VOLUME I REPORT

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

SITE # 1-30-052

REMEDIAL INVESTIGATION REPORT

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1.0 INTRODUCTION

1.1 Purpose

This document presents the results of the Remedial Investigation (RI) for Group Environmental Management Company (A BP Affiliated Company) at the former Columbia Cement Co., Inc., (CCC) Site (Site No. 1-30-052) located at 159 Hanse Avenue, Freeport, New York (Figure 1). The RI primarily focused on residual impacts due to an April 1988 spill of 1,1,1-trichloroethane (1,1,1-TCA) that occurred when a delivery truck ruptured at the Site. However, a subset of ground water and soil boring samples were analyzed for the New York State Department of Environmental Conservation (NYSDEC) Target Compound List (TCL) organic compounds and the Target Analyte List (TAL) inorganic compounds.

An initial Focused Subsurface Investigation (FSI) performed as part of a property transaction was conducted and 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. However, ground water analytical results from this investigation are provided in this report and represent a separate independent monitoring event.

Burmah Castrol (former owner of site) 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 remedial program for the Site that includes 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. Burmah Castrol Holdings, Inc., is the entity responsible for this remediation and retains all liabilities in the matter to the extent they exist. Burmah Castrol and its subsidiaries and its affiliated entities were acquired by BP PLC in 2000.

Delaware Engineering, P.C. (Delaware), developed a Field Health and Safety Plan (FHSP), Sampling and Analysis Plan (SAP) and a Citizen's Participation Plan (CPP). The Site-specific FHSP was developed to ensure the health and safety of workers and the immediate community during implementation of the RI. The SAP contained both a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP), which outlined data quality objectives and detailed the specific sampling procedures and the relevant sampling and analytical protocols to ensure that the data collected during the RI were of sufficient quality to support remedial decisions. The CPP outlined 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

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 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. The Site storm-water drainage system discharges into Freeport Creek approximately 1,000 feet northwest of the Site.

A survey benchmark was established by Earth Tech (formerly Rust Environment & Infrastructure) 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. Illinois Tool Works (ITW) currently owns the property and operates it under the name TACC. 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 former Columbia Cement facility building (now TACC) is the first and only construction at this address since the landfilling ceased. Adjacent facilities are contemporary with the former CCC facility.

Relevant Site conditions and activities, which occurred prior to the Phase I RI, 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 and 1989. These tanks and associated lines were removed by Unico Service Corporation on January 6, 1990;

- 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;

- In the spring of 1988, five new 8,000-gallon underground storage tanks were installed to the south of the existing storm water basin (southern tank farm); and

- Following the 1,1,1-TCA Spill, a new (northern tank farm) underground tank farm, comprised of five 8000-gallon tanks, was installed to the north of the aforementioned 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.

Spill Incident

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

The remaining material in the tank trailer (1,740 gallons of 1,1,1-TCA) was drained into 55-gallon drums, while the spilled material (approximately 1,760 gallons) flowed towards an on-Site storm drain. This resulted in some 1,1,1-TCA to enter a storm sewer outlet. The on-Site storm drains ultimately drain into Freeport Creek approximately 1,000 feet to the northwest of the 1,1,1-TCA Spill Area. Immediate clean-up activities consisted of: 1) Removing liquid and approximately ten cubic yards of soil from the noted
storm drain, and 2) Removing liquid material from the storm drain system. The storm drains were purged by flushing with clean water until sampling results showed concentrations of 1,1,1-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 1,1,1-TCA concentrations in soil ranging from 67 parts per million (ppm) to 42,649 ppm.

1.4 Prior Investigation Activities

The following is a summary of environmental analyses and events since the 1,1,1-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: Tyree Environmental drilled Three borings. One of these borings was converted into a monitoring well, MW-1S, which still exists. 1,1,1-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 1,1,1-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 1,1,1-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 1,1,1-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 1,1,1-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 1,1,1-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 1,1,1-TCA Spill, and one water sample from the storm water basin near MW-1S were analyzed. Laboratory results reported by Vulcan Materials Company indicated 1,1,1-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. 1,1,1-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 inclusion of the Site on the State's registry of inactive hazardous waste disposal Sites.

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 1,1,1-TCA, as well as 1,1-dichloroethane, chlorobenzene and toluene.

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

10. 5/12/92: Eder Associates collected ground water 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 1,1,1-TCA, while the temporary observation wells had 1,1,1-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 ground water samples during low and high tide to assess the possible variation of 1,1,1-TCA concentration in MW-1S due to tidal influence. Results indicated that little variation was noted. 1,1,1-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. 1,1,1-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 ground water collected using Geoprobe™ techniques in the northwest and southwest corners of the Site, away from the 1,1,1-TCA Spill area. Reported 1,1,1-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 ground water from monitoring well MW-1S and reported a 1,1,1-TCA concentration of less than 5 ppb. Some doubt exists regarding the sampling protocols used for this sample.

14. During June of 1997 a Focused Sub-Surface Investigation (FSI) was performed which included the installation of eight ground water monitoring wells to assess conditions near the spill area and at the property boundaries.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

Activities completed during the RI included:

- Installation of two borings near the spill area (SB-98-3, SB-98-4) and one in the storm drain located in the spill area (SB-98-2) and collection of soil samples for VOC field screening and laboratory analysis. Proposed boring SB-98-1 was aborted with the concurrence of the NYSDEC due to its proximity to underground storage tank piping and the consensus that the boring would essentially be duplicative of boring SB-98-4;

- Advancement of a shallow soil boring (SB-98-5) in the vicinity of former boring TB-97-6 for field PID screening and laboratory analysis;

- Advancement of a background soil boring (BSB-98-7) in the northeast corner of the Site and collection and laboratory analysis of background soil boring samples;

- Installation of two deep monitoring wells, one at the west-southwest corner of the Site adjacent to existing shallow monitoring well MW-97-1S (MW-98-9D) and one at the west-northwest corner adjacent to MW-97-2S (MW-98-10D). Collection of continuous split spoon soil samples with field PID screening and laboratory analysis of selected soil samples;

- Installation of one shallow and one deep monitoring well to the east of the spill area (MW-98-8S and MW-98-8D), including the collection of continuous split spoon soil samples, field PID screening of all samples and laboratory analysis of selected soil samples;

- Collected vadose zone soil gas samples with field PID screening and laboratory analysis of fifty percent of the samples (January 1999). Collection of three additional samples to further evaluate vadose zone volatile organic concentrations at lower reporting limits.

- Field PID screening and laboratory analysis of sediments from the on-Site storm drains. Confirmed storm drain discharge (i.e., are the storm drains interconnected) and storm water discharge points;

- Collection of sediment samples from on-Site storm drains. Samples were analyzed for the NYSDEC TAGM 4046 TCL Volatile Organics (SW-846 Method 8260) and TCL Semi-Volatile Organics (SW-846 Method 8270), the 8 RCRA Metals and TPH Diesel Range Organics (SW-846 Method 8015). Samples were collected and analyzed pursuant to the USEPA Class V Injection Well program as administered by the Nassau County Health Department.

- Collection of surface water and sediment samples from Freeport Creek for volatile organic analysis

- Installation of one deep monitoring well in the spill area (MW-00-11A) screened below the gray clay and silt unit in the underlying gray sand unit, with the collection of continuous split spoon samples for field screening with a photoionization detector (PID) and laboratory analysis;

- Installation of one deep monitoring well (MW-00-12D) to the south of the spill area between existing shallow monitoring wells MW-4S and MW-5S. This well was screened at the top of the gray clay and silt unit in the gravelly sand unit. This boring was utilized to collect a grab sample from the gray sand Unit underlying the gray clay and silt unit. Soil boring samples were screened in the field with a PID and selected samples were submitted for laboratory analysis;

- Collection of indoor/outdoor air samples by the NYSDOH. Indoor air collected from building directly south of Site;

- Installation of one off-site shallow ground water monitoring well (MW-03-13S). The monitoring well was installed approximately 400 feet south of the site along Hanse Avenue in front of the AHRC property (230 Hanse Avenue).

- Measurement of ground water levels in all on-Site monitoring wells (December 1998 January 1999, April/May 2000 and May 2003);

- Evaluated the boring data for evidence of dense non-aqueous phase liquid (DNAPL)

- Development of all new monitoring wells;

- In-situ hydraulic conductivity testing of all new monitoring wells;

- Collection of ground water samples from the on-Site monitoring wells for laboratory analysis (January 1999, April 2000 and May 2003);

Previous investigative results were reviewed to aid in developing the scope of the RI. The sampling and analysis conducted during the RI also addressed 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 material safety data sheet for this product is included in the Health and Safety Plan. The soil and ground water analyses conducted during this Phase I RI were intended to detect any potential subsurface impacts related to these volatile compounds.

The initial field work associated with this RI was initiated in December 1998 and was performed between December 14, 1998 and December 29, 1998. Water level measurements were collected by Delaware on December 30, 1998 and February 16, 1999. The second phase of field work was initiated in April 2000 and was completed in early May 2000. The third phase of field work, which included the indoor air samples collected by the New York State Department of Health (NYSDOH) and the installation of monitoring well MW-03-13S and collection of ground water samples were conducted in September 2002 and May 2003, respectively. Techniques and methods specified in the Phase I, Phase II and Phase II Addendum Work Plans were used for performing all field investigations and laboratory testing.

2.1 Sub-surface Borings

Since 1997, twenty-six soil borings have been advanced to assess the presence, nature, and extent of volatile organic compounds (VOCs) in subsurface soil and ground water at the Site and in the vicinity of the 1988 spill area. All soil boring and monitoring well locations are depicted in Figure 2. The subsurface boring information collected to-date is listed below:

- Fifteen shallow soil borings have been advanced to characterize the geology and subsurface soil quality of the Fill, Tidal Marsh and upper portion of the Gravelly Sand unit. Fourteen of these soil borings were subsequently converted into monitoring wells and have helped to characterize ground water flow patterns and ground water quality for the "shallow" hydrogeologic unit (upper portion of Gravelly Sand unit) at the Site.

- Six soil borings have been drilled to the base of the Gravelly Sand unit to provide additional characterization of subsurface conditions in the spill area.

- Four additional soil borings have been advanced to further describe the geology and subsurface soil quality of the Fill, Tidal Marsh, Gravelly Sand and upper portion of the gray clay and silt unit. Each of these borings was subsequently converted into a "deep" overburden monitoring well to further characterize ground water flow patterns and ground water quality for the "deep" hydrogeologic unit (base of Gravelly Sand unit) at the Site.

- Two borings (SB-98-8S/MW-98-8S and SB-98-8D/MW-98-8D) were advanced to the east of the spill area to evaluate sub-surface soil and ground water quality east of the Site. Continuous split spoon soil samples were collected from boring SB-98-8D and all samples were field screened with a PID. Selected samples were submitted for laboratory analysis.

- Two additional borings were completed during the Phase II RI Investigation to refine the sub-surface conceptual model of the spill area and the Site. One additional soil boring (MW-00-11A) was advanced near the spill area in the vicinity of boring SB-98-3 and one boring (MW-00-12D) was drilled south of the spill area between monitoring wells MW-97-4S and MW-97-5S. Borings MW-00-11A and MW-00-12D were constructed into monitoring wells.

- Completion of off-site monitoring well MW-03-13S on south side of Hanse Avenue in front of the AHRC building (230 Hanse Avenue). The boring/monitoring well was advanced into the gravelly sand unit.

A qualified geologist coordinated the drilling operations and performed the following duties:

- collected split-spoon samples;
- prepared boring logs based on sample observations;
- performed field screening (PID) of split-spoon samples;

- properly labeled, packaged and handled samples for laboratory analysis;
- supervised monitoring well installation; and
- completed daily drilling records.

Two soil borings were advanced in the vicinity of the spill area (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 boring (BSB-98-7) was drilled in a background area mutually selected by Delaware and the NYSDEC.

The borings were advanced using a truck-mounted drill rig. With the exception of boring SB-98-5, each boring was advanced to the top of the gray clay and silt unit. Continuous two-foot split spoon samples were collected from the ground surface to top of this unit. Boring SB-98-5 was advanced similarly, but to the top of the shallower gravelly sand unit.

At completion, soil borings were properly sealed with cement-bentonite grout to eliminate a potential conduit for the downward migration of contaminants. A cement-bentonite grout mixture was pumped directly to the bottom of the hollow stem augers using a tremie pipe until grout returned to the surface. Augers were extracted incrementally and the grout was subsequently topped off. The grout material consisted 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.

Soil samples were obtained utilizing a split-spoon sampler according to the American Society for Testing Materials (ASTM) Method D-1586. Samples were characterized and logged, and the headspace of all samples was field screened for VOCs using a PID equipped with an 11.2 eV lamp. Collection of the split spoon samples and the field PID screening was performed in accordance with the Work Plan. Soil characteristics were described using the Modified Burmister and the Unified Soil Classification systems. Boring logs describing the stratigraphy and subsurface materials were prepared as described in the Work Plan.

The split spoon soil screening (S.S.) was performed immediately following opening of the split spoon. Upon retrieval, the split spoon was opened and screened with the PID to obtain the S.S. reading. The head space (H.S.) vapor reading was performed on a soil from the spit spoon that was placed into a clean glass jar and seal with aluminum foil for subsequent PID screening. This sub sample was allowed to equilibrate for fifteen to thirty minutes, then the aluminum foil cap was punctured with the tip of the PID probe and the maximum instrument reading was recorded.

In borings SB-98-2 and SB-98-3, the samples that exhibited the highest field PID reading were 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.

In all borings except SB-98-5, the soil sample in the fill above the tidal marsh layer that exhibited the highest field PID reading was submitted for laboratory analysis for the NYSDEC TCL VOCs using the NYSDEC, ASP, CLP Method 95-1. In each boring except SB-98-5 and the background BSB-98-

7 boring, a sample from the top of the tidal marsh unit and the top of the underlying gray clay and silt unit was submitted for laboratory TCL VOC analysis. The soil sample from boring SB-98-5 that exhibited the highest PID value was analyzed for the NYSDEC TCL VOCs (NYSDEC Method 95-1). Samples from the tidal marsh unit and the gray clay and silt unit from borings SB-98-2, SB-98-3 and SB-98-4 were analyzed for total organic carbon (TOC).

In background boring BSB-98-7, samples from the fill, top of the tidal marsh unit and the top of the gray clay and silt unit were submitted for laboratory analysis of the TCL/TAL parameters and TOC. Samples were analyzed by Toxicon Laboratory, a New York State Department of Health (NYSDOH), ELAP, ASP/CLP approved laboratory. A complete NYSDEC, ASP, CLP deliverable package was provided for all analyses.

Samples were collected and handled under proper chain of custody protocol. The chain of custody form recorded 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 subsurface investigations continuous monitoring for volatile organic vapors was conducted with a field PID instrument. Air monitoring conformed to the NYSDOH Community Air Monitoring Plan (Ground Intrusive Activities). The air-monitoring program indicated that no elevated PID readings were recorded at the Site perimeter and downwind particulate levels were consistent with upwind values. Field air monitoring data are available upon request.

2.2 Phase I MW-98-8S Shallow Overburden Boring/Monitoring Well

The objective of this task was to determine the presence of VOCs and assess the impact, if any, to ground water quality east of the spill area with respect to the NYSDEC TCL/TAL parameters. This monitoring well was also used to determine if impacted ground water in the shallow overburden is migrating off-Site to the east.

The boring was advanced using 6 ¼" I.D. hollow stem augers. The depth for the well was approximately 21 feet below grade, which straddled the tidal marsh unit and gravelly sand deposit such as previously installed at shallow overburden monitoring well MW-1S, which is adjacent to the spill area. The test boring log for each soil boring and monitoring well boring is provided in Appendix A.

2.2.1 Monitoring Well Installation

The shallow overburden monitoring well (MW-98-8S) was 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 was No. 10 slot (i.e., 0.010 inch) and the length of the screen was ten feet. The base of the well was equipped with threaded bottom plugs, while the top of the well was equipped with a locking pressure cap. Procedures for monitoring well installation were performed in accordance with the approved Work Plan.

Monitoring well MW-98-8S was constructed by first advancing a minimum eight-inch outside diameter (O.D.) hollow stem auger to one foot below the top of the tidal marsh layer. The 6 ¼ inch

I.D. hollow stem augers were left in place and a cement-bentonite mixture was tremied into the augers. The augers were subsequently withdrawn and a length of four-inch I.D. Schedule 40 PVC pipe long enough to leave approximately 2 feet of stick-up, and with a wooden plug at the down-hole end, was inserted to the bottom of the borehole. After allowing the cement-bentonite grout to set overnight, the wooden plug at the base of the 4-inch I.D. PVC riser was removed and the remainder of the monitoring well borehole was advanced utilizing a nominal 4-inch diameter drill casing advanced with drive and wash methods.

Prior to monitoring well construction, the four-inch inside diameter Schedule 40 PVC casing was cut to approximately 0.75 feet below grade. Sand was introduced gradually to the annular space between the well screen and adjacent casing. The sand pack extended from the bottom of the boring to approximately 2.0 feet above the top of the screen. During placement of the sand pack, the hollow stem auger casing was withdrawn in increments so that the formation materials did not collapse against the PVC well casing and/or screen. The sand pack consisted 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 bentonite pellet seal was placed above the sand pack to form a seal at least two-feet thick. Cement-bentonite grout was placed from the top of the bentonite pellet seal to approximately three feet below grade.

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

2.3 Phase I Deep Borings/Monitoring Wells

Three deep monitoring wells were installed to assess the impact, if any, to soil quality along both the western property boundary and east of the spill area. These wells were also used to determine ground water quality in the "deep" overburden adjacent to the northwestern, southwestern and southeastern property boundary.

One deep soil boring (MW-98-8D) was drilled along the eastern property boundary east of the spill area, one boring was drilled adjacent to shallow monitoring well MW-97-1S (MW-98-9D) and one was drilled adjacent to shallow monitoring well MW-97-2S (MW-98-10D). Soil samples were collected at two-foot intervals from ground surface until the gray clay and silt unit was encountered. The wells were constructed so that the bottom of the screen was at the top of the gray clay and silt unit. As described in the preceding section, the deep monitoring well borings were advanced by procedures intended to prevent the downward migration of mobile contaminants that may potentially be present in the overlying fill and/or tidal marsh unit. The test boring logs and well construction logs for each newly installed monitoring well are presented in Appendix A and Appendix B, respectively.

Sample collection, description, headspace screening, and monitoring well installation were similar to the procedures used to install the shallow overburden boring/monitoring well. Three subsurface soil samples were collected and submitted to a laboratory for VOC and TOC analysis. The sample with the highest field PID reading was submitted as well as the sample from the top of the Tidal Marsh unit and a sample from the top of the gray clay and silt unit. The soil sample from boring MW-98-8D that exhibited the highest PID reading was to be analyzed for the NYSDEC TCL/TAL parameters (NYSDEC CLP methods). Since no PID readings above background were detected at well MW-98-8D, the TCL/TAL sample was collected at the ground water interface.

2.4 Phase II Borings

The borings were advanced using a truck-mounted drill rig. Borings MW-00-11A and MW-00-12D were advanced through the fill, tidal marsh, gravelly sand, gray clay and silt, and into the upper portion of the gray sand unit. Continuous two-foot split spoon samples were collected from the ground surface to the upper portion of the gray sand unit until sufficient characterization was attained. Sample collection, description, and headspace screening were performed in accordance with procedures outlined in the Phase II RI/FS Work Plan (Work Plan) and similar to procedures outlined in the 1998 Phase I RI Work Plan.

At both drilling locations, soil samples were collected at two-foot intervals from ground surface until the upper portion of the gray sand beneath the gray clay and silt unit had been sufficiently characterized. To further characterize the vertical extent of 1,1,1-TCA in subsurface soils in the spill area, all split spoon samples from the spill area boring, MW-00-11A, from the tidal marsh unit to the gray clay and silt unit were submitted for TCL volatile organic analysis (CLP Method 95-1). Sample results from the fill and top of tidal marsh have exhibited 1,1,1-TCA concentrations above the NYSDEC Recommended Soil Cleanup Objective.

From boring MW-00-12D three subsurface soil samples were submitted to the laboratory and analyzed for the TCL volatile organics (CLP Method 95-1. This included the sample from the top of the tidal marsh unit, a sample from the top of the gray clay and silt unit and the sample that exhibited the highest field PID reading.

As detailed in the Phase II RI Health and Safety Plan, continuous monitoring for volatile organic vapors was conducted with a field PID instrument. Air monitoring was performed in accordance with the NYSDOH Community Air Monitoring Plan (Ground Intrusive Activities). The air monitoring program indicated that no elevated PID readings were recorded at the Site perimeter and downwind particulate levels were consistent with upwind values. Field air monitoring data are available upon request.

2.4.1 MW-00-11A Deep Monitoring Well Below The Gray Clay And Silt Layer

The objective of this task was to determine the vertical extent of VOC-impacted soil beneath the tidal marsh unit near the spill area. This included the characterization of subsurface conditions in the gravelly sand, gray clay and silt and the upper portion of the gray sand layer. The boring was converted into a monitoring well to provide ground water quality data beneath the confining gray clay and silt unit. The boring/monitoring well was drilled and installed utilizing a "double telescope" method, so that both the shallow fill soil and gravelly sand hydrogeologic unit were individually sealed off prior to advancing the borehole through underlying low permeability units. The boring/monitoring well location is shown in Figure 2.

Monitoring well MW-00-11A was drilled by first advancing a 8 1/4-inch inside diameter (I.D.) hollow stem augers (HSAs) to one foot below the top of the tidal marsh layer. A cement-bentonite grout was tremied into the augers. A length of 6-inch I.D. Schedule 40 PVC pipe sufficient to leave 2 feet of stickup was inserted with a wooden plug on the base to the bottom of the grout-filled borehole. The HSAs were then withdrawn. After allowing the cement-bentonite grout to set overnight, the boring was advanced through the gravelly sand hydrogeologic unit to a depth of one foot into the gray clay and silt unit utilizing 5 7/8-inch diameter mud-rotary drilling methods. The borehole was filled with cement-bentonite grout and a length of 4-inch I.D. Schedule 40 PVC pipe sufficient to leave approximately 2 feet of stick-up was inserted, with a wooden plug at the base, to the bottom. After allowing the cement-bentonite grout to set overnight, drilling was resumed by advancing nominal 3-inch diameter steel drill casing through the gray clay and silt unit and into the lower gray sand unit, using drive-and-wash drilling methods. The boring was advanced 15 feet into the gray sand unit at which depth a standard 2-inch PVC monitoring well with a 10-foot screen was installed. The total depth of boring MW-00-11A was 61.5 feet below ground surface. The test boring log and monitoring well construction form are provided in Appendix A and B, respectively.

Monitoring well MW-00-11A was 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 was No. 10 slot (i.e., 0.010 inch) and the length of the screen was ten feet. The base of each well was equipped with threaded bottom plugs, while the top of the monitoring well was equipped with a locking pressure cap. Procedures for monitoring well installation were performed in accordance with the Work Plan.

Prior to monitoring well construction, the four-inch I.D. Schedule 40 PVC casing was cut to approximately 0.75 feet below grade. Sand was introduced gradually to the annular space between the well screen and adjacent four-inch I.D. PVC casing. The sand pack extended from the bottom of the boring to approximately 2.0 feet above the top of the screen. During placement of the sand pack, the three-inch I.D. drill casing was withdrawn in increments so that the formation materials did not collapse against the PVC well casing and/or screen. The sand pack consisted 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 bentonite pellet seal was placed above the sand pack to form a 3.5-foot thick seal. Cement-bentonite grout was placed from the top of the bentonite seal to approximately 0.75 foot below grade.

The grout material consisted 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. The grout was introduced via a tremie pipe lowered to just above the top of the bentonite pellet seal. As the grout material was pumped into the borehole, the tremie pipe was removed and the casing incrementally withdrawn.

A lockable flush mounted curb box was installed over the well riser to protect the well and prevent unauthorized access. The well identification number was clearly labeled on the outside of the manhole.

2.4.2 MW-00-12D Deep Monitoring Well South Of Spill Area

Deep soil boring MW-00-12D was drilled south of the spill area between existing monitoring wells MW-97-4S and MW-97-5S to determine the vertical extent of VOC-impacted soil in this section of the Site. The boring also provided for the collection of a grab-type ground water sample from the lower gray sand unit (below the gray clay and silt unit). The grab ground water sample was submitted to the laboratory for volatile organic analysis with a 48-hour turnaround. Since laboratory results, as detailed in Section 4, indicated that the grab ground water sample was not significantly above ground water standards, a second monitoring well screened in the gray sand unit was not required. The boring was subsequently converted into a monitoring well screening the basal portion of the gravelly sand hydrogeologic unit. This monitoring well was used to further define ground water flow patterns and ground water quality in this portion of the Site, and assess if impacted ground water in the shallow overburden is migrating off-Site to the south. As described in the preceding section, this deep boring/monitoring well was also advanced by procedures intended to prevent the downward migration of mobile contaminants that may potentially be present in the overlying fill and/or tidal marsh unit. The test boring log and well construction form for this newly installed monitoring well are presented in Appendix A and B, respectively.

Drilling of the boring MW-00-12D involved installing a permanent 6-inch I.D. PVC casing from ground surface to the top of the tidal marsh unit, in the same manner as that described above for boring MW-00-11A. After allowing the grout to set overnight, nominal 4-inch drill casing was advanced with drive and wash methods to a depth of 2.3 feet into the gray clay and silt unit. Nominal 3-inch diameter steel drill casing was then advanced using drive and wash techniques an additional 1.8 feet into the gray clay and silt unit. The 3-inch casing provided a secondary temporary seal of the gravelly sand hydrogeologic unit while the boring was advanced through the gray clay and silt unit. Soil sampling was conducted through the gray clay and silt unit and the upper portion of the gray sand using a direct push sampling technique. Once the lower gray sand was encountered, a GeoProbe™ SP-15 screen point was driven an additional 14.5 feet into the lower gray sand unit. The total depth of boring MW-00-12D was 52.5 feet below ground surface. Water was purged from the sampler and a grab ground water sample was collected from the gray sand hydrogeologic unit.

Following collection of the grab sample, the portion of borehole through the gray clay and silt unit was permanently sealed with angular bentonite chips that were placed as the 3-inch diameter drill casing was extracted from the borehole. A standard 2-inch diameter PVC monitoring well was subsequently installed at the base of the gravelly sand hydrogeologic unit, as the 3-inch drill casing was extracted from the borehole.

Procedures for the "deep" monitoring well installation, including placement of filter packs, bentonite seal and cement bentonite grout was performed in accordance with the approved Work Plan and followed similar procedures as outlined in the 1998 Phase I RI.

2.5 Phase III MW-03-13S Monitoring Well Installation

Monitoring well MW-03-13S was installed approximately 400 feet south of the Site in front of the AHRC property at 230 Hanse Avenue. The monitoring well was installed by Parratt-Wolff, Inc., with field supervision by Mr. Mark Williams (Earth Tech, Albany, New York).

The monitoring well was constructed of two-inch ID, Schedule-40 PVC well screen, flush-threaded into Schedule-40 PVC riser pipe of the same diameter. The size of the screen will be No. 10 slot (i.e., 0.010 inch). The screen length was fifteen feet and was based upon site specific conditions as determined by the on-site geologist. The base of the well was equipped with a threaded bottom plug, while the top of the was equipped with a vented, non-threaded cap. The well was completed at the street grade with a flush mount curb box.

The monitoring well was drilled using 4 1/4-inch diameter hollow stem augers. Continuous two-foot split spoon samples were collected and inspected/logged by a geologist. The split spoon samples were screened in the field for volatile organic vapors using an HNU photoionization detector. No readings above background were observed in any of the split spoon samples.

Split spoon samplers and drilling equipment were cleaned prior to mobilization to the site. The split spoon samples were cleaned between each use. Split spoon samplers were cleaned by brushing off visible material and washing with a non-phosphate detergent and rinsing with potable water. Drill cuttings and water generated during the cleaning were placed in fifty-five gallon drums and transported off-site for disposal at a permitted facility.

The monitoring well was constructed by gradually introducing sand inside the casing to fill the annular space between the well screen and adjacent casing. The sand pack extended from the bottom of the boring to approximately two-feet above the top of the screen. During placement of the sand pack, casing was withdrawn in increments so that the formation materials do not collapse against the well casing and/or screen. The sand pack consisted 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 was placed above the sand pack to preclude migration of sealing material into the sand pack. A bentonite pellet seal was placed above the sand pack to form a seal at least two-feet thick. Cement-bentonite grout was placed from the top of the bentonite pellet seal to approximately three feet below grade.

The grout material was Type I Portland cement mixed with either a powdered/granular bentonite to a consistency deemed acceptable by the supervising geologist. The grout was introduced via a tremie pipe lowered to just above the top of the bentonite pellet seal. As the grout material was pumped into the borehole, the tremie pipe was removed and the casing withdrawn. A lockable flush mount well cover was installed upon completion of the well to protect the well and prevent unauthorized access. The well identification number was labeled on the inside of the flush mounted curb box.

The total depth of monitoring well MW-03-13S was twenty-five feet below grade. A fifteen-foot screen was installed with the top of the screen at elevation 88.05 feet (based on assumed plant datum of 100 feet above mean sea level) and the bottom of the screen was at elevation 73.05. The geological units encountered during boring included fill material, tidal marsh and gravelly sand. The monitoring well was screened at the base of the fill across the tidal marsh layer into the gravelly sand. A boring/monitoring well construction log is provided in Appendix B.

2.6 Storm Drain Evaluation

In December 1999, during the first phase of the RI, soil samples were collected from the storm drain (SD-8) located west of monitoring well MW-96-6S using a hand auger. Samples were collected from the sediment surface to two and one-half feet. The material collected from every six inches was screened in the field with a PID. The sample from zero to six inches and the sample exhibiting the highest PID value (24-30 inches) were submitted to Toxicon Laboratory for analysis of the NYSDEC TCL VOCs (NYSDEC Method 95-1).

In April 2000, samples were collected from all on-Site storm drains, except SD-1 to evaluate storm drain sediment quality with respect to the USEPA Class V injection well program and determine the need, if any, for sediment removal. Samples were analyzed for the TCL volatile and semi-volatile organics, the eight RCRA metals and diesel range total petroleum hydrocarbons. NYSDEC Category B deliverable reports were provided by the laboratory. A sample from SD-1 was collected and analyzed for the TCL volatile organic compounds.

2.7 Soil Gas Survey

In December 1999, a soil gas survey was implemented along the eastern and southern boundaries of the Site. Along the eastern and southeastern property boundary, soil gas samples were collected from the vadose zone approximately every 50 linear feet. Along the southwestern section of the property, soil gas samples were collected approximately every 25 feet because of the presence of office space in the adjacent building. All samples were screened in the field with a PID. A total of eighteen samples were screened in the field. Nine samples, collected in Tedlar bags, were submitted for laboratory analysis by a modified USEPA 624 Method. Samples were collected to determine if volatile organic compounds in the vadose zone could potentially represent a potential route of human exposure to volatile organic compounds. Two background ambient air samples were also collected and submitted for laboratory analysis.

To further evaluate vadose zone soil gas concentrations along the south side of the Site adjacent to the office space south of the Site, three soil gas samples were collected in April 2000. Samples were collected in Summa canisters and submitted to Severn Trent Laboratory (Colchester Vermont) for analysis with a 10 ug/m3 reporting limit.

2.8 NYSDOH Indoor and Outdoor Air Sample Collection and Analysis

On September 12, 2002 the New York State Department of Health (NYSDOH) collected indoor air samples from the building (191 Hanse Avenue) directly south and adjacent to the Site. Three indoor air samples were collected from the section of the building currently occupied by Love & Quiches. Two ambient air samples were collected; one in the alleyway between the TACC building and the building occupied by Love & Quiches and one in the front of the building along Hanse Avenue (191 Hanse Avenue). The intent of the sampling program was to determine if Site related chemical compounds in ground water and/or soil gas were migrating into the adjacent building and affecting indoor air quality.

Samples were collected in stainless steel Suma canisters equipped with calibrated flow controllers and vacuum gages. Samples were analyzed for volatile organics by the NYSDOH Wadsworth Center for Laboratories and Research (Albany, New York). The NYSDOH report is provided in Appendix G.

2.9 Freeport Creek Surface Water Samples

Samples from Freeport Creek were collected at the following locations:

- At the outfall in Freeport Creek;
- 100' upstream of the outfall, 25' from the eastern bank of the creek or at the point where the bank drops off, whichever is closer to shore;
- 100' upstream of the outfall, approximately in the center of the creek;
- 100' downstream of the outfall, 25' from the eastern bank of the creek or at the point where the bank drops off, whichever is closer to shore; and,
- 100' downstream of the outfall, approximately in the center of the creek.

Although the work plan stated that samples would be collected fifty feet upstream of the storm water outfall from the Site to Freeport Creek (outfall), a field decision was made to collect the samples 100 feet upstream of the outfall to ensure no potential movement of contaminants upstream with the tide. At each location (except the outfall), samples were collected using a Kemmerer bottle at two discrete depths: One sample was collected from approximately one half the total depth of the creek while the second was collected just above the bottom of the creek. Because the water at the outfall was shallow (approximately 3 feet) only a single sample immediately above the creek bottom was collected. All samples were submitted for TCL volatile organic analysis (NYSDEC CLP Method 95-1). Samples were collected as detailed in the Phase II Remedial Investigation Work Plan.

2.10 Freeport Creek Sediment Samples

Samples from Freeport Creek were collected at the following locations:

- At point of the outfall discharge to Freeport Creek;
- 100' upstream of the outfall, 25' from the eastern bank of the creek or at the point where the bank drops off, whichever is closer to shore;
- 100' upstream of the outfall, approximately one quarter of the way across the creek (100 feet from shore);
- 100' upstream of the outfall, approximately in the center of the creek (200 feet from shore);
- 100' downstream of the outfall, 25' from the eastern bank of the creek or at the point where the bank drops off, whichever is closer to shore;
- 100' downstream of the outfall, approximately one quarter of the way across the creek (50 feet from shore);

- 100' downstream of the outfall, approximately in the center of the creek (100 feet from shore);
- 200' downstream of the outfall, 25' from the eastern bank of the creek or at the point where the bank drops off, whichever is closer to shore;
- 200' downstream of the outfall, approximately one quarter of the way across the creek (50 feet from shore);
- 200' downstream of the outfall, approximately in the center of the creek (200 feet from shore).

Although the work plan stated that samples would be collected fifty feet upstream of the storm water outfall from the Site to Freeport Creek (outfall), a field decision was made to collect the samples 100 feet upstream of the outfall to ensure that potential movement of contaminants upstream with the tide would not affect the upstream background sediment sample. Because of the presence of Marinas on the western side of Freeport Creek, sediment samples were not collected at a point three quarters of the way across the creek as detailed in the Phase II Work Plan. All samples were collected with a Ponar dredge as detailed in the Work Plan. Samples were submitted to the laboratory for TCL volatile organic analysis (NYSDEC CLP Method 95-1)

2.11 Decontamination

All non-disposable equipment was decontaminated prior to and after the field activities. All disposable sampling equipment was discarded between samples. The purpose of the equipment decontamination was to minimize the potential for cross-contamination of the samples.

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

2.12 Handling Of Investigation-Derived Waste

Wastes resulting from the investigative activities were handled in accordance with the Work Plan. The investigation-derived waste (IDW) included the following:

- Drill cuttings;
- Water and sediment resulting from the drilling and development of newly-installed wells;
- Purge water and sediment from sampling the wells;

- Personnel protective equipment (PPE) and associated debris; and
- Decontamination fluids.

All investigation-derived waste was placed into 55-gallon drums and was transported off-Site to a permitted facility for treatment and/or disposal.

2.13 Monitoring Well Development

After installation, all new wells were developed to remove residual formational silts and clays, increase the hydraulic conductivity immediately around the well and reduce the turbidity of ground water samples. This helped to ensure that the ground water samples, and other hydraulic information obtained from these wells, were representative of subsurface conditions.

The wells were developed using procedures outlined in Section 2.3.4 of the Work Plan. All ground water and sediments resulting from well development were managed as described in Section 2.11 of the Work Plan.

Monitoring wells MW-98-8S, MW-98-8D, MW-98-9D and MW-98-10D were developed between December 21 and 23, 1998 and wells MW-00-11A and MW-00-12D were developed on April 24, 2000. Field parameters, (temperature, pH, specific conductivity, and turbidity) were measured incrementally during well development. The procedures used to obtain these measurements were as specified in the Work Plan. Well development was continued until a turbidity goal of less than or equal to 50 Nephelometric Turbidity Units (NTUs) was achieved or until an amount of ground water equivalent to at least 10 well volumes was removed and other field parameters were stabilized. Well development data are presented in Appendix C.

2.14 Hydraulic Conductivity Testing

After sufficient time had elapsed for hydraulic stabilization of the newly installed wells, each monitoring well was tested to estimate hydraulic conductivity of the screened formation. This estimate was used to estimate ground water flow rates, assess the potential rate of contaminant transport, and screen potential remedial options, if necessary. The hydraulic conductivity testing consisted of in-situ slug tests using pressure transducers. Test procedures were performed in accordance with methods described in the Sampling and Analysis Plan and Section 2.4 of the Work Plan. Hydraulic conductivity test data are provided in Appendix D and summarized in Table 3.

2.15 Ground Water Flow Direction/Tidal Evaluation

The Phase I RI data indicated that the constant alternating low and high tides appear to cause a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and east or southeast in the east half of the Site during low tide conditions. A definitive determination of the length of time ground water flows in each direction could not be determined based on the Phase I data, however, the Phase I data did demonstrate that the overall net ground water flow direction at the Site is from east to west and that ground water flow to the east and southeast only represents a minor component of the overall ground water flow pattern.

To further evaluate the overall direction and timing of ground water movement in the shallow subsurface flow regime, water level measurements were collected from all on-Site monitoring wells on May 3, 2000 and May 10, 2000 (Appendix E). Water level measurements were collected every minute using Solinst® Model 3001 Level Logger pressure transducers. Each round of water level measurements was implemented to avoid periods immediately (i.e., two days) after a significant, (i.e., greater that 0.25 inches, precipitation event). Measurements were performed for approximately twenty to twenty-one hours. Depth to water table data, collected during high tide and low tide on May 3, 2000, are summarized in Table 2C. Ground water contour maps were prepared to depict ground water flow patterns in the spill area and the Site during high tide, low tide and mean high tide (Figures 5, 6 and 7, respectively). Water table data from December 1998 and February 1999 are presented in Tables 2A and 2B, respectively.

2.16 Ground Water Sampling And Analysis

In January 1999 ground water samples were collected from the Site monitoring wells (MW-8S. MW-8D, MW-9D, MW-10D, 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). In April 2000, another round of ground water samples were collected from the Site monitoring wells, including wells MW-00-11A and MW-00-12D, which were installed in April 2000. In May 2003, a ground water sample was collected from each on- Site monitoring well and the newly installed off-site monitoring well (MW-03-13S). During each event, the ground water samples were analyzed for the TCL VOCs (NYSDEC, ASP, CLP Method 95-1). The January 1999 samples from monitoring wells MW-98-8S, MW-98-8D, MW-1S and MW-1D-97 were analyzed for the complete NYSDEC TCL/TAL parameters (NYSDEC, ASP, CLP methods). A NYSDEC CLP deliverable package was provided for all analyses.

Ground water sampling procedures were presented in the Sampling and Analysis Plan. Ground water generated during the purging of existing monitoring wells and development/purging of new monitoring wells was contained in 55-gallon drums and was transported off-Site for treatment and/or disposal at a permitted facility.

