-03 will also be analyzed for the full NYSDEC TCL/TAL parameters by NYSDEC, ASP, CLP methods. If no PID readings above background are detected then the TCL/TAL sample will be collected at the center of the fill zone or the groundwater interface if groundwater is encountered within the fill zone.

In all borings (except SB-98-5) the soil sample in the upper fill above the peat layer that exhibits the highest field PID reading will be submitted for laboratory analysis of the NYSDEC TCL VOCs, using the NYSDEC, ASP, CLP method 95-1. Additionally, from each boring (except SB-98-5 and the background BSB-98-6 borings) a sample from the top of the peat layer and the top of the gray silt and clay layer will be submitted for laboratory VOC analysis (NYSDEC method 95-1). The soil sample from boring SB-98-5 that exhibits the highest PID value will be analyzed for the NYSDEC TCL VOCs (NYSDEC method 95-1). Also sample from the peat layer and the gray silt and clay layer from borings SB-98-01, -02, -03 and –04 will be analyzed for total organic carbon.

In the background boring a sample from the upper fill, top of the peat layer and the top of the gray silt and clay layer will be submitted for laboratory analysis of the NYSDEC TCL/TAL parameters and total organic carbon.

A summary of the analyses that will be performed is presented in Table 1. Samples will be analyzed by Toxicon Laboratory. Toxicon is a New York State Department of Health (NYSDOH), ELAP, ASP/CLP approved laboratory and will be required to maintain this certification throughout the RI. A complete NYSDEC, ASP, CLP deliverable package will be provided for all analyses.

Samples will be collected and handled under proper chain of custody protocol. The chain of custody form will record the sample and container type, identification, a description, date and time of sampling, sampler name, method of transport and analysis requested.

As detailed in the Health and Safety Plan, during all sub-surface investigations continuous

monitoring for volatile organic vapors will be conducted with a field PID instrument. Air monitoring will conform to the NYSDOH Community Air Monitoring Plan (Ground Intrusive Activities) found in Appendix B.

2.2 SHALLOW OVERBURDEN BORING/MONITORING WELL

The objective of this task is to determine the presence of VOCs and assess the impact, if any to groundwater quality east of the spill area. This monitoring well will also determine if impacted groundwater in the shallow overburden is migrating off-site to the east.

The boring will be advanced using 4 ¼" I.D. hollow stem augers. The depth for the well will be approximately 25 feet below grade, which is anticipated to be in the gravelly sand deposit.

2.2.1 Monitoring Well Installation

The shallow overburden monitoring well (MW-98-8S) will be constructed of 2-inch ID, Schedule-40 PVC well screen flush-threaded into Schedule-40, PVC riser pipe of the same diameter. The size of the screen will be No. 10 slot (i.e., 0.010 inch). The length screen length will be ten feet but may be changed based upon site specific conditions as determined by the on-site geologist. The base of each well will be equipped with threaded bottom plugs, while the top of each well will be equipped with a vented, non-threaded cap. Procedures for monitoring well installation are provided in the sampling and analysis work plan.

All monitoring wells will be constructed by first advancing a minimum eight-inch outside diameter (O.D.) borehole to one foot below the top of the tidal marsh (e.g., peat) layer. The 4 ¼ inch inside diameter hollow stem augers will be left in place and a cement-bentonite mixture tremied into the augers. The augers will be subsequently withdrawn, and a length of four inch I.D. Schedule 40 PVC pipe sufficient to leave approximately 2 feet of stick-up will be inserted to the bottom of the borehole. The grout mixture will be removed from within the Schedule 40 PVC pipe by tremie grouting a bentonite slurry into the pipe, thus displacing the cement-bentonite mixture. After allowing the grout to set overnight, the remainder of the monitoring well borehole will be advanced utilizing a nominal 4-inch diameter drill casing advanced with drive and wash methods.

If bridging of sands is encountered an alternative drilling method, such as conventional mud rotary employing a tricone roller will be utilized. Prior to flush mount monitoring well construction, the four-inch inside diameter schedule 40 PVC casing will be cut to approximately 0.75 feet below grade. Sand will be introduced gradually inside the casing, and will fill the annular space between the well screen and adjacent casing. The sand pack will extend from the bottom of the boring to approximately 2.0 feet above the top of the screen. During placement of the sand pack, casing will be withdrawn in increments so that the formation materials do not collapse against the well casing and/or screen. The sand pack will consist of clean, graded, silica sand with grain size distribution matched to the slot-size of the screen; i.e., a Unimin™ Grade 0 or equivalent sand. A six-inch layer of clean Unimin™ Grade 00 sand will then be placed above the sand pack to preclude migration of sealing material into the sand pack. A bentonite pellet seal will be placed above the sand pack to

Table 1

Phase I Remedial Investigation - Sample and Analysis Summary

Columbia Cement Company, Inc. Facility

Freeport, New York

Media	Number of Samples	Number of QA/QC Samples				Total Number of Samples	Analysis[5]
		MS/MSD[1]	Field Dup[2]	Equip Blank[3]	Trip Blank[4]		
Soil Gas							
Laboratory confirmation samples	5					5	VOC's, 95-1 (modified)[6]
Soil							
* *Spill Area Soil Borings*							
SB-98-01, SB-98-02, SB-98-03, SB-98-04	12			1		13	VOC's, 95-1 and TOC
Note: Two samples for full TCL/TAL, highest PID reading from SB-98-02 and highest reading from SB-98-01 or SB-98-03.	2	2	1	1		6	Full TCL/TAL and TOC
Additional Soil Boring (in the vicinity of boring TB-97-6)							
SB-98-5	1					1	VOC's, 95-1
Monitoring Well Installation Soil Borings							
Three deep monitoring wells (three samples each boring)	9					9	VOC's, 95-1 and TOC
Note: highest PID reading for MWSB-98-8D Full TCL/TAL	1					1	Full TCL/TAL and TOC
Dry Well Hand Auger Soil Borings							
dry well immediately to the west of MW-97-6S	2	2	1			5	VOC's, 95-1
Background Soil Boring							
BSB-98-7	3					3	Full TCL/TAL, TOC[10]
Groundwater							
** *Groundwater Monitoring Wells*							
all on Site monitoring wells with the exception of those listed below	9				3	12	VOC's, 95-1
MW-1S, MW-1D-97, MW-98-8S and MW-98-8D	4	2	1			7	Full TCL/TAL

Notes:

1) QA/QC samples will include a matrix spike (MS) and matrix spike duplicate (MSD) sample at a frequency of not less than 5% (one MS/MSD pair per every 20 samples collected) for each matrix (aqueous and soil).
2) A blind field duplicate sample will be collected at a frequency of one per every 20 samples for each matrix (aqueous and soil).
3) Equipment blanks are not required when dedicated sampling equipment is used. If non-dedicated sampling equipment is used in the soil sampling program, equipment blanks will be analyzed at a frequency of not less than 5% (one equipment blank per every 20 samples collected).
4) One trip blank will submitted for analysis for each day aqueous matrix volatile organic samples are collected. A trip blank will be included in each cooler that contains aqueous matrix volatile organic samples; therefore all volatile organic samples and containers will be shipped to and from the laboratory in the smallest number of coolers possible in order to minimize the number of trip blanks required.
5) All samples will be analyzed using NYSDEC ASP (10/95) analytical procedures for Superfund-CLP Volatile Organics (NYSDEC Method 95-1), Semivolatile Organics (NYSDEC Method 95-2), Pesticides/Aroclors (NYSDEC Method 95-3) and/or the appropriate Analytical Methods for CLP Inorganics, as necessary.
6) A total of five soil gas samples in Tedlar bags for volatile organic analysis by an acceptable gas chromatography/mass. spectroscopy (GC/MS) method at the laboratory. The target compound list will be the same as that listed in NYSDEC ASP Method 95-1.
7) The limited list of volatile organic compounds to be analyzed for using NYSDEC ASP Method 95-1 are as follows: 1,1,1-Trichloroethane; Chloromethane; 1,1-Dichloroethane; 1,1-Dichloroethene; and Vinyl Chloride.
8) The analytical laboratory contracted to perform the sample analyses will be a New York State Department of Health (NYSDOH), Environmental Laboratory Approval Program (ELAP) certified laboratory holding the Analytical Services Protocol (ASP) certification.
9) This sample will not be submitted for analysis if the PID reading is not elevated with respect to background PID readings.
10) These samples will be submitted for Full TCL/TAL, and total organic carbon (TOC) analysis.
11) * Three samples from each of the four Spill Area soil borings analyzed for VOC's (95-1), except two samples for Full TCL/TAL, one highest PID reading from SB-98-02 and one highest PID reading from either SB-98-01 or SB-98-03 for full TAL/TCL analysis.
12) ** All monitoring well samples analyzed for VOC's (95-1) except for MW-1S, MW-1D-97, MW-98-8S and MW-98-8D for full TAL/TCL analysis.

form a seal at least two-feet thick. Cement-bentonite grout will be placed from the top of the bentonite pellet seal to approximately three feet below grade.

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

2.2.2 Monitoring Well Development

The newly installed monitoring wells will be developed prior to sampling in order to remove residual

silts, sands and clays, increase the hydraulic conductivity immediately around the well, and reduce the turbidity of groundwater samples. Well development will continue until a turbidity goal of less than or equal to 50 Nephelometric Turbidity Units (NTUs) is obtained. If this goal cannot be obtained, well development will continue until an amount of groundwater equivalent to 10 well volumes has been removed. This will help ensure that the groundwater samples, and other hydraulic information obtained from these wells, are representative of sub-surface conditions.

All groundwater and sediments resulting from well development will be managed as described in Section 2.8. Wells will be developed using procedures presented in the Sampling and Analysis Work Plan.

2.3 DEEP BORING/MONITORING WELL

Three deep monitoring wells will be installed to assess the impact, if any, to soil and/or groundwater quality along both the western property boundary and east of the spill area. These wells will also help to determine if impacted groundwater in the deep overburden is migrating off-site.

One deep soil boring (MW-98-8D) will be drilled along the eastern property boundary east of the spill area, one adjacent to shallow monitoring well MW-97-2S (MW-98-10D) and one boring adjacent to shallow monitoring well MW-97-1S (MW-98-9D). Soil samples will be collected in two-foot intervals from ground surface until the gray silt and clay unit is encountered. The wells will be constructed so that the bottom of the screen is at the top of the gray silt and clay layer. As described in Section 2.2.1 the deep monitoring well borings will be advanced by procedures that will prohibit the downward migration of contaminants that may potentially be present in the overburden or peat layer.

Sample collection, description, headspace screening, well installation and well development will be similar to the procedures used to install the shallow overburden boring/monitoring well. Three sub-

surface soil samples will be collected and submitted to a laboratory for VOC (NYSDEC method 95-1) and TOC analysis. The sample with the highest field PID reading will be submitted as will a sample from the top of the peat layer and a sample from the top of the gray silt and clay layer. The soil sample from boring MW-98-8D that exhibits the highest PID reading will be analyzed for the NYSDEC TCL/TAL parameters (NYSDEC CLP methods). If no PID readings above background are detected then the TCL/TAL sample will be collected at the groundwater interface.

