Work Plan

# New Cassel
# Operable Unit 4
# Site No. 1-30-043A-V
# Vapor Intrusion Investigation
# Work Assignment #D00490-40

## Towns of Hempstead and North Hempstead, Nassau County, New York

New York State Department of
Environmental Conservation

March 2006

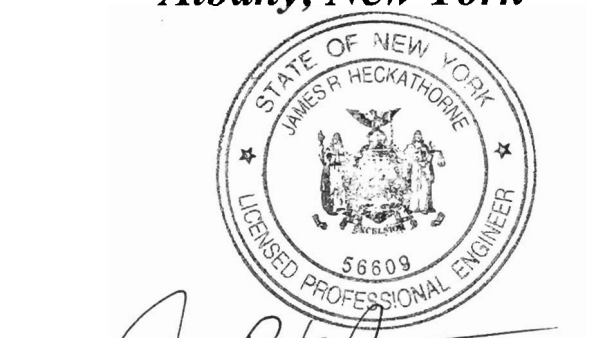
O'BRIEN & GERE

10653/37976

# WORK PLAN

## New Cassel - Operable Unit 4
## Vapor Intrusion Investigation
## Work Assignment #D004090-40
## New York

***New York State***
***Department of Environmental Conservation***
***Albany, New York***




James R. Heckathorne, P.E.
Vice President

March 2006

O'BRIEN & GERE
ENGINEERS, INC.

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# 1. Introduction

This document represents the draft Work Plan for investigation of Operable Unit (OU)-4, located south and west of the New Cassel Industrial Area (NCIA) in the Towns of Hempstead and North Hempstead, Nassau County (Figure 1). The NCIA is about 170 acres and is bounded by the Long Island Railroad to the north, Frost Street to the east, Old Country Road to the south, and Grand Island Boulevard to the southwest. The NCIA is a heavily developed industrial and commercial area. Development in this area dates back to the 1950's and many of the properties have housed various businesses over the years. The topography is generally flat. A total of seventeen sites within the NCIA were listed as Class 2 sites in the New York State Registry of Inactive Hazardous Waste Disposal Sites. The listing of the 17 sites occurred between May 1995 and September 1999. The boundaries of the NCIA form a separate operable unit designated as OU-3 (Figure 1).

The areal extent of OU-4, the subject of the investigation, is designated on Figure 1 as the "study area". OU-4 is a largely residential area consisting of single family homes and the W.T. Clarke High School. The Bowling Green well field is also located in the area defined by OU-4.

In general, the scope of work for this project involves the evaluation of vapor intrusion associated with contaminated OU-3 ground water. Tasks for the evaluation consist of the installation of soil vapor points as well as the collection of subslab, interior, and ambient air samples. Proposed soil vapor sample locations are shown on Figure 2. The subslab, interior, and ambient air sample locations will be designated based on the analysis of the soil vapor from these locations.

The work described herein is being performed in accordance with the Standby Contract between O'Brien & Gere and the New York State Department of Environmental Conservation (NYSDEC) dated 1999, and the letter from Dorothy Norvik, NYSDEC, to Douglas Crawford, O'Brien & Gere, dated October 28, 2005. The letter designates this work assignment as number 40 under the Standby Contract.

## 1.1. Project Objectives

The objective of the work assignment is to assess whether volatile organics in ground water flowing in a hydraulically downgradient direction from the NCIA (OU-3) may be volatilizing and entering structures located within the study area (OU-4). For planning purposes, the location of these structures (homes, businesses, etc.) can be addressed in terms of three areas. The first area is the residential area bounded to

the north by Old Country Road, to the east by Carman Avenue Extension, to the south by Choir Lane, and to the west by Grand Boulevard. This area includes the Bowling Green well field. The second area is that bounded by Old Country Road to the north, Grand Boulevard to the east, Westley Road to the south, and Brompton and Regent Drives to the west. This area includes the W.T. Clarke High School. The third area is bounded by Old Country Road to the south, Grand Boulevard to the east, the Long Island Railroad to the north, and Salisbury Park Drive to the West.

## 1.2. Approach

On a task by task basis, the approach as listed in the work assignment consists of the following tasks. The Task Summary is shown on Table 2.

**Task 1A: Develop a draft work plan incorporating the following elements:**

- Review the work assignment and perform an area visit with the NYSDEC Project Manager, Joseph Jones.
- Gather and review background information related to the investigation such as the Record of Decision for OU-3.
- Develop a general scope of work of the Soil Vapor Intrusion Investigation.
- Identify preliminary field activities and primary areas of concern.
- Compile the level of effort required for work plan development.
- Develop estimated costs for execution of the investigation.
- Construct a project schedule.
- Develop an organization chart.
- Develop an M/WBE subcontracting plan that meets the goals of the Standby Contract.

**Task 1B: Final Work Plan Preparation**

In addition to the above elements, the final work plan is to be delivered to NYSDEC one week after the draft work plan is accepted. The final work plan is to incorporate the following additional elements:

- **A meeting with NYSDEC and O'Brien & Gere, to review comments** and details of the Draft Work Plan, if necessary.

- A description of the level of effort and the budget required for all work, including subcontracting.
- A field sampling plan describing the procedures for collecting samples and those points in the investigation that may require field decisions.
- A summary of the site reconnaissance and records search.
- A detailed staffing plan.
- The identity of the subcontractors and the M/WBE commitment to this project.
- A Health and Safety Plan, Quality Assurance Project Plan, and, possibly, a Citizen Participation Plan.

**Task 2: Site Investigation**

This task addresses the field investigation of the NCIA. Subtasks associated with Task 2 include:

- Base map development with a scale of 1 in to 40 ft (for purposes of this plan, it has been assumed that a base map sufficient to meet the objectives of the work plan is available for use).
- A survey of each sample point within 0.1 ft, placed on the base map (in lieu of surveying in this manner, the use of a Trimble global positioning system (GPS) is proposed).
- Soil gas investigation consisting of the installation of temporary probes at 40 locations installed using direct push technology. The probes will be installed to depths of 8 ft, 25 ft, and approximately 60 ft below the ground surface. Five soil profile samples (estimated) will also be collected from three of the deep borings. A total of 120 samples will, therefore, be taken to characterize soil vapor in the area, exclusive of duplicate samples.
- The above samples will be collected in laboratory certified clean, Summa-type canisters. Tubing will be dedicated, consisting of either Teflon® or polyethylene.
- Sulfur hexafluoride or helium will be used as a tracer gas at ten vapor sampling locations.
- The soil gas samples will be analyzed by an ELAP certified laboratory for volatiles using EPA Method TO-15.
- An interim report will be prepared and submitted to the Department within four weeks of the completion of the above subtasks.

- Indoor air sampling will be performed at approximately 20 structures. Subslab vapor sampling may also be conducted. Prior to sampling, an inspection of general site conditions will be performed at each property. In terms of indoor air, two samples will be collected at each property, one in the basement and the other on the first floor. Samples will be collected over a 24 hour period using Summa-like canisters and analyzed by EPA Method TO-15. Assuming that one subslab sample collected from each of the twenty structures, a total of 60 samples will be collected under this subtask.

- Ten (10) outdoor, ambient air samples will be collected concurrently with collection of the indoor air samples. These samples will also be analyzed by EPA Method TO-15.

The Analytical Sampling Summary for Task 2 is shown on Table 3.

*Note: Although not specifically identified in the work assignment, permitting will form a critical portion of the work. Permits will be required by both Hempstead and North Hempstead to install geoprobes. Permitting will be performed as part of Task 2.*

**Task 3: Investigation Report**

Throughout the work assignment, documents will be prepared in both hard copy and electronically. The documents will contain a description of work that was performed during Task 2 and the analytical results obtained from sample analyses. The project status will also be monitored as part of this task and will include a monthly Cost Control Report, Project Report, and Progress Schedule Update.

After field work is completed, a final investigation report will be prepared. The report will include:

- A summary of data collected as part of the field work or records search

- A summary of the hydrological and physical condition of the area, as it pertains to soil vapor

- A summary of the activities that took place during the field investigation, related maps, and areas of potential concern

- Recommendations for additional sampling areas, data gaps, and data usability.

The period of performance for this work assignment is twelve months from the notice to proceed.

**Task 4: Administration**

Administrative tasks will be tracked as Task 4.

## 1.3. Document Format

This document contains the following sections:

- Section 1 – Introduction
- Section 2 – Background
- Section 3 – Site Characterization Documents
- Section 4 – Scope of Work
- Section 5 – Project Staffing Plan
- Section 6 – Proposed Subcontractors
- Section 7 – Minority and Women Business Enterprise Utilization
- Section 8 – Work Assignment Budget
- Section 9 – Project Schedule
- References

# 2. Background

## 2.1. General

The information presented in this section is based on the Technical Scope of Work provided in the Work Assignment letter, conversations with the NYSDEC Project Manager, background information contained in the Record of Decision for OU-3, and the area walk-over conducted on 11/16/05.

## 2.2. Study Area Location and Background

The "study area" that is the subject of this investigation is shown on Figure 1. The area is highly urbanized and contains a high density of residential dwellings. The W.T. Clarke High School and the Bowling Greene Public well field also lie within this area.

## 2.3. Previous Investigations

Previous investigations concerning off-site ground water are summarized in the record of decision for OU-3 (ROD, October 2003). The ROD identifies 1,1,1-trichloroethane, tetrachloroethylene, and trichloroethylene as having been released to ground water by businesses located in OU-3.

The ROD also identifies three plumes of contaminated ground water flowing into the study area from OU-3. The relative dimensions and locations of these plumes are shown on Figures 3 and 4.

Since OU-3 ground water, however, has not be sampled in some time (Joseph Jones, NYSDEC, personal communication 11/16/05), the extent of the plumes shown on these Figures may not be entirely accurate. The investigation presented in this work plan has been designed in recognition of this situation.

## 2.4. Geology and Hydrology

The Upper Pleistocene deposits of poorly sorted sand and gravel that make up the Upper Glacial Aquifer (UGA) are found from the surface to a depth of approximately 80 ft below ground surface (bgs) in the study area. The Magothy aquifer is located beneath the UGA and consists of fine sands, silt and small amounts of clay.

In general, the top of the Magothy formation is found at least 100 ft bgs in Long Island. However, according to the ROD, the Magothy is sometimes found at significantly shallower depths (60-80 ft bgs) in the study area in comparison to many other areas of Long Island. The UGA and the Magothy are in direct hydraulic connection; however, clay lenses are often found in the upper Magothy in this area. The Magothy is the principal source of fresh water on Long Island.

Depth of the water table within OU-3 is believed to be between 55-65 ft bgs with ground water flowing in a southwesterly direction. As a result, deeper soil vapor probes will be installed to around 50 ft bgs instead of the 60 ft identified in the work assignment since the ground water table is expected to fluctuate.

# 3. Site Characterization Documents

## 3.1. Field Activities Plan

The Field Activities Plan (FAP) presents the procedures for implementing field investigations, the collection of samples, and drilling requirements. The project FAP is in Appendix A.

## 3.2. Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) provides quality assurance/quality control (QA/QC) criteria for work efforts associated with the sampling of environmental media. The QAPP is provided in Appendix B.

The QAPP has been prepared utilizing the guidance and format provided in the following documents:

- United States Environmental Protection Agency (USEPA), Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Office of Emergency and Remedial Response, Washington, D.C. (USEPA 1988a).

- United States Environmental Protection Agency (USEPA), EPA Requirements For Quality Assurance Project Plans For Environmental Data Operations, EPA QA/R-5 (USEPA 2001a).

This QAPP will assist in generating data of a known and acceptable level of precision and accuracy. The QAPP provides information regarding the project description and personnel responsibilities, and sets forth specific procedures to be used during sampling of relevant environmental matrices, other field activities, and the analyses of data. The procedures in this QAPP will be followed by personnel participating in the field investigation and in the laboratory analyses of environmental samples.

## 3.3. Health and Safety Plan

The Health and Safety Plan (HASP) has been developed to provide both general procedures and specific requirements to be followed by O'Brien & Gere personnel while performing field activities.

The HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be used by O'Brien & Gere personnel to address potential health and safety hazards. The plan specifies procedures and equipment to be used by O'Brien & Gere personnel during work activities and emergency response to minimize exposures of O'Brien & Gere personnel to hazardous materials. The HASP is provided in Appendix C.

## 3.4. Data Management and Validation

Analytical data from the laboratory will be received in hardcopy and electronic format. The electronic data will be entered into a project database for use in preparation of summary tables.

Analytical data received from the laboratory will be validated as discussed in the QAPP. A Data Usability Summary Report (DUSR) will be prepared by a data validator and an Electronic Data Deliverable (EDD) package will be provided as specified in Section 4.2.7.

# 4. Scope of Work

## 4.1. General

The following scope of work was developed based on the Technical Scope of Work outlined in the Work Assignment letter received by O'Brien & Gere on 10/28/05, the 11/16/05 site visit, review of the OU-3 ROD, and conversations with Joseph Jones, NYSDEC Project Manager. The field activities and sampling/analysis matrix are summarized in Tables 1 and 2, respectively. Detailed Procedures for implementing the scope of work are set forth in the FAP, QAPP, and HASP. These are attached as Appendices A, B, and C, respectively.

O'Brien & Gere assumes that NYSDEC will provide access to each area investigated with limited support from O'Brien & Gere. It is also assumed that a base map sufficient to plot the sample locations is available through previous NYSDEC work and that sample locations can be located via use of a Trimble geographic positioning system (GPS).

## 4.2. Investigative Activities

### 4.2.1. Base Map Development

As noted earlier, it has been assumed that a base map sufficient for this investigation exists at a scale of 1 inch to 40 feet. The map will be downloaded into a GIS system and properly scaled for use in plotting sample locations. The map may be an aerial photograph of the appropriate scale. Ground water flow direction will be obtained from the ROD for OU-3 and shown on the map. Aerial photographs of appropriate scale are available on the NYS 61S web site.

### 4.2.2. Survey

Sample locations will be surveyed using a Trimble GPS. The Trimble is accurate to submeter accuracy and should be adequate to meet the goals of this investigation.

### 4.2.3. Soil Gas Investigation

The soil gas investigation will be performed using the *NYS Department of Health Guidance for Evaluating Soil Vapor Intrusion* as a guide.

Temporary soil gas probes will be installed at approximately forty locations as shown on Figure 2. The purpose of installing the probes will be to collect soil vapor samples to assess whether vapor phase contaminants are present within the investigation area.

The probes will be installed using stainless steel drive rods equipped with detachable stainless steel drive points. Once the desired depth is reached, a six inch screen will be attached to the drive point together with the sample tubing necessary to carry the soil vapor to the ground surface. Tubing will be dedicated and made of either Teflon® or polyethylene. A sand pack will be used around the screen while granular bentonite will be used to pack the annular space above the sand to a point near or at the ground surface. The bentonite will be hydrated for at least 24 hours before the sample is withdrawn from the subsurface.

Prior to the collection of samples, the soil gas probes will be purged in accordance with the NYSDOH guidance for the evaluation soil vapor intrusion. One to three implant volumes will be purged at a flow rate that does not exceed 0.2 liters/minute.

Soil gas samples will be collected at three depths below ground surface, one at a depth of a typical building foundation (8 ft bgs), one at approximately 25 ft bgs, and one just above the water table (typically 60 ft bgs in the area of the investigation according to the work assignment). The samples will be collected using a laboratory certified clean SUMMA-type canister with two-hour flow regulators.