2.17 Data Usability Report

A Data Usability Summary Report (DUSR) was prepared for all analytical data generated during the RI. The DUSR was completed following the NYSDEC guidance for DUSRs. Laboratory reporting sheets are provided in Appendix F. The data analysis indicated that although some data are considered estimated, all data are valid and useable. The data are of sufficient quality to make informed decisions on ground water, soil, sediment and soil gas quality.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Geology

3.1.1 Regional Geology

The study area lies within the Atlantic Coastal Plain physiographic province, as does all of Long Island. The Site is situated on a flat outwash plain, located south of a terminal moraine. The plain has a maximum elevation of about 180 feet above mean sea level (msl) at points northeast of Hicksville. The plain slopes gradually to the south to extensive tidal areas and marshes at sea level. A barrier beach and dunes form the southern outline of the region.

The study area is underlain by bedrock, which is reportedly several hundred feet below ground surface (BGS). The majority of bedrock in the region consists of southeasterly-sloping Cretaceous sedimentary layers.

During the Late Cretaceous Period, streams and rivers carried sediments from the eroding Appalachian Highlands to low-lying coastal areas. The sand, silt, and clay of the Raritan and Magothy formations, which constitute the base of Long Island, were deposited as deltas in areas of shallow water. During the Tertiary Period, the region was uplifted above sea level and the Cretaceous sediments were once again eroded and dissected by streams and rivers. During the Pleistocene Epoch of the Quaternary Period, several major glacial advances occurred in the region. During the Illinoisan advance, outwash sand and gravel (Jameco gravel formation) was deposited by meltwater streams. Following the advance, the sea level rose to its present level and a marine clay (Gardiners Clay) was deposited. Wisconsinan glacial advances generated terminal moraine deposits in the region and the sea level dropped approximately 350 feet BGS, exposing a broad and flat coastal plain. The ice sheet receded approximately 11,000 years ago (Holocene) and the sea level rose to its present level. Currents and wave action modified the outwash plain into the shoreline that exists today.

The United States Geological Survey (USGS) has characterized subsurface geologic conditions in the general vicinity of the Site (USGS, 1958). Drilling services were provided by C.W. Lauman & Co., Inc. The USGS installed an out-post well, located south of Merrick Road and west of Buffalo Avenue, less than 1/4 mile east-northeast of the Site. The USGS logged 825 feet of unconsolidated material.

3.1.2 Site Geology

The following sections describe Site geology, based on the results of the RI field investigation and on the evaluation of previously obtained data. The following unconsolidated deposits were encountered in order of increasing depth:

- Fill
- Tidal Marsh
- Gravelly Sand
- Gray Clay and Silt
- Gray Sand

Each of the five stratigraphic units encountered at the Site is discussed briefly below. A summary of stratigraphic contacts encountered at each boring drilled on-Site is provided in Table 1. Three geologic cross-sections of the Site that help to demonstrate the conceptual geologic model of the Site are shown in Figures 3 and 4. Available subsurface logs for the Site are included in Appendix A.

Fill

Fill overlies the native material at the Site. The fill consists of reworked native soils, road stone (ballast), wood, glass, brick, textile debris, packaging/paper waste, metal, angular gravel, and, in some areas, asphalt. It appears thickest in the central, mid-northern and spill area section of the Site and along areas in close proximity to the former Columbia Cement Company (CCC) building foundation. The typical thickness of the fill is approximately 11 feet, and ranges from 3.1 feet (TB-97-5) to 22.9 feet (TB-97-3). Much of the fill likely originated as part of the former Village of Freeport Landfill.

Tidal Marsh

The tidal marsh layer depicts the natural surface grade before the Site was disturbed. A layer of dark brown, dark gray and black organic clayey silt with little fine to medium sand is present beneath the fill in most areas of the Site. Nineteen on-Site borings were used to provide geologic description of the tidal marsh unit. This organic layer contains varying amounts of roots, wood and peat and is assessed to be soft as indicated by the low penetration resistance. As shown in Figure 4, the cross-sections indicate that this native unit is somewhat planar when less disturbed but is absent or thin along many areas of the Site due to localized excavation, as indicated in cross sections A-A' and B-B'. The tidal marsh unit was not present in the mid-northern portion of the Site (MW-97-7S) or adjacent to the spill area (TB-97-3, SB-98-2, SB-98-4, and MW-00-11A) where it has likely been excavated and/or replaced by fill.

Twenty-four on-Site borings drilled in the spill area and the throughout the Site were used to characterize the thickness of the tidal marsh unit (Table 1). The average depth to the top of the tidal marsh unit, where present, is approximately 9.5 feet. Average thickness of the tidal marsh unit is approximately 4 feet and appears to be thickest along the eastern and western perimeter of the Site where Site disturbance may have been minimal. The base of the tidal marsh unit, where present, is generally at a Site elevation of approximately 85 feet (Site datum).

The presence and thickness of the tidal marsh unit varies because of past landfilling activities in the study area, localized excavation, and construction of several Site features (i.e., former CCC building foundation, storm drains, and underground storage tanks). The variability is best exemplified by the difference observed in borings MW-97-1S and MW-98-9D, a well pair located in the southwestern corner of the Site. In addition, the top of the tidal marsh unit at boring TB-97-6 is thought to be inaccurate due to probable mixing of fill with the tidal marsh unit during filling activities following the removal of the former floor drain "runoff" underground storage tank in this area.

Gravelly Sand

A relatively thick, flat-lying and continuous layer of undifferentiated gravelly sand is present beneath the tidal marsh layer, or below the fill materials where the tidal marsh layer is absent. Twenty-four

Site borings were used to provide geologic description of the gravelly sand unit. Overall, the gravelly sand unit consists of a medium dense, brown to light gray, coarse to fine sand, with little medium to fine subrounded gravel. Minor amounts (10-15 percent) of silt and clay are present in isolated samples. The gravelly sand unit, which is slightly thicker along the western property boundary, grades into a well-sorted, medium dense to very dense, medium to fine sand as depth increases.

Lithologic descriptions of this unconfined shallow water-bearing zone vary from organic clayey silt too coarse to fine sand with little medium to fine gravel. The variations in the descriptions are due to variations in the distribution of fine and coarser-grained sediment. Despite these variations, the gravelly sand unit was deposited under relatively uniform conditions and, as a result, lithologic variations are gradual both laterally and vertically.

Based upon literature and Site-specific data, this unit ranges regionally in thickness from approximately 15 to 30 feet in the Site vicinity. Ten on-Site borings that were drilled in the spill area (MW-1D-97, MW-00-11A, SB-98-2, SB-98-3, and SB-98-4) and the Site (MW-98-8D, MW-98-9D, MW-98-10D, MW-00-12D, and BSB-98-7) were used to characterize the thickness of the gravelly sand unit. The average thickness of the gravelly sand unit is 20.9 feet and ranges in thickness from 16.1 feet along the southeastern portion of the Site (boring SB-98-3 and well MW-00-11A) to 26.4 feet in the northwestern portion of the Site (well MW-98-10D). The average base for the gravelly sand unit is approximately 35.4 feet and has a flat base elevation of approximately 62.85 feet (Site Datum 100'). Impacts to the gravelly sand in the spill area appear to lessen with depth. The basal portion of this high permeability unit typically contained no odor, no staining, and no dense non-aqueous phase liquids (DNAPL).

Gray Clay and Silt

A layer of very stiff to stiff, low permeability gray clay and silt with a trace of fine sand was observed underlying the gravelly sand unit. Ten on-Site borings were used to provide geologic description of the gray clay and silt unit. The gray clay and silt unit, which initially consists of a medium gray clayey silt to silt and clay with little to trace fine sand, becomes clayier with depth. This unit was typically non-plastic, dry, micaceous, and occasionally contained pyrite flakes. No odors, staining, elevated headspace readings, or DNAPL were observed in any sample of this unit during the 1997 FSI, the Phase I RI, and the Phase II RI. It is believed that this unit may serve as an aquitard or lower confining layer at the Site, underlying the unconfined the gravelly sand water-bearing zone.

Based upon regional data, this low permeability layer ranges in thickness from approximately 7 to 13 feet (USGS, 1958). Geologic data collected from the 1997 FSI, the Phase I RI, and the Phase II RI indicate that the top of the gray clay and silt unit ranged from 34.0 feet beneath the storm drain in the spill area (boring SB-98-2) to 37 feet BGS along the western boundary of the Site (MW-98-9D and MW-98-10D). As shown in Figure 4, the top of the gray clay and silt unit slopes gently from northeast to southwest. The elevation of the top of gray clay and silt unit is highest in the northeastern portion of the study area (64.39 feet BSD at boring BSB-98-7) and lowest in the southwestern portion of the Site (60.54 feet BSD at MW-98-9D).

Although only two borings (MW-00-11A and MW-00-12D) penetrated the entire gray clay and silt unit, the unit ranged in thickness from 13.95 feet near the spill area (MW-00-11A) to 15.3 feet south of the spill area (MW-00-12D). Based on data collected from the Phase II RI, the base of the gray clay and silt unit ranged from 48.55 feet (elevation of 49.34 feet referenced to Site Datum 100') in the spill area to 50.0 feet (elevation of 48.60 feet) south of the spill area in the southeastern portion of the Site. As shown in Figure 4, the thickness of the unit will likely be consistent throughout the Site and the base elevation will be relatively flat.

Gray Sand

A relatively thick, flat-lying and continuous layer of undifferentiated gray to light gray fine sand is present beneath the gray clay and silt layer. Overall, the gray sand consists of a very dense, gray to light gray, medium to fine (+) sand, with little silt and occasional mica, biotite and pyrite flakes. This unit was observed to gradually grade into a well-sorted, medium dense to dense, medium to fine (+) sand as depth increases. Lithologic descriptions of this confined water-bearing zone do not vary significantly. The gray sand unit was deposited under relatively uniform conditions and, as a result, lithologic variations are gradual both laterally and vertically. No odors, staining, elevated headspace readings or DNAPL were observed in any sample collected from this unit during the Phase II RI.

Based upon literature, this unit ranges regionally in thickness from approximately 20 to 30 feet in the Site vicinity. The average thickness of the gray sand unit is not known at the Site. Based on limited collected from the Phase II RI, the top of the gray sand unit was flat (Figure 4).

3.2 Hydrogeology

3.2.1 Regional Hydrogeology

3.2.1.1 Surface Water

The Site is situated within a peninsula of the Middle Bay drainage basin. Storm water runoff from the Site flows toward Freeport Creek, which at its closest point is approximately 500 feet from the Site. Freeport Creek flows to the south via the Narrows, into Middle Bay, and ultimately empties into the Atlantic Ocean near Jones Inlet, approximately 4.5 miles south of the Site. Tidal wetlands are common in this area.

The nearest surface water body to the east is Stadium Park Canal (also referred to as the Merrick River), approximately 1,000 feet east of the Site. It eventually flows into Freeport Creek south of the Site.

Freeport Creek and Stadium Park Canal are classified as Class SC, saline surface waters. The best usage of these waters is for fishing and they are suitable for fish propagation and survival. Water quality may also be suitable for primary and secondary contact recreation although other factors may limit the use for these purposes. Wetland areas prevail to the south of the Site.

3.2.1.2 Ground Water

Ground water derived from the thick saturated wedge of unconsolidated deposits is an important source of water in the region. Productive confined regional aquifers include the Jameco, Magothy and Lloyd aquifers. These aquifers are impacted by saltwater encroachment near the southern shore of Nassau County and are not a potable water source in this area.

Regional ground water recharge occurs from precipitation falling on gently sloped interstream areas. Unconfined ground water flow generally corresponds to and follows the topography. Regional ground water flow is in a southerly direction from the interstream areas toward Freeport Creek, which functions as a regional discharge feature for ground water flow. Tributaries to Freeport Creek act as localized discharge zones. Local variations in flow directions are caused by discharge to nearby streams and/or tidal influence.

The ground water in the vicinity of the Site is not used as a potable water supply source. Ground water in the area south of the east to west trending Sunrise Highway and Merrick Road vicinity, which includes the Site area (see Figure 1), has been characterized as "saline" because of encroachment of saline ground water. This is consistent with NYSDEC's classification of the Site.

According to its Registry of Inactive Hazardous Waste Sites, NYSDEC classifies Site ground water as Class GSA, saline ground water. These ground waters typically have a chloride concentration of more than 250 mg/L or a total dissolved solids concentration of more than 1,000 mg/L.

3.2.2 Site Hydrogeology

3.2.2.1 Surface Water

The flow of surface water across the Site is intermittent and originates from runoff due to precipitation. Surface water flow across the Site is directed into several storm drains located along the northern and southern easements of the Site, which drain from east to west. Ultimately, the storm drains direct flow to the north along Hanse Avenue and into Freeport Creek west of Rider Place.

3.2.2.2 Hydrogeological units

The geologic units present at the Site comprise three hydrogeologic units. Three of these units (i.e., fill, tidal marsh and gravelly sand) constitute the shallow unconsolidated sediments (overburden) water-bearing zone. The water level elevation data, in addition to data gathered during the Phase I RI and Phase II RI test boring program, indicate that this shallow water-bearing zone can be subdivided into an unsaturated zone, a tension-saturated zone (or capillary fringe) and a saturated zone.

Ground water in the shallow water-bearing zone occurs under unconfined water table conditions and rises and falls with changes in recharge and discharge in addition to influences from the tide. Recharge to the unconfined shallow water-bearing zone is almost entirely from precipitation that infiltrates the ground surface and migrates downward to the water table. The ultimate point of discharge from the unconfined shallow water-bearing zone is Freeport Creek.

The underlying stiff gray clay and silt unit serves as a lower confining layer below the shallow unconfined water-bearing zone. Flow through this layer is anticipated to be minimal. The third hydrogeologic unit consists of a gray sand. Ground water in this deep water-bearing zone occurs under confined conditions.

3.2.2.3 Ground Water Level Measurements

Water level measurements, recorded for all existing wells in December 1998, February 1999 and May 2000 are presented in Tables 2A, 2B and 2C, respectively.

The water table was encountered at depths between 5.5 and 8.0 feet and is generally present in the fill, tidal marsh, and upper gravelly sand units. A capillary fringe exists between the water table and the unsaturated zone. Ground water within the tension-saturated capillary zone fills the pore spaces, but is bound by tensional forces and therefore, does not enter wells screening this portion of the shallow water-bearing zone.

Ground water level measurements obtained on May 3, 2000 were used to prepare the water table elevation contour maps for the Site during high tide (Figure 5), low tide (Figure 6) and mean tide conditions (Figure 7). The mean ground water level, determined by averaging the level's measured during high and low tide, can be used to estimate the net flow of ground water at the Site.

3.2.2.4 In-Situ Hydraulic Conductivity Test Results

In-situ hydraulic conductivity (K) tests were conducted in the two wells, MW-1S and MW-98-8S, constructed to screen the lower fill, tidal marsh and upper gravelly sand unit. K testing was also performed in the seven monitoring wells installed in the upper gravelly sand unit (S-series), in the five wells (MW-1D-97, MW-98-8D, MW-98-9D, MW-98-10D and MW-00-12D) installed in the lower gravelly sand unit (D-series), in the well screened in the gray sand unit below the gray clay and silt unit (MW-00-11A) and in the off-site monitoring well (MW-03-13S) constructed to screen the tidal marsh and upper gravelly sand unit.

In-situ hydraulic conductivity test results for the wells are summarized on Table 3 and well construction details are provided in Table 4. The data sheets with calculations used to arrive at these in-situ hydraulic conductivity numbers are presented in Appendix D. The hydraulic conductivity's were determined using both the Hvorslev and the Bouwer and Rice methods; the results by both methods correlate well.

Results indicate that the horizontal hydraulic conductivity for wells screening the upper gravelly sand unit ranged from $1.36x10^{-2}$ cm/sec (38.6 feet/day) in well MW-97-3S to $3.96x10^{-2}$ cm/sec (112.3 feet/day) in well MW-97-4S using the Hvorslev method. The upper gravelly sand unit ranged from $1.44x10^{-2}$ cm/sec (40.8 feet/day) in well MW-97-3S to $2.41x10^{-2}$ cm/sec (68.32 feet/day) in well MW-97-4S using the Bouwer & Rice method. The "D" wells (MW-1D-97, MW-98-8D, MW-98-9D, MW-98-10D, and MW-00-12D), which screen the lower portion of the gravelly sand, exhibit similar horizontal hydraulic conductivity values. Results indicate that the horizontal hydraulic conductivity for wells screening the lower gravelly sand unit ranged from $1.21x10^{-2}$ cm/sec (34.3 feet/day) in well MW-98-8D to $4.15x10^{-2}$ cm/sec (117.65 feet/day) in well MW-98-9D using the Hvorslev method. The lower gravelly sand unit ranged from $7.47x10^{-3}$ cm/sec (21.18 feet/day) in well MW-98-8D to $3.62x10^{-2}$ cm/sec (102.63 feet/day) in well MW-98-9D using the Bouwer & Rice method.

Wells MW-1S and MW-98-8S, which are in and east of the spill area, respectively, screen the fill, tidal marsh and upper gravelly sand unit. Hydraulic conductivity's in these hybrid wells are nearly two orders of magnitude lower than the average hydraulic conductivity value for other on-Site wells. This is due to the lower permeability values and thickness of the fill and tidal marsh layers in this area of the Site.

The results obtained for the gravelly sand wells are consistent with published ranges of hydraulic conductivity for "clean sand" (Freeze and Cherry, 1979), and indicates that this hydrogeologic unit is relatively uniform. Although the gravelly sand portion of this hydrogeologic unit is considered to be moderately high in hydraulic conductivity, and as such will tend to transmit ground water relatively rapidly, it is important to note that the fill and/or tidal marsh may limit vertical components of flow at the Site, and in the spill area specifically.

Laboratory permeability tests were not performed on the fill, tidal marsh or gray clay and silt deposit. The laboratory permeability tests measure the vertical hydraulic conductivity of a sample, as opposed to in-situ hydraulic conductivity tests, which measure the horizontal hydraulic conductivity. Typically, vertical hydraulic conductivity is one or two orders of magnitude lower than the horizontal hydraulic conductivity in the same unit. It is anticipated that the vertical hydraulic conductivity of the fill and tidal marsh may be two to four orders of magnitude lower than the horizontal hydraulic conductivity values obtained from wells screening the gravelly sand in the spill area.

Well MW-00-11A, which is at or near the spill area, screens the gray sand hydrogeologic unit that underlies the gray clay and silt aquitard. The aquitard limits vertical components of flow to the gray sand unit. Because this water-bearing zone is under the confined conditions, only the Hvorslev method was used to summarize the horizontal hydraulic conductivity for the gray sand. As detailed in Table 3, the gray sand hydrogeologic unit exhibits a K value of 2.12×10^{-2} cm/sec (60.09 feet/day), which is similar to the average K value for the unconfined gravelly sand hydrogeologic unit.

3.2.2.5 Tidal Influence on Ground Water Levels

Ground water in the vicinity of the Site is influenced by the tide. The Phase I RI data indicated that the constant alternating low and high tides appear to cause a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and east or southeast in the east half of the Site during low tide conditions. Available data from the fifteen on-Site monitoring wells indicate that ground water levels cycle twice daily on the order of approximately one foot or less due to tidal influences. Water level data collected during high tide and low tide on May 3, 2000 are presented in Table 2C.

The tidal fluctuations are not constant across the Site. The high and low tidal levels in on-Site wells occur later than the corresponding Freeport Creek high or low tide. However, the vertical range of water level variations between high and low tidal levels increases in an easterly direction. This suggests greater hydraulic connection between the eastern boundary wells and Freeport Creek. The cause has not been determined but may be related to the variability of soil or hydraulic conductivity, and the hydraulic connection to storm drains, which ultimately discharge into Freeport Creek.

The water table at the Site exists fairly close to the ground surface (approximately 5.5 to 8.0 feet below grade). The depth to ground water is variable due to the variations in Site stratigraphy and location of wells relative to Site utilities and other Site features. Tidal effects, local variations in hydraulic conductivity, temporal and/or spatial changes may significantly influence ground water flow patterns at the Site.

3.2.2.6 Ground Water Flow Patterns

Generalized ground water conditions under high and low tide conditions as well as the calculation of net ground water flow was prepared to better define the dynamic and complex ground water flow patterns at the Site. Following is a discussion of ground water flow patterns in the unconfined shallow overburden water-bearing zone.

Ground water flow through the unconfined shallow water-bearing zone is primarily lateral based on the observed horizontal component hydraulic gradients and the negligible apparent downward vertical gradients measured between corresponding "S" and "D" wells. The apparent low vertical hydraulic conductivity of the fill and tidal marsh unit, when present, suggests that these units may locally restrict flow between the fill and upper gravelly sand unit.

Each of the water table contour maps indicates ground water flow directions during various phases of tidal cycles (i.e., high, low and mean value). As illustrated in Figure 5, high tide ground water indicates the absence of a divide, and uniform flow across the entire Site in a westerly direction with a slight northwesterly component in the northwestern quadrant of the Site.

The shallow ground water flow regime during low tide conditions (Figure 6) indicates the presence of a flow divide. The Site can be generally divided into two distinct areas: the west half of the Site, which exhibits low to moderate tidal fluctuations and relatively low hydraulic gradients generally toward the southwest, and the east half of the Site, which exhibits pronounced tidal fluctuations and relatively higher hydraulic gradients generally toward the southeast. The southeastern most portion (near the MW-98-8 well pair) of the Site appears to indicate that a ground water trough exists near the northeast corner, spill, and south of the spill area.

The constant alternating low and high tides causes a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and historically east or southeast in the east half of the Site during low tide. This shifting of ground water flow direction back and forth has functioned to minimize the migration of volatile organic compounds from the Site. Although a definitive determination of the length of time ground water flows in each direction cannot be determined, as discussed in the following section, the overall net ground water flow direction is from east to west. Ground water flow to the east and southeast, although present, is most likely a minor component of the overall ground water flow pattern.

3.2.2.7 Net Ground Water Flow

Ground water flow rates through the saturated portion of the unconfined shallow water-bearing zone are governed by the horizontal hydraulic conductivity, the hydraulic gradient which is strongly influenced by the tide, and the effective porosity.

The mean hydraulic gradient is from the east to the west (Figure 7). Overburden ground water, during mean tide conditions, flows in a westerly direction beneath the Site, and ultimately flows toward Freeport Creek. The average hydraulic gradient of the water table along a ground water flow path roughly extending from monitoring well MW-1S to MW-97-1S (flow path length of approximately 330 feet) is approximately 0.0002 ft./ft. For the remainder of the Site area, the hydraulic gradient appears to be lowest (0.00037 ft./ft. [low tide] to 0.0004 ft./ft. [high tide]) in the central portion of the Site and greatest (0.0021 ft./ft. [high tide] to 0.0036 ft./ft. [low tide]) along the southeastern perimeter of the Site. The low gradient areas are consistent with historical trends. The area with the highest gradient was consistently in the southeastern portion of the Site.

Although the net ground water flow is to the west, ground water analytical data indicated that chloroethane (further discussed in Section 4.0) was detected in ground water from monitoring well MW-98-8D, which is located east of the spill area. Historical data indicate that during low tide conditions there is occasionally a minor component of flow to the east or southeast.

Horizontal ground water flow dominates within saturated zones. It is anticipated that vertical flow dominates within unsaturated and tension-saturated zones (Freeze and Cherry, 1979). A horizontal ground water flow velocity was calculated for the unconfined shallow water-bearing zone. The ground water flow velocities were calculated using a version of Darcy's law adjusted to account for effective porosity:

$$V = K I/n$$

where:

V	=	ground water flow velocity
K	=	hydraulic conductivity = 1.53×10^{-2} cm/sec (43.4 feet/day)
I	=	hydraulic gradient (the change in head divided by distance) = 0.0002 ft./ft.
n	=	effective porosity = 0.40

The horizontal ground water flow velocity within the shallow unconfined overburden unit was estimated for flowpath A (well MW-1S to well MW-97-1S), which is 330 feet long. The hydraulic gradient was calculated between the two monitoring wells. Using the geometric mean horizontal hydraulic conductivity of 1.53×10^{-2} cm/sec (43.4 feet/day) and an estimated effective porosity of forty (40) percent, a net horizontal ground water flow velocity of 7.65×10^{-6} cm/sec (0.022 feet/day) was estimated. Based on a ground water flow velocity of 0.022 feet/day, it would take approximately 41.7 years for ground water at the spill area to reach the western property boundary.

However, as discussed in Section 4.0 and 5.0, chloroethane was detected in ground water from monitoring wells MW-97-1S and MW-98-9D, which are located in the southwest corner of the Site. As discussed in Section 5.0, the storm water drain line located along the south side of the building may function as a preferential route for ground water movement.

4.0 SITE ENVIRONMENTAL CONDITIONS

This section details the results of the chemical analysis of the samples collected at the Site during the RI. Ground water analytical data from the 1997 FSI were also used to evaluate ground water quality at the Site.

4.1 Sub-Surface Soil Analytical Data

Sub-surface soil boring sample analytical data are presented in Tables 5 through Table 9. This section compares the analytical data from the sub-surface soil samples to the NYSDEC, TAGM 4046 recommended soil cleanup objectives (RSCO). The Site-specific RSCO's presented in Tables 5, 6 and 7 were calculated, using the total organic carbon data from the background boring (BSB-98-7) and the MW-98-8D, MW-98-9D and MW-98-10D monitoring well borings for the fill unit and the tidal marsh unit. The Site-specific RSCO's were calculated using the equilibrium partition equation referenced in the NYSDEC, Technical and Administrative Guidance Memorandum, HWR-94-4046 (TAGM 4046), January 24, 1994. Where the TAGM 4046 referenced a RSCO based on a USEPA health-based value for carcinogens, this value was used as the Site-specific RSCO. A table depicting the calculations is provided below:

Pursuant to the NYSDEC request, Site Specific RSCOs were calculated using the average total organic carbon from the fill and tidal marsh units from borings:

SAMPLE	TOC %
BSB-98-7	16.3
BSB-98-7	17.7
MW-98-8D Fill	15.7
MW-98-8D TM	13.3
MW-98-9D TM	15.3
MW-98-10D TM	4.24
Average	13.8

Site Specific RSCO Calculations (f x cw x koc) x 100 CF = RSCO

Parameter	f Fill/TM	cw	koc	RCSO Fill/TM
VOLATILES				
1,1,1-Trichloroethane	0.0138	5	152	1049
1,1,2-Trichloroethane	0.0138	5	56	386
2-Butanone	0.0138	50	4.5	311
Bromoform	0.0138	5	53	366
Cholorethane	0.0138	5	37	255
1,1-Dichloroethene	0.0138	5	65	449
Methylene Chloride	0.0138	5	21	145
1,1-Dichloroethane	0.0138	5	30	207
Acetone	0.0138	50	2.2	152

Benzene	0.0138	1	83	115
Carbon Disulfide	0.0138	50	54	3726
Chloroform	0.0138	7	31	299
Tetrachloroethene	0.0138	5	277	1911
Ethylbenzene	0.0138	5	1,100	7590
Toluene	0.0138	5	300	2070
Xylene	0.0138	5	240	1656
Styrene	0.0138	5	920	6348
4-methyl-2-pentanone	0.0138	50	19	1311
2-Hexanone	0.0138	50	23	1587
Trichloroethene	0.0138	5	126	869
Vinyl Chloride	0.0138	2	57	157
SEMI-VOLATILES				
Phenol	0.0138	1	27	37
1,4-Dichlorobenzene	0.0138	5	1700	11,730
4-Methylphenol	0.0138	50	17	1,173
Naphthalene	0.0138	10	1300	17,940
2-Methylnaphthalene	0.0138	50	727	50,163
Acenaphthene	0.0138	20	4600	126,960
Dibenzofuran	0.0138	5	1230	8,487
Fluorene	0.0138	50	7300	503,700
Phenanthrene	0.0138	50	4365	301,185
Anthracene	0.0138	50	14000	966,000
Di-n-butylphthalate	0.0138	50	162	11,178
Fluoranthene	0.0138	50	38000	2,622,000
Pyrene	0.0138	50	13295	917,355
Chrysene	0.0138	0.002	200000	552
bis(2-Ethylhexyl)phthalate	0.0138	5	8706	60,071
Di-n-octylphthalate	0.0138	50	2346	161,874
4-Chloro-3-methylphenol	0.0138	5	47	324
Butylbenzylphthatlate	0.0138	50	2430	167,670
PESTICIDES				
Dieldrin	0.0138	0.004	10700	44*
4,4'-DDD	0.0138	0.3	770000	2,900*
4,4'-DDT	0.0138	0.2	243000	2,900*
gamma-Chlordane	0.0138	0.05	140000	540*

f - percent organic matter
koc - partition coefficient
cw - Groundwater standard
All concentrations expressed in ppm
* RCSO based on USEPA Health Based Value for Carcinogens.
Consistent with TAGM 4046 Individual Semi-Volatiles cannot exceed 50,000 ug/kg

4.1.1 Volatile Organic Analytical Data

The volatile organic results from the soil boring sub-surface samples are summarized in Table 5. Data are also depicted on Drawing 1(Map Pocket). The values in bold in both Table 5 and Drawing 1 indicate that the listed concentration exceeded the Site-specific RSCO. The Drawing 1 data for monitoring well boring MW-00-11A only provides results for compounds that exceeded the RSCO in at least one of the MW-00-11A soil samples.

The sub-surface samples from soil boring SB-98-2, which was advanced in the storm drain located within the 1,1,1-trichlorethane spill zone, exhibited concentrations of bromoform, 1,1,1-TCA, 1,1-dichloroethane, toluene, ethylbenzene and xylene that were above their respective Site-specific RSCOs. However, concentrations decreased significantly with increasing depth. The highest concentrations were detected in the fill sample (10-13.7'). No parameter concentrations were above the Site-specific RSCOs from the sample collected at the top of the gray clay and silt (34-34.5'). Data from the SB-98-2 soil boring samples indicate that the gray clay and silt aquitard has not been impacted with respect to volatile organic compounds and that dense non-aqueous phase liquids (DNAPL) are not present on top of the gray clay and silt aquitard. Field inspection of the split spoon samples from boring SB-98-2 did not indicate the presence of DNAPL in any of the samples.

The sub-surface samples from soil boring SB-98-3, which is located in the spill area, exhibited concentrations of 1,1,1-TCA, 1,1-dichloroethene, 1,1-dichloroethane and toluene, which were above the respective RSCOs. The 1,1,1-TCA concentrations decreased with depth. The compound 1,1-dichloroethene, a degradation product of 1,1,1-TCA, was detected in the sample from the tidal marsh unit (19.35-19.58') at a concentration higher than the sample from the fill unit (18-19.35). No parameter concentrations were above the Site-specific RSCOs in the sample collected from the top of the gray clay and silt aquitard. The SB-98-3 data indicate that the gray clay and silt unit has not been impacted by Site related contaminants and that DNAPLs are not present. Field inspection of the split spoon samples from boring SB-98-3 did not indicate the presence of DNAPL in any of the samples.

In boring MW-00-11A, split spoon samples were continuously collected from the ground surface to a depth of 60 feet, which is into the gray sand unit located below the gray clay and silt unit. All samples were submitted to the laboratory for volatile organic compound analysis by NYSDEC method 95-1. The analytical data indicated that 1,1,1-TCA, 1,1-dichloroethane, acetone, chloroethane, methylene chloride and toluene are present in sub-surface soils between eight feet below ground surface and approximately twenty feet below at concentrations that are significantly above the RSCO. Trichlorethene was detected above the RSCO in one sub-surface sample (8-10'). Soils below approximately twenty feet below ground surface and above eight feet below ground surface do not exhibit elevated concentrations of volatile organics.

Although acetone and methylene chloride were not reported in the laboratory blanks associated with all the MW-00-11A boring samples, both compounds were detected in the laboratory blanks associated with several of the MW-00-11A samples and other boring samples from the Site. Both methylene chloride and acetone are common laboratory contaminants. USEPA data validation guidelines state that sample results for any common laboratory volatile organic contaminant that are detected in an associated blank sample, that are less than ten times the associated blank concentrations should be qualified as not detected at the contract required quantitation limit or the reported concentration, which ever is higher.

The MW-00-11A boring samples between eight feet and twenty feet below ground surface were significantly diluted prior to analysis to ensure that the reported 1,1,1-TCA concentrations were within the linear range of the instrument. Because of this dilution, the methylene chloride and acetone reported in the samples was consistent with the concentrations of these two compounds in laboratory blank samples (associated with other samples) analyzed by the laboratory for this Site. Therefore, the high acetone and methylene chloride reported in the MW-00-11A boring samples between eight to twenty feet below ground surface are potentially laboratory artifacts. However, both acetone and methylene chloride have been historically used at the Site and are currently used at the Site. The methylene chloride and acetone reported in the MW-00-11A soil boring samples are considered suspect and may potentially be related to laboratory contamination.

The MW-00-11A soil boring data indicate that Site activities and the 1,1,1-TCA spill have not had an impact on sub-surface soils in the gray clay and silt unit and the underlying gray sand unit. The MW-00-11A boring data indicate that DNAPLs are not present on the gray clay and silt aquitard in the vicinity of boring MW-00-11A. Field inspection of the split spoon samples from boring MW-00-11A did not indicate the presence of DNAPL in any of the samples.

The SB-98-4 subsurface boring samples from the fill zone exhibited concentrations of chloroethane, acetone and 1,1-dichloroethane that were above the Site-specific RSCOs. The 1,1-dichloroethane concentrations in the SB-98-4 fill unit sample were significantly lower than the SB-98-2 and SB-98-3 fill unit sample concentrations. Compound concentrations generally decreased with sample depth. No compounds were detected above the RSCOs in the soil samples from the gravelly sand unit and the gray clay and silt unit. Data from boring SB-98-4 indicate the gray clay and silt unit has not been impacted by Site related contaminants and that DNAPLs are not present. Field inspection of the split spoon samples from boring SB-98-4 did not indicate the presence of DNAPL in any of the samples. Boring SB-98-5 was advanced to a depth of 14 feet to evaluate high field PID readings from boring TB-97-6 that was advanced as part of the 1997 FSI. The sample (8-10'-fill unit) with the highest field PID reading from SB-98-5 was analyzed for the NYSDEC TCL volatile organics. The analytical data indicated that no volatile organic compound concentrations were above the Site-specific RSCOs. Data indicate that volatile organic compounds are not a concern in the fill zone in the vicinity of boring SB-98-5.

Three sub-surface boring samples (fill 4-6'; Top of tidal marsh 7.7-8'; Top of gray clay and silt 34.75-36') were collected from the MW-98-8D boring. No volatile organic compounds were detected above the Site-specific RSCOs. The MW-98-8D boring data indicates that volatile organics are not a concern in the sub-surface soil at the Site east perimeter in the vicinity of monitoring well MW-98-8D.

No volatile organic compound concentrations were above the Site-specific RSCOs in the three MW-98-9D boring samples (tidal marsh 6.1-6.5'; Transition tidal marsh/gravelly sand 12-14'; gray clay and silt 37-38') or the three MW-98-10D boring samples (tidal marsh 9.98-10.2'; gravelly sand 12-14'; gray clay and silt 37.1-38'). The MW-98-9D and MW-98-10D boring data indicate that volatile organics are not a concern in sub-surface soils along the Site west perimeter.

The MW-00-12D boring soil sample data indicate that with the exception of acetone in the fill unit (8.0-8.5') sample, no volatile organic compound concentrations were above the Site-specific RSCOs. The MW-00-12 (8.0-8.5') acetone concentration (210 ug/Kg) was consistent with the background BSB-98-7 boring fill unit (8-10') acetone concentration (210 ug/Kg). Both the MW-00-12 and the Background BSB-98-7 acetone concentrations were only slightly above the RSCO (150 ug/Kg). Data indicate that volatile organic compounds are not a concern in sub-surface soils south of the spill zone at the southern perimeter of the Site.

In summary, the sub-surface boring soil data show that with the exception of the sub-surface soil in the vicinity of the original spill (SB-98-2, SB-98-3, MW-00-11A, SB-98-4)), sub-surface soil volatile organic concentrations do not significantly exceed the Site-specific RSCOs and sub-surface soils are not significantly impacted. The SB-98-2, SB-98-3, and MW-00-11A sub-surface boring samples indicate that sub-surface soils in the vicinity of the original 1,1,1-TCA spill continue to represent a source of volatile organics (1,1,1-trichlorethane, 1,1-dichloroethane, 1,1-dicloroethene, ethylbenzene, toluene and xylene and possibly acetone and methylene chloride). The MW-11-00A soil boring analytical data indicated that 1,1,1-TCA, 1,1-dichloroethane, toluene and chloroethane are present in sub-surface soils between eight feet and approximately twenty feet below ground surface at concentrations that are significantly above the RSCO. Soils below approximately twenty feet below ground surface and above eight feet below ground surface do not exhibit elevated concentrations of volatile organics.

The volatile data from borings SB-2, SB-3, SB-4, MW-00-11A, MW-97-9D, MW-97-10D, MW-98-8D and MW-00-12D- confirm the absence of DNAPL pools at the gray clay and silt unit and the tidal marsh unit (where present in these borings).

4.1.2 Semi-Volatile Organics, Pesticides and PCBs

From borings SB-98-2, SB-98-3 and MW-98-8D the sample that exhibited the highest PID reading was submitted for analysis of the NYSDEC TCL organic compounds. From the background boring sample BSB-98-7 a sample from the fill, tidal marsh and gray clay and silt and from boring SB-98-4 a sample from the gravelly sand unit (28-30') were submitted for analysis of the NYSDEC TCL organic compounds. The semi-volatile and Pesticide/PCB data are presented in Table 6 and Table 7, respectively.

The semi-volatile organic analyses showed that with the exception of chrysene and bis(2-Ethylhexyl)phthalate in the SB-98-2 boring sample (fill: 10-13.7'), phenol; 4-chloro-3-methylphenol and bis(2-Ethylhexyl)phthalate in the SB-98-3 boring sample (fill: 18-19.35'), and Di-n-butylphthalate in the SB-98-4 sample (gravelly sand 28-30') no semi-volatile organic compounds were detected at concentrations above the Site-specific RSCOs. No semi-volatile organic compounds were detected above the Site-specific RSCOs in the MW-98-8D (fill: 4-6') sample. Bis(2-Ethylhexyl)phthalate was detected above the Site-specific RSCO in the background BSB-98-7 fill sample (8-10').

The detection of these compounds above the Site-specific RSCOs in the fill sample is not unusual. The fill is composed of a variety of refuse, most likely from the Village of Freeport's former municipal landfill. Bis(2-Ethylhexyl)phthalate and di-n-butylphthalate are common plasticizers and would be found in typical municipal trash. Chrysene is a polynuclear aromatic hydrocarbon (PAH), which are common to petroleum based products and would also be present in typical municipal waste. Phenol and 4-chloro-3-methylphenol are constituents of common municipal waste debris. McGinely (1984) reported that phenol was detected in the leachate of 70 percent of the landfills investigated in Wisconsin.

No pesticide or PCBs were detected in any of the boring samples above the Site-specific RSCOs.

With the exception of low concentrations of dieldrin (BSB-98-7: 8-10'), 4,4'-DDD (MW-98-8D: 4-6'), 4,4'-DDT (SB-98-2: 10-13.7'), methoxychlor (MW-98-8D: 4-6') and gamma chlordane (SB-98-3: 18-19.35') no pesticide or PCBs were detected above the laboratory practical quantitation limit.

4.1.3 Metals & TOC

From borings SB-98-2, SB-98-3 and MW-98-8D the sample that exhibited the highest PID reading was submitted for analysis of the NYSDEC TAL metals. From the background boring sample BSB-98-7 a sample of the fill, tidal marsh and gravelly sand, gray clay and silt and from boring SB-98-4 a sample of the gravelly sand unit (28-30') were submitted for analysis for the NYSDEC TAL metals. All sub-surface boring soil samples were analyzed for total organic carbon. The metals and total organic carbon data are presented in Table 8and Table 9 respectively.

The NYSDEC, RSCO for many of the metal analytes is dependent on Site background concentrations. Boring BSB-98-7 is considered representative of Site background for the CCC Site. The fill, tidal marsh and gray clay and silt metals results from boring BSB-98-7 are considered representative of background conditions for each unit, respectively.