2.4 GROUNDWATER FLOW DIRECTION/TIDAL EVALUATION

Water-level measurements will be obtained from the existing monitoring wells and the four new monitoring wells. Although the Focused Subsurface Investigation (July 1997) indicated that the tidal influence appears to be relatively minor, water level measurements will be collected from all monitoring wells on a minimum of two separate days. During each day, a complete round of on-site monitoring well water level measurements will be collected every 30 minutes beginning at the high tide and continuing to the next high tide. Each round of water level measurements will be scheduled, insofar as practicable, to avoid periods immediately (*i.e.*, two days) after a significant, i.e., greater than 0.25 inches, precipitation event. Graphs will be prepared depicting changes in water level elevations and groundwater contour maps will be prepared for the low and high groundwater elevation. The procedure for obtaining the water-level measurements is presented in the Sampling and Analysis Work Plan.

2.5 HYDRAULIC CONDUCTIVITY TESTING

After sufficient time has elapsed for hydraulic stabilization of the newly installed wells, they will be tested to estimate hydraulic conductivity of the screened formation. This estimate will be used to estimate groundwater flow rates, assess the potential rate of contaminant transport, and screen potential remedial options, if necessary. The hydraulic conductivity testing will consist of in-situ slug and/or bail tests using pressure transducers. Test procedures are described in Sampling and Analysis Work Plan.

2.6 GROUNDWATER SAMPLING AND ANALYSIS

Groundwater will be collected from the four new monitoring wells and nine (9) existing monitoring wells (*i.e.*, MW-1, MW-1D-97, MW-97-1S, MW-97-2S, MW-97-3S, MW-97-4S, MW-97-5S, MW-97-6S and MW-97-7S). Each water sample will be analyzed for the TCL VOCs (NYSDEC, ASP, CLP method 95-1). Groundwater from monitoring wells MW-98-8S, MW-98-8D, MW-1S and MW-1D-97 will be analyzed for the complete NYSDEC TCL/TAL parameters (NYSDEC, ASP, CLP methods). A NYSDEC CLP deliverable package will be provided for all analyses.

Groundwater sampling procedures are presented in the Sampling and Analysis Plan. Excess groundwater generated from the sampling activity will be managed as discussed in Section 2.10.

2.7 DRYWELL EVALUATION

During the Phase I RI, soil samples will be collected from the dry well located west of monitoring well MW-96-6S using a hand auger. Samples will be collected from the sediment surface to two and one-half feet or refusal, whichever occurs first. The material collected from every six inches will be screened in the field with a PID. The sample from zero to six inches and the sample exhibiting the highest PID value will be submitted to Toxicon Laboratory for analysis of the NYSDEC TCL VOCs (NYSDEC method 95-1).

2.8 SOIL GAS SURVEY

A soil gas survey will be implemented along the eastern and southern boundaries of the Site. Along the eastern and southeastern property boundary soil gas samples will be collected from the vadose zone approximately every 50 linear feet. This will also document soil gas concentrations in the vicinity of former boring TB-97-6. Along the southwestern section of the property soil gas samples will be collected approximately every 25 feet because of the presence of office space in the adjacent building. All samples will be screened in the field with a PID. Twenty percent of the samples from the fifty-foot spacing and twenty percent of the samples from the twenty-five foot spacing will be submitted to a laboratory for analysis of the NYSDEC TCL VOCs. A single soil gas sample will also be collected in the spill area and in the vicinity of the existing underground toluene storage tank.

2.9 DECONTAMINATION

All non-disposable equipment will be decontaminated prior to and after the field activities. All disposable sampling equipment will be discarded between samples. The purpose of equipment decontamination is to minimize the potential for compromising data validity by reducing the possibility of cross-contamination.

Prior to drilling the first shallow subsurface boring, the equipment used in drilling will be cleaned to remove possible contaminants. All equipment that will come in contact with the soil, as well as water tanks, drill tools, iron casings, pumps and hoses, will undergo the initial cleaning procedure. While working at the Site, the drilling equipment will be decontaminated between boring locations to prevent cross-contamination. The back end of the drill rig and all drilling tools will be decontaminated before leaving the Site. The cleaning process will involve the use of a high-pressure steam cleaner. Clean, potable water will be used for decontamination of drilling equipment and in drilling procedures.

2.10 HANDLING OF INVESTIGATION DERIVED WASTES

Field activities will produce investigation-derived waste (IDW) which will require appropriate management. This IDW includes the following:

- Soil cuttings resulting from the drilling;

- Groundwater from the development and purging of monitoring;
- Decontamination fluids and sediments which may settle out of such fluids; and
- Personnel protective equipment (PPE) and associated debris resulting from the field activities.

The management of these materials is discussed below.

2.10.1 Soil

Soil cuttings generated during the drilling program of the borings and newly installed monitoring wells will be contained in 55-gallon drums pending analytical results. Following review of the data the cuttings will be properly disposed.

2.10.2 Groundwater

Groundwater generated during the purging of existing monitoring wells and development/purging of new monitoring wells will be contained in 55-gallon drums pending analytical results. Following review of the analytical data the purge water/development water will be either discharged to the ground surface or transported off-site for treatment and/or disposal at a permitted facility.

2.10.3 Decontamination Fluids

Decontamination fluids will be containerized in appropriate 55-gallon drums and temporarily stored on-site. Upon completion of field activities, this material will be properly characterized and, after receiving the analytical results and necessary approvals from Burmah Castrol and NYSDEC, will be discharged onto the ground surface or transported off-site for treatment and/or disposal at a permitted facility.

2.10.4 PPE and Associated Debris

Used PPE and other associated debris (e.g., disposable sampling equipment) will be containerized in appropriate 55 gallon drums and stored temporarily on-site. At the conclusion of field activities, these materials will be appropriately characterized and after receiving the necessary approvals from Burmah Castrol and the NYSDEC, will be transported off-site for disposal at an appropriate facility.

2.11 DATA USABILITY REPORT

A Data Usability Summary Report (DUSR) will be prepared for all analytical data generated during the RI. The DUSR will be completed following the NYSDEC guidance for DUSRs. A copy of the NYSDEC guidance is included in Appendix C. The DUSR will be prepared by a Delaware Engineering chemist (Mr. Anthony Noce).

2.12 RI REPORT

A RI Report will be prepared documenting results of the RI. This report will include a summary of previous investigations and will incorporate appropriate data generated during the July 1997 FSI. The report will include methodologies used and data generated during the RI. Conclusion on site conditions will be prepared based on the RI data and where applicable, the data from the July 1997 FSI.

A Phase I RI report will be prepared which details the results of the Phase I RI investigation and provides recommendations for required Phase II work. The Phase II report will incorporate the Phase I RI data by reference and provide a complete interpretation of Site conditions and the extent of contamination, both areally and vertically, will be discussed and presented graphically for all environmental media.

2.13 PHASE II RI

Phase II of the RI will be implemented following review of the data generated during Phase I. The extent of any additional on-Site investigation necessary will be dependent on the results of the Phase I RI. In addition, off-site sample collection and analysis will be performed during Phase II of the RI. The NYSDOH request for installation of a shallow overburden monitoring well between MW-97-1S and MW-97-2S will be evaluated following review of the Phase I RI groundwater flow direction and analytical data.

The Phase II investigation will include a human health exposure assessment and an ecological exposure assessment.. The Phase II human health exposure assessment and the ecological assessment will be completed following review of any environmental data gathered during the Phase II RI.

The drywells at the Site will be evaluated during the Phase II RI. If the drywells conform to the definition of a USEPA Class V injection well, then the sediment from the drywells will be sampled and analyzed for the following parameters:

- 8 RCRA Metals;
- TCL Volatile Organics (SW-848 8260);
- TCL Semi-Volatile Organics (SW-846 8270); and
- TPH (SW-846 Method 8015).

In addition, some of the drywell sediments will be sampled for the full NYSDEC ASP TCL/TAL parameters. The drywells may be cleaned by removal of sediments prior to collection and analysis of the samples.

Also, the Nassau County Health Department will inform USEPA Region II of the existence of the drywells for proper permitting or abandonment by the existing owners of the Site.

2.13.1 Human Health Exposure Assessment

The human health exposure assessment (HHEA) will consist of an evaluation of the potential routes of human exposure to site related chemicals. The following items will be addressed within the HHEA scope of work:

- evaluation of Site history, chemical, hydrologic, demographic and other information;
- identification and evaluation of potential exposure pathways through a review of data collection activities, analytical protocols, current and surrounding land use, populations-at-risk and other related data; and,
- characterization of completed exposure pathways by the evaluation of chemical release sources, fate and transport, human exposure (contact) points and chemical intake routes.

The human exposure routes that present a potential toxic concern will be identified. Potential human exposures will be characterized using principles and procedures consistent with the following U.S. Environmental Protection Agency (EPA) documents:

- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Interim Final, Part A* (December 1989, EPA/540/1-89/002)
- *Guidance on Risk Characterization for Risk Managers and Risk Assessors.* Memorandum. February 26, 1992
- *Guidance for Data Usability in Risk Assessment, Interim Final* (October 1990, EPA/540/G-90/008)
- *Superfund Exposure Assessment Manual* (April 1988, EPA/540/1-88/001)
- *Exposure Factors Handbook* (March 1990, EPA/600/8-89/043).

The purpose of the exposure assessment is to identify pathways through which people can be exposed under current and potential future use scenarios. The exposure assessment utilizes the current conditions at the Site and surrounding area in determining exposure scenarios and exposure concentrations. Additionally, future uses of the Site and surrounding area are also considered.

2.13.2 Fish and Wildlife Impact Analysis

The fish and wildlife impact analysis (FWIA) will be performed following the NYSDEC FWIA procedures presented in the NYSDEC, Division of Fish and Wildlife, "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (dated October, 1994). The Step I (Site Description)

and the pathway analysis and criteria-specific sections of the Step II (Contaminant-Specific Impact Analysis) analysis will be performed.

The objective of the Step I, site description is to identify the fish and wildlife resources, land-use and habitat types that exist in the vicinity of the Site. In addition, fish and wildlife species that may utilize habitats that could potentially be impacted by site-related contaminants are identified. This information is necessary to allow identification of potential pathways of contaminant migration that could impact fish and wildlife resources.

The objective of the Step II, contaminant specific impact is to determine the impacts, if any, of site-related contaminants on fish and wildlife resources. The pathway analysis evaluates and identifies potential contaminants of concern, sources of contaminants, potential pathways of contaminant migration and potential for fish and wildlife resources to be impacted by site-related contaminants. The criteria-specific analysis determines if reported chemical concentrations represent a potential threat to aquatic life and wildlife.