Tracer gas (either helium or sulfur hexafluoride) will be used in accordance with the NYSDOH guidance. At a minimum, ten soil vapor sampling locations will be evaluated with tracer gas. The flow rate during sampling shall not exceed 0.2 liters/minute to minimize atmospheric air infiltration during sampling.

The soil gas samples will be analyzed by Chemtech Corporation, Warwick, RI, a WBE NY State certified laboratory. USEPA Method TO-15 will be utilized to analyze the samples. A minimum reporting limit of 1 microgram/cubic meter will be used for each analyte reported. The laboratory will be required to report preliminary results within 10 working days of sample receipt.

Once the soil vapor sample has been collected, the tubing will be cut below the ground surface and the upper most bentonite removed. The area will then be filled with topsoil or, in the case of asphalt, cold patch used to patch the boring.

An interim report summarizing the data collected above will be submitted to NYSDEC within four weeks of the completion of the above tasks. The report will include a map identifying all sample locations, data collected and a summary of field activities.

### 4.2.4. Indoor Air

Indoor air will be sampled at a total of approximately 20 structures located in the study area. It is assumed that one sample will be collected from the basement and another from the first floor. The protocol for the sampling will follow the *New York State Guidance for Evaluating Soil Vapor Intrusion*. Sample locations will be selected on the basis of the results of the soil gas investigation and, for this reason, are not presented here. Prior to sampling, a pre-sampling inspection of each structure will be conducted and a chemical inventory performed.

Indoor air samples will be collected over a 24 hour period. The samples will be collected in laboratory certified clean Summa-type canisters. The samples will be collected at about four to six feet above the floor to simulate the breathing zone. TO-15 will again be used in the analysis. Reporting limits of 1.0 microgram/cubic meter will be required except for trichloroethylene (TCE). For TCE, a reporting limit of 0.25 microgram/cubic meter will be required.

### 4.2.5. Subslab Sampling

In addition to indoor air samples, it has been assumed that one subslab air sample will be collected from each residential sample for a total of 20 subslab samples. A hammer drill or equivalent will be used to penetrate the basement floor to advance the boring. The annular space between the one inch hole and the 3/8 inch tubing will be filled with clean sand and the hole sealed at the ground surface. Approximately 1 liter of gas will be purged from the subsurface probe using a photoionization detector (PID). The PID readings will be observed and the highest will be recorded on the appropriate field form. The PID will be disconnected and the end of the sample tubing will be connected directly to the canister intake valve. Flexible silicone tubing will be used at a minimum and as a tubing adapter only. The sample will be collected over a 24 hour period. **TO-15 will be used to analyze subslab samples. The** required reporting limit will be 1.0 microgram/cubic meter.

Reporting for indoor air and subslab sampling will include information pertaining the installation, collection and sampling of the properties. No conclusion shall be contained within the reports. A data base shall also be included compiled from data validated by a qualified data validator.

### 4.2.6. Ambient Air Sampling

It is further assumed that 10 outdoor locations will be sampled for ambient air quality. The protocol for this effort shall also follow the NYSDOH guidance. Outdoor air samples will be collected with a laboratory certified clean Summa-type canister and regulator. The regulators will be calibrated for a 24-hour sample collection event. A

section of disposable Teflon® tubing will be extended from the canister to collect the sample from the breathing zone at four to six feet above the ground surface. The analysis for outdoor air samples will achieve detection limits of 1.0 microgram/cubic meter for each compound except for TCE, which will have a reporting limit of 0.25 microgram/cubic meter.

#### 4.2.7. Site Investigation Report

Documents will be provided electronically to NYSDEC in Adobe Acrobat (.pdf) format and in hard copy format. Preliminary reports and supporting documents for the final reports will also be delivered to NYSDEC. These documents must contain a cover page indicating that they are not the finalized documents and state the percent of work this document represents and the amount of work that remains. At the time of Work Assignment completion, the Engineer will submit all final documents and data that were generated during the Work Assignment for NYSDEC. Data generated under this Work Assignment shall be submitted in an electronic data deliverable (EDD) that complies with the Division's Electronic Data Warehouse Standards or as otherwise directed by the Department.

At the time of completion of the Work Assignment services, the Engineer shall deliver to NYSDEC the original copies, two reproducible copies, plus additional copies, of all final plans, drawings, specifications, computations, designs, construction data, reports, record, drawings, and other documents and data pertaining to the work which is the subject of the Work Assignment to the extent that the information has not already been furnished.

After field work is completed, a Final Investigation Report will be prepared that includes:

- A summary of data collected as part of the field work
- A summary of the physical condition of the site, as it pertains to soil vapor
- A summary of the activities that took place during the field investigation
- Recommendations for additional work

## 4.3. Administration

This task consists of administration duties required by the State Superfund Contract dated 1999 between the Department and O'Brien & Gere including:

- Monthly Cost Control Report pursuant to Schedule 2 of the State Superfund Contract.

- Quarterly report, submitted on Form 101, providing a description of the Engineer's utilization of MBE/WBE firms in relation to this work assignment. The quarterly reports will be submitted on Form 101 before the seventh day of the month following the end of the quarter. In addition to Form 101, the report will include the names of the MBE/WBE firms, subcontracts and purchase order awarded to these firms, scope of work performed, cost of work performed to date, and actual dollar amounts and percent of work assignment costs paid to these MBE/WBE firms to date. This report will include invoices from the MBE/WBE firms and copies of canceled checks paid to the MBE/WBE firms. O'Brien & Gere will also report on such other matters related to Affirmative Action goals and requirements established by this Contract as the Department may require.

- Monthly Project Report describing the compliance with the progress schedule, accomplishments, problems, and projected changes in the scope of services.

# 5. Project Staffing Plan

The general responsibilities of key project personnel are listed below:

*Program Manager*:

Douglas M. Crawford, P.E. will be responsible for overall State Superfund Standby Contract (#D004090) program management, including administration and financial issues. Mr. Crawford is NSPE level IX.

*Project Manager*:

Jeffrey E. Banikowski, CPG will be responsible for overall management of the work assignment under the State Superfund Standby Contract (#D004090-40). Responsibilities will include coordination with NYSDEC, budget responsibilities, assistance in preparation of the work plan, and reviewing field activities and the site characterization report. Mr. Banikowski is NSPE level VIII.

*Project Officer:*

James R. Heckathorne, P.E. will be the Professional Engineer of record and be responsible for reviewing and signing documents that require the stamp and signature of a New York State licensed Professional Engineer. Mr. Heckathorne is NSPE level IX.

*Sr. Project Scientist:*

John Hunt, a Sr. Project Scientist, will act as field supervisor. Mr. Hunt will be responsible for coordination with the subcontractors, day to day field activities, and general oversight pertaining to the field work.

## 6. Proposed Subcontractors

With the exception of AARCO, all proposed subcontractors are either minority or women owned businesses enterprises as listed in Section 7. AARCO will dispose of any waste that is generated during the drilling procedure.

# 7. Minority and Women Business Enterprise Utilization

O'Brien & Gere anticipates utilizing the following minority and women business enterprises on this project in the following capacities:

- Land Air Water Environmental Service, Inc., a WBE, will install the soil vapor points required for the collection of soil vapor samples.
- Advantage Travel, a WBE, will be responsible for making travel and lodging arrangements for O'Brien & Gere personnel.
- Skyline Specialty, Inc., another WBE, will be utilized for the purchase of field supplies and rental of field equipment such as the PID required for field work.
- Nancy Potek, a WBE, will validate the analytical data.
- ChemTech Environmental Consulting Inc., a WBE, will perform laboratory services related to soil vapor and air analyses.
- YEC Environmental will assist in the collection of indoor and ambient air samples.

## 8. Work Assignment Budget

The following State Superfund Standby Contract schedules are included in Attachment 2:

| | |
|---|---|
| Schedule 2.11(a) | Summary of Work Assignment |
| Schedule 2.11(b) | Direct Labor Hours Budgeted |
| Schedule 2.11(b-1) | Direct Administrative Labor Hours Budgeted |
| Schedule 2.11(c) | Direct Non-Salary Costs – In-House, Field Supplies, and Travel |
| Schedule 2.11(d) | Vendor Rental Equipment |
| Schedule 2.11(e) | Cost -Plus Fixed-Fee Subcontractors |
| Schedule 2.11(f) | Unit Price Subcontracts |
| Schedule 2.11(g) | Monthly Cost Control Report – Fiscal Information (Summary and Each Individual Task) |
| Schedule 2.11(h) | Monthly Cost Control Report – Labor Hours (Summary and Each Individual Task) |

The costs presented in the Schedule 2.11 consist of those incurred since project inception and estimated costs to complete the above-described tasks. These costs represent our estimate based on the current status of the project and available information and assumptions stated in this Work Plan. The costs of the project may be affected by additional information or issues raised during execution of the project. Out of scope efforts will be estimated and presented to the Department for approval prior to execution.

# 9. Project Schedule

Table 3 is a Preliminary Project Schedule that is based on limited information that is currently available regarding access to individual properties within the study area (Figure 1). Some of the dates may, therefore, change as the Work Plan is being implemented.

## References

NYSDEC, March 2003. Record of Decision, New Cassel Industrial Area Sites, Town of North Hempstead, Nassau County, New York, Off-site Groundwater South of the New Cassel Industrial Area, Operable Unit No. 3.

NYSDEC, October 28, 2005. Work Assignment Letter from Dorothy A. Norvick, Chief Contracts and Payment Section (NYSDEC), to Douglas Crawford, Vice President, O'Brien & Gere.

**Table 1.** **New Cassel - Operable Unit 4**
**Towns of Hempstead and North Hempstead, Nassau County, NY**
**Task Summary**

| **New Cassel Operable Unit 4, Nassau County** |
|---|
| |
| **Task 1A – Develop a Draft Work Plan** |
| Subtask 1 – Site Visit: Perform Site visit with the NYSDEC Project Manager and O'Brien & Gere Project Manage |
| Subtask 2 – Background Review: Gather sufficient background information to design the Work Plan |
| Subtask 3 – Develop a general scope of work |
| Subtask 4 – Identify preliminary field activities and primary areas of concern |
| Subtask 5 – Compile the level of effort necessary for work plan development |
| Subtask 6 – Develop estimated costs for execution of the investigation |
| Subtask 7 – Develop a general scope of work |
| Subtask 8 – Construct a project schedule |
| Subtask 9 – Develop an organization chart |
| Subtask 10 – Develop an M/WBE subcontracting plan |
| **Task 1B – Prepare Final Work Plan** |
| Subtask 1 – Prepare Field Analysis Plan, Health and Safety Plan, and Quality Assurance Plan for inclusion in Work Plan |
| **Task 2 – Site Characterization** |
| Subtask 1 – Prepare a Base Map with a scale of 1 inch to 40 feet |
| Subtask 2 – Survey each sample location to submeter accuracy |
| Subtask 3 – Perform soil gas investigation consisting of a series of vapor probes at various depths and locations |
| Subtask 4 – Collect soil vapor samples in Summa-type canisters |
| Subtask 5 – Use tracer gas at 10 soil vapor probe locations |
| Subtask 6 – Analyze samples by EPA Method TO-15 |
| Subtask 7 – Prepare Interim Report |
| Subtask 8 – Conduct indoor air and subslab sampling, again using EPA Method TO-15 |
| Subtask 9 – Perform ambient air sampling |
| **Task 3 – Site Investigation Reports** |
| Subtask 1 – Prepare monthly Cost Control, Project, and Progress Reports |
| Subtask 2 – Prepare Draft and Final Site Investigation Reports |
| **Task 4 - Administration** |
| Administrative efforts will be tracked as Task 4 |

**Table 2. Analytical Sampling Summary - Operable Unit 4**
**Towns of Hempstead and North Hempstead, Nassau County, NY**

| Task/Analysis | Method | Matrix | Samples* | MS | MSD | Field Duplicates | Equipment Blanks | Trip Blanks | Total Samples |
|---|---|---|---|---|---|---|---|---|---|
| Soil Vapor Samples (40 locations at 3 depths) | TO-15 | Soil Vapor | 120 | N/A | N/A | 12 | N/A | N/A | 132 |
| Indoor Air Samples (20 structures, basement and first floor | TO-15 | Indoor Air | 40 | N/A | N/A | 4 | N/A | N/A | 44 |
| Subslab | TO-15 | Soil Vapor | 20 | N/A | N/A | 2 | N/A | N/A | 22 |
| Ambient Air | TO-15 | Air | 10 | N/A | N/A | 2 | N/A | N/A | 12 |
| Waste Disposal: None Anticipated | | | | | | | Grand Total | | 210 |

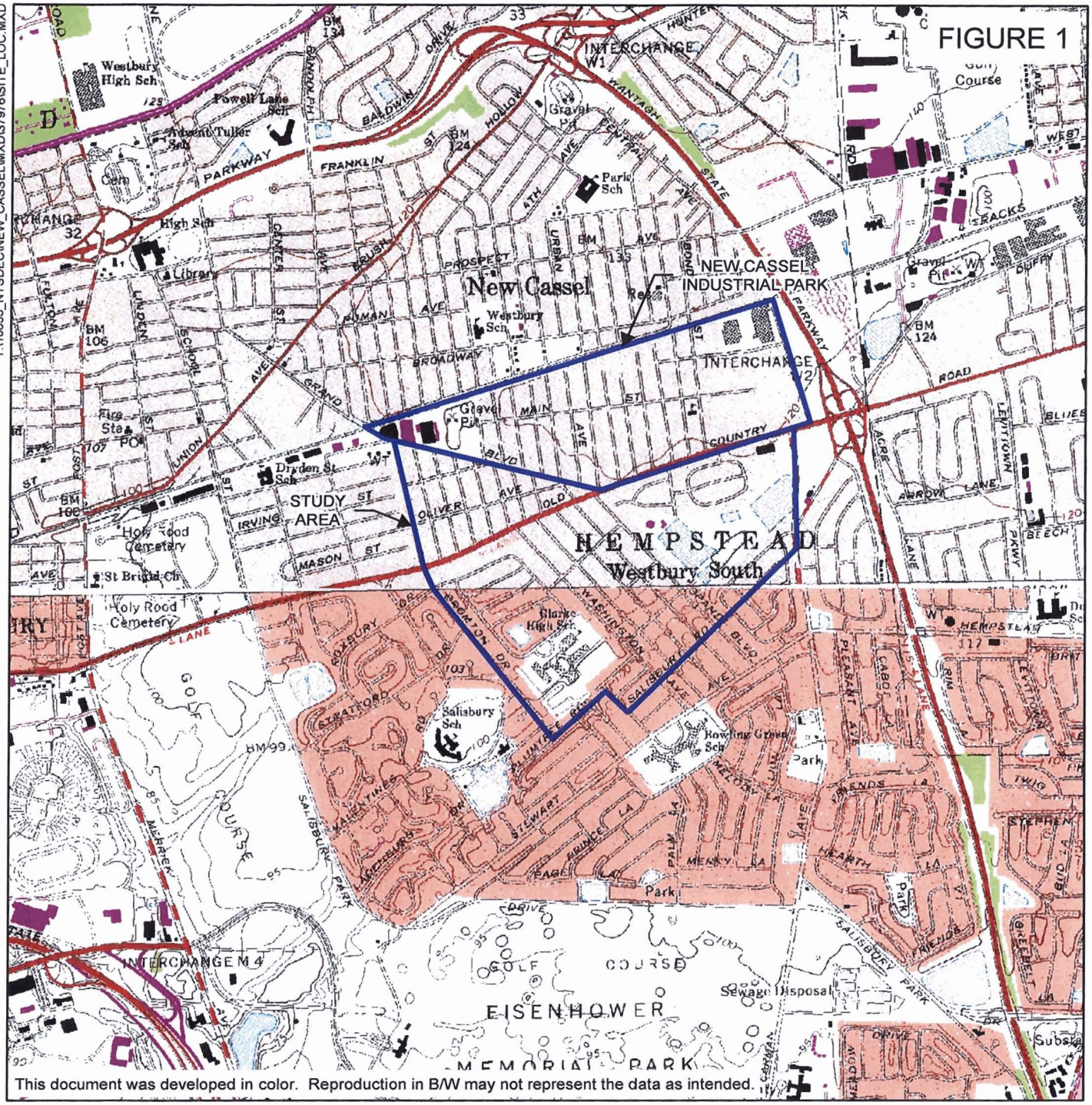
*-Estimated

## Table 3. Tentative Schedule

The following schedule has been developed with the recognition that access agreements and permits to perform the work have yet to be obtained. Therefore, the schedule should be considered tentative in nature.