With the exception of magnesium in the SB-98-2 (fill:10-13.7') sample, antimony, chromium, iron and mercury in the SB-98-3 (fill: 18-19.35'), chromium and mercury in the background BSB-98-7 (fill: 8-10') sample and beryllium and mercury in the MW-98-8D (fill: 4-6') sample, all metal concentrations were below the NYSDEC RSCO. None of the exceedences of the NYSDEC, RSCO are considered significant.
The BSB-98-7 background sample exhibited the highest mercury concentration and mercury detected in the Site borings is considered representative of area background. The mercury levels in the fill most likely are related to the landfill debris and not Site operations.

Both magnesium and iron are major constituents of fill debris and are natural elements in soil. Typical eastern USA natural soil background magnesium and iron concentrations range from 100 – 5,000 mg/kg and 2,000- 50,000 mg/kg, respectively.

Total organic carbon (TOC) values are presented in Table 9. TOC results from the background boring (BSB-98-7) and the MW-98-8D, MW-98-9D and MW-98-10D monitoring well borings were used to calculate Site-specific RSCOs. TOC data indicate that the fill and tidal marsh exhibited the highest TOCs and the gravelly sand and gray clay and silt the lowest.

4.2 Ground water Analytical Data

In January 1999, ground water samples were collected from the on-Site monitoring wells and the samples were analyzed for the NYSDEC TCL volatile organic compounds. Ground water from monitoring wells MW-1S, MW-1D-97, MW-98-8S and MW-98-8D were sampled and analyzed for the full NYSDEC, TCL and TAL parameters. In April 2000 and May 2003, ground water samples were collected from all monitoring wells and samples were analyzed for the NYSDEC TCL volatile organic compounds. Ground water data are summarized in Table 10 through Table 13

4.2.1 Volatile Organic Data

The January 1999, April 2000 and May 2003 ground water volatile organic sample results are summarized in Table 10. Drawing 2 (Map Pocket) depicts the 1997 FSI, the January 1999, the April 2000 and the May 2003, ground water volatile organic analytical results.

4.2.1.2 SPILL AREA GROUND WATER VOLATILE DATA

Ground water samples were collected from three monitoring wells within the spill area, MW-1S, MW-97-1D and MW-00-11A. Monitoring well MW-1S is screened in the shallow overburden across the tidal marsh unit and the gravelly sand unit. Monitoring well MW-97-1D is screened in the gravelly sand unit near the top of the gray clay and silt unit. Monitoring well MW-00-11A is screened in the gray sand unit located below the gray clay and silt unit.

Ground water from monitoring wells MW-1S and MW-1D-97 continue to exhibit concentrations of chloroethane and 1,1-dichloroethane (1,1,1-TCA degradation products) that are above the respective ground water standards. Vinyl chloride (a secondary 1,1,1-TCA degradation product) was detected above the ground water standard in the June 1997 and April 2000 ground water samples from wells MW-1S and MW-1D-97. The reporting limit for vinyl chloride in the January 1999 and May 2003 MW-1S and MW-97-1D samples was higher than the June 1997 and April 2000 vinyl chloride concentrations in the ground water from these two wells.

Methylene chloride was reported in the June 1997, January 1999 and April 2000 ground water samples from monitoring wells MW-1S and MW-97-1D at concentrations above the ground water standard. Methylene chloride was and is currently used at the Site. Methylene chloride was not detected in the May 2003 ground water samples from monitoring well MW-1S (<0.5 mg/L) or MW-97-1D (<0.05 mg/L). Trichloroethene was detected in June 1997 MW-1S ground water sample at an estimated concentration below the ground water standard and in the April 2000 MW-97-1D ground water sample at concentrations above the ground water standard. Trichloroethene was not historically used at the Site.

The April 2000 and May 2003 ground water data from monitoring well MW-00-11A indicate that ground water quality below the gray clay and silt unit in the underlying gray sand unit has not been significantly impacted by Site related contaminants. No compounds were detected above the ground water standard. Two compounds, acetone and 1,1,1-TCA were detected at low concentrations below the ground water standard in the April 2000 sample. Although precautions were taken during the drilling of this monitoring well to prevent possible transport of contaminants from the ground water/sub-surface soils above the gray clay and silt unit, it is possible that some residual contaminants did migrate into the boring. The detected acetone and 1,1,1-TCA may potentially represent residual contamination associated with the drilling/monitoring well installation. Neither of these compounds was detected in the May 2003 ground water sample from monitoring well MW-00-11A.

Several petroleum distillate type compounds were detected in the June 1997 (benzene, toluene, xylene, ethylbenzene, 4-isopropyltoluene and naphthalene) and April 2000 (benzene, toluene, xylene) ground water sample from monitoring well MW-1S at concentrations above the ground water standard. Laktane, a petroleum distillate product was historically used at the Site. Two petroleum distillate related compounds, benzene and toluene have been detected above the ground water standard in ground water from monitoring well MW-97-1D. However, the MW-97-1D benzene and toluene concentrations were lower than the MW-1S values.

The compound 1,4-dichlorobenzene was detected in the June 1997 MW-1S and MW-97-1D ground water samples at concentrations slightly above the ground water standard. The February 1999 reporting limit for this compound was higher than the June 1997 ground water 1,4-dichlorobenzene concentrations and this compound (not a NYSDEC TCL parameter) was not included in the April 2000 and May 2003 ground water analyses.

The ground water data from the monitoring wells located within the spill area indicate that chloroethane and 1,1-dichloroethane are the primary ground water contaminants and the concentrations of these compounds continue to exceed the ground water standard in ground water above the gray clay and silt unit (MW-1S and MW-97-1D). The April 2000 and May 2003 ground water data from monitoring well MW-00-11A indicate that ground water quality below the gray clay and silt unit has not been affected by Site related contaminants.

4.2.1.2 Shallow Overburden Ground Water Volatile Data

Ground water data from shallow monitoring well MW-1S, located in the immediate vicinity of the original 1,1,1-TCA spill, show that ground water in this area continues to exhibit concentrations of 1,1-dichloroethane and chloroethane that are above the NYSDEC ground water standards.

Concentrations of vinyl chloride and 1,1-dichloroethene (secondary 1,1,1-TCA degradation products) were detected at concentrations above the NYSDEC ground water standard in the April 2000 MW-1S sample. However, because of the high concentrations of chloroethane and 1,1-dichloroethane, the January 1999 and May 2003 MW-1S samples were diluted prior to analysis and the 1,1-dichloroethene and vinyl chloride reporting limit in the MW-1S samples were above the ground water standard. Benzene, ethylbenzene, toluene and xylene were also detected at concentrations slightly above the ground water standard in the April 2000, MW-1S sample. Methylene chloride was detected above the ground water standard in both the January 1999 and April 2000 MW-1S ground water samples and acetone was detected above the ground water standard in the January 1999 ground water sample.

Shallow overburden ground water directly east of the spill area at the Site property line has not been impacted with respect to 1,1,1-TCA or related degradation products. Ground water data from monitoring well MW-98-8S indicates that only one compound, methylene chloride, which is not related to the spill, was detected above the ground water standard in the April 2000 ground water sample. Methylene chloride was detected in the April 2000 MW-98-8S ground water sample at a reported concentration (13 ug/L) slightly above the ground water standard (5 ug/L). No compounds were detected at or above the laboratory reporting limit in the January 1999 and the May 2003 ground water samples from monitoring well MW-98-8S. Data indicate that the 1,1,1-TCA spill has not had an impact on shallow overburden ground water quality directly east of the spill area at the Site boundary.

Shallow overburden ground water data indicate that ground water quality north (MW-97-7S) and northeast (MW-97-3S) of the spill area along the northern property line has not been significantly impacted by the 1,1,1-TCA spill. This is consistent with the ground water flow data (Section 3), which shows that the area north and northeast of the spill area is generally hydrologically upgradient. With the exception of methylene chloride in the MW-97-7S April 2000 ground water sample, no volatile organic compounds were detected in the June 1997, January 1999 or April 2000 MW-97-7S ground water samples. The April 2000 MW-97-7S methylene chloride concentration (19 ug/L) was slightly above the ground water standard (5 ug/L). Methylene chloride was not detected in the May 2003 MW-97-7S ground water sample. Chlorobenzene was detected in the May 2003 MW-97-7S ground water sample at a concentration (6 ug/L) slightly above the ground water standard (5 ug/L).

Chloroethane, a 1,1,1-TCA degradation product, was detected in the June 1997, January 1999 and April 2000 ground water samples from monitoring well MW-97-3S. However, only one sample (April 2000 8 ug/L) was above the ground water standard (5 ug/L). Chloroethane was not detected in the May 2003 MW-97-3S ground water sample. Chlorobenzene was reported in the April 2000 (8 ug/L) and May 2003 (7 ug/L) ground water samples slightly above the ground water standard (5 ug/L).

Ground water quality at the northwest property boundary (MW-97-2S) has not been significantly impacted by spill related compounds. Chlorobenzene was detected all in four (June 1997, January 1999, April 2000 and May 2003) ground water samples from MW-97-2S at concentrations (15 ug/L to 20 ug/L) above the ground water standard (5 ug/L). The compound 1,4-dichlorbenzene, a non TCL volatile organic was detected in the June 1997 ground water sample (3.2 ug/L) at a concentration slightly above the ground water standard (3 ug/L). Chloroethane was detected in the May 2003 ground water sample at a concentration (7 ug/L) only slightly above the ground water standard (5 ug/L).

The shallow overburden ground water quality along the northern property boundary, north of the 1,1,1-TCA spill area, indicates that the spill has not significantly impacted ground water quality along the northern property boundary. With the exception of chloroethane at concentrations only slightly above the ground water standard in the April 2000 MW-97-3S and the May 2003 MW-97-2S ground water samples, no 1,1,1-TCA or related degradation products have been detected in the ground water monitoring wells located along the northern property boundary.

Ground water samples south of the spill area at or near the Site southern boundary have exhibited concentrations of spill related compounds at concentrations above the ground water standard. Ground water from all the southern shallow overburden monitoring wells (MW-97-5S, MW-97-4S, MW-97-6S and MW-97-1S) consistently exhibited concentrations of chloroethane that were above the ground water standard. Concentrations ranged from 8 ug/L (MW-97-4S April 2000) to 3,600 ug/L (MW-97-5S June 1997 and May 2003). The chloroethane concentration reported in the May 2003 MW-97-6S ground water sample (2,600 ug/L) was the highest detected from this monitoring well.

The compound 1,1,1-trichlorloethane was reported in the June 1997 and January 1999 ground water samples from monitoring well MW-97-6S at concentrations (13 ug/L) above the ground water standard (5 ug/l). However, 1,1,1-TCA was not detected in the April 2000 MW-97-6S ground water sample. The compound 1,1-dichloroethane, a 1,1,1-TCA degradation product was detected at a concentration (6 ug/L) slightly above the ground water standard (5 ug/L) in the June 1997 MW-97-4S ground water sample. This compound was not detected in the January 1999, April 2000 or May

2003 MW-97-4S ground water samples. 1,1-Dichloroethane was detected in the May 2003 ground water sample from MW-97-5S at a concentration above the ground water standard and higher than previous MW-97-5S ground water sample concentrations.

Benzene and chlorobenzene were sporadically detected in the ground water samples collected along the southern part of the Site. Benzene was detected slightly above the ground water standard in the June 1997 and April 2000 MW-97-5S ground water samples, the June 1997 MW-97-4S ground water sample and the April 2000 MW-97-6S ground water sample. Chlorobenzene was detected slightly above the ground water standard in the April 2000 MW-97-6S ground water sample and the June 1997 MW-97-1S ground water sample. Benzene and chlorobenzene are not associated with the 1988 1,1,1-TCA spill. Methylene chloride was reported in the April 2000 MW-97-1S ground water sample at a concentration (20 ug/L) above the ground water standard (5 ug/L).

The ground water data from monitoring well MW-03-13S indicate that shallow overburden ground water south of the Site in the vicinity of Hanse Avenue and the AHRC property has not been affected by Site related volatile organic compounds. With the exception of a low concentration of carbon disulfide (1 ug/L), no volatile organic compounds were detected in the MW-03-13S ground water sample. The carbon disulfide concentration was well below the ground water guidance value (60 ug/L). The carbon disulfide is most likely related to decomposition of organic material present in the fill material and the tidal marsh layer.

4.2.1.3 Deep Ground Water Volatile Data

There are four deep overburden ground water monitoring wells located near the Site boundary. Monitoring wells MW-98-10D, MW-98-9D and MW-98-8D are located at the Site boundary in the north west, south west and along the eastern boundary (directly east of the spill area), respectively. Monitoring well MW-00-12D is located south of the spill area between wells MW-97-4S and MW-97-5S, and is screened in the gravelly sand unit at the top of the gray clay and silt unit. Additionally, during the drilling of MW-00-12D, a grab ground water sample was collected from the gray sand sediments located below the gray clay and silt unit.

Ground water data from monitoring well MW-98-10D indicates that the 1,1,1-TCA spill has not significantly impacted deep overburden ground water in the gravelly sand unit along the northwestern boundary of the Site. With the exception of methylene chloride and chlorobenzene in the April 2000 ground water sample and chloroethane in the May 2003 ground water sample, at concentrations slightly above the respective ground water standards, no compounds were detected above the ground water standard in the January 1999, April 2000 or May 2003 ground water samples.

Ground water from monitoring well MW-98-9D consistently exhibited chloroethane concentrations that were above the ground water standard. The May 2003 ground water chloroethane concentration was the highest detected. Chlorobenzene was detected at the ground water standard in the April 2000 MW-98-9D sample.

The most recent ground water analytical data from monitoring well MW-98-8D indicate that ground water quality directly east of the spill area along the eastern property boundary, is not affected by the 1988 1,1,1-TCA spill or other Site related chemical compounds. No volatile organic compounds were detected at or above the reporting limit in the May 2003 ground water sample from monitoring well MW-98-8D. Chloroethane was reported in the January 1999 and April 2000 MW-98-8D ground water samples at concentrations above the ground water standard.

Chloroethane was detected above the ground water standard in the April 2000 and May 2003 samples from monitoring well MW-00-12D. The May 2003 ground water chloroethane concentration was significantly higher that the April 2000 ground water chloroethane concentration. The April 2000 ground water sample from this monitoring well also exhibited concentrations of 1,1,1-TCA, acetone and methylene chloride that exceeded the ground water standard. Analytical results from the grab ground water sample (April 2000) that was collected from the gray sand unit below the gray clay and silt layer (from the MW-00-12D boring) indicated that ground water quality in the gray sand sediments south of the spill area has not been affected by the 1,1,1-TCA spill or Site activities. No NYSDEC TCL volatile organic compounds were detected at or above the laboratory reporting limit of 10 ug/L in the MW-00-12D gray sand unit grab water sample.

4.2.1.4 Ground Water Volatile Data Summary

The ground water data from the monitoring wells located within the spill area indicate that concentrations of methylene chloride, 1,1,1-TCA and related degradation products continue to exceed the ground water standard in ground water above the gray clay and silt unit (MW-1S and MW-97-1D). Refer to Table 10 and Drawing No.2 for concentrations. The April 2000 and May 2003 ground water data from monitoring well MW-00-11A (located in the spill area) indicate that ground water quality in the gray sand unit below the gray clay and silt layer has not been significantly affected by Site related contaminants.

The ground water flow patterns and on-Site cultural features control the dispersion of impacted ground water from the Site. The constant alternating low and high tides causes a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and east or southeast in the east half of the Site during low tide. This shifting of ground water flow direction back and forth has functioned to minimize the migration of volatile organic compounds from the Site. Although a definitive determination of the length of time ground water flows in each direction cannot be determined, the overall net ground water flow direction is from east to west. Ground water flow to the east and southeast, although present, is most likely a minor component of the overall ground water flow pattern.

Ground water data from the shallow overburden monitoring wells MW-97-3S, MW-97-7S and MW-97-2S indicate that ground water quality along the northern Site perimeter has not been significantly affected by the 1,1,1-TCA spill. The chlorobenzene consistently detected in these wells is potentially related to an off-Site source.

Ground water data from monitoring wells MW-97-5S, MW-97-4S and MW-97-6S indicate that shallow overburden ground water quality at the southern Site perimeter south of the spill area has been impacted by the 1,1,1-TCA spill and other Site related compounds. Ground water from these wells consistently exhibited concentrations of chloroethane that were above the ground water standard. Benzene and chlorobenzene were sporadically detected above the ground water standard in these monitoring wells. Ground water with elevated concentrations of chloroethane, benzene and chlorobenzene is potentially migrating off-Site to the south. The chlorobenzene is most likely associated with an off-Site source.

Ground water data from monitoring well MW-00-12D indicates that ground water quality in the gravelly sand unit above the gray clay and silt, south of the spill area near the southern Site perimeter has been affected by the 1,1,1-TCA spill and other Site related compounds. Chloroethane, methylene chloride, acetone and 1,1,1-TCA were detected above the ground water standard in the April 2000 ground water sample. The May 2003 MW-00-12D ground water sample chloroethane concentration was above the ground water standard and significantly higher than the April 2000 concentration.

Data indicates ground water with elevated concentrations of Site related compounds is potentially moving off-Site to the south. However, the hydropunch sample collected from the MW-00-12D boring in the gray sand sediments below the gray clay and silt unit, indicated that the Site has not impacted ground water quality in the gray sand unit south of the spill area.

Shallow and deep overburden ground water east of the Site has not been significantly impacted by the 1,1,1-TCA spill. With the exception of methylene chloride in the April 2000 MW-98-8S ground water sample, no volatile organics were detected above the ground water standard. Although chloroethane was detected in the January 1999 and April 2000 ground water samples from monitoring well MW-98-8D at concentrations above the ground water standard, chloroethane was not detected in the May 2003 MW-98-8D ground water sample.

Ground water data from the deep overburden zone (gravelly sand unit) indicate that ground water along the northwest property boundary has not been significantly affected by the 1,1,1-TCA spill. No 1,1,1-TCA has been detected in the MW-98-10D ground water samples. Chloroethane was not detected in the January 1999 or the April 2000 ground water samples and was detected in the May 2003 ground water sample at a concentration only slightly above the ground water standard.

Ground water quality in the upper (MW-97-1S) and lower (MW-98-9D) gravelly sand unit above the gray clay and silt unit, along the southwestern Site perimeter, has been slightly affected by the 1,1,1,-trichloroethane spill. Ground water from these wells has exhibited chloroethane concentrations above the ground water standard. The detection of spill related compounds in ground water from these wells may potentially be related to preferential movement of ground water along the storm sewer line that is located along the southern property boundary. Impacted ground water is potentially migrating off-Site to the southwest. Chlorobenzene has also been detected in the ground water samples from these monitoring wells and is most likely related to an off-Site source.

The ground water data from monitoring well MW-03-13S indicate that shallow overburden ground water south of the Site in the vicinity of Hanse Avenue and the AHRC property has not been affected by Site related volatile organic compounds. With the exception of a low concentration of carbon disulfide (1 ug/L), no volatile organic compounds were detected in the MW-03-13S ground water sample. The carbon disulfide concentration was well below the ground water guidance value (60 ug/L).

4.2.2 Ground water Semi-Volatile and Pesticide/PCB Data

Ground water from monitoring wells MW-1S, MW-1D-97, MW-98-8S and MW-98-8D were analyzed for the NYSDEC TCL semi-volatile organic and pesticide/PCB compounds. The semi-volatile organic and the pesticide/PCB data are summarized in Table 11and Table 12 respectively.

Both the semi-volatile and the pesticide/PCB data documented that no NYSDEC TCL semi-volatile or pesticide/PCB compounds were detected above the respective New York State ground water standards. The data indicate that semi-volatile organic and pesticide/PCBs are not a concern in Site ground water.

4.2.3 Inorganic Data

Ground water from monitoring wells MW-1S, MW-1D-97, MW-98-8S and MW-98-8D were analyzed for the NYSDEC TAL inorganic compounds (metals and cyanide); the data are summarized in Table 13. The data shows that the MW-98-8S ground water barium concentration, the MW-1S, MW-1D-97 and MW-98-8S manganese values, and the iron and sodium data from monitoring wells MW-1S, MW-1D-97, MW-8S and MW-8D, exceeded the respective NYSDEC ground water standards. With the exception of these metals, no other NYSDEC TAL inorganic compounds (metals/cyanide) were detected above the NYSDEC ground water standards.

The detection of barium, manganese, iron and sodium in Site ground water monitoring wells at concentrations above the ground water standard is most likely related to the fill material from the former landfill. All four of these metals are common constituents of municipal landfill debris. The reported iron concentrations are also potentially caused by the sample sediment load. Pursuant to NYSDEC requirements, the ground water samples were collected as total matrix (not field filtered) samples. Iron is a major element in soil and sediment present in a ground water sample will have metal ions, including iron, both sorbed to its surface and as an integral component of the sediment itself. When sediment-laden samples are preserved with acid in the field (per standard protocol), and especially when samples are prepared in the laboratory via hot acid digestion (also per standard protocol), metals will be desorbed from the sediment matrix, resulting in reported ground water metals concentrations that are higher than is actually dissolved in the ground water.

None of the metals detected above the ground water standard represent a public or environmental health threat. The overburden ground water in the area is not used as a potable water supply. The iron and manganese ground water standards are based on aesthetics (taste, staining, etc.). The sodium ground water standard is based on sensitivity of people with high blood pressure to sodium in the diet. Although the MW-98-8S barium value was above the ground water standard, it was below both the New York State Department of Health (Title 10, Chapter 1, Part 5) and the United States Environmental Protection Agency (National Primary Drinking Water Standards) drinking water standards.

To summarize, data indicate that metals and cyanide are not a concern in Site ground water. The reported barium, manganese, iron and sodium values are most likely to a significant extent related to the fill debris associated with the former landfill. Sediment in the total matrix samples is also most likely a significant natural source of the iron detected in the ground water samples.

4.3 Soil Gas Analytical Data

The soil gas sample locations are depicted on Figure 2.0. The soil gas samples were collected to determine if volatile organic concentrations in the soil vadose zone at the Site perimeter represent a potential threat to personnel in adjacent buildings.

During the first phase of the soil gas investigation, a total of eighteen soil gas samples were collected along the east and south perimeter of the Site. Samples could not be collected at the proposed SG-05 and SG-01 locations. At SG-05 slide hammer refusal was encountered and a soil gas sampling probe could not be inserted into the ground. At location SG-01, underground utilities prevented the installation of a soil gas probe. Two background ambient air samples were also collected. One (BG-01) on December 16, 1998 in the vicinity of SG-18 and the second on December 17, 1998 in the vicinity of SG-07.

All samples were screened for volatile organics on-Site with a field PID. Fifty percent of the samples from both the east and south perimeter of the Site and the two background samples were submitted for laboratory analysis of the NYSDEC TCL volatile organic compounds. The field PID readings for all the soil gas samples are summarized below. The NYSDEC, TCL Phase I soil gas analytical data are summarized in Table 14 and are compared to the NIOSH, OSHA and ACGIH standards in Table 16.

SOIL GAS SAMPLING – FIELD PID READINGS

SOIL GAS SAMPLE	FIELD PID READING (PPM)
SG-01	Utility Lines No Sample Collected
SG-02	0.0
SG-03	0.0
SG-04 *	0.0
SG-05	Slide Hammer Refusal No Sample Collected
SG-06 *	0.0
SG-07 *	0.0
SG-08	0.0
SG-09	1.0
SG-10	2.1
SG-11 *	3.4
SG-12	3.1
SG-13 *	4.8
SG-14	0.0
SG-15 *	5.1
SG-16 *	5.2
SG-17 *	0.4
SG-18	0.0
SG-19	0.0
SG-20 *	2.3
Background –01 (12/16/98: SG-18 Location)	0.0
Background –02 (12/17/98: SG-07 Location)	0.0

* Sample submitted for laboratory analysis of the NYSDEC TCL volatile organics	

The samples that were submitted to the laboratory for analysis of the NYSDEC TCL volatile organic compounds, included the four samples that exhibited the highest field PID readings. The analytical data presented in Table 14 indicates that with the exception of low (mg/m^3) concentrations of 1,1,2-trichloroethane (SG-11), trichloroethene (SG-13), 1,1-dichloroethene and 1,1,1-TCA (SG-16) and xylene (SG-20), no volatile organic compounds were detected in the soil gas samples at or above the laboratory practical quantitation limit. All volatile organic concentrations were well below the National Institute for Occupational Safety and Health (NIOSH) and OSHA (Occupational Safety and Health Administration) recommended exposure limits. The soil gas data indicate that soil vapor volatile organic concentrations at the Site perimeter do not represent a health concern to on-Site workers.

Soil gas points SG-11 and SG-13 were collected along the Site perimeter near the eastern end of the building located adjacent to and south of the Site. With the exception of low concentrations of 1,1,2-trichloroethane (SG-11) and trichloroethene (SG-13) no volatile organic compounds were detected above the laboratory reporting limit of 10,000 ug/m^3 in either of these samples. The compounds 1,1,2-trichloroethane and trichloroethene are not associated with the 1998 spill of 1,1,1-TCA.

The NYSDOH generally compares soil gas data from hazardous waste Sites to the NYSDOH and USEPA databases of background contaminant levels in indoor air when evaluating inadvertent potential exposures to workers not directly involved with or related to the use of the subject chemicals. Background levels for specific volatile compounds are typically in the low ug/m^3 range. Although the laboratory reporting limit for the soil gas samples was 10,000 ug/m^3, results between the detection limit of 1,000 ug/m^3 and 10,000 ug/m^3 would have been reported as estimated concentrations.

The building directly south of the Site is built on a slab without a basement and therefore compounds that are non-detect at 1000 ug/m^3 in soil gas would most likely not represent a public health concern. However, lack of a basement may not entirely eliminate movement of vapors into a building if there is a pressure gradient that would encourage migration of vapors into the building (negative interior pressure) or if there are holes, cracks, open construction joints, open sumps or utility openings present in the slab. Therefore to further evaluate soil gas concentrations with respect to typical indoor air background levels, three additional samples were collected (April 2000) along the southern Site perimeter near the building located adjacent to the Site. The samples were analyzed for the TCL volatile organics with a reporting limit of less than 10 ug/m^3 for most compounds. Analytical results are provided in Table 15. Sampling locations are depicted on Figure 2.

In Table 16 sample results are compared to the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs), the National Institute for Occupational Safety and Health (NIOSH) exposure limits , the Occupational Safety and Health Administration (OSHA), permissible exposure limits (PELs), typical indoor air background concentrations and the Agency For Toxic Substances And Disease Registry (ATSDR), Minimal Risk Levels (MRLs). The ACGIH, NIOSH and OSHA values are based on worker exposures over an eight hour day. The ATSDR MRL levels are derived using the no-observed-adverse-effect-level/uncertainty factor process. The MRLs are set below levels, that based on current information, might cause adverse non-cancer health effects in the people most sensitive to a chemical induced effect. The MRLs were derived for acute (1-14 days) intermediate (15-365 days) and chronic (365 days and longer) exposure duration's. The MRLs are generally based on the most sensitive substance-induced end point considered to be of relevance to humans.

The second phase of soil gas data revealed that 1,1,1-TCA and one degradation product, 1,1-dichloroethane were detected in all three soil gas samples (SG-1A, SG-2A and SG-3A). Two other 1,1,1-TCA degradation products, chloroethane and 1,1-dichloroethene were detected in the SG-3A soil gas sample. Sample SG-3A was collected closest to and approximately 90 feet southwest of the spill area. The soil gas data indicate that soil gas concentrations of 1,1,1,-trichloroethane and related degradation products decrease rapidly with increasing distance from the spill area.

Acetone and 1,1,1-TCA were the two compounds generally detected at the highest concentrations in all three soil gas samples. Acetone concentrations ranged from 320 ug/m3 to 510 ug/m3 and 1,1,1-TCA concentrations ranged from 30 ug/m3 to 710 ug/m3. Other compounds detected in at least one of the samples include methylene chloride, chloroform, benzene, toluene, tetrachloroethene, 1,2,4-trimethylebenzene, carbon disulfide, cyclohexane, n-hexane and methyl ethyl ketone. Concentrations ranged from just above the detection limit to 94 ug/m3.

All soil gas sample results were significantly below the eight hour worker exposure standards (ACGIH, NIOSH, OSHA). The SG-3 trichloroethene value, the SG-16 1,1,1-trichlorethane concentration and the reported SG-20 total xylene concentration were above the ATSDR MRL concentrations. The background ambient air total xylene concentration was higher than the SG-20 value, indicating that the reported SG-20 value is not Site related. Although concentrations of several Site related chemicals were above typical background indoor air values, only three chemicals, acetone, n-hexane and toluene were significantly above the background concentrations as reported by the USEPA (Typical Indoor Air data from USEPA "National Ambient Volatile Organic Compounds (VOCs) Data Base Update", EPA/600/3-88/010a, March 1988).

All compound concentrations from the three samples (SG-1A, SG-2A, SG-3A) collected along the southern Site perimeter between the on-Site building and the adjacent building, were less than the ATSDR MRL concentrations and were significantly below the eight hour worker exposure standards (ACGIH, NIOSH, OSHA). The data indicate that soil gas concentrations south of the Site are not a concern with respect to migration of vapors into the adjacent building. The building located on the south side of the Site is constructed on a concrete slab. Although slab construction may not eliminate movement of vapors into a building, a slab would significantly restrict the migration of vadose zone soil gases into the building.

4.4 Indoor and Ambient Air Volatile Organic Data

On September 12, 2002, indoor air samples from the Love & Quiches building at 191 Hanse Avenue and ambient air samples outside the building, were collected by the NYSDOH. The intent of the sampling program was to determine if ground water and/or soil gas concentrations of Site related compounds represented a potential source of vapors to indoor air in buildings downgradient and adjacent to the Site.

Samples were collected in stainless steel Suma canisters equipped with calibrated flow controllers and vacuum gages. Samples were analyzed for volatile organics by the NYSDOH Wadsworth Center for Laboratories and Research (Albany, New York). The NYSDOH report is provided in Appendix F.

The indoor and outdoor 1,1,1-TCA and chloroethane concentrations in all samples were consistent with both the USEPA and the NYSDOH typical indoor and outdoor background concentrations. The indoor air data indicate that the 1998 spill of 1,1,1-TCA and existing ground water concentrations do not represent a concern with respect to indoor air concentrations in adjacent buildings.

4.5 Storm Drain Analysis

The RI storm drain (referred to as dry wells in the Phase I RI Work Plan) analysis consisted of the following tasks:

- Determination if the storm drains meet the definition of a Class V injection well under the USEPA, Underground Injection Control Program (Part C of the Safe Drinking Water Act, 40 CFR 144);

- Evaluation of the storm drain system at the Site; and,

- Collection of sub-surface soil/sediment samples from the storm drain (SD-8) located on the south side of the Site and west of monitoring well MW-97-6S in December 1998 and April 1999.

- April 2000, collection of sub-surface soil/sediment samples from Storm drains SD-2 through SD-8 for evaluation of sediment quality as part of the USEPA Class V Injection Well program as administered by the Nassau County Health Department.

- One sample was collected from SD-1 in April 2000 to evaluate volatile organic concentrations in the surface sediments in SD-1

4.5.1 Class V Injection Well

Federal regulations set forth in 40 CFR 144.1 (g)(1)(ii) state that any dug hole or well that is deeper than its largest surface dimension, where the principal function of the hole is emplacement of fluids, are covered by the Underground Injection Control (UIC) regulations. The storm drains along the north and south sides of the Site and the storm drain in the spill area are deeper than the largest surface dimension. The primary purpose of these drains is to remove surface water runoff and discharge it to the sub-surface and to convey the surface water off-Site via a piped drainage system. Therefore, the storm drains at the Site meet the definition of a Class V injection well.

4.5.2 Site Storm Drain System

Delaware personnel conducted an inspection of the storm drains on November 9 and 10, 1998. This inspection consisted of the following tasks:

1. Visually inspect each storm drain, noting each of the following:

- width/diameter
- depth
- outlet/inlet pipes

2. Using a hand auger, attempt to determine if there is a bottom to the storm drains.
3. Review the storm sewer map at the Village of Freeport Municipal Office Building.
4. Review the plant engineer's spill file, with special attention paid to the following:
   - 1988 State/County dye test documentation
   - available construction photos
   - Site drainage plans
5. Confirm actual flow patterns for the storm drains.

4.5.2.1 VISUAL INSPECTION

Each of the storm drains is a 24" diameter manhole, although several open into larger areas. The storm drains exhibit depths from the top of grade to sediment varying from approximately nine inches to about five feet. Several of the storm drains contained standing water. With the exception of the storm drain located immediately south of MW-97-5S (SD-7), none were found to have a bottom.

A summary of the observations is presented below for each storm drain (SD):

SD-1

- the storm drain located in the spill area
- 9" metal collar; concrete walls flaring out to a diameter of ~4'
  26" to water, ~6" standing water before sediment is encountered...contains at least 8-10" of sediment; the presence of concrete blocks and debris in the sediment makes auguring further impossible. No bottom encountered

SD-2

- located N/NE of MW-97-2S, between 143 and 159 Hanse Ave.
- brick lined (2 courses - ~6"), then concrete to a depth of at least 24"
- ~1' to sediment - no bottom encountered

SD-3

- located due east of SD-2, between SD-2 and MW-97-7S
- concrete/coated brick lining (2 courses - ~6"), then concrete to a depth of at least 36"
- ~17.5" to sediment – no bottom encountered

SD-4

- located east of MW-97-7S
- concrete/coated brick lining (2 courses - ~6"), then concrete to a depth of at least 36"
- very uneven sediment surface; ~9-13" to sediment
- able to auger down to a depth of ~4.5' – no bottom encountered

SD-5

- located east of SD-4
- 3 courses brick, then flares out to form a roughly circular vault w/ concrete walls ~6' in diameter

- standing water ~36" from the top of grating; ~22" standing water, then at least 24" of sediment – no bottom encountered

SD-6

- located off of the NE corner of the building
- 3 courses of brick (~10"), then an 8" thick concrete collar...opens to a large vault >8' in diameter (the manhole is not centered over the vault, making measurements difficult)...the walls appear to be concrete w/ evenly spaced slots, each roughly 8" wide and 2" tall in vertical rows of 3, separated by ~8"
- the vault is roughly 28" tall, measuring from the bottom of the concrete collar to the top of the sediment
- ~4' to sediment
- able to auger down to a depth of >4.5' – no bottom encountered

CB (Catch Basin)

- located immediately north of MW-98-8D
- concrete lined, concrete bottom; 24" diameter x 30" deep
- ~6" of sediment noted at the base.

SD-7

- located immediately south of MW-97-5S
- 8" thick concrete collar below 5" manhole form...opens to a large vault ~8' in diameter (the manhole is not centered over the vault, making measurements difficult)
- concrete lined
- ~32" to sediment
- able to auger down an additional 28", apparently encountered a concrete bottom (roughly 5' below grade)

SD-8

- located west of MW-97-6S
- 8" thick concrete collar below 5" manhole form...opens to a large vault ~8' in diameter (the manhole is not centered over the vault, making measurements difficult)...the walls appear to be
- concrete w/ evenly spaced slots, each roughly 8" wide and 2" tall in vertical rows of 2, separated by ~8"
- ~34.5" to sediment
- able to auger down an additional 24" – no bottom encountered

SD-9

- located NW of MW-98-9D
- appears to be concrete lined
- ~36" to sediment
- unable to access storm drain for additional observations due to location in front of the loading docks.

4.5.2.2 File Review

The Department of Health conducted a dye test on the flow from SD-1 in 1988, which indicated that the storm drain is connected to a line, which runs under the building to the municipal storm sewer, which runs along Hanse Avenue to Freeport Creek. This was indicated on both the Village storm sewer map and the Site drainage plans. Review of the Site drainage plans indicated that the storm drains along the north side of the building (*i.e.*, SD-2, SD-3, SD-4, SD-5 and SD-6) are all connected by a line which runs from SD-6 to the municipal storm sewer line which runs along Hanse Avenue and that the storm drains along the south side of the building (*i.e.*, SD-7, SD-8 and SD-9) are connected by a line which runs from SD-7 to the municipal storm sewer line which runs along Hanse Avenue.

Review of the available photos taken at the time of the construction of the building did not reveal any pictures of the storm drains. However, there were several pictures that included the storm sewer lines running along both the north and south sides of the building as well as the line under the building.

4.5.2.3 Flow Patterns

It was not feasible to fill either of the storm drains at the upstream end of the systems (*i.e.*, SD-6 and SD-7) due to the amount of water that would be required. However, water was poured directly into accessible pipes and down roof drains to determine the flow patterns in the system. Each of the storm drains ties into a line which runs along the side of the building and out to the storm sewer rather than directly between the storm drains. In addition, the roof drains connect directly to the lines along each side of the building.

4.5.3 Storm Drain Sediment Samples

In December 1998 two sub-surface sediment samples from the storm drain (SD-8) located on the south side of the Site and west of monitoring well MW-97-6S were collected and analyzed for the NYSDEC TCL volatile organic compounds. Samples were collected from 0-6 inches and 24-30 inches with a duplicate sample collected and analyzed from the 24-30 inch depth. Based on the results for the December 1998 SD-8 storm drain samples, additional samples were collected in April 1999 to further characterize volatile organic concentrations in SD-8 sediments.

In April 2000 sediment samples were collected from storm drains SD-2 through SD-8 to evaluate sediment quality for the USEPA Class V Injection Well Program. These samples were analyzed for the NYSDEC TAGM 4046 TCL Volatile Organics (SW-846 Method 8260) and TCL Semi-Volatile Organics (SW-846 Method 8270),the 8 RCRA Metals and TPH Diesel Range Organics (SW-846 Method 8015). A sample from SD-1 was analyzed for the TCL volatile organics. The SD-8 analytical data are summarized in Table 17A. The April 2000 SD-1 through SD-8 analytical data are summarized in Table 17B.

4.5.3.1 SD-8 December 1998 and April 1999 Sample Results

Low concentrations of methylene chloride, acetone, 1,1-dichloroethane, 1,1,1-TCA, toluene and xylene were detected in the SD-8 0-6 inch sample. However, all concentrations were below the

NYSDEC RSCOs.

Two compounds, 1,1-dichloroethane and 1,1,1-TCA were detected in the 24-30 inch sample at concentrations (1,1-dichloroethane, 110 ug/Kg: 1,1,1-TCA 850 ug/kg) slightly above the NYSDEC RSCOs (1,1-dichloroethane, 100 ug/Kg: 1,1,1-TCA, 800 ug/Kg). The data from this storm drain indicate that additional samples collected below 30 inches were required to define the vertical extent of volatile organic compounds in the storm drain sediments.

In April 1999 sediment samples from SD-8 were collected every six inches from the surface to a depth of 53 inches. The volatile organic analytical data revealed that with the exception of acetone in the 36"-42' sample, all volatile compound concentrations were below the NYSDEC RSCO's. The SD-8 36-42" acetone concentration (300 ug/kg) was only slightly above the RSCO of 200 ug/Kg and is not considered significant.

4.5.3.2 April 2000 Storm Drain Sediment Results

Volatile Organic Analytical Results

The April 2000 storm drain sample data indicated that with the exception of SD-1, SD-5 and SD-8, all storm drain volatile organic concentrations were below the NYSDEC RSCO's. The SD-8 sample exhibited 1,1,1-TCA at a concentration (4,800 ug/Kg) that was above the RSCO (800 ug/Kg). The SD-5 sample exhibited a total xylene concentration (1,760 ug/Kg) that was slightly above the RSCO (1,200 ug/Kg). SD-1, located in the spill area and in the area where tankers are currently unloaded, exhibited a methylene chloride (22,000 ug/Kg) concentration that was above the RSCO (100 ug/Kg).