3.0 FEASIBILITY STUDY

Upon completion and approval of the Final RI report by the NYSDEC, a Feasibility Study (FS) will be performed utilizing the approach outlined in NYSDEC TAGM HWR-90-4043. The first step involves the development of remedial action alternatives. These alternatives are screened, as necessary or appropriate, during the second step. The third and final step involves the detailed analysis of the remaining remedial alternatives according to the selection criteria specified in the National Contingency Plan (NCP). This process culminates in the recommendation of one or more remedial alternatives in the FS Report.

3.1 DEVELOPMENT OF REMEDIAL ALTERNATIVES

The development of remedial alternatives will involve the following six-step process:

- Development of remedial action objectives specifying the contaminants and media of interest, exposure pathways, receptors and acceptable contaminant levels for each exposure route.

- The media of interest will be determined by the nature and extent of contamination as well as appropriate NYS Standards Criteria and Guidelines (SCGs) and any federal standards that are more stringent than State standards;

- Development of general response actions for each medium of interest, defining containment, treatment, excavation, pumping, or other general actions which might satisfy the remedial action objectives;

- Identification of the volume of material or area(s) of contamination to which the general response actions might be applied;

- Identification and screening of technology types applicable to each general response action to eliminate those that are not implementable;

- Assembly of the technologies and process options into remedial alternatives, preserving a range of treatment and containment choices.

In the above process, data gathered during the RI is used to identify and screen technology types and process options. Technologies that could prove difficult to implement, might not achieve the remedial action objectives within a reasonable time frame, or might not be applicable or feasible based on site-specific conditions, are eliminated from further consideration. Also, results can be used to guide additional site characterization work, if necessary.

3.2 INTERIM REMEDIAL MEASURE (IRM)

Based on the results of the RI, an assessment may potentially be made regarding the need for and feasibility of an interim remedial measure (IRM). The assessment will consider whether an IRM is likely to prevent or mitigate environmental damage and would serve to reduce the scope and cost of the final remedy. IRMs that could be considered may include excavation of impacted soil or removal of product, prior to implementation of a groundwater pump and treat system. The results of any IRM analysis will be communicated in a letter report to the NYSDEC prior to finalization of the RI/FS Report.

3.3 SCREENING AND ANALYSIS OF REMEDIAL ALTERNATIVES

The remedial alternatives developed in the previous task may undergo an initial screening to reduce the number of alternatives for detailed analysis. This screening will be accomplished by evaluating alternatives on the basis of effectiveness, implementability (both technical and administrative) and cost. The range of remedial alternatives will, however, be preserved during the screening. Innovative technologies will be considered throughout the screening process to determine if they provide a potential for better performance, easier implementation or cost savings to demonstrated technologies. The "No action (Monitoring Only)" alternative will be considered and subjected to further detailed analysis.

3.3.1 Detailed Analysis of Alternatives

A detailed evaluation of the remedial alternatives that remain following the preliminary screening will be conducted. This detailed evaluation will follow the process specified in the EPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" (Interim Final, October 1988) and "Guidance on Superfund Selection of Remedy" (July 1987) as well as the NYSDEC Technical and Administrative Guidance Memorandum No. 4030 entitled "Selection of Remedial Actions at Inactive Hazardous Waste Sites", dated September 13, 1989 and revised May 15, 1990.

3.3.1.1 INDIVIDUAL ANALYSIS OF EACH ALTERNATIVE

Delaware Engineering will conduct an analysis of each alternative. The two threshold criteria against which the remedial alternatives will be evaluated are:

- Overall protection of human health and the environment; and
- Compliance with applicable New York State Standard Criteria and Guidelines (SCGS).

Following this, Delaware Engineering will analyze the following balancing criteria:

- Short-term impacts and effectiveness;

- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility or volume;
- Implementability (i.e., technical and administrative); and
- Cost (i.e., capital, annual operation and maintenance and present worth).

Delaware Engineering will analyze the ecological impact and reduction of human exposure for each alternative. Two additional evaluation criteria, state and community acceptance will be addressed by the NYSDEC in the Record of Decision.

To assist with the analysis, the alternatives will be scored using a relative weighting system. Each evaluation criteria will be assigned a relative weighting factor. Each alternative will be assessed against the evaluation criteria, and will be assigned a relative score representative of the alternatives' achievement of the goals of the evaluation criteria. Following completion of this evaluation, the results of the comparison of alternatives will be tested using a sensitivity analysis. Various design aspects of each alternative will be altered to reflect uncertainties in the design.

3.3.1.2 COMPARATIVE ANALYSIS OF ALTERNATIVES

Following the evaluation of each remedial alternative, a comparative analysis will be performed to determine the relative performance of each remedial alternative against the seven criteria. The remedial alternative(s) or combination of alternatives that receives the highest evaluation will be recommended as the preferred alternative(s).

3.4 FEASIBILITY STUDY REPORT

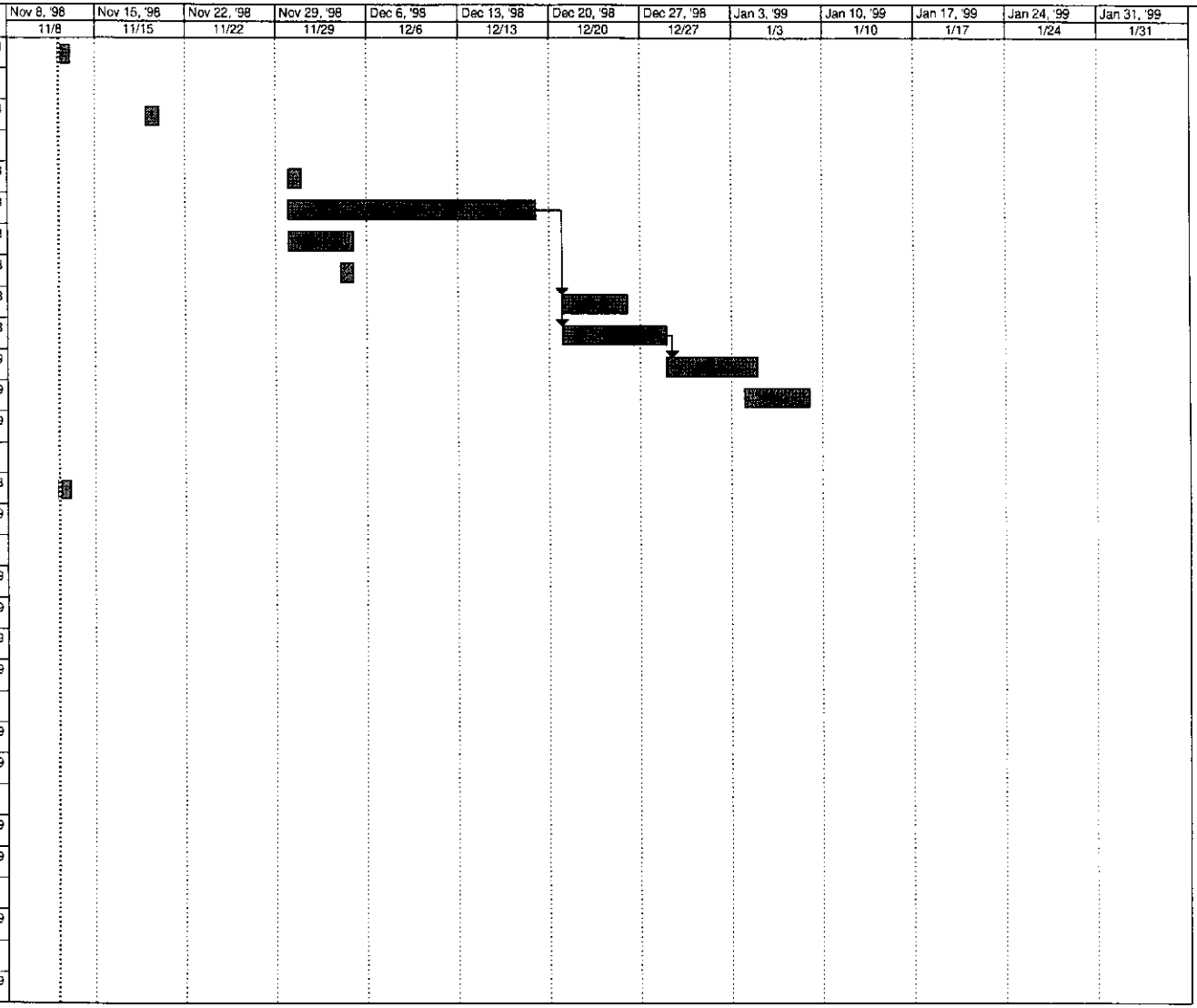
The results of the evaluation of remedial alternative will be documented in the FS Report. The Report will compile revised RI conclusions, the final exposure and impact assessments, and the progress of alternative development through the detailed analysis of alternatives. The report will contain a recommendation for the final remedy.

4.0 PROJECT SCHEDULE

A detailed schedule for the Phase I RI activities is presented in Figure 3. An estimated overall project schedule for completion of the RI/FS is provided; however, this schedule is dependent on the extent of Phase II activities and may require modification. The time allotted in the Consent Order for various deliverables (*e.g.*, 30 days for submittal of a final RI Report after receipt of NYSDEC comments on the draft report, *etc.*) has been factored into the schedule. It has been assumed that the NYSDEC will comment on both the draft RI and the draft FS reports and 30 days has been allotted for the NYSDEC's review of all draft and final reports.