| Task | Duration in Weeks as Presented in Work Assignment 40 |
|---|---|
| 1A – Draft Work Plan Preparation | 6 |
| 1B – Final Work Plan | 6 |
| 2 – Investigation | 12 |
| 3 – Investigation Report | 8 |

FIGURE 1

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NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW CASSEL STUDY AREA
TOWNS OF HEMPSTEAD AND NORTH
HEMPSTEAD, NEW YORK
NASSAU COUNTY

# SITE LOCATION

0 1,000 2,000 4,000 6,000 8,000

Feet

1:24,000

10653.37976
JANUARY 2006

O'BRIEN & GERE

T:\10653_NYSDEC\NEW_CASSEL\MXD\37976\SAMP_LOC.MXD

# FIGURE 2


## LEGEND

**LOCATION TYPE**

♦ APPROXIMATE SOIL VAPOR SAMPLING LOCATION

NOTES:
Final soil vapor locations will be selected after access agreements are obtained and an on-site visit is conducted

NEW CASSEL
STUDY AREA OU-4
TOWNS OF HEMPSTEAD
AND NORTH HEMPSTEAD
NEW YORK

## SAMPLE LOCATIONS

0 500 1,000 2,000
Feet

DECEMBER 2005
10653.37976

O'BRIEN & GERE

PLOT DATE: 12/7/05 DIV. 84 JPS

This document was developed in color. Reproduction in B/W may not represent the data as intended.

T:\10653_NYSDEC\NEW_CASSEL\MXD\37976\VOC_ISOPLETHS.MXD

# FIGURE 3

## LEGEND

VOC ISOPLETHS

NOTES:
Final soil vapor locations will be selected after access agreements are obtained and an on-site visit is conducted

NEW CASSEL
STUDY AREA OU-4
TOWNS OF HEMPSTEAD
AND NORTH HEMPSTEAD,
NEW YORK

(after Figure 3, Record of Decision
New Cassel Industrial Area Sites
October 2000)

## VOC ISOPLETHS (ug/L)
## 65 TO 200 ft bgs

0 500 1,000 2,000
Feet

DECEMBER 2005
10653.37976

O'BRIEN & GERE

PLOT DATE: 12/14/05 DIV. 84 JPS

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T:\10653_NYSDEC\NEW_CASSEL\MXD\37976\VOC_ISOPLETHS_2.MXD

# FIGURE 4


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## LEGEND

VOC ISOPLETHS

NOTES:
Final soil vapor locations will be selected after access agreements are obtained and an on-site visit is conducted

NEW CASSEL
STUDY AREA OU-4
TOWNS OF HEMPSTEAD
AND NORTH HEMPSTEAD,
NEW YORK

(after Figure 3, Record of Decision
New Cassel Industrial Area Sites
October 2000)

## VOC ISOPLETHS (ug/L)
## 0 TO 64 ft bgs

0 500 1,000 2,000
Feet

DECEMBER 2005
10653.37976

O'BRIEN & GERE

PLOT DATE: 12/14/05 DIV. 71 JSB

Appendix A

# Field Activities Plan

Field Activities Plan

# New Cassel
# Operable Unit 4
# Site No. 1-30-043A-V
# Vapor Intrusion Investigation
# Work Assignment #D00490-40

## Towns of Hempstead and North Hempstead, Nassau County, New York

New York State Department of Environmental Conservation

February 2006

O'BRIEN & GERE

# Contents

# 1. Introduction

## 1.1. General Plan

This document represents the Field Activities Plan (FAP) for investigation of Operable Unit (OU)-4 located south and west of the New Cassel Industrial Area, New Cassel, NY (Figure 1). The area of investigation is located in the towns of Hempstead and North Hempstead, Nassau County.

This FAP presents the procedures for implementing the field investigation described in the Work Plan (WP) for OU-4 (O'Brien & Gere, 2005). It provides detailed procedures for collecting environmental samples including a description of equipment and personnel requirements.

# 2. Field Investigation Activities

## 2.1. General

This section describes the field activities to be completed as part of the WP. The analytical sampling summary is described Section 4 of the WP.

## 2.2. Permitting

Permits will be obtained from the Towns of Hempstead and North Hempstead for the installation of the soil vapor probes. If necessary, the probe locations will be marked in the field prior to obtaining the permits. It is assumed that the NYS Department of Environmental Conservation (NYSDEC) will take the lead in contacting property owners prior to the installation of the probes as necessary.

## 2.3. Marking of Subsurface Utilities

Prior to initiation of intrusive activities, an underground facilities protective organization (UFPO) request will be made by the driller selected to install the soil vapor probes. A date and time will then be established for the various companies to mark the locations of subsurface public utilities. Utility as-built maps will be requested from the municipality and current owners, as appropriate, to assist in locating the on-site utilities. Approval of the boring locations will be requested from the municipality, the owner or his representative, as appropriate, prior to initiating boring activities.

## 2.4. Base Map Development

A base map will be obtained with a scale of 1 inch to 40 feet. It is assumed that a base map having his scale can be obtained from either aerial photographs or from NYSDEC. This will eliminate the need to survey OU-4, a substantial budgetary savings.

## 2.5. Survey

Sample locations will be surveyed using a Trimble® GPS, GeoExplorer series. The Trimble® is capable of locating samples to submeter accuracy through post-processing the data after it is collected in the field. Given the scope of work, greater accuracy in locating the probe locations is not required for this assignment.

## 2.6. Soil Gas Investigation

A soil gas investigation will be performed in study area shown on Figure 1 of the WP. Soil vapor probes will be installed to three depths in order to acquire the data. The probes will be installed using stainless steel drive rods equipped with detachable stainless steel drive points. Once the desired depth is reached, a six inch screen will be attached to the drive point together with the sample tubing necessary to carry the soil vapor to the ground surface. Tubing will be dedicated and made of either Teflon® or polyethylene. A sand pack will be used around the screen while granular bentonite will be used to pack the annular space above the sand pack to a point near or at the ground surface. The bentonite will be hydrated for at least 24 hours before the sample is withdrawn from the subsurface. In the event that the screen cannot be threaded onto the probe, the bottom of the screen will be sealed with bentonite. The screen will then be lowered to just above the drive point (anchor). The sand pack and bentonite will be applied in the manner discussed earlier.

Prior to sample collection, the soil gas probes will be purged in accordance with the New York State Department of Health (NYSDOH) guidance for the evaluation of soil vapor intrusion (February 2005). One to three implant volumes will be purged at a flow rate that does not exceed 0.2 liters/minute.

Soil gas samples will be collected at three depths below ground surface, one at a depth of a typical building foundation (8ft bgs), one at approximately 25 ft bgs, and one just above the water table (typically 60 ft bgs in the study area according to the work assignment). To account for changes in the depth of the water table with time, samples may be collected somewhat shallower than 60 ft. The samples will be collected in Summa-type canisters that are certified by the laboratory as "clean" (free of the contaminants of interest).

Tracer gas (either helium or sulfur hexafluoride) will be used in accordance with the NYSDOH guidance. At a minimum, ten soil vapor sampling locations will be evaluated with tracer gas. The tracer gas will be introduced in a chamber directly over the probe location prior to sample collection. A suitable detector will then be connected to the sample tubing and a measurement taken to evaluate the presence of the tracer gas. If the gas is not present, sample collection using the Summa-type canister will be initiated. If the gas is present, either the field

supervisor will determine whether the bentonite should be rehydrated or whether a new probe should be installed. The tracer gas will only be used on the shallower probes since it is unlikely that the gas could be detected at depths deeper than 8 ft bgs.

ChemTech Consulting Group, Inc., Englewood, N.J., will analyze the soil gas samples as well as the indoor air, subslab, and ambient air samples. ChemTech is a NY State listed minority owned business enterprise and is ELAP certified for air analyses using USEPA Method TO-15. A minimum reporting limit of 1 microgram/cubic meter will be used for each analyte reported with the exception of indoor and ambient air samples analyzed for trichloroethylene (TCE). The required detection limit for these latter samples will be 0.25 micrograms/cubic meter. In addition, the laboratory will be required to submit hard copy ASP Category B and electronic deliverables. Each 1.4 liter sample canister obtained from ChemTech will be batch certified as clean.

Once the soil vapor samples are collected, the tubing will be cut below the ground surface and the upper most bentonite removed. The area will then be filled with topsoil or, in the case of asphalt, cold patch. Concrete removed during the collection of subslab samples will be patched using a commercial, pre-mixed concrete. NYSDEC will be responsible for any liabilities associated with intrusive sampling on properties accessed as part of this work assignment.

An interim report summarizing the data collected above will be submitted to NYSDEC within four weeks of the completion of the above tasks. The report will include a site map identifying all sample locations, data collected, and a summary of field activities.

## 2.7. Indoor Air

Indoor air will be sampled at a total of approximately 20 structures located in the study area. It is assumed that one sample will be collected from the basement and another from the first floor of each structure. The protocol for the sampling will follow the *New York State Guidance for Evaluating Soil Vapor Intrusion*. Sample locations will be selected on the basis of the results of the soil gas investigation. The criteria for collection will be as follows:

- the presence of soil vapor contaminants in close proximity to the individual structure
- the presence of soil vapor contaminants in relationship to previous mapped contaminant plumes
- areal representativeness of the structures within the study area.

It is anticipated that only structures with basements will be sampled.

Prior to sampling, a product inventory of each structure will be performed to identify conditions that may effect interpretation of the

sample results. If necessary, the owner will be asked to remove chemicals that may influence the interpretation.

In addition to the product inventory, the following information will be obtained during the survey:

- the type of heating system
- floor plan sketches
- the presence of floor penetrations
- outdoor plot sketches
- photoionization detector readings

During the actual sampling, other information to be recorded will include:

- weather conditions
- ventilation conditions
- any pertinent observations that could influence the sample results such as recent chemical usage.

## 2.8. Subslab Sampling

Subslab sampling will be performed in accordance with the NYSDOH guidance. A drill will be used to penetrate the basement floor to install a temporary port from which to obtain the subslab sample. The probe will be constructed using polyethylene or Teflon® tubing of laboratory or food grade quality. Tubing will not extend further than 2 inches into the subslab material. Sand will be used to cover a small portion of the probe tip for sampling. Granular bentonite will be used to fill the annular space around the remainder of the tubing. A inert flexible stopper (such as that used in a laboratory) coated with hydrated bentonite, bentonite, beeswax, or other material will be used at the top of the probe to prevent ambient air from entering the subsurface and diluting the sample.

After the probe is constructed, approximately 1 liter of gas will be purged from the subsurface probe using a PID. The PID readings will be observed and the highest will be recorded on the field form. The PID will be disconnected and the end of the sample tubing will be connected directly and the end of the sample tubing will be connected directly to the canister intake valve. The sample will be collected in a 1.4 liter canister. The sample will be taken over a 24 hour period and analyzed by USEPA Method TO-15.

Reporting for indoor air and sublab sampling will include information pertaining to the installation, collection, and sampling of the properties. No conclusion shall be contained with the reports. A data base shall also be included in the report, compiled from data validated by a qualified data validator.

## 2.9. Ambient Air Sampling

Up to ten outdoor locations will be sampled for ambient air quality while structure samples are being collected. The protocol for this effort will also follow NYSDOH protocols.

Ambient samples will be collected using certified clean Summa-type canisters will flow regulators set to sample for a 24 hour period. A section of disposable Teflon® tubing will be extended from the canister to collect the sample from the breathing zone at four to six feet above the ground surface. The canister will be placed in a secure location between potential sources of air contamination (factories located in the industrial park or gas stations). The analysis for outdoor air samples will achieve detection limits of 1.0 microgram/cubic meter for each compound except for TCE using USEPA Method TO-15. The detection limit for TCE is 0.25 micrograms/cubic meter.

To document the conditions encountered during ambient air sampling, the following will be recorded in the field log book:

- outdoor plot sketches that include the location of sampling and its environs, particularly potential sources of air contamination that could influence the interpretation of the indoor air results
- weather conditions
- any other pertinent observations such as odors

## 2.10. Quality Assurance/Quality Control (QA/QC) Sampling

Duplicate samples will be taken during each sampling task for QA/QC purposes. QA/AC samples are discussed in the quality assurance/quality control plan.

## 2.11. Health and Safety

Health and safety issues associated with this project are addressed in the Health and Safety Plan (HASP) developed for this program. The HASP is provided as an appendix to this plan.

## 2.12. Site Investigation Report

Documents will be proved in accordance with the work assignment and section 4.2.7 of the work plan. The report will include:

- A summary of data collected as part of the field work
- A description of site conditions while work was underway
- A summary of the activities that took place during field work
- Recommendations for additional field work

Conclusions will not be included in the report.

# 3. Handling of Investigation-Derived Wastes

## 3.1. General

To the extent possible, investigation-derived wastes (IDW) will be minimized for this program. IDW will be managed in accordance with Section IV of Technical and Administrative Guidance Memorandum (TAGM) 4032 (NYSDEC, November 21, 1989).

It is anticipated that any IDW that is produced will consist of soil resulting from the installation of the direct push soil vapor probes. Soils generated in this manner will be placed in 55 gallon drums for disposal. If possible, the drums will be staged on property owned by Nassau County pending their removal. No analytical work is considered necessary since the soils will be generated from residential areas away from known hazardous waste sites.

## 3.2. General Refuse

General refuse will be placed in trash bags and disposed of in appropriate waste receptacles.

Appendix B

# Quality Assurance Project Plan

Quality Assurance Project Plan

# New Cassel Industrial Area Sites
# Operable Unit 4
# Site No. 1-30-043A-V
# Site Characterization
# Work Assignment #D00490-40

## Town of Hempstead, Nassau County, New York

New York State Department of Environmental Conservation

February 2006

O'BRIEN & GERE

# 1. Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) provided below presents the seven elements of site-specific information required by DER-10 *Technical Guidance for Site Investigation and Remediation* (DER-10 QAPP, NYSDEC 2002). A *Generic QAPP* prepared for Standby Contract #D004090 (Standby Contract QAPP, O'Brien & Gere 2005) is provided separately. The Standby Contract QAPP provides supplemental and more detailed laboratory information, including corrective action tables for laboratory analyses associated with investigation activities. The combination of the DER-10 QAPP and the Standby Contract QAPP address data quality assurance and management of those data associated with vapor intrusion investigation of Operable Unit (OU)-4, located south and south west of the New Cassel Industrial Park, New Cassel, NY.