The Nassau County Health Department (NCHD)collected duplicate samples at storm drains SD-2, SD-7 and SD-8. The NCHD SD-2 and SD-7 volatile results were consistent with the results reported by SCI-LAB. The NCHD SD-8 results had a reported 1,1,1-TCA concentration of 500 ug/Kg. The NCHD SD-8 sample also had a reported total xylene concentration of 2,100 ug/Kg, which is above the NYSDEC RSCO of 1,200 ug/Kg. The discrepancies between the two samples are most likely related to a combination of laboratory variability and sample homogeneity. Overall, the SD-8 volatile data indicate that 1,1,1-TCA and total xylenes exceeded the NYSDEC RSCOs.

Semi-Volatile Organic Data

The semi-volatile organic analytical data indicated that storm drain sediments did not exhibit high concentrations of semi-volatile organic compounds. With the exception of low concentrations of pyrene, bis (2-ethylhexyl) phthalate and di-n-octyl phthalate in one or more storm drain sediment samples, all semi-volatile TCL compounds were not detected at or above the laboratory reporting limit. All storm drain semi-volatile organic results were below the RSCO.

RCRA Metals

The storm drain RCRA metals data revealed that with the exception of silver, all RCRA metal results were less than the RSCO or Site background (BSB-98-7 fill 8 –10'). Silver was not detected in the background sample at a reporting limit of 0.02 mg/Kg. Silver was detected in storm drain samples SD-3 through SD-8 at concentrations ranging from 1.3 mg/Kg to 5 mg/Kg. Although the SD-3 through SD-8 silver results were above the RSCO (Site Background), the reported concentrations do not represent a public or environmental health threat. Storm drains silver results are not cause for removing sediments from the storm drains.

TPH as Diesel

The total petroleum hydrocarbon (TPH) diesel range organics data indicates that the storm drain sediments do not exhibit elevated TPH concentration. All concentrations were less than 1000 ug/Kg , which is well below the NYSDEC RSCO of 10,000 ug/Kg for total volatile organics and 50,000 ug/Kg for total semi-volatile organics. The TPH diesel range organic analysis indicated that the SD-7 storm drain sediment sample contained a petroleum hydrocarbon similar to diesel fuel or fuel oil No. 2 at a concentration of 700 mg/Kg. However, with the exception of a low estimated concentration of xylenes (2 ug/kg) and a low concentration of pyrene (400 ug/kg) no petroleum related volatile organics or semi-volatile organics were detected in the SD-7 storm drain sample. Data indicate that the sediments in SD-7 do not represent a human health or environmental threat.

4.6 Freeport Creek Surface Water Data

The surface water samples collected from Freeport Creek were analyzed for the NYSDEC TCL volatile organic compounds. Analytical results are summarized in Table 18. The surface water data demonstrates that the Site is not impacting surface water quality in Freeport Creek. All surface water analytical results were below the respective surface water standards. With the exception of low concentrations of trichloroethene and 4-methyl-2-pentanone in the upstream center shallow sample and a low concentration of tetrachloroethene in the downstream center deep sample, no volatile organic compounds were detected at or above the reporting limit in any of the samples.

4.7 Freeport Creek Sediment Data

Freeport Creek Sediment volatile organic data are summarized in Table 19. The Freeport Creek sediment data indicate that the Site has not had a significant impact on Freeport Creek Sediment Quality. With the exception of a low estimated concentration (9 ug/Kg) of 1,1,1-TCA in the sample collected 200 feet downstream of the outfall from (center of creek approximately 100 feet from shore), no 1,1,1-TCA or related degradation products were detected in the Freeport Creek sediment samples. No 1,1,1-TCA or related degradation products were detected in the sediment sample collected at the stormwater outfall.

Several volatile organic compounds (acetone, carbon disulfide, 2-butanone) were detected in the sediment samples collected upstream and downstream of the outfall. Upstream concentrations were generally consistent with the downstream concentrations. Chloroform, was detected at a low concentration (13 ug/Kg) in the downstream sample collected 100 feet downstream of the outfall and twenty-five feet from shore. Chloroform was not detected in the upstream samples.

Overall, Freeport Creek sediment quality downstream of the outfall is consistent with sediment quality upstream of the outfall. Sediment quality at the outfall does not indicate any Site related impacts. Data indicate that the Site has not had a significant impact on Freeport Creek sediment quality.

5.0 FATE AND TRANSPORT

The data presented in the preceding section indicate that volatile organic compounds are the only compounds of concern at the Site. The ground water and sub-surface soil data show that semi-volatile organics, pesticides, PCBs and inorganics (metals and cyanide) are not present at concentrations significantly above ground water standards, recommended soil cleanup objectives, or background concentrations.

Sub-surface boring soil data show that with the exception of the sub-surface soil in the vicinity of the original spill (SB-98-2, SB-98-3, MW-00-11A, SB-98-4), sub-surface soil volatile organic concentrations do not significantly exceed the Site-specific RSCOs and sub-surface soils are not significantly impacted. The SB-98-2, SB-98-3, and MW-00-11A sub-surface boring samples indicate that sub-surface soils in the vicinity of the original 1,1,1-TCA spill continue to represent a source of volatile organics (1,1,1-trichlorethane, 1,1-dichloroethane, 1,1-dicloroethene, ethylbenzene, toluene and xylene and possibly acetone and methylene chloride). The MW-11-00A soil boring analytical data indicated that 1,1,1-TCA, 1,1-dichloroethane, toluene and chloroethane are present in sub-surface soils between eight feet and approximately twenty feet below ground surface at concentrations that are significantly above the RSCO. Soils below approximately twenty feet below ground surface and above eight feet below ground surface do not exhibit elevated concentrations of volatile organics.

The ground water data verifies that ground water (MW-1S and MW-1D-97) in the vicinity of the spill area, continues to exhibit concentrations of 1,1,1-TCA and related degradation products (1,1-dichlorethane, 1,1-dichloroethene, vinyl chloride and chloroethane) and methylene chloride and acetone that are above the NYSDEC ground water standard. The data shows that chloroethane is the only volatile organic compound consistently detected above the NYSDEC ground water standard at the Site perimeter.

This section discusses the fate and transport characteristics of the volatile organic compounds of concern in sub-surface soils and ground water at the Site. The fate and transport of the compounds of concern is controlled by the chemical/physical characteristics of the chemicals and Site physical characteristics including but not limited to ground water flow direction, ground water flow rates, sub-surface soil types, soil permeability, organic carbon content and cultural features (storm drains, sewer lines etc.).

As previously stated, volatile organic compounds are the compounds or chemicals of concern at the Site. The pertinent physical and chemical properties of the volatile organic compounds of concern at the Site are detailed in Table 20. A discussion of the effect of a chemicals physical/chemical properties on movement through the environment is provided in the following sections.

5.1 Water Solubility

Water solubility refers to the maximum concentration of a chemical that dissolves in a given amount of pure water. Solubility is important in understanding a chemicals ability to migrate in the environment. Environmental conditions, such as temperature and pH, can influence chemical solubility. Highly water-soluble chemicals are less strongly adsorbed to soil and, thus, are rapidly leached from the soil into both ground water and surface water. Solubility also affects volatilization from water. Highly water-soluble chemicals tend to be less volatile and are also more readily biodegradable.

For liquids that are immiscible with water, liquid density plays a critical role. Liquids that are denser than water may penetrate and preferentially settle to the base of an aquifer, while lighter liquids will float.

The water solubility of a chemical in conjunction with ground water concentrations can be used to estimate the presence or absence of a non-aqueous phase of a chemical (pure product). Generally, ground water concentrations greater than one percent of a chemical's solubility are an indication of the possible presence of pure product.

The densities of 1,1,1-TCA, two of its degradation products; 1,1-dichloroethane and 1,1-dichloroethene; and methylene chloride are greater than water (1 g/mL). Therefore, if pure product of these compounds were present, the possibility exists that the dense non-aqueous phase liquid (DNAPL) would settle and accumulate at the less permeable tidal marsh unit and the gray clay and silt unit. However, the soil boring samples collected at the top of the tidal marsh unit and the gray clay and silt unit from boring SB-98-3 and MW-00-12D, and the gray clay and silt unit from borings SB-98-2, SB-98-4 and MW-00-11A (no tidal marsh unit present at these borings), indicate that product has not accumulated in these areas. Also the ground water data from monitoring wells MW-1S and MW-1D-97, which exhibited the highest ground water volatile organic concentrations, indicate that a source of pure product is most likely not present. Monitoring well MW-1S is screened across the fill and gravelly sand units (no tidal marsh unit present) and the bottom of the MW-1D-97 screen is at the top of the gray clay and silt unit. The maximum reported ground water concentrations of the volatile organic compounds of concern at the Site are less than one percent of each compounds solubility (Solubility's provided in Table 20).

The available ground water data and sub-surface boring data indicate that there are most likely no pools of DNAPL on the tidal marsh and gray clay and silt units. However, the SB-98-2, SB-98-3 and the MW-00-11A boring sample data indicate that within the fill unit (and tidal marsh unit SB-98-3) there may be small, isolated, discrete zones of disconnected residual product (1,1,1-TCA) or ganglia trapped within pores of the sub-surface soil below the water table within the saturated zone. These ganglia are extremely small and not visible to the naked eye.

When there is a sufficient volume of DNAPL released at the ground surface, DNAPL can penetrate the water table and displace water in the saturated zone, acting as a non-wetting fluid. As the source of DNAPL crossing the water table is eliminated, product residual will be created due to capillary action. The residual will consist of disconnected ganglia, trapped within the pore spaces. The residuals act as a source of dissolved phase ground water contamination. As ground water flows past the residuals in the saturated zone, the contaminant will dissolve in the ground water via diffusion.

For example, the SB-98-2 sub-surface boring sample collected within the fill zone (10-13.7') was collected below the water table and exhibited a 1,1,1-TCA concentration of 7,000 mg/kg. It is possible that there are discrete zones of disconnected residual ganglia trapped within the pore spaces in this area. However, the SB-98-2, SB-98-3, SB-98-4 and MW-00-11A, sub-surface boring data indicate that the possible presence of any residual ganglia is very limited in extent. The residual ganglia if present is limited to the fill unit in the vicinity of SB-98-2, SB-98-3 and MW-00-11A. The deeper sub-surface samples from borings SB-98-2, SB-98-3 and MW-00-11A, indicate that residual ganglia are most likely not present below the fill unit. Also the SB-98-4 and MW-98-8D data indicate that residual 1,1,1-trichlorethane ganglia is not present to the west and east of the spill area. The ground water data from monitoring wells MW-00-12D, MW-97-5S and MW-97-4S indicate that residual ganglia is not present to the south of the spill area.

5.2 Henry's Law Constant

Henry's law constant (H) takes into account molecular weight, solubility, and vapor pressure, and indicates the degree of volatility of a chemical in a solution. When the chemical contaminant has high water solubility in relation to its vapor pressure, the chemical dissolves mainly in water. When vapor pressure is high relative to water solubility, Henry's law constant is high and the chemical volatilizes primarily to the air. A high H for a pollutant would indicate a potential for a compound to partition into the vapor phase. In the case of a pollutant in surface water, a compound with a high H would indicate a tendency for reduction in the surface water concentration through partitioning to the air. In the sub-surface unsaturated zone, the contaminant with a high H could potentially partition to the soil vapor phase.

Comparison of the H values for the compounds of concern to the H ranges in the following table, indicate that 1,1,1-TCA; 1,1-dichloroethene, methylene chloride and vinyl chloride would be expected to significantly partition to the vapor phase. In a surface water environment this would act to reduce and minimize surface water concentrations.

Henry's Law Constant Ranges

Extent of Volatility	Range of Values ($atm\ m^3/mol$)
Nonvolatile	less than 3×10^{-7}
low volatility	3×10^{-7} to 1×10^{-5}
moderate volatility	1×10^{-5} to 1×10^{-3}
high volatility	greater than 1×10^{-3}

This process may have helped to minimize concentrations of these compounds that potentially reached Freeport Creek via storm water runoff.

The high H for these compounds (1,1,1-TCA; 1,1-dichloroethene, methylene chloride and vinyl chloride) indicates a potential for partitioning to the soil vapor phase. However, the soil gas investigation showed that soil vapor volatile organic concentrations at the Site perimeter were below ACGIH, NIOSH and OSHA occupational exposure limits. Concentrations from all samples south of the Site were below the ATSDR MRL guidelines.

Soil gas at the Site does not represent a concern to on-Site workers. Additionally, buildings in the area are constructed on slabs. Although slab construction may not eliminate the movement of vapors into an building, the slab would significantly reduce the potential for soil vapor to migrate into a building. The indoor air samples collected by the NYSDOH from the building directly south of the Site indicate that soil gas vapors do not represent a threat to indoor air quality in adjacent buildings.

5.3 Organic Carbon Partition Coefficient

The K_{oc} (organic carbon partition coefficient) provides an indication of the tendency for organic compounds to be adsorbed by soil and sediment. The K_{oc} is chemical-specific and largely independent of soil properties. A high K_{oc} indicates that organic chemicals bond tightly to soil organic matter and therefore less of the chemical is available to move into ground water or surface water. A low K_{oc} suggests the potential for chemical movement into ground water or surface water.

Comparison of the K_{oc} for the Site chemicals of concern (Table 20) with the data in the following table, shows that ethyl benzene will be moderately to strongly sorbed, 1,1,1-TCA, toluene and xylene moderately sorbed, and 1,1-dichloroethane; 1,1-dichloroethene, acetone, chloroethane, methylene chloride and vinyl chloride weakly sorbed. The K_{oc} data indicate that although compound sorption to soils will occur at the Site, volatile organic compounds of concern at the Site will partition to the aqueous phase.

K_{oc} Ranges (mL/g organic carbon)

Sorption to Soil	Coefficient Values
Very weakly sorbed	less than 10
Weakly sorbed	10 to 100
Moderately sorbed	100 to 1,000
Moderately to strongly sorbed	1,000 to 10,000
Strongly sorbed	10,000 to 100,000
Very strongly sorbed	greater than 100,000

However, sorption of chemicals to soil organic matter will retard the movement of dissolved phase chemicals (Vs) relative to the rate of ground water flow (V) and the ratio is defined as the retardation factor. The retardation factor can be calculated via the following formula:

$R = V/Vs = 1 + K_d(d_b/n)$ and
K_d= Koc x Organic Carbon Content (OC milligrams organic carbon/milligram of soil)

Where K_d is the partition coefficient (cm^3/g), d_b is the bulk density (g/cm^3) and n is the porosity. The velocity of the dissolved phase relative to ground water can be calculated by rearrangement of the above equation:

$$Vs = V/1 + K_d(d_b/n)$$

As stated in Section 3.2.2.7, it is estimated that it would take approximately 41.7 years for ground water in the spill area to reach the western Site boundary. Because of chemical sorption to soil organic matter, it would theoretically take even longer for chemical compounds detected in the spill area to reach the western Site perimeter. Based on the equations above, the estimated travel times for the volatile organics detected in ground water at the Site are detailed in the following table. The organic carbon content for the gravelly sand unit (average upgradient boring BSB-98-7 and downgradient boring MW-98-10D) was used to calculate K_d. This represents a conservative retardation travel time since the gravelly sand unit has a lower organic carbon content than the fill unit or tidal marsh unit, and therefore chemicals would be retarded to a lesser degree than in the fill unit or the tidal marsh unit. The bulk density was assumed to be 1. The 1,1,1-TCA spill occurred in 1988, data indicate that based on movement of chemicals along the ground water table gradient, 1,1,1-tricholoroethane and related degradation products would not have reached the western Site perimeter.

COMPOUND	Ground water Velocity ft/day	K_d Cm^3/g OC	Bulk Density g/cm^3	Porosity	Chemical Flow Rate ft/day	Years to Reach Western Site Perimeter
1,1,1-TCA	0.022	0.2736	1	0.4	0.0131	69.2
1,1-Dichloroethane	0.022	0.054	1	0.4	0.0194	46.6
1,1-Dichloroethene	0.022	0.117	1	0.4	0.0170	53.1
Acetone	0.022	0.00396	1	0.4	0.0218	41.5
Benzene	0.022	0.1494	1	0.4	0.0160	56.4
Chloroethane	0.022	0.0666	1	0.4	0.0189	47.9
Ethylbenzene	0.022	1.98	1	0.4	0.0037	244.5
Methylene Chloride	0.022	0.01584	1	0.4	0.0212	42.7
Toluene	0.022	0.54	1	0.4	0.0094	96.6
Vinyl Chloride	0.022	0.1026	1	0.4	0.0175	51.6
Xylene	0.022	0.432	1	0.4	0.0106	85.5

However, chloroethane was detected in ground water from monitoring wells MW-97-1S and MW-98-9D, which are located in the southwest corner of the Site. It is possible that the storm sewer line located along the south side of the building functions as a preferential route for ground water movement, which would result in a reduced travel time for Site related chemicals to reach monitoring well locations MW-98-9D and MW-97-1S.

5.4 Chemical Transformation/Degradation

Chemical transformation takes into account physical, chemical, and biologic changes in a contaminant over time. Hydrolysis, oxidation, photolysis, and microbial degradation influence chemical transformation. Biodegradation, the breakdown of organic compounds, is a significant environmental process in soil. The biodegradation rate is dependent on numerous factors including the organic content of the soil and the presence of acclimated microbial populations. Ground water and sub-surface soil data at the Site indicate that there is significant degradation of the volatile organic compounds.

The detection of 1,1-dichloroethane, 1,1-dichloroethene, chloroethane and vinyl chloride in ground water or sub-surface soil samples at the Site are attributed to the degradation of 1,1,1-TCA, which can be degraded by both abiotic and biotic mechanisms. Under methanogenic conditions 1,1,1-trichlorethane is reduced by microbial organisms to 1,1-dichloroethane, which is then reduced, by microbial organisms to chloroethane.

With the exception of relatively low concentrations of 1,1,1-TCA (MW-97-6S) and 1,1-

dichloroethane (MW-97-4S), chloroethane is the only spill related volatile organic compound detected in the Site perimeter monitoring well ground water samples above the NYSDEC ground water standard. Chloroethane is abiotically transformed by hydrolysis to the relatively environmentally non-toxic compound ethanol. Ethanol is ultimately converted to carbon dioxide via microbial degradation. The half-life for the abiotic hydrolysis of chloroethane to ethanol has been reported to range from 0.027 years to 0.12 years in laboratory experiments (Smith, 1984.Vogel, 1987. Wood, 1981.).

Abiotically, 1,1,1-TCA can be converted to 1,1-dichloroethene by dehydrohalogenation. The 1,1-dichloroethene can then by converted to vinyl chloride by reductive halogenation by microbial organisms and the vinyl chloride mineralized by microbial organisms to carbon dioxide.
Through hydrolysis, 1,1,1-trichlorethane can be abiotically transformed to acetic acid, which in turn is mineralized to carbon dioxide by microbial organisms.

The high concentrations of 1,1-dichloroethane and chloroethane verses the concentrations of 1,1-dichlorethene and vinyl chloride, indicate that microbial breakdown of 1,1,1-tricloroethane is the primary degradation process at the Site. The detection of 1,1-dichloroethene and vinyl chloride is limited to monitoring wells MW-1S and MW-1D-97, which are located in the spill area. The microbial degradation of 1,1,1-trichlorethane is most likely associated with microbial populations present in the fill material associated with the former landfill. The microbial mediated degradation of 1,1,1-TCA at the Site has functioned to reduce the mass of 1,1,1-TCA on-Site and helped to prevent the migration of 1,1,1-trichlorethane from the Site.

5.5 Octanol/Water Partition Coefficient and Bioconcentration Factor

The bioconcentration factor (BCF) is a measure of the extent of chemical partitioning at equilibrium between a biologic medium, such as a fish tissue, and an external medium, such as water. A bioconcentration factor is determined by dividing the equilibrium concentration (mg/kg) of a chemical in an organism or tissue by the chemical concentration in the external medium. In general, chemicals with a high K_{ow} value tend to have high BCFs. However, bioconcentration is also dependent on the ability of a species to metabolize a chemical. If a species can rapidly metabolize a chemical, the chemical would not have a high BCF even though it may have a high K_{ow}. BCF values provide information on a chemicals propensity to move through the food chain resulting in higher concentrations at each trophic level. With higher concentrations at each trophic level, compounds with even moderately low toxicity could result in physiological effects in species at the higher trophic levels due to the increase in the body burden concentration of the chemical. The octanol/water partition coefficients and the BCF values presented in Table 20, indicate that the volatile organic chemicals of concern at the Site do not significantly bioaccumulate in the environment.

5.6 Ground water Gradients and Flow Direction

The hydrogeological data presented in Section 3.0 indicates that there is a very low ground water table gradient and that the predominant net flow direction is to the west with a slight northwest component of flow in the northwestern quadrant of the Site. Although there is a component of ground water flow in a southeasterly direction in the vicinity of the spill area, this appears to occur only during low tide conditions. The net movement of ground water is to the west with a slight northwesterly component in the northwestern quadrant of the Site.

The constant alternating low and high tides causes a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and east or southeast in the east half of the Site during low tide. This shifting of ground water flow direction back and forth has functioned to minimize the migration of volatile organic compounds from the Site. Although a definitive determination of the length of time ground water flows in each direction cannot be determined, the overall net ground water flow direction is from east to west. Ground water flow to the east and southeast, although present, is most likely a minor component of the overall ground water flow pattern.

The ground water flow data indicate that the monitoring wells pairs (MW-97-1S/MW-98-9D and MW-97-2S/MW-98-10D) along the western perimeter of the Site are positioned such that they would intercept any significant dissolved phase volatile organic compounds that originated from the spill area. Data indicate that additional monitoring wells on the western perimeter of the Site are not necessary.

Ground water flow through the unconfined shallow water-bearing zone is primarily lateral, based on the observed horizontal component, hydraulic gradients and the negligible apparent vertical gradients measured between corresponding "S" and "D" wells. The apparent low vertical hydraulic conductivity of the fill unit and tidal marsh unit, when present, suggests that these units may locally restrict flow between the fill and upper gravelly sand unit. This characteristic most likely functioned to limit the movement of 1,1,1-TCA from the spill area.

5.7 Surface Water Drainage Patterns

The Site storm drains control the movement of surface water from the Site. The storm drains most likely have had an influence on the fate and transport of the volatile organic compounds detected at the Site, primarily 1,1,1-TCA and the related microbial degradation products.

As described in Section 4. 4, storm drain SD-1 is connected to a line, which runs under the building to the municipal storm sewer, which runs along Hanse Avenue to Freeport Creek. This was indicated on both the Village storm sewer map and the Site drainage plans. The Site drainage plans also indicated that the storm drains along both the north and south sides of the building are all connected by a line (separate line for the drains on the north and south sides of the building), which run to the municipal storm sewer line that runs along Hanse Avenue.

The bedding along the storm drain line located along the south side of the building may potentially represent a preferential pathway for movement of ground water and dissolved phase volatile organic compounds. The storm drain sediment data indicate that storm drain sediments do not represent a significant source of volatile organic compounds. The potential preferential movement of dissolved phase volatile organic compounds along the storm drain line located on the south side of the Site, may potentially represent at least a partial source of the volatile organics detected in ground water from monitoring wells MW-97-6S, MW-97-1S and MW-98-9D.

Product from the 1,1,1-TCA spill reached storm drain SD-1 and reportedly migrated to Freeport Creek. The SD-1 storm drain volatile organic surface sample (0-12") exhibited elevated concentrations of methylene chloride. No spill related volatile organic compounds were detected above the NYSDEC RSCO. The data indicates that surface sediments in SD-1 do not represent a source of dissolved phase spill related volatile organics to the storm drain system and Freeport Creek. However, the SD-1 surface sediments may represent a potential source of dissolved phase methylene chloride to Freeport Creek. The source of this methylene chloride is most likely not related to the former CCC operations.

Surface sediments in storm drain SD-8 exhibited an elevated 1,1,1-TCA concentration and both SD-8 and SD-5 total xylene concentrations that were above the NYSDEC RSCO. Surface sediments in these storm drains may represent a potential continuing source of xylene and 1,1,1-TCA to Freeport Creek.

5.8 Fate and Transport Summary

- The available ground water data and sub-surface boring data indicate that there are most likely no pools of DNAPL on the tidal marsh and gray clay and silt units. Any potential discrete zones of disconnected residual ganglia trapped within pores of the sub-surface soil below the water table is limited to the fill unit in the vicinity of SB-98-2, SB-98-3 and MW-00-11A.

- Volatilization most likely functioned to minimize concentrations of volatile organic compounds that potentially reached Freeport Creek via storm water runoff. This was confirmed by the Freeport Creek surface water volatile organic analytical data, which indicated that all volatile results were below the surface water standards and most compounds were not detected at or above the laboratory reporting limit.

- The high Henry's Law Constant for 1,1,1-TCA; 1,1-dichloroethene, methylene chloride and vinyl chloride indicate a potential for partitioning to the soil vapor phase. However, the soil gas investigation showed that soil vapor volatile organic concentrations at the Site perimeter were below ACGIH, NIOSH and OSHA occupational standards and do not represent a health concern to on-Site workers. Analytical results from the three low detection limit samples collected along the south side of the Site indicated that all compound concentrations were below the ATSDR MRL guidelines. Additionally, buildings adjacent to the Site are constructed on slabs. Although slab construction may not eliminate movement of vapors into a building, slabs will significantly reduce the potential for migration of soil vapor into a building. The indoor air sampling conducted by the NYSDOH in the building south of the Site and occupied by Love & Quiches indicates that soil vapor does not represent a threat to indoor air quality with respect to Site specific volatile organic compounds.

- The K_{oc} data indicate that although compound sorption to soils will occur at the Site, the volatile organic compounds of concern at the Site will partition to the aqueous phase. However, there will be sorption to soil organic matter, which will retard the movement of chemicals from the spill area relative to the ground water flow rate.

- Based on a ground water flow velocity of 0.022 feet/day, it could take approximately 41.7 years for ground water at the spill area to reach the western property boundary. The movement of chemicals along the ground water gradient would be further retarded by sorption to soil organic matter. Data indicate that chemicals in the spill area potentially may not have reached the western Site perimeter via movement along the ground water table gradient. However, chloroethane was detected in ground water from monitoring wells MW-97-1S and MW-98-9D, which are located in the southwest corner of the Site. It is possible that the storm sewer line located along the south side of the building functions as a preferential route for ground water movement, which would result in a reduced travel time for Site related chemicals to reach monitoring well locations MW-98-9D and MW-97-1S.

- The high concentrations of 1,1-dichloroethane and chloroethane verses the concentrations of 1,1-dichlorethene and vinyl chloride, indicate that microbial breakdown of 1,1,1-tricloroethane is the primary degradation process at the Site. The detection of 1,1-dichloroethene and vinyl chloride is limited to monitoring wells MW-1S and MW-1D-97, which are located in the spill area. The microbial mediated degradation of 1,1,1-TCA at the Site has functioned to reduce the mass of 1,1,1-TCA on Site and helped to minimize the migration of 1,1,1-trichlorethane from the Site.

- The octanol/water partition coefficients and the BCF values presented in Table 20, indicate that the volatile organic chemicals of concern at the Site do not significantly bioaccumulate in the environment.

- The constant alternating low and high tides causes a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and east or southeast in the east half of the Site during low tide. This shifting of ground water flow direction back and forth has functioned to minimize the migration of volatile organic compounds from the Site. Although a definitive determination of the length of time ground water flows in each direction cannot be determined, the overall net ground water flow direction is from east to west. Ground water flow to the east and southeast, although present, is most likely a minor component of the overall ground water flow pattern.

- The ground water flow data indicate that the monitoring wells pairs (MW-97-1S/MW-98-9D and MW-97-2S/MW-98-10D) along the western perimeter of the Site are positioned such that they would intercept any significant dissolved phase volatile organic compounds that originated from the spill area. Data indicate that additional monitoring wells on the western perimeter of the Site are not necessary.

- The apparent low vertical hydraulic conductivity of the fill and tidal marsh unit, when present, suggests that these units may locally restrict flow between the fill and upper gravelly sand unit. This characteristic most likely functioned to limit the movement of 1,1,1-TCA from the spill area.

  - The RI data indicate that surface sediments in the SD-1 storm drain may represent a potential source of dissolved phase methylene chloride to the storm drain system and Freeport Creek. Potential preferential movement of dissolved phase volatile organics (via ground water) along the storm drain line on the south side of the Site, may potentially represent a partial source of the volatile organics detected in ground water from monitoring wells MW-97-6S, MW-97-1S and MW-98-9D. Surface sediments in the SD-8 and SD-5 may represent a source of 1,1,1-TCA (SD-8) and xylenes (SD-8 and SD-5) to Freeport Creek.

6.0 HUMAN HEALTH EXPOSURE ASSESSMENT

The purpose of the human health exposure assessment is to identify pathways through which people are (if any) exposed to Site related contaminants under current and reasonable future conditions. The exposure assessment utilizes current conditions at the Site and surrounding area in determining existing current potential exposure pathways and reasonable potential future uses of the Site and surrounding area for evaluating potential future exposure pathways.

An exposure pathway is the process by which an individual is exposed to contaminants that originate from some source of contamination. In order for contaminants from a Site to have any impact on human health there must be a completed exposure pathway. The exposure pathway includes all the elements that link a contaminant source to a receptor population. An exposure pathway consists of the following five elements:

1. **Source of contamination**: source of contaminant release into the environment, or the environmental media responsible for causing contamination at a point of exposure if the original source of contamination is unknown;

2. **Environmental media and transport mechanisms:** environmental media include waste materials, ground water, surface water, air, surface soil, subsurface soil, sediment, and biota. Transport mechanisms serve to move contaminants from the source to points where human exposure can occur;

3. **Point of exposure:** a location of potential or actual human contact with a contaminated medium, e.g., residence, business, residential yard, playground, campground, waterway or water body, contaminated spring or hand-drawn well, food services, etc;

4. **Route of exposure;** means the process through which the contaminant actually enters or contacts the body, such as ingestion, inhalation, dermal contact, and dermal absorption; and

4. **Receptor population:** persons who are exposed or potentially exposed to the contaminants of concern at a point of exposure. This will include demographics, land use and natural resource uses in the vicinity of the Site.

Completed exposure pathways exist when the five elements of a pathway link the contaminant source to a receptor population. The following sections describe the Site conditions and associated surrounding land use for each of the five exposure pathway elements. A description of any completed pathways, potentially completed pathways and pathways that are eliminated are also presented.

6.1 Contamination Source

The primary contamination source at the Site is the 1988 spill of 1,1,1-TCA. As noted in Section 1.0, approximately 1,760 gallons of 1,1,1-TCA that were spilled onto the ground entered an on-Site storm drain. The storm drain system at the Site ultimately discharges to Freeport Creek. Other potential secondary sources of contamination include the fill material beneath the Site, historical (removed) underground solvent storage tanks, the current underground solvent storage tanks, and historical and existing Site solvent handling practices.

6.2 Environmental Media

Generally, the environmental media that humans could be exposed to include ground water, surface water and associated sediments, air, food chain (consumption) and soil. At the CCC Site, humans could also potentially be exposed to contaminants present in storm drain samples, primarily via transport of the storm drain sediments to Freeport Creek.

A detailed discussion of the impacted environmental media at the Site is provided in Section 4.0. The data presented in Section 4.0 indicate that volatile organic concentrations in ground water and sub-surface soil are above the New York State ground water standards and the New York State Recommended Soil Cleanup Objectives. Soil gas samples are reported to contain volatile organic compound concentrations above typical indoor air values, however, most concentrations are below the ATSDR, MRL concentrations and OSHA and NIOSH occupational exposure limits. Three storm drains exhibit sediments with volatile organic compound concentrations above the New York State Recommended Soil Cleanup Objectives.

6.2.1 Ground Water Data

The ground water data from the monitoring wells located within the spill area indicate that concentrations of methylene chloride, 1,1,1-TCA and related degradation products continue to exceed the ground water standard in ground water above the gray clay and silt unit (MW-1S and MW-97-1D). Refer to Table 10 and Drawing No.2 for concentrations. The April 2000 ground water data from monitoring well MW-00-11A (located in the spill area) indicate that ground water quality in the Sand & Gravel sediments below the gray clay and silt unit has not been significantly affected by Site related contaminants.

The ground water flow patterns and on-Site cultural features control the dispersion of impacted ground water from the Site. The constant alternating low and high tides causes a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and east or southeast in the east half of the Site during low tide. This shifting of ground water flow direction back and forth has functioned to minimize the migration of volatile organic compounds from the Site. Although a definitive determination of the length of time ground water flows in each direction cannot be determined the overall net ground water flow direction is from east to west. Ground water flow to the east and southeast, although present, is most likely a minor component of the overall ground water flow pattern.

Ground water data from the shallow overburden monitoring wells MW-97-3S, MW-97-7S and MW-97-2S (screened in the indicate that ground water quality along the northern Site perimeter has not been impacted by the 1,1,1-TCA spill. The chlorobenzene consistently detected in these wells is potentially related to an off-Site source. Methylene chloride was detected above the ground water standard in the April 2000 sample from monitoring well MW-97-2S.

Ground water data from monitoring wells MW-97-5S, MW-97-4S and MW-97-6S indicate that shallow overburden ground water quality at the southern Site perimeter south of the spill area has been impacted by the 1,1,1-TCA spill and other Site related compounds. Ground water from these wells consistently exhibited concentrations of chloroethane that were above the ground water standard. Benzene and chlorobenzene were sporadically detected above the ground water standard in these monitoring wells. Ground water with elevated concentrations of chloroethane, benzene and chlorobenzene is most likely migrating off-Site to the south. The chlorobenzene is most likely associated with an off-Site source.

Ground water data from monitoring well MW-00-12D indicates that ground water quality in the gravelly sand unit above the gray clay and silt, south of the spill area near the southern Site perimeter has been slightly impacted by the 1,1,1-TCA spill and other Site related compounds. Chloroethane, methylene chloride, acetone and 1,1,1-TCA were detected above the ground water standard. Data indicates ground water with elevated concentrations of Site related compounds is potentially moving off-Site to the south. However, the hydropunch sample collected from the MW-00-12D boring in the gray sand below the gray clay and silt unit, indicated that the Site has not impacted ground water quality in the gray sand south of the spill area.

Shallow overburden ground water east of the Site has not been significantly impacted by the 1,1,1-TCA spill. With the exception of methylene chloride in the April 2000 MW-98-8S ground water sample, no volatile organics were detected above the ground water standard. Chloroethane has been detected in ground water from monitoring well MW-98-8D at concentrations above the ground water standard. Data indicate that deep overburden ground water in the gravelly sand unit above the gray clay and silt has been slightly impacted by the 1,1,1-TCA spill, and is potentially moving off-Site to the east.

Ground water data from the deep overburden zone (gravelly sand unit) indicate that ground water along the northwest property boundary has not been impacted by the 1,1,1-TCA spill. However, methylene chloride and chlorobenzene were detected in the April 2000 ground water sample from MW-98-10D. Methylene chloride was also reported in the shallow overburden MW-97-2S ground water sample.

Ground water quality in the upper (MW-97-1S) and lower (MW-98-9D) gravelly sand unit above the gray clay and silt unit, along the southwestern Site perimeter, has been slightly affected by the 1,1,1-TCA spill. Ground water from these wells has exhibited chloroethane concentrations above the ground water standard and indicates that impacted ground water is potentially migrating off-Site to the south/southwest. Chlorobenzene has also been detected in the ground water samples from these monitoring wells and is potentially related to an off-Site source.

The ground water data from monitoring well MW-03-13S indicate that shallow overburden ground water south of the Site in the vicinity of Hanse Avenue and the AHRC property has not been affected by Site related volatile organic compounds. With the exception of a low concentration of carbon disulfide (1 ug/L), no volatile organic compounds were detected in the MW-03-13S ground water sample. The carbon disulfide concentration was well below the ground water guidance value (60 ug/L).

6.2.2 Sub-Surface Soil Analytical Data

The sub-surface boring soil data show that with the exception of the sub-surface soil in the vicinity of the original spill (SB-98-2, SB-98-3, MW-00-11A, SB-98-4)), sub-surface soil volatile organic concentrations do not significantly exceed the Site-specific RSCOs and sub-surface soils are not significantly impacted. The SB-98-2, SB-98-3, and MW-00-11A sub-surface boring samples indicate that sub-surface soils in the vicinity of the original 1,1,1-TCA spill continue to represent a source of volatile organics (1,1,1-trichlorethane, 1,1-dichloroethane, 1,1-dicloroethene, ethylbenzene, toluene and xylene). The MW-00-11A soil boring analytical data indicated that 1,1,1-TCA, 1,1-dichloroethane, toluene and chloroethane are present in sub-surface soils between eight feet below ground surface and approximately twenty feet below at concentrations that are significantly above the RSCO. Soils below approximately twenty feet below ground surface and above eight feet below ground surface do not exhibit elevated concentrations of volatile organics.

The volatile data from borings SB-98-2, SB-98-3, SB-98-4, MW-11-00A, MW-97-9D, MW-97-10D, MW-98-8D and MW-00-12D confirm the absence of DNAPL pools at the gray clay and silt unit and the tidal marsh unit (where present in these borings).

The area in the vicinity of the former spill is paved. Also, considering the depth at which contaminated soils are isolated (contaminated soils encountered at a depth between eight to twenty feet below the ground surface), human exposure is not a significant concern. Exposure would be limited to on-Site workers during excavation activities between eight to twenty feet below grade. These soils will represent a continuing source of contaminants to ground water.

6.2.3 Soil Gas Analytical Data

All soil gas sample results were significantly below the eight-hour worker exposure standards (ACGIH, NIOSH, OSHA). With respect to indoor air quality, the protection of employees who use these chemicals falls under the domain of the OSHA. The SG-13 trichloroethene value, the SG-16 1,1,1-trichlorethane concentration and the reported SG-20 total xylene concentration were above the ATSDR MRL concentrations. The background ambient air total xylene concentration was higher than the SG-20 unsaturated zone soil vapor value. Although concentrations of several Site related chemicals were above typical background indoor air values, only three chemicals, acetone, n-hexane and toluene were significantly above the background concentrations as reported by the USEPA (Typical Indoor Air data from USEPA "National Ambient Volatile Organic Compounds (VOCs) Data Base Update", EPA/600/3-88/010a, March 1988).

Soil gas data from the three low-detection limit samples collected south of the on-Site building, revealed that spill related compounds, 1,1,1-TCA and 1,1-dichloroethane (1,1,1-TCA degradation product) were detected in all three soil gas samples (SG-1A, SG-2A and SG-3A). Two other 1,1,1-TCA degradation products, chloroethane and 1,1-dichloroethene were detected in the SG-3A soil gas sample. Sample SG-3A was collected closest to and approximately 90 feet southwest of the spill area. The soil gas data indicate that soil gas concentrations of 1,1,1-TCA and related degradation products decrease rapidly with increasing distance from the spill area.

Acetone and 1,1,1-TCA were the two compounds generally detected at the highest concentrations in all three soil gas samples. Acetone concentrations ranged from 320 ug/m3 to 510 ug/m3 and 1,1,1-TCA concentrations ranged from 30 ug/m3 to 710 ug/m3. Other compounds detected in at least one of the samples include methylene chloride, chloroform, benzene, toluene, tetrachloroethene, 1,2,4-trimethylebenzene, carbon disulfide, cyclohexane, n-hexane, total xylenes and methyl ethyl ketone.

Concentrations ranged from just above the detection limit to 94 ug/m3.

The soil gas data indicate that soil gas in the vadose zone is migrating to the south from the spill area with detectable concentrations of Site related volatile organic compounds. However, all compound concentrations from the three samples (SG-1A, SG-2A, SG-3A) collected along the southern Site perimeter between the on-Site building and the adjacent building, were less than the ATSDR MRL concentrations.

The building adjacent to the Site to the south does represent a potential exposure point. However, the building is constructed on a concrete slab, and although slab construction may not eliminate the movement of vapors into a building, a slab will minimize the migration of vapors from the vadose zone into a building. Additionally, all volatile organic concentrations in the soil gas samples collected south of the building were below the ATSDR MRL guidelines and below the ACGIH, NIOSH and OSHA worker exposure standards. Data indicate that human exposure to Site related contaminants via the vadose zone are not currently a significant concern. This is confirmed by the indoor air samples collected by the NYSDOH in the building south of the Site and occupied by Love & Quiches. However, because of the detection of site related compounds in soil gas at the Site boundary, the NYSDOH has requested that indoor air be considered a potential human exposure pathway.

