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ENVIRONMENTAL

February 11, 2025

Mr. Joseph Jones
Project Manager
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 11233
Joseph.jones@dec.ny.gov

**RE: Soil Vapor Intrusion Investigation Work Plan
125 State Street, Westbury, New York**

Dear Mr. Jones,

Please find the attached Soil Vapor Intrusion Investigation Work Plan for the above referenced property.

If you have any questions or need anything else, please do not hesitate to contact me.

Very truly yours,

Castleton Environmental Geologic Services DPC

Frank P. Castellano, PG
Principal

Daren Murphy
Project Manager



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ENVIRONMENTAL

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Soil Vapor Intrusion Investigation Work Plan

**125 State Street
Westbury, New York
NYSDEC Site No. 130043C**

FEBRUARY 2025

Prepared for:

1st State LLC
125 State Street
Westbury, NY 11590
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**SOIL VAPOR INTRUSION INVESTIGATION WORK PLAN
125 STATE STREET, WESTBURY, NEW YORK
NYSDEC SITE NO. 130043C
CASTLETON PROJECT NUMBER: TOMC2501
FEBRUARY 2025**

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1.0 INTRODUCTION

Castleton Environmental Geologic Services, DPC (Castleton) has prepared this Soil Vapor Intrusion (SVI) Investigation Work Plan for the property located at 125 State Street, Westbury, New York (the site). This work is being performed on behalf of 1st State LLC (the Property Owner) based on the findings and recommendations cited in the SVI Investigation Report by Castleton, dated July 2024. This Work Plan is accompanied with a Health and Safety Plan (HASP), dated February 2025, prepared by Castleton.

1.1 Site Background

The site is located at 125 State Street in Westbury, Nassau County, New York (Figure 1). The site is located in the central part of the New Cassel Industrial Area. The site is approximately 0.665-acres in size and is occupied by a one-story building with a mezzanine and no basement. The remainder of the site is paved. The site is zoned commercial. The site is currently occupied by Tomco Mechanical, a heating, ventilation, and air conditioning (HVAC) installation and services provider. Formerly, the site was occupied by Tishcon Corporation (Tishcon) from 1984 to 1996. Tishcon produced dietary supplements and vitamin products in the form of powder and tablets. The powders and tablets were produced in a dry blending process. From 1985 to 1993, the chemicals methylene chloride, 1,1,1-trichloroethane (1,1,1-TCA), and methanol were used in the tablet coating process. Equipment used in the process was rinsed out in the driveway where storm drains were located.

A site plan is included as Figure 2.

In 2005, the site was designated as an SVI Legacy site requiring evaluation of the SVI pathway for the building situated on the site. In February 2011, a consultant representing the NYSDEC collected three (3) soil vapor samples from beneath the site building, three (3) indoor air samples from within the site building, and one (1) ambient air sample outside the site building. The purpose of the sampling was to assess the potential for site-related contamination to enter the site building and affect the indoor air quality through SVI.

The February 2011 sample locations and data are shown on Figure 3.

Tetrachloroethene (PCE) and 1,1,1 TCA, each considered site-related contamination, were reported in the analytical results during the February 2011 investigation. PCE and 1,1,1 TCA were detected at maximum concentrations of 9,800 ug/m³ and 3,300 ug/m³, respectively, in soil vapor beneath the southwest corner of the site building.

Upon comparison to the decision matrices found in the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH October 2006), the levels of PCE and 1,1,1 TCA in soil vapor beneath the building require mitigation by the criteria established therein.



No mitigative actions have been taken at the site to address the 2011 SVI data, i.e., installation of vapor barrier, sub-slab depressurization system (SSDS), etc.

Therefore, in 2021, the NYSDEC requested that 1st Street, LLC re-evaluate the SVI at the site building.

During March 2023, Castleton performed an SVI investigation throughout the site to quantify VOCs in sub-slab vapor and air and determine if/where an SVI condition exists.

The work was performed in accordance with the SVI Investigation Work Plan dated January 2023 by Castleton and approved by NYSDEC on February 24, 2023.

The investigation included the installation of four (4) sub-slab vapor sampling points (SSV01 through SSV04), four (4) indoor air sampling points (IAQ01 through IAQ04), and one (1) outdoor air sample (OAQ01).

The March 2023 sample locations and data are shown on Figure 4.

The dataset and NYSDOH Decision Matrices indicate that no further action is recommended for the compounds 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trichloroethene (TCE), methylene chloride, PCE, 1,1,1-TCA, and vinyl chloride. Based on the dataset and comparison to the NYSDOH Decision Matrices, for sample location SSV04/IAQ04, the recommended action for carbon tetrachloride is to identify source(s) and resample or mitigate. It should be noted that the recommendation is driven by the indoor air concentration as opposed to the sub-slab concentration which was reported as non-detect. No further action is recommended for carbon tetrachloride at the remaining sample locations.

Specific potential indoor sources of carbon tetrachloride were not identified during the sampling event. Notably, however, household cleaning products containing bleach were observed within the kitchen and kitchen closet. Household cleaning products containing bleach can produce volatile organic compounds, including carbon tetrachloride. As such, the elevated indoor carbon tetrachloride concentrations can be attributable to the use and storage of these products in this area of the site building. Therefore, the elevated level of carbon tetrachloride detected in indoor air sample IAQ04 is likely due to indoor sources as opposed to an SVI condition given the concentrations detected in the sub-slab samples.

Notably, the compounds yielding the highest concentrations in the sub-slab vapor were PCE and 1,1,1-TCA which is consistent with the 2011 sampling, however, the concentrations during this recent sampling event were an order of magnitude lower.

Given the amount of time between sampling rounds, the current sub-slab data, and site occupancy, Castleton recommends resampling in the 2024-2025 heating season to confirm that no further action is required to address potential exposures to 1,1-DCE, cis-1,2-DCE, TCE, methylene chloride, PCE, 1,1,1-TCA, and vinyl chloride and to determine whether indoor air levels of carbon tetrachloride require mitigation. The resampling effort will include a product inventory (Soil Vapor Intrusion-Structure Sampling Questionnaire).

On January 30, 2025, the NYSDEC approved the SVI investigation report prepared by Castleton.

2.0 SVI INVESTIGATION

The SVI investigation will be performed to confirm that no further action is required to address potential exposures to 1,1-DCE, cis-1,2-DCE, TCE, methylene chloride, PCE, 1,1,1-TCA, and vinyl chloride and to determine whether indoor air levels of carbon tetrachloride require mitigation. The investigation will consist of the collection and laboratory analysis of sub-slab vapor, indoor air, and outdoor air samples. To assess the likely worse case conditions, the sampling will be performed during the heating season (approximately November 15 through March 31). Indoor air and co-located sub-slab soil vapor samples collected outside the heating season cannot be used to rule out exposure risk. SVI sampling will consist of the collection and laboratory analysis of sub-slab vapor, indoor air, and outdoor air samples as described below:

- Four (4) sub-slab vapor samples will be collected within the Site building to assess sub-slab vapor quality.
- Four (4) indoor ambient air samples will be collected concurrently in the locations of the sub-slab vapor samples to assess indoor quality.
- One (1) outdoor ambient air sample (control) will be collected to assess background air conditions.

The samples will be collected at similar locations to those collected during the SVI Investigation performed in March 2023 by Castleton.

All samples will be collected in accordance with the Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH October 2006).

Proposed vapor and ambient air sample locations are shown on Figure 5.

2.1 Sub-Slab Vapor Sampling

The sub-slab vapor sample points will be set no more than two inches below the building slab. A hammer drill will be used to drill through the concrete slab. Dedicated polyethylene tubing will be used at each sample point. The sample point will be sealed with bentonite or other another non-VOC containing and non-shrinking product.

As part of the evaluation, a tracer gas (helium) will be used to serve as a quality assurance/quality control (QA/QC) device to verify the integrity of the soil vapor probe seal. Helium will be used as the tracer gas and a box will serve to keep it in contact with the probe during testing. A portable monitoring device will be used to analyze a sample of soil vapor for the tracer prior to sampling. If the tracer sample results show a significant presence of the tracer, the probe seals will be adjusted and re-checked to prevent infiltration.

One to three volumes will be purged prior to sample collection to ensure samples collected are representative. Sub-slab vapor samples will be collected in Summa canisters which have been batch certified clean by the laboratory and analyzed by using USEPA Method TO-15.

The flow rate of both purging and sampling will not exceed 0.2 L/min. Sampling will occur for approximately 24 hours. A sample log sheet will be maintained summarizing sample identification, date and time of sample collection, sampling depth, identity of samplers, sampling methods and devices, soil vapor purge volumes, volume of the soil vapor extracted, vacuum of canisters before and after the samples are collected, apparent moisture content of the sampling zone, and chain of custody protocols.

Sub-slab vapor samples will be submitted to a NYSDOH Environmental Laboratory Accreditation Program (ELAP)-certified laboratory and analyzed for VOCs by EPA Method TO-15 and TO-15 SIM to accommodate the detection limits required as specified in the NYSDOH matrices updated May 2017 and February 2024 (https://health.ny.gov/environmental/indoors/vapor_intrusion/update.htm).

The selected ELAP-certified laboratory for this project: Pace Analytical Services of Mansfield, Massachusetts (Pace). For the previous SVI investigation, Castleton utilized Alpha Analytical as the ELAP-certified laboratory who was acquired by Pace in 2023.

The EPA Method TO-15 reporting limits provided by Pace, which apply to both indoor/ambient air and sub-slab vapor are provided in Appendix A.

2.2 Indoor and Outdoor Ambient Air Sampling

Indoor air samples will be placed approximately 3 to 5 feet above the building slab proximate to sub-slab vapor locations prior to sample collection commencing. The outdoor air sample will be placed 3 to 5 feet above ground level. Samples will be collected using Summa canisters (batch certified clean by the laboratory) fitted with flow controllers not to exceed .02 L/min and will run for approximately 24 hours.

Indoor and outdoor ambient air samples will be submitted to a NYSDOH Environmental Laboratory Accreditation Program (ELAP)-certified laboratory and analyzed for VOCs by EPA Method TO-15 and TO-15 SIM to accommodate the detection limits required as specified in the

NYSDOH matrices updated May 2017 and February 2024 (https://health.ny.gov/environmental/indoor/vapor_intrusion/update.htm).

The selected ELAP-certified laboratory for this project: Pace. For the previous SVI investigation, Castleton utilized Alpha Analytical as the ELAP-certified laboratory who was acquired by Pace in 2023.

The EPA Method TO-15 reporting limits provided by Pace, which apply to both indoor/ambient air and sub-slab vapor are provided in Appendix A.

Documentation during the indoor and outdoor air sampling will include:

- A product inventory survey documenting sources of volatile chemicals present within the site building during the indoor air sampling that could potentially influence the sample results.
- Use of heating or air conditioning systems.
- Site sketch with locations of sampling locations, chemical storage areas, location of basement sumps and subsurface drains, doorways, stairways, and any other pertinent information.
- Outdoor site sketch showing the building, sampling location, streets, and paved areas.
- Weather conditions and ventilation conditions.
- Any observations or readings from field instrumentation should be recorded.

2.3 Reporting

The building survey and questionnaire will be provided to NYSDEC and NYSDOH immediately after completion of on-site work. The laboratory data will be provided to NYSDEC and NYSDOH immediately upon receipt of results from the laboratory.

A comprehensive SVI Investigation Summary Report will be prepared following completion of the field activities and receipt of the laboratory data and Data Usability Summary Report (DUSR) results. The Report will provide detailed summaries of the investigative findings of vapor and air analytical results compared to the NYSDOH May 2017 and February 2024 Decision Matrices. The Report will include an updated Site Plan and remedial recommendations, as warranted.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

3.1 Quality Assurance/Quality Control Procedures

QA/QC procedures will be used to provide performance information with regard to accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sampling and analysis for this investigation. Field QA/QC procedures will be used (1) to document that samples are representative of actual conditions at the Site and (2) identify possible cross-contamination from field activities or sample transit. Laboratory QA/QC procedures and analyses will be used to demonstrate whether analytical results have been biased either by interfering compounds in the sample matrix, or by laboratory techniques that may have introduced

systematic or random errors to the analytical process. A summary of the field and laboratory QA/QC procedures is provided below.

3.2 Field QA/QC

Field QA/QC will include the following procedures:

- Field quality control samples will include duplicate sample collection. One (1) field duplicate sample will be collected at an indoor air sample location;
- Calibration of field equipment, including PID, on a daily basis;
- Use of dedicated and/or disposable field sampling equipment;
- Proper sample handling and preservation;
- Proper sample chain of custody documentation; and
- Completion of report logs.

The above procedures will be executed as follows:

- Disposable sampling equipment, including acetate sleeves, latex gloves, and disposable or sample tubing, will be used to minimize cross-contamination between samples;
- For each of the parameters analyzed, a sufficient sample volume will be collected to adhere to the specific analytical protocol, and provide sufficient sample for reanalysis if necessary;
- Samples will be analyzed prior to the expiration of the respective holding time for each analytical parameter to ensure the integrity of the analytical results.

3.3 Sample Custody

Sample handling in the field will conform to appropriate sample custody procedures. Field custody procedures include proper sample identification, chain-of-custody forms, and packaging and shipping procedures. Sample labels will be attached to all sampling canisters before field activities begin to ensure proper sample identification. Each label will identify the site and sample location.

After each sample is collected and appropriately identified, the following information will be entered into the chain-of-custody form:

- sample identification,
- date and time of sample collection,
- sampling depth,
- identity of samplers,
- sampling methods and devices,
- soil vapor purge volumes,
- volume of soil vapor extracted,
- if canisters used, vacuum of canisters before and after samples collected,
- apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and

- chain of custody protocols and records used to track samples from sampling point to analysis.

The sampler will sign and date the “Relinquished” blank space prior to removing one copy of the custody form and sealing the remaining copies of the form in a Ziploc plastic bag. The canisters will be picked up by a laboratory representative from the Site or hand delivered to the laboratory.

3.4 Report Logs

Field logs and borings logs will be completed during the course of this investigation. A field log will be completed on a daily basis which will describe all field activities including:

- Project number, name, manager, and address;
- The date and time;
- The weather conditions;
- On-site personnel and associated affiliations;
- Description of field activities; and
- Pertinent sample collection information including sample identification numbers, description of samples, location of sampling points, number of samples taken, method of sample collection and any factors that may affect its quality, time of sample collection, name of collector, and field screening results.