1. **Project scope and goals**: The principal data quality objectives (DQOs) and project objectives of this investigation include the following:

- Provide data that are usable for the evaluation of the nature and extent of site-related VOCs in soil vapor, subslab vapor, indoor air and ambient air in the designated study area.
- Provide documentation that will permit validation of the laboratory data. Data validation results will be reported in a data usability summary report (DUSR).
- Develop sufficient information that recommendations can be made regarding the need for further work in the study area.

2. **Project organization**: Personnel assigned to the project are listed in Table 1.

3. **A site map** showing sample locations is provided as Figure 2 in the work plan.

4. **Sampling efforts, objectives, analyses, data uses, and analytical level** are listed in Table 2.

5. **A field sampling summary indicating quantities, methods, sample storage in the field and sample handling time requirements** is presented in Table 3 and in the FAP.

6. **Sampling procedures and equipment decontamination procedures** are provided in the Field Activities Plan (FAP).

7. **Environmental samples** will be submitted to Chemtech Corporation, Warwick, RI, for analyses.

8. **Analytical methods and reporting limits** are listed in Tables 4 and 5, respectively. Quality Control Requirements and Corrective Actions are shown in Table 6. NYSDEC Analytical Services Protocol (ASP) Exhibit E quality control requirements will be used to perform the sample analysis, including the non-contract laboratory program (CLP) analyses, utilizing the laboratory interpretation of the requirements as they apply to USEPA Methods.

9. **Provision of laboratory data in electronic format** is discussed in the Standby Contract QAPP (O'Brien & Gere 2005).

New York State Department of Environmental Conservation
New Cassel – Operable Unit #4
Vapor Intrusion Investigation

| **Table 1**. Project organization & responsibilities | | |
|---|---|---|
| *New York State Department of Environmental Conservation (NYSDEC)* | | |
| Project Manager | Joe Jones | • Overall responsibility for all phases of the remedial investigation/feasibility study (RI/FS). |
| *O'Brien & Gere Engineers, Inc. (Engineers)* | | |
| Project Officer | Douglas M. Crawford, P.E. | • Responsible for overall corporate management of the RI/FS.<br>• Provide for the allocation of staff and other resources required to complete the project within the specified schedule and budget.<br>• Verify that technical, financial, and scheduling objectives are achieved successfully.<br>• Sing final reports submitted to NYSDEC. |
| Project Manager | Jeffrey Banikowski, C.P.G. | • Responsible for implementation and completion of each task identified in the Field Activities Plan (FAP).<br>• Manage technical and administrative aspects of the project and function as the principle contact to the NYSDEC Project Manager.<br>• Define project objectives and schedule.<br>• Apply technical and corporate resources.<br>• Develop and meet ongoing project staffing requirements.<br>• Review work performed on each task to verify quality, responsiveness, and timeliness.<br>• Review overall task performance with respect to scope and authorizations.<br>• Approve reports prior to submission to NYSDEC.<br>• Represent the project team at meetings. |
| Quality Assurance (QA) Officer | Karen Storne | • Review project plans and revisions to verify that QA is maintained.<br>• Responsible for performance and system audits, if necessary.<br>• Report to the O'Brien & Gere Project Manager. |

| **Table 1.** Project organization & responsibilities | | |
|---|---|---|
| Field Coordinator | John Hunt | • Oversee field and related activities as described in the FAP.<br>• Responsible for leading, coordinating, and supervising day-to-day field activities of the sampling personnel.<br>• Coordinate with O'Brien & Gere Project Manager on technical issues.<br>• Coordinate with laboratory prior to collection and shipment of samples.<br>• Develop and implement field-related sampling plans and schedule.<br>• Supervise or act as the field sample custodian.<br>• Implement quality control (QC) of technical data including field measurements.<br>• Implement QC of project-specific chain of custudy documentation.<br>• Adhere to work schedules.<br>• Authorize and approve text and graphics required for field efforts.<br>• Coordinate and oversee technical efforts of subcontractors.<br>• Identify and resolve problems at the field team level in consultation with the O'Brien & Gere Project Manager.<br>• Implement and document corrective action procedures and provide communication between the sampling personnel and upper management. |
| **Sampling personnel** | To be determined | • Responsible for documentation of proper sample collection protocols, sample collection, field measurements, equipment decontamination, and chain of custody documentation.<br>• Report to O'Brien & Gere Field Coordinator. |
| Data management | To be determined | • Responsible for assisting with the development of data collection documentation procedures (*e.g.* chain of custody) to support data management needs.<br>• Responsible for data management activities including execution of electronic data deliverables (EDD) to develop a project database and verification of data QC.<br>• Coordinate with laboratory to resolve data quality issues, as necessary.<br>• Assist in the coordination of QA/QC efforts between Engineers and the laboratory. |
| *Nancy Potak* | | |
| Data Quality Reviewer | Nancy Potak | • Validate data.<br>• Prepare a Data Usability Summary Report (DUSR) describing overall data quality and usability for intended uses. |

New York State Department of Environmental Conservation
New Cassel – Operable Unit #4
Vapor Intrusion Investigation

| *Chemtech Corporation* | | |
|---|---|---|
| Project Supervisor | Amit Vaidya | The project supervisor is the point of contact between Engineers and O'Brien & Gere Laboratories. |
| Laboratory QA Coordinator(s) | Krupa Dubey | • Responsible for laboratory QA/QC activities associated with the project.<br>• Verify that analyses are conducted within the appropriate holding times.<br>• Verify that laboratory custody procedures are followed.<br>• Monitor daily precision and accuracy records.<br>• Maintain detailed copies of procedures.<br>• Reschedule analyses based upon unacceptable data accuracy or precision<br>• Identify and implement corrective actions necessary to maintain QA standards.<br>• Conduct initial validations and assessments of analytical results and report the findings directly to the O'Brien & Gere Laboratories Project Supervisor.<br>• Perform final QC of laboratory EDD prior to submittal to Engineers.<br>• Approve final laboratory reports prior to delivery to Engineers. |
| Laboratory Sample Custodian | Snehal Mehta | • Verify proper sample entry and sample handling procedures by laboratory personnel.<br>• Set up sampling coolers and containers.<br>• Receive and inspect incoming sample containers.<br>• Sign appropriate documentation.<br>• Verify accuracy of chain-of-custody forms.<br>• Notify Laboratory QC Coordinator of sample receipt and inspection.<br>• Assign each sample a unique identification number and enter each into the sample receiving log.<br>• Control and monitor access and storage of samples. |

**Table 2.** *Sampling efforts, objectives, analyses, data uses, and analytical level*

| *Sampling Effort* | *Objectives* | *Types of analysis* | *Data Uses* | *Analytical Level* |
|---|---|---|---|---|
| Soil Vapor Sampling | Characterize the nature and extent of site-related constituents in soil vapor | VOCs | Support vapor intrusion evaluation | Definitive |
| Residential Sub-Slab and Indoor Air Sampling | Characterize the nature and extent of site-related constituents in residential sub-slab and indoor air | VOCs | Support vapor intrusion evaluation | Definitive |

**Notes:**
VOCs indicates volatile organic compounds.
TOC indicates total organic carbon

**Table 3.** *Field sampling summary*

| Parameter (method) | Matrix | Sample containers | Preservation | Holding times | Number of environmental samples | QC sample frequency | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Field duplicate | Trip Blank | MS/MSD or Duplicate | Equipment Blank |
| VOCs (USEPA Method TO15) | Air | Canisters as prepared and certified according to USEPA Method TO-15. | NA | 14 days from collection | 210 | One per 20 samples per round or one per matrix if less than 20 samples (soil vapor, sub-slab vapor, indoor air, ambient air) | NA | NA | NA |

Note:
VOCs indicates volatile organic compounds
NA indicates not applicable

| **Table 4.** *Analytical methods* | | | |
|---|---|---|---|
| ***Sample type*** | ***Parameter*** | ***Analytical Method*** | ***Reference*** |
| Soil Vapor | VOCs | USEPA Method TO-15 | 1, 2 |
| Sub-Slab Vapor | VOCs | USEPA Method TO-15 | 1, 2 |
| Indoor Air | VOCs | USEPA Method TO-15 | 1, 2 |

**Notes:**

VOCs indicates volatile organic compounds.

References:

1- New York State Department of Conservation 2000. *Analytical Services Protocol (ASP)*, June 2000 Revision. Albany, NY.

2- United States Environmental Protection Agency (USEPA). 1999b. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition Compendium Method TO-15 Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/ Mass Spectrometry (GC/MS).* Cincinnati, Ohio

**Table 5.** ***Laboratory PQLs and MDLs for volatile organic compounds (USEPA Method TO-15) for air samples.***

| CHEMTECH Laboratory TO-15 Compound List | CAS | MDL (pppv) | PQL (ppbv) | MDL (ug/m3) | PQL (ug/m3) | IA and SS RL (ug/m3) | SV RL (ug/m3) |
|---|---|---|---|---|---|---|---|
| 1,1,1-Trichloroethane | 71-55-6 | 0.028 | 0.1 | 0.15 | 0.55 | 1.0 | 1.0 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 0.047 | 0.1 | 0.33 | 0.69 | 1.0 | 1.0 |
| 1,1,2-Trichloroethane | 79-00-5 | 0.043 | 0.1 | 0.24 | 0.55 | 1.0 | 1.0 |
| 1,1-Dichloroethane | 75-34-3 | 0.03 | 0.1 | 0.12 | 0.4 | 1.0 | 1.0 |
| 1,1-Dichloroethene | 75-35-4 | 0.034 | 0.1 | 0.133 | 0.4 | 1.0 | 1.0 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 0.051 | 0.1 | 0.38 | 0.74 | 1.0 | 1.0 |
| 1,2-Dichloropropane | 78-87-5 | 0.054 | 0.1 | 0.25 | 0.46 | 1.0 | 1.0 |
| 1,3-Dichloropropene | 542-75-6 | 0.047 | 0.1 | 0.22 | 0.45 | 1.0 | 1.0 |
| 1,4-Dichlorobenzene (p-) | 106-46-7 | 0.054 | 0.1 | 0.32 | 0.29 | 1.0 | 1.0 |
| Benzene | 71-43-2 | 0.031 | 0.1 | 0.1 | 0.32 | 1.0 | 1.0 |
| Bromomethane | 74-83-9 | 0.022 | 0.1 | 0.08 | 0.39 | 1.0 | 1.0 |
| Carbon tetrachloride | 56-23-5 | 0.061 | 0.1 | 0.39 | 0.63 | 1.0 | 1.0 |
| Chlorobenzene | 108-90-7 | 0.047 | 0.1 | 0.22 | 0.46 | 1.0 | 1.0 |
| Chloroethane | 75-00-3 | 0.024 | 0.1 | 0.06 | 0.26 | 1.0 | 1.0 |
| Chloroform | 67-66-3 | 0.022 | 0.1 | 0.11 | 0.49 | 1.0 | 1.0 |
| Chloromethane | 74-87-3 | 0.031 | 0.1 | 0.06 | 0.21 | 1.0 | 1.0 |
| Ethylbenzene | 100-41-4 | 0.034 | 0.1 | 0.33 | 0.43 | 1.0 | 1.0 |
| Ethylene dibromide (1,2-dibromoethane) | 106-93-4 | 0.041 | 0.1 | 0.031 | 0.77 | 1.0 | 1.0 |
| Hexachlorobutadiene | 87-68-3 | 0.066 | 0.1 | 0.071 | 1.07 | 1.0 | 1.0 |
| Methylene chloride | 75-09-2 | 0.047 | 0.1 | 0.16 | 0.35 | 1.0 | 1.0 |
| m-Xylene | 108-38-3 | 0.084 | 0.2 | 0.36 | 0.87 | 1.0 | 1.0 |
| o-Xylene | 95-47-6 | 0.05 | 0.1 | 0.22 | 0.43 | 1.0 | 1.0 |
| p-Xylene | 106-42-3 | 0.084 | 0.2 | 0.36 | 0.87 | 1.0 | 1.0 |
| Styrene | 100-42-5 | 0.04 | 0.1 | 0.17 | 0.43 | 1.0 | 1.0 |
| Tetrachloroethene | 127-18-4 | 0.038 | 0.1 | 0.259 | 0.68 | 1.0 | 1.0 |
| Toluene | 108-88-3 | 0.054 | 0.1 | 0.2 | 0.38 | 1.0 | 1.0 |
| Trichloroethene | 79-01-6 | 0.043 | 0.1 | 0.23 | 0.54 | 0.25 | 1.0 |
| Vinyl chloride | 75-01-4 | 0.031 | 0.1 | 0.08 | 0.26 | 1.0 | 1.0 |
| 1,3-Butadiene | 106-99-0 | 0.07 | 0.1 | 0.15 | 0.22 | 1.0 | 1.0 |
| Hexane | 110-54-3 | 0.024 | 0.1 | 0.08 | 0.29 | 1.0 | 1.0 |
| Methyl ethyl ketone (2-butanone) | 78-93-3 | 0.07 | 0.1 | 0.2 | 0.35 | 1.0 | 1.0 |
| Vinyl acetate | 108-05-4 | 0.025 | 0.1 | 0.09 | 0.35 | 1.0 | 1.0 |
| 1,2,4-Trimethylbenzene (Pseudocumene) | 95-63-6 | 0.048 | 0.1 | 0.24 | 0.49 | 1.0 | 1.0 |
| 1,2-Dichlorobenzene | 95-50-1 | 0.049 | 0.1 | 0.3 | 0.6 | 1.0 | 1.0 |
| 1,2-Dichloroethane | 107-06-2 | 0.065 | 0.1 | 0.26 | 0.4 | 1.0 | 1.0 |
| 1,3,5-Trimethylbenzene (Mesitylene) | 108-67-8 | 0.054 | 0.1 | 0.26 | 0.49 | 1.0 | 1.0 |
| 1,3-Dichlorobenzene | 541-73-1 | 0.065 | 0.1 | 0.39 | 0.6 | 1.0 | 1.0 |
| cis-1,2-Dichloroethene | 156-59-2 | 0.043 | 0.1 | 0.17 | 0.4 | 1.0 | 1.0 |
| Freon 11 (Trichlorofluoromethane) | 75-69-4 | 0.041 | 0.1 | 0.23 | 0.56 | 1.0 | 1.0 |
| Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane) | 76-13-1 | 0.024 | 0.1 | 0.18 | 0.77 | 1.0 | 1.0 |
| Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane) | 76-14-2 | 0.028 | 0.1 | 0.02 | 0.7 | 1.0 | 1.0 |
| Freon 12 (Dichlorodifluoromethane) | 75-71-8 | 0.031 | 0.1 | 0.15 | 0.49 | 1.0 | 1.0 |
| trans-1,3-Dichloropropene | 542-75-6 | 0.047 | 0.1 | 0.22 | 0.45 | 1.0 | 1.0 |
| 1,4-Dioxane | 123-91-1 | 0.054 | 0.1 | 0.19 | 0.36 | 1.0 | 1.0 |
| 2,2,4-Trimethyl pentane | 540-84-l | 0.026 | 0.1 | 0.12 | 0.47 | 1.0 | 1.0 |
| 2-Hexanone | 591-78-6 | 0.04 | 0.1 | 0.16 | 0.36 | 1.0 | 1.0 |
| Acetone | 67-64-1 | 0.126 | 0.1 | 0.3 | 0.24 | 1.0 | 1.0 |
| Bromodichloromethane | 75-27-4 | 0.035 | 0.1 | 0.23 | 0.67 | 1.0 | 1.0 |
| Bromoform | 75-25-2 | 0.035 | 0.1 | 0.36 | 1.03 | 1.0 | 1.0 |
| Carbon disulfide | 75-15-0 | 0.022 | 0.1 | 0.07 | 0.31 | 1.0 | 1.0 |
| Cyclohexane | 110-82-7 | 0.07 | 0.1 | 0.23 | 0.34 | 1.0 | 1.0 |
| Dibromochloromethane | 124-48-1 | 0.041 | 0.1 | 0.34 | 0.85 | 1.0 | 1.0 |
| Methyl isobutyl ketone (4-Methyl-2-pentanone) | 108-10-1 | 0.06 | 0.1 | 0.24 | 0.41 | 1.0 | 1.0 |
| Methyl tert-butyl ether | 1634-04-4 | 0.043 | 0.1 | 0.16 | 0.36 | 1.0 | 1.0 |
| trans-1,2-Dichloroethene | 156-60-5 | 0.038 | 0.1 | 0.15 | 0.4 | 1.0 | 1.0 |