6.2.4 Storm Drain Sediments

The April 2000 storm drain sediment data indicate that with the exception of SD-1, SD-5 and SD-8, all storm drain volatile organic concentrations were below the NYSDEC RSCO's. The SD-8 sample exhibited 1,1,1-TCA at a concentration (4,800 ug/Kg) that was above the RSCO (800 ug/Kg). The split sample collected by the Nassau County Health Department at SD-8 exhibited a total xylene concentration (2,100 ug/Kg) that was above the total xylene RSCO (1,200 ug/Kg). The SD-5 sample exhibited a total xylene concentration (1,760 ug/Kg) that was slightly above the RSCO. The SD-1 sample exhibited a methylene chloride value (22,000 ug/Kg) that was above the RSCO (100 ug/Kg).

Sediments from SD-1, SD-5 and SD-8 could potentially migrate to Freeport Creek via the storm drain system, where human exposure to contaminants present in the sediments could occur via contact with Freeport Creek water and sediments. However, as noted in Section 4.0, Freeport Creek surface water and sediments do not exhibit any significant impact related to the Site. Direct contact with sediments in the storm drain would be limited to on-Site workers involved in any cleaning or maintenance of the storm drains.

6.2.5 Freeport Creek Surface Water and Sediment Data

Freeport Creek surface water and sediment data indicate that the Site has not impacted Freeport Creek surface water and sediment quality. All surface water sample volatile organic compound results were below the surface water standard.

Sediment data revealed that with the exception of a low estimated concentration (9 ug/Kg) of 1,1,1-TCA in the sample collected 200 feet downstream of the outfall from the Center of Freeport Creek, no 1,1,1-TCA or related degradation products were detected in the Freeport

Creek sediment samples. No 1,1,1-TCA or related degradation products were detected in the sediment sample collected at the stormwater outfall.

Several volatile organic compounds (acetone, carbon disulfide, 2-butanone) were detected in the sediment samples collected upstream and downstream of the outfall. Upstream concentrations were generally consistent with the downstream concentrations. Chloroform, was detected at a low concentration (13 ug/Kg) in the downstream sample collected 100 feet downstream of the outfall and twenty-five feet from shore. Chloroform was not detected in the upstream samples.

The Freeport Creek surface water and sediment data indicate that the Site has no impacted surface water and sediments quality. Therefore, since there is no impact, there is not a completed exposure pathway for these media.

6.3 Point of Exposure

The point of exposure is the point at which people contact a contaminated medium. It is dependent on past, present and future use of the Site and surrounding land use and natural resource use. This section discusses use of the Site, surrounding land use and natural resource usage in the vicinity of the Site. An evaluation of potential human exposure to each medium associated with the Site and surrounding environs is presented.

6.3.1 Land use and Natural Resource Usage

The land use in the vicinity of the Site is a mixture of industrial and commercial businesses and will reasonably continue to remain so. Located to the north of the plant is a storage warehouse used by TACC. To the south of the main plant is storage warehouse divided into three sections. Love Quiches uses the front half for storage of bulk food supplies. The middle section is storage of empty 50 gallon drums for TACC. The back of the building farthest from Hanse Ave is storage of wood paneling by Knickerbocker. Rea Ronal, Inc., a manufacturer of chemicals is located directly east of and adjacent to the Site. A warehouse used by TACC is located directly north of the spill Area. Faber Plastics, Flexmaster Corporation and Love & Quiches are located on the west of Hanse Avenue across from the Site. The Site itself is an approximately two acre parcel occupied by a one-story industrial building, with attendant parking and an underground tank farm located in the eastern section of the parcel. The on-Site building is primarily an industrial manufacturing facility for the manufacture of contact cements. The front portion of the building is used as office space. It is a reasonable expectation that the Site usage will continue as industrial.

On the west side of Freeport Creek, downstream of the storm water outfall from the Site (outfall), there are several marinas located on Freeport Creek. A residential community is located approximately 1000 feet west of the Site, on the west side of South Main Street. There are seven residential homes located at the corner of Hanse Avenue and St. Mary's Pl, approximately 750 feet north of the Site.

A public access recreational boat launch facility is located approximately 1,400 feet southwest of the Site, along the Stadium Park Canal. Cow Meadows Preserve, a public access preserve is located approximately 3,500 feet south of the Site along Freeport Creek. During a Site visit several people were observed fishing in Freeport Creek approximately 1000 feet downstream of the outfall.

6.3.2 Environmental Medium

The environmental medium present at or in the vicinity of the Site are ground water, Freeport Creek surface water and sediments, sub-surface soils, storm drain sediments and vadose zone soil gas. Additionally, consumption of fish and shell fish from Freeport Creek represents a potential exposure point.

The Site ground water data indicates that overburden ground water above the gray clay and silt layer is impacted and potentially migrating off-Site to the south, west to southwest and to a limited extent to the east southeast. However, information provided by the Nassau County Department of Health indicated that public water is supplied to all properties in the area and there are no public water supply wells located in a downgradient direction from the Site. Ground water in this area is considered saline and it is reasonable to assume that there will be no future use of the overburden ground water as a potable water supply.

Ground water from the Site ultimately discharges to Freeport Creek. The surface water data from Freeport Creek indicates that the Site has not had an impact on Freeport Creek surface water quality. Therefore, ground water does not represent a point of exposure and there is not a completed exposure pathway. The only potential future ground water exposure point would be worker exposure during any below ground water table excavation work. Although ground water concentrations at the perimeter of the Site exceed the ground water standards, concentrations would be expected to rapidly decrease with increasing distance from the source (spill area). The only reasonable future ground water exposure point would be excavation below the ground water table on-Site or adjacent to the Site.

The presence of the Marinas downstream of the outfall along Freeport Creek and the associated recreational boating and fishing, dictate that there will be direct contact with surface water and most likely sediments from Freeport Creek. However, the Freeport Creek surface water and sediment data indicate that the Site has not had an impact on Freeport Creek surface water and sediment quality. Therefore, since Freeport Creek surface water and sediments are not contaminated media, there is not a currently completed exposure pathway. Considering that the 1,1,1-TCA spill occurred in 1988, future degradation of Freeport Creek surface water and sediment quality related to the spill or former Site activities is unlikely.

Sub-surface soil analytical data from borings installed throughout the Site indicate that with the exception of sub-surface soils in the vicinity of the spill area, the spill or former Site activities have not impacted sub-surface soils. Sub-surface soils in the spill area from a depth of approximately eight feet to twenty feet below ground surface, exhibit 1,1,1-TCA, related degradation compounds and other compounds formerly and currently used at the Site, at concentrations above the NYSDEC RSCO.

The area in the vicinity of the former spill is paved. Also, considering the depth at which contaminated soils are isolated (contaminated soils encountered at a depth between eight to twenty feet below the ground surface), human exposure is not a significant concern. Currently there is not a completed exposure pathway. Future exposure would be limited to on-Site workers during excavation activities between eight to twenty feet below grade. This could occur if the underground storage tanks located within the spill area were to be removed or required maintenance. The exposure could be controlled by the use of proper personal protective equipment. The sub-surface soils will remain a continuing source of contaminants to ground water.

The storm drain sediment data indicate that sediments in storm drains SD-1, SD-5 and SD-8 have exhibited volatile organic concentrations above the NYSDEC, RSCOs. The storm drains are located on-Site and Site access is controlled. Exposure of the general public to direct contact with the sediments is not a reasonable scenario. The storm drains are also covered with metal grates. On-Site workers generally have no reason to remove the grates and remove sediments. Although it is potentially possible for sediments from the storm drains to migrate to Freeport Creek, sediments in Freeport Creek have not been impacted by Site related chemicals. Based on current Site conditions and reasonable future Site use, there is no current or future completed exposure point for the general public to come in contact with the storm drain sediments and therefore there is no completed exposure pathway. The only potential future exposure to storm drain sediments would be associated with on-Site workers or contractors performing any necessary maintenance.

The vadose zone soil vapor data revealed that Site related chemicals are present in the soil vapor. Although concentrations of several Site related chemicals were above typical background indoor air values, only three chemicals, acetone, n-hexane and toluene were significantly above the background concentrations as reported by the USEPA (Typical Indoor Air data from USEPA "National Ambient Volatile Organic Compounds (VOCs) Data Base Update", EPA/600/3-88/010a, March 1988). All concentrations were less than the ACGIH, NIOSH and OSHA occupational worker exposure concentrations. With respect to indoor air quality, the protection of employees who use these chemicals falls under the domain of the U.S. Occupational Safety and Health Administration (OSHA). All soil vapor chemical concentrations from the three low reporting limit samples collected on the south side of the Site near the adjacent building to the south were below the published ATSDR MRL concentrations. The indoor air samples collected by the NYSDOH in the building south of the Site and occupied by Love & Quiches indicates that soil vapor currently does not represent a threat to indoor air quality with respect to Site specific volatile organic compounds.

The exposure point for volatile organic compounds present in vadose zone soil gas is typically considered to be indoor air when soil vapor migrates from the ground into buildings. The movement of soil vapor into buildings most frequently is a concern in buildings with basements or crawl spaces. Both the on-Site building and the building adjacent to and south of the Site are constructed on concrete slabs and the movement of soil vapor into these buildings is most likely very limited. Because of the adhesive manufacturing, indoor background air volatile concentrations in the on-Site building are expected to be higher than the soil gas concentrations.

As previously noted, soil gas concentrations are below the ATSDR MRL concentrations. However, ATSDR has not developed MRLs for chloroethane, 1,1-dichloroethane, cyclohexane, and methyl-ethyl-ketone which are Site related compounds and were detected in at least one of the low reporting limit soil gas samples collected at the southern Site perimeter. Typical indoor air background concentrations were also not published for chloroethane and 1,1-dichloroethane. However, the concentrations of these compounds were below the ACGIH, NIOSH and OSHA worker occupational exposure standards. This fact, in conjunction with the most likely limited migration of soil vapor through the concrete slab of the building into the work spaces of the building located adjacent to and south of the Site, indicates that the soil vapor currently does not represent a significant potential exposure point. However, the NYSDOH has requested that indoor air be considered a potential future human exposure pathway.

Consumption of fish and wildlife can represent a point of exposure. As noted in Section 6.3.1, several people were observed fishing in Freeport Creek, downstream of the outfall. Currently, the NYSDEC shell fishing regulations do not allow the harvesting of shell fish within Freeport Creek to a point approximately 7,000 feet downstream of the outfall. Since the Freeport Creek surface water and sediment data indicate that the Site has not had an impact on Freeport Creek surface water and sediment quality, human consumption of fish from Freeport Creek would not represent any adverse chemical exposure related to the Site. Also, as discussed in Section 5, the volatile organic chemicals of concern at the Site do not significantly bioaccumulate in the environment. The consumption of fish from Freeport Creek does not represent a completed exposure pathway to Site related chemicals.

6.4 Receptor Populations

The potential receptor populations are based on the current and potential future land use on and in the vicinity of the Site. As previously discussed the current and foreseeable future use of the Site and surrounding area is commercial/industrial space. Although there are several marinas located along Freeport Creek and a public boat launch located along Stadium Canal, analytical data indicate that the Site has not impacted Freeport Creek surface water or sediment quality. Therefore, people using the marinas do not represent receptor populations. There are no residential homes located in close proximity to the Site. The closest residential homes are located approximately 750 feet north of the Site, which from a ground water perspective is upgradient of the Site.

The only potential current receptor population would be workers in the building adjacent to and south of the Site. It is possible, although unlikely, that workers in this building could be exposed to vadose zone soil vapor that contains Site related chemicals. However, the vadose zone chemical concentrations were below the available ATSDR MRL concentrations, which indicate that exposure to the vadose zone soil vapor would not represent a significant exposure. The four Site related chemicals detected in soil gas samples at the southern Site perimeter, which do not have ATSDR MRL values, were below the ACGIH, OSHA and where available the NIOSH worker exposure standards. Additionally, the building is constructed on a slab, and although slab construction may not eliminate the movement of vapors into a building, a slab will minimize the movement of vadose zone vapors into a building.

There are no currently completed exposure pathways associated with Site related contaminants. Potential future receptor populations would be on-Site workers exposed to contaminated ground water or sub-surface soils during any on-Site excavation work. On-Site workers could also potentially be exposed to storm drain sediments with concentrations of Site chemicals above the NYSDEC RSCOs during any storm drain maintenance. All these exposures could be mitigated through the use of proper personnel protection clothing.

The NYSDOH believes that exposure to site related chemicals via migration of soil vapor containing site related chemicals into indoor air represents a potential future exposure pathway. This potential exposure could be mitigated through the installation of a soil vapor extraction system as part of the Site remediation.

6.5 Route Of Exposure

Exposure routes are the means by which contaminants enter the human body. Potential routes of exposure are summarized below:

Water

1. Direct ingestion
2. Dermal contact and reaction
   Ocular contact and reaction
3. Inhalation secondary to household use

Soil/Sediment

1. Direct ingestion (primarily by children 9 months to 5 years of age)
2. Dermal contact and reaction
   Ocular contact and reaction
3. Inhalation of chemicals volatilized from soil
4. Inhalation of reentrained dust

Air

1. Inhalation
2. Dermal contact and reaction
   Ocular contact and reaction

Biota /Food Chain

1. Ingestion of plants, animals, or products contaminated secondary to intake of contaminated water
2. Ingestion of plants, animals, or products contaminated secondary to intake of contaminated soil, dust, or air
3. Ingestion of plants, animals, or products contaminated secondary to inhalation or evapotranspiration of contaminated air
4. Dermal contact with and reaction to contaminated plants, animals, or products

Miscellaneous Media

1. Direct ingestion
2. Dermal contact and reaction
   Ocular contact and reaction
3. Inhalation secondary to volatilization or reentrainment of miscellaneous media
4. Ingestion of plants or animals contaminated secondary to contact with contaminated miscellaneous media (e.g., exposed wastes and building materials

The exposure routes that are applicable to a Site are dependent on several factors. These include but are not limited to the media contaminated, surrounding land use (current and future), point of exposure and receptor population. As discussed in the preceding sections, there are no current completed exposure pathways.

6.6 Summary

The following sections summarize the human health exposure assessment by media. The analysis indicates that there is not currently any completed exposure pathway to chemicals related to the 1,1,1-TCA spill or other Site related chemicals associated with operation of the Site by Burmah Castrol. The only future potentially completed exposure pathways would be to ground water through excavation below the ground water table on or near the Site, excavation of sub-surface soils at a depth between approximately four to twenty feet below grade in the spill area, and on-Site maintenance of the storm drains and contact with storm drain sediments. These exposures could be controlled through the use of proper personnel protective equipment. Additionally, the NYSDOH believes that exposure to site related chemicals via migration of soil vapor containing site related chemicals into indoor air represents a potential future exposure pathway. This potential exposure could be mitigated through the installation of a soil vapor extraction system as part of the Site remediation

6.6.1 Ground water

On-Site ground water exhibits concentrations of Site related volatile organic chemicals at concentrations above the New York State ground water and drinking water standards. Ground water data indicates that ground water with elevated concentrations of volatile organics is potentially moving beyond the Site boundaries. However, ground water in this area is considered saline and is not used as a potable water source. Public water is supplied to the area and there are no public water supply wells located in the vicinity of the Site. Although ground water ultimately discharges to Freeport Creek and the Long Island Sound, surface water data from Freeport Creek indicate that ground water has not impacted Freeport Creek surface water quality. Therefore, although ground water is contaminated, there is no current point of exposure and no current completed exposure pathway.

The only potential future exposure would be to workers excavating below the ground water table on or adjacent to the Site. These exposures could be controlled through the use of proper personnel protection equipment.

6.6.2 Surface Water/Sediments

There are several marinas located along Freeport Creek downstream of the Outfall. Additionally, people have been observed fishing in Freeport Creek downstream of the outfall. Therefore, direct contact with Freeport Creek surface water and sediments is possible. However, the Freeport Creek surface water and sediment data indicate that the Site has not had an impact on surface water and sediment quality and it is unlikely that contaminants associated with the 1988 1,1,1-TCA spill will have a future impact on Freeport Creek surface water and sediment quality. Therefore, there is not a current or future completed exposure pathway.

6.6.3 Sub-Surface Soils

Sub-surface soils in the vicinity of the spill, from a depth of approximately eight feet below grade to a depth of approximately twenty feet below grade exhibit elevated chemical concentrations. However, the Site is paved, access is controlled and the depth of the impacted soils preclude any current direct contact. Therefore, there is no current completed exposure pathway.

The Site is currently an industrial facility and will most likely remain so in the foreseeable future. The only future completed exposure pathway to the impacted sub-surface soils would be to on-Site workers excavating in the vicinity of the spill area. The TACC underground tank farm is located in this area and any excavation for maintenance/repair of tanks/associated piping could provide a completed exposure pathway via direct contact, incidental ingestion and possibly inhalation from volatilization from the soil. However, any exposure could be controlled through the use of proper personnel protection equipment.

6.6.4 Storm Drain Sediments

The storm drain sediment data indicate that sediments in three on-Site storm drains have exhibited volatile organic concentrations above the NYSDEC, RSCOs. The storm drains are located on-Site and Site access is controlled. Exposure of the general public to direct contact with the sediments is not a reasonable scenario. The storm drains are also covered with metal grates. On-Site workers generally have no reason to remove the grates and remove sediments. Although it is potentially possible for sediments from the storm drains to migrate to Freeport Creek, sediments in Freeport Creek have not been impacted by Site related chemicals. Based on current Site conditions and reasonable future Site use, there is no current or future completed exposure point for the general public to come in contact with the storm drain sediments and therefore there is no completed exposure pathway. The only potential future exposure to storm drain sediments would be associated with on-Site workers or contractors performing any necessary maintenance.

6.6.4 Vadose Zone Soil Gas

It is possible, although unlikely, that workers in the building directly south of the Site could be exposed to vadose zone soil vapor that contains Site related chemicals. However, the vadose zone chemical concentrations were below the available ATSDR MRL concentrations, which indicate that exposure to the vadose zone soil vapor would not represent a significant exposure. The four Site related chemicals detected in soil gas samples at the southern Site perimeter, which do not have ATSDR MRL values, were below the ACGIH, OSHA and where available the NIOSH worker exposure standards. Additionally, the building is constructed on a slab, and although slab construction may not eliminate the movement of vadose zone vapors into a building, a slab will minimize the movement of vapors into a building. The indoor air samples collected by the NYSDOH in the building south of the Site and occupied by Love & Quiches indicates that soil vapor does not represent a threat to indoor air quality with respect to Site specific volatile organic compounds. Therefore, exposure to soil gas is currently not a completed exposure pathway. However, the NYSDOH believes that exposure to site related chemicals via migration of soil vapor containing site related chemicals into indoor air represents a potential future exposure pathway. This potential exposure could be mitigated through the installation of a soil vapor extraction system as part of the Site remediation

7.0 FISH AND WILDLIFE IMPACT ANALYSIS

This section presents the findings of the Fish and Wildlife Impact Analysis (FWIA) performed at the former CCC facility. The FWIA was 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" (October 1994). The results of the Step I (Site Description) and the Step IIA (Pathway Analysis) sections of the FWIA are presented.

The objectives 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 Step II 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. If there are no potential pathways or if analytical data indicate that contaminants have not migrated to a resource along potential pathways, then it can be concluded that there has been minimal impact on the resource.

A cover type map documenting land use and the terrestrial, palustrine and lacustrine communities located within a one-half mile radius of the Site is provided in Drawing No. 3 (Map Pocket). Topography and drainage within a two-mile radius of the Site are depicted on Drawing No. 4 (Map Pocket). The locations of New York State regulated freshwater wetlands within a two-mile radius of the Site are depicted in Drawing No 5 (Map Pocket). The NYSDEC Tidal Wetlands Maps for the Freeport and Jones Beach quads (Tidal Wetland Map Numbers Index 2 Map No.620-498 and 620-500) were reviewed to determine the location of Tidal Wetlands within a two-mile radius of the Site.

Significant natural resources (e.g., wetlands, streams) located within a two-mile radius of the Site are documented. A description of the fish and wildlife resources that could potentially utilize the cover types located within a one half-mile radius of the Site is presented. The general habitat quality within a one-half mile radius of the Site is discussed.

7.1 Site Topography And Drainage

Located to the north of the plant is a storage warehouse used by TACC. To the south of the main plant is storage warehouse divided into three sections. Love Quiches uses the front half for storage of bulk food supplies. The middle section is storage of empty 50-gallon drums for TACC. The back of the building farthest from Hanse Ave is storage of wood paneling by Knickerbocker. Lea Ronal Specialty Chemicals Worldwide (224-272 Buffalo Avenue Ext.) is located east of the Site. Farber Plastics (162 Hanse Avenue) is located west of the Site.

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 Site is flat, sloping gently from north to south, with all elevations greater than 5 feet and less than 10 feet above mean sea level. The Site is asphalt covered. The Site storm-water drainage system discharges into Freeport Creek approximately 1,000 feet northwest of the Site.

7.2 Land Use/Major Plant Communities Within One-Half Mile Of The Site

A cover type map detailing the major land use/plant communities within approximately a one-half mile radius of the Site is presented on Drawing No. 3 (Map Pocket). The cover type map was prepared based on interpretation and evaluation of aerial photographs, topographic maps and NYSDEC wetland maps. Field checking was performed to verify the accuracy of the cover type map. The cover types within a half-mile of the Site were classified using the New York Heritage Program Classification System (NHPCS, Reschke, 1990).

The predominant vegetation in each cover type was identified for areas classified as terrestrial natural (TN), palustrine (P) and lacustrine (L). The cover type boundary lines are approximate and have not been surveyed. The determination of dominance was qualitative, based on visual estimates. Vegetative plots and transects were not used in determining dominance. These methods are beyond the scope of a Step I analysis.

The predominant land use within a one-half mile radius of the Site is industrial and commercial with some residential homes. With the exception of five small areas of tidal marsh and an isolated area of upland habitat located along the Meadowbrook Parkway, there is no undeveloped land located within a one-half mile radius of the Site.

The upland habitat along the Meadowbrook Parkway is located approximately two thousand feet west of the Site. The predominant vegetation in this area is a mixture of herbaceous and woody vegetation. The predominant herbaceous vegetation is red raspberry (Rubus strigosus), seaside goldenrod (Solidago sempervirens), pokeweed (Phytolacca rigida) and grass species. The dominant woody vegetation is tartarian honeysuckle (Lonicera tatarica), staghorn sumac (Rhus typhinia) and arrowwood (Viburnum dentatum).

There are tidal marsh areas located south-southeast and east of the Site. The two tidal marshes to the south and southeast are part of a mosaic of tidal marshes located between the mainland and Jones Inlet. The other three tidal wetlands are small isolated areas located east of the Site; two along Stadium Park Canal and the third further east. The dominant vegetation in each of the marshes is spartina (Spartina species).

7.3 Wetlands Within A One-Half Mile And Two Mile Radius Of The Site

There are five New York State regulated freshwater wetlands located within a two-mile radius of the Site. Wetland F-5 is a Class I wetland. Wetlands F-2, F-4, F-6 and F-10 are Class II wetlands. The NYSDEC wetland classification system is based on a numerical rating of I to IV, with Class I wetlands representing the most significant wetlands. Criteria for classifying a wetland are detailed in the Freshwater Wetlands Maps and Classification Regulations (6NYCRR Part 664). The wetland locations are presented in Drawing No 5.

The is a large mosaic of tidal marshes, depicted on the New York State tidal marsh Inventory Maps located within a two mile radius of the Site. There are five tidal marshes located within a one-half mile radius of the Site, which are classified by NYSDEC as High Marsh or Salt Meadow. The two tidal marshes to the south and southeast are part of a mosaic of tidal marshes located between the mainland and Jones Inlet. The other three tidal wetlands are small isolated areas located east of the Site; two along Stadium Park Canal and the third further east. The dominant vegetation in each of the marshes is spartina (Spartina species)

7.4 Streams And Related Surface Water Bodies Within A One Half Mile And Two Mile Radius Of The Site

Freeport Creek and Stadium Park Canal (Merrick River) are the only streams located within a two-mile radius of the Site. Freeport Creek and Stadium Park Canal are classified as Class SC, saline surface waters. The best usage of these waters is for fishing and they are suitable for fish propagation and survival. Water quality may also be suitable for primary and secondary contact recreation although other factors may limit the use for these purposes.

7.5 Resource Characterization Within One-Half And Two Miles Of The Site

Resource characterization consists of determining the wildlife species that may potentially utilize, or have been determined to utilize, the plant communities or habitats identified in the previous sections as existing within one-half mile of the Site. Also, any known species of concern (i.e., endangered, threatened, etc.) or significant habitats that may exist within two miles of the Site are identified. Additionally, the general quality of the habitats that are located within one-half mile of the Site and their ability to provide for the needs of the species that may utilize the habitats is discussed. Areas of observed vegetative stress, leachate seeps, documented evidence of fish and/or wildlife mortality and any known population impacts related to Site-related contaminants are presented.

7.5.1 Endangered, Threatened Or Special Concern Fish And Wildlife Or Plant Species Or Significant Habitats

The United States Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), the NYSDEC Wildlife Resources Center and the NYSDEC Region 1 Office were contacted regarding the known occurrence of endangered, threatened, or special concern species or habitats located within a one-half mile radius of the Site.

The NYSDEC, USFWS and the NMFS indicated that there are no known occurrences of threatened, endangered, or special concern fish and wildlife species located within a one-half mile radius of the Site.

7.5.2 Fish and Wildlife Species Potentially Using Habitats Within a One-Half Mile Radius of the Site

The highly developed nature of the land located within a one-half mile radius of the Site severely limits the number of species that will occur within this defined area. Terrestrial species utilizing the upland habitat along the Meadowbrook parkway is most likely limited to small mammals and bird.

The aquatic species utilizing Freeport Creek and Stadium Canal is most likely somewhat limited due to the developed nature of these creeks. Within a one-half mile radius of the Site, fish and invertebrate species in these creeks would be representative of species associated with estuaries.

The species utilizing the tidal marsh areas south of the Site are potentially significant and could be representative of the large diversity of species that inhabit estuaries. A listing of the fish, invertebrate and amphibian, mammal and bird species that inhabit estuaries is beyond the scope of this document. However, a listing of some of the common species that could potentially be found in this area is provided in Table 22.

All species that could potentially utilize the habitats within a one-half mile radius of the Site are not included on these lists. Also, these lists are not meant to indicate that these species can always be found, or that all will be present at one time within one-half mile of the Site. These lists were prepared following a limited field evaluation of the habitats and review of available literature. These lists are not the result of a Site-specific population survey. Actual population surveys are complex and time intensive and are beyond the scope of a Step I baseline evaluation.

Many wildlife species are mobile and generally require a range of habitat types to meet their life cycle requirements. In addition, many species will only use the area within one-half mile of the Site for a portion of their life requisites. Thus, all the species identified on these lists were not actually observed within a one-half mile radius of the Site.

7.5.3 General Habitat Quality Within One-Half Mile of the Site

The upland habitat located adjacent to the Meadowbrook parkway is considered a poor quality habitat. This is a small area and its juxtaposition between the parkway and Stadium Park Canal limit wildlife access to the area. The area may provide habitat for a limited variety of small mammals and birds. It is a common ecological tenant that large blocks of undisturbed areas can support a greater number of species than smaller areas. This is partially related to the fact that larger areas will typically contain a wider variety of habitat types. Areas with diverse habitat types are more likely to contain the range of resources necessary to support a given species life cycle requirements. The greater number of habitat types the wider the diversity of plant communities. Animal species are ultimately dependent upon plants for survival, either directly in the case of herbivores, or indirectly with respect to animal species that use plants for shelter or feed on herbivores

The aquatic habitats of Freeport Creek and Stadium Park Canal located within a one-half mile radius of the Site most likely represent poor to moderate quality habitat. The shoreline of Freeport Creek has been bullheaded and is developed along both shores within a one-half mile radius of the Site. The western shore of Stadium Park canal is entirely developed within a one-half mile radius of the Site. There is a limited area of undeveloped terrestrial habitat and tidal marsh located along the east side of Stadium Park Canal.

The tidal wetland areas located within a half mile of the Site are most likely of moderate quality. Although these areas are small, there are larger areas of tidal wetlands located nearby in East Bay, on Fighting Island and in the Cow Meadow Preserve.

7.6 Applicable Fish And Wildlife Regulatory Criteria

The appropriate Site Specific Criteria (SSC) that may potentially be applicable to the Site are detailed below:

- Clean Water Act, 233 U.S.C. 1261 et seq. Sec. 404 regulates the discharge of pollutants into wetlands and other water bodies, including dredged or fill materials;
- The Freshwater Wetlands Act (Article 24 of the Environmental Conservation Law) and the Freshwater Wetlands Implementing Regulations (6NYCRR Parts 663 and 664) are designed to protect wetlands. Only wetlands that have been mapped by the State of New York are regulated;
- Tidal Wetlands Act (Article 25 of the Environmental Conservation Law) and the Tidal Wetlands Implementing Regulations (6NYCRR Part 661).
- Executive Order 11990, Protection of Wetlands. This order recognized the value of wetlands and directed federal agencies to minimize the degradation, destruction and loss of wetlands;
- Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.);
- Fish and Wildlife Coordination Act;
- NYSDEC, Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, October 1993;
- NYSDEC, Water Quality Regulations for Surface Waters and Ground waters, 6NYCRR Parts 700-705;
- NYSDEC, Technical Guidance for Screening Contaminated Sediments, November 1993;
- USEPA, Interim Sediment Criteria Values For Nonpolar Hydrophytic Organic Chemicals (May 1988); and
- NYSDEC, Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, January 24, 1994.

7.7 Pathway Analysis

This section evaluates pathways through which wildlife could potentially be exposed to Site related contaminants. This evaluation includes the identification of habitats and fish and wildlife resources that could potentially be impacted by Site contaminants, potential pathways of contamination migration and exposure, and sources of contamination.

In order for fish and wildlife to be affected by chemical constituents from a Site, two conditions must exist. There first must be an avenue by which fish and wildlife can be exposed to chemical constituents, referred to as a completed exposure pathway. In addition, the chemical concentrations within the completed exposure pathway must be of sufficient magnitude to cause an impact.

Potential fish and wildlife exposure pathways with respect to Site related contaminants include direct contact with water, soil or sediments that contain Site related chemicals, or ingestion of plants, animals or water, which have become contaminated with Site related chemicals.

There is no completed exposure pathway for wildlife exposure to Site contaminants at the Site or the immediately surrounding area. The area is paved and intensively developed with little to no wildlife habitat. Impacted media at the Site included ground water; sub-surface soils and to a limited extent storm drain sediments. The impacted sub-surface soils are at depth and are covered by asphalt. There are no ground water discharge points located on or in the immediate vicinity of the Site. The available information indicates that the contaminated media on-Site does not represent a threat to wildlife.

Ground water from the Site discharges to Freeport Creek. Additionally, storm drains from the Site discharge storm water and sediments to Freeport Creek via the on-Site storm drain system. Therefore, it is theoretically possible for fish and wildlife in Freeport Creek to be exposed to Site related chemicals.

FREEPORT CREEK SURFACE WATER AND SEDIMENT SAMPLES

Ten sediment samples were taken through out Freeport Creek and were analyzed for the NYSDEC TCL volatile organic compounds and TOC.

Freeport Creek Sediment volatile organic data are summarized in Table 19. The Freeport Creek sediment data indicate that the Site has not had a significant impact on Freeport Creek Sediment Quality. With the exception of a low estimated concentration (9 ug/Kg) of 1,1,1-TCA in the sample collected 200 feet downstream of the outfall from the Center of Freeport Creek, no 1,1,1-TCA or related degradation products were detected in the Freeport Creek sediment samples. No 1,1,1-TCA or related degradation products were detected in the sediment sample collected at the stormwater outfall.

Several volatile organic compounds (acetone, carbon disulfide, 2-butanone) were detected in the sediment samples collected upstream and downstream of the outfall. Upstream concentrations were generally consistent with the downstream concentrations. Chloroform, which is not a Site related chemical of concern, was detected at a low concentration (13 ug/Kg) in the downstream sample collected 100 feet downstream of the outfall and twenty-five feet from shore. Chloroform was not detected in the upstream samples.

Overall, Freeport Creek sediment quality downstream of the outfall is consistent with sediment quality upstream of the outfall. Sediment quality at the outfall does not indicate any Site related impacts. Data indicate that the Site has not had a significant impact on Freeport Creek sediment quality. Site related chemicals do not represent a threat to fish and wildlife via exposure to Freeport Creek sediments.

Nine surface water samples were collected from Freeport Creek and were analyzed for the

NYSDEC TCL volatile organic compounds. Analytical results are summarized in Table 18. The surface water data demonstrates that the Site is not impacting surface water quality in Freeport Creek. All surface water analytical results were below the respective surface water standards. With the exception of low concentrations of trichloroethene and 4-methyl-2-pentanone in the upstream center shallow sample and a low concentration of tetrachloroethene in the downstream center deep sample, no volatile organic compounds were detected at or above the reporting limit in any of the samples. Data indicates that Freeport Creek surface waters have not been significantly impacted and that the Site does not represent a threat to fish and wildlife associated with the Freeport Creek habitat.

8.0 SUMMARY AND CONCLUSIONS

This section summarizes the information obtained from the Phase I RI investigation and provides conclusions based on this information.

- The sub-surface boring soil data show that with the exception of the sub-surface soil in the vicinity of the original spill (SB-98-2, SB-98-3, MW-00-11A), sub-surface soil volatile organic concentrations do not significantly exceed the Site-specific RSCOs and sub-surface soils are not significantly impacted. The SB-98-2, SB-98-3 and MW-00-11A sub-surface boring data indicate that considerable sub-surface soil contamination remains in the vicinity of these borings and that sub-surface soils in the vicinity of the original 1,1,1-TCA spill continue to represent a source of volatile organics (1,1,1-TCA, 1,1-dichloroethane, 1,1-dicloroethene, ethylbenzene, toluene and xylene). Concentrations of 1,1,1-TCA and related degradation products are above the RSCO from a depth of approximately 8 feet below grade to a depth of 20 feet below grade.

- The volatile data from borings SB-98-2, SB-98-3, SB-98-4, MW-98-8D, MW-98-9D, MW-98-10D, MW-00-11A and MW-00-12D and the ground water analytical data, confirm the absence of DNAPL pools on the tidal marsh and gray clay and silt units. Any potential discrete zones of disconnected residual ganglia trapped within pores of the sub-surface soil below the water table is limited to the fill unit in the vicinity of SB-98-2, SB-98-3 and MW-00-11A.

- The sub-surface boring data indicate that semi-volatile organic, pesticides, PCBs and metals are not parameters of concern in Site soils.

- The MW-98-8S and MW-98-8D ground water data indicate that volatile organic compounds have not significantly impacted ground water east of the spill area. With the exception of methylene chloride in the April 2000 sample, no volatile organic compounds were detected in the MW-98-8S ground water samples above the ground water standard. With the exception of chloroethane no volatile organic compounds were detected above the ground water standard in ground water from MW-98-8D. Chloroethane was not detected in the most recent (May 2003) ground water sample from monitoring well MW-98-8D.

- Ground water data from monitoring wells MW-97-1S, MW-97-2S, MW-98-9D and MW-98-10D show that ground water along the western perimeter of the Site has not been significantly impacted by volatile organic compounds. Data indicate that with the exception of chloroethane, methylene chloride and chlorobenzene, ground water at the western Site boundary does not exhibit volatile organic compounds at concentrations above the ground water standard.

- The ground water data from monitoring well MW-00-11A and the grab sample (below the gray clay and silt) from monitoring well boring MW-00-12D, indicate that ground water quality below the gray clay and silt unit in the gray sand has not been significantly affected by Site related contaminants.

- The ground water data from monitoring well MW-03-13S indicate that shallow overburden ground water south of the Site in the vicinity of Hanse Avenue and Site related volatile organic compounds have not affected the AHRC property. With the exception of a low concentration of carbon disulfide (1 ug/L), no volatile organic compounds were detected in the MW-03-13S ground water sample. The carbon disulfide concentration was well below the ground water guidance value (60 ug/L). The carbon disulfide is most likely related to decomposition of organic material present in the fill material and the tidal marsh layer.

- High tide ground water indicates the absence of a divide, and uniform flow across the entire Site in a westerly direction with a slight northwesterly component in the northwestern quadrant of the Site.

- The shallow ground water flow regime during low tide conditions (Figure 6) indicates the presence of a flow divide. The Site can be generally divided into two distinct areas: the west half of the Site, which exhibits low to moderate tidal fluctuations and relatively low hydraulic gradients generally toward the southwest, and the east half of the Site, which exhibits more pronounced tidal fluctuations and relatively higher hydraulic gradients generally toward the southeast. The southeastern most section (near MW-98-8 well pair) of the Site appears to indicate that a ground water trough exists near the northeast corner, spill, and south of the spill area.

- The constant alternating low and high tides causes a cyclical shift in ground water flow direction; east to west with a northwest trend in the northwest quadrant of the Site during high tide and east or southeast in the east half of the Site during low tide. This shifting of ground water flow direction back and forth has functioned to minimize the migration of volatile organic compounds from the Site. Although a definitive determination of the length of time ground water flows in each direction cannot be determined, the overall net ground water flow direction is from east to west. Ground water flow to the east and southeast, although present, is most likely a minor component of the overall ground water flow pattern.

- The ground water flow data indicate that the monitoring wells pairs (MW-97-1S/MW-98-9D and MW-97-2S/MW-98-10D) along the western perimeter of the Site are positioned such that they would intercept any significant dissolved phase volatile organic compounds that originated from the spill area. Data indicate that additional monitoring wells on the western perimeter of the Site are not necessary.

- Ground water flow through the unconfined shallow water-bearing zone is primarily lateral based on the observed horizontal component hydraulic gradients and the negligible apparent downward vertical gradients measured between corresponding "S" and "D" wells. The apparent low vertical hydraulic conductivity of the fill and tidal marsh unit, when present, suggests that these units may locally restrict flow between the fill and upper gravelly sand unit. This characteristic most likely functioned to limit the movement of 1,1,1-TCA from the spill area.

- Ground water flow rates and chemical retardation factors indicate it could potentially take up to 41.7 years for 1,1,1-trichoroethane and degradation products to reach the western Site boundary. The storm sewer line located along the south side of the building may function as a preferential route for ground water movement.

- Low concentrations of volatile organic compounds in the storm drains on the south side of the building and the potential preferential movement of dissolved phase volatile organics (via ground water) along the storm drain line, may potentially represent a partial source of the volatile organics detected in ground water from monitoring wells MW-97-6S, MW-97-1S and MW-98-9D.

- The vadose zone soil vapor data revealed that Site related chemicals are present in the soil vapor. Although concentrations of several Site related chemicals were above typical background indoor air values, only three chemicals, acetone, n-hexane and toluene were significantly above the background concentrations as reported by the USEPA. All concentrations were less than the ACGIH, NIOSH and OSHA occupational worker exposure concentrations. All soil vapor chemical concentrations from the three low reporting limit samples collected on the south side of the Site near the adjacent building to the south were below the published ATSDR MRL concentrations. The indoor air samples collected by the NYSDOH in the building south of the Site and occupied by Love & Quiches indicates that soil vapor currently does not represent a threat to indoor air quality with respect to Site specific volatile organic compounds.