FIGURE 3 RI/FS SCHEDULE

ID	Task Name	Start	Finish
1	Task 1 Prepare Work Plans	Thu 11/12/98	Thu 11/12/98
2			
3	NYSDEC Review Final Work Plans	Thu 11/19/98	Thu 11/19/98
4			
5	Task 2 Phase I Field Work	Mon 11/30/98	Mon 11/30/98
6	Monitoring Well Installation	Mon 11/30/98	Fri 12/18/98
7	Soil Gas Suvey	Mon 11/30/98	Fri 12/4/98
8	Dry Well Sample	Fri 12/4/98	Fri 12/4/98
9	Well Development	Mon 12/21/98	Fri 12/25/98
10	Soil Borings	Mon 12/21/98	Mon 12/28/98
11	Hydraulic Cond. Testing	Tue 12/29/98	Mon 1/4/99
12	Well Sampling	Mon 1/4/99	Fri 1/8/99
13	Receive Lab Data	Mon 2/8/99	Fri 3/12/99
14			
15	Task 3	Thu 11/12/98	Thu 11/12/98
16	Phase I RI Report	Mon 3/15/99	Fri 4/9/99
17			
18	DEC Review	Mon 4/12/99	Fri 5/7/99
19	Phase II Work Plan	Fri 4/9/99	Thu 4/15/99
20	DEC Review Phase II WP	Thu 4/22/99	Wed 5/5/99
21	Phase I RI Public Meeting	Mon 5/10/99	Mon 5/10/99
22			
23	Implement Phase II Field Work	Tue 5/11/99	Mon 5/31/99
24	Receive Lab Data	Mon 7/5/99	Fri 8/6/99
25			
26	Phase II Report	Mon 8/9/99	Fri 8/27/99
27	FS Report	Tue 7/6/99	Tue 7/6/99
28			
29	DEC Review	Wed 8/4/99	Tue 8/31/99
30			
31	PRAP	Wed 9/1/99	Wed 9/1/99



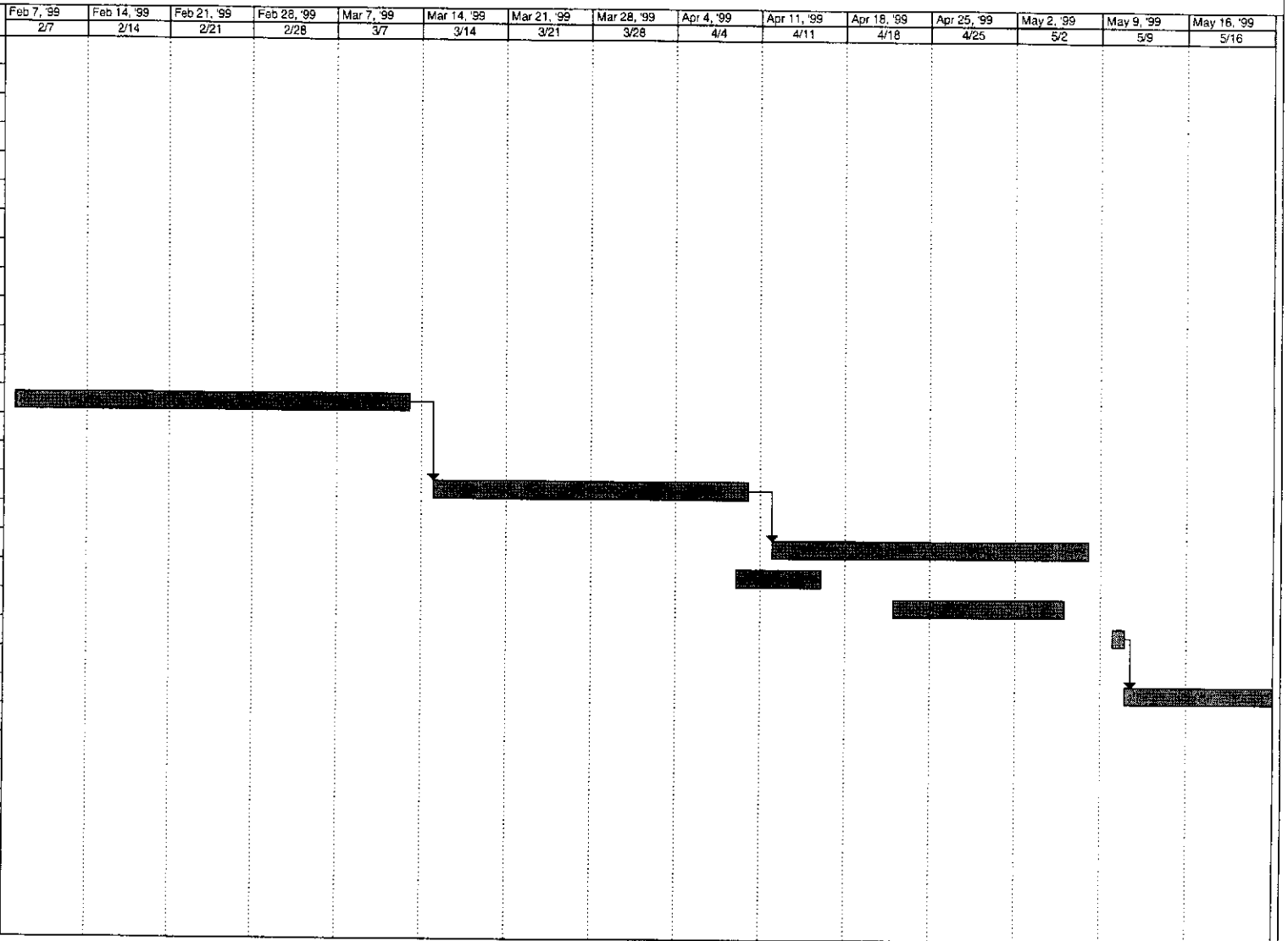
Project: cccsched.
Date: Thu 11/12/98

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

Burmah Castrol CCC Site

FIGURE 3 RI/FS SCHEDULE

ID	Task Name	Start
1	Task 1 Prepare Work Plans	Thu 11/12/98
2		
3	NYSDEC Review Final Work Plans	Thu 11/19/98
4		
5	Task 2 Phase I Field Work	Mon 11/30/98
6	Monitoring Well Installation	Mon 11/30/98
7	Soil Gas Suvey	Mon 11/30/98
8	Dry Well Sample	Fri 12/4/98
9	Well Development	Mon 12/21/98
10	Soil Borings	Mon 12/21/98
11	Hydraulic Cond. Testing	Tue 12/29/98
12	Well Sampling	Mon 1/4/99
13	Receive Lab Data	Mon 2/8/99
14		
15	Task 3	Thu 11/12/98
16	Phase I RI Report	Mon 3/15/99
17		
18	DEC Review	Mon 4/12/99
19	Phase II Work Plan	Fri 4/9/99
20	DEC Review Phase II WP	Thu 4/22/99
21	Phase I RI Public Meeting	Mon 5/10/99
22		
23	Implement Phase II Field Work	Tue 5/11/99
24	Receive Lab Data	Mon 7/5/99
25		
26	Phase II Report	Mon 8/9/99
27	FS Report	Tue 7/6/99
28		
29	DEC Review	Wed 8/4/99
30		
31	PRAP	Wed 9/1/99



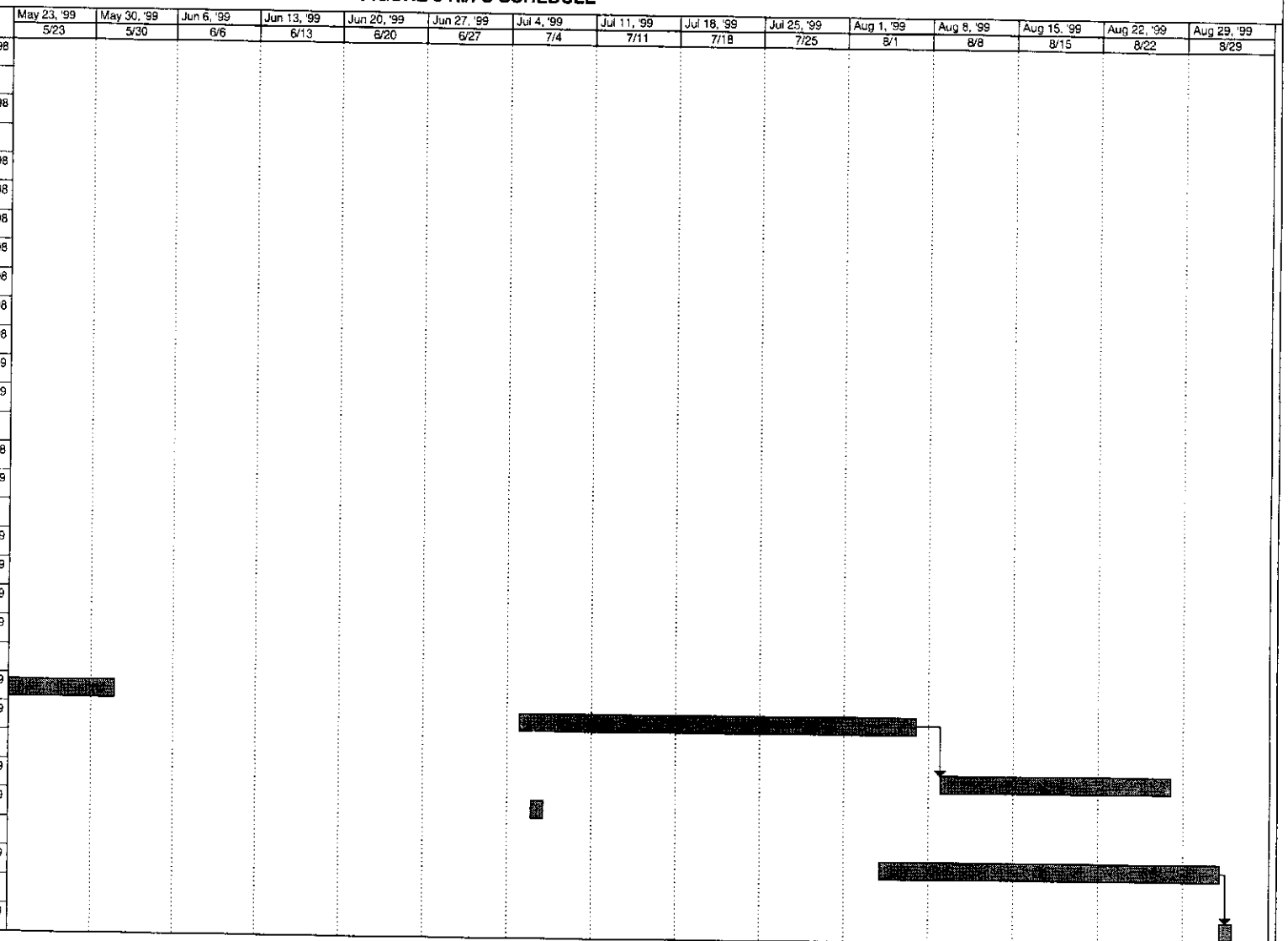
Project: ccosched
Date: Thu 11/12/98

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

Burmah Castrol CCC Site

FIGURE 3 RI/FS SCHEDULE

ID	Task Name	Start
1	Task 1 Prepare Work Plans	Thu 11/12/98
2		
3	NYSDEC Review Final Work Plans	Thu 11/19/98
4		
5	Task 2 Phase I Field Work	Mon 11/30/98
6	Monitoring Well Installation	Mon 11/30/98
7	Soil Gas Suvey	Mon 11/30/98
8	Dry Well Sample	Fri 12/4/98
9	Well Development	Mon 12/21/98
10	Soil Borings	Mon 12/21/98
11	Hydraulic Cond. Testing	Tue 12/29/98
12	Well Sampling	Mon 1/4/99
13	Receive Lab Data	Mon 2/8/99
14		
15	Task 3	Thu 11/12/98
16	Phase I RI Report	Mon 3/15/99
17		
18	DEC Review	Mon 4/12/99
19	Phase II Work Plan	Fri 4/9/99
20	DEC Review Phase II WP	Thu 4/22/99
21	Phase I RI Public Meeting	Mon 5/10/99
22		
23	Implement Phase II Field Work	Tue 5/11/99
24	Receive Lab Data	Mon 7/5/99
25		
26	Phase II Report	Mon 8/9/99
27	FS Report	Tue 7/6/99
28		
29	DEC Review	Wed 8/4/99
30		
31	PRAP	Wed 9/1/99



Project: cccsched
Date: Thu 11/12/98

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

Burmah Castrol CCC Site

APPENDIX A

Personnel Resumes

EXPERIENCE PROFILE:

Mr. Brust's broad project management experience includes scores of property assessments for manufacturing and mining industries, remedial investigations, site cleanups, industrial decommissioning projects, and regulatory compliance audits. He often assists our clients in negotiations with regulatory agencies and other involved parties, and has been a frequent speaker on various environmental issues at technical seminars and other professional functions.