PQL - Practical Quantitation Limit
MDL - Method Detection Limit
RL - Reporting Limit (NYSDEC/NYSDOH standard)
IA - Indoor Air Sample
SS - Sub-Slab Sample
SV - Soil Vapor Sample

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Sampling procedure | Per USEPA Method TO-15 | Per USEPA Method TO-15 | Per USEPA Method TO-15 |
| Canister Blank Test | Prior to sample collection. | Any canister that has not tested clean (compared to direct analysis of humidified zero air of less than 0.2 ppbv of targeted VOCs) will not be used. | As a "blank" check of the canister(s) and cleanup procedure, the final humid zero air fill of 100% of the canisters is analyzed until the cleanup system and canisters are proven reliable (less than 0.2 ppbv of any target VOCs). The check can then be reduced to a lower percentage of canisters. |
| Sampling System certification | Prior to sample collection | 1. Verify that the calibration system is clean (less than 0.2 ppbv of any target compounds) by sampling a humidified gas stream, *without* gas calibration standards, with a previously certified clean canister.<br>2. The assembled dynamic calibration system is certified clean if less than 0.2 ppbv of any targeted compounds is found.<br>3. Sample the dynamic calibration gas stream with the sampling system with nominal concentrations of 10 ppmv in nitrogen of selected VOCs.<br>4. A recovery of between 90% and 110% is expected for all targeted VOCs. | Certification is not achieved until recovery criterion is met. |
| Holding times | Samples must be extracted and analyzed within holding time. | VOCs: Although method indicates that most VOCs can be recovered from canisters near their original concentrations after storage times of up to thirty days, analyze within 14 days from collection for air. | 1. If holding times are exceeded for initial or any reanalyses required due to QC excursions, **notify QAO* immediately since resampling may be required.**<br>1. Document corrective action in the case narrative. |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| MS Tuning | Once every 12 hours prior to initial calibration and calibration verifications. | 1. BFB key ions and abundance criteria listed in the method must be met for all 9 ions and analyses must be performed within 12 hours of injection of the BFB.<br>2. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is conducted using a single scan prior to the elution of BFB.<br>2. Part of the BFB peak will not be background subtracted to meet tune criteria.<br>3. Documentation of all BFB analyses and evaluation must be included in the data packages. | 1. Tune the mass spectrometer.<br>2. Document corrective action in the case narrative - **samples cannot be analyzed until control limit criteria have been met.** |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Initial Calibration | Prior to sample analysis and when calibration verifications criteria are not met. Initial calibration will contain all target analytes in each standard. | 1. Five concentrations bracketing expected concentration range for all compounds of interest; one std must be near the PQL.<br>2. The calculated %RSD for the RRF for each compound in the calibration table must be less than 30%.<br>3. The RRT for each target compound at each calibration level must be withiin 0.06 RRT units of the mean RRT for the compound.<br>4. The area response of internal standards at each calibration level must be within 40% of the mean area response over the initial calibration range for each internal standard.<br>5. The retention time shift for each of the internal standards at each calibration level must be within 20 s of the mean retention time over the initial calibration range for each internal standard. | 1. Identify and correct problem.<br>2. If criteria are still not met, recalibrate.<br>3. Document corrective action in the case narrative - **samples cannot be analyzed until calibration control limit criteria are met. Contact QAO* to discuss problem target analytes before proceeding with analysis.** |
| Calibration Verification | Every 12 hours, following BFB. The calibration verification will contain all target analytes in each standard at a concentration that is representative of the midpoint of the initial calibration. | 1. The %D for each target compound in a daily calibration sequence must be within ±30 percent in order to proceed with the analysis of samples and blanks. | 1. Reanalyze.<br>2. If criteria are still not met, identify and correct problem, recalibrate.<br>3. Document corrective action in the case narrative - **samples cannot be analyzed until calibration control limit criteria are met.** |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Analysis Sequence | 1, Perform instrument performance check using bromofluorobenzene (BFB).<br>2. Initiate multi-point calibration or daily calibration checks.<br>3. Perform a laboratory method blank.<br>4. Complete this sequence for analysis of less than or equal to 20 field samples. | NA | NA |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Laboratory Method Blank Analysis | A laboratory method blank (LMB) is an unused, certified canister that has not left the laboratory. The blank canister is pressurized with humidified, ultra-pure zero air and carried through the same analytical procedure as a field sample. The injected aliquot of the blank must contain the same amount of internal standards that are added to each sample.<br>2. Method blanks are analyzed at least once in a 24-hour analytical sequence. All steps in the analytical procedure are performed on the blank using all reagents, standards, equipment, apparatus, glassware, and solvents that would be used for a sample analysis.<br>3. The laboratory method blank must be analyzed after the calibration standard(s) and before any samples are analyzed.<br>4. Whenever a high concentration sample is encountered (i.e., outside the calibration range), a blank analysis should be performed immediately after the sample is completed to check for carryover effects. | 1. The area response for each internal standard in the blank must be within ±40 percent of the mean area response of the IS in the most recent valid calibration.<br>2. The retention time for each of the internal standards must be within ±0.33 minutes between the blank and the most recent valid calibration.<br>3. The blank should not contain any target analyte at a concentration greater than its quantitation level (three times the MDL as defined) and should not contain additional compounds with elution characteristics and mass spectral features that would interfere with identification and measurement of a method analyte. | 1. Reanalyze blank.<br>2. If limits are still exceeded, clean instrument, recalibrate analytical system, and reanalyze all samples if detected for same compounds as in blank.<br>3. Document corrective action in the case narrative - **samples cannot be analyzed until blank criteria have been met.** |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Laboratory Control Sample Analysis | Each analytical batch.<br><br>Prepared from independent calibration standards.<br><br>Spike must contain all target analyte and should be at a concentration, which is in the lower 1/2 of the calibration curve. | Recovery within 70-130% recovery. | 1. If recovery failures are above control limits and these compounds are not detected in the associated samples, report results.<br>2. If recovery failures are below control limits, reanalyze LCS and examine results of other QC analyses.<br>3. If other QC criteria have not been met, stop analysis, **locate and correct problem, recalibrate instrument and reanalyze samples since last satisfactory LCS**.<br>4. Document corrective action in the case narrative. |
| Laboratory Control Sample Duplicate Analysis | Each analytical batch.<br><br>Prepared from independent calibration standards.<br><br>Spike must contain all target analyte and should be at a concentration, which is in the lower 1/2 of the calibration curve. | Precision within 25 RPD. | 1. If recovery failures are outside of control limits, reanalyze LCS and examine results of other QC analyses.<br>2. If other QC criteria have not been met, stop analysis, **locate and correct problem**.<br>3. Document corrective action in the case narrative. |
| Internal Standards | All samples and blanks (including MS/MSD) | 1- Retention times for any internal standard must be within 20 sec from the latest daily (24-hour) calibration standard (or mean retention time over the initial calibration range).<br>2- The area response for any internal standard must not change by more than ±40 percent between the sample and the most recent valid calibration. | 1. Reanalyze.<br>2. If still outside of the limits, report both analyses.<br>3. Document corrective action in the case narrative. |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Field Dup. Analysis | Collected 1 per matrix; every 20 samples of similar matrix | 50% RPD for waters and 100% RPD for soil.<br>For sample results that are less than or equal to five times the PQL, the criterion of plus or minus two times the PQL will be applied to evaluate field duplicates. | No corrective action required of the laboratory since the laboratory will not know the identity of the field duplicate samples. If these criteria are not met, sample results will be evaluated on a case-by-case basis. |
| Dilutions | 1. When target analyte concentration exceeds upper limit of calibration curve.<br>2. When matrix interference is demonstrated by the lab and documented in the case narrative (highly viscous samples or a large number of nontarget peaks on the chromatogram). The QAO* will be contacted.<br>3. A reagent blank will be analyzed if an analyte saturates the detector or if highly concentrated analytes are detected.<br>4. Laboratory will note in the data deliverables which analytical runs were reported. | Not applicable | Not applicable |
| Sample Batching | The laboratory will batch project samples together along with QC samples specified from the project. Non-project information will not be included in the data packages. | Not applicable | Not applicable |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Laboratory control limits | Generated with results for an analyte from a minimum of 20 sample analyses. The average of the sample results and the standard deviation are calculated. The internal warning limits are established at 2 times the standard deviation and the control limits are established at 3 times the standard deviation. The control limits are updated annually. | Not applicable | Not applicable |
| Deliverables | 1.NYSDEC ASP Category B deliverables must be provided to document each audit item for easy reference and inspection.<br>2.An example calculation will be provided for each analysis, for each type of matrix in the data package using samples from the project.<br>3.Any laboratory abbreviations or notations presented in the raw data or summary information will be explained or referenced in the case narrative.<br>4.Final spiking concentrations will be presented in summary form.<br>5.Standard tracing information will be provided.<br>6.Cooler temperatures will be provided in the data packages.<br>7.Run logs will be provided in the data packages. | Not applicable | Provide missing or additional deliverables for validation purposes. |

**Table 6.** *Volatile organic compounds using USEPA Method TO-15 Quality Control Requirements and Corrective Actions.**

| Audit | Frequency | Control Limits | Corrective Action |
|---|---|---|---|
| Method and QAPP requirements | The laboratory will perform the method as presented in this QAPP and will adhere to the QAPP requirements presented herein. Otherwise the laboratory will specifically note any procedures that differ from the method or the QAPP in the data package case narrative. | Not applicable | Not applicable |

**Notes:**
*Indicates that data validation will be performed in accordance with QA/QC criteria established in these tables and the analytical methods. Excursions from QA/QC criteria will be qualified based on guidance provided in this QAPP.
QAO* indicates that communications with the QAO will be documented and included in the data packages.
Source: O'Brien & Gere Engineers, Inc.

# Health and Safety Plan

Health and Safety Plan

# New Cassel
# Operable Unit 4
# Site No. 1-30-043A-V
# Vapor Intrusion Investigation
# Work Assignment #D00490-40

## Towns of Hempstead and North Hempstead, Nassau County, New York

New York State Department of
Environmental Conservation

February 2006

O'BRIEN & GERE

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# 1. Introduction

This Health and Safety Plan (HASP) has been developed to provide both general procedures and specific requirements to be followed by O'Brien & Gere Engineers, Inc. (O'Brien & Gere) personnel while performing a vapor intrusion investigation (VI) at operable unit #4 south of the New Cassel Industrial Park, Nassau County, New York.

This HASP describes the responsibilities, training requirements, protective equipment, and standard operating procedures to be used by O'Brien & Gere personnel to address potential health and safety hazards while investigating operable unit #4. This plan specifies procedures and equipment to be used by O'Brien & Gere personnel during work activities and emergency response to minimize exposures of O'Brien & Gere personnel to hazardous materials.

The health and safety of subcontractors to O'Brien & Gere will be set forth in HASPs provided by each subcontractor. Documentation of the subcontractor's HASP will be obtained prior to the start of the subcontractor's work.

## 1.1. Site Location and Description

The study area includes several residential areas adjacent to and hydraulically downgradient of the New Cassel Industrial Park in the Towns of Hempstead and North Hempstead. The study area is the densely populated residential area shown on Figure 1 of the work plan.

## 1.2. Implementation of Health and Safety Plan

The requirements and guidelines presented in this HASP are based on a review of available information and an evaluation of potential on-site hazards. This HASP incorporates by reference the applicable Occupational Safety and Health Administration (OSHA) requirements in 29 CFR Part 1910 and 29 CFR Part 1926. The protective equipment selection was made according to Subpart I of 29 CFR 1910. O'Brien & Gere personnel are required to read this HASP before beginning work on site. This HASP will be available for inspection and review by O'Brien & Gere employees while work activities are underway.

When conducting the site investigation activities described in the Work Plan, O'Brien & Gere personnel will comply with this HASP. This HASP is specifically intended for guiding the conduct of O'Brien & Gere activities defined in the Work Plan in the areas of the Site specified for these work activities. Although this HASP can be made available to interested persons for informational purposes, O'Brien & Gere does not assume responsibility for the interpretations or activities of any persons or entities other than employees of O'Brien & Gere.

The health and safety considerations of subcontractors to O'Brien & Gere will be set forth in HASPs provided by each subcontractor. Documentation of the subcontractor's HASP will be obtained prior to the start of the subcontractor's work.

## 1.3. Project Organization

All personnel involved in the investigation activities at the Site implicitly have a part in implementing the HASP. Among them, the Project Officer, the Project Manager, the Corporate Associate for Safety and Health, the SSHC, and the Site Supervisor have specifically designated responsibilities. Their names and telephone numbers are listed in Table 1-1. Other key O'Brien & Gere project personnel, the project's organization, and other primary contacts for the project are presented in the Work Plan.

Key project personnel and their responsibilities with regard to the sampling activities are discussed below.

**Project Officer**

James R. Heckathorne, P.E. is the Project Officer. The Project Officer is responsible for the overall administration and technical execution of the project. The Project Officer is further responsible for the acquisition and delegation of resources necessary for project completion and HASP implementation.

**Project Manager**

Jeffrey Banikowski, C.P.G. is the Project Manager. The Project Manager reports to the Project Officer and is directly responsible for the technical progress and financial control of the project.

**Corporate Associate for Safety and Health**

Mr. Jeff Parsons, C.I.H. is the Corporate Associate for Safety and Health. Mr. Parsons will be responsible for implementation of this HASP. Procedural changes and modifications to this HASP must be approved by Mr. Parsons.

**Site Safety and Health Coordinator**

The O'Brien & Gere Site Safety and Health Coordinator (SSHC) for this investigation will be designated as the field team leader. The SSHC reports to the O'Brien & Gere Project Manager, coordinates his activities with the O'Brien & Gere Corporate Associate for Safety and Health and establishes operating standards and coordinates overall project safety and health activities for the site. The SSHC reviews project plans and revisions to plans to determine that safety and health procedures are maintained throughout the investigation. The SSHC audits the effectiveness of the HASP on a continuing basis and suggests changes, if necessary, to the Project Manager.