- The human health exposure assessment indicates that currently, there is no completed exposure pathway to chemicals related to the 1,1,1-TCA spill or other Site related chemicals. Future potentially completed exposure pathway would be to ground water through excavation below the ground water table on or near the Site, excavation of sub-surface soils at a depth between approximately eight to twenty feet below grade in the spill area, and on-Site maintenance of the storm drains and contact with storm drain sediments. These exposures could be controlled through the use of proper personnel protective equipment. However, the NYSDOH believes that exposure to site related chemicals via migration of soil vapor containing site related chemicals into indoor air represents a potential future exposure pathway. This potential exposure could be mitigated through the installation of a soil vapor extraction system as part of the Site remediation

- The surface water data demonstrates that the Site is not impacting surface water quality in Freeport Creek. All surface water analytical results were below the respective surface water standards. With the exception of low concentrations of trichloroethene and 4-methyl-2-pentanone in the upstream center shallow sample and a low concentration of tetrachloroethene in the downstream center deep sample, no volatile organic compounds were detected at or above the reporting limit in any of the samples.

- Freeport Creek sediment quality downstream of the outfall is consistent with sediment quality upstream of the outfall. Sediment quality at the outfall does not indicate any Site related impacts. Data indicate that the Site has not had a significant impact on Freeport Creek sediment quality.

- The RI data indicate that surface sediments in the SD-1 storm drain may represent a potential source of dissolved phase methylene chloride to the storm drain system and Freeport Creek. Potential preferential movement of dissolved phase volatile organics (via ground water) along the storm drain line on the south side of the Site, may potentially represent a partial source of the volatile organics detected in ground water from monitoring wells MW-97-6S, MW-97-1S and MW-98-9D. Surface sediments in the SD-8 and SD-5 may represent a source of 1,1,1-TCA (SD-8) and xylenes (SD-8 and SD-5) to Freeport Creek.

- The fish and wildlife impact analysis indicated that there is no completed exposure pathway and therefore no impact on fish and wildlife resources. Land use within a one-half mile radius of the

Site is a mixture of industrial and commercial with a limited number of residential homes. There is very little undeveloped land.

9.0 REFERENCES

Agency For Toxic Substances And Disease Registry, Public Health Assessment Guidance Manual, 1998.

Cherry, J.A., Freeze,R.A., Ground water, Prentice-Hall, Inc., 1979.

Dragun, J.,Ph.D., The Soil Chemistry of Hazardous Materials, Hazardous Materials Control Research Institute, Silver Spring Maryland, 1988.

Dragun, J., Leverett, R.S., Degradation of Volatile Chlorinated Aliphatic Priority Pollutants in Ground water, Perigannon Press, Ltd., 1985.

Kueper, B.H., The Behavior of Dense Non-Aqueous Phase Liquid Contaminants in Heterogeneous Porous Media, Doctorate Thesis, University of Waterloo, 1989.

NYSDEC Technical and Administrative Guidance Memorandum, Determination of Soil Cleanup Objectives and Cleanup Levels, JWR-94-4046, January 24, 1991

United States Environmental Protection Agency, Chemical Summary For Methylchloroform, EPA 749-f-94-014a, August 1994

USEPA, Superfund Public Health Evaluation Manual, EPA 540/1-86/060, 1986

USEPA (Typical Indoor Air data from USEPA "National Ambient Volatile Organic Compounds (VOCs) Data Base Update", EPA/600/3-88/010a, March 1988)

United States Army Corps of Engineers, Riverine Emergency Management Model, Chemical Properties Table, August 1997

Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, 1983

Vogel, T. M., Criddle, C.S., McCarty, P.L., Transformation of Halogenated Aliphatic Compounds, Environmental Science and Technology, Vol. 21, No. 8 1987.

TABLES

Table 1
Summary of Site Stratigraphy
Former Columbia Cement Company, Inc. Facility
Freeport, Nassau County, New York

Boring I.D.	Fill[1] (Interval-Feet BGS/[Elevation])	Tidal Marsh[2] (Interval-Feet BGS/[Elevation])	Gravelly Sand[3] (Interval-Feet BGS/[Elevation])	Gray Clay and Silt Lower Confining Unit[4] (Interval-Feet BGS/[Elevation])	Gray Sand[5] (Interval-Feet BGS/[Elevation])
B-8	0-7.0	7.0-12.0	12.0->35.0	NE	NE
MW-1S				NE	NE
MW-1D-97	0-11.50 [97.96-86.46]	11.50-15.30 [86.46-82.66]	15.30-34.9 [82.66-63.06]	34.9->38 [63.06-<59.96]	NE
MW-97-1S	0-6.10 [97.63-91.53]	6.10-7.25 [91.53-90.38]	7.25->26.0 [90.38-<71.63]	NE	NE
MW-97-2S	0-9.75 [98.83-89.08]	9.75-11.25 [89.08-87.58]	11.25->25.25 [87.58-<73.41]	NE	NE
MW-97-3S	0-7.90 [98.66-90.76]	7.90-13.35 [90.76-85.31]	13.35->25.0 [85.31-<73.66]	NE	NE
MW-97-4S	0-9.10 [98.86-89.76]	9.10-13.15 [89.76-85.71]	13.15->25.5 [85.71-<73.36]	NE	NE
MW-97-5S	0-9.80 [98.59-88.79]	9.80-11.55 [88.79-87.04]	11.55->26.0 [87.04-<72.59]	NE	NE
MW-97-6S	0-10.10 [98.69-88.59]	10.10-12.95 [88.59-85.74]	12.95->26.0 [85.74-<72.69]	NE	NE
MW-97-7S	0-17.60 [98.79-81.19]	NE	17.60->32.0 [81.19-<66.79]	NE	NE
MW-98-8S					
MW-98-8D	0-7.70[98.68-90.98]	7.70-13.55[90.98-85.13]	13.55-35.3[85.13-63.38]	35.30->38.0[63.38-<60.68]	NE
MW-98-9D	0-5.65 [97.54-91.89]	5.65-11.7[91.89-85.84]	11.70-37.0[85.84-60.54]	37.0->40.0[60.54-<57.54]	NE
MW-98-10D	0-9.85 [98.75-88.90]	9.85-10.75[88.90-88.00]	10.75-37.10[88.00-61.65]	37.1->38.0[61.65-<60.75]	NE
MW-00-11A	0-18.5 [97.89 - 79.39]	NE	18.5-34.6 [79.39 - 63.29]	34.6-48.55 [63.29 - 49.34]	48.55->61.5 [49.34 - <36.39]
MW-00-12D	0-8.45 [98.6 - 90.15]	8.45-12.95 [90.15 - 85.65]	12.95-34.7 [85.65 - 63.90]	34.7-50.0 [63.90 - 48.60]	50.0->52.5 [48.60 - <46.10]
MW-03-13S	0-10.85 [98.05-87.20]	10.85-14.65 [87.20-83.40]	14.65->25.5 [83.4->72.55]	NE	NE
TB-97-1	0-10.9 [98.43-87.53]	10.9-13.3 [87.53-85.13]	13.3->26.0 [85.13-<72.43]	NE	NE
TB-97-2	0-9.77 [98.11-88.34]	9.77-22.4 [88.34-75.71]	22.4->26.0 [75.71-<72.11]	NE	NE
TB-97-3	0-22.9 [98.24-75.34]	NE	22.9->26.0 [75.34-<72.24]	NE	NE
TB-97-4	0-7.75 [98.28-90.53]	7.75-12.1 [90.53-86.18]	12.1->25.0 [86.18-<73.28]	NE	NE
TB-97-5	0-3.10 [98.43-95.33]	3.10-13.35 [95.33-85.08]	13.35->25.0 [85.08-<73.43]	NE	NE
TB-97-6	0-7.80 [99.07-91.27]	7.80-13.70 [91.27-85.37]	13.7->25.0 [85.37-<74.07]	NE	NE
SB-98-2	0-15.10[97.64-82.54]	NE	15.10-34.0[82.54-63.64]	34.0->38.0[63.64-<59.64]	NE
SB-98-3	0-19.35[97.83-78.48]	19.35-19.58[78.48-78.25]	19.58-35.67[78.25-62.16]	35.67->38.0[62.16-<59.83]	NE
SB-98-4	0-14.55[98.44-83.89]	NE	14.55-35.16[83.89-63.28]	35.16->38.0[63.28-<60.44]	NE
SB-98-5	0-12.65[99.01-86.36]	12.65-13.49[86.36-85.52]	13.49->14.0[85.52-<85.01]	NE	NE
BSB-98-7	0-11.35[98.94-87.59]	11.35-13.63[87.59-85.31]	13.63-34.55[85.31-64.39]	34.55->38.0[64.39-<60.94]	NE

Notes:
BGS = Below Ground Surface; NE = Not Encountered
Elevations based on a benchmark established by Rust E&I at utility pole F34, assumed site datum = 100.00
1 = Fill consists of soil (20-75%) and landfill debris [(80-25%); cinders, brick, stone, concrete, glass, wood, textile debris & metal].
2 = Tidal Marsh unit generally consists of a dark brown to dark gray-black organic clayey silt to occasional clay and silt with frequent roots and wood; occasionally peat-like.
3 = Gravelly Sand unit generally consists of a brown to light gray coarse, medium(+) to fine sand, little medium to fine(+) subrounded gravel.
4 = Gray Clay and Silt unit or "Lower Confining" unit consists of a gray silt and clay, trace fine sand grading downward to a non-plastic clay and silt, trace fine sand.
5 = Gray Sand unit generally conists of a brownish gray to light medium to fine (+) fine Sand, little silt.

TABLE 2A
Groundwater Elevation Data
Former Columbia Cement Company, Inc. Facility
Freeport, New York
December 30, 1998 Data

Monitoring Well	Round 1 feet	Round 2 feet	Round 3 feet	Round 4 feet	Round 5 feet	Round 6 feet	Round 7 feet	Round 8 feet	Round 9 feet
MW-1S	91.81	91.84	91.85	91.82	91.82	91.79	91.73	91.66	91.59
MW-1D-97	91.83	91.85	91.86	91.86	91.84	91.79	91.74	91.67	91.62
MW-97-1S	91.65	91.63	91.60	91.65	91.60	91.53	91.49	91.43	91.37
MW-97-2S	91.48	91.52	91.51	91.51	91.51	91.48	91.45	91.42	91.37
MW-97-3S	91.95	91.98	91.98	91.99	91.94	91.91	91.85	91.75	91.66
MW-97-4S	91.85	91.85	91.86	91.85	91.83	91.75	91.73	91.66	91.59
MW-97-5S	91.85	91.87	91.86	91.85	91.84	91.78	91.72	91.65	91.57
MW-97-6S	91.74	91.73	91.71	91.73	91.71	91.65	91.64	91.59	91.54
MW-97-7S	91.64	91.67	91.67	91.66	91.66	91.64	91.59	91.56	91.50
MW-98-8S	91.93	92.24	91.98	91.93	91.92	91.86	91.80	91.73	91.65
MW-98-8D	91.92	91.96	91.97	91.97	91.94	91.89	91.82	91.76	91.66
MW-98-9D	91.66	91.66	91.62	91.66	91.60	91.56	91.51	91.46	91.39
MW-98-10D	91.53	91.57	91.56	91.55	91.52	91.52	91.50	91.44	91.42

	Round 10 feet	Round 11 feet	Round 12 feet	Round 13 feet	Round 14 feet	Round 15 feet	Round 16 feet	Round 17 feet	Round 18 feet
MW-1S	91.52	91.41	91.34	91.22	91.16	91.06	90.97	90.96	90.93
MW-1D-97	91.54	91.44	91.34	91.23	91.17	91.08	91	91.01	90.95
MW-97-1S	91.29	91.23	91.16	91.07	91.02	90.95	90.93	90.92	90.93
MW-97-2S	91.33	91.28	91.22	91.16	91.13	91.08	91.03	91.01	*90.99*
MW-97-3S	91.56	91.44	91.31	91.18	91.11	91.01	90.93	90.89	90.89
MW-97-4S	91.51	91.42	91.33	91.21	91.14	91.05	91.00	90.97	90.93
MW-97-5S	91.49	91.39	91.29	91.17	91.11	91.01	90.92	90.90	90.89
MW-97-6S	91.48	91.40	91.32	91.26	91.19	91.13	91.06	91.03	91.01
MW-97-7S	91.46	91.40	91.32	91.26	91.22	91.16	91.09	91.07	91.06
MW-98-8S	91.55	91.47	91.34	91.21	91.20	91.05	90.96	90.93	90.90
MW-98-8D	91.56	91.46	91.35	91.22	91.16	91.04	90.95	90.93	90.91
MW-98-9D	91.31	91.25	91.18	91.10	91.05	90.98	90.95	90.94	90.95
MW-98-10D	91.38	91.31	91.25	91.18	91.17	91.12	91.08	91.05	91.04

	Round 19 feet	Round 20 feet	Round 21 feet	Round 22 feet	Round 23 feet	Round 24 feet	Round 25 feet	Round 26 feet
MW-1S	90.93	90.95	90.97	91.03	91.07	91.10	91.15	91.20
MW-1D-97	90.96	90.97	90.99	91.06	91.08	91.11	91.17	91.23
MW-97-1S	90.93	90.98	90.99	91.02	91.05	91.06	91.10	91.14
MW-97-2S	91.01	91.01	91.21	91.03	91.05	91.06	91.07	91.10
MW-97-3S	90.9	90.93	90.88	91.04	91.09	91.1	91.19	91.23
MW-97-4S	90.94	90.95	90.99	91.03	91.06	91.06	91.1	91.15
MW-97-5S	90.89	90.92	90.95	91	91.05	91.06	91.09	91.14
MW-97-6S	91.01	91.01	91.06	91.04	91.07	91.07	91.1	91.15
MW-97-7S	91.05	91.05	91.06	91.08	91.09	91.11	91.15	91.17
MW-98-8S	90.91	90.91	90.97	91.05	91.08	91.10	91.20	91.22
MW-98-8D	90.91	90.92	90.98	91.04	91.08	91.08	91.19	91.23
MW-98-9D	90.95	91.00	91.01	91.04	91.07	91.08	91.12	91.17
MW-98-10D	91.04	91.05	91.05	91.10	91.11	91.11	91.14	91.16

	Minimum	Maximum	Max-Min
MW-1S	90.93	91.85	0.92
MW-1D-97	90.95	91.86	0.91
MW-97-1S	90.92	91.65	0.73
MW-97-2S	90.99	91.52	0.53
MW-97-3S	90.88	91.99	1.11
MW-97-4S	90.93	91.86	0.93
MW-97-5S	90.89	91.87	0.98
MW-97-6S	91.01	91.74	0.73
MW-97-7S	91.05	91.67	0.62
MW-98-8S	90.9	92.24	1.34
MW-98-8D	90.91	91.97	1.06
MW-98-9D	90.94	91.66	0.72
MW-98-10D	91.04	91.57	0.53

TABLE 2B
Groundwater Elevation Data
Former Columbia Cement Company, Inc. Facility
Freeport New York
February 16, 1999 Data

	Round 1 feet	Round 2 feet	Round 3 feet	Round 4 feet	Round 5 feet	Round 6 feet	Round 7 feet	Round 8 feet	Round 9 feet
MW-1S	91.62	91.64	91.64	91.66	91.66	91.61	91.58	91.55	91.49
MW-1D-97	91.65	91.65	91.68	91.69	91.69	91.68	91.64	91.58	91.52
MW-97-1S	91.43	91.43	91.42	91.41	91.40	91.39	91.36	91.32	91.25
MW-97-2S	91.34	91.35	91.36	91.35	91.34	91.35	91.34	91.33	91.29
MW-97-3S	91.73	91.75	91.77	91.78	91.77	91.74	91.68	91.61	91.53
MW-97-4S	91.63	91.65	91.65	91.67	91.67	91.65	91.62	91.58	91.51
MW-97-5S	91.63	91.66	91.66	91.66	91.67	91.65	91.60	91.54	91.47
MW-97-6S	91.53	91.54	91.55	91.57	91.57	91.56	91.53	91.51	91.47
MW-97-7S	91.50	91.52	91.53	91.54	91.54	91.53	91.52	91.49	91.46
MW-98-8S	91.74	91.75	91.77	91.78	91.78	91.75	91.68	91.64	91.57
MW-98-8D	91.72	91.72	91.75	91.75	91.75	91.72	91.64	91.61	91.61
MW-98-9D	91.44	91.44	91.42	91.43	91.41	91.41	91.37	91.33	91.26
MW-98-10D	91.36	91.38	91.38	91.39	91.38	91.37	91.36	91.33	91.29

	Round 10 feet	Round 11 feet	Round 12 feet	Round 13 feet	Round 14 feet	Round 15 feet	Round 16 feet	Round 17 feet	Round 18 feet
MW-1S	91.43	91.36	91.26	91.22	91.15	91.08	91.06	91.05	91.06
MW-1D-97	91.47	91.40	91.31	91.24	91.17	91.14	91.08	91.07	91.07
MW-97-1S	91.19	91.14	91.09	91.03	90.99	90.96	90.96	90.97	90.97
MW-97-2S	91.25	91.20	91.16	91.12	91.09	91.05	91.05	91.04	91.05
MW-97-3S	91.45	91.36	91.25	91.17	91.09	91.01	90.99	91.00	91.00
MW-97-4S	91.44	91.38	91.29	91.22	91.15	91.09	91.04	91.04	91.04
MW-97-5S	91.41	91.34	91.25	91.18	91.11	91.05	91.01	91.01	91.01
MW-97-6S	91.43	91.35	91.32	91.26	91.21	91.16	91.13	91.13	91.13
MW-97-7S	91.43	91.37	91.33	91.28	91.24	91.19	91.17	91.17	91.17
MW-98-8S	91.50	91.42	91.33	91.25	91.18	91.10	91.08	91.08	91.08
MW-98-8D	91.47	91.38	91.29	91.20	91.11	91.04	91.01	91.02	91.01
MW-98-9D	91.20	91.15	91.10	91.04	91.00	90.97	90.98	90.98	90.98
MW-98-10D	91.25	91.22	91.17	91.13	91.11	91.07	91.06	91.05	91.06

	Round 19 feet	Round 20 feet	Round 21 feet	Round 22 feet	Round 23 feet	Round 24 feet	Round 25 feet	Round 26 feet	Round 27 feet
MW-1S	91.11	91.15	91.21	91.29	91.36	91.42	91.48	91.55	91.57
MW-1D-97	91.15	91.19	91.25	91.30	91.39	91.44	91.50	91.58	91.60
MW-97-1S	91.07	91.10	91.12	91.21	91.24	91.28	91.36	91.38	91.39
MW-97-2S	91.08	91.10	91.15	91.17	91.21	91.22	91.25	91.32	91.33
MW-97-3S	91.10	91.16	91.23	91.31	91.42	91.49	91.57	91.63	91.68
MW-97-4S	91.12	91.16	91.23	91.31	91.38	91.43	91.50	91.56	91.59
MW-97-5S	91.09	91.15	91.30	91.28	91.34	91.43	91.47	91.55	91.59
MW-97-6S	91.19	91.21	91.22	91.27	91.33	91.41	91.45	91.46	91.51
MW-97-7S	91.20	91.22	91.26	91.30	91.33	91.39	91.43	91.46	91.49
MW-98-8S	91.17	91.21	91.30	91.36	91.55	91.51	91.58	91.65	91.69
MW-98-8D	91.12	91.17	91.25	91.31	91.41	91.45	91.55	91.62	91.65
MW-98-9D	91.08	91.11	91.14	91.22	91.24	91.30	91.35	91.38	91.40
MW-98-10D	91.10	91.13	91.14	91.20	91.23	91.26	91.31	91.35	91.36

	Round 28 feet	Round 29 feet	Round 30 feet	Round 31 feet	Round 32 feet	Minimum feet	Maximum feet	Max-Min feet
MW-1S	91.61	91.60	91.55	91.57	91.53	91.05	91.66	0.61
MW-1D-97	91.64	91.64	91.58	91.60	91.55	91.07	91.69	0.62
MW-97-1S	91.40	91.39	91.38	91.40	91.40	90.96	91.43	0.47
MW-97-2S	91.35	91.34	91.32	91.35	91.35	91.04	91.36	0.32
MW-97-3S	91.70	91.71	91.63	91.67	91.63	90.99	91.78	0.79
MW-97-4S	91.62	91.61	91.56	91.58	91.55	91.04	91.67	0.63
MW-97-5S	91.62	91.62	91.55	91.61	91.58	91.01	91.67	0.66
MW-97-6S	91.52	91.51	91.46	91.49	91.45	91.13	91.57	0.44
MW-97-7S	91.51	91.51	91.46	91.49	91.49	91.17	91.54	0.37
MW-98-8S	91.72	91.68	91.65	91.64	91.61	91.08	91.78	0.70
MW-98-8D	91.68	91.68	91.62	91.66	91.62	91.01	91.75	0.74
MW-98-9D	91.41	91.39	91.38	91.40	91.41	90.97	91.44	0.47
MW-98-10D	91.36	91.37	91.35	91.35	91.35	91.05	91.39	0.34

Table 2C
Summary of Water Table Elevation Data (May 3, 2000)
Former Columbia Cement Company, Inc. Facility
Freeport, Nassau County, New York

Well I.D.	Measuring Point Elevation[1]	Depth to Water During Low Tide[2]	Elevation of Water Table During Low Tide[2]	Depth to Water During High Tide[3]	Elevation of Water Table During High Tide[3]
MW-1S	97.60	6.57	91.03	5.93	91.67
MW-1D-97	97.72	6.66	91.06	6.02	91.70
MW-97-1S	97.22	6.20	91.02	5.70	91.52
MW-97-2S	98.26	7.19	91.07	6.78	91.48
MW-97-3S	98.21	7.16	91.05	6.32	91.89
MW-97-4S	98.46	7.41	91.05	6.76	91.70
MW-97-5S	98.33	7.33	91.00	6.62	91.71
MW-97-6S	98.35	7.22	91.13	6.74	91.61
MW-97-7S	98.37	7.19	91.18	6.78	91.59
MW-98-8S	98.71	7.56	91.15	6.83	91.88
MW-98-8D	98.49	7.50	90.99	6.71	91.78
MW-98-9D	97.22	6.25	90.97	5.73	91.49
MW-98-10D	98.46	7.39	91.07	7.02	91.44
MW-00-11A	97.22	---	NM	---	NM
MW-00-12D	98.20	7.14	91.06	6.46	91.74

Notes:

Elevations based on a benchmark established by Rust E&I at utility pole F34, assumed site datum = 100.00
[1] = Measuring point elevation is at marked Top of 2" I.D. PVC.
[2] = Low Tide (May 3, 2000 at 3:57 P.M.).
[3] = High Tide (May 3, 2000 at 10:22 P.M.).

Table 3

Summary of Hydraulic Conductivity Test Results
Former Columbia Cement Company, Inc. Facility
Freeport, New York

Monitoring Well I.D.	Test Method			
	Hvorslev		Bouwer & Rice	
	(cm/sec)	(ft/day)	(cm/sec)	(ft/day)
MW-1S	6.15E-04	1.74	4.45E-04	1.26
MW-97-1S	3.16E-02	89.59	2.32E-02	65.77
MW-97-2S	3.03E-02	85.90	2.33E-02	66.06
MW-97-3S	1.36E-02	38.56	1.44E-02	40.82
MW-97-4S	3.96E-02	112.27	2.41E-02	68.32
MW-97-5S	2.49E-02	70.59	1.58E-02	44.79
MW-97-6S	3.64E-02	103.19	2.64E-02	74.84
MW-97-7S	2.24E-02	63.50	2.08E-02	58.97
MW-98-8S	7.23E-03	20.50	4.24E-03	12.02
MW-03-13S	1.90E-02	53.86	1.12E-02	31.75
MW-1D-97	1.23E-02	34.87	1.02E-02	28.92
MW-98-8D	1.21E-02	34.30	7.47E-03	21.18
MW-98-9D	4.15E-02	117.65	3.62E-02	102.63
MW-98-10D	1.63E-02	46.21	1.08E-02	30.62
MW-00-12D	1.30E-02	36.85	1.37E-02	38.83
MW-00-11A	2.12E-02	60.09	1.28E-02	36.28
Min.	6.15E-04	1.74	4.45E-04	1.26
Max.	4.15E-02	117.65	3.62E-02	102.63
Average	2.15E-02	60.60	1.59E-02	45.19
Geometric Mean	1.61E-02	45.64	1.20E-02	34.02

NOTE:
The application of the Hvorslev method assumes unconfined conditions for all "S" wells and "D" wells at the site. Confined conditions are assumed for monitoring well MW-00-11A; therefore, the application of the Hvorslev method is considered most appropriate.

Table 4

Summary of Well Construction Details
Former Columbia Cement Company, Inc. Facility
Freeport, Nassau County, New York

Well I.D.	Ground Surface Elevation[1]	Concrete Seal depth in feet BGS/[Elevation]	Cement-Bentonite Grout depth in feet BGS/[Elevation]	Bentonite Seal depth in feet BGS/[Elevation]	Sand Pack depth in feet BGS/[Elevation]	Screen depth in feet BGS/[Elevation]
MW-1S	98.04	~0-3.0	~3.0-8.0	~8.0-10.0	~10.0-21.0	~11.0-21.0
MW-1D-97	97.96	0-3.0	3.0-22.0 [94.96-75.96]	22.0-27.5 [75.96-70.46]	27.5-34.5 [70.46-63.46]	28.65-33.65 [69.31-64.31]
MW-97-1S	97.63	0-3.0	3.0-9.2 [94.63-88.43]	9.15-12.25 [88.43-85.38]	12.25-25.0 [85.38-72.63]	14.25-24.25 [83.38-73.38]
MW-97-2S	98.83	0-3.0	3.0-9.3 [95.83-89.53]	9.3-12.5 [89.53-86.33]	12.5-25.0 [86.33-73.83]	14.5-24.5 [84.33-74.33]
MW-97-3S	98.66	0-3.0	3.0-11.0 [95.66-87.66]	11.0-14.0 [87.66-84.66]	14.0-25.25 [84.66-73.41]	15.0-25.0 [83.66-73.66]
MW-97-4S	98.86	0-3.0	3.0-11.0 [95.86-87.86]	11.0-14.0 [87.86-84.86]	14.0-25.5 [84.86-73.36]	15.25-25.25 [83.61-73.61]
MW-97-5S	98.59	0-3.0	3.0-9.7 [95.59-88.89]	9.7-13.0 [88.89-85.59]	13.0-26.0 [85.59-72.59]	15.80-25.80 [82.79-72.79]
MW-97-6S	98.69	0-3.0	3.0-10.6 [95.69-88.09]	10.55-14.0 [88.09-84.69]	14.0-25.5 [84.69-73.19]	15.5-25.5 [83.19-73.19]
MW-97-7S	98.79	0-3.0	3.0-16.1 [95.79-82.69]	16.1-20.0 [82.69-78.79]	20.0-31.5 [78.79-67.29]	21.35-31.35 [77.44-67.44]
MW-98-8S	98.89	0-3.0	3.0-5.0 [95.89-93.89]	5.0-8.0 [93.89-90.89]	8.0-21.0 [90.89-77.89	10.0-20.0 [88.89-78.89]
MW-98-8D	98.68	0-3.0	3.0-20.0 [95.68-78.68]	20.0-23.0 [78.68-75.68]	23.0-35.3 [75.68-63.38]	25.0-35.0 [73.68-63.68]
MW-98-9D	97.54	0-3.0	3.0-23.0 [94.54-74.54]	23.0-26.0 [74.54-71.54]	26.0-37.1 [71.54-60.44]	27.0-37.0 [70.54-60.54]
MW-98-10D	98.75	0-3.0	3.0-23.0 [95.75-75.75]	23.0-26.0 [75.75-72.75]	26.0-37.1 [72.75-61.65	27.0-37.0 [71.75-61.75]
MW-00-11A	97.89	0-3.0	3.0-45.0 [94.89-52.89]	45.0-48.5 [52.89-49.39]	48.5-61.5 [49.39-36.39]	51.0-61.0 [46.89-36.89]
MW-00-12D	98.60	0-3.0	3.0-19.0 [95.60-79.60]	19.0-22.5 [79.60-76.10]	22.50-38.0 [79.60-60.60]	25.0-35.0 [73.60-63.60]
MW-03-13S	98.05	0-3.0	3.0-5.0 [95.05-93.05]	5.0-8.0 [93.05-90.05]	8.0-25.5 [90.05-72.55]	10.0-25.0 [88.05-73.05]

Note:
Elevations based on a benchmark established by Rust E&I at utility pole F34, assumed site datum = 100.00
Survey of monitoring well MW-03-13S was performed by Donald Stedge, L.S. of Central Valley, New York on June 26, 2003

Table 5

Volatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 1998 (MW-00-11 and MW-00-12 April 2000)

Sample ID / Compound	SB-98-2 (10-13.7') Fill	SB-98-2 (15.1-15.67') Fill/Tp GrSnd	SB-98-2 (34.0-34.5') Gr Clay/Silt	SB-98-3 (18-19.35') Fill	X-1 SB-98-3 (18-19.35')]	SB-98-3 (19.35-19.58') Tidal Marsh	SB-98-3 (35.67-36') Gr Clay/Silt	SB-98-4 (10-12') Fill	SITE SPECIFIC RSCO
1,1,1-Trichloroethane	**7,000,000 D**	**38,000**	20	**1,200,000 D**	**1,800,000 D**	**810,000 D**	9 J	430 D	1,049
1,1,2,2-Tetrachloroethane	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
1,1,2-Trichloroethane	240,000 U	320 J	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	386
1,1-Dichloroethane	**71,000 J**	**400 J**	3 J	**17,000 J**	96,000 U	**120,000 D**	1 J	**360 D**	207
1,1-Dichloroethene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	**1,100 J**	10 U	6 J	449
1,2-Dichloroethane	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
1,2-Dichloroethene (total)	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
1,2-Dichloropropane	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
2-Butanone	240,000 U	2,400 U	4 J	48,000 U	96,000 U	2,400 U	6 J	84	311
2-Hexanone	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	1,587
4-Methyl-2-Pentanone	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	1,311
Acetone	240,000 U	2,400 U	27	48,000 U	96,000 U	2,400 U	31	**570 D**	152
Benzene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	52	115
Bromodichloromethane	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
Bromoform	240,000 U	**460 J**	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	366
Bromomethane	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
Carbon Disulfide	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	13	3,726
Carbon Tetrachloride	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
Chlorobenzene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
Chloroethane	240,000 U	2,400 U	4 J	48,000 U	96,000 U	2,400 U	10 U	**1,600 D**	255
Chloroform	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	299
Chloromethane	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
cis-1,3-Dichloropropene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
Dibromochloromethane	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
Ethylbenzene	**250,000**	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	13	7,590
Methylene Chloride	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	23	145
Styrene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	6,348
Tetrachloroethene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	450 J	10 U	50	1,911
Toluene	**660,000**	820 J	10 U	48,000 U	96,000 U	**8,200**	10 U	10 U	2,070
trans-1,3-Dichloropropene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	NA
Trichloroethene	240,000 U	2,400 U	10 U	48,000 U	96,000 U	350 J	10 U	10 U	869
Vinyl Chloride	240,000 U	2,400 U	10 U	48,000 U	96,000 U	2,400 U	10 U	10 U	157
Xylene (total)	**1,500,000**	420 J	10 U	48,000 U	96,000 U	400 J	10 U	34	1,656

Table 5

Volatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 1998 (MW-00-11 and MW-00-12 April 2000)

Sample ID Compound	SB-98-4 (14.55-16') Fill/Gr Snd	SB-98-4 (28-30') Gr Snd	SB-98-4 (35.16-36') Gr Clay/Silt	SB-98-5 (8-10') Fill	BSB-98-7 (8-10') Fill	BSB-98-7 (11.35-13.63') Tidal Marsh	BSB-98-7 (28-30') Gr Snd	BSB-98-7 (34.55-36') Gr Clay/Silt	SITE SPECIFIC RSCO
1,1,1-Trichloroethane	67	3 J	28	75	10 U	10 U	10 U	10 U	1,049
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	386
1,1-Dichloroethane	2 J	10 U	3 J	5 J	10 U	10 U	10 U	10 U	207
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	449
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
2-Butanone	10	10	5 J	10 U	34	4 J	2 J	8 J	311
2-Hexanone	10 U	6 J	10 U	10 U	10 U	10 U	10 U	10 U	1,587
4-Methyl-2-Pentanone	10 U	10	10 U	10 U	10 U	10 U	10 U	10 U	1,311
Acetone	42	42	65	55	**210**	62	24	36	152
Benzene	2 J	10 U	10 U	5 J	10 U	10 U	10 U	10 U	115
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	366
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	2 J	10 U	10 U	3,726
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Chloroethane	4 J	10 U	2 J	10 U	10 U	10 U	10 U	10 U	255
Chloroform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	299
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Ethylbenzene	10 U	10 U	10 U	3 J	10 U	10 U	10 U	10 U	7,590
Methylene Chloride	10 U	2 J	2 J	2 J	17	10	2 J	9 J	145
Styrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	6,348
Tetrachloroethene	10 U	10 U	10 U	5 J	10 U	10 U	10 U	10 U	1,911
Toluene	10	10 U	10 U	32	10 U	10 U	10 U	10 U	2,070
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Trichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	869
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	157
Xylene (total)	4 J	10 U	10 U	22	10 U	10 U	10 U	3 J	1,656

Table 5

Volatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 1998 (MW-00-11 and MW-00-12 April 2000)

Sample ID Compound	MW-98-8D (4-6') Fill	MW-98-8D (7.7-8') Tidal Marsh	MW-98-8D (34.75-36') Gr Clay/Silt	MW-98-9D (6.1-6.5') Tidal Marsh	MW-98-9D (12-14') TM/Gr Snd	MW-98-9D (37-38') Gr Clay/Silt	MW-98-10D (9.85-10.2') Tidal Marsh	MW-98-10D (12-14') Gr Snd	MW-98-10D (37.1-38') Gr Clay/Silt	SITE SPECIFIC RSCO
1,1,1-Trichloroethane	22	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1,049
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	386
1,1-Dichloroethane	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	207
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	449
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
2-Butanone	10 U	19	10 U	15	10 U	10 U	7 J	10 U	10 U	311
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1,587
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1,311
Acetone	13	78	14	80	26	36	33	11	32	152
Benzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	115
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	366
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	3,726
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	255
Chloroform	10 U	17	10 U	10 U	10 U	10 U	10 U	10 U	10 U	299
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	7,590
Methylene Chloride	3 J	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U	145
Styrene	10 U	9 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	6,348
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1,911
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2,070
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA
Trichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	869
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	157
Xylene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1,656

Table 5

Volatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility

Freeport, New York

Sampling Dates: December 1998 (MW-00-11 and MW-00-12 April 2000)

Sample ID / Compound	MW-00-12D (8.0-8.5') Fill	MW-00-12D (8.5-10')	MW-00-12D (34.7-36')	MW-00-11A (1-2') Fill	MW-00-11A (2-4') Fill	MW-00-11A (4-6') Fill	MW-00-11A (6-8') Fill	MW-00-11A (8-10') Fill	MW-00-11A (10-12') Fill	SITE SPECIFIC RSCO
1,1,1-Trichloroethane	10 J	10 U	6 U	100	66	210	135	**40000**	**66000**	1,049
1,1,2,2-Tetrachloroethane	12 U	10 U	6 U	6 U	6 U	120 U	64 U	1500 U	3000 U	NA
1,1,2-Trichloroethane	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	386
1,1-Dichloroethane	10 J	10 U	6 U	13	8	63	58 JD	**3400**	**3400**	207
1,1-Dichloroethene	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	449
1,2-Dichloroethane	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	NA
1,2-Dichloropropane	12 U	10 U	6 U	12 U	12 U	60 U	64 U	1500 U	3000 U	NA
2-Butanone-(MEK)	49	19 U	13 U	12 U	12 U	160	200	3000 U	6000 U	NA
2-Hexanone	23 U	19 U	13 U	12 U	12 U	120 U	130 U	3000 U	6000 U	311
4-Methyl-2-Pentanone (MIBK)	23 U	19 U	13 U	12 U	12 U	120 U	130 U	3000 U	6000 U	1,587
Acetone	210 UB	19 U	22 U	84 U	140 U	420 U	810 U	**2300** JD	**3300** JD	1,311
Benzene	4 J	2 J	6 U	6	4 J	17 JD	64 U	1500 U	3000 U	152
Bromodichloromethane	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	115
Bromoform	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	NA
Bromomethane	23 U	19 U	13 U	12 U	12 U	120 U	130 U	3000 U	6000 U	366
Carbon Disulfide	12 U	10 U	6 U	3 J	2 J	27 JD	64 U	1500 U	3000 U	NA
Carbon Tetrachloride	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	3,726
Chlorobenzene	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	NA
Chloroethane	14 J	19 U	2 J	5 J	12 U	48 JD	130 U	3000 U	6000 U	NA
Chloroform	5 J	10 U	6 U	9	7	60 U	64 U	1500 U	3000 U	255
Chloromethane	23 U	19 U	13 U	12 U	12 U	120 U	130 U	3000 U	6000 U	299
cis-1,2-Dichloroethene	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	NA
cis-1,3-Dichloropropene	12 U	10 U	6 U	12 U	12 U	60 U	64 U	1500 U	3000 U	NA
Dibromochloromethane	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	NA
Ethylbenzene	12 U	10 U	6 U	6 U	6 U	60 U	64	1500 U	3000 U	7,590
Methylene Chloride	25 U	10 U	7 U	20 U	17 U	170 U	150 U	**5500**	**4900**	145
Styrene	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	6,348
Tetrachloroethene	12 U	10 U	13 U	2 J	1 J	60 U	64 U	350 JD	3000 U	1,911
Toluene	3 J	10 U	6 U	7	10	33 JD	48 JD	1500 JD	1400 JD	2,070
trans-1,2-Dichloroethene	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	NA
trans-1,3-Dichloropropene	12 U	10 U	6 U	6 U	6 U	60 U	64 U	1500 U	3000 U	869
Trichloroethene	12 U	10 U	6 U	6 U	6 U	60 U	64 U	**1200** JD	3000 U	157
Vinyl Chloride	23 U	19 U	13 U	12 U	12 U	120 U	130 U	3000 U	6000 U	1,656
Xylene (total)	12 U	10 U	6 U	6 U	6 U	60 U	17 JD	400 JD	3000 U	1,660

Table 5

Volatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 1998 (MW-00-11 and MW-00-12 April 2000)

Sample ID / Compound	MW-00-11A (12-14') Fill	MW-00-11A (14-16') Fill	MW-00-11A (16-18') Fill	MW-00-11A (18-20') Fill/Gr Snd	MW-00-11A (22-24') Gr Snd	MW-00-11A (24-26') Gr Snd	MW-00-11A (26-28') Gr Snd	MW-00-11A (28-30') Gr Snd	MW-00-11A (30-32') Gr Snd	SITE SPECIFIC RSCO
1,1,1-Trichloroethane	**110000**	**830000**	**2600000**	**910000**	8	6 U	11	7	1 J	1,049
1,1,2,2-Tetrachloroethane	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
1,1,2-Trichloroethane	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	386
1,1-Dichloroethane	**1600** JD	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	207
1,1-Dichloroethene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	449
1,2-Dichloroethane	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
1,2-Dichloropropane	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
2-Butanone-(MEK)	6400 U	84000 U	150000 U	62000 U	12 U	12 U	13 U	12 U	12 U	NA
2-Hexanone	6400 U	84000 U	150000 U	62000 U	12 U	12 U	13 U	12 U	12 U	311
4-Methyl-2-Pentanone (MIBK)	6400 U	84000 U	150000 U	62000 U	12 U	12 U	13 U	12 U	12 U	1,587
Acetone	**3500** JD	**31000** JD	**170000**	**17000**	12 U	12 U	17 U	9 U	16 U	1,311
Benzene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	152
Bromodichloromethane	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6	6 U	6 U	115
Bromoform	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
Bromomethane	6400 U	84000 U	150000 U	62000 U	12 U	12 U	13 U	12 U	12 U	366
Carbon Disulfide	3200 U	42000 U	77000 U	31000 U	6 U	6 U	2 J	1 J	6 U	NA
Carbon Tetrachloride	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	3,726
Chlorobenzene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
Chloroethane	**1100** JD	84000 U	150000 U	62000 U	12 U	12 U	13 U	12 U	12 U	NA
Chloroform	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	255
Chloromethane	6400 U	84000 U	150000 U	62000 U	12 U	12 U	13 U	12 U	12 U	299
cis-1,2-Dichloroethylene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
cis-1,3-Dichloropropene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
Dibromochloromethane	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
Ethylbenzene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	7,590
Methylene Chloride	**3100** JD	**25000** JD	**42000** JD	**19000**	6 U	6 U	6 U	6 U	6 U	145
Styrene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	6,348
Tetrachloroethene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	1,911
Toluene	**2500** JD	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	2,070
trans-1,2-Dichloroethene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	NA
trans-1,3-Dichloropropene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	869
Trichloroethene	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	157
Vinyl Chloride	6400 U	84000 U	150000 U	62000 U	12 U	12 U	13 U	12 U	12 U	1,656
Xylene (total)	3200 U	42000 U	77000 U	31000 U	6 U	6 U	6 U	6 U	6 U	1,660