EDUCATION:

MS, Environmental Science, Rutgers University, 1986
BA, Biology, Seton Hall, 1982

PROJECT EXPERIENCE:

While working as Vice President and Division Manager with another firm, Mr. Brust was involved in the following projects:

Project Director, Stormwater Assessment and Management Program, Industrial Manufacturer, Schenectady, New York. Mr. Brust is currently serving as Project Director on this extremely complex and time sensitive project. The project scope has included the development of a multi-layered hydraulic flow model for the extensive sewer network across the entire site, the development and implementation of a stormwater quality sampling program, and the removal of sediments within various underground conduits. The project has also included the implementation of a pilot study at the wastewater treatment plant to increase the removal efficiency of suspended solids. (1995 - Ongoing)

Project Director, EHS Compliance Assessment, GE Corporate Research & Development Center, Niskayuna, New York. GE retained the firm to conduct a thorough compliance assessment of all Environmental, Health, and Safety programs at its corporate laboratory facility. As the Project Director, Mr. Brust established the project team and participated in numerous planning and debrief meetings with GE staff. He also participated in the presentation of the assessment results to the various laboratory managers and to senior management at the facility, and in the development of subsequent action plans. (1995 - Ongoing)

Project Director, Landfill Fire Air Monitoring, Waterford, New York. Mr. Brust was the Project Director on this extremely sensitive and high profile project, which involved a large underground fire in its RCRA-permitted hazardous waste landfill. When the fire was nearly extinguished, an exploratory excavation program was undertaken to determine the extent of damage to the bottom liner. The firm developed and implemented an air monitoring program which was designed to confirm that no fugitive emissions were affecting nearby residents or school children. (1994 - 1995)

Client Advisor, American National Can Company, Chicago, Illinois. For nine years, Mr. Brust managed all environmental aspects related to the acquisition and divestiture of industrial sites for the world's largest packaging manufacturer. The 85 facilities located throughout the United States varied in their complexity and concerns. All involved regulatory agency and contractual negotiations, and were conducted in close coordination with the client's engineering, legal, and real estate departments. These facilities typically had 400,000 to 1,000,000 square feet of manufacturing and warehouse operations. Applicable regulatory programs have included RCRA, CWA, CAA, SARA, TSCA, and other federal and state mandated programs. (1987 - Ongoing)

Client Advisor, General Electric Company Mr. Brust serves as the overall client advisor to the General Electric Company for the national Corporate Purchasing Agreement. The scope of services to be provided under this agreement is very diverse; it includes both environmental compliance and restoration projects as well as civil engineering services. The firm worked with five GE operations in NY and others across the United States.

Client Advisor, New York State Department of Environmental Conservation the firm provides engineering support to the NYSDEC under the Superfund Standby Program. This $20mm environmental engineering term agreement is in its' seventh year and will soon be extended for another five years. Mr. Brust is the principal client advisor and is responsible for overall staffing and work quality.

Other Relevant Experience

For six years, Mr. Brust managed all environmental aspects related to the acquisition and divestiture of industrial sites for the world's largest packaging manufacturer. The 85 facilities located throughout the United States varied in their complexity and concerns. All involved regulatory agency and contractual negotiations, and were conducted in close coordination with the client's engineering, legal, and real estate departments. Typically, acquisitions focused on the level of current regulatory compliance, the possible effect of future regulations on the operating ability of the plants, and the condition of soil and groundwater quality. Divestitures generally involved equipment decommissioning, soil and building cleanups, asbestos surveys and abatement, underground storage tank removals, and agency negotiations. These facilities typically had 400,000 to 1,000,000 square feet of manufacturing and warehouse operations. Applicable regulatory programs have included RCRA, CWA, CAA, SARA, TSCA, and other federal and state mandated programs.

Prior to joining the firm, Mr. Brust worked on the Emergency Environmental Response Unit (EERU) contract for the EPA. This contract was established to provide logistic and technical support to EPA regions throughout the United States on an as-needed basis. Mr. Brust was involved in approximately 50 emergency response actions including railroad derailments, transformer fires, hazardous waste spills, and emergency cleanups. Many of these responses were the first step in classifying various sites for later inclusion on the list of Superfund sites. During work on this contract, Mr. Brust also worked on the development of the EPA's first mobile incinerator and later operated this unit at the James Denny dioxin-contaminated Superfund site in Missouri.

Mr. Brust led the development of negotiating strategies for a chemical manufacturer whose New York facility has been listed as an Inactive Hazardous Waste Disposal Site by the NYSDEC and who was simultaneously initiating the Corrective Action aspects of RCRA. The EPA identified 27 Solid Waste Management Units (SWMUs) on this third-generation industrial site. Of those, 12 were believed likely to require some degree of investigation and/or remediation. The situation was further complicated by an underlying aquifer which is the sole source of drinking water for the local community.

For several years, Mr. Brust also provided environmental assistance to a fiberglass tank manufacturer with facilities across the Untied States. Inappropriate waste management practices in the mid to late 1970s resulted in significant requirements for remedial action in the regulatory climate of the 1990s. Mr. Brust assisted their corporate legal staff with the assessment and cleanup of several sites, while focusing on the use of alternative investigation and remedial techniques whenever possible.

The potential acquisition of an extremely contaminated chemical manufacturing site in West Virginia warranted a subsurface investigation and extensive negotiations with regulatory agency staff and state government representatives. Although the prospective buyer could initiate interim remedial measures approximating $1 million, the buyer could not tolerate any subsequent soil or groundwater cleanup expenditures. Mr. Brust managed all investigatory tasks on this project and was established as the lead agency negotiator with the WVDNR.

On behalf of a potential investor, Mr. Brust managed a multi-faceted assessment of the Iron Ore Company of Canada operations in Labrador and Quebec, Canada. IOCC, formed in the years following World War II, owned extensive land holdings in both provinces, it's own railroad operation, open pit mines, port facilities on the St. Lawrence Seaway, and multiple processing and beneficiation plants. The environmental component of the overall due diligence process included an analysis of potential liabilities resulting from past waste disposal practices, an evaluation of pending air and hazardous waste regulations on the profitability of operations, and analyses of the proposed capital expenditures program, employee health and safety, and the ability of the current management team to maintain compliance. Three other critical concerns involved the possible future ramifications of (1) 500 million tons of iron ore tailings which had been directed to a lake near the main processing facility; (2) ore processing wastes which had been directed to a one-square mile settling pond near the Seaway; and (3) reclamation obligations at and near 23 abandoned mine pits.

EXPERIENCE PROFILE:

Mr. Fahrenkopf has fifteen years experience in the environmental field, featuring the coordination of subcontractor laboratory services on numerous RCRA, solid waste landfill, and listed hazardous waste sites. He is responsible for the preparation of sampling and analysis plans all phases of environmental sampling and preparation of quality assurance project plans for RCRA, CERCLA, and Department of Defense investigations. Mr. Fahrenkopf has prepared New York State Department of Environmental Conservation Part 360 Solid Waste environmental monitoring plans and site analytical plans for several municipal and industrial landfills. His responsibilities also include the review and interpretation of environmental analytical data. Mr. Fahrenkopf has also been responsible for establishment of field laboratories at several hazardous waste sites.

From 1992 to September 1998, Mr. Fahrenkopf served as the Quality Assurance Officer for a NYSDEC Superfund Standby Contract for Rust Environment & Infrastructure. He has served as the liaison between consultant project managers and the subcontracted analytical laboratories. He has been responsible for the design of sampling programs and preparation of sampling and analysis plans as well as quality assurance project plans. He has been responsible for the validation and supervision of other data validators to evaluate the quality and useability of laboratory analytical data.

Mr. Fahrenkopf has been approved by the New York State Department of Environmental Conservation (NYSDEC) for the validation of organic and inorganic environmental analytical data. He has performed extensive data validation at all levels of complexity including review of laboratory raw data, quality control performance criteria and regulatory compliance for various federal and state analytical requirements. Mr. Fahrenkopf has validated hundreds of full CLP samples obtained under CERCLA, RCRA and Department of Defense/Army Corps of Engineers programs.

Mr. Fahrenkopf's analytical laboratory work included analysis of potable water, waste water, soils, fertilizers, cement and landfill leachates, using atomic absorption spectroscopy, UV-Visible spectroscopy and wet chemical methods. He has analyzed soil and water samples for volatile organics using gas chromatographic (GC) procedures and supervised the establishment of a field laboratory for analysis of semi-volatile organic compounds by GC.

Mr. Fahrenkopf has broad experience in the investigation and evaluation of ecological conditions at hazardous waste, industrial and landfill sites. His experience includes wetland delineations, wetland mitigation and wetland design, ecological risk assessments, habitat evaluation and endangered/threatened species surveys. He has performed habitat assessments and Fish and Wildlife Impact Analyses following the New York State Department of Environmental Conservation (NYSDEC) Guidelines for NYSDEC listed hazardous waste sites.

Mr. Fahrenkopf has extensive experience in wetland delineation, mitigation, creation and design. Mr. Fahrenkopf has prepared wetland permits detailing measures implemented to avoid and minimize impacts to wetlands. He has prepared detailed design plans for restoration of impacted wetlands and design plans for creation of wetlands.

EDUCATION:

BS Wildlife Biology, Colorado State University, 1980
AAS Biology Cobleskill Agricultural and Technical College, 1978
Twenty-seven Credit hours in chemistry
Short Course Interpretation of Mass Spectral Data and Environmental Applications of GC/MS
Wetland Delineation Course

PROFESSIONAL AFFILIATIONS:

American Chemical Society

PROJECT EXPERIENCE:

While working as a Senior Environmental Scientist with another firm, Mr. Fahrenkopf was involved in the following projects:

Remedial Investigation/Feasibility Study New York State Hazardous Waste Site: Project manager and Project chemist/biologist for an RI/FS at a public utility in West Nyack, New York. Project included collection of groundwater, sub-surface soil, surface water and sediment samples. Contaminants of concern included volatile organics in sub-surface soils and groundwater and PCBs in surface soils, sub-surface soils and river sediments. Prepared fish and wildlife impact analysis for the site.