3.5 Laboratory QA/QC

An ELAP-certified laboratory will be used for all sample analyses. The laboratory will follow the following QA/QC protocols. All samples will be delivered to the laboratory within 24 hours of sample collection. Samples will be received by laboratory personnel, who will inspect the sample cooler(s) to check the integrity of the custody seals. The cooler(s) will then be opened, the samples unpackaged, and the information on the chain-of-custody form examined. If the shipped samples match those described on the chain-of-custody form, the laboratory sample custodian will sign and date the form on the next “Received” blank and assume responsibility for the samples. If problems are noted with the sample shipment, the laboratory custodian will sign the form and record problems in the “Remarks” box. The custodian will then immediately notify the Project Manager so appropriate follow-up steps can be implemented on a timely basis.

A record of the information detailing the handling of a particular sample through each stage of analysis will be maintained by the laboratory. The record will include:

- Job reference, sample matrix, sample number, and date sampled;
- Date and time received by laboratory, holding conditions, and analytical parameters;
- Extraction date, time and extractor’s initials (if applicable), analysis date, time, and analyst’s initials; and
- QA batch number, date reviewed, and reviewer’s initials.

3.6 Data Usability Summary Report

A DUSR will be prepared by a third-party contractor, which will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and chain of custody procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method.

4.0 HEALTH AND SAFETY PLAN (HASP)

The investigation HASP is included in Appendix A. The Site Safety Coordinator will be Daren Murphy. Investigative work performed under this Work Plan will be in full compliance with applicable health and safety laws and regulations, including site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the investigation work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations.

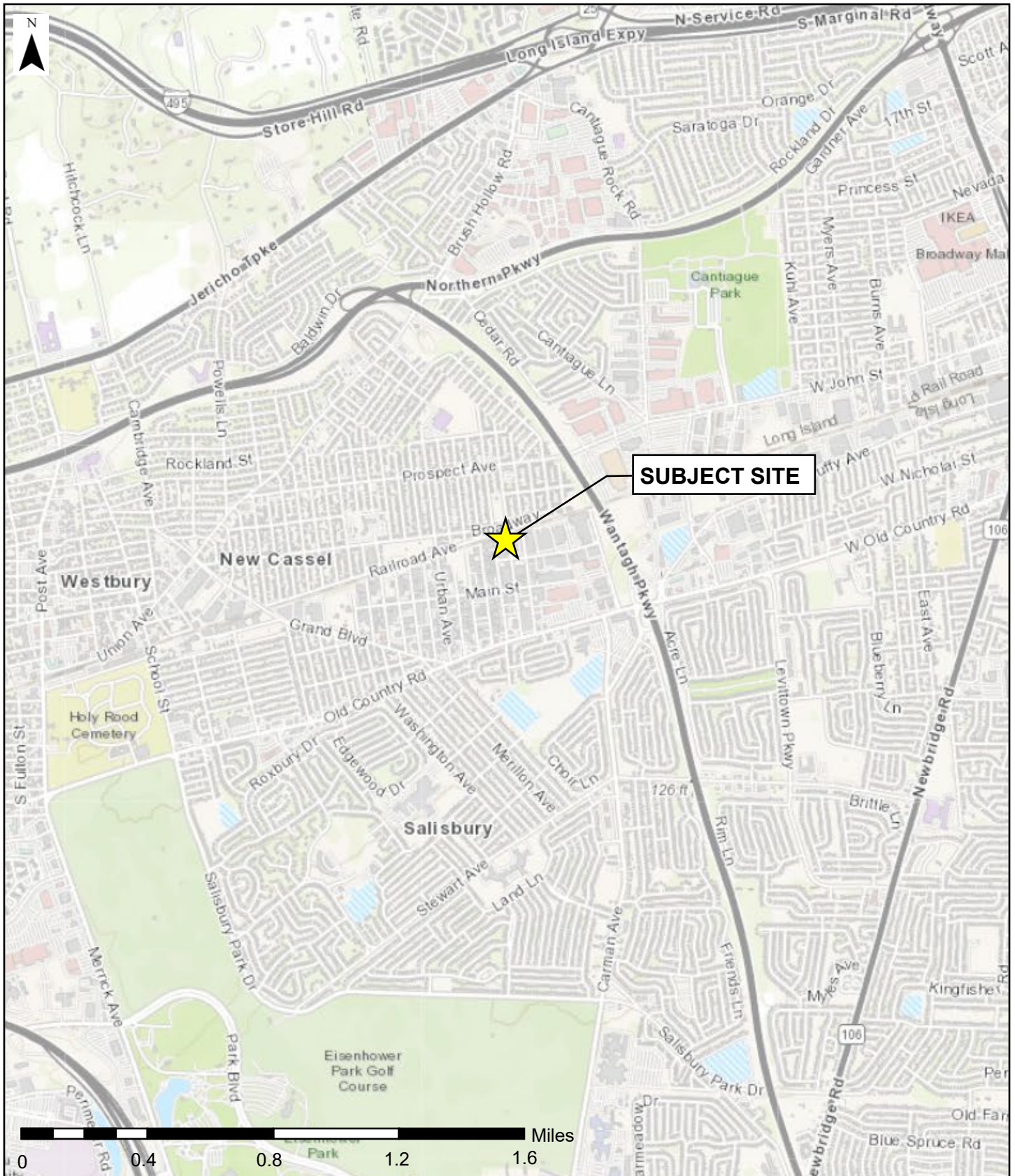
All field personnel involved in investigation activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be required to sign a HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a logbook or specific form. Potential on-site chemicals of concern include VOCs. Information fact sheets for each contaminant group and/or MSDS' are included in the HASP.

An emergency contact sheet with names and phone numbers for all pertinent project personnel as well as regulatory hotline information is included in the HASP. That document will define the specific project contacts for use in case of emergency.



FIGURES



SUBJECT SITE

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P: 631-482-1818
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SITE LOCATION

125 State Street
Westbury, NY

PREPARED FOR: Mr. Anthony Martinelli, 1st State LLC, 125 State St, Westbury, NY

PROJECT: TOMC2501
DATE: 2/7/2025
SCALE: AS SHOWN
DRAWN BY: DM
APPROVED BY: FPC

FIGURE:

1



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Site Boundary

PREPARED FOR:
1st State LLC
125 State Street,
Westbury, NY

PROJECT:	TOMC2501
DATE:	2/7/2025
SCALE:	AS SHOWN
DRAWN BY:	DM
APPROVED BY:	FPC

Site Plan

125 State Street
Westbury, NY

FIGURE:

2

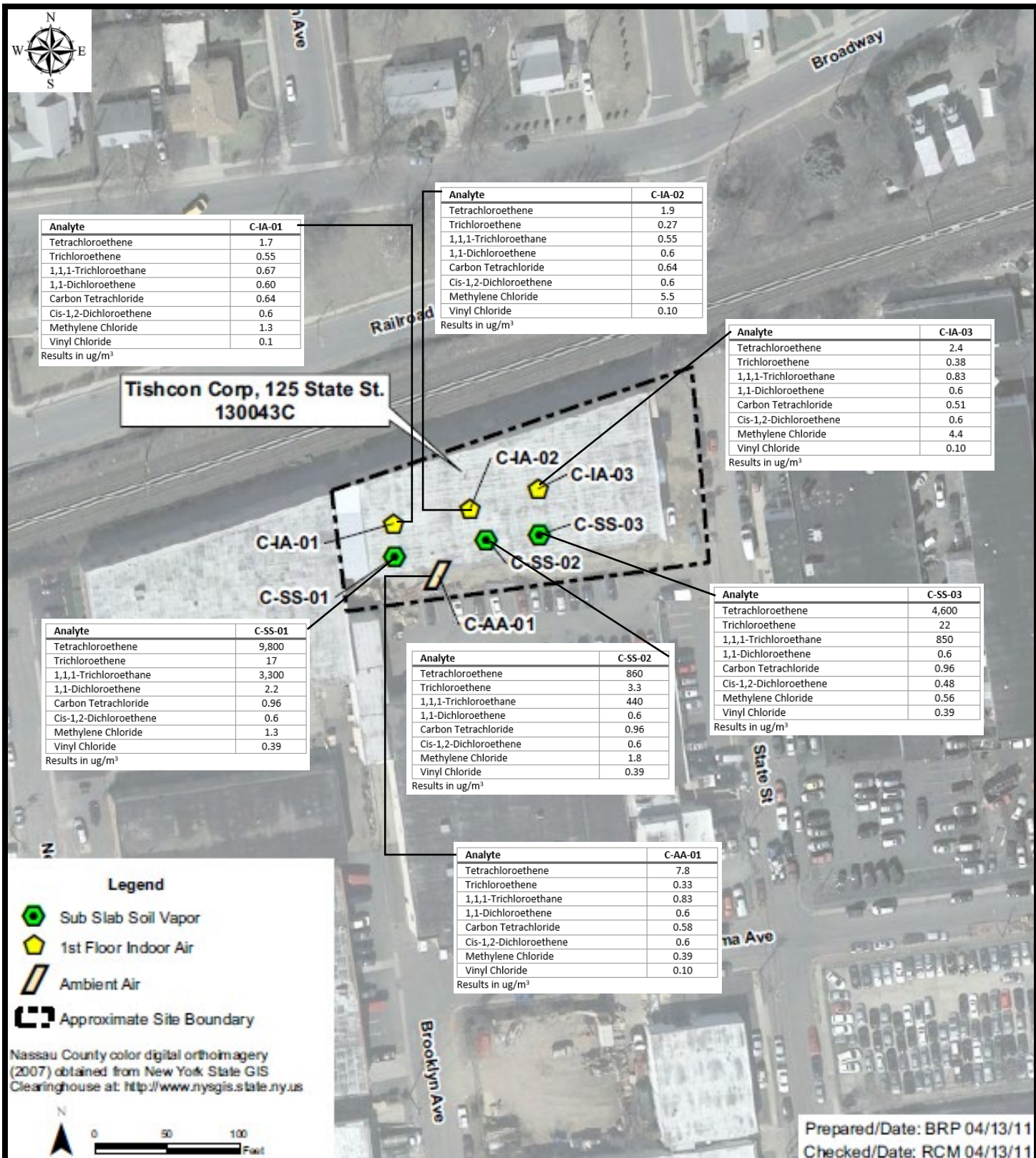


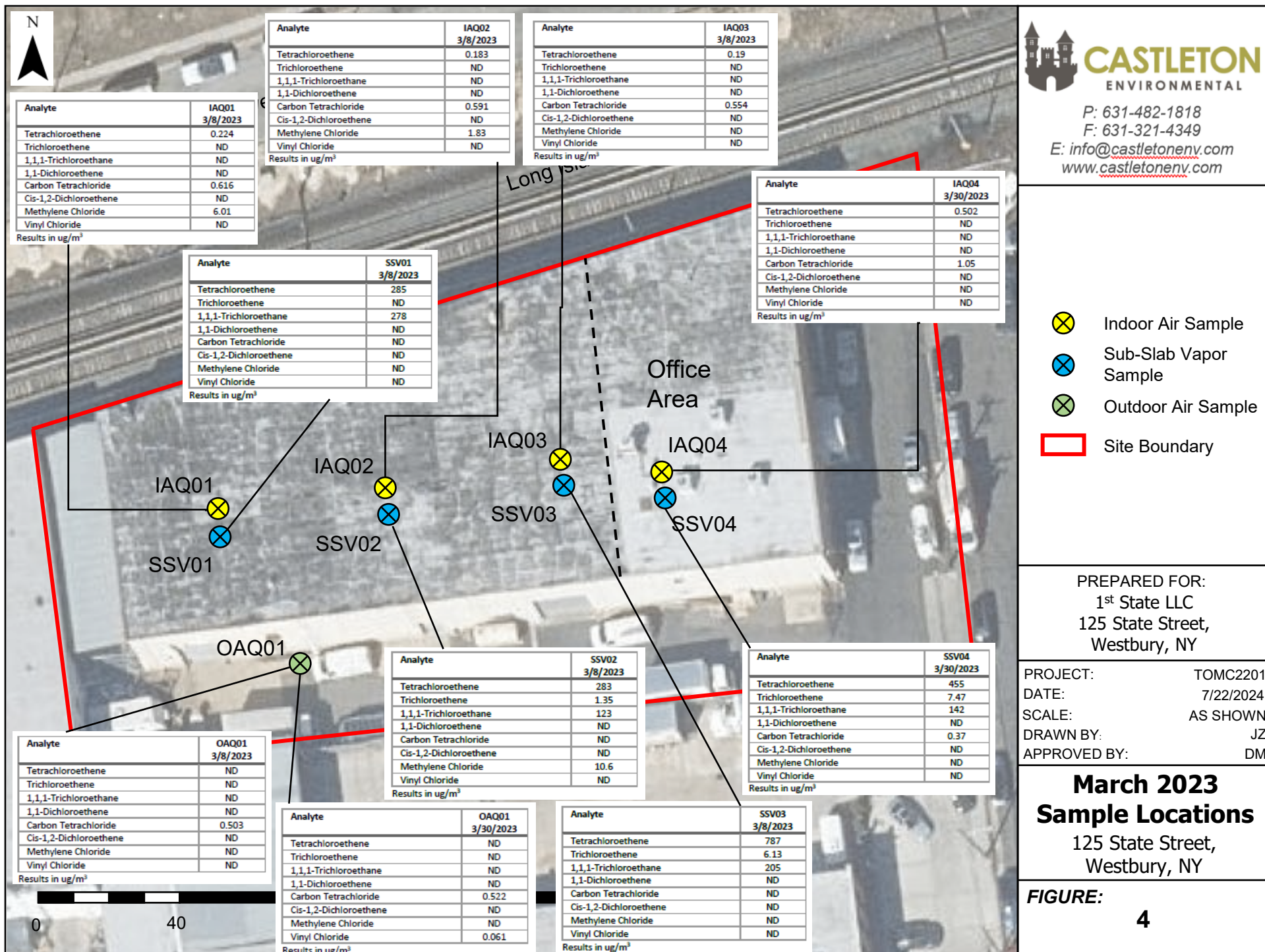
Figure 3

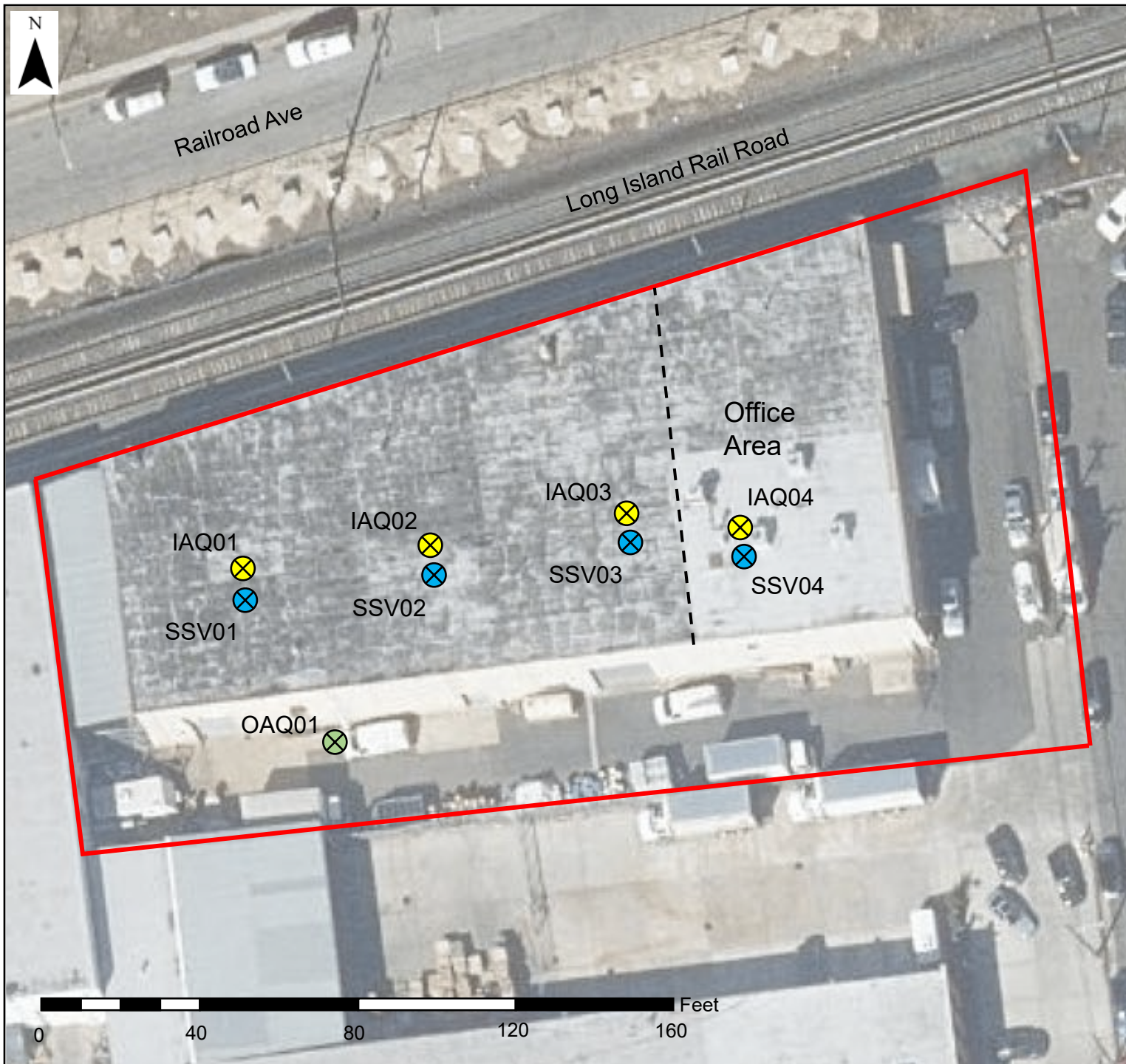
Feb 2011 SVI Sample Locations

125 State Street
Westbury, New York



Note: Base Map and Legend from Draft Final Vapor Intrusion Investigation Report New Cassel Industrial Area Site # 130043, prepared by MACTEC Engineering and Consulting, P.C., dated May 2011





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-  Indoor Air Sample
-  Sub-Slab Vapor Sample
-  Outdoor Air Sample
-  Site Boundary

PREPARED FOR:
1st State LLC
125 State Street,
Westbury, NY

PROJECT:	TOMC2501
DATE:	7/22/2024
SCALE:	AS SHOWN
DRAWN BY:	DM
APPROVED BY:	FPC

Proposed Sample Locations

125 State Street,
Westbury, NY

FIGURE:

5



APPENDIX A – LABORATORY REPORTING LIMITS

	Method	Compound	CAS	RL	Units	Compound	CAS	RL	Units
1	TO15-LL	1,1,1-Trichloroethane	71-55-6	1.09	ug/m3	1,1,1-Trichloroethane	71-55-6	0.2	ppbV
2	TO15-LL	1,1,2,2-Tetrachloroethane	79-34-5	1.37	ug/m3	1,1,2,2-Tetrachloroethane	79-34-5	0.2	ppbV
3	TO15-LL	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	1.53	ug/m3	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.2	ppbV
4	TO15-LL	1,1,2-Trichloroethane	79-00-5	1.09	ug/m3	1,1,2-Trichloroethane	79-00-5	0.2	ppbV
5	TO15-LL	1,1-Dichloroethane	75-34-3	0.809	ug/m3	1,1-Dichloroethane	75-34-3	0.2	ppbV
6	TO15-LL	1,1-Dichloroethene	75-35-4	0.793	ug/m3	1,1-Dichloroethene	75-35-4	0.2	ppbV
7	TO15-LL	1,2,4-Trichlorobenzene	120-82-1	1.48	ug/m3	1,2,4-Trichlorobenzene	120-82-1	0.2	ppbV
8	TO15-LL	1,2,4-Dimethylbenzene	95-63-6	0.983	ug/m3	1,2,4-Dimethylbenzene	95-63-6	0.2	ppbV
9	TO15-LL	1,2-Dibromoethane	106-93-4	1.54	ug/m3	1,2-Dibromoethane	106-93-4	0.2	ppbV
10	TO15-LL	1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	1.4	ug/m3	1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	0.2	ppbV
11	TO15-LL	1,2-Dichlorobenzene	95-50-1	1.2	ug/m3	1,2-Dichlorobenzene	95-50-1	0.2	ppbV
12	TO15-LL	1,2-Dichloroethane	107-06-2	0.809	ug/m3	1,2-Dichloroethane	107-06-2	0.2	ppbV
13	TO15-LL	1,2-Dichloropropane	78-87-5	0.924	ug/m3	1,2-Dichloropropane	78-87-5	0.2	ppbV
14	TO15-LL	1,3,5-Trimethylbenzene	108-67-8	0.983	ug/m3	1,3,5-Trimethylbenzene	108-67-8	0.2	ppbV
15	TO15-LL	1,3-Butadiene	106-99-0	0.442	ug/m3	1,3-Butadiene	106-99-0	0.2	ppbV
16	TO15-LL	1,3-Dichlorobenzene	541-73-1	1.2	ug/m3	1,3-Dichlorobenzene	541-73-1	0.2	ppbV
17	TO15-LL	1,4-Dichlorobenzene	106-46-7	1.2	ug/m3	1,4-Dichlorobenzene	106-46-7	0.2	ppbV
18	TO15-LL	1,4-Dioxane	123-91-1	0.721	ug/m3	1,4-Dioxane	123-91-1	0.2	ppbV
19	TO15-LL	2,2,4-Trimethylpentane	540-84-1	0.934	ug/m3	2,2,4-Trimethylpentane	540-84-1	0.2	ppbV
20	TO15-LL	2-Butanone	78-93-3	1.47	ug/m3	2-Butanone	78-93-3	0.5	ppbV
21	TO15-LL	2-Hexanone	591-78-6	0.82	ug/m3	2-Hexanone	591-78-6	0.2	ppbV
22	TO15-LL	3-Chloropropene	107-05-1	0.626	ug/m3	3-Chloropropene	107-05-1	0.2	ppbV
23	TO15-LL	4-Ethyltoluene	622-96-8	0.983	ug/m3	4-Ethyltoluene	622-96-8	0.2	ppbV
24	TO15-LL	4-Methyl-2-pentanone	108-10-1	2.05	ug/m3	4-Methyl-2-pentanone	108-10-1	0.5	ppbV
25	TO15-LL	Acetone	67-64-1	2.38	ug/m3	Acetone	67-64-1	1	ppbV
26	TO15-LL	Benzene	71-43-2	0.639	ug/m3	Benzene	71-43-2	0.2	ppbV
27	TO15-LL	Benzyl chloride	100-44-7	1.04	ug/m3	Benzyl chloride	100-44-7	0.2	ppbV
28	TO15-LL	Bromodichloromethane	75-27-4	1.34	ug/m3	Bromodichloromethane	75-27-4	0.2	ppbV
29	TO15-LL	Bromoform	75-25-2	2.07	ug/m3	Bromoform	75-25-2	0.2	ppbV
30	TO15-LL	Bromomethane	74-83-9	0.777	ug/m3	Bromomethane	74-83-9	0.2	ppbV
31	TO15-LL	Carbon disulfide	75-15-0	0.623	ug/m3	Carbon disulfide	75-15-0	0.2	ppbV
32	TO15-LL	Carbon tetrachloride	56-23-5	1.26	ug/m3	Carbon tetrachloride	56-23-5	0.2	ppbV
33	TO15-LL	Chlorobenzene	108-90-7	0.921	ug/m3	Chlorobenzene	108-90-7	0.2	ppbV
34	TO15-LL	Chloroethane	75-00-3	0.528	ug/m3	Chloroethane	75-00-3	0.2	ppbV
35	TO15-LL	Chloroform	67-66-3	0.977	ug/m3	Chloroform	67-66-3	0.2	ppbV
36	TO15-LL	Chloromethane	74-87-3	0.413	ug/m3	Chloromethane	74-87-3	0.2	ppbV
37	TO15-LL	cis-1,2-Dichloroethene	156-59-2	0.793	ug/m3	cis-1,2-Dichloroethene	156-59-2	0.2	ppbV
38	TO15-LL	cis-1,3-Dichloropropene	10061-01-5	0.908	ug/m3	cis-1,3-Dichloropropene	10061-01-5	0.2	ppbV
39	TO15-LL	Cyclohexane	110-82-7	0.688	ug/m3	Cyclohexane	110-82-7	0.2	ppbV
40	TO15-LL	Dibromochloromethane	124-48-1	1.7	ug/m3	Dibromochloromethane	124-48-1	0.2	ppbV
41	TO15-LL	Dibromomethane	74-95-3	1.42	ug/m3	Dibromomethane	74-95-3	0.2	ppbV
42	TO15-LL	Dichlorodifluoromethane	75-71-8	0.989	ug/m3	Dichlorodifluoromethane	75-71-8	0.2	ppbV
43	TO15-LL	Ethyl Acetate	141-78-6	1.8	ug/m3	Ethyl Acetate	141-78-6	0.5	ppbV
44	TO15-LL	Ethyl Alcohol	64-17-5	9.42	ug/m3	Ethyl Alcohol	64-17-5	5	ppbV
45	TO15-LL	Ethylbenzene	100-41-4	0.869	ug/m3	Ethylbenzene	100-41-4	0.2	ppbV
46	TO15-LL	Heptane	142-82-5	0.82	ug/m3	Heptane	142-82-5	0.2	ppbV
47	TO15-LL	Hexachlorobutadiene	87-68-3	2.13	ug/m3	Hexachlorobutadiene	87-68-3	0.2	ppbV
48	TO15-LL	iso-Propyl Alcohol	67-63-0	1.23	ug/m3	iso-Propyl Alcohol	67-63-0	0.5	ppbV
49	TO15-LL	Methyl tert butyl ether	1634-04-4	0.721	ug/m3	Methyl tert butyl ether	1634-04-4	0.2	ppbV
50	TO15-LL	Methylene chloride	75-09-2	1.74	ug/m3	Methylene chloride	75-09-2	0.5	ppbV
51	TO15-LL	Naphthalene	91-20-3	1.05	ug/m3	Naphthalene	91-20-3	0.2	ppbV
52	TO15-LL	n-Hexane	110-54-3	0.705	ug/m3	n-Hexane	110-54-3	0.2	ppbV
53	TO15-LL	o-Xylene	95-47-6	0.869	ug/m3	o-Xylene	95-47-6	0.2	ppbV
54	TO15-LL	p/m-Xylene	179601-23-1	1.74	ug/m3	p/m-Xylene	179601-23-1	0.4	ppbV
55	TO15-LL	Propylene	115-07-1	0.861	ug/m3	Propylene	115-07-1	0.5	ppbV
56	TO15-LL	Styrene	100-42-5	0.852	ug/m3	Styrene	100-42-5	0.2	ppbV
57	TO15-LL	Tetrachloroethene	127-18-4	1.36	ug/m3	Tetrachloroethene	127-18-4	0.2	ppbV
58	TO15-LL	Tetrahydrofuran	109-99-9	1.47	ug/m3	Tetrahydrofuran	109-99-9	0.5	ppbV
59	TO15-LL	Toluene	108-88-3	0.754	ug/m3	Toluene	108-88-3	0.2	ppbV
60	TO15-LL	trans-1,2-Dichloroethene	156-60-5	0.793	ug/m3	trans-1,2-Dichloroethene	156-60-5	0.2	ppbV
61	TO15-LL	trans-1,3-Dichloropropene	10061-02-6	0.908	ug/m3	trans-1,3-Dichloropropene	10061-02-6	0.2	ppbV
62	TO15-LL	Trichloroethene	79-01-6	1.07	ug/m3	Trichloroethene	79-01-6	0.2	ppbV
63	TO15-LL	Trichlorofluoromethane	75-69-4	1.12	ug/m3	Trichlorofluoromethane	75-69-4	0.2	ppbV
64	TO15-LL	Vinyl acetate	108-05-4	3.52	ug/m3	Vinyl acetate	108-05-4	1	ppbV
65	TO15-LL	Vinyl bromide	593-60-2	0.874	ug/m3	Vinyl bromide	593-60-2	0.2	ppbV
66	TO15-LL	Vinyl chloride	75-01-4	0.511	ug/m3	Vinyl chloride	75-01-4	0.2	ppbV