Specifically, the SSHC is responsible for the conducting the following actions:

- Provide a complete copy of the HASP at the site before the start of activities;
- Familiarize workers with the HASP;
- Conduct on-site health and safety training and briefing sessions;
- Document the availability, use, and maintenance of personal protective and other safety or health equipment;
- Maintain safety awareness among O'Brien & Gere employees onsite and communicating safety and health matters to them;
- Review field activities for performance in a manner consistent with O'Brien & Gere policy and this HASP;
- Monitor health and safety conditions during field activities;
- Coordinate with emergency response personnel and medical support facilities;
- Notify the Corporate Associate for Safety and Health and the Project Manager of the need to initiate corrective actions in the event of an emergency, an accident, or identification of a potentially unsafe condition;

- Notify the Corporate Associate for Safety and Health and the Project Manager of an emergency, an accident, the presence of a potentially unsafe condition, a health or safety problem encountered, or an exception to this HASP;

- Recommend improvements in safety and health measures to the Corporate Associate for Safety and Health and the Project Manager; and,

- Conduct safety and health performance and system audits.

The SSHC has the authority to recommend that the Project Manager, after consultation with the Corporate Associate for Safety and Health, take the following actions:

- Suspend field activities or otherwise limit exposures if the health or safety of any O'Brien & Gere employee appears to be endangered;

- Notify O'Brien & Gere personnel to alter work practices that the SSHC deems to not protect them; and,

- Suspend an O'Brien & Gere employee from field activities for violating the requirements of this HASP.

**Site Supervisor**

The Site Supervisor, designated by the O'Brien & Gere Project Manager, will be responsible for the implementation of sampling programs. The site supervisor will be responsible for overall site coordination including field sampling collection and chain-of-custody. The Site Supervisor will report directly to the Project Manager or designee.

**Table 1-1** *Project personnel.*

| ***Name and Title*** | ***Telephone*** |
|---|---|
| James R. Heckathorne, P.E.<br>Project Officer<br>Syracuse, New York | (315) 437-6100 |
| Jeffrey E. Banikowski, C.P.G.<br>Project Manager<br>Syracuse, New York | (315) 437-6100 |
| Jeff Parsons<br>Corporate Associate for Safety and Health<br>Syracuse, New York | (315) 437-6100<br>(315) 391-0638 (cell) |
| To Be Determined<br>Site Safety & Health Coordinator<br>Syracuse, New York | (315) 437-6100 |
| **NYSDEC Key Personnel** | |
| Joe Jones<br>Project Manager<br>Albany, New York | (518) 402-9621 |

# 2. Hazard Analysis

General site chemical and environmental hazards are summarized in Section 2.1. Specific health and safety considerations for field tasks detailed in the Field Activities Plan (FAP), contained in Appendix A of the RI Work Plan, are presented in separate subsections as outlined below:

- soil vapor survey (Section 2.2)
- sub-slab survey (Section 2.3)
- indoor air survey and ambient air survey (Section 2.4)

Both the potential health and safety hazards and the hazard and contaminant control procedures for each task of the investigation are discussed in the sections below.

## 2.1. General Site Hazards

### 2.1.1. Chemical hazards

Chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to site constituents of potential concern (COPC's). Site COPC's are considered to mainly include volatile organic compounds (VOCs).

The potential for unprotected personnel for inhalation of constituents during intrusive site operations is unlikely. The potential for unprotected personnel for dermal contact with soils or water containing COPCs during drilling and sampling operations is also unlikely. Proper use of personnel protective equipment is intended to reduce potential exposure to site contaminants.

Materials Safety Data Sheets (MSDSs) for the following COPCs are provided in Exhibit 1:

- tetrachloroethene
- trichloroethene

### 2.1.2. Potential environmental and physical hazards

Prior to initiating activity, the site conditions will be discussed with all employees. Hazards will be identified and protective measures will be explained.

*Environmental hazards,* in addition to site contaminants, include site fauna and flora. Aggressive fauna, such as ticks, fleas, mosquitoes, bees, wasps, spiders and snakes may be present in the study area. Poison ivy and poison oak may also be present.

*Physical Hazards* involved with field activities are primarily associated with the environment of the study area. The work area presents hazards of slips, trips, and falls from scattered debris and irregular walking surfaces. Weather related hazard include wet, muddy, slick, walking surfaces and unstable soil, sunburn, lightning, rain, snow, ice, and heat and cold related illnesses. There exists a potential for incidents involving personnel struck by or struck against objects resulting in fractures, cuts, punctures, or abrasions. Walking and working surfaces during activities may involve slip, trip, and fall hazards.

Materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion and laceration hazards. A common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique, must be employed.

Working surfaces that are slippery can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect working surfaces and keep working surfaces clear of debris and moisture.

In addition, borings may be installed along the shoulders of public roadways. Appropriate traffic control measures will be implemented, which may include the use of cones, flagmen, and/or traffic control signs at the work area(s).

### 2.1.3. Hazard and contaminant control

For each field task, Level D personal protective equipment (PPE) is to be worn. Protective equipment will also include boots with good treads; personnel will be reminded to remain alert of the area where they are walking to decrease the chance of slipping. Eye protection will be worn to minimize splashing into eyes. The specific requirements for Level D PPE are presented in Section 4.

The primary hazards for contaminant exposure for each task are summarized on Table 2-1. If odors are encountered during field activities, air monitoring with a PID should be conducted to evaluate the concentrations that are present. Action levels for upgrading PPE are presented in Section 6.2. If measured levels indicate that PPE should be upgraded, the investigation will be discontinued and the NYSDEC project manager (NYSDEC PM) will be notified.

Field equipment will be inspected and in proper working condition. Mechanical assistance will be provided for large lifting tasks. Ground Fault Circuit Interrupter (GRCI) will be used on all electric power tools and extension cords in outdoor work locations. Electrical extension cords will be protected or guarded from damage (*i.e.*, cuts from other machinery) and be maintained in good condition.

## 2.2. Soil Vapor Implants

### 2.2.1. Potential health hazards and contaminants

The physical hazards of this operation are primarily associated with operation of the drill rig and traffic.

Hazards generally associated with direct-push operations include noise levels exceeding the OSHA PEL of 90 dBA that are both a hazard and a hindrance to communication, carbon monoxide from the direct-push rig, and overhead electrical and telephone wires which can be hazardous. Moving parts on the direct-push rig may catch clothing. Moving the direct-push rig over uneven terrain may cause the vehicle to roll over or get stuck in a rut or mud. High pressure hydraulic lines and air lines used on direct-push rigs are hazardous when they are in disrepair or incorrectly assembled.

Some borings may be installed along the shoulders of public roadways. Appropriate traffic control measures will be implemented, which may include the use of cones, flagmen, and/or traffic control signs at the work area(s).

### 2.2.2. Hazard and contaminant control

General PPE requirements presented in Section 2.1 apply to this task. Personnel must wear hard hats and ear muffs and/or earplugs when working near operating heavy machinery. Prior to approaching a drill rig, loose clothing will be secured and the boom position will be checked.

O'Brien & Gere personnel will remain upwind from the vehicle exhausts to the extent practicable unless required by sampling work. The breathing zone will be periodically monitored for volatile organic vapors using a PID during the monitoring well and soil boring installations. Subsequent monitoring and respirator wear will be in accordance with Chapter 6 of this HASP.

The drilling subcontractor will be required to inspect chains, lines, cables, and high-pressure lines daily for weak spots, frays, and other signs of wear. The drilling subcontractor will be required to make repairs as necessary. The drilling subcontractor will be required to verify the location of underground utilities with both the facility and the local

power and utility companies prior to drilling. Overhead and underground utilities will be considered "live" until verified otherwise.

In addition, field personnel should be aware of physical hazards associated with the installation of the soil gas samplers and use proper lifting techniques to minimize muscle strains.

Back strain can be prevented by employing proper lifting techniques. Heavy equipment, such as generators, will only be lifted with the legs, preferably using two or three personnel.

## 2.3. Sub-slab vapor sampling

### 2.3.1. Potential health hazards and contaminants

Hazards generally associated with the sub-slab vapor sampling include strains associated with handling equipment and drilling holes in a concrete slab, pinching of hands or fingers associated with handling the soil vapor equipment, and potential exposure to soil vapor contaminants during implant installation.

### 2.3.2. Hazard and contaminant control

General PPE requirements presented Section 2.1 apply to this task. In addition, field personnel should be aware of physical hazards associated with the installation of the sub-slab implants and use proper lifting techniques to minimize muscle strains.

## 2.4. Indoor air sampling

### 2.4.1. Potential health hazards and contaminants

Hazards generally associated with the indoor air sampling include strains associated with handling equipment, pinching of hands or fingers associated with handling the sampling equipment, and potential exposure to soil vapor while setting up equipment .

### 2.4.2. Hazard and contaminant control

General PPE requirements presented Section 2.1 apply to this task. In addition, field personnel should be aware of physical hazards associated with indoor air sampling and use proper lifting techniques to minimize muscle strains.

**Table 2-1.** *Personal protection requirements for the Investigation*

| Task | Description of primary health concerns | PPE Level | Monitoring | Action Level |
|---|---|---|---|---|
| Installation of soil borings | Inhalation due to volatilization or dust, absorption by skin contact. | Level D (Section 4) | Organic vapor monitoring (Section 6.2) | See section 6.3 of HASP. |
| Soil Vapor Sampling | Inhalation due to volatilization, absorption by skin contact. | Level D (Section 4) | Organic vapor monitoring (Section 6.2), if odors observed. | See section 6.3 of HASP |
| Indoor Air sampling | Inhalation due to volatilization, absorption by skin contact. | Level D (Section 4) | Organic vapor monitoring (Section 6.2), if odors observed. | See section 6.3 of HASP |

Notes:
PID = photoionization detector
HASP = Health and Safety Plan
Sections referred to in parentheses ( ) are found in the HASP.

# 3. Personnel Training

## 3.1. Site Workers

O'Brien & Gere employees performing the activities listed in the Work Plan must have completed a training course of at least 40 hours meeting the requirements of 29 CFR 1910.120(e) for safety and health at hazardous waste operations. If the course was completed more than 12 months before the commencement of work, completion of an approved 8 hour refresher course on health and safety at hazardous waste operations is required.

## 3.2. Emergency Response Personnel

O'Brien & Gere employees who respond to emergency situations involving health and safety hazards must be trained in how to respond to such emergencies in accordance with the provisions of 29 CFR 1910.120(l). Skills such as cardiopulmonary resuscitation (CPR), mouth-to-mouth rescue breathing, and basic first aid skills may be necessary. Personnel who respond to emergencies in the study area will be briefed on potential site hazards by the SSHC before being permitted to enter the buffer and exclusion zones.

## 3.3. Site-Specific Training

Site-specific training will be provided to each O'Brien & Gere employee and reviewed before implementing field assignments. O'Brien & Gere personnel will be briefed daily by the Site Supervisor or by the SSHC as to the potential hazards that may be encountered during that day. Topics will include:

- Availability of this HASP;
- General site hazards and specific hazards in the work areas;

- Selection, use, testing, and care of the body, eye, hand, foot and respiratory protective equipment being worn and the limitations of each;
- Emergency response procedures and requirements;
- Emergency notification procedures and evacuation routes to be followed; and,
- Procedures for obtaining emergency assistance and medical attention.

## 3.4. Training Certification

A record of employee training completion will be maintained by the SSHC for each O'Brien & Gere employee who is trained. This record will include the dates of the completion of worker training, supervisor training, refresher training, emergency response training, and study-area specific training for participating O'Brien & Gere employees.

# 4. Personnel Protection

The basic level of personal protective equipment (PPE) to be used during field activities associated with implementation of the study is OSHA Level D. If the SSHC determines that field measurements or observations indicate that a potential exposure is greater than the protection afforded by the equipment or procedures specified in this or other sections of this HASP, the work will be stopped. O'Brien & Gere personnel will be removed from the area and the NYSDEC Project Manager notified of the situation.

O'Brien & Gere respirator users have been trained, medically approved and fit tested to use respiratory protection. Respirators issued are approved for protection against dust and organic vapors by the National Institute for Occupational Safety and Health (NIOSH). Respirators are issued for the exclusive use of one worker and will be cleaned and disinfected after each use by the worker. Respirator users must check the fit of the respirator before each day's use to see that it seals properly. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges attached to the respirator. No facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory PPE. Cartridges and filters for air-purifying respirators in use will be changed at the end of each workday that an air-purifying respirator is worn, unless the SSHC determines that a change is not necessary. The user will inspect the integrity of air-purifying respirators daily and record the inspection per the O'Brien & Gere QAM. It should be noted that respirator usage for this project is not anticipated but is discussed as a matter of completeness.

## 4.1. Protective Equipment Description

The level of personal protective equipment is categorized as Level A, B, C, or D, based upon the degree of protection required. For each level, hard hats will be required if dangers related to overhead objects may be present. For drilling activities, hard hats will be worn at all times. For other tasks, hard hats will be worn, as necessary. The following is a brief summary of the two levels that may be used on this site.

**Level C** - The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air-purifying respirators are met. The following constitute Level C equipment:

- NIOSH approved full-face air purifying respirator with organic vapor/acid gases cartridges and P100 filters;

- Chemical-resistant clothing (polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed;
- Gloves, outer, nitrile, chemical-resistant;
- Gloves, inner, nitrile, chemical-resistant;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Boots, outer neoprene or Chemical resistant (latex or neoprene) boot covers;
- Hearing protection, if necessary
- Hard hat, if necessary; and,
- Face shield when not wearing a full-face respirator.

**Modified Level D** - A work uniform providing additional skin protection when respiratory protection is not necessary. The following constitute Modified Level D equipment:

- Chemical-resistant clothing (polyethylene coated overalls, chemical-splash suit, disposable chemical-resistant overalls) with ankles and cuffs taped closed;
- Gloves, outer, nitrile, chemical-resistant;
- Gloves, inner, nitrile, chemical-resistant;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Boots, outer neoprene or chemical resistant (latex or neoprene) boot covers;
- Hearing protection, if necessary
- Hard hat, if necessary;
- Escape mask (optional); and,
- Face shield when not wearing other eye protection.
- Respirator.

**Level D** - A work uniform affording minimal protection, used for nuisance contamination only. The following constitute Level D equipment:

- Coveralls or other appropriate work clothing;
- Shoes, with steel toe and shank meeting ANSI requirements;
- Optional chemical resistant boot covers;
- Safety glasses or chemical splash goggles;
- Gloves, nitrile if handling wet materials;
- Hearing protection, if necessary
- Hard hat, if necessary; and
- Escape mask (optional).

## 4.2. Protective Equipment Failure

If an individual experiences a failure or other alteration of PPE that may affect its protective ability, that person is to leave the work area immediately. The Project Manager or the SSHC must be notified and, after reviewing the situation, is to determine the effect of the failure on the continuation of on-going operations. If the Project Manager or the SSHC determine that the failure affects the safety of workers, the work site, or the surrounding environment, workers are to be evacuated until corrective actions have been taken. The SSHC will not allow re-entry until the equipment has been repaired or replaced and the cause of the failure has been identified.