Remedial Investigation Leigh Valley NYSDEC Inactive Hazardous Waste Site: Project chemist/biologist and QA/QC officer for an RI associated with groundwater and surface water TCE contamination from a railroad car spill in the 1970s. Project was performed in 1994-1995 for the New York State Department of Environmental Conservation as part of a Standby Superfund Contract with the State of New York.

Remedial Investigation Westinghouse Site, Buffalo, New York, NYSDEC Hazardous Waste Site: Project chemist/biologist and QA/QC officer for an RI which the firm was retained by the NYSDEC to conduct at the Westinghouse Site. Mr. Fahrenkopf was responsible for data validation, the fish and wildlife assessment and chemical data interpretation and review. Contaminants of concern included chlorinated solvents and PCBs.

Remedial Investigation Sweden 3 Site, Inactive Hazardous Waste Site, Brockport New York: Project chemist/biologist and QA/QC officer for a RI which the firm implemented for the New York State Department of Environmental Conservation in 1992. Responsible for data validation, environmental chemical data interpretation and fish and wildlife impact analysis. Primary contaminant of concern was identified as TCE.

RCRA RFI, FMC Corporation, Bessemer City, North Carolina: Project chemist and QA/QC officer for site investigation at a lithium processing plant. Responsible for laboratory coordination, environmental chemical data evaluation and interpretation and data validation. Contaminants of concern included chlorinated solvents, lithium and flouride. Investigation was performed in 1995/1996 and RFI report submitted tot the USEPA.

Storm Sewer Investigation: Involved in the design and implementation of a sampling plan for a storm sewer investigation for a fortune 500 company in upstate New York. Program included collection of samples and monitoring of flow at numerous points along an industrial plant sewer system during both low and high flows.

Industrial Effluent Monitoring: Design and implementation of a sampling program for discharge monitoring of the effluent from a leachate detention basin for a public utility in southern New York State.

Site Remediation, Pyramid Mall, Syracuse, New York State Inactive Hazardous Waste Site. Set up an on-site field laboratory equipped with four gas chromatographs. Responsible for supervision of field laboratory staff and analysis of soil and water samples for volatile organics. Prepared report detailing laboratory procedures and analytical results. Responsible for coordination with a subcontractor analytical laboratory performing confirmation analysis of field laboratory data.

Site Investigation, FICA Landfill, New York State Listed Hazardous Waste Site. Responsible for management of subcontractor analytical laboratory. Prepared Sampling and Analysis Plan and Quality Assurance Project Plan. Prepared report interpreting ground water, surface water, sediment and soil analytical results. Performed a Fish and Wildlife Impact Analysis at the site following the NYSDEC guidelines. Prepared report presenting the results of the impact analysis. Included delineation of an U.S. Army Corp of Engineers jurisdictional wetland. Evaluated sediment concentrations with respect to potential impact on aquatic life and terrestrial wildlife.

NYSDEC Preliminary Site Investigations
New York State Department of Environmental Conservation 19 PSA sites. Involved in the preparation of Sampling and Analysis Plans and Quality Assurance Project Plans. Coordinated Laboratory Services. Responsible for validation of analytical results. Responsible for coordinating soil gas surveys at five of the sites and involved in the interpretation of soil gas results and preparation of soil gas reports.

OXY USA, Levy Plant.
Data validation and interpretation for site investigation of an inoperative dye manufacturing facility which had contamination of groundwater, surface water, and soil with metals and organics. Management of a field laboratory equipped with a Hewlett Packard 5890 gas chromatograph for analysis of soil samples for semi-volatile organic compounds.

NYSDEC Preliminary Site Assessments at C&D Sites
Responsible for collection of hydrogen sulfide samples at a NYSDEC listed hazardous waste site.
Responsible for coordinating the collection and analysis of hydrogen sulfide samples from nine sites as part of a Preliminary Site Assessment at each of the sites.

Wetland Design, Redwing Inc. Preparation of a wetland mitigation plan which included the creation of 4.9 acres of wetland. Prepared conceptual and final design plans for creation of 2.45 acres of deciduous forested wetland and 2.45 acres of emergent marsh.

Occidental Chemical Corporation. Preparation of a wetland restoration plan associated with the Remediation of contaminated sediments from a wetland located along the Little Niagara River in Tonawanda, New York. Included preparation of conceptual and final design plans for restoration of an emergent marsh following excavation and dredging of contaminated soils.

City of Rome, New York/New York State Department of Environmental Conservation. Wetland delineation and wetland mitigation associated with remediation of the City of Rome landfill. Project was 75% funded by the New York State Department of Environmental Conservation. Delineated boundaries of wetland around the landfill. Prepared mitigation plan which included conceptual and final design plans for creation of 9 acres of wetland. Prepared U.S. Army Corps of Engineers Nationwide 38 permit.

Biodiversity Study, Waste Management of New York State. Conducted a biodiversity assessment of a 500 acre property. Included preparation of vegetation map and quantitative evaluation of species abundance. Characterization of birds that inhabit the facility via visual observations and Emlin lines (bird listening transects).

RCRA RFI/CMS, NGK Metals, Reading, Pennsylvania. Managed an ecological assessment at the site, including management of subcontractors and generation of a report detailing the results or a habitat evaluation and fish and benthos survey of a small stream using the USEPA Rapid Bioassessment Protocols for use in streams and rivers. Project chemist for the project, responsible for data validation, environmental chemical data review and report preparation.

Ecological Risk Assessment Chemical Waste Management, Model City Facility. Performed an ecological risk assessment as part of an RCRA Facility Investigation. Report was submitted to NYSDEC and USEPA for review and approval.

Wetland Evaluation - Delineation of wetland areas and evaluation of the suitability of an area for creation of a wetland on a residential development project.

Fish and Wildlife Impact Analyses at over 12 industrial and hazardous waste sites in New York State. Tasks included preparation of vegetative cover type maps, determination of animal types indigenous to the area, interpretation of site chemistry, and evaluation of potential impact to the surrounding environment.

Endangered Species Evaluation - Determination of the suitability of an undeveloped tract of land as suitable habitat for the Bog turtle, an endangered species in New York State.

EXPERIENCE PROFILE:

Mr. Noce has more than ten years of experience in the field of environmental chemistry. He has been involved in various project work including field sampling of air, soil, water and hazardous wastes; industrial hygiene air sampling; environmental site assessments; data validation; regulatory and file research; environmental database management; and project management. In addition, he applies his laboratory skills to provide a wide range of quality assurance (QA) functions in support of field activities. Mr. Noce was involved in a commercial/industrial site assessment program for a previous employer, and has performed facility site inspections and prepared assessment reports for a number of commercial facilities.

He has extensive data validation experience at all levels of complexity including the review of laboratory raw data, quality control (QC) performance criteria and regulatory compliance to meet various federal and state analytical requirements. He meets the NYSDEC requirements for performing both inorganic and organic data validation. He has more than five years of experience in performing data validation, and has validated hundreds of full CLP sample sets obtained under CERCLA, RCRA, NYSDEC and Department of Defense/Army Corps of Engineers programs. Validation experience also includes the review and evaluation of PCB congener-specific analyses. He has interpreted field and laboratory analytical data from petroleum underground storage tank investigations, and has provided guidance to project personnel on the field and laboratory analytical procedures to be used when investigating potential releases of petroleum hydrocarbons.

Mr. Noce is active in a variety of industrial hygiene activities, including sampling and analysis, report preparation, and task management. He applies his formal educational training by acting as an instructor for a variety of professional development courses, including an overview of the Department of Transportation (DOT) regulations (HM 126f/181) and various other health and safety courses.

EDUCATION:

Graduate Coursework:

Comprehensive Industrial Hygiene Review, Harvard School of Public Health, 1998
Fundamentals of Industrial Hygiene, Cornell University School of Industrial and Labor Relations, 1995
Environmental Physiology, SUNY Albany, 1994

BA Biology and Secondary Education, Potsdam College of SUNY, 1988 (including 20 hours of coursework in Chemistry - General and Organic, Biochemistry)

CERTIFICATIONS:

Certified Hazardous Materials Manager - Master Level (#8607), since 1997
Certified Environmental Trainer - MTHMW (#98-768), since 1998
OSHA Hazardous Materials Site Worker Course – 40 Hour Initial Training Course (March, 1993)
OSHA Hazardous Materials Site Worker Course - 8 Hour Annual Refresher (April, 1998)
OSHA Hazardous Materials Site Worker Course - 8 Hour Supervisor Training

AREAS OF EXPERTISE:

Industrial Hygiene and Occupational Safety
Hazardous Materials Transportation
Field Sampling and Sample Management
Data Validation, Review and Interpretation
On-site Gas Chromatograph Screening
Remedial Construction Oversight and Management
USEPA CLP/NYSDEC ASP Laboratory Analyses

OVERVIEW OF PROJECT EXPERIENCE:

Health & Safety Training Instructor, New York State Thruway Authority Canal Corporation. Prepared and presented the chemistry and toxicology section of an 8-hour training course for Canal Corporation employees. Presented the entire 8-hour course on numerous occasions.

Health & Safety Training Instructor, Rensselaer County. Prepared and presented the construction fall protection, hazard communication/right-to-know, personal protective equipment, physical & biological health hazards, chemistry, and toxicology sections of a 10-hour construction safety awareness training course for County Engineering and Highway employees.

Health & Safety Training Instructor, The Noteworthy Company, Amsterdam, New York. Prepared and presented a facility-specific 4-hour training course for company employees covering the chemicals used in the lithographic printing processes at the facility. Also prepared and presented hazardous materials handling training for selected employees.

Industrial Hygiene Sampling, Consolidated Rail Corporation, Multiple Locations. Sampling Team Coordinator for a national industrial hygiene sampling program conducted throughout the Conrail system. Assigned sampling teams to complete work assignments as they were received, coordinated the analytical results received from the different laboratories conducting the analyses and prepared letter reports documenting the results of the sampling. Also personally involved in the collection of samples for several work assignments. Continuing to provide a variety of industrial hygiene and health and safety services to Conrail on an on-going basis.

Indoor Air Quality Assessment, Office Building/Warehouse, New York. Planned and implemented an indoor air quality investigation reported in our client's offices, which are located above a large warehouse area.

Indoor Air Quality Assessment, Office Building, Westborough, Massachusetts. Collected real time carbon dioxide data as well as bacterial, fiber and volatile samples for analysis to determine the cause of an indoor air quality problem reported in our client's office building. Assisted in the report preparation and reviewed recommendations made to alleviate the problems discovered.

Air Quality Assessment, Manufacturing Facility, New York. Planned and implemented an indoor air quality assessment for a manufacturing facility.