	Method	Compound	CAS	RL	Units	Compound	CAS	RL	Units
1	TO15-SIM	1,1,1-Trichloroethane	71-55-6	0.109	ug/m3	1,1,1-Trichloroethane	71-55-6	0.02	ppbV
2	TO15-SIM	1,1,2,2-Tetrachloroethane	79-34-5	0.137	ug/m3	1,1,2,2-Tetrachloroethane	79-34-5	0.02	ppbV
3	TO15-SIM	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.383	ug/m3	1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.05	ppbV
4	TO15-SIM	1,1,2-Trichloroethane	79-00-5	0.109	ug/m3	1,1,2-Trichloroethane	79-00-5	0.02	ppbV
5	TO15-SIM	1,1-Dichloroethane	75-34-3	0.081	ug/m3	1,1-Dichloroethane	75-34-3	0.02	ppbV
6	TO15-SIM	1,1-Dichloroethene	75-35-4	0.079	ug/m3	1,1-Dichloroethene	75-35-4	0.02	ppbV
7	TO15-SIM	1,2,4-Trichlorobenzene	120-82-1	0.371	ug/m3	1,2,4-Trichlorobenzene	120-82-1	0.05	ppbV
8	TO15-SIM	1,2,4-Trimethylbenzene	95-63-6	0.098	ug/m3	1,2,4-Trimethylbenzene	95-63-6	0.02	ppbV
9	TO15-SIM	1,2-Dibromoethane	106-93-4	0.154	ug/m3	1,2-Dibromoethane	106-93-4	0.02	ppbV
10	TO15-SIM	1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	0.349	ug/m3	1,2-Dichloro-1,1,2,2-tetrafluoroethane	76-14-2	0.05	ppbV
11	TO15-SIM	1,2-Dichlorobenzene	95-50-1	0.12	ug/m3	1,2-Dichlorobenzene	95-50-1	0.02	ppbV
12	TO15-SIM	1,2-Dichloroethane	107-06-2	0.081	ug/m3	1,2-Dichloroethane	107-06-2	0.02	ppbV
13	TO15-SIM	1,2-Dichloropropane	78-87-5	0.092	ug/m3	1,2-Dichloropropane	78-87-5	0.02	ppbV
14	TO15-SIM	1,3,5-Trimethylbenzene	108-67-8	0.098	ug/m3	1,3,5-Trimethylbenzene	108-67-8	0.02	ppbV
15	TO15-SIM	1,3-Butadiene	106-99-0	0.044	ug/m3	1,3-Butadiene	106-99-0	0.02	ppbV
16	TO15-SIM	1,3-Dichlorobenzene	541-73-1	0.12	ug/m3	1,3-Dichlorobenzene	541-73-1	0.02	ppbV
17	TO15-SIM	1,4-Dichlorobenzene	106-46-7	0.12	ug/m3	1,4-Dichlorobenzene	106-46-7	0.02	ppbV
18	TO15-SIM	1,4-Dioxane	123-91-1	0.36	ug/m3	1,4-Dioxane	123-91-1	0.1	ppbV
19	TO15-SIM	2,2,4-Trimethylpentane	540-84-1	0.934	ug/m3	2,2,4-Trimethylpentane	540-84-1	0.2	ppbV
20	TO15-SIM	2-Butanone	78-93-3	1.47	ug/m3	2-Butanone	78-93-3	0.5	ppbV
21	TO15-SIM	2-Hexanone	591-78-6	0.82	ug/m3	2-Hexanone	591-78-6	0.2	ppbV
22	TO15-SIM	3-Chloropropene	107-05-1	0.626	ug/m3	3-Chloropropene	107-05-1	0.2	ppbV
23	TO15-SIM	4-Ethyltoluene	622-96-8	0.098	ug/m3	4-Ethyltoluene	622-96-8	0.02	ppbV
24	TO15-SIM	4-Methyl-2-pentanone	108-10-1	2.05	ug/m3	4-Methyl-2-pentanone	108-10-1	0.5	ppbV
25	TO15-SIM	Acetone	67-64-1	2.38	ug/m3	Acetone	67-64-1	1	ppbV
26	TO15-SIM	Benzene	71-43-2	0.319	ug/m3	Benzene	71-43-2	0.1	ppbV
27	TO15-SIM	Benzyl chloride	100-44-7	0.518	ug/m3	Benzyl chloride	100-44-7	0.1	ppbV
28	TO15-SIM	Bromodichloromethane	75-27-4	0.134	ug/m3	Bromodichloromethane	75-27-4	0.02	ppbV
29	TO15-SIM	Bromoform	75-25-2	0.207	ug/m3	Bromoform	75-25-2	0.02	ppbV
30	TO15-SIM	Bromomethane	74-83-9	0.078	ug/m3	Bromomethane	74-83-9	0.02	ppbV
31	TO15-SIM	Carbon disulfide	75-15-0	0.623	ug/m3	Carbon disulfide	75-15-0	0.2	ppbV
32	TO15-SIM	Carbon tetrachloride	56-23-5	0.126	ug/m3	Carbon tetrachloride	56-23-5	0.02	ppbV
33	TO15-SIM	Chlorobenzene	108-90-7	0.461	ug/m3	Chlorobenzene	108-90-7	0.1	ppbV
34	TO15-SIM	Chloroethane	75-00-3	0.264	ug/m3	Chloroethane	75-00-3	0.1	ppbV
35	TO15-SIM	Chloroform	67-66-3	0.098	ug/m3	Chloroform	67-66-3	0.02	ppbV
36	TO15-SIM	Chloromethane	74-87-3	0.413	ug/m3	Chloromethane	74-87-3	0.2	ppbV
37	TO15-SIM	cis-1,2-Dichloroethene	156-59-2	0.079	ug/m3	cis-1,2-Dichloroethene	156-59-2	0.02	ppbV
38	TO15-SIM	cis-1,3-Dichloropropene	10061-01-5	0.091	ug/m3	cis-1,3-Dichloropropene	10061-01-5	0.02	ppbV
39	TO15-SIM	Cyclohexane	110-82-7	0.688	ug/m3	Cyclohexane	110-82-7	0.2	ppbV
40	TO15-SIM	Dibromochloromethane	124-48-1	0.17	ug/m3	Dibromochloromethane	124-48-1	0.02	ppbV
41	TO15-SIM	Dibromomethane	74-95-3	1.42	ug/m3	Dibromomethane	74-95-3	0.2	ppbV
42	TO15-SIM	Dichlorodifluoromethane	75-71-8	0.989	ug/m3	Dichlorodifluoromethane	75-71-8	0.2	ppbV
43	TO15-SIM	Ethyl Acetate	141-78-6	1.8	ug/m3	Ethyl Acetate	141-78-6	0.5	ppbV
44	TO15-SIM	Ethyl Alcohol	64-17-5	9.42	ug/m3	Ethyl Alcohol	64-17-5	5	ppbV
45	TO15-SIM	Ethylbenzene	100-41-4	0.087	ug/m3	Ethylbenzene	100-41-4	0.02	ppbV
46	TO15-SIM	Heptane	142-82-5	0.82	ug/m3	Heptane	142-82-5	0.2	ppbV
47	TO15-SIM	Hexachlorobutadiene	87-68-3	0.533	ug/m3	Hexachlorobutadiene	87-68-3	0.05	ppbV
48	TO15-SIM	iso-Propyl Alcohol	67-63-0	1.23	ug/m3	iso-Propyl Alcohol	67-63-0	0.5	ppbV
49	TO15-SIM	Methyl tert butyl ether	1634-04-4	0.721	ug/m3	Methyl tert butyl ether	1634-04-4	0.2	ppbV
50	TO15-SIM	Methylene chloride	75-09-2	1.74	ug/m3	Methylene chloride	75-09-2	0.5	ppbV
51	TO15-SIM	Naphthalene	91-20-3	0.262	ug/m3	Naphthalene	91-20-3	0.05	ppbV
52	TO15-SIM	n-Hexane	110-54-3	0.705	ug/m3	n-Hexane	110-54-3	0.2	ppbV
53	TO15-SIM	o-Xylene	95-47-6	0.087	ug/m3	o-Xylene	95-47-6	0.02	ppbV
54	TO15-SIM	p/m-Xylene	79601-23-1	0.174	ug/m3	p/m-Xylene	79601-23-1	0.04	ppbV
55	TO15-SIM	Propylene	115-07-1	0.861	ug/m3	Propylene	115-07-1	0.5	ppbV
56	TO15-SIM	Styrene	100-42-5	0.085	ug/m3	Styrene	100-42-5	0.02	ppbV
57	TO15-SIM	Tetrachloroethene	127-18-4	0.136	ug/m3	Tetrachloroethene	127-18-4	0.02	ppbV
58	TO15-SIM	Tetrahydrofuran	109-99-9	1.47	ug/m3	Tetrahydrofuran	109-99-9	0.5	ppbV
59	TO15-SIM	Toluene	108-88-3	0.377	ug/m3	Toluene	108-88-3	0.1	ppbV
60	TO15-SIM	trans-1,2-Dichloroethene	156-60-5	0.079	ug/m3	trans-1,2-Dichloroethene	156-60-5	0.02	ppbV
61	TO15-SIM	trans-1,3-Dichloropropene	10061-02-6	0.091	ug/m3	trans-1,3-Dichloropropene	10061-02-6	0.02	ppbV
62	TO15-SIM	Trichloroethene	79-01-6	0.107	ug/m3	Trichloroethene	79-01-6	0.02	ppbV
63	TO15-SIM	Trichlorofluoromethane	75-69-4	0.281	ug/m3	Trichlorofluoromethane	75-69-4	0.05	ppbV
64	TO15-SIM	Vinyl acetate	108-05-4	3.52	ug/m3	Vinyl acetate	108-05-4	1	ppbV
65	TO15-SIM	Vinyl bromide	593-60-2	0.874	ug/m3	Vinyl bromide	593-60-2	0.2	ppbV
66	TO15-SIM	Vinyl chloride	75-01-4	0.051	ug/m3	Vinyl chloride	75-01-4	0.02	ppbV



APPENDIX B – HASP



CASTLETON

ENVIRONMENTAL

70 West Main Street, Babylon, NY 11702
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Health and Safety Plan

**125 State Street
Westbury, New York
NYSDEC Site No. 130043C**

FEBRUARY 2025

Prepared for:

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HEALTH AND SAFETY PLAN
125 STATE STREET, WESTBURY, NEW YORK
NYSDEC SITE NO. 130043C
CASTLETON PROJECT NUMBER: TOMC2501
FEBRUARY 2025

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Appendix D	Medical Data Sheet
Appendix E	General Health and Safety Work Practices
Appendix F	Hospital Route Map and Directions
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1.0 STATEMENT OF COMMITMENT

This Health and Safety Plan (HASP) has been prepared to ensure that workers are not exposed to chemical, biological and physical hazards during the planned Environmental Site Investigations to be performed at the site located at 125 State Street, in Westbury, Nassau County, New York (the site). Castleton Environmental Geologic Services DPC (Castleton) policy is to minimize the possibility of work-related exposure through awareness and qualified supervision, health and safety training, medical monitoring, use of appropriate personal protective equipment, and the following activity specific safety protocols contained in this HASP. Castleton has established a guidance program to implement this policy in a manner that protects personnel to the maximum reasonable extent.

This HASP, which applies to persons present at the site actually or potentially exposed to safety or health hazards, describes emergency response procedures for actual and potential physical, biological and chemical hazards. This HASP is also intended to inform and guide personnel entering the work area or exclusion zone. Persons are to acknowledge that they understand the potential hazards and the contents of this Health and Safety policy.

2.0 INTRODUCTION

2.1 Purpose

This HASP addresses the minimum health and safety practices that will be employed by site workers participating in investigation activities at the project site located at 125 State Street, in Westbury, Nassau County, New York, known as the Tishcon Corp at 125 State Street site, NYSDEC Site No. 130043C.

The HASP takes into account the specific hazards inherent to the site and presents the minimum requirements which are to be met by Castleton, its' subcontractors, and other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. Castleton subcontractors will have the option of adopting this HASP or developing their own site-specific document. If a subcontractor chooses to prepare their own HASP, it must meet the minimum requirements as detailed in this HASP and must be made available to Castleton.

Activities performed under this HASP will comply with applicable parts of Occupational Safety and Health Administration (OSHA) Regulations, primarily 29 CFR Parts 1910 and 1926 and all other applicable federal, state, and local regulations. Modifications to the HASP may be made with the approval of the Castleton Health and Safety Manager (HSM) and/or Project Manager (PM). A copy of this HASP will be maintained on-site during all work activities.

Refusal to comply with the HASP or violation of any safety procedures by field personnel may result in their immediate removal from the site following consultation with the HSM and the Field Team Leader (FTL).

2.2 Scope

This HASP addresses the potential hazards related to the environmental investigation activities. The primary environmental investigation activities include the following:

- Site Mobilization/Demobilization;
- Soil Vapor and Ambient Air Sampling, and
- Vapor Point Installation

The potential hazards associated with this scope are listed below and are discussed in more detail in this HASP after the project organization and responsibilities section.

- Chemical Hazards
- Biological Hazards
- Physical Hazards

2.3 Application

The HASP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- Castleton employees and subcontractors;
- Client representatives; and
- Federal, state or local representatives.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section specifies the project organization and responsibilities.

3.1 Project Manager

- Participates in major incident investigations;
- Ensures that the HASP has all of the required approvals before site work is conducted; and
- Has the overall project responsibility for project health and safety.

3.2 Field Team Leader (FTL)/ Site Health and Safety Officer (SHSO)

- Ensures that the HASP is implemented in conjunction with the Health and Safety Manager (HSM);
- Ensures that field work is scheduled with adequate equipment to complete the job safely;
- Enforces site health and safety rules;
- Ensures that proper personal protective equipment is utilized;
- Ensures that the HSM is informed of project changes that require modifications to the HASP;
- Ensures that the procedure modifications are implemented;
- Investigates incidents;
- Conducts the site safety briefing;
- Reports to HSM to provide summaries of field operations and progress; and
- Acts as Emergency Coordinator.

3.3 Health and Safety Manager

- Provides for the development of the HASP;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves individuals who are assigned SHSO responsibilities;
- Coordinates revisions of this HASP with field personnel; and
- Assists in the investigation of major accidents.

3.4 Site Personnel

- Report any unsafe or potentially hazardous conditions to the FTL/SHSO;
- Maintain knowledge of the information, instructions and emergency response actions contained in this HASP; and
- Comply with rules, regulations and procedures as set forth in this HASP and any revisions.

4.0 SITE HISTORY AND PROJECT DESCRIPTION

4.1 Project Background

This HASP has been prepared by Castleton on behalf of 1st State LLC (the Property Owner), to perform a soil vapor intrusion (SVI) investigation at the site to confirm that no further action is required to address potential exposures to 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trichloroethene (TCE), methylene chloride, tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), and vinyl chloride and to determine whether indoor air levels of carbon tetrachloride require mitigation.

4.2 Site Location and Description

The Site is located at 125 State Street, in Westbury, Nassau County, New York. The site is bounded by Long Island Rail Road tracks to the north, industrial building to the south, State Street to the east, and commercial building to the west.

The site is located in the central part of the New Cassel Industrial Area. The site is approximately 0.665-acres in size and is occupied by a one-story building with a mezzanine and no basement areas. The remainder of the site is paved. The site is zoned commercial. The site is currently occupied by Tomco Mechanical, an HVAC installation and services provider. Formerly, the site was occupied by Tishcon Corporation from 1984 to 1996. Tishcon produced dietary supplements and vitamin products in the form of powder and tablets. The powders and tablets were produced in a dry blending process. From 1985 to 1993, the chemicals methylene chloride, 1,1,1-trichloroethane (1,1,1-TCA), and methanol were used in the tablet coating process. Equipment used in the process was rinsed out in the driveway where storm drains were located.

5.0 POTENTIAL HAZARDS OF THE SITE

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under Section 1.0. Additional information can be found in Appendix A - Safety Data Sheets or in Appendix B - Activity Hazard Analyses.

5.1 Chemical Hazards

Potential on-site chemicals of concern include VOCs (tetrachloroethene (PCE) and 1,1,1-trichloroethane (1,1,1 TCA).