# 5. Medical Monitoring

## 5.1. Medical Surveillance Program

O'Brien & Gere has implemented a medical monitoring program in accordance with 29 CFR 1910.120. The O'Brien & Gere program is designed to monitor and reduce health risks to employees potentially exposed to hazardous materials and to provide baseline medical data for each employee involved in work activities. It is also designed to determine the employee's ability to wear personal protective equipment such as chemical resistant clothing and respirators.

Medical examinations are administered on a post-employment and annual basis and as warranted by symptoms of exposure or specialized activities. The examining physician is required to make a report to O'Brien & Gere of any medical condition that would increase the employee's risk when wearing a respirator or other PPE. O'Brien & Gere maintains site personnel medical records as required by 29 CFR 1910.120 and by 29 CFR 1910.1020, as applicable.

O'Brien & Gere employees performing the activities listed in the Work Plan of this document have or will receive medical tests as regulated by 29 CFR 1910.120. Where medical requirements of 29 CFR 1910.120 overlap those of 29 CFR 1910.134, the more stringent of the two will be enforced.

## 5.2. Respirator Clearance

Employees who wear or may wear respiratory protection have been provided respirators as required by 29 CFR 1910.134. This standard requires that an individual's ability to wear respiratory protection be medically certified before performing designated duties.

# 6. Air Monitoring

## 6.1. General

Although highly unlikely, field activities associated with the investigation may cause potentially hazardous conditions, through the volatilization of hazardous substances. These substances may be in the form of vapors, dusts, or mists that can enter the body through ingestion, inhalation, adsorption and direct contact. Monitoring of these substances will be performed to ensure appropriate personal protective measures are employed during Site activities.

Action levels have been established for activity cessation, and determination of personal protection levels. Section 4 discusses the minimal personal protection required for investigation activities. Table 6-1 lists action levels, airborne concentrations, and associated personal protection levels. If PID measured levels continuously exceed 5 ppm total VOCs for 15 minutes, work will cease and the NYSDEC PM will be notified to evaluate potential responses to the conditions encountered.

## 6.2. Monitoring

### 6.2.1. Organic vapor and particulates

Field health and safety air sampling for the study area investigation will consist of organic vapor monitoring according to provisions of Section 2 and Table 2-1. The air will be monitored periodically with a portable PID equipped with a 10.2 electron volt detector to determine the presence and concentration of organic vapors before sampling, during intrusive field activities (direct-push soil boring). Particulates will be visually monitored

Personnel monitoring will be conducted in the breathing zone. Monitoring instruments will be checked for appropriate response, in accordance with the manufacturer's instructions.

## 6.3. Action Levels

Action levels presented in this section are intended primarily for the protection of workers implementing the investigation. The action levels are used to determine when activities should stop, to determine when site evacuation is necessary, and to determine when the NYSDEC PM should be notified to select an appropriate response to the conditions encountered.

### 6.3.1. Organic vapors and particulate

Organic vapors and/or particulates may be released during intrusive activities such as soil vapor implant installation. Air quality will be monitored, as necessary, according the protocols described in following sections.

The breathing zone and work zone will be monitored periodically for VOCs using a photoionization detector (PID) while airborne dust will be visually monitored. Should periodic
monitoring indicate sustained VOC levels exceeding 5 ppm above background or visible dust levels in the breathing zone at the work, then the monitoring will be increased to a continuous frequency. Actions, such as keeping the sampling upwind of motors and fuel areas will be implemented to reduce potential interference due to vapors that may be associated with motor operation. If conditions exceed the continuous monitoring air quality goals, work will be discontinued, the workers will leave the work area, and the NYSDEC PM will be notified.

**Table 6-1** *Vapor and particulate monitoring requirements in brief*

| Total VOC Concentration (ppm) | Method | Monitoring Zone | Monitoring Requirements | PPE |
|---|---|---|---|---|
| <5 for 15-minute average | PID | Work zone | Periodically in the work zone at minimum 15-minute intervals | Level D |
| >5 for 15-minute average | PID | Work zone | Continually in the work zone | Leave area and notify NYSDEC PM |

# 7. Site Control

## 7.1. Site Security

Site security will be monitored and controlled by the Site Supervisor, as necessary. Duties will include limiting access to the work area to authorized personnel, overseeing project equipment and materials, and overseeing work activities. The procedures specified below will be followed to control access to each work site to prevent persons who may be unaware of site conditions from exposure to hazards. Work area control procedures may be modified as required by site conditions.

## 7.2. Work Zone Control

The work zone is considered to be the area surrounding sampling activities. Generally, the area will be considered as centered on the work activities and 30 ft in diameter. The Site Supervisor will control access to the work zone, as necessary, with signage, flagging, or barriers.

## 7.3. Site Access Procedures

Access to the immediate work area during field activities will be limited to those personnel required to perform the work. Such personnel are anticipated to include, but will not necessarily be limited to, O'Brien & Gere employees or subcontractors and those representatives as designated by the NYSDEC or local agencies.

## 7.4. Site Communications

A cellular telephone will be used during activities to facilitate communications for emergency response and other purposes and to serve as the primary means of communication.

## 7.5. Confined Space Entry

No entry of permit-required confined space is expected while O'Brien & Gere personnel perform the tasks listed in the FAP. A confined space is defined as a space that has limited or restricted means for entry (for example tanks, vessels, silos, storage bins, hoppers, vaults, and pits) and is not designed for continuous employee occupancy.

# 8. Decontamination

## 8.1. Emergency Decontamination Procedures

Although no contact with chemicals that present a hazard is anticipated for the field program, this section has been included in the event of an emergency. The extent of emergency decontamination depends on the severity of the injury or illness and the nature of the contamination. Minimum decontamination will consist of detergent washing, rinsing and removal of contaminated outer clothing and equipment. If time does not permit the completion of all of these actions, it is acceptable to remove the contaminated clothing without washing it. If the situation is such that the contaminated clothing cannot be removed, the person should be given required first aid treatment, and then wrapped in plastic or a blanket prior to transport to medical care. If heat stress is a factor in the victim's illness/injury, outer clothing will be removed from the victim immediately.

## 8.2. Decontamination Supplies

The following supplies will be available on site for the decontamination of personnel and equipment:

- Plastic drop cloths;
- Plastic bags or DOT-approved fiberboard drums to collect non-reusable protective clothing;
- Plastic wash tubs;
- Soft bristled long-handle brushes;
- DOT-approved drums or appropriate other containers, to collect wash and rinse water;
- Hand spray units for decontamination;
- Soap, water, alcohol wipes, and towels to wash hands, faces, and respirators; and,
- Washable tables and benches or chairs, if necessary.

## 8.3. Collection and Disposition of Contaminated Materials

Cuttings, if generated, and field decontamination wastes are to be collected, bagged or drummed, and disposed of in accordance with the procedures in the FAP. Investigation derived waste will be managed as described in the FAP.

## 8.4. Refuse Disposal

General refuse will be contained in appropriate areas or facilities. Trash from the project will be properly disposed.

# 9. Emergency Response

## 9.1. Notification of Site Emergencies

In an emergency, personnel will signal distress either by yelling or with three blasts from a horn (vehicle horn, air horn and so forth). The SSHC, Site Supervisor, or the Project Manager will immediately be notified of the nature and extent of the emergency.

Table 9-2, located on the following page, contains emergency telephone numbers. This table will be kept with the portable telephone and updated as needed by the SSHC. The portable telephone will be used to notify off-site personnel of emergencies. The operating condition of this telephone will be determined daily before initiation of activities.

Directions to Nassau University Medical Center (NUMC) Hospital from Old Country Road near the Wantaugh Parkway North, which are main roads within the area of investigation, are provided in the table below:

***Table 9-1.*** *Directions to NUMD Hospital*

| ***Directions*** | ***Approx. Distance*** |
|---|---|
| Start out going south from Carman Ave Ext. | 0.2 mi |
| Continue on Carman Ave | 1.6 mi |
| Turn left at Intern Dr | 0.2 mi |
| Bear right at Perimeter E | 0.1 mi |
| Turn right at 3rd St E | 0.1 mi |
| End at NUMC Hospital (516) 572-0123<br>2201 Hempstead Turnpike East Meadow, NY | |
| Total mileage (approximate) | 2.3 mi |

The route to the hospital is provided on Figure 1. Should someone be transported to a hospital or doctor, a copy of this HASP should accompany them.

**Table 9-2.** *Emergency response contact list – Carriage Cleaners Site.*

| *Agency* | *Contact/Function* | *Phone Number* |
|---|---|---|
| Police Dept. | Report Incidents | 911 |
| NYS Police Dept. | Report Incidents | 911 |
| Nassau County Sheriff's Depart. | Report Incidents | 911 |
| City of Rochester Fire Dept. | Report Fire | 911 |
| NUMC Hospital<br>2201 Hempstead Turnpike<br>East Meadow, NY | Main Information | (516) 572-0123 |
| USEPA Emergency Response Team | | 212-340-6656 |
| CHEMTREC | Chemical Emergencies | 800-424-9300 |
| NYSDEC<br>Albany, NY | Emergency | 800-342-9296 |
| Emergency NYSDEC Project Contact | Joe Jones | (518) 402-9621 |
| Oil Spill | | 800-457-7362 |
| Poison Control Center | | 800-336-6997 |
| Chemical Emergency Advice | | 800-424-9300 |
| National Spill Response Center | | 800-424-8802 |

## 9.2. Responsibilities

The SSHC is responsible for responding to, or coordinating the response of off-site personnel to, emergencies. In the event of an emergency, the SSHC will direct notification and response, and will assist the Site Supervisor in arranging follow-up actions. Upon notification of an exposure incident, the SSHC will call the hospital, fire, and police emergency response personnel for recommended medical diagnosis, treatment if necessary, and transportation to the hospital.

Before the start of investigation activities at the study area, the SSHC will:

1. Confirm that the following safety equipment is available: eyewash station, first aid supplies, and a fire extinguisher

2. Have a working knowledge of the O'Brien & Gere safety equipment.

3. Confirm the most direct route to NUMC (Table 9-1) is prominently posted with the emergency telephone numbers (Table 9-2).

4. Confirm that employees who will respond to emergencies have been appropriately trained.

Before work may resume following an emergency, used emergency equipment must be recharged, refilled, or replaced and government agencies must be notified as required.

The Project Manager, assisted by the SSHC and the Site Supervisor, must investigate the incident as soon as possible. The Project Manager will determine whether and to what extent exposure actually occurred, the cause of exposure, and the means to prevent similar incidents. The resulting report must be signed and dated by the Project Manager, the SSHC, and the Site Supervisor.

## 9.3. Accidents and Injuries

In the event of an accident or injury, workers will immediately implement emergency isolation measures to assist those who have been injured or exposed and to protect others from hazards. Upon notification of an exposure incident, the SSHC will contact emergency response personnel who can provide medical diagnosis and treatment. If necessary, immediate medical care will be provided by personnel trained in first aid procedures. Other on-site medical or first aid response to an injury or illness will be provided only by personnel competent in such matters. In addition, the O'Brien & Gere Corporate Associate for Safety and Health will be notified within 24-hours of an accident involving O'Brien & Gere personnel and/or its subcontractors.

## 9.4. Safe Refuge

Before commencing site activities the SSHC will identify the location that will serve as the place of refuge for O'Brien & Gere workers in case of an emergency evacuation. During an emergency evacuation, personnel should evacuate the work area both for their own safety and to prevent hampering rescue efforts. Following an evacuation, the SSHC will account for study area personnel.

## 9.5. Fire Fighting Procedures

A fire extinguisher meeting the requirements of 29 CFR Part 1910 Subpart L, as a minimum, will be available during on-site activities. This is intended to control small fires. When a fire cannot be controlled with the extinguisher, the area will be evacuated, and the fire department will be contacted immediately. The SSHC or the Site Supervisor will determine when to contact the fire department.

## 9.6. Emergency Equipment

The following equipment, selected based on potential site hazards, will be maintained in the support zone for safety and emergency response purposes:

- Fire extinguisher;
- First aid kit; and,
- Eye wash bottles.

## 9.7. Emergency Site Communications

Hand and verbal signals will be used at the site. Portable telephones will be available during site activities for emergency response communications.

## 9.8. Security and Control

Work zone security and control during emergencies, accidents, and incidents will be monitored by the SSHC or the Site Supervisor. The duties of the SSHC or the Site Supervisor include limiting access to the work zones to authorized personnel and overseeing emergency response activities.

# 10. Special Precautions and Procedures

The activities listed in the Work Plan may expose personnel to both chemical and physical hazards. The hazards associated with specific site activities are discussed in Section 2. The potential for exposure to hazardous situations will be significantly reduced through the use of air monitoring, PPE, hazard awareness training, and administrative and engineering controls. Other general hazards that may be present on a hazardous waste work site are discussed below.

## 10.1. Heat Stress

The timing and location of this project may be such that heat stress could pose a threat to the health and safety of study area personnel. The SSHC will implement work and rest regimens so that O'Brien & Gere Engineers personnel do not suffer adverse effects from heat. These regimens will be developed by the SSHC following the guidelines in the 1997 edition of the ACGIH *Threshold Limit Values for Physical Agents in the Work Environment*. Special clothing and an appropriate diet and fluid intake will be recommended to O'Brien & Gere Engineers personnel involved in the activities specified in Section 2 to further reduce this hazard. In addition, ice and fluids will be provided as appropriate in the support zone.

## 10.2. Cold Injury

The project may require work during seasonal periods when cold injury could pose a threat to the health and safety of study area personnel. Factors that influence the development of a cold related injury include ambient temperatures, wind velocity and wet clothing and skin. The SSHC will implement work and rest regimens so that O'Brien & Gere Engineers personnel do not suffer adverse effects from cold. These regimens will be developed by the SSHC following the guidelines in the 1997 edition of the ACGIH *Threshold Limit Values for Physical Agents in the Work Environment*. Special clothing and an appropriate diet and fluid intake will be recommended to O'Brien & Gere Engineers personnel involved in the activities specified in Section 2 to further reduce this hazard. In addition, ice and fluids will be provided as appropriate in the support zone.

## 10.3. Heavy Machinery/Equipment

O'Brien & Gere employees performing study area activities may use or work near operating heavy equipment and machinery. Respiratory protection and protective eyewear may be worn during portions of work activities. Since this protective equipment reduces peripheral vision of the wearer, O'Brien & Gere Engineers personnel should exercise extreme caution in the vicinity of operating equipment and machinery to avoid physical injury to themselves or others.

## 10.4. Additional Safety Practices

The following are important safety precautions that will be enforced during the completion of the activities listed in Section 2:

1. Contact with potentially contaminated surfaces should be avoided whenever possible. Workers should minimize walking through puddles, mud, or other discolored surfaces; kneeling on ground; and leaning, sitting, or placing equipment on drums, containers, vehicles, or the ground.

2. Medicine and alcohol can mask the effects of exposure to certain compounds. Consumption of prescribed drugs must be at the direction of a physician.

3. O'Brien & Gere Engineers personnel and equipment in the work areas will be minimized consistent with effective site operations.

4. Unsafe or inoperable equipment left unattended will be identified by a "DANGER, DO NOT OPERATE" tag.

5. Activities in the exclusion zone will be conducted using the "Buddy System." The Buddy is another worker fully dressed in the appropriate personal protective equipment who can perform the following activities:

   - Provide partner with assistance
   - Observe partner for sign of chemical or heat exposure
   - Periodically check the integrity of partner's PPE
   - Notify others if emergency help is needed.