Air Permitting and Compliance, Industrial Facility, Amsterdam, New York. Assisted in the preparation of air emission inventories and air permit applications for an offset lithographic printing operation located in NYSDEC Region 4. Oversaw the collection of hazardous chemicals inventory information and the calculation of emissions that assisted the facility in "capping out" as a "synthetic minor" source under Title V of the Clean Air Act. Provide ongoing air emission tracking assistance and certification data for the client.

Air Permitting, Mining Operation, Upstate New York. Provided assistance in preparing applications for air emission sources of particulate matter, CO, NO_x, SO_x and total unburned hydrocarbons in support of a proposed mining and aggregate production facility located in NYSDEC Region 5. Responsible for calculating the potential to emit and provide a quantitative assessment of potential air quality impacts associated with construction and operation of the proposed using air modeling software.

Air Permitting, Industrial Facility, Schenectady, New York. Assisted in the preparation of an application for a new air emission source of volatile organic compounds, including some hazardous air pollutants, for a printing operation located in NYSDEC Region 4. Reviewed information from the client regarding print paste formulas and other products used as well as information from suppliers and manufacturers on the volatile organic constituents and hazardous air pollutant content of each product used.

Excavation Plan, OCC Durez Site, North Tonawanda, New York. Assisted in developing an excavation plan to be used in the event that non-aqueous-phase liquid (NAPL) was encountered during excavation activities in the area of the Occidental Chemical Corporation's Durez facility.

Air Monitoring, Industrial Facility, Waterford, New York. Member of the sampling team and alternate team leader for an ambient air quality monitoring program during mitigation activities at a burning chemical landfill. Responsible for coordinating the laboratory analyses and the review and reporting of the data received. Helped to compile the climatological data for the days when samples were collected. Analytical methodologies included EPA Method TO-11, EPA Method TO-14, EPA Method 16, NIOSH Method 5506, NIOSH Method S173 and NIOSH Method 1603. The purpose of the program was to evaluate the ambient air quality at the site and monitor for possible fugitive emissions that may have resulted from the planned mitigation activities.

Monitoring Well Installation, New York State Superfund Lehigh Valley Railroad Derailment Site, Western New York. Operated a Photovac 10S70 portable gas chromatograph in support of this monitoring well installation program. Headspace over both groundwater and soil samples were analyzed for TCE, cis-1,2-DCE and trans-1,2-DCE. The results were considered when determining screening intervals for well installation and to help prevent possible vertical contamination during drilling. They also served as the basis for disposal of the purge water and drill cuttings. Selected samples were screened for the presence of any NAPL using a hydrophobic dye and UV light.

Air Stripper Treatability Study, Industrial Facility, Upstate New York. Operated two Photovac 10S70 portable gas chromatographs in support of a pilot study during the start up and operation of an air stripper at a large industrial facility in New York. Analyzed for a variety of volatile organic compounds, including benzene, toluene, ethylbenzene, xylene, methyl ethyl ketone, trichloroethene, cis- and trans-dichloroethene and methyl isobutyl ketone. The data was used to balance the system and monitor final air emissions.

River Sediment Data Analysis, Confidential Client, New York. Prepared a series of innovative tables documenting the exceedance ratios of chemical compounds in river-bottom sediments in comparison to NYSDEC Sediment Criteria to demonstrate potential impact from a private client's facility. These tables have helped to demonstrate that the primary compounds of concern are not those that are attributable to the client. This discovery has had a significant impact in the approach that the State has taken for this project.

Landfill Cover Analysis, Confidential Client, New York. Planned and implemented the analytical component of a demonstration program approved by both the Connecticut Department of Environmental Protection and the NYSDEC. The program allowed a private client to use processed construction and demolition debris as an alternative daily cover material at a landfill. Samples were collected weekly and analyzed for total RCRA metals, TCLP metals, BTEX, TPH, TOC, grain size and asbestos, with the results reported on an expedited basis. In addition to being responsible for coordination with the analytical laboratory, the client, and landfill personnel, Mr. Noce reviewed the data and prepared a final data summary package with statistical information presented for the results over the course of the program.

Laboratory Audits, Multiple Locations. Conducted on-site laboratory audits for a private industrial client, and recommended the laboratory chosen for the long-term monitoring program at the client's facility.

Hydrogen Sulfide Remediation Project, Confidential Client, New York. Served as project chemist on a team assisting a major financial institution with interests in a housing development. This development was situated over a gypsum landfill emitting nuisance levels of hydrogen sulfide. Developed a strategy for continual monitoring of hydrogen sulfide from the landfill into the housing development.

ADDITIONAL TRAINING:

Train-The-Trainer: Designing, Developing, and Delivering Effective Training Programs
Designing Effective Environmental Training Course
Hazardous Materials Management Course
Probability, Statistics, and Geostatistics for the Environmental Professional (NGWA Short Course)
DOT HM126f/181 Train-The-Trainer Course
Ohmicron Immunoassay Field Test Kit Certification Course
NYSDEC/EPA Organic Data Validation Course
Inductively Coupled Argon Plasma Emission Spectroscopy Course
10 Hour Construction-Site Safety Course
Red Cross Certification to perform CPR and First Aid

PROFESSIONAL MEMBERSHIPS:

American Chemical Society (Alternate Councilor, Chair of 1997 and 2003 Northeast Regional Meetings)
Academy of Certified Hazardous Materials Managers
American Industrial Hygiene Association
Northeast Regional Health and Safety Council
National Ground Water Association

EMPLOYMENT HISTORY:

1998-Present	Delaware Engineering
1993-1998	Rust Environment & Infrastructure
1991-1993	Ward Scientific Ltd.
1990-1991	Enseco-Erco Laboratory
1988-1990	York Laboratories

Mark A. Williams
Staff Scientist II, Environmental Geologist

Education

M.S. work, 1990, Environmental Science, SUNY-ESF, Syracuse, New York
B.S., 1986, Geology, East Carolina University, Greenville, North Carolina

Experience Summary

Mr. Williams serves as a project scientist, field supervisor and task manager for various environmental contamination assessment projects and geologic/hydrogeologic investigations. He has over eight years of experience conducting and overseeing multi-tasked subsurface investigations at active/inactive landfills and industrial/commercial facilities. As a field and project geologist with Rust, Mr. Williams has coordinated and supervised several remediation and remedial construction projects, investigated numerous sites contaminated due to spills and/or leaking underground storage tank (LUST) facilities and performed inspections associated with Operation and Maintenance (O&M) programs. He has also performed Phase I/Phase II environmental due diligence evaluations associated with real estate transactions of industrial and manufacturing facilities, as well as commercial properties.

Mr. Williams has been responsible for borehole and corehole geologic logging, installation of numerous monitoring wells, piezometers and recovery wells by mud and air rotary, air hammer, auger and coring methods, aquifer testing and analysis and the collection of environmental samples. His considerable field experience has allowed him to develop extensive skills in analyzing and describing subsurface conditions. His project tasks include the development of project work plans, sampling and analysis plans and health and safety plans. He also coordinates field investigation activities, oversees and trains staff level personnel, conducts technical research, data evaluation and analysis and report writing.

Project Experience

Domestic Well and Initial Environmental Sampling Report (IRM), Lehigh Valley Railroad Derailment Site, LeRoy, New York. NYSDEC. Field Task Manager and Health and Safety Officer. Objectives of the Investigation were to determine the extent of TCE and cyanide contamination in surficial and subsurface soil, river sediment, and groundwater (bedrock) at the Site for the purpose of evaluating site remedial alternatives. Mr. Williams conducted and supervised the logging and sampling of over twenty test pits, using Level C health and safety protection, at a railroad derailment site where liquid trichloroethane (TCE) and crystalline cyanide were spilled. In addition, he served as the air monitoring/field health and safety officer during initial sampling activities using real-time direct reading instruments and indirect sampling techniques for organic vapors and respirable particulate. Activities included collecting work zone/perimeter monitoring for volatile organic contaminants and cyanide particulate to determine effects of sampling activities on adjacent properties. Mr. Williams also conducted personnel monitoring for a number of other contaminants using various collection methods. During later

stages of the Investigation, Mr. Williams performed groundwater sampling, hydraulic conductivity testing and data analysis of all fifty-five newly-installed bedrock monitoring wells.

Nineteen (19) Class 2A Preliminary Site Assessments, New York State. NYSDEC. Task Manager of a multi-site work assignment for the NYSDEC - Division of Hazardous Waste Remediation. The focus of these multi-task investigations was to determine whether the disposal of hazardous waste, as defined by 6 NYCRR Part 371, is documented at these sites, and if so, to determine whether they present a potential threat to public health and/or the environment as a result of the presence of hazardous waste. Responsibilities included the development and implementation of site-specific scopes of work, data interpretation and report preparation.

Engineering Investigation at Construction and Demolition Debris Sites - Final Preliminary Site Assessment, upstate and southern New York State. NYSDEC. Field/Project Geologist. Conducted Phase II investigations under contract to the NYSDEC at seven Class 2A construction and demolition debris landfills located in upstate and southern New York State. The objective of these investigations was to determine if hazardous waste was disposed of at any of these Sites. Mr. Williams was involved with the development of a generic work plan, generic quality assurance project plan (QAPP), site-specific health and safety plans and preliminary site assessment reports. Mr. Williams also served as co-Task Manager for one site in Columbia County (LaMunyan) and one site in Greene County (Ferro). Tasks performed in the field included test trench logging, geologic research and field mapping, soil logging/waste characterization and sampling and drum sampling. In addition, he also collected air samples for hydrogen sulfide using real-time direct reading and indirect sampling techniques. Other responsibilities included oversight and coordination of project personnel for completion of field tasks, evaluation/interpretation of hydrogeologic and analytical data and the organization and preparation of project report(s). Investigation concluded that hazardous wastes were not present at these Sites.

Remedial Investigation - Almy Brothers Site, Binghamton, New York. NYSDEC. RI Field Geologist. Objectives of the Investigation were to determine the extent of pesticide contamination in waste drums, surficial and subsurface soil, storm sewer and river sediment, air and groundwater at the Site for the purpose of evaluating site remedial alternatives. Tasks included supervision of field activities, surface and subsurface soil sampling and logging, groundwater monitoring well construction supervision, borehole and monitoring well log preparation, well development, groundwater sampling, drum sampling (Level B), hydraulic conductivity testing, data evaluation and analysis and report writing. The investigation results were used to evaluate the nature and extent of pesticide and dioxin contamination and to collect design information necessary for selection of a remedial system.

Remedial Investigation - Philmar Electronics Site, Morrisonville, New York. NYSDEC. RI Field Geologist. The Philmar site is an inactive hazardous waste site where groundwater was contaminated by chlorinated volatile organic chemicals and petroleum hydrocarbons as a result

of waste spills and disposal on the property. Tasks included supervision of field activities, surface and subsurface soil sampling and logging, groundwater monitoring well construction supervision, borehole and monitoring well log preparation, well development, groundwater sampling, hydraulic conductivity testing, data evaluation and analysis and report writing. Objectives of the Investigation were to determine the extent of groundwater contamination at the Site for the purpose of evaluating site remedial alternatives. Based on the results of the RI/FS, the NYSDEC selected a remedy for the site which provided for installation of a recovery trench in the weathered till, treatment of recovered groundwater, and disposal of water in an on-site infiltration field.