The chemicals identified above may have an effect on the central nervous system, entering the body through the respiratory system and dermal exposure. Acute exposure symptoms may include skin irritation. Specific information on the chemicals can be found in Table 5-1.

Table 5-1 Chemical Hazards

COMPOUND	CAS#	OSHA PEL	ROUTES OF EXPOSURE	SYMPTOMS OF EXPOSURE	TARGET ORGANS
Tetrachloroethene (PCE)	127-18-4	TWA 100 ppm	Inhalation Ingestion Skin/Eye	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis; nausea, vomiting; Allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, chest pain, muscle pain, flushing	Eyes, skin, respiratory system, central nervous system
1,1,1-Trichloroethane (1,1,1-TCA)	71-55-6	TWA 350 ppm	Inhalation Ingestion Skin/Eye	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis; nausea, vomiting and diarrhea	Eyes, skin, respiratory system, central nervous system

Abbreviations

C = Ceiling limit, not to be exceeded

CNS = Central Nervous System

PEL=Permissible Exposure Limit

OSHA = Occupational Safety and Health Administration

ppm = parts per million

TWA = Time-weighted average (8 hours)

5.2 Biological Hazards

Work will be performed in a developed area of Nassau County, New York. During the course of the project, there is potential for workers to come into contact with biological hazards such as animals, insects and plants. The Activity Hazard Analyses found in Appendix B includes specific hazards and control measures for each task, if applicable.

5.2.1 *Animals*

The Site is located in a predominantly developed area. It is possible that dogs, cats, rats and mice may be present. Workers shall use discretion and avoid all contact with animals.

5.2.2 *Insects*

Insects, such as mosquitoes, ticks, bees and wasps may be present during certain times of the year. Workers will be encouraged to wear repellents and PPE, if deemed necessary, when working in areas where insects are expected to be present.

During the months of April through October, particular caution must be exercised to minimize exposure to deer ticks and the potential for contracting Lyme disease. Specific precautionary work practices that are recommended include the following:

- Cover your body as much as possible. Wear long pants and long sleeved shirts. Light color clothing makes spotting of ticks easier.
- Try to eliminate possible paths by which the Deer Tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles). If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized for added protection when the potential for heat stress is not a concern.
- Conduct periodic and frequent, (e.g., hourly), surveys of your clothing for the presence of ticks. Remove any tick, save it and report to the clinic with the tick.
- Use insect /tick repellents that contain the chemical DEET (n,n-Diethyltoluamide). Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF and Maximum Strength OFF.

5.2.3 *Plants*

Poison ivy, sumac and oak may be present on site. The FTL/SHSO should identify the susceptible individuals. Worker shall avoid all contact with these plants.

5.2.4 *COVID-19*

There are many types of coronaviruses including some that commonly cause mild upper-respiratory tract illnesses. COVID-19 is a new disease, caused by a novel (or new) coronavirus that has not been seen in humans. The virus that causes COVID-19 is thought to spread mainly from person to person, mainly through respiratory droplets produced when an infected person coughs, sneezes, or talks. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. Spread is more likely when people are in close contact with one another (within 6 feet). To prevent the spread of COVID-19, at a minimum, the following steps will be taken:

- Stay home if sick.
- Keep physical distance. Stay at least 6 feet away from other people.

- Wear a face covering.
- Keep your hands clean.

5.3 Physical Hazards

Most safety hazards are discussed in the Activity Hazard Analyses (AHA) in Appendix B for the different phases of the project. In addition to the AHAs, general work rules and other safety procedures are described in Section 10 of this HASP.

5.3.1 Temperature Extremes

Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. The potential hazards of working in hot environments include dehydration, cramps, heat rash, heat exhaustion, and heat stroke.

Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, and poor judgment.

Castleton's Heat/Cold Stress Protocols are specified in Appendix C.

5.3.2 Steam, Heat and Splashing

Exposure to steam/heat/splashing hazards can occur during steam cleaning activities. Splashing can also occur during well development and sampling activities. Exposure to steam/heat/splashing can result in scalding/burns, eye injury, and puncture wounds.

5.3.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, drill rigs, pumps and engines. Workers will wear hearing protection while in the work zone when these types of machinery are operating.

5.3.4 Fire and Explosion

When conducting excavation or drilling activities, the opportunity of encountering fire and explosion hazards may exist from encountering underground utilities, from the use of diesel engine equipment, and other potential ignition sources. During dry periods there is an increased chance of forest and brush fires starting at the job site. If these conditions occur no smoking will be permitted at the site and all operations involving potential ignition sources will be monitored continuously (fire watch).

5.3.5 Manual Lifting/Material Handling

Manual lifting of heavy objects may be required. Failure to follow proper lifting technique can result in back injuries and strains. Back injuries are a serious concern as they are the most common work place injury, often resulting in lost or restricted work time, and long treatment and recovery periods.

5.3.6 Slips, Trips and Falls

Working in and around the site will pose slip, trip and fall hazards due to slippery surfaces that may be oil covered, or from rough terrain, surfaces that are steep inclines, surfaced debris, or surfaces which are wet from rain or ice. Falls may result in twisted ankles, broken bones, head trauma or back injuries.

5.3.7 Heavy Equipment Operation

Drilling equipment be used where required. Working with or near heavy equipment poses many potential hazards, including electrocution, fire/explosion, being struck by or against, or pinched/caught/crushed by, and can result in serious physical harm.

5.3.8 Electrocution

Encountering underground utilities may pose electrical hazards to workers. Additionally, overhead electrical lines can be a concern during drilling operations. Potential adverse effects of electrical hazards include burns and electrocution, which could result in death.

6.0 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control and mitigate those hazards. The AHAs will be used to train work crews in proper safety procedures during phase preparatory meetings.

AHAs have been developed by Castleton for the following phases of work:

1. Site Mobilization/Demobilization;
2. Soil Vapor, and Ambient Air Sampling, and
3. Vapor point installation

Copies of these AHAs are included in Appendix B of this HASP.

7.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) specified in Table 7-1 represents the hazard analysis and PPE selection required by 29 CFR 1910.132. Specific information on known potential hazards can be found under Section 4.0 and Appendix B - Activity Hazard Analyses. For the purposes of PPE selection, the HSM and FTL/SHSO are considered competent persons. The signatures on the

approval page of the HASP constitute certification of the hazard assessment. For activities not covered by Table 7-1, the FTL/SHSO will conduct the hazard assessment, select the PPE, and document changes in the appropriate field logs. PPE selection will be made in consultation with the HSM.

Modifications for initial PPE selection may also be made by the FTL/SHSO in consultation with the HSM and changes documented accordingly. If major modifications occur, the HSM will notify the PM.

7.1 PPE Abbreviations

HEAD PROTECTION

HH = Hard Hat

HEARING PROTECTION

EP = ear plugs

EM = ear muffs

HAND PROTECTION

Cot = cotton

But = Butyl

LWG = Leather Work Gloves

Neo = Neoprene

Nit = Nitrile

Sur = Surgical

EYE/FACE PROTECTION

APR = Full Face Air Purifying
Respirator

MFS = Mesh Face shield

PFS = Plastic Face shield

SG = ANSI approved safety
glasses with side shields

BODY PROTECTION

WC = work clothes

Cot Cov = Cotton Coveralls

Poly = Polyethylene coated

Tyvek® coveralls

Saran = Saranex coated
coveralls

Tyvek® = Uncoated Tyvek®
coveralls

FOOT PROTECTION

Neo = Neoprene

OB = Overboot

Poly = polyethylene coated boot

Rub = rubber slush boots

STB = Leather work boots with steel
toe

RESPIRATORY PROTECTION

APR = Full-face air purifying
respirator with organic vapor
cartridges

ASR = Full face air supplied
respirator with escape bottle

SCBA = Self-contained breathing
apparatus

7.2 Hazard Assessment for Selection of Personal Protective Equipment

The initial selection of personal protective equipment for each task was done by performing a hazard assessment taking into consideration the following:

- Potential chemical and physical present;
- Work operations to be performed;
- Potential routes of exposure;
- Concentrations of contaminants present; and
- Characteristics, capabilities and limitations of PPE and any hazard that the PPE presents or magnifies.

A review of the analytical data from previous sampling events indicates that VOCs identified in Table 5-1 are the primary contaminants of concern.

The exposure routes for these chemicals are inhalation, skin absorption, skin/eye contact and ingestion. Chemical protective gloves will be required for all activities that involve sample

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization/ Demobilization	HH	SG	STB	WG	WC	None	None
Monitoring Well / Vapor Point Installation	HH	SG	STB	WG, Nit & Sur as needed	WC, Tyvek® as needed	None	None initially APR if action levels exceeded
Soil, groundwater, vapor and ambient air sampling	HH	SG	STB	WG, Nit & Sur as needed	WC, Tyvek® as needed	None	None initially APR if action levels exceeded
Decontamination	HH	SG	STB	Nit + Sur	WC, Tyvek® as needed	None	None initially APR if action levels exceeded

handling and the likelihood for skin contact. The proper use of PPE and strict adherence to decontamination and personal hygiene procedures will effectively minimize skin contact and ingestion as potential routes of exposure.

Table 7-1
Personal Protective Equipment Selection

7.3 Respirator Cartridge Change-Out Schedule

A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR. If the use of respirators is necessary, the respirator cartridge change-out schedule for this project will be as follows:

1. Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first; and
2. If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short of time period they were used the day before.

The schedule was developed based on the following scientific information and assumptions:

- Analytical data that is available regarding site contaminants;
- Using the Rule of Thumb provided by the AIHA;
- All of the chemicals have boiling points greater than 70°C;
- Total airborne concentration of contaminants is anticipated to be less than 200 ppm;
- The humidity is expected to be less than 85%; and
- Desorption of the contaminants (including those with poor warning properties) after partial use of the chemical cartridge can occur after a short period (hours) without use (eg, overnight) and result in a non-use exposure.

The following is a partial list of factors that may affect the usable cartridge service life and/or the degree of respiratory protection attainable under actual workplace conditions. These factors have been considered when developing the cartridge change-out schedule.

Type of contaminant(s);

- Contaminant concentration;
- Relative humidity;
- Breathing rate; Temperature; Changes in contaminant concentration, humidity, breathing rate and temperature;
- Mixtures of contaminants;
- Accuracy in the determination of the conditions;
- The contaminant concentration in the workplace can vary greatly. Consideration must be given to the quality of the estimate of the workplace concentration;
- Storage conditions between multiple uses of the same respirator cartridges. It is recommended that the chemical cartridges be replaced after each work shift. Contaminants adsorbed on a cartridge can migrate through the carbon bed without airflow;
- Age of the cartridge;
- Condition of the cartridge and respirator;
- Respirator and cartridge selection respirator fit;
- Respirator assembly, operation, and maintenance;
- User training, experience and medical fitness;
- Warning properties of the contaminant; and
- The quality of the warning properties should be considered when establishing the chemical cartridge change schedule. Good warning properties may provide a secondary or back-up indication for cartridge change-out.

8.0 AIR MONITORING

Air monitoring will be performed for protection for on-site workers and the downwind community (i.e., off-site receptors including residences, businesses, and on-site workers not directly involved in the remedial work) from potential airborne contaminant releases resulting from remedial activities at the site. Air monitoring will be used to help to confirm that the remedial work will not spread contamination off-site through the air. Site monitoring with a photoionization detector (PID) will be performed during any invasive activities.

Real-time monitoring for dust and VOCs will be conducted both within the work area, and along the site perimeter, during intrusive activities such as excavation activities.

9.0 ZONES, PROTECTION AND COMMUNICATION

9.1 Site Control

Site zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas. A three-zone approach will be utilized. It shall include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones shall be established on the work site when operations begin.

This project is a hazardous waste remediation project, and any person working in an area where the potential for exposure to site contaminants exists, will only be allowed access after providing the FTL/SHSO with proper training and medical documentation.

The zones are based upon current knowledge of proposed site activities. It is possible that the zone configurations may be altered due to work plan revisions. Should this occur, the work zone will be adjusted accordingly, and documented through use of a field-change request form.

The following shall be used for guidance in revising these preliminary zone designations, if necessary.

Support Zone - The SZ is an uncontaminated area that will be the field support area for most operations. The SZ provides for field team communications and staging for emergency response. Appropriate safety equipment will be located in this zone. Potentially contaminated personnel/materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples.

Contamination Reduction Zone - The CRZ is established between the EZ and the SZ. The CRZ contains the contamination reduction corridor and provides for an area for decontamination of personnel and portable hand-held equipment, tools and heavy equipment. A personnel decontamination area will be prepared at each exclusion zone. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

Exclusion Zone - All activities, which may involve exposure to site contaminants, hazardous materials and/or conditions, should be considered an EZ. The FTL/SHSO may establish more than one EZ where different levels of protection may be employed, or different hazards exist. The size of the EZ shall be determined by the site HSO allowing adequate space for the activity to be completed, field members and emergency equipment.

9.2 Contamination Control

Decontamination areas will be established for drilling/sampling activities.

9.2.1 Personnel Decontamination Station

All personnel and portable equipment used in the EZ shall be subject to a thorough decontamination process, as deemed necessary by the FTL/SHSO. Sampling equipment shall be decontaminated. As necessary, all boots and gloves will be decontaminated using soap and water solution and scrub brushes or simple removal and disposal. All used respiratory protective equipment will be decontaminated daily and sanitized with appropriate sanitizer solution.

All drums generated as a result of sampling and decontamination activities will be marked and stored at a designated area at the site until the materials can be properly disposed of off-site.

All non-expendable sampling equipment will be decontaminated. This usually entails the use of Alconox, solvent and distilled/deionized water rinses to eliminate contaminants.

9.3 Communication

- Each team member will have a cell phone/radio for communication with the PM, HSO and other team members during field activities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site- specific training. Typical hand signals are the following:

SIGNAL

Hand gripping throat
 Grip on a partner's wrist or placement of both hands around a partner's waist.
 Hands on top of head
 Thumbs up
 Thumbs down

MEANING

Out of air, can't breathe
 Leave the area immediately, no debate.
 Need assistance
 Okay, I'm all right, I understand.
 No, negative.

10.0 MEDICAL SURVEILLANCE PROCEDURES

All contractor and subcontractor personnel performing field work where potential exposure to contaminants exists at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f).

10.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the HSM before an employee can work in the exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months.

Additional medical testing may be required by the HSM in consultation with the Corporate Medical Consultant and the FTL/SHSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance.

10.2 Medical Data Sheet

A medical data sheet is provided in Appendix D. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

11.0 SAFETY CONSIDERATIONS

11.1 General Health and Safety Work Practices

A list of general health and safety work practices is included as an included in Appendix E. The work rules will be posted in a conspicuous location at the site.