6. The HASP will be reviewed frequently for its applicability to the current and upcoming operations and activities.

## 10.5. Daily Log Contents

The Project Manager and the SSHC will establish a system appropriate to the site investigation areas that will record, at a minimum, the following information:

1. The O'Brien & Gere Engineers personnel and other personnel conducting the study area activities, their arrival and departure times, and their destination at the investigation areas

2. Incidents and unusual activities that occur on the site such as, but not limited to, accidents, breaches of security, injuries, equipment failures and weather related problems

3. Changes to the Work Plan and the HASP

4. Daily Information such as:

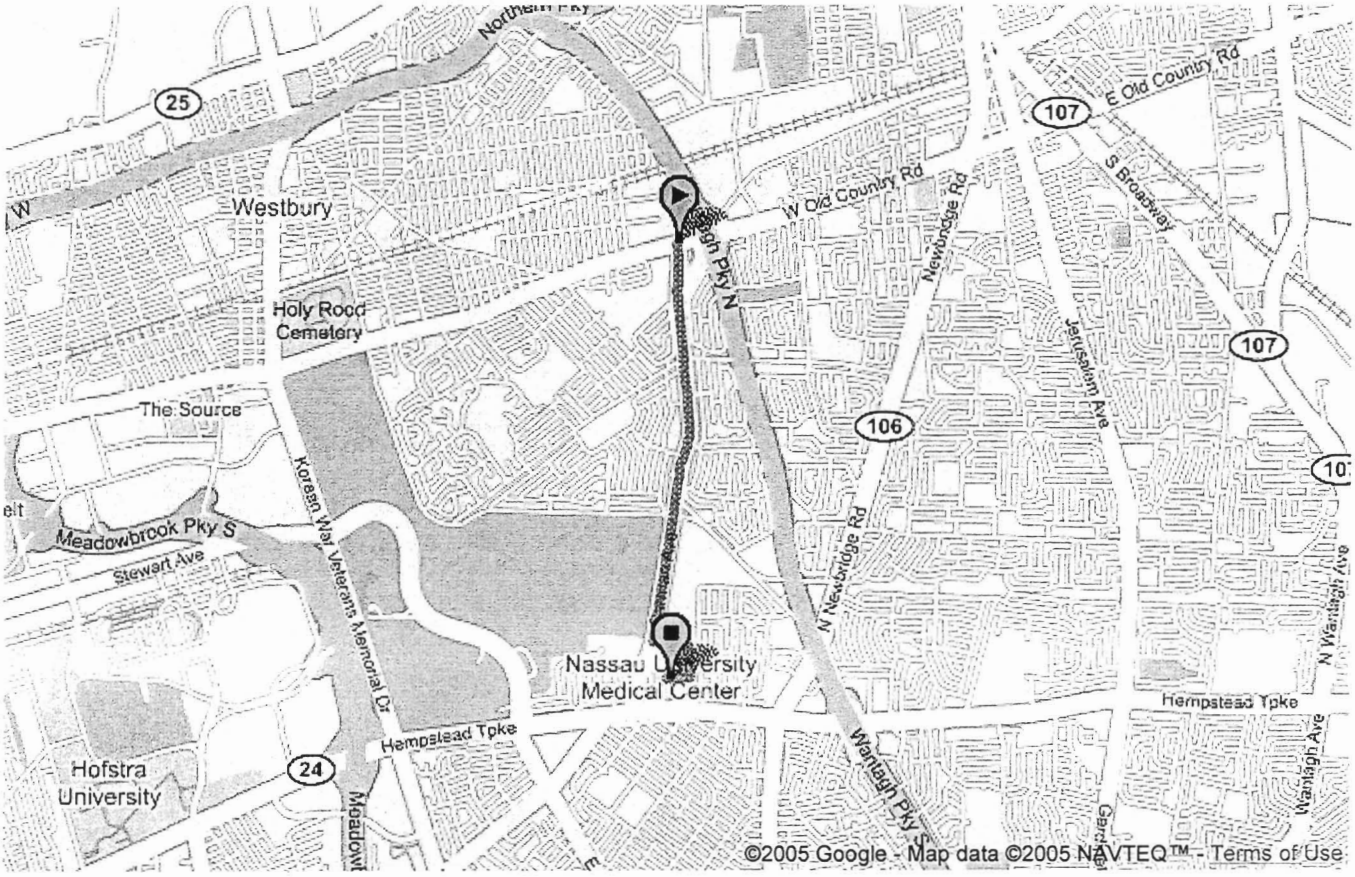
    - Work accomplished and the current site status
    - Air monitoring results

Figure 1

# New Cassel - Operable Unit #4
# Nassau University Medical Center

Google Local

Start address: **40.755970, -73.553180**
**+40° 45' 21.49", -73° 33' 11.45"**
End address: **40.726670, -73.553610**
**+40° 43' 36.01", -73° 33' 13.00"**
Distance: **2.3 mi (about 5 mins)**




| | |
|---|---|
| 1. | Head **south** from **Carman Ave Ext** - go **0.2 mi** |
| 2. | Continue on **Carman Ave** - go **1.6 mi** |
| 3. | Turn **left** at **Intern Dr** - go **0.2 mi** |
| 4. | Bear **right** at **Perimeter E** - go **0.1 mi** |
| 5. | Turn **right** at **3rd St E** - go **0.1 mi** |

These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.



NUMC
2201 HEMPSTEAD TURNPIKE
EAST MEADOW, NY 11554
(516) 572-0123

Exhibit 1

# Material Safety Data Sheets

MSDS Number: **T0767** * * * * * *Effective Date:* ***05/08/03*** * * * * * *Supercedes:* ***08/02/00***

**MSDS** Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

# TETRACHLOROETHYLENE

## 1. Product Identification

**Synonyms:** ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride
**CAS No.:** 127-18-4
**Molecular Weight:** 165.83
**Chemical Formula:** Cl2C:CCl2
**Product Codes:**
J.T. Baker: 9218, 9360, 9453, 9465, 9469
Mallinckrodt: 1933, 8058

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Tetrachloroethylene | 127-18-4 | 99 - 100% | Yes |

## 3. Hazards Identification

**Emergency Overview**

---

**WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.**

**J.T. Baker SAF-T-DATA(tm)** Ratings (Provided here for your convenience)

---

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

---

**Potential Health Effects**

---

**Inhalation:**
Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.

**Ingestion:**
Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhea, headache, and dizziness.

**Skin Contact:**
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.

**Eye Contact:**
Causes irritation, redness, and pain.

**Chronic Exposure:**
May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.

**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.

---

# 4. First Aid Measures

**Inhalation:**
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:**
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Skin Contact:**
Wash skin with soap or mild detergent and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
**Eye Contact:**
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

**Note to Physician:**
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

## . Fire Fighting Measures

**Fire:**
Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapor generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapors are heavier than air and collect in low-lying areas.
**Explosion:**
Not considered to be an explosion hazard. Containers may explode when involved in a fire.
**Fire Extinguishing Media:**
Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire exposed containers cool.
**Special Information:**
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

## 6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

## . Handling and Storage

Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in

workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (ceiling),
300 ppm/5min/3-hour (max)

-ACGIH Threshold Limit Value (TLV):
25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen
**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.
**Skin Protection:**
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
**Eye Protection:**
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

## 9. Physical and Chemical Properties

**Appearance:**
Clear, colorless liquid.
**Odor:**
Ethereal odor.
**Solubility:**
0.015 g in 100 g of water.
**Specific Gravity:**
1.62 @ 20C/4C
**pH:**
No information found.
**% Volatiles by volume @ 21C (70F):**
100
**Boiling Point:**
121C (250F)
**Melting Point:**
-19C (-2F)

**Vapor Density (Air=1):**
5.7
**Vapor Pressure (mm Hg):**
18 @ 25C (77F)
**Evaporation Rate (BuAc=1):**
0.33 (trichloroethylene = 1)

## 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.
**Hazardous Decomposition Products:**
Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.
**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
Strong acids, strong oxidizers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminum, iron and zinc.
**Conditions to Avoid:**
Moisture, light, heat and incompatibles.

## 11. Toxicological Information

Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 34.2 g/m3/8H; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

| Ingredient | ---NTP Carcinogen--- Known | Anticipated | IARC Category |
|---|---|---|---|
| Tetrachloroethylene (127-18-4) | No | Yes | 2A |

## 12. Ecological Information

**Environmental Fate:**
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with

photochemically produced hydroxyl radicals.
**Environmental Toxicity:**
The LC50/96-hour values for fish are between 1 and 10 mg/l. The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.

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## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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## 14. Transport Information

**Domestic (Land, D.O.T.)**
---
**Proper Shipping Name:** TETRACHLOROETHYLENE
**Hazard Class:** 6.1
**UN/NA:** UN1897
Packing Group: III
**Information reported for product/size:** 20L

**International (Water, I.M.O.)**
---
**Proper Shipping Name:** TETRACHLOROETHYLENE
**Hazard Class:** 6.1
**UN/NA:** UN1897
Packing Group: III
**Information reported for product/size:** 20L

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## 15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Tetrachloroethylene (127-18-4) | Yes | Yes | Yes | Yes |

--------\Chemical Inventory Status - Part 2\---------------------------------

| Ingredient | Korea | --Canada-- DSL | NDSL | Phil. |
|---|---|---|---|---|
| Tetrachloroethylene (127-18-4) | Yes | Yes | No | Yes |

--------\Federal, State & International Regulations - Part 1\----------------

| Ingredient | -SARA 302- RQ | TPQ | ------SARA 313------ List | Chemical Catg. |
|---|---|---|---|---|
| Tetrachloroethylene (127-18-4) | No | No | Yes | No |

--------\Federal, State & International Regulations - Part 2\----------

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|
| Tetrachloroethylene (127-18-4) | 100 | U210 | No |

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
eactivity: No (Pure / Liquid)

**WARNING:**
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

**Australian Hazchem Code:** 2[Z]
**Poison Schedule:** None allocated.
**WHMIS:**
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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# 16. Other Information

**NFPA Ratings:** Health: **2** Flammability: **0** Reactivity: **0**
**Label Hazard Warning:**
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
**Label Precautions:**
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
**Label First Aid:**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
**Product Use:**
Laboratory Reagent.
**Revision Information:**
No Changes.

**Disclaimer:**
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**********

**Prepared by:** Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **T4940** * * * * * *Effective Date:* ***05/08/03*** * * * * * *Supercedes:* ***09/14/00***

**MSDS** **Material Safety Data Sheet**

*From:* **Mallinckrodt Baker, Inc.**
**222 Red School Lane**
**Phillipsburg, NJ 08865**

Mallinckrodt CHEMICALS J.T.Baker

**24 Hour Emergency Telephone: 908-859-2151**
**CHEMTREC: 1-800-424-9300**

**National Response in Canada**
**CANUTEC: 613-996-6666**

**Outside U.S. and Canada**
**Chemtrec: 703-527-3887**

**NOTE:** CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

# TRICHLOROETHYLENE

## 1. Product Identification

**Synonyms:** Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride
**CAS No.:** 79-01-6
**Molecular Weight:** 131.39
**Chemical Formula:** C2HCl3
**Product Codes:**
J.T. Baker: 5376, 9454, 9458, 9464, 9473, 9474
Mallinckrodt: 8598, 8600, 8633

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Trichloroethylene | 79-01-6 | 100% | Yes |

## 3. Hazards Identification

**Emergency Overview**

**WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.**

**J.T. Baker SAF-T-DATA(tm)** Ratings (Provided here for your convenience)

---

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

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**Potential Health Effects**

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**Inhalation:**
Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.

**Ingestion:**
Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.

**Skin Contact:**
Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.

**Eye Contact:**
Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.

**Chronic Exposure:**
Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.

**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

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# 4. First Aid Measures

**Inhalation:**
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:**
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
**Skin Contact:**
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
**Eye Contact:**
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

**Note to Physician:**
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

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## 5. Fire Fighting Measures

**Fire:**
Autoignition temperature: 420C (788F)
Flammable limits in air % by volume:
lel: 8; uel: 12.5
**Explosion:**
A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.
**Fire Extinguishing Media:**
Use water spray to keep fire exposed containers cool. If substance does ignite, use CO2, dry chemical or foam.
**Special Information:**
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

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## 6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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## 7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

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## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
Trichloroethylene:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (Ceiling),
300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) 100 ppm (STEL);
listed as A5, not suspected as a human carcinogen.

**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

**Skin Protection:**
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.

**Eye Protection:**
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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## 9. Physical and Chemical Properties

**Appearance:**
Clear, colorless liquid.

**Odor:**
Chloroform-like odor.

**Solubility:**

Practically insoluble in water. Readily miscible in organic solvents.
**Specific Gravity:**
1.47 @ 20C/4C
**pH:**
No information found.
**% Volatiles by volume @ 21C (70F):**
100
**Boiling Point:**
87C (189F)
**Melting Point:**
-73C (-99F)
**Vapor Density (Air=1):**
4.5
**Vapor Pressure (mm Hg):**
57.8 @ 20C (68F)
**Evaporation Rate (BuAc=1):**
No information found.

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## 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.
**Hazardous Decomposition Products:**
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.
**Conditions to Avoid:**
Heat, flame, ignition sources, light, moisture, incompatibles

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## 11. Toxicological Information

**Toxicological Data:**
Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.
**Reproductive Toxicity:**
This material has been linked to mutagenic effects in humans.

--------\Cancer Lists\----------

| Ingredient | ---NTP Carcinogen--- Known | Anticipated | IARC Category |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Trichloroethylene (79-01-6) | No | Yes | 2A |

## 12. Ecological Information

**Environmental Fate:**
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
**Environmental Toxicity:**
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

## 14. Transport Information

**Domestic (Land, D.O.T.)**
---
**Proper Shipping Name:** TRICHLOROETHYLENE
**Hazard Class:** 6.1
**UN/NA:** UN1710
Packing Group: III
**Information reported for product/size:** 4L

**International (Water, I.M.O.)**
---
**Proper Shipping Name:** TRICHLOROETHYLENE
**Hazard Class:** 6.1
**UN/NA:** UN1710
Packing Group: III
**Information reported for product/size:** 4L

# 15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Trichloroethylene (79-01-6) | Yes | Yes | Yes | Yes |

--------\Chemical Inventory Status - Part 2\----------

| Ingredient | Korea | --Canada-- DSL | NDSL | Phil. |
|---|---|---|---|---|
| Trichloroethylene (79-01-6) | Yes | Yes | No | Yes |

--------\Federal, State & International Regulations - Part 1\----------

| Ingredient | -SARA 302- RQ | TPQ | ------SARA 313------ List | Chemical Catg. |
|---|---|---|---|---|
| Trichloroethylene (79-01-6) | No | No | Yes | No |

--------\Federal, State & International Regulations - Part 2\----------

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|
| Trichloroethylene (79-01-6) | 100 | U228 | No |

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

**WARNING:**
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

**Australian Hazchem Code:** None allocated.
**Poison Schedule:** S6
**WHMIS:**
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

# 16. Other Information

**NFPA Ratings:** Health: **2** Flammability: **1** Reactivity: **0**
**Label Hazard Warning:**
WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
**Label Precautions:**
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.

Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.

**Label First Aid:**

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

No Changes.

**Disclaimer:**

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**Prepared by:** Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)