Remedial Construction Oversight - Philmar Electronics Site, Morrisonville, New York. NYSDEC. Field Manager. Provided field construction management of remedial activities (oversight of recovery trench and infiltration field construction) at the Philmar Electronics site. Supervised the activities of all on-site contractors. As Assistant Construction Manager, responsibilities included reviews of submittals, coordination of work activities, approval of subcontractors' invoices, inspection of equipment installation, daily oversight and tracking of excavation, oversight of the installation of recovery trench and discharge piping, oversight of installation of a permeable soil cap, performing required inspection and quality assurance testing, yield testing and the collection of treatability samples. Based on water quality and yield tests performed on the recovery trench after construction, design plans were subsequently prepared for the treatment system. The treatment system design included thermal enhanced air stripping followed by filtration and activated carbon adsorption. In late 1995 RUST performed oversight of the treatment system construction. In January 1996 RUST started the recovery and treatment system and has operated the unit since that time.

Supplemental Hydrogeologic Investigation/Engineering Report and Remedial Design for Groundwater/Leachate Interceptor Trench, Seneca Falls, New York. Seneca Meadows, Inc. Mr. Williams provided field supervision of a hydrogeologic investigation as part of a permit application for one of the largest solid waste landfills in New York State. The investigation included design of a monitoring well network, test pitting, drilling, borehole and corehole logging, monitoring well installation, hydraulic conductivity testing, geotechnical and groundwater sampling and participated in meetings with regulatory agencies. The investigation results were used to evaluate the nature and extent of groundwater contamination, to characterize groundwater flow and to develop design information necessary for development of a remedial system.

Mr. Williams also performed a noise survey at the facility. Duties included measuring sound levels at various work zone areas and along the perimeter of the landfill property using a precision sound level meter. The results were reported to the NYSDEC.

Engineering Report for Cement Kiln Dust Monofill Expansion, Ravena, New York. Blue Circle Cement, Inc. Project hydrogeologist responsible for design of monitoring well network

and supervision of field activities including: drilling, monitoring well and piezometer installation, well development, hydraulic conductivity testing and surface, sediment and groundwater sampling. He also evaluated the geologic and hydrogeologic data and aided in the NYSDEC-approved Engineering Report. Tasks included the following: regional and site geologic and hydrogeologic characterization, preparation of groundwater contour maps utilized in the design of the northern expansion footprint, determination of causes for groundwater elevation fluctuation, determination of potential groundwater monitoring zones and the establishment of a long-term groundwater monitoring system.

Remedial Investigation/ Feasibility Study, ORU-West Nyack Service Facility, West Nyack, New York. Orange and Rockland Utilities, Inc. Provided field supervision and served as project hydrogeologist for a subsurface investigation of a former 10,000 gallon UST Area, former Dry Well and a Suspected Transformer Disposal Area. Supervised the drilling of forty-five soil borings, drilling and installation of twelve monitoring wells and subsurface exploration of four test pits. Additional activities included borehole, corehole and test pit logging, collecting sediment, surface water and groundwater samples, surfical geologic mapping, aerial photo interpretation, hydraulic conductivity testing, review and analysis of new and existing data and aided in the determination of the nature and extent of subsurface soil and groundwater contamination.

Hydrogeologic Investigation of Proposed Papermill Byproduct Management Facility, South Glens Falls, New York. Project Hydrogeologist. Performed site screening and ranking, supervised the drilling and installation of over twenty-five monitoring wells, test pit supervision, borehole and corehole logging, packer testing, collecting groundwater and surface water samples and hydraulic conductivity testing. In addition, he reviewed and analyzed new and existing data, prepared the site investigation report and provided analysis of solid waste/environmental impact on areas relating to solid waste treatment for a Draft Environmental Impact Statement of a proposed development area.

Environmental Liability Assessment/Subsurface Investigation, Newell, West Virginia. MCI. Project Hydrogeologist/Environmental Scientist. Performed test pit supervision, soil logging, oversight of monitoring well installation and groundwater sample collection for a pre-purchase site assessment of a specialty chemicals manufacturing facility in northwestern West Virginia. The project involved a hydrogeologic investigation, environmental monitoring, review of historical files and calculation of a preliminary liability assessment score. Mr. Williams also provided project management, technical direction and supervision, data compilation and reporting. The liability assessment focused on the level of current regulatory compliance, the possible effect of future regulations on the operating ability of the plant, and the condition of soil and groundwater quality at the site. After review of our report, the client did not pursue further acquisition efforts.

East Street/Lyman Street Site Investigation, Pittsfield, Massachusetts. General Electric.

Project Hydrogeologist/Project Manager. Performed groundwater monitoring well, piezometer and recovery well construction supervision. Tasks included supervision of field activities, soil sampling and logging, borehole and monitoring well log preparation using gINT software, well development using compressed nitrogen, groundwater sampling, hydraulic conductivity testing, data evaluation and analysis and report writing.

Field Activity/Odor Control Report, Metz Construction and Demolition Debris Landfill, South Bethlehem, New York. WMI. Project Geologist. Mr. Williams provided field supervision and served as project hydrogeologist for a subsurface investigation and fire abatement study at a permitted construction and demolition debris landfill. Services included the installation and monitoring of temperature probes, temperature probing, health and safety monitoring and supervision of boring and grouting activities. Tasks also included geologic and geotechnical logging, subsurface soil sampling, coordination of field activities, installation of monitoring wells, groundwater sampling, data evaluation and report preparation for this project.

Leaking UST Investigation, Verona, New York. Freihofer Baking Company. Served as a task manager for a project involving the evaluation of an existing groundwater pump and treat/soil venting system. Based on the results of this evaluation, Mr. Williams supervised drilling by geoprobe and hollow stem auger techniques, logged subsurface soils, installed monitoring wells, developed the newly-installed and existing monitoring wells, collected groundwater samples and conducted additional historical research. The investigation results were used to delineate impacted subsurface soils and groundwater, to characterize groundwater flow, to evaluate if off-site sources contributed or were responsible for the petroleum contamination and to develop design information necessary for the development of an effective remedial system. A new system consisting of a shallow tray air-stripper and recovery wells was selected, designed and subsequently installed.

Leaking UST Investigation and Tank Removal, Whitehouse, Ohio. American National Can Company. Served as a task geologist for a project which involved the drilling of soil borings, collection of subsurface soil samples for headspace screening and laboratory analysis, characterization of impacts to subsurface soil and groundwater, removal of underground storage tanks and off-site disposal of contaminated soils.

Monitoring of Free-Product at the Gulf Terminal, Port of Rensselaer, New York. Chevron. Mr. Williams was a field hydrogeologist for the preparation of a site investigation report for a former owner of a petroleum storage terminal. Tasks included the supervision of geoprobe drilling, collection and logging of subsurface soils, evaluation of the existing monitoring well network, extension of select monitoring wells in the West Yard and the collection and review of quarterly depth to product / depth to water measurements.

Professional Memberships

National Water Well Association (Association of Groundwater Scientists and Engineers)
National Solid Waste Management Association
Hudson-Mohawk Professional Geologists Association

Presentations, Publications, Awards

Presentations

"Secondary Material Utilization." University of Montreal, Environmental Issues Symposium, 1988.

Awards

Utilization Award - 1991, Dunn Corporation

Robin Hood Oak Award - 1988, SUNY - Environmental Science and Forestry College

Who's Who Among Colleges and Universities - 1989, SUNY-Environmental Science and Forestry College

W.A. Tarr Award - 1986, Sigma Gamma Epsilon - Epsilon Phi Chapter, East Carolina University

Outstanding Senior Award - 1986, Department of Geology, East Carolina University

Employment History

1993-Present	RUST Environment & Infrastructure
1989-1993	Dunn Corporation (merged into RUST)
1987-1989	SUNY - Environmental Science and Forestry College
1986 (Summer)	Dunn Geoscience Corporation

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APPENDIX B

Community Air Monitoring Plans
(Ground Intrusive and Non-Intrusive Activities)

Community Air Monitoring Plan
(Ground Intrusive Activities)

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area is necessary. The plan must include the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area on a **continuous** basis. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.
- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Community Air Monitoring Plan
(Non-Intrusive Activities)

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area is necessary. The plan must include the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area daily at **2 hour** intervals. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.
- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations. If the downwind particulate level is 150 $\mu g/m^3$ greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume but more frequent intervals of monitoring, as directed by the Safety Officer, must be conducted. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background, and
- more frequent intervals of monitoring, as directed by the Safety Officer, are conducted.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Community Air Monitoring Plan
(Non-Intrusive Activities)

Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

- if organic vapor levels are approaching 5 ppm above background.

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health and Safety Plan of the Work Plan will go into effect.
2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.
3. Frequent air monitoring will be conducted at 30 minutes intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

APPENDIX C

Guidance for the Development of Data Usability Summary Reports

New York State Department of Environmental Conservation
Division of Environmental Remediation

Guidance for the Development of Data Usability Summary Reports

Background:

The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the costly and time consuming process of third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

Though the substitution of a DUSR for a full third party data validation may seem to be a relaxation of the Division's quality assurance requirements, this is definitely not the case. The development of the DUSR must be carried out by an experienced environmental scientist, such as the project Quality Assurance Officer, who is fully capable of conducting a full data validation. Furthermore, the DUSR is developed from a full New York State Department of Environmental Conservation Analytical Services Protocol (NYSDEC ASP) Category B or a United States Environmental Protection Agency Contract Laboratory Protocol (USEPA CLP) deliverables package.

The DUSR and the data deliverables package will be reviewed by the Division's Quality Assurance Unit. In most cases, we expect that this review will result in agreement or with only minor differences that can be easily reconciled. If data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later date on the same data package used for the development of the DUSR.

Personnel Requirements:

The Environmental Scientist preparing the DUSR must hold a Bachelors Degree in a relevant natural or physical science or field of engineering and must submit a resume to the Division's Quality Assurance Unit documenting experience in environmental sampling, analysis and data review.

Preparation of a DUSR:

The DUSR is developed by reviewing and evaluating the analytical data package. During the course of this review the following questions must be asked and answered:

1.. Is the data package complete as defined under the requirements for the NYSDEC ASP Category B or USEPA CLP deliverables?

2. Have all holding times been met?

3. Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?

4. Have all of the data been generated using established and agreed upon analytical protocols?

5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?

6. Have the correct data qualifiers been used ?

Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data qualifications must be documented following the NYSDEC ASP '95 Rev. guidelines.

Contact the Division of Environmental Remediation Quality Assurance Group at (518) 457- 9280, with any questions on the preparation of a DUSR.

Revised 09/97