Table 5

Volatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 1998 (MW-00-11 and MW-00-12 April 2000)

Sample ID / Compound	MW-00-11A (32-34') Gr Snd		MW-00-11A (34-36') Gr Snd / Gr Clay/Silt		MW-00-11A (38-40') Gr Clay/Silt		MW-00-11A (40-42') Gr Clay/Silt		MW-00-11A (42-44') Gr Clay/Silt		MW-00-11A (44-46') Gr Clay/Silt		MW-00-11A (46-48') Gr Clay/Silt		MW-00-11A (48-50') Gr Clay/Silt and Gray Sand		MW-00-11A (50-52') Gray Sand		SITE SPECIFIC RSCO
1,1,1-Trichloroethane	3	J	6	U	6	U	5	J	3	J	2	J	6	U	7	U	7	U	1,049
1,1,2,2-Tetrachloroethane	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
1,1,2-Trichloroethane	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	386
1,1-Dichloroethane	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	207
1,1-Dichloroethene	6	U	6	U	6		6	U	6	U	6	U	6	U	7	U	7	U	449
1,2-Dichloroethane	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
1,2-Dichloropropane	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
2-Butanone-(MEK)	13	U	12	U	13	U	10	J	13	U	33		6	J	13	U	13	U	NA
2-Hexanone	13	U	12	U	13	U	13	U	13	U	13	U	13	U	13	U	13	U	311
4-Methyl-2-Pentanone (MIBK)	13	U	12	U	13		13	U	13	U	13	U	13	U	13	U	13	U	1,587
Acetone	13	U	25	UB	42	UB	52	UB	61	UB	140	UB	36	UB	10	J	13	U	1,311
Benzene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	152
Bromodichloromethane	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	115
Bromoform	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
Bromomethane	13	U	12	U	13	U	13	U	13	U	13	U	13	U	13	U	13	U	366
Carbon Disulfide	4	J	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
Carbon Tetrachloride	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	3,726
Chlorobenzene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
Chloroethane	13	U	12	U	13	U	13	U	13	U	13	U	13	U	13	U	13	U	NA
Chloroform	6	U	6	U	6	U	2	J	3	J	5	J	2	J	7	U	7	U	255
Chloromethane	13	U	12	U	13	U	13	U	13	U	13	U	13	U	13	U	13	U	299
cis-1,2-Dichloroethylene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
cis-1,3-Dichloropropene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
Dibromochloromethane	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
Ethylbenzene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	7,590
Methylene Chloride	6	U	6	U	6	U	6	U	9	U	15	UB	8	U	7	U	7	U	145
Styrene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	6,348
Tetrachloroethene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	1,911
Toluene	6	U	6	U	6	U	6	U	2	J	2	J	6	U	7	U	7	U	2,070
trans-1,2-Dichloroethene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	NA
trans-1,3-Dichloropropene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	869
Trichloroethene	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	157
Vinyl Chloride	13	U	12	U	13	U	13	U	13	U	13	U	13	U	13	U	13	U	1,656
Xylene (total)	6	U	6	U	6	U	6	U	6	U	6	U	6	U	7	U	7	U	1,660

Table 5

Volatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 1998 (MW-00-11 and MW-00-12 April 2000)

Sample ID Compound	MW-00-11A (54-56') Gray Sand		MW-00-11A (56-58') Gray Sand		MW-00-11A (58-60') Gray Sand		SITE SPECIFIC RSCO
1,1,1-Trichloroethane	5	U	6	U	6	U	1,049
1,1,2,2-Tetrachloroethane	5	U	6	U	6	U	NA
1,1,2-Trichloroethane	5	U	6	U	6	U	386
1,1-Dichloroethane	5	U	6	U	6	U	207
1,1-Dichloroethene	5		6	U	6	U	449
1,2-Dichloroethane	5	U	6	U	6	U	NA
1,2-Dichloropropane	5	U	6	U	6	U	NA
2-Butanone-(MEK)	10	U	13	U	12	U	NA
2-Hexanone	10	U	13	U	12	U	311
4-Methyl-2-Pentanone (MIBK)	10	U	13	U	12	U	1,587
Acetone	15		13	U	28		1,311
Benzene	5	U	6	U	6	U	152
Bromodichloromethane	5	U	6	U	6	U	115
Bromoform	5	U	6	U	6	U	NA
Bromomethane	10	U	13	U	12	U	366
Carbon Disulfide	5	U	6	U	7		NA
Carbon Tetrachloride	5	U	6	U	6	U	3,726
Chlorobenzene	5	U	6	U	6	U	NA
Chloroethane	10	U	13	U	12	U	NA
Chloroform	5	U	6	U	3	J	255
Chloromethane	10	U	13	U	12	U	299
cis-1,2-Dichloroethylene	5	U	6	U	6	U	NA
cis-1,3-Dichloropropene	5	U	6	U	6	U	NA
Dibromochloromethane	5	U	6	U	6	U	NA
Ethylbenzene	5	U	6	U	6	U	7,590
Methylene Chloride	5	U	4	U	8	U	145
Styrene	5	U	6	U	6	U	6,348
Tetrachloroethene	5	U	6	U	6	U	1,911
Toluene	5	U	6	U	2	J	2,070
trans-1,2-Dichloroethene	5	U	6	U	6	U	NA
trans-1,3-Dichloropropene	5	U	6	U	6	U	869
Trichloroethene	5	U	6	U	6	U	157
Vinyl Chloride	10	U	13	U	12	U	1,656
Xylene (total)	5	U	6	U	6	U	1,660

All results expressed in ug/Kg.

Concentration in bold exceeds the RSCO (Based on Site Specific Organic Carbon Content of 1.38 percent).

U-indicates not detected at or above the listed concentration.

J- indicates estimated concentration below the contract required reporting limit but above the instrument detection limit.

D- indicates sample was diluted prior to analysis.

Gr Snd - indicates Gravelly Sand Unit and Gr Clay/Silt indicated Gray Clay and Silt Unit

Table 6

Semivolatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 15, 16, 22 and 23, 1998

Sample ID Compound	SB-98-2 (10-13.7') Fill	SB-98-4 (28-30') Gr Snd	SB-98-3 (18-19.35') Fill	X-1 SB-98-3 (18-19.35') SB-98-3 (18-19.35')	BSB-98-7 (8-10') Fill	BSB-98-7 (11.35-13.63') Tidal Marsh	BSB-98-7 (34.55-36') Gr Clay/Silt	MW-98-8D (4-6') Fill	SITE SPECIFIC RSCO
Phenol	380 U	380 U	**340 J**	410 U	510 U	640 U	420 U	440 U	37.26
bis(2-Chloroethyl)Ether	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2-Chlorophenol	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
1,3-Dichlorobenzene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
1,4-Dichlorobenzene	380 U	*230 J*	450 U	410 U	510 U	640 U	420 U	440 U	11,730
1,2-Dichlorobenzene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2-Methylphenol	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2,2'-oxybis(1-Chloropropane)	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
4-Methylphenol	380 U	380 U	450 U	*89 J*	510 U	640 U	420 U	440 U	1,173
N-Nitroso-di-n-propylamine	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Hexachloroethane	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Nitrobenzene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Isophorone	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2-Nitrophenol	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2,4-Dimethylphenol	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2,4-Dichlorophenol	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
1,2,4-Trichlorobenzene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Naphthalene	*660*	380 U	1300	*720*	510 U	640 U	420 U	*49 J*	17,940
4-Chloroaniline	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Hexachlorobutadiene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
bis(2-Chloroethoxy)methane	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
4-Chloro-3-Methylphenol	380 U	380 U	**980**	410 U	510 U	640 U	420 U	440 U	324
2-Methylnaphthalene	*360 J*	380 U	450 U	*320 J*	510 U	640 U	420 U	440 U	50,000
Hexachlorocyclopentadiene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2,4,6-Trichlorophenol	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2,4,5-Trichlorophenol	930 U	920 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
2-Chloronaphthalene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2-Nitroaniline	930 U	920 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
Dimethylphthalate	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Acenaphthylene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
2,6-Dinitrotoluene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
3-Nitroaniline	930 U	920 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
Acenaphthene	*240 J*	380 U	*740*	410 U	510 U	640 U	420 U	440 U	50,000
2,4-Dinitrophenol	930 U	920 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
4-Nitrophenol	930 U	380 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
Dibenzofuran	380 U	380 U	450 U	410 U	510 U	640 U	420 U	*120 J*	8,478
2,4-Dinitrotoluene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	

Table 6

Semivolatile Organic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 15, 16, 22 and 23, 1998

Sample ID Compound	SB-98-2 (10-13.7') Fill	SB-98-4 (28-30') Gr Snd	SB-98-3 (18-19.35') Fill	X-1 SB-98-3 (18-19.35') SB-98-3 (18-19.35')	BSB-98-7 (8-10') Fill	BSB-98-7 (11.35-13.63') Tidal Marsh	BSB-98-7 (34.55-36') Gr Clay/Silt	MW-98-8D (4-6') Fill	SITE SPECIFIC RSCO
Diethylphthalate	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
4-Chlorophenyl-phenylether	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Fluorene	*380 J*	380 U	450 U	*130 J*	510 U	640 U	420 U	*200 J*	50,000
4-Nitroaniline	930 U	920 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
4,6-Dinitro-2-methylphenol	930 U	920 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
N-Nitrosodiphenylamine	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
4-Bromophenyl-phenylether	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Hexachlorobenzene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Pentachlorophenol	930 U	380 U	1100 U	990 U	1200 U	1500 U	1000 U	1100 U	
Phenanthrene	*5300*	380 U	*4200*	*700*	*330 J*	*170 J*	420 U	*830*	50,000
Anthracene	*210 J*	380 U	450 U	410 U	510 U	640 U	420 U	*260 J*	50,000
Carbazole	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Di-n-butylphthalate	2900	1800	*520*	*660*	*80 J*	640 U	420 U	440 U	11,178
Fluoranthene	*3600*	380 U	*2500*	*420*	*700*	*480 J*	*130 J*	*890*	50,000
Pyrene	*560*	380 U	*920*	*160 J*	*720*	*450 J*	420 U	*570*	50,000
Butylbenzylphthalate	380 U	380 U	450 U	*520*	510 U	640 U	420 U	*100 J*	50,000
3,3'-Dichlorobenzidine	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Benzo(a)anthracene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Chrysene	**2200**	380 U	450 U	410 U	*480 J*	640 U	420 U	440 U	552
bis(2-Ethylhexyl)phthalate	**56,000 D**	*340 J*	*20,000 E*	**74,000 D**	**96,000 D**	*1,800*	*180 J*	*1,400*	50,000
Di-n-octylphthalate	*6200*	380 U	*1300*	*2,800*	*410 J*	640 U	420 U	440 U	50,000
Benzo(b)fluoranthene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Benzo(k)fluoranthene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Benzo(a)pyrene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Indeno(1,2,3-cd)pyrene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Dibenz(a,h)anthracene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	
Benzo(g,h,i)perylene	380 U	380 U	450 U	410 U	510 U	640 U	420 U	440 U	

All results expressed in ug/Kg.
Concentration in bold exceeds the RSCO (Based on Site Specific Organic Carbon Content of 1.38 percent).
U-indicates not detected at or above the listed concentration.
J- indicates estimated concentration below the contract required reporting limit but above the instrument detection limit.
D- indicates sample was diluted prior to analysis.
E- indicates estimated value, concentration exceeded the instrument calibration range.

Table 7

Pesticide/PCB Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 15, 16, 22 and 23, 1998

Sample ID / Compound	SB-98-2 (10-13.7')	SB-98-4 (28-30')	SB-98-3 (18-19.35')	X-1 *SB-98-3 (18-19.35')*	BSB-98-7 (8-10')	BSB-98-7 (11.35-13.63')	BSB-98-7 (34.55-36')	MW-98-8D (4-6')	SITE SPECIFIC RSCO
alpha-BHC	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
beta-BHC	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
delta-BHC	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
gamma-BHC (Lindane)	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
Heptachlor	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
Aldrin	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
Heptachlor epoxide	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
Endosulfan I	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
Dieldrin	3.8 U	0.1 U	4.5 U	4.1 U	*6.0*	6.4 U	4.2 U	4.4 U	44
4,4'-DDE	3.8 U	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	4.4 U	
Endrin	3.8 U	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	4.4 U	
Endosulfan II	3.8 U	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	4.4 U	
4,4'-DDD	3.8 U	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	*25*	2,900
Endosulfan sulfate	3.8 U	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	4.4 U	
4,4'-DDT	*210*	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	4.4 U	2,100
Methoxychlor	20 U	10 U	23 U	21 U	26 U	33 U	22 U	*8.6 J*	10,000
Endrin ketone	3.8 U	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	4.4 U	
Endrin aldehyde	3.8 U	0.1 U	4.5 U	4.1 U	5.1 U	6.4 U	4.2 U	4.4 U	
alpha-Chlordane	2.0 U	0.05 U	2.3 U	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	
gamma-Chlordane	2.0 U	0.05 U	*20 P*	2.1 U	2.6 U	3.3 U	2.2 U	2.3 U	540
Toxaphene	200 U	100 U	230 U	210 U	260 U	330 U	220 U	230 U	
Aroclor-1016	38 U	1 U	45 U	41 U	51 U	64 U	42 U	44 U	
Aroclor-1221	78 U	2 U	91 U	83 U	100 U	130 U	85 U	90 U	
Aroclor-1232	38 U	1 U	45 U	41 U	51 U	64 U	42 U	44 U	
Aroclor-1242	38 U	1 U	45 U	41 U	51 U	64 U	42 U	44 U	
Aroclor-1248	38 U	1 U	45 U	41 U	51 U	64 U	42 U	44 U	
Aroclor-1254	38 U	1 U	45 U	41 U	51 U	64 U	42 U	44 U	
Aroclor-1260	38 U	1 U	45 U	41 U	51 U	64 U	42 U	44 U	

All results expressed in ug/Kg.
U-indicates not detected at or above the listed concentration.
J- indicates estimated concentration below the contract required reporting limit but above the instrument detection limit.
Concentration in bold exceeds the RSCO (Based on Site Specific Organic Carbon Content of 1.38 percent).

Table 8

Inorganic Analytical Data Summary - Soil Borings

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 15, 16, 22 and 23, 1998

Sample ID / Analyte	SB-98-2 Fill (10-13.7')	SB-98-3 Fill (18-19.35')	X-1 *Fill* *SB-98-3 (18-19.35')*	SB-98-4 Gr Snd (28-30')	BSB-98-7 Fill (8-10')	BSB-98-7 Tidal Marsh (11.35-13.63')	BSB-98-7 Gr Clay/Silt (34.55-36')	MW-98-8D Fill (4-6')	NYS RSCO
Aluminum	715	1100	585	2280	6070	11600	8270	8350	SB
Antimony	0.85 U	34.7	**97.6**	0.87 U	22.7	3.9	0.09 U	33.2	SB
Arsenic	0.8	3.2	0.46 U	0.07 U	28.9	15.3	12.2	6.6	7.5 or SB
Barium	21.2	52.7	45.3	9.3	954	119	21.3	707	300 or SB
Beryllium	0.11 U	0.12 U	0.11 U	0.11 U	0.21 B	0.64	0.35	**0.39**	0.16 or SB
Cadmium	0.09 U	0.1 U	0.1 U	0.09 U	7.5	1.8	0.21	6	1 or SB
Calcium	28800	2070	3340	288	21000	2520	1000	21200	SB
Chromium	10	**217**	17.6	5	64	36.3	18.8	49.9	10 or SB
Cobalt	4	3.5	0.1 U	1.3 B	19.7	6.5	8.9	13.8	30 or SB
Copper	71.2	41.9	119	2.3	633	76.2	10	447	25 or SB
Iron	26100	32700	**92900**	3340	5200	79300	39800	63900	2,000 or SB
Lead	44.8	42.5	872	0.8	3160	230	4.6	1590	SB
Magnesium	**15500**	391	655	715	1910	4140	4060	2750	SB
Manganese	139	223	350	26	919	175	137	449	SB
Mercury	0.09	0.1	**0.31**	0.04 U	0.96	0.70	0.08	**0.70**	0.1
Nickel	14.4	26.5	0.21 U	2.8	82.7	19.4	15.2	65.1	13 or SB
Potassium	65.2 B	180 B	1.9 U	242 B	3310	8020	3830	941	SB
Selenium	0.09 U	0.09 U	1.5 U	0.09 U	0.1 U	0.1 U	0.1 U	0.19 U	2 or SB
Silver	0.27 U	0.29 U	0.29 U	0.28 U	0.02 U	0.02 U	0.02 U	3.1	SB
Sodium	81.5 B	140 B	234 B	64.2 B	6070	4530	411 B	725	SB
Thallium	0.15 U	0.16 U	1.1 U	0.15 U	2.6	0.17 U	0.17 U	0.5 B	SB
Vanadium	4.7	47.2	0.1 U	5.8	20.6	38.9	26	32.5	150 or SB
Zinc	240	282	478	10.9	2380	456	49.8	2230	20 or SB

All results expressed in mg/Kg.

Concentration in bold exceeds the RSCO

Note: Boring sample BSB-98-7 represents site background (SB)

U - indicates not detected at or above the listed concentration

B- indicates estimated concentration below the contract required reporting limit but above the instrument detection limit

Table 9

Total Organic Carbon Analytical Data Summary

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Dates: December 15, 16, 17, 18, 21, 22 and 23, 1998

	Sample ID	TOC Result (mg/Kg)	TOC (%)
Fill			
	BSB-98-7 (8-10')	16,300	1.63
	MW-98-8D (4-6')	15,700	1.57
	SB-98-2 (10-13.7')	2,150	0.215
	SB-98-3 (18-19.35')	6,110	0.611
	X-1 *[SB-98-3 (18-19.35')]*	8,200	0.82
	SB-98-4 (10-12')	17,600	1.76
Tidal Marsh			
	SB-98-3 (19.35-19.58')	29,800	2.98
	BSB-98-7 (11.35-13.63')	17,700	1.77
	MW-98-8D (7.7-8')	13,300	1.33
	MW-98-9D (6.1-6.5')	15,300	1.53
	MW-98-10D (9.85-10.2')	4,240	0.424
Gravelly Sand			
	SB-98-4 (14.55-16')	2,640	0.264
	SB-98-4 (28-30')	551	0.0551
	BSB-98-7 (28-30')	2,700	0.27
	MW-98-10D (12-14')	891	0.0891
Gray Clay & Silt			
	SB-98-2 (34.0-34.5')	2,300	0.23
	SB-98-3 (35.67-36')	1,310	0.131
	BSB-98-7 (34.55-36')	3,460	0.346
	SB-98-4 (35.16-36')	2,200	0.22
	MW-98-9D (37-38')	1,150	0.115
	MW-98-10D (37.1-38')	3,100	0.31
Transition Samples			
	*SB-98-2 (15.1-15.67')	3,780	0.378
	**MW-98-8D (34.75-36')	2,110	0.211
	***MW-98-9D (12-14')	10,300	1.03
Dry Well Sediments			
	DWSS-08 (0-6")	10,500	1.05
	DWSS-08 (24-30")	25,900	2.59
	X-2 *[DWSS-08 (24-30")]*	18,500	1.85

* Transition from Fill to Gravelly Sand
** Transition from Gravelly Sand to Gray Clay & Silt
*** Transition from Tidal Marsh to Gravelly Sand

Table 10
Volatile Organic Analytical Data Summary-Ground Water
Former Columbia Cement Company, Inc. Facility
Freeport, New York
Sampling Dates: January 1999; April 2000; May 2003

Sample ID	MW-1S			MW-97-1D			MW-97-1S			MW-97-2S			NYS Groundwater Standard
Screened Interval (depth ft. below gr		~11.0 - 21.0			28.65-33.65			14.25-24.25			14.5-24.5		
Screened Interval (Elevation)					69.31-64.31			83.38-73.38			84.33-74.33		
Date Sampled	1/4/1999	4/2000	5/2003	1/4/1999	4/2000	5/2003	1/4/1999	4/2000	5/2003	1/4/1999	4/2000	5/2003	
Compound													
Chloromethane	1,000 U	10 U	1,000 U	100 U	10 U	100 U	10 U	10 U	20 U	10 U	10 U	10 U	5
Bromomethane	1,000 U	10 U	1,000 U	100 U	10 U	100 U	10 U	10 U	20 U	10 U	10 U	10 U	5
Vinyl Chloride	1,000 U	**26**	1,000 U	100 U	**9 J**	100 U	10 U	10 U	20 U	10 U	10 U	10 U	2
Chloroethane	**11,000**	**12,000 D**	**13,000**	**500**	**480 D**	**1200**	**120**	**320 D**	**220**	10 U	10 U	**7 J**	5
Methylene Chloride	**170 J**	**580 BD**	500 U	**500**	**840 BD**	50 U	10 U	**20**	10 U	10 U	**15**	5 U	5
Acetone	**300 J**	10 U	1,000 U	**230 J**	10 U	100 U	10 U	7 J	20 U	10 U	8 J	10 U	50
Carbon Disulfide	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	NS
1,1-Dichloroethene	1,000 U	**23**	500 U	500 U	**5**	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
1,1-Dichloroethane	**4,300**	**2,600 D**	**690**	**4,100**	**350 D**	**140**	10 U	5 U	10 U	10 U	5 U	5 U	5
1,2-Dichloroethene (total)	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
Chloroform	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	7
1,2-Dichloroethane	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
2-Butanone	1,000 U	10 U	1,000 U	500 U	10 U	100 U	10 U	10 U	20 U	10 U	10 U	10 U	50GV
1,1,1-Trichloroethane	**350 J**	**140 JD**	500 U	**5,100**	2 J	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
Carbon Tetrachloride	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
Bromodichloromethane	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
1,2-Dichloropropane	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	1
cis-1,3-Dichloropropene	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	0.4*
Trichloroethene	1,000 U	4 J	500 U	500 U	**9**	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
Dibromochloromethane	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
1,1,2-Trichloroethane	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	1
Benzene	1,000 U	**23**	500 U	500 U	5 U	50 U	10 U	1 J	10 U	10 U	1 J	5 U	1
trans-1,3-Dichloropropene	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	0.4*
Bromoform	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
4-Methyl-2-Pentanone	1,000 U	10 U	1,000 U	500 U	10 U	100 U	10 U	10 U	20 U	10 U	10 U	10 U	NS
2-Hexanone	1,000 U	10 U	1,000 U	500 U	10 U	100 U	10 U	10 U	20 U	10 U	10 U	10 U	50 GV
Tetrachloroethene	1,000 U	1 J	500 U	500 U	1 J	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
1,1,2,2-Tetrachloroethane	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
Toluene	1,000 U	**76**	500 U	500 U	**11**	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
Chlorobenzene	1,000 U	2 J	500 U	500 U	5 U	50 U	10 U	**11**	10 U	**20**	**15**	**12**	5
Ethylbenzene	1,000 U	**5 J**	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	1 J	5 U	5
Styrene	1,000 U	5 U	500 U	500 U	5 U	50 U	10 U	5 U	10 U	10 U	5 U	5 U	5
Xylene (total)	1,000 U	**19**	500 U	500 U	1 J	50 U	1 J	2 J	10 U	10 U	2 J	5 U	5**

Table 10
Volatile Organic Analytical Data Summary-Ground Water
Former Columbia Cement Company, Inc. Facility
Freeport, New York
Sampling Dates: January 1999; April 2000; May 2003

Sample ID	MW-97-3S			MW-97-4S			MW-97-5S			MW-97-6S			NYS
Screened Interval (depth ft. below g	15.0-25.0			15.25-25.25			15.80-25.80			15.5-25.5			Groundwater
Screened Interval (Elevation)	83.66-73.66			83.61-73.61			82.79-72.79			83.19-73.19			Standard
Date Sampled	1/4/1999	4/2000	5/2003	1/4/1999	4/2000	5/2003	1/4/1999	4/2000	5/2003	1/4/1999	4/2000	5/2003	
Compound													
Chloromethane	10 U	10 U	10 U	100 U	10 U	10 U	50 U	10 U	500 U	50 U	10 U	500 U	5
Bromomethane	10 U	10 U	10 U	100 U	10 U	10 U	50 U	10 U	500 U	50 U	10 U	500 U	5
Vinyl Chloride	10 U	10 U	10 U	100 U	10 U	10 U	50 U	10 U	500 U	50 U	10 U	500 U	2
Chloroethane	1 J	**8 J**	10 U	**500**	**8 J**	**140**	**260**	**810 D**	**3,600**	**400**	**910 D**	**2,600**	5
Methylene Chloride	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Acetone	10 U	10 U	10 U	100 U	10 U	10 U	50 U	10 U	500 U	50 U	10 U	500 U	50
Carbon Disulfide	10 U	5 U	1 J	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	60GV
1,1-Dichloroethene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
1,1-Dichloroethane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	2 J	**860**	50 U	5 U	250 U	5
1,2-Dichloroethene (total)	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Chloroform	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	7
1,2-Dichloroethane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
2-Butanone	10 U	10 U	10 U	100 U	10 U	10 U	50 U	10 U	500 U	50 U	10 U	500 U	50GV
1,1,1-Trichloroethane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	**13 J**	5 U	250 U	5
Carbon Tetrachloride	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Bromodichloromethane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
1,2-Dichloropropane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	1
cis-1,3-Dichloropropene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	0.4*
Trichloroethene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Dibromochloromethane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
1,1,2-Trichloroethane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	1
Benzene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	**2 J**	250 U	50 U	**2 J**	250 U	1
trans-1,3-Dichloropropene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	0.4*
Bromoform	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
4-Methyl-2-Pentanone	10 U	10 U	10 U	100 U	10 U	10 U	50 U	10 U	500 U	50 U	10 U	500 U	NS
2-Hexanone	10 U	10 U	10 U	100 U	10 U	10 U	50 U	10 U	500 U	50 U	10 U	500 U	50 GV
Tetrachloroethene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
1,1,2,2-Tetrachloroethane	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Toluene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Chlorobenzene	10 U	**8**	**7**	100 U	5 U	3 J	50 U	5 U	250 U	50 U	**32**	250 U	5
Ethylbenzene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Styrene	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	5 U	250 U	5
Xylene (total)	10 U	5 U	5 U	100 U	5 U	5 U	50 U	5 U	250 U	50 U	1 J	250 U	5**

Table 10
Volatile Organic Analytical Data Summary-Ground Water
Former Columbia Cement Company, Inc. Facility
Freeport, New York
Sampling Dates: January 1999; April 2000; May 2003

Sample ID	**MW-97-7S**			**MW-98-8S**			**MW-98-8D**			**MW-98-9D**			**NYS**
Screened Interval (depth ft. below g	**21.35-31.35**			**10.0-20.0**			**25.0-35.0**			**27.0-37.0**			**Groundwater**
Screened Interval (Elevation)	**77.44-67.44**			**78.89-68.89**			**73.68-63.68**			**70.54-60.54**			**Standard**
Date Sampled	**1/4/1999**	**4/2000**	**5/2003**	**1/4/1999**	**4/2000**	**5/2003**	**4/1/1999**	**4/2000**	**5/2003**	**4/1/1999**	**4/2000**	**5/2003**	
Compound													
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	5
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	5
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	2
Chloroethane	10 U	10 U	10 U	10 U	2 J	10 U	**93**	**46**	10 U	**38**	**290 D**	**810**	5
Methylene Chloride	10 U	**19**	5 U	10 U	**13**	5 U	3 J	5 U	5 U	10 U	5 U	50 U	5
Acetone	10 U	9 J	10 U	10 U	18	10 U	13	10 U	10 U	10 U	10 U	100 U	50
Carbon Disulfide	10 U	5 U	5 U	10 U	1 J	1 J	10 U	5 U	5 U	10 U	5 U	50 U	60GV
1,1-Dichloroethene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
1,1-Dichloroethane	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
1,2-Dichloroethene (total)	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
Chloroform	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	2 J	5 U	50 U	7
1,2-Dichloroethane	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	50GV
1,1,1-Trichloroethane	10 U	5 U	5 U	10 U	5 U	5 U	4 J	5 U	5 U	10 U	5 U	50 U	5
Carbon Tetrachloride	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
Bromodichloromethane	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
1,2-Dichloropropane	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	1
cis-1,3-Dichloropropene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	0.4*
Trichloroethene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
Dibromochloromethane	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
1,1,2-Trichloroethane	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	1
Benzene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	1
trans-1,3-Dichloropropene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	0.4*
Bromoform	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	NS
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	50 GV
Tetrachloroethene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
1,1,2,2-Tetrachloroethane	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
Toluene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
Chlorobenzene	10 U	3 J	**6**	10 U	5 U	5 U	10 U	5 U	5 U	10 U	**5**	50 U	5
Ethylbenzene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
Styrene	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	50 U	5
Xylene (total)	10 U	5 U	5 U	10 U	5 U	5 U	10 U	5 U	5 U	10 U	2 J	50 U	5**

7/15/03

Table 10
Volatile Organic Analytical Data Summary-Ground Water
Former Columbia Cement Company, Inc. Facility
Freeport, New York
Sampling Dates: January 1999; April 2000; May 2003

Sample ID	MW-98-10D			MW-00-11A		MW-00-12D		MW-03-13S	NYS Groundwater Standard
Screened Interval (depth ft. below gr	27.0-37.0			51.0-61.0		25.0-35.0			
Screened Interval (Elevation)	71.75-61.75			46.89-36.89		73.6-63.6			
Date Sampled	1/4/1999	4/2000	5/2003	4/2000	5/2003	4/2000	5/2003	5/2003	
Compound									
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	1,000 U	10 U	5
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	1,000 U	10 U	5
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	1,000 U	10 U	2
Chloroethane	10 U	10 U	**11**	10 U	10 U	**17**	**8,400**	10 U	5
Methylene Chloride	10 U	**23**	5 U	5 U	5 U	**16**	520 U	5 U	5
Acetone	10 U	10 J	10 U	34	10 U	**69**	1,000 U	10 U	50
Carbon Disulfide	10 U	5 U	5 U	5 U	5 U	5 U	500 U	1 J	60GV
1,1-Dichloroethene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
1,1-Dichloroethane	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
1,2-Dichloroethene (total)	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Chloroform	1 J	5 U	5 U	5 U	5 U	5 U	500 U	5 U	7
1,2-Dichloroethane	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	500 U	10 U	50GV
1,1,1-Trichloroethane	10 U	5 U	5 U	4 J	5 U	**10**	1,000 U	5 U	5
Carbon Tetrachloride	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Bromodichloromethane	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
1,2-Dichloropropane	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	1
cis-1,3-Dichloropropene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	0.4*
Trichloroethene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Dibromochloromethane	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
1,1,2-Trichloroethane	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Benzene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	1
trans-1,3-Dichloropropene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	0.4*
Bromoform	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	1,000 U	10 U	NS
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	1,000 U	10 U	50 GV
Tetrachloroethene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
1,1,2,2-Tetrachloroethane	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Toluene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Chlorobenzene	10 U	**6**	**6**	5 U	5 U	5 U	500 U	5 U	5
Ethylbenzene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Styrene	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5
Xylene (total)	10 U	5 U	5 U	5 U	5 U	5 U	500 U	5 U	5**

All results expressed in ug/L.
NS indicates no groundwater standard.
GV indicates guidance value.
* Standard applies to the sum of the cis and trans isomers.
** Standard applies to the sum of the isomers.
Value in bold exceeds the groundwater standard
U-indicates not detected at or above the listed concentration.
J- indicates estimated concentration below the contract required reporting limit but above the instrument detection limit.

Table 11

Semivolatile Organic Analytical Data Summary - Groundwater

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Date: January 4, 1999

Compound / Sample ID	MW-1S	X-3 (MW-1S)	MW-97-1D	MW-98-8S	MW-98-8D	NYS Groundwater Standard
Phenol	10 U	10 U	10 U	10 U	10 U	1 **
bis(2-Chloroethyl)Ether	10 U	10 U	10 U	10 U	10 U	1
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	1 **
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	3*
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	3*
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	3*
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	1 **
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U	10 U	5
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	1 **
N-Nitroso-di-n-propylamine	10 U	10 U	10 U	10 U	10 U	NS
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	5
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	0.4
Isophorone	10 U	10 U	10 U	10 U	10 U	50 GV
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	1 **
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	1 **
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	1 **
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	5*
Naphthalene	*8 J*	*8 J*	10 U	10 U	10 U	10 GV
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	5
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	0.5
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	5
4-Chloro-3-Methylphenol	10 U	10 U	10 U	10 U	10 U	1 **
2-Methylnaphthalene	*1 J*	*1 J*	10 U	10 U	10 U	NS
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	5
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	1 **
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U	25 U	1 **
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 GV
2-Nitroaniline	25 U	25 U	25 U	25 U	25 U	5
Dimethylphthalate	10 U	10 U	10 U	10 U	10 U	50 GV
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	NS
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	5
3-Nitroaniline	25 U	25 U	25 U	25 U	25 U	5
Acenaphthene	10 U	10 U	*6 J*	10 U	*1 J*	20 GV
2,4-Dinitrophenol	25 U	25 U	25 U	25 U	25 U	1 **
4-Nitrophenol	25 U	25 U	25 U	25 U	25 U	1 **
Dibenzofuran	10 U	10 U	*2 J*	10 U	10 U	NS
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	1
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	50 GV
4-Chlorophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	NS

Table 11

Semivolatile Organic Analytical Data Summary - Groundwater

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Date: January 4, 1999

Sample ID / Compound	MW-1S	X-3 (MW-1S)	MW-97-1D	MW-98-8S	MW-98-8D	NYS Groundwater Standard
Fluorene	10 U	10 U	*4 J*	10 U	10 U	50 GV
4-Nitroaniline	25 U	25 U	25 U	25 U	25 U	5
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U	25 U	1 **
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	50 GV
4-Bromophenyl-phenylether	10 U	10 U	10 U	10 U	10 U	5
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	0.04
Pentachlorophenol	25 U	25 U	25 U	25 U	25 U	1 **
Phenanthrene	10 U	10 U	10 U	10 U	10 U	50 GV
Anthracene	10 U	10 U	10 U	10 U	10 U	50 GV
Carbazole	10 U	10 U	10 U	10 U	10 U	NS
Di-n-butylphthalate	*1 J*	*2 J*	*1 J*	10 U	*1 J*	NS
Fluoranthene	10 U	10 U	10 U	10 U	10 U	50 GV
Pyrene	10 U	10 U	10 U	10 U	10 U	50 GV
Butylbenzylphthalate	*1 J*	10 U	10 U	10 U	10 U	50 GV
3,3'-Dichlorobenzidine	10 U	10 U	10 U	10 U	10 U	5
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	0.002
Chrysene	10 U	10 U	10 U	10 U	10 U	0.002
bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U	5
Di-n-octylphthalate	*2 J*	*1 J*	10 U	10 U	10 U	50 GV
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	0.002
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	0.002
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	Non Detect
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	0.002
Dibenz(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	NS
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U	10 U	NS

All results expressed in ug/L.
* Standard applies to each isomer individually.
** Standard applies to sum of total phenolic compounds

Table 12

Pesticide/PCB Analytical Data Summary - Groundwater

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Date: January 4, 1999

Compound / Sample ID	MW-1S	X-3 (MW-1S)	MW-97-1D	MW-98-8S	MW-98-8D	NYS Groundwater Standard
alpha-BHC	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.05
beta-BHC	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.01
delta-BHC	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.04
gamma-BHC (Lindane)	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.05
Heptachlor	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.04
Aldrin	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	Non-Detect
Heptachlor epoxide	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.03
Endosulfan I	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	NS
Dieldrin	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	0.004
4,4'-DDE	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	0.2
Endrin	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	Non-Detect
Endosulfan II	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	NS
4,4'-DDD	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	0.3
Endosulfan sulfate	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	NS
4,4'-DDT	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	0.2
Methoxychlor	0.26 U	0.26 U	0.26 U	0.26 U	0.28 U	35
Endrin ketone	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	5
Endrin aldehyde	0.053 U	0.051 U	0.053 U	0.052 U	0.057 U	5
alpha-Chlordane	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.05
gamma-Chlordane	0.026 U	0.026 U	0.026 U	0.026 U	0.028 U	0.05
Toxaphene	2.6 U	2.6 U	2.6 U	2.6 U	2.8 U	NS
Aroclor-1016	0.53 U	0.51 U	0.53 U	0.52 U	0.57 U	0.09
Aroclor-1221	1 U	1 U	1 U	1 U	1.1 U	0.09
Aroclor-1232	0.53 U	0.51 U	0.53 U	0.52 U	0.57 U	0.09
Aroclor-1242	0.53 U	0.51 U	0.53 U	0.52 U	0.57 U	0.09
Aroclor-1248	0.53 U	0.51 U	0.53 U	0.52 U	0.57 U	0.09
Aroclor-1254	0.53 U	0.51 U	0.53 U	0.52 U	0.57 U	0.09
Aroclor-1260	0.53 U	0.51 U	0.53 U	0.52 U	0.57 U	0.09

All results expressed in ug/L.
U-indicates not detected at or above the listed concentration.
J- indicates estimated concentration below the contract required reporting limit but above the instrument detection limit.

Table 13

Inorganic Analytical Data Summary - Groundwater

Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sampling Date: January 4, 1999

Sample ID / Analyte	MW-1S	X-3 (MW-1S)	MW-97-1D	MW-98-8S	MW-98-8D	NYS Groundwater Standard
Aluminum	176 B	198 B	1430	282	3380	
Antimony	15.9 U	15.9 U	15.9 U	15.9 U	15.9 U	3
Arsenic	2.3 B	1.3 B	1.3 U	1.3 U	1.3 U	25
Barium	468	467	703	**1540**	65.3	1,000
Beryllium	2 U	2 U	2 U	2 U	2 U	3 GV
Cadmium	1.9 B	1.7 U	1.7 U	1.7 U	1.7 U	5
Calcium	63,400	63,200	196,000	243,000	37,000	
Chromium	2.7 U	4.1 B	4.8 B	2.7 U	13.5	50
Cobalt	3.2 B	4.4 B	5.6 B	10.3 B	3.1 B	
Copper	1.1 U	1.1 U	1.1 U	1.1 U	12.3 B	200
Iron	**25,900**	**28,600**	**12,900**	**13,400**	**5,640**	300
Lead	1 B	1.8 B	0.9 U	0.9 U	7	25
Magnesium	13,500	13,500	31,400	34,900	5,380	35,000 GV
Manganese	**357**	**361**	**306**	**321**	125	300
Mercury	0.38	0.2 U	0.2 U	0.35	0.44	2
Nickel	15 B	19.6 B	47.4	52.6	13.3 B	
Potassium	19,300	19,400	49,500	70,400	6,780	
Selenium	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	10
Silver	5.1 U	5.1 U	5.1 U	5.1 U	5.1 U	50
Sodium	**48,400**	**48,400**	**155,000**	**232,000**	**35,400**	20,000
Thallium	2.8 U	2.8 U	2.8 U	**7.2** B	2.8 U	0.5 GV
Vanadium	1.7 U	1.8 B	6.2 B	1.7 U	19.4 B	
Zinc	247	199	71	48.7	116	2,000
Cyanide	10 U	10 U	10 U	10 U	10 U	200

All results expressed in ug/L.
GV indicates guidance value
Concentration in bold exceeds the groundwater standard
U - indicates not detected at or above the listed concentration
B- indicates estimated concentration below the contract required reporting limit but above the instrument detection limit

Table 14

Volatile Organic Analytical Data Summary - Soil Gas

Former Columbia Cement Company, Inc. Facility

Freeport, New York

Sampling Dates: December 16 and 17, 1998

Sample ID / Compound	SG-04	SG-06	SG-07	SG-X2	SG-11	SG-13	SG-15
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U	10 U	**1 J**	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	**2 J**	10 U	10 U
Benzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U

All results expressed in mg/m^3.
U- indicates not detected at or above the listed concentration
J - indicates estimated concentration below the laboratory reporting limit but above the instrument detection limit

Table 14

Volatile Organic Analytical Data Summary - Soil Gas

Former Columbia Cement Company, Inc. Facility

Freeport, New York

Sampling Dates: December 16 and 17, 1998

Sample ID / Compound	SG-16	SG-17	SG-X1	SG-20	BACK-01	BACK-02
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Methylene Chloride	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	10 U	10 U	10 U	10 U	10 U
Carbon Disulfide	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	**17**	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	**6 J**	10 U	10 U	10 U	10 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	10 U	10 U	10 U	10 U	10 U
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	10 U	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	**1 J**	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	**1 J**	10 U
Styrene	10 U	10 U	10 U	10 U	**1 J**	10 U
Xylene (total)	10 U	10 U	10 U	**2 J**	**4 J**	10 U

All results expressed in mg/m^3.