11.2 The Buddy System

At a minimum, employees shall work in groups of two in such a manner that they can observe each other and maintain line-of-sight for each employee within the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

11.3 Sample Handling

Personnel responsible for the handling of samples should wear the prescribed level of protection. Samples should be identified as to their hazard and packaged as to prevent spillage or breakage. Sample containers shall be decontaminated in the CRZ or EZ before entering a clean Support Zone area. Any unusual sample conditions, odors, or real-time readings should be noted. Laboratory personnel should be advised of sample hazard level and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling, in order to assure that the practices are appropriate for the suspected contaminants in the sample.

11.4 Excavation

Excavations will be conducted in accordance with the requirements contained in 29 CFR 1926, Subpart P-Excavations. It provides for the designation of a "Competent Person" and general requirements for safe excavating practices. The program also incorporates company standards

for the monitoring of potentially hazardous atmospheres; protection from water hazards; analyzing and maintaining the stability of adjacent structures; daily competent person inspections; soil classification; sloping and benching; protective systems; and training.

The Competent Person will be the FTL or other designee with appropriate training and experience. The Competent Person will be assisted in his/her duties by other technical personnel such as the HSM, geologists, structural engineers and soils engineers.

12.0 DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site.

All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials will be collected and bagged for appropriate disposal as non-hazardous solid waste. Additional waste disposal procedures may be developed as applicable.

13.0 EMERGENCY RESPONSE PLAN

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures which are addressed in the following subsections include communications, local emergency support units, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures.

13.1 Responsibilities

13.1.1 Health and Safety Manager (HSM)

The HSM oversees and approves the Emergency Response/Contingency Plan and performs audits to determine that the plan is in effect and that all pre-emergency requirements are met. The HSM acts as a liaison to applicable regulatory agencies and notifies OSHA of reportable accidents.

13.1.2 Field Team Leader/Site Health and Safety Officer (FTL/HSO)

The FTL/SHSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The FTL/SHSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can ensure that OSHA is notified within the required time frame. The HSM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of \$500 within 24 hours.

13.1.3 Emergency Coordinator

The Emergency Coordinator for the project is the FTL/SHSO.

The Emergency Coordinator shall make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the emergency coordinator will inform interested parties about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. The emergency coordinator will locate emergency phone numbers and identify hospital routes prior to beginning work on site. The emergency coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator will implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

13.1.4 Site Personnel

Site personnel are responsible for knowing the Emergency Response/Contingency Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency.

13.2 Communication

A variety of communication systems may be utilized during emergency situations. These are discussed in the following sections.

13.2.1 Hand Signals

Downrange field teams will employ hand signals where necessary for communication during emergency situations. Hand signals are found in Section 8.3.

13.2.2 Field Radios and Cell Phones

Castleton field personnel are provided cellular phones for site communication and emergency use.

13.3 Local Emergency Support Units

A route map from the site to the nearest hospital can be found in Appendix F. This map will be placed with the above emergency telephone numbers in all on-site vehicles.

13.4 Pre-Emergency Planning

Castleton will communicate directly with administrative personnel from the emergency room at the hospital to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to any of the contaminants expected to be found on the site.

Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

Before the field activities begin, the local emergency response personnel will be notified of the schedule for field activities and about the materials that are thought to exist on the site so that they will be able to respond quickly and effectively in the event of a fire, explosion, or other emergency. Before fieldwork on the site commences, each person who will be working there or observing the operations will complete a medical data sheet (Appendix D). These data sheets will be filled out during site-specific training and will be kept on the site.

In the event of an incident where a team member becomes exposed or suffers from an acute symptom of exposure to site materials and has to be taken to a hospital, a copy of his/her medical data sheet will be presented to the attending physician.

Table 13-1
Emergency Telephone Numbers

Contact	Firm or Agency	Telephone Number
Police		911
Fire		911
Hospital	Nassau University Medical Center	(516) 572-0123
Ambulance		911
Project Manager/Health and Safety Manager	Daren Murphy	(631) 416-4309
Health & Safety Officer	Daren Murphy	(631) 416-4309
Poison Control Center		(800) 962-1253
Chemtrec		(800) 424-9300

13.5 Emergency Medical Treatment

The procedures and rules in this HASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the FTL/SHSO immediately. First aid equipment will be available on site at the following locations:

- First Aid Kit: Support Zone (or designated by FTL/SHSO upon arrival)
- Emergency Eye Wash: Support Zone (or designated by FTL/SHSO upon arrival)

During site-specific training, project personnel will be informed of the location of the first aid station(s) that has been set up. Unless they are in immediate danger, severely injured persons will not be moved until paramedics can attend to them. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be

obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person can be transported to the hospital, will be followed closely.

There will be at least two people with current First Aid and CPR certification on each active work shift. When personnel are transported to the hospital, the FTL/SHSO will provide a copy of the Medical Data Sheet to the paramedics and treating physician.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance. A map and directions to the hospital can be found in Appendix F.

13.6 Emergency Site Evacuation Routes and Procedures

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At his/her discretion, the EC also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, an air horn will be sounded on the site. The horn will sound continuously for one blast, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the evacuation meeting point, which will be determined upon arrival at the site by the FTL/SHSO, prior to work beginning. This will then be conveyed to all crew members during the site-specific briefing.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency. He/she will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the EC will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. A map showing evacuation routes, meeting places and



the location of emergency equipment will be posted in all trailers and used during site-specific training.

13.7 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

13.7.1 Fire Prevention

Adhering to the following precautions will prevent fires:

- Good housekeeping and storage of materials;
- Storage of flammable liquids and gases away from oxidizers;
- No smoking in the exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

13.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

SKIN AND EYE CONTACT: Use copious amounts of soap and water. Wash/rinse affected areas thoroughly, and then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination. Skin should also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs.

INHALATION: Move to fresh air. Decontaminate and transport to hospital or local medical provider.

INGESTION: Decontaminate and transport to emergency medical facility.

PUNCTURE WOUND OR LACERATION: Decontaminate and transport to emergency medical facility.

13.9 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or postponed. The FTL/SHSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

13.10 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

- Health and Safety Manager;
- Project Manager; and
- The employer of any injured worker who is not a Castleton employee

Written confirmation of verbal reports are to be completed by the FTL/SHSO using the Incident Report Form and submitted within 24 hours. The incident report and investigation form is found in Appendix G. If the employee involved is not a Castleton employee, his employer will receive a copy of the report.

13.11 Adverse Weather Conditions

In the event of adverse weather conditions, the FTL/SHSO will determine if work can continue without potentially risking the safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries;
- Potential for cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds);
- Limited visibility (fog);
- Potential for electrical storms;
- Earthquakes; and
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The FTL/SHSO will determine the need to cease field

operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

13.12 Spill Control and Response

All small hazardous spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill. The following seven steps should be taken by the Emergency Coordinator:

- Determine the nature, identity and amounts of major spill components;
- Make sure all unnecessary persons are removed from the spill area;
- Notify appropriate response teams and authorities;
- Use proper PPE in consultation with the FTL/SHSO;
- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc.);
- If possible, try to stop the leak with appropriate material; and,
- Remove all surrounding materials that can react or compound with the spill.

13.13 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on-site:

- Industrial first aid kit;
- Burn kit and portable eye washes (one per field team);
- Fire extinguishers (one per work area); and
- Absorbent material /spill kit.

14.0 TRAINING

14.1 General Health and Safety Training

In accordance with Castleton corporate policy, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations unless otherwise noted in the above reference. At a minimum, the training shall have consisted of instruction in the topics outlined in the standard.

Personnel who have not met the requirements for initial training shall not be allowed to work in any site activities in which they may be exposed to hazards (chemical or physical).

14.1.1 Three Day Supervised On the Job Training

In addition to the required initial hazardous waste operations training, each employee shall have received three days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

14.2 Annual Eight-Hour Refresher Training

Annual eight-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The training will cover a review of 1910.120 requirements and related company programs and procedures.

14.3 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and emergency services at the site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

14.4 On-Site Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings daily by the FTL/SHSO to assist site personnel in safely conducting their work activities. A copy of the Daily Briefing Sign-In Sheet is contained in Appendix H. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity to periodically update the crews on monitoring results. Prior to starting any new activity, a training session using the Activity Hazard Analysis will be held for crew members involved in the activity.

14.5 First Aid and CPR

The HSM will identify those individuals requiring first aid and CPR training to ensure that emergency medical treatment is available during field activities. It is anticipated that a minimum of one field person on-site at any one time will have first aid and CPR training. The training will be consistent with the requirements of the American Red Cross Association or American Heart Association. If none are available on-site, then the HSM shall be notified.

14.6 Supervisory Training

Supervisors and health and safety personnel shall have completed an additional eight hours of specialized training in accordance with 29 CFR 1910.120.



15.0 LOGS, REPORTS AND RECORDKEEPING

Changes to the HASP will be documented in the Health and Safety log book and as appropriate, the HSM and/or PM will be notified. Daily tailgate meetings will be documented in the H&S log book as well as personnel on-site.

15.1 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training and documentation of three-day OJT) and medical clearance for hazardous waste site work and respirator use will be maintained on-site. Records for all subcontractor employees will also be kept on-site.

15.2 Incident Report and Investigation Form

The incident report and investigation form is to be completed for all accidents and incidents, including near misses. The form can be found in Appendix G.

15.3 Health and Safety Logbooks

The FTL/SHSO will maintain a logbook during site work. The daily site conditions, personnel, monitoring results and significant events will be recorded. The original logbooks will become part of the exposure records file.



16.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of the HASP. It is maintained on site by the FTL/SHSO as a project record. Each field team member shall sign this section after site-specific training is completed and before being permitted to work on site.

I have read, or have been informed of, the Health and Safety Plan and understand the information presented. I will comply with the provisions contained therein.

<i>Name (Print and Sign)</i>	<i>Date</i>



APPENDIX A SAFETY DATA SHEETS

SAFETY DATA SHEET

Creation Date 10-Dec-2009

Revision Date 23-Jan-2018

Revision Number 5

1. Identification

Product Name Tetrachloroethylene

Cat No. : AC445690000; ACR445690010; AC445690025; AC445691000

CAS-No 127-18-4
Synonyms Perchloroethylene

Recommended Use Laboratory chemicals.
Uses advised against Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet**Company**

Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

Emergency Telephone NumberFor information **US** call: 001-800-ACROS-01 / **Europe** call: +32 14 57 52 11Emergency Number **US**:001-201-796-7100 / **Europe**: +32 14 57 52 99**CHEMTREC** Tel. No.**US**:001-800-424-9300 / **Europe**:001-703-527-3887**2. Hazard(s) identification****Classification**

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Skin Sensitization	Category 1
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Kidney, Liver, Blood.	

Label Elements**Signal Word**

Danger

Hazard Statements

Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure

**Precautionary Statements****Prevention**

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Wear protective gloves/protective clothing/eye protection/face protection

Response

IF exposed or concerned: Get medical attention/advice

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Skin

IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention

Storage

Store locked up
Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Toxic to aquatic life with long lasting effects

WARNING. Cancer - <https://www.p65warnings.ca.gov/>.

3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Tetrachloroethylene	127-18-4	>95

4. First-aid measures

General Advice

If symptoms persist, call a physician.

Eye Contact

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact

Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation

Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion

Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects

None reasonably foreseeable. May cause allergic skin reaction. Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Notes to Physician

Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media No information available

Flash Point No information available

Method - No information available

Autoignition Temperature No information available

Explosion Limits

Upper No data available

Lower No data available

Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. Containers may explode when heated.

Hazardous Combustion Products

Chlorine Hydrogen chloride gas Phosgene

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health
2

Flammability
0

Instability
0

Physical hazards
N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation.

Environmental Precautions Do not flush into surface water or sanitary sewer system.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and storage

Handling Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Ensure adequate ventilation. Avoid ingestion and inhalation.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from sunlight.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Tetrachloroethylene	TWA: 25 ppm STEL: 100 ppm	(Vacated) TWA: 25 ppm (Vacated) TWA: 170 mg/m ³ Ceiling: 200 ppm TWA: 100 ppm	IDLH: 150 ppm	TWA: 100 ppm TWA: 670 mg/m ³ TWA: 200 ppm TWA: 1250 mg/m ³ STEL: 200 ppm STEL: 1340 mg/m ³

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures

Use only under a chemical fume hood. Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment**Eye/face Protection**

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection

Long sleeved clothing.

Respiratory Protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	Characteristic, sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-22 °C / -7.6 °F
Boiling Point/Range	120 - 122 °C / 248 - 251.6 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	6.0 (Ether = 1.0)
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	18 mbar @ 20 °C
Vapor Density	No information available
Density	1.619
Specific Gravity	1.625
Solubility	0.15 g/L water (20°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 150°C
Viscosity	0.89 mPa s at 20 °C
Molecular Formula	C ₂ Cl ₄
Molecular Weight	165.83

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions.
Conditions to Avoid	Incompatible products. Excess heat. Exposure to moist air or water.
Incompatible Materials	Strong acids, Strong oxidizing agents, Strong bases, Metals, Zinc, Amines, Aluminium
Hazardous Decomposition Products	Chlorine, Hydrogen chloride gas, Phosgene
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	None under normal processing.

11. Toxicological information

Acute Toxicity

Product Information Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrachloroethylene	LD50 = 2629 mg/kg (Rat)	LD50 > 10000 mg/kg (Rat)	LC50 = 27.8 mg/L (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Tetrachloroethylene	127-18-4	Group 2A	Reasonably Anticipated	A3	X	A3

IARC: (International Agency for Research on Cancer)

NTP: (National Toxicity Program)

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

IARC: (International Agency for Research on Cancer)

Group 1 - Carcinogenic to Humans

Group 2A - Probably Carcinogenic to Humans

Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)

Known - Known Carcinogen

Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

A1 - Known Human Carcinogen

A2 - Suspected Human Carcinogen

A3 - Animal Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens

A1 - Confirmed Human Carcinogen

A2 - Suspected Human Carcinogen

A3 - Confirmed Animal Carcinogen

A4 - Not Classifiable as a Human Carcinogen

A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects No information available

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)

STOT - repeated exposure Kidney Liver Blood

Aspiration hazard No information available

Symptoms / effects, both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing

Endocrine Disruptor Information

Component	EU - Endocrine Disruptors Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Tetrachloroethylene	Group II Chemical	Not applicable	Not applicable

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Tetrachloroethylene	EC50: > 500 mg/L, 96h (Pseudokirchneriella subcapitata)	LC50: 4.73 - 5.27 mg/L, 96h flow-through (Oncorhynchus mykiss) LC50: 11.0 - 15.0 mg/L, 96h static (Lepomis macrochirus) LC50: 8.6 - 13.5 mg/L, 96h static (Pimephales promelas) LC50: 12.4 - 14.4 mg/L, 96h flow-through (Pimephales promelas)	EC50 = 100 mg/L 24 h EC50 = 112 mg/L 24 h EC50 = 120.0 mg/L 30 min	EC50: 6.1 - 9.0 mg/L, 48h Static (Daphnia magna)

Persistence and Degradability Insoluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility . Is not likely mobile in the environment due its low water solubility. Will likely be mobile in the environment due to its volatility.