U- indicates not detected at or above the listed concentration

J - indicates estimated concentration below the laboratory reporting limit but above the instrument detection limit

Table 15
Soil Gas Analytical Results
Former Columbia Cement Company, Inc. Facililty
Freeport, New York
April 2000

Parameter	SG-1A		SG-2A		SG-3A	
1,1,1-Trichloroethane	30.00		240.00		710.00	D
1,1,2,2-Tetrachloroethane	6.90	U	6.90	U	6.90	U
1,1,2-Trichloroethane	5.50	U	5.50	U	5.50	U
1,1-Dichloroethane	13.00		51.00		50.00	
1,1-Dichloroethene	4.00	U	4.00	U	9.90	
1,2,4-Trichlorobenzene	7.40	U	7.40	U	7.40	U
1,2,4-Trimethylbenzene	4.90	U	7.60		5.10	
1,2-Dibromoethane	7.70	U	7.70	U	7.70	U
1,2-Dichlorobenzene	6.00	U	6.00	U	6.00	U
1,2-Dichloroethane	4.00	U	4.00	U	4.00	U
1,2-Dichloropropane	4.60	U	4.60	U	4.60	U
1,3,5-Trimethylbenzene	4.90	U	4.90	U	4.90	U
1,3-Butadiene	2.50	U	2.50	U	2.50	U
1,3-Dichlorobenzene	6.00	U	6.00	U	6.00	U
1,4-Dichlorobenzene	6.00	U	6.00	U	6.00	U
1,4-Dioxane	3.60	U	3.60	U	3.60	U
2,2,4-Trimethylpentane	5.40	U	5.40	U	5.40	U
2-Chlorotoluene	5.20	U	5.20	U	5.20	U
3-Chloropropene	3.10	U	3.10	U	3.10	U
4-Ethyltoluene	4.90	U	4.90	U	4.90	U
Acetone	510.00	D	340.00	D	320.00	D
Benzene	3.20	U	6.50		5.10	
Bromodichloromethane	6.70	U	6.70	U	6.70	U
Bromoethene	4.40	U	4.40	U	4.40	U
Bromoform	10.00	U	10.00	U	10.00	U
Bromomethane	3.90	U	3.90	U	3.90	U
Carbon Disulfide	3.10	U	6.20		9.90	
CarbonTetrachloride	6.30	U	6.30	U	6.30	U
Chlorobenzene	4.60	U	4.60	U	4.60	U
Chloroethane	2.60	U	2.60	U	100.00	
Chloroform	13.00		4.90	U	4.90	U
Chloromethane	2.10	U	2.10	U	2.10	U
cis-1,2-Dichloroethene	4.00	U	4.00	U	4.00	U
cis-1,3-Dichloropropene	4.50	U	4.50	U	4.50	U
Cyclohexane	35.00		18.00		16.00	
Dibromochloromethane	9.90	U	9.90	U	9.90	U
Dichlorodifluoromethane	4.90	U	4.90	U	4.90	U
Dichlorotetrafluoroethane	7.00	U	7.00	U	7.00	U
Ethylbenzene	4.30	U	4.30	U	4.30	U
FreonTF	7.70	U	7.70	U	7.70	U
Hexachlorobutadiene	11.00	U	11.00	U	11.00	U
IsopropylAlcohol	2.50	U	2.50	U	2.50	U

Table 15
Soil Gas Analytical Results
Former Columbia Cement Company, Inc. Facililty
Freeport, New York
April 2000

Parameter	SG-1A		SG-2A		SG-3A	
Methyl Butyl Ketone	4.10	U	4.10	U	4.10	U
Methyl Ethyl Ketone	33.00		33.00		52.00	
Methyl Isobutyl Ketone	4.10	U	4.10	U	4.10	U
Methylene Chloride	30.00		140.00		93.00	
Methyltert-ButylEther	3.60	U	3.60	U	3.60	U
n-Heptane	4.10	U	4.10	U	4.10	U
n-Hexane	94.00		54.00		22.00	
Styrene	4.30	U	4.30	U	4.30	U
Tetrachloroethene	53.00		29.00		16.00	
Tetrahydrofuran	2.90	U	2.90	U	2.90	U
Toluene	44.00		31.00		37.00	
trans-1,2-Dichloroethene	4.00	U	4.00	U	4.00	U
trans-1,3-Dichloropropene	4.50	U	4.50	U	4.50	U
Trichloroethene	5.40	U	5.40	U	5.40	U
Trichlorofluoromethane	5.60	U	5.60	U	5.60	U
VinylChloride	2.60	U	2.60	U	2.60	U

All values expressed in ug/M^3
U indicates not detected at or above the listed concentration
D indicates analysis based on diluted sample

	855.00000	956.30	1446.00

TABLE 16
Former Columbia Cement Company, Inc. Facility
Freeport, New York

Soil Gas Analytical Data Summary

Sampling Dates: December 1998 and April 2000

Sample ID / Compound	SG-11	SG-13	SG-16	SG-20	SG-1A	SG-2A	SG-3A	BACK-01	ACGIH TLV TWA ppm	ACGIH TLV TWA mg/m^3	NIOSH ppm	NIOSH mg/m^3	OSHA ppm	OSHA mg/m^3	Conversion Factor	TYPICAL INDOOR AIR BACKGROUND CONC. mg/m^3	ATSDR MRLs mg/m^3
1,1,1-Trichloroethane	10 U	10 U	6	10 U	0.030	0.24	0.71	10 U	350	1900	C 350	1900	350	1900	1 ppm = 5.46 mg/m^3	0.267	3.82 int
1,1,2-Trichloroethane	2 J	10 U	10 U	10 U	0.0055 U	0.0055 U	0.0055 U	10 U	10	55	10	55	10	55	1 ppm = 5.46 mg/m^3	NAV	NAV
1,1-Dichloroethane	10 U	10 U	17	10 U	0.013	0.051	0.050	10 U	100	400	100	400	100	400	1 ppm = 4.05 mg/m^3	NAV	NAV
1,1-Dichloroethene	10 U	10 U	10 U	10 U	0.004 U	0.004 U	0.0099 U	10 U	*200*	*810*	*100*	*400*	*100*	*400*	1 ppm = 4.05 mg/m^3	0.797	0.08 int
1,2,4-Trimethylbenzene	NA	NA	NA	NA	0.0049 U	0.0076	0.0051	NA	*25*	*123*	*25*	*120*	*25*	*120*	1 ppm = 4.92 mg/m^3	0.0028	NAV
Acetone	10 U	10 U	10 U	10 U	0.5100	0.3400	0.3200	10 U	*750*	*1780*	*250*	*590*	*100*	*2400*	1 ppm = 2.38 mg/m^3	0.019	30.94 chr
Benzene	10 U	10 U	10 U	10 U	0.0032 U	0.0065	0.0051	10 U	*10*	32	*0.1 (1/ST)*	*0.3*	*1 (5/ST)*	*3*	1 ppm = 3.19 mg/m^3	0.016	0.013 int
Carbon Disulfide	10 U	10 U	10 U	10 U	0.0031 U	0.0062	0.0099	10 U	*10*	*31*	*1 (3/ST)*	*3*	*20*	*62*	1 ppm = 3.11 mg/m^3	NAV	0.93 chr
Chloroethane	10 U	10 U	10 U	10 U	0.0026 U	0.0026 U	0.1000	10 U	*1000*	*2640*	*NE*	*NE*	*1000*	*2600*	1 ppm = 2.64 mg/m^3	NAV	39.6 ac
Chloroform	10 U	10 U	10 U	10 U	0.0130	0.0049 U	0.0049 U	10 U	*20*	*49*	*2/ST*	*9.76*	*50*	*240*	1 ppm = 4.88 mg/m^3	0.004	0.098 chr
Cyclohexane	NA	NA	NA	NA	0.0350	0.0180	0.0160	NA	*300*	*1030*	*300*	*1050*	*300*	*1050*	1 ppm = 3.44 mg/m^3	0.0047	NAV
Ethylbenzene	10 U	10 U	10 U	10 U	0.0043 U	0.0043 U	0.0043 U	1 J	100	430	100/ST 125	430/ST 540	100	430	1 ppm = 4.34 mg/m^3	0.0125	4.34 int
Methyl Ethyl Ketone	10 U	10 U	10 U	10 U	0.0330	0.0330	0.0520	10 U	*200*	*590*	*200*	*590*	*200*	*590*	1 ppm = 2.95 mg/m^3	0.0273	NAV
Methylene Chloride	10 U	10 U	10 U	10 U	0.0300	0.1400	0.0930	10 U	*50*	*174*	*NE*	*NE*	*25*	*87.5*	1 ppm = 3.5 mg/m^3	NAV	1.05 chr
n-Hexane	NA	NA	NA	NA	0.0940	0.0540	0.0220	NA	*50*	*176*	*50*	*180*	*500*	*1800*	1 ppm = 3.53 mg/m^3	0.002	2.11 chr
Styrene	10 U	10 U	10 U	10 U	0.0043 U	0.0043 U	0.0043 U	1 J	20	85	50/ST 100	210/ST 430	100/C 200	430/C 850	1 ppm = 4.26 mg/m^3	NAV	0.25 int
Tetrachloroethene	10 U	10 U	10 U	10 U	0.0530	0.0290	0.0160	1 J	25	170	NE	NE	100/C 200	680/C 1400	1 ppm = 6.78 mg/m^3	0.024	0.27 chr
Toluene	10 U	10 U	10 U	10 U	0.0440	0.0310	0.0370	10 U	*50*	*188*	*100*	375	*100*	375	1 ppm = 3.77 mg/m^3	0.0026	1.51 chr
Trichloroethene	10 U	1 J	10 U	10 U	0.0054 U	0.0054 U	0.0054 U	10 U	50	270	NE	NE	100/C 200	540/C 1100	1 ppm = 5.37 mg/m^3	0.0072	0.54 int
Xylene (total)	10 U	10 U	10 U	2 J				4 J	100	430	100/ST 150	430/ST 650	100	430	1 ppm = 4.34 mg/m^3	0.0125	0.43 chr

Notes:

1) All sample results expressed in milligrams per cubic meter (mg/m^3).

2) The following standards have been provided for comparison values and are presented in both parts per million (ppm) and mg/m^3:
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) Time-Weighted Average (TWA) and Short-Term Exposure Limit (STEL) values;
- National Institute for Occupational Safety and Health (NIOSH) exposure limits *(ST indicates a short-term exposure limit, * indicates the lowest feasible concentration)*; and
- Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) values *(C indicates a ceiling value)*.

Please note that the conversion factor for ppm to mg/m^3 for each compound has been provided in the far right column.
ACGIH TLVs are from the 1998 TLV book; the NIOSH and OSHA exposure limits are from the June 1997 edition of the NIOSH Pocket Guide to Hazardous Materials.

3) "U" indicates that the compound was not detected at or above the reporting limit indicated.

4) "J" indicates that the result reported is below the reporting limit but greater than the method detection limit (MDL) and the reported concentration is considered estimated. Although the laboratory reporting limit is 10 mg/m3, the MDL for each compound is significantly lower and estimated results greater than the MDL but less than the reporting limit have been reported.

5) No target compounds were detected in the following samples: SG-04, SG-06, SG-07, SG-X2 (a blind duplicate of SG-07), SG-15, SG-17, SG-X1 (a blind duplicate of SG-17) and BACK-02.

6) Samples BACK-01 and BACK-02 are background samples of ambient air collected as part of the soil gas survey using the same sampling train.

7) NA indicates not analyzed

8) NE indicated none established

9) SG-1A, SG-2A and SG-3A collected in April 2000

10) NAV indicates data not available

11) Typical Indoor Air data from USEPA "National Ambient Volatile Organic Compounds (VOCs) Data Base Update", EPA/600/3-88/010a, March 1988

12) ATSDR MRLs from Agency For Toxic Substances and Disease Registry, Minimal Risk Levels for Hazardous Substances

13) ac = acute; chr = chronic; int = intermediate exposures

Table 17A

Remedial Investigation
SD-8 Volatile Organic Analytical Data Summary
Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sample ID Date Depth Sample Taken Compound	SD-8 12/23/98 (0-6")	SD-8 12/23/98 (24-30")	SD-8 4/7/99 (0-6")	SD-8 4/7/99 (6-12")	SD-8 4/7/99 (12-18")	SD-8 4/7/99 (18-24")	SD-8 4/7/99 (24-30")	NYSDEC RSCO
Chloromethane	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Bromomethane	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Vinyl Chloride	13 U	11 U	6 J	10 U	10 U	10 U	10 U	200
Chloroethane	13 U	11 U	10 U	10 U	10 U	10 U	37	1,900
Methylene Chloride	3 J	11 U	16	4 J	2 J	3 J	88	100
Acetone	13	11 U	130 B	44 U	5 U	30 U	55 B	200
Carbon Disulfide	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
1,1-Dichloroethene	13 U	11 U	10 U	10 U	10 U	6 J	2 J	400
1,1-Dichloroethane	24	4 J	10 U	10 U	10 U	10 U	39	100
1,2-Dichloroethene (total)	13 U	11 U	10 U	10 U	10 U	10 U	2 J	
Chloroform	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
1,2-Dichloroethane	13 U	11 U	10 U	10 U	10 U	9 J	10 U	
2-Butanone	13 U	11 U	45	28 U	10 U	87	10 J	
1,1,1-Trichloroethane	380 D	850 D	33	45 U	59	10 U	96	800
Carbon Tetrachloride	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Bromodichloromethane	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
1,2-Dichloropropane	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
cis-1,3-Dichloropropene	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Trichloroethene	13 U	11 U	2 J	10 U	0.6 J	10 U	2 J	700
Dibromochloromethane	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
1,1,2-Trichloroethane	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Benzene	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
trans-1,3-Dichloropropene	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Bromoform	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
4-Methyl-2-Pentanone	13 U	11 U	6 J	10 U	10 U	10 U	2 J	
2-Hexanone	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Tetrachloroethene	13 U	11 U	10 U	10 U	0.3 J	10 U	1 J	
1,1,2,2-Tetrachloroethane	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Toluene	3 J	2 J	24	6 J	10 U	4 J	6 J	1,500
Chlorobenzene	13 U	11 U	10 U	10 U	10 U	10 U	10 U	
Ethylbenzene	13 U	11 U	12 J	4 J	10 U	4 J	10 J	
Styrene	13 U	11 U	2 J	1 J	10 U	10 U	10 U	
Xylene (total)	2 J	1 J	45	20	10 U	19	45	1,200

Table 17A

Remedial Investigation
SD-8 Volatile Organic Analytical Data Summary
Former Columbia Cement Company, Inc. Facility
Freeport, New York

Sample ID Date Depth Sample Taken Compound	SD-8 4/7/1999 (30-36")	SD-8 4/7/1999 (36-42")	SD-8 4/7/1999 (42-48")	SD-8 4/7/1999 (48-53")	SD-8 4/2000 (0-12")	NYSDEC RSCO
Chloromethane	10 U	10 U	10 U	10 U	7 U	
Bromomethane	10 U	10 U	10 U	10 U	14 U	
Vinyl Chloride	10 U	10 U	10 U	10 U	14 U	200
Chloroethane	13	780	140	200	14 U	1,900
Methylene Chloride	9 J	23 J	17 J	5 J	12 U	100
Acetone	25 U	300 B	150 B	44 B	18 U	200
Carbon Disulfide	10 U	16 J	3 J	10 U	7 U	
1,1-Dichloroethene	10 U	10 U	10 U	10 U	7 U	400
1,1-Dichloroethane	21	74	33	12 J	17	100
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	7 U	
Chloroform	10 U	10 U	10 U	10 U	7 U	
1,2-Dichloroethane	10 U	10 U	10 U	10 U	7 U	
2-Butanone	7 J	93	51	22 J	14 U	
1,1,1-Trichloroethane	49	52	34	11 J	4800 D	800
Carbon Tetrachloride	10 U	10 U	10 U	10 U	7 U	
Bromodichloromethane	10 U	10 U	10 U	10 U	7 U	
1,2-Dichloropropane	10 U	10 U	10 U	10 U	7 U	
cis-1,3-Dichloropropene	10 U	10 U	10 U	10 U	7 U	
Trichloroethene	0.8 J	10 U	10 U	10 U	7 U	700
Dibromochloromethane	10 U	10 U	10 U	10 U	7 U	
1,1,2-Trichloroethane	10 U	10 U	3 J	3 J	7 U	
Benzene	10 U	10 U	1 J	10 U	7 U	
trans-1,3-Dichloropropene	10 U	10 U	10 U	10 U	7 U	
Bromoform	10 U	10 U	10 U	10 U	7 U	
4-Methyl-2-Pentanone	10 U	10 U	4 J	10 U	14 U	
2-Hexanone	10 U	10 U	10 U	10 U	14 U	
Tetrachloroethene	10 U	10 U	10 U	10 U	7 U	
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U	7 U	
Toluene	1 J	15 J	8 J	4 J	2 J	1,500
Chlorobenzene	10 U	10 U	10 U	10 U	7 U	
Ethylbenzene	2 J	10 U	4 J	10 U	7 U	
Styrene	10 U	10 U	10 U	10 U	7 U	
Xylene (total)	6 J	23 J	15 J	3 J	4 J	1,200

Table 17B

Remedial Investigation
SD-8 Volatile Organic Analytical Data Summary
Former Columbia Cement Company, Inc. Facility
Freeport, New York

Parameter	SD-1 0-12"	SD-2 0-12"	SD-3 0-12"	X-1 0-12"	SD-4 0-12"	SD-5 0-12"	SD-6 0-12"	SD-7 0-12"	SD-8 0-12"	RSCO
Volatile Organic Compounds (ug/Kg)										
Chloromethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Vinyl Chloride	<2000	<12	<14	<14	<16	<120	<11	<12	<14	200
Bromomethane	<2000	<12	<14	<14	<16	<120	<11	<12	<14	N/A
Chloroethane	<2000	<12	<14	<14	<16	<120	<11	<12	<14	1900
Trichlorofluoromethane	<2000	<12	<14	<14	<16	<120	<11	<12	<14	N/A
Acetone	<1700	<58	<14	<16	<26	<210	<86	<22	<18	200
1,1-Dichloroethene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Acrylonitrile	<2000	<12	<14	<14	<16	<120	<11	<12	<14	N/A
Iodomethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Methylene Chloride	**22000**	<11	<14	<14	<21	<67	<6	<13	<12	100
Carbon Disulfide	<1000	2	<7	<7	<8	6	<6	<6	<7	2700
trans-1,2-Dichloroethene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
1,1-Dichloroethane	<1000	<6	<7	<7	<8	<60	<6	<6	17	200
Vinyl Acetate	<2000	<12	<14	<14	<16	<120	<11	<12	<14	N/A
2-Butanone-(MEK)	<2000	<12	<14	<14	<16	<120	<11	<12	<14	300
cis-1,2-Dichloroethylene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Bromochloromethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Chloroform	<1000	<6	<7	<7	<8	<60	<6	<6	<7	300
1,2-Dichloroethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	100
1,1,1-Trichloroethane	<1000	2	<7	<7	4	<60	<6	<6	**4,800**	800
Carbon Tetrachloride	<1000	<6	<7	<7	<8	<60	<6	<6	<7	600
Benzene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	60
Dibromomethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
1,2-Dichloropropane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Trichloroethene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	700
Bromodichloromethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
cis-1,3-Dichloropropene	<1000	<6	<7	<7	<8	<60	<6	<6	<14	N/A
4-Methyl-2-Pentanone (MIBK)	<2000	<12	<14	<14	<16	<120	32	<12	<7	1000
trans-1,3-Dichloropropene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
1,1,2-Trichloroethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Toluene	560	<6	<7	2	<8	26	<6	<6	2	1500
2-Hexanone	<2000	<12	<14	<14	<16	<60	<11	<12	<14	N/A
Dibromochloromethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
1,2-Dibromoethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Tetrachloroethene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
1,1,1,2-Tetrachloroethane	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Chlorobenzene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	1700
Ethylbenzene	230	<6	2	2	<8	270	2	<6	<7	N/A
Total Xylenes	<1000	<6	3j	5	4j	**1750**	9j	2j	4	1200
Bromoform	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
Styrene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	N/A
1,1,2,2-Tetrachloroethane	**970**	<6	<7	<7	<8	<60	<6	<6	<7	600
1,3-Dichlorobenzene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	1600
1,4-Dichlorobenzene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	8500
1,2-Dichlorobenzene	<1000	<6	<7	<7	<8	<60	<6	<6	<7	7900
1,2-Dibromo-3-Chloropropane	<2000	<12	<14	<14	<16	<120	<11	<12	<14	N/A

Table 17B

Remedial Investigation
SD-8 Volatile Organic Analytical Data Summary
Former Columbia Cement Company, Inc. Facility
Freeport, New York

Semi-volatile Organic Compounds (ug/Kg)	SD-2	SD-3	X-1	SD-4	SD-5	SD-6	SD-7	SD-8	RSCO
bis(2-Chloroethyl)ether	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
1,3-Dichlorobenzene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
1,4-Dichlorobenzene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Benzyl Alcohol	<400	<4600	<470	<5100	<4000	<3800	<400	<460	N/A
1,2-Dichlorobenzene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
bis(2-Chloroisopropyl)ether	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
N-Nitroso-di-n-propylamine	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Hexachloroethane	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Nitrobenzene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	200
Isophorone	<210	<2350	<240	<2600	<2000	<1950	<210	<235	4400
Benzoic Acid	<400	<4600	<470	<5100	<4000	<3800	<400	<460	N/A
Bis(2-Chloroethoxy)-methane	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
1,2,4-Trichlorobenzene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Naphthalene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	13000
4-Chloroaniline	<210	<2350	<240	<2600	<2000	<1950	<210	<235	220
Hexachlorobutadiene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
2-MethylNaphthalene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	36400
Hexachlorocyclopentadiene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
2-Chloronaphthalene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
2-Nitroaniline	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	430
Dimethyl Phthalate	<400	<4600	<470	<5100	<4000	<3800	<400	<460	2000
Acenaphthylene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	41000
Acenapthene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	50000
2,6-Dinitrotoluene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	1000
3-Nitroaniline	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	500
Dibenzofuran	<210	<2350	<240	<2600	<2000	<1950	<210	<235	6200
2,4-Dinitrotoluene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Diethyl Phthalate	<400	<4600	<470	<5100	<4000	<3800	<400	<460	7100
4-Chlorophenyl Phenyl Ether	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Fluorene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	50000
4-Nitroaniline	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	N/A
N-Nitrosodiphenylamine	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
4-Bromophenyl Phenyl Ether	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Hexachlorobenzene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	410
Phenanthrene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	50000
Anthracene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	50000
Di-n-butylphthalate	<400	<4600	<470	<5100	<4000	<3800	<400	<460	8100
Fluoranthene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	50000
Pyrene	<210	<2350	<240	4100	7100	<1950	410	<235	50000
Benzidine	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A
Butyl Benzyl Phthalate	<400	<4600	<470	<5100	<4000	<3800	<400	<460	50000
Benzo(a)anthracene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	224
3,3'-Dichlorbenzidine	<400	<4600	<470	<5100	<4000	<3800	<400	<460	N/A
Chrysene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	400
bis(2-Ethylhexyl)phthalate	350 J	6900	<470	7600	19700	<3800	4600	<460	50000
Di-n-octyl phthalate	<400	<4600	<470	<5100	<4000	9500	<400	<460	50000
Benzo(b)fluoranthene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	1100
Benzo(k)fluoranthene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	1100
Benzo(a)pyrene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	61
Indeno (1,2,3-cd)Pyrene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	3200

Table 17B

Remedial Investigation
SD-8 Volatile Organic Analytical Data Summary
Former Columbia Cement Company, Inc. Facility
Freeport, New York

	SD-2	SD-3	X-1	SD-4	SD-5	SD-6	SD-7	SD-8	RSCO	
Dibenzo(a,h)Anthracene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	14	
Benzo (g,h,l)perylene	<210	<2350	<240	<2600	<2000	<1950	<210	<235	50000	
Phenol	<210	<2350	<240	<2600	<2000	<1950	<210	<235	30	
2-Chlorophenol	<210	<2350	<240	<2600	<2000	<1950	<210	<235	800	
2-Nitrophenol	<210	<2350	<240	<2600	<2000	<1950	<210	<235	330	
2,4-Dimethylphenol	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A	
2,4-Dichlorophenol	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	400	
4-Chloro-3-methylphenol (p-	<210	<2350	<240	<2600	<2000	<1950	<210	<235	240	
2,4,6-Trichlorophenol	<210	<2350	<240	<2600	<2000	<1950	<210	<235	N/A	
2,4-Dinitrophenol	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	200	
4-Nitrophenol	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	100	
2-Methyl-4,6-dinitrophenol	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	N/A	
2,4,5-Trichlorophenol	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	100	
Pentachlorophenol	<1010	<11500	<1200	<12900	<10000	<9500	<1000	<1150	100	
2-Methylphenol (o-Cresol)	<210	<2350	<240	<2600	<2000	<1950	<210	<235	100	
4-Methylphenol (p-Cresol)	<210	<2350	<240	<2600	<2000	<1950	<210	<235	900	
METALS (mg/Kg)	**SD-2**	**SD-3**	**X-1**	**SD-4**	**SD-5**	**SD-6**	**SD-7**	**SD-8**	**RSCO**	**SITE BACKGROUND BSB-98-7 FILL**
Arsenic	16	6.6	11	13	11	5.5	4.2	8	7.5 or SB	28.9
Barium	79	49	49	63	31	18	32	53	300 or SB	954
Cadmium	1.6	4.1	5.4	7.4	2	1.3	1.7	2.8	1 or SB	7.5
Chromium	16	18	21	27	14	7.5	11	22	10 or SB	64
Lead	210	88	89	130	140	31	180	140	SB	3160
Mercury	1.0	0.06	0.07	0.1	0.1	0.04	0.32	0.1	0.1	0.96
Selenium	<7.3	<7.9	<7.7	<8.4	<6.4	<4.5	<5.3	<6.0	2 or SB	<0.1
Silver	<1.2	**5.8**	**2.1**	**4.2**	**2.1**	**2.8**	**5**	1.3	SB	<0.02
Diesel Range Organics (mg/Kg)	<61	<69	<72	<77	<60	<57	700	<69		
Percent Solids	81.8	72.3	69.5	64.3	83.2	87.1	82.1	71.9		

Notes:
1) SB indicates site Background
2) N/A indicates not applicable
3)J-indicates estimated concentration below the contract required reporting limit but above the instrument detection limit.
4) Value in bold exceeds the Recommended Soil Cleanup Objective (RSCO).
5) < indicates not detected at or above the listed concentration

Table 18

Volatile Organic Analytical Data Summary - Surface Water Freeport Creek

Former Columbia Cement Company, Inc. Facility
Freeport, New York
Sampling Date: April 2000

Sample ID Compound	OutFall X-1	OutFall Shallow	100' Up Stream Center Deep	100' Up Stream Center Shallow	100' Down Stream Center Deep	100' Down Stream Center Shallow	100' Upstream 25' From Shore Deep	100' Upstream 25' From Shore Shallow	100' Down Stream 25' From Shore Deep	100' Down Stream 25' From Shore Side Shallow	NYSDEC Water Standard
Chloromethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5
Acetone	10 U	13 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	14 U	50 (GV)
1,1-Dichloroethene	5 U	5 U	5 U	5 U	5 U	<5 U	5 U	5 U	5 U	5 U	NS
Methylene Chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
Carbon Disulfide	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	NS
trans-1,2-Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
1,1-Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
2-Butanone-(MEK)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	50 (GV)
cis-1,2-Dichloroethylene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	NS
Chloroform	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	7
1,2-Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.6
1,1,1-Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
Carbon Tetrachloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5
Benzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1
1,2-Dichloropropane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1
Trichloroethene	5 U	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5
Bromodichloromethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	50 (GV)
cis-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.4*
trans-1,3-Dichloropropene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.4*
1,1,2-Trichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1
Dibromochloromethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	50 (GV)
Bromoform	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	50 (GV)
4-Methyl-2-Pentanone (MIBK)	10 U	10 U	10 U	4 J	10 U	10 U	10 U	10 U	10 U	10 U	NS
Toluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
2-Hexanone	10 U	10 U	10 U	10 U	5 U	10 U	10 U	10 U	10 U	10 U	50 (GV)
Tetrachloroethene	5 U	5 U	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5
Chlorobenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
Ethyl benzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
Styrene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
Total Xylenes	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5

Note:
* Standard applies to the sum of the cis and trans isomers.
GV indicates guidance value.

Table 19

Volatile Organic Analytical Data Summary - Sediment Freeport Creek

Former Columbia Cement Company, Inc. Facility
Freeport, New York
Sampling Date: April 2000

Sample ID / Compound	100' UP Stream 25' FromShore	100' UP Stream 100' From Shore	100' UP Stream 200' From Shore	100' Down Stream 25' From Shore	100' Down Stream 100' From Shore	100' Down Stream 200' From Shore	200' Down Stream 25' From Shore	200' Down Stream 50' From Shore	200' Down Stream 100' From Shore	Out Fall	X-1 Out Fall
Chloromethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Vinyl Chloride	25 U	34 U	43 U	15 U	34 U	35 U	49 U	40 U	38 U	15 U	15 U
Bromomethane	25 U	34 U	43 U	15 U	34 U	35 U	49 U	40 U	38 U	15 U	15 U
Chloroethane	25 U	34 U	43 U	15 U	34 U	35 U	49 U	40 U	38 U	15 U	15 U
Acetone	250	390	290	16	98	400	75	440	590	33	35
1,1-Dichloroethylene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Methylene Chloride	12 U	17 U	22 U	15 U	17 U	18 U	25 U	20 U	19 U	8 U	17 U
Carbon Disulfide	54	49	56	8 U	11 J	65	12 J	120	200	8 U	8 U
trans-1,2-Dichloroethene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
1,1-Dichloroethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
2-Butanone-(MEK)	66	110	83	15 U	34 U	130	49 U	140	170	15 U	15 U
cis-1,2-Dichloroethene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Chloroform	12 U	17 U	22 U	13	17 U	18 U	25 U	20 U	19 U	2 J	9
1,2-Dichloroethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
1,1,1-Trichloroethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	9 J	8 U	8 U
Carbon Tetrachloride	25 U	34 U	43 U	15 U	34 U	35 U	49 U	40 U	38 U	15 U	15 U
Benzene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
1,2-Dichloropropane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Trichloroethene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Bromodichloromethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
cis-1,3-Dichloropropene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
trans-1,3-Dichloropropene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
1,1,2-Trichloroethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Dibromochloromethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Bromoform	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
4-Methyl-2-Pentanone (MIBK)	25 U	34 U	43 U	15 U	34 U	35 U	49 U	40 U	38 U	15 U	15 U
Toluene	7 J	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
2-Hexanone	25 U	34 U	43 U	15 U	34 U	35 U	49 U	40 U	38 U	15 U	15 U
Tetrachloroethene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Chlorobenzene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Ethylbenzene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Styrene	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Total Xylenes	12 U	17 U	22 U	8 U	17 U	59 U	25 U	20 U	19 U	8 U	8 U
1,1,2,2-Tetrachloroethane	12 U	17 U	22 U	8 U	17 U	18 U	25 U	20 U	19 U	8 U	8 U
Total Organic Carbon (mg/Kg)	495	720	1010	397	880	645	3160	1180	1130	575	450
Percent Solids	40.7	29	27	77	29.6	28.4	20.4	24.7	26.2	65.8	65

Table 20
Physical/Chemical Properties
Chemicals of Concern
Former Columbia Cement Company, Inc. Facility
Freeport, New York

COMPOUND	Solubility mg/L	Density g/mL	Partition Coeficient mL/g OC	Henry's Law Constant atm m3/mol	Octanol/Water Partition Coeficient Log Kow	Bioconcentration Factor (Fish)
1,1,1-Trichloroethane	1,334	1.3376	152	2.76E-02	2.5	5.6
1,1-Dichloroethane	5,500	1.174	30	4.31E-03	1.79	Low
1,1-Dichloroethene	2,225	1.218	65	3.40E-02	1.84	5.6
Acetone	Miscible	0.791	2.2	2.06E-05	-2.40E-01	Low
Benzene	1,750	0.8786	83	5.59E-03	2.12	5.2
Chloroethane	5,740	0.92	37	6.15E-04	1.49	Low
Ethylbenzene	152	0.867	1100	6.43E-03	3.15	37.5
Methylene Chloride	20,000	1.3266	8.8	2.03E-03	1.3	5
Toluene	535	0.867	300	6.37E-03	2.73	10.7
Vinyl Chloride	2,670	0.9121	57	8.19E-02	1.38	1.17
Xylene	198	0.868	240	7.04E-03	3.26	Low

References

NYSDEC Technical and Administrative Guidance Memorandum, Determination of Soil Cleanup Objectives and Cleanup Levels, JWR-94-4046, January 24, 1991

United States Environmental Protection Agency, Chemical Summary For Methylchloroform, EPA 749-f-94-014a, August 1994

USEPA, Superfund Public Health Evaluation Manual, EPA 540/1-86/060, 1986

United States Army Corps of Engineers, Riverine Emergency Management Model, Chemical Properties Table, August 1997

Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, 1983

Table 21
Former Columbia Cement Company, Inc., Facility
Vegetation Identified in Natural Areas
Within One-Half Mile of the Site

Successional Shrub Field (SSF)

White Birch	Betula papyrifera
Pitch Pine	Pinus rigida
White Cedar	Chamaccyparis thyoides
Ailanthus	Ailanthus altissima
Staghorn Sumac	Rhus typhina
Tartarian Honeysuckle	Lonicera tatarica
Arrowwood	Viburnum dentatum
Pin Oak	Quercus palustris
White Poplar	Populus alba
Weeping Willow	Salix babylonica
Bay Berry	Myrica heterophylla
Groundsel tree	Baccharis halimifolia
Japanese Honeysuckle	Lonicera Japonica
Common Reed	Phragmities australis
Glass Wort	Salicornia europaca
Seaside Golden Rod	Solidago sempervirens
Red Raspberry	Rubus strigosus
Poke Weed	Phytolacca rigida

SMG: Salt Marsh Grass

Spartina species

Table 22
Former Columbia Cement Co., Inc., Facility
Mammal/Amphibian/Reptile/Fish /Bird Species That Could Potentially Utilize Habitats Within One-Half Mile Of The Site

COMMON NAME	GENUS AND SPECIES
Mammals	
Eastern Cottontail	Sylvilagus floridanus
Star-nosed Mole	Condylura cristata
Deer Mouse	Peromyscus maniculatus
House Mouse	Mus musculus
Meadow Jumping Mouse	Zapus hudsonius
House Mouse	Mus musculus
Raccoon	Procyon lotor
Norway Rat	Rattus norvegicus
Striped Skunk	Mephitis mephitis
Gray Squirrel	Sciurus carolinensis
Eastern Chipmunk	Tamias striatus
Eastern Mole	Scalopus aquaticus
Opossum	Didelphis virginiana
Meadow Vole	Microtus pennsylvanicus
Muskrat	Ondatra zibethicus
Amphibians/Reptiles	
Diamondback Terrapin	Malaclemys terrapin
Bull Frog	Rana catesbeiana
Green Frog	Rana clamitans
Pickerel Frog	Rana palustris
Spring Peeper	Hyla crucifer
Brown Snake	Storeria dekayi
Eastern Ribbon Snake	Thammophis sauritus
Northern Water Snake	Nerodia sipedon
Fish	
Blue Fish	Pomatomus saltatrix
Winter Flounder	Pleuronectes americanus
Fluke	Paralichthys dentatus
Atlantic Mackerel	Scomber scombrus
Scup	Stenotomus chrysops
Cunner	Tautogolabrus adspersus
Striped Bass	Morone saxatilis
Skates	Rajidae
Atlantic Silversides	Menidia menidia

COMMON NAME	GENUS AND SPECIES
Birds	
American Crow	Corvus brachyrhynchos
American Goldfinch	Carduelis trustis
American Kestrel	Falco sparverius
American Robin	Turdus migratorius
Barn Swallow	Hirudo rustica
Black-capped Chickadee	Parus atricapillus
Blue Jay	Cyanocitta cristata
Brown-headed Cowbird	Molothrus ater
Bufflehead	Bucephala albeola
Canada Goose	Branta canadensis
Chimney Swift	Chaetura pelagica
Common Erget	Casmerodius albus
Common Goldeneye	Bucepala clangula americana
Common Grackle	Quiscalus guiscula
Common Merganser	Mergus merganser americanus
Common Tern	Sterna hirundo
Cormorant	Phalacrocorax auritus
Eastern Phoebe	Sayonis phoebe
European Starling	Stumus vulgaris
Glossy Ibis	Plegadis falcinellus
Great Blue Heron	Ardea herodias
Great Egret	Ardea alba
Greater Scaup	Aythya marila mariloides
Herring Gulls	Larus argentatus
Hooded Merganser	Mergus cucullatus
House Sparrow	Passer domesticus
Killdeer	Charadrius vociferus
Least Tern	Sterna antillarum
Lesser Scaup	Aythya affinis
Little Blue Heron	Egretta caerulea
Mallard	Anas platyrhynchos
Mourning Dove	Zenaida macroura
Northern Cardinal	Cardinalis cardinalis
Old Squaw	Clangula hyemalis
Red-winged Blackbird	Agelaius phoneniceus
Rough-winged Swallow	Stelgidoptery ruficollis
Snowy Egret	Egretta thula
Song Sparrow	Melospiza melodia
Spotted Sandpiper	Actitis macularia
Yellow- Crowned Night-Heron	Nyctanassa violacea
Invertebrates	
Atlantic Horseshoe Crab	Limulus polypemus
Long finned Squid	Loligo pealei
Short finned Squid	Illex illecebrosus
New England Neptue	Neptuna decemcostata
Knobbed Whelk	Busycon carica
Northern Lobster	Homarus americanus

COMMON NAME	GENUS AND SPECIES
Northern Seastar	Asterias vulgaris
Spider Crab	Halicarcinus maenas
Northern Quahog	Mercenaria mercenaria
Blue Mussels	Mytilus edulis
Moon Jelly	Aurelia aurita
Acorn Barnacles	Balanus eburneus
Common Periwinkles	Littorina littorea
Common Northern Moon Snail	Lunatia heros

FIGURES