Component	log Pow
Tetrachloroethylene	2.53 - 2.88

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrachloroethylene - 127-18-4	U210	-

14. Transport information

DOT

UN-No UN1897
 Proper Shipping Name TETRACHLOROETHYLENE
 Hazard Class 6.1
 Packing Group III

TDG

UN-No UN1897

Proper Shipping Name TETRACHLOROETHYLENE
 Hazard Class 6.1
 Packing Group III

IATA

UN-No UN1897
 Proper Shipping Name TETRACHLOROETHYLENE
 Hazard Class 6.1
 Packing Group III

IMDG/IMO

UN-No UN1897
 Proper Shipping Name TETRACHLOROETHYLENE
 Hazard Class 6.1
 Subsidiary Hazard Class P
 Packing Group III

15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Tetrachloroethylene	X	X	-	204-825-9	-		X	X	X	X	X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.

F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

S - Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Tetrachloroethylene	127-18-4	>95	0.1

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Tetrachloroethylene	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Tetrachloroethylene	X		-

OSHA Occupational Safety and Health Administration
 Not applicable

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Tetrachloroethylene	100 lb 1 lb	-

California Proposition 65 This product contains the following proposition 65 chemicals

Component	CAS-No	California Prop. 65	Prop 65 NSRL	Category
Tetrachloroethylene	127-18-4	Carcinogen	14 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Tetrachloroethylene	X	X	X	X	X

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant Y
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 10-Dec-2009

Revision Date 23-Jan-2018

Print Date 23-Jan-2018

Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Material Safety Data Sheet

1,1,1-Trichloroethane

ACC# 14370

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,1,1-Trichloroethane**Catalog Numbers:** AC294930000, AC294930250, AC294932500, AC327940000, AC327940010, AC327942500, S80231, T391-20, T391-4, T398-4**Synonyms:** Methyl chloroform; Methyltrichloromethane; Trichloroethane; Trichloromethylmethane; 1,1,1-TCE.**Company Identification:**

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100**Emergency Number:** 201-796-7100**For CHEMTREC assistance, call:** 800-424-9300**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
71-55-6	1,1,1-Trichloroethane	>96	200-756-3
123-91-1	1,4-Dioxane	2.5	204-661-8
106-88-7	1,2-Butylene oxide	0.47	203-438-2
75-52-5	Nitromethane	0.34	200-876-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid.

Warning! Causes eye, skin, and respiratory tract irritation. May be harmful if inhaled. May cause central nervous system depression. This is a CFC substance which destroys ozone in the upper atmosphere. Destruction of the ozone layer can lead to increased ultraviolet radiation which, with excess exposure to sunlight, can lead to an increase in skin cancer and eye cataracts.

Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes mild eye irritation. Vapors may cause eye irritation.

Skin: Causes skin irritation. Prolonged or repeated contact may dry/defat the skin and cause irritation. 1,4-Dioxane may cause an allergic skin reaction, and absorption of this substance may cause systemic toxicity. Methyl chloroform is an acknowledged skin irritant in guinea pigs, where a single topical application of 1 ml or repeated contact over 3 days causes edema, erythema, inflammation, and cellular degeneration. There is one case report of allergic contact dermatitis in a worker exposed to 1,1,1-trichloroethane. It is not possible to draw any conclusions from this single report.

Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Low hazard for usual industrial handling. Although there are no case reports of aspiration, it was induced in rats in one study. In addition, based on its physical properties (viscosity and surface tension), it seems likely that 1,1,1-trichloroethane can be aspirated.

Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause narcotic effects in high concentration. Causes irritation of the mucous membrane and upper respiratory tract. Numerous deaths due to depression of CNS

control of respiration and fatal cardiac arrhythmia have been reported from methyl chloroform inhalation (accidental or intentional) in poorly ventilated rooms, pits, tanks, and other small areas (Documentation of the TLV). Cases of intentional abuse of 1,1,1-trichloroethane in substances such as typewriter correction fluid for euphoric symptoms have been documented.

Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis. Exposure to high concentrations may cause central nervous system depression. Studies with solvent abusers have established that severe cardiac arrhythmias may result from cardiac sensitization, where the heart has an increased response to circulating epinephrine. In these cases, exposures by far exceeded occupational relevant levels. Liver effects have been observed in some animal studies at high

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.

Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Alcoholic beverage consumption may enhance the toxic effects of this substance.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is nonflammable. Vapors may accumulate in confined spaces Methyl chloroform burns only in excess oxygen or in air if a strong source of ignition is present. No flash point in conventional closed tester; however, vapors in containers can explode if subjected to high energy source.

Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.

Flash Point: Not applicable.

Autoignition Temperature: 500 deg C (932.00 deg F)

Explosion Limits, Lower:7.0 vol %

Upper: 16 vol %

NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation. Approach spill from upwind.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid breathing vapor.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in aluminum containers.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,1,1-Trichloroethane	350 ppm TWA; 450 ppm STEL	700 ppm IDLH	350 ppm TWA; 1900 mg/m ³ TWA
1,4-Dioxane	20 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous route	500 ppm IDLH	100 ppm TWA; 360 mg/m ³ TWA
1,2-Butylene oxide	none listed	none listed	none listed
Nitromethane	20 ppm TWA	750 ppm IDLH	100 ppm TWA; 250 mg/m ³ TWA

OSHA Vacated PELs: 1,1,1-Trichloroethane: 350 ppm TWA; 1900 mg/m³ TWA 1,4-Dioxane: 25 ppm TWA; 90 mg/m³ TWA 1,2-Butylene oxide: No OSHA Vacated PELs are listed for this chemical. Nitromethane: 100 ppm TWA; 250 mg/m³ TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: colorless

Odor: Sweet, mild chloroform-like.

pH: Not applicable.

Vapor Pressure: 100 mm Hg @ 20 deg C

Vapor Density: 4.55 (air=1)

Evaporation Rate: 1.0 (carbon tetrachloride=1)

Viscosity: 0.86 cP @ 20 deg C

Boiling Point: 74 deg C

Freezing/Melting Point: -33 deg C

Decomposition Temperature: > 260 deg C

Solubility: Insoluble.

Specific Gravity/Density: 1.338 (water=1)

Molecular Formula: C₂H₃Cl₃

Molecular Weight: 133.38

Section 10 - Stability and Reactivity

Chemical Stability: Because of 1,1,1-TCE's reactivity with magnesium, aluminum, & their alloys, inhibitors (like 1,4-dioxane, 1,3-dioxolane, isobutyl alcohol, or nitroethane) are often added to increase the stability of the solvent & prevent corrosion of metal parts. 1,1,1-Trichloroethane reacts slowly with water to produce hydrochloric acid.

Conditions to Avoid: High temperatures, ignition sources, moisture, confined spaces.

Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, aluminum, magnesium, chemically active metals.

Hazardous Decomposition Products: Hydrogen chloride, chlorine, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:

CAS# 71-55-6: KJ2975000

CAS# 123-91-1: JG8225000

CAS# 106-88-7: EK3675000

CAS# 75-52-5: PA9800000

LD50/LC50:

CAS# 71-55-6:

Draize test, rabbit, eye: 100 mg Mild;
Draize test, rabbit, eye: 2 mg/24H Severe;
Draize test, rabbit, skin: 5 gm/12D (Intermittent) Mild;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 3911 ppm/2H;
Inhalation, mouse: LC50 = 29492 ppm/10M;
Inhalation, rat: LC50 = 17000 ppm/4H;
Inhalation, rat: LC50 = 14250 ppm/7H;
Inhalation, rat: LC50 = 20000 ppm/2H;
Oral, mouse: LD50 = 6 gm/kg;
Oral, rabbit: LD50 = 5660 mg/kg;
Oral, rat: LD50 = 9600

CAS# 123-91-1:

Draize test, rabbit, eye: 100 mg Severe;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Inhalation, mouse: LC50 = 37 gm/m³/2H;
Inhalation, rat: LC50 = 46 gm/m³/2H;
Oral, mouse: LD50 = 5300 mg/kg;
Oral, rabbit: LD50 = 2 gm/kg;
Oral, rat: LD50 = 4200 mg/kg;
Skin, rabbit: LD50 = 7600 uL/kg;

CAS# 106-88-7:

Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 6300 mg/m³/4H;
Oral, rat: LD50 = 500 mg/kg;
Skin, rabbit: LD50 = 2100 uL/kg;

CAS# 75-52-5:

Oral, mouse: LD50 = 950 mg/kg;
Oral, rat: LD50 = 940 mg/kg;

Carcinogenicity:

CAS# 71-55-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 123-91-1:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 106-88-7:

- **ACGIH:** Not listed.
- **California:** Not listed.

- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

CAS# 75-52-5:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 5/1/97
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: No information found

Teratogenicity: Animal evidence suggests that 1,1,1-TCE is not teratogenic at exposures which are not maternally toxic. Slight fetotoxicity (for example, reduced fetal weight) has been reported at doses which were not maternally toxic.

Reproductive Effects: Animal evidence suggests that 1,1,1-TCE does not cause reproductive effects.

Mutagenicity: Evidence from studies using live animals suggests that 1,1,1-trichloroethane is not mutagenic.

Neurotoxicity: Some studies using sensitive neurobehavioural tests have shown altered scores for exposed workers. However, whether or not these results indicate nervous system damage is not clear. Other studies with 1,1,1-TCE have not shown any changes.

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: EC50 = 52.9 mg/L; 96 Hr; Flow-through at 25.5°C Fish: Bluegill/Sunfish: LC50 = 72 mg/L; 96 Hr; Static bioassay Fish: Fathead Minnow: LC50 = 52.9 mg/L; 96 Hr; Flow-through at 25.5°C Fish: Sheepshead minnow: LC50 = 53-72 mg/L; 96 Hr; Unspecified Water flea Daphnia: EC50 > 530 mg/L; 48 Hr; Unspecified Releases to surface water will decrease in concn almost entirely due to evaporation. Spills on land will decrease in concentration almost entirely due to volatilization and leaching.

Environmental: Releases to air may be transported long distances and partially return to earth in rain. In the troposphere, 1,1,1-trichloroethane will degrade very slowly by photooxidation and also slowly diffuse to the stratosphere where photodegradation will be rapid. This substance has a high potential for oxone depletion.

Physical: No information available.

Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series:

CAS# 71-55-6: waste number U226.

CAS# 123-91-1: waste number U108.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	1,1,1-TRICHLOROETHANE	1,1,1-TRICHLOROETHANE
Hazard Class:	6.1	6.1
UN Number:	UN2831	UN2831
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 71-55-6 is listed on the TSCA inventory.
CAS# 123-91-1 is listed on the TSCA inventory.
CAS# 106-88-7 is listed on the TSCA inventory.
CAS# 75-52-5 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 71-55-6: Effective 10/4/82, Sunset 10/4/92 CAS# 106-88-7: Effective 10/4/82, Sunset 10/4/92
CAS# 75-52-5: Effective 4/13/89, Sunset 12/19/95

Chemical Test Rules

CAS# 71-55-6: 40 CFR 799.5000

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 71-55-6: 1000 lb final RQ; 454 kg final RQ CAS# 123-91-1: 100 lb final RQ; 45.4 kg final RQ
CAS# 106-88-7: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 71-55-6: immediate.
CAS # 123-91-1: delayed, fire.
CAS # 106-88-7: immediate.
CAS # 75-52-5: immediate, delayed, fire, reactive.

Section 313

This material contains 1,1,1-Trichloroethane (CAS# 71-55-6, >96%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains 1,4-Dioxane (CAS# 123-91-1, 2.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains 1,2-Butylene oxide (CAS# 106-88-7, 0.47%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 71-55-6 is listed as a hazardous air pollutant (HAP).
CAS# 123-91-1 is listed as a hazardous air pollutant (HAP).
CAS# 106-88-7 is listed as a hazardous air pollutant (HAP).

CAS# 71-55-6 is listed as a Class 1 ozone depletor with an 0.1 ODP; 110 GWP

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 71-55-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 71-55-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

CAS# 75-52-5 is considered highly hazardous by OSHA.

STATE

CAS# 71-55-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 123-91-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 106-88-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 75-52-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

WARNING: This product contains 1,4-Dioxane, a chemical known to the state of California to cause cancer.

WARNING: This product contains Nitromethane, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 123-91-1: 30 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN N

Risk Phrases:

R 20 Harmful by inhalation.

R 59 Dangerous for the ozone layer.

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

S 59 Refer to manufacturer/supplier for information on recovery/recycling.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 71-55-6: 3

CAS# 123-91-1: 2

CAS# 106-88-7: 3

CAS# 75-52-5: 2

Canada - DSL/NDSL

CAS# 71-55-6 is listed on Canada's DSL List.

CAS# 123-91-1 is listed on Canada's DSL List.

CAS# 106-88-7 is listed on Canada's DSL List.

CAS# 75-52-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1B, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 71-55-6 is listed on the Canadian Ingredient Disclosure List.

CAS# 123-91-1 is listed on the Canadian Ingredient Disclosure List.

CAS# 75-52-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/11/1999**Revision #5 Date:** 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.



APPENDIX B

ACTIVITY HAZARD ANALYSES

Project Identification	Location 125 State Street. Site Westbury, NY	Estimated Dates TBD
Phase of Work Mobilization/ Demobilization	Page 1 of 1	Analysis Approved by Daren Murphy
TASKS	HAZARDS	CONTROL MEASURES
1. Mobilization and demobilization of equipment site tools, personnel	Slips/trips/falls	- Maintain alertness to slip/trip/fall hazards; - Maintain good housekeeping; - Walk, do not run; - Wear footwear with soles that grip; - Unloading areas should be on even terrain; and - Mark and repair if possible tripping hazards.
	Manual lifting and material handling	- Instruct personnel on proper lifting techniques; - Use proper lifting techniques; and - Team lifting will be used for heavy loads or use mechanical lifting devices.
	Temperature extremes	- Drink plenty of fluids; - Train personnel of signs/symptoms of heat/cold stress; - Monitor air temperatures when extreme weather conditions are present; and - Stay in visual and verbal contact with your buddy.
	Vehicular traffic	Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
	Overhead hazards	- Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; - Ground personnel will stay clear of suspended loads; - Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and - Overhead hazards will be identified prior to commencing work operations.
	Noise	Ear plugs or ear muffs shall be worn for operations that exceed 85 decibels.
	Electrocution	- Equipment will be equipped with GFCI; - A licensed electrician will conduct electrical work; - Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50kV.
	Biological hazards	- Be alert to the presence of biological hazards; - Wear insect repellent; - Follow procedures in Section 4.2.2 for tick bites; - FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.

Project Identification	Location 125 State Street Site Westbury, NY	Estimated Dates TBD
Phase of Work Drilling	Page 1 of 2	Analysis Approved by Daren Murphy
TASKS	HAZARDS	CONTROL MEASURES
1. Drill to required depths and collect soil samples/install wells.	Chemical hazards	- Wear appropriate PPE per Table 6-1; - Perform air monitoring per Community Air Monitoring Plan; - Practice contamination avoidance; - Follow proper decontamination procedures; and - Wash hands/face before eating, drinking or smoking.
	Hand and power tool usage	- Equip electrical equipment with GFCI's; - Inspect electrical equipment and tools prior to use; - Daily inspections will be performed; - Remove broken or damaged tools from service; - Use the tool for its intended purpose; - Use in accordance with manufacturer instructions; and - Tag and remove defective equipment.
	Temperature extremes	- Drink plenty of fluids; - Train personnel of signs/symptoms of heat/cold stress; - Monitor air temperatures when extreme weather conditions are present; and, - Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	- Instruct personnel on proper lifting techniques; - Use proper lifting techniques; and - Team lifting will be used for heavy loads or use mechanical lifting devices.
	Fire/Explosion	- ABC type fire extinguishers shall be readily available; - No smoking in workarea.
	Biological hazards	- Be alert to the presence of biological hazards; - Wear insect repellent; - Follow procedures in Section 4.2.2 for tick bites; - FTL/SHSO should be aware of on-site personnel with allergic reactions in insect bites and stings.
	Heavy equipment	- Ground personnel will stay clear of suspended loads; - Ground personnel will stay out of the swing radius; - Eye contact with operators will be made before approaching equipment; - Equipment will not be approached on blind sides; - Equipment will be equipped with backup alarms or spotters shall be used.
	Slips/Trips/Falls	- Maintain alertness to slip/trip/fall hazards; - Maintain good housekeeping; - Walk, do not run; - Wear footwear with soles that grip; - Unloading areas should be on even terrain; and mark and repair if possible, tripping hazards are present.
	Electrocution	- Equipment will be equipped with GFCI; - A licensed electrician will conduct electrical work; - Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50kV.

Project Identification	Location 125 State Street Site Westbury, NY	Estimated Dates TBD
Phase of Work Drilling	Page 1 of 1	Analysis Approved by Daren Murphy
TASKS	HAZARDS	CONTROL MEASURES
	Noise	- Hearing protection mandatory at or above 85 dBA. - Instruct personnel how to properly wear hearing protective devices. • Disposable ear plugs or other hearing protection required when working near noisy equipment.
	Steam/Heat/Splashing	- Use face shield and safety glasses or goggles; - Stay out of the splash/steam radius; - Do not direct steam at anyone; - Do not hold objects with your foot and steam area near it; - Direct spray to minimize spread of constituents of concern; and - Use shielding as necessary.
	Excavation hazards	Follow 29 CFR 1926 Subpart P.
	Overhead hazards	- Personnel will be required to wear hard hats that meet ANSI Standard Z89.1; - Ground personnel will stay clear of suspended loads; - Equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects; and - Overhead hazards will be identified prior to commencing work operations.
	Electrocution	- Equipment will be equipped with GFCI; - A licensed electrician will conduct electrical work; - Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50kV.

Project Identification	Location 125 State Street Site Westbury, NY	Estimated Dates TBD
Phase of Work Vapor/ Ambient Air Sampling	Page 1 of 1	Analysis Approved by Daren Murphy
TASKS	HAZARDS	CONTROL MEASURES
1. Collect vapor and ambient air samples.	Chemical hazards	- Wear appropriate PPE per Table 6-1; - Practice contamination avoidance; - Follow proper decontamination procedures; and - Wash hands/face before eating, drinking or smoking.
	Temperature extremes	- Drink plenty of fluids; - Train personnel of signs/symptoms of heat/cold stress; - Monitor air temperatures when extreme weather conditions are present; and - Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	- Maintain alertness to slip/trip/fall hazards; - Maintain good housekeeping; - Walk, do not run; - Wear footwear with soles that grip; - Unloading areas should be on even terrain; and - Mark and repair if possible tripping hazards.
	Electrocution	- Equipment will be equipped with GFCI; - A licensed electrician will conduct electrical work; - Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50kV.

Project Identification	Location 125 State Street Site Westbury, NY	Estimated Dates TBD
Phase of Work Decontamination	Page 1 of 1	Analysis Approved by Daren Murphy
TASKS	HAZARDS	CONTROL MEASURES
1. Decontaminate equipment	Chemical hazards	- Wear appropriate PPE per Table 6-1; - Practice contamination avoidance; - Follow proper decontamination procedures; and - Wash hands/face before eating, drinking or smoking.
	Temperature extremes	- Drink plenty of fluids; - Train personnel of signs/symptoms of heat/cold stress; - Monitor air temperatures when extreme weather conditions are present; and - Stay in visual and verbal contact with your buddy.
	Manual lifting and material handling	Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	Slips/Trips/Falls	- Maintain alertness to slip/trip/fall hazards; - Maintain good housekeeping; - Walk, do not run; - Wear footwear with soles that grip; - Unloading areas should be on even terrain; and - Mark and repair if possible, tripping hazards.
	Electrocution	- Equipment will be equipped with GFCI; - A licensed electrician will conduct electrical work; - Equipment will stay a minimum of 15 feet from overhead-energized electrical lines (up to 50 kV). This distance will increase 0.4 inches for each 1 kV above 50kV.



APPENDIX C

HEAT/COLD STRESS PROTOCOLS

HEAT STRESS

Heat Stress (Hyperthermia)

Heat stress is the body's inability to regulate the core temperature. A worker's susceptibility to heat stress can vary according to his/her physical fitness, degree of acclimation to heat, humidity, age and diet.

1. Prior to site activity, the field team leader may make arrangements for heat stress monitoring (i.e., monitoring heart rate, body temperature, and body water loss) during actual site work if conditions warrant. In addition, the FTL is to ensure that each team member has been acclimatized to the prevailing environmental conditions, that personnel are aware of the signs and symptoms of heat sickness, that they have been adequately trained in first aid procedures, and that there are enough personnel on-site to rotate work assignments and schedule work during hours of reduced temperatures. Personnel should not consume alcoholic or caffeinated beverages but rather drink moderate levels of an electrolyte solution and eat well prior to commencing site work.
2. Although there is no specific test given during a baseline physical that would identify a person's intolerance to heat, some indicators are tobacco or medication use, dietary habits, body weight, and chronic conditions such as high blood pressure or diabetes.
3. *Heat cramps*, caused by profuse perspiration with inadequate fluid intake and salt replacement, most often afflict people in good physical condition who work in high temperature and humidity. Heat cramps usually come on suddenly during vigorous activity. Untreated, heat cramps may progress rapidly to heat exhaustion or heat stroke. First aid treatment: remove victim to a cool place and replace lost fluids with water.
4. Thirst is not an adequate indicator of heat exposure. Drinking fluid by itself does not indicate sufficient water replacement during heat exposure. A general rule, the amount of water administered should replace the amount of water lost, and it should be administered at regular intervals throughout the day. For every half pound of water lost, 8 ounces of water should be ingested. Water should be replaced by drinking 2 – 4 ounce servings during every rest period. A recommended alternative to water is an electrolyte drink split 50/50 with water.

5. *Heat exhaustion* results from salt and water loss along with peripheral pooling of blood. Like heat cramps, heat exhaustion tends to occur in persons in good physical health who are working in high temperatures and humidity. Heat exhaustion may come on suddenly as dizziness and collapse. Untreated, heat exhaustion may progress to heat stroke.
6. *Treatment for heat exhaustion*: Move the victim to a cool environment (e.g. air-conditioned room/car), lay victim down and fan him/her. If the air-conditioning is not available, remove the victim to a shaded area, remove shirt, and fan. If symptoms do not subside within an hour, notify 911 to transport to hospital.
7. *Heat stroke* results from the body's inability to dissipate excess heat. A true medical emergency that requires immediate care, it usually occurs when one ignores the signs of heat exhaustion and continues strenuous activities. Working when the relative humidity exceeds 60% is a particular problem. Workers in the early phase of heat stress may not be coherent or they will be confused, delirious or comatose. Changes in behavior, irritability and combativeness are useful early signs of heat stroke.
8. *Treatment of heat stroke*: Move the victim to a cool, air-conditioned environment. Place victim in a semi-reclined position with head elevated and strip to underclothing. Cool victim as rapidly as possible, applying ice packs to the arms and legs and massaging the neck and torso. Spray victim with tepid water and constantly fan to promote evaporation. Notify 911 to transport to hospital as soon as possible.

TABLE 1

SYMPTOMS OF HEAT STRESS

Heat cramps are caused by heavy sweating with inadequate fluid intake. Symptoms include;

- Muscle cramps
- Cramps in the hands, legs, feet and abdomen

Heat exhaustion occurs when body organs attempt to keep the body cool. Symptoms include;

- | | |
|----------------------------------|--------------------|
| • Pale, cool moist skin | • Rapid heart rate |
| • Core temperature elevated 1-2° | • Heavy sweating |
| • Thirst | • Dizziness |
| • Anxiety | • Nausea |

Heat stroke is the most serious form of heat stress. Immediate action must be taken to cool the body before serious injury and death occur. Symptoms are;

- Red, hot, dry skin
- Lack of perspiration
- Seizures
- Dizziness and confusion
- Strong, rapid pulse
- Core temperature of 104° or above
- Coma

TABLE 2HEAT STRESS INDICATORS

Heat stress indicator	When to measure	If Exceeds...	Action
Heart rate (pulse)	Beginning of rest period	110 beats per minute	Shorten next work period by 33%
Oral temperature	Beginning of rest period	99°F (after thermometer is under tongue for 3 minutes)	Shorten next work period by 33%
		100.6°F	Prohibit work in impermeable clothing
Body weight	1. Before workday begins (a.m.) 2. After workday ends (p.m.)		Increase fluid intake

COLD STRESS

Cold stress (Hypothermia)

In hypothermia the core body temperature drops below 95°F. Hypothermia can be attributed to a decrease in heat production, increased heat loss or both.

Prevention

Institute the following steps to prevent overexposure of workers to cold:

1. Maintain body core temperature at 98.6°F or above by encouraging workers to drink warm liquids during breaks (preferably not coffee) and wear several layers of clothing that can keep the body warm even when the clothing is wet.
2. Avoid frostbite by adequately covering hands, feet and other extremities. Clothing such as insulated gloves or mittens, earmuffs and hat liners should be worn. To prevent contact frostbite (from touching metal and cold surfaces below 20°F), workers should wear gloves. Tool handles should be covered with insulating material.
3. Adjust work schedules to provide adequate rest periods. When feasible, rotate personnel and perform work during the warmer hours of the day.
4. Provide heated shelter. Workers should remove their outer layer(s) of clothing while in the shelter to allow sweat to evaporate.
5. In the event that wind barriers are constructed around an intrusive operation (such as drilling), the enclosure must be properly vented to prevent the buildup of toxic or explosive gases or vapors. Care must be taken to keep a heat source away from flammable substances.
6. Using a wind chill chart such as the one in Table 3, obtain the equivalent chill temperature (ECT) based on actual wind speed and temperature. Refer to the ECT when setting up work warm-up schedules, planning appropriate clothing, etc. Workers should use warming shelters at regular intervals at or below an ECT of 20°F. For exposed skin, continuous exposure should not be permitted at or below an ECT of -25°F.

Frostbite

Personnel should be aware of symptoms of frostbite/hypothermia. If the following symptoms are noticed in any worker, he/she should immediately go to a warm shelter.

Condition	Skin Surface	Tissue Under Skin	Skin Color
Frostnip	Soft	Soft	Initially red, then white
Frostbite	Hard	Soft	White and waxy
Freezing	Hard	Hard	Blotchy, white to yellow-gray to gray

1. *Frostnip* is the incipient stage of frostbite, brought about by direct contact with a cold object or exposure of a body part to cool/cold air. Wind chill or cold water also can be major factors. This condition is not serious. Tissue damage is minor and the response to care is good. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostnip.
2. *Treatment of frostnip*: Care for frostnip by warming affected areas. Usually the worker can apply warmth from his/her bare hands, blow warm air on the site, or, if the fingers are involved, hold them in the armpits. During recovery, the worker may complain of tingling or burning sensation, which is normal. If the condition does not respond to this simple care, begin treatment for frostbite.
3. *Frostbite*: The skin and subcutaneous layers become involved. If frostnip goes untreated, it becomes superficial frostbite. This condition is serious. Tissue damage may be serious. The worker must be transported to a medical facility for evaluation. The tip of the nose, tips of ears, upper cheeks and fingers (all areas generally exposed) are most susceptible to frostbite. The affected area will feel frozen, but only on the surface. The tissue below the surface must still be soft and have normal response to touch. *DO NOT* squeeze or poke the tissue. The condition of the deeper tissues can be determined by gently palpating the affected area. The skin will turn mottled or blotchy. It may also be white and then turn grayish-yellow.
4. *Treatment of frostbite*: When practical, transport victim as soon as possible. Get the worker inside and keep him/her warm. Do not allow any smoking or alcohol consumption. Thaw frozen parts by immersion, re-warming in a 100°F to 106°F water bath. Water temperature will

drop rapidly, requiring additional warm water throughout the process. Cover the thawed part with a dry sterile dressing. Do not puncture or drain any blisters.

NOTE: Never listen to myths and folk tales about the care of frostbite. *Never* rub a frostbitten or frozen area. *Never* rub snow on a frostbitten or frozen area. Rubbing the area may cause serious damage to already injured tissues. Do not attempt to thaw a frozen area if there is any chance it will be re-frozen.

5. *General cooling/Hypothermia:* General cooling of the body is known as systemic hypothermia. This condition is not a common problem unless workers are exposed to cold for prolonged periods of time without any shelter.

Body Temperature	°C	Symptoms
99-96	37-35.5	Intense, uncontrollable shivering
95-91	35.5-32.7	Violent shivering persists. If victim is conscious, he has difficulty speaking.
90-86	32-30	Shivering decreases and is replaced by strong muscular rigidity. Muscle coordination is affected. Erratic or jerkey movements are produced. Thinking is less clear. General comprehension is dulled. There may be total amnesia. The worker is generally still able to maintain the appearance of psychological contact with his surroundings.
85-81	29.4-27.2	Victim becomes irrational, loses contact with his environment, and drifts into a stuporous state. Muscular rigidity continues. Pulse and respirations are slow and the worker may develop cardiac arrhythmias.
80-78	26.6-18.5	Victim becomes unconscious. He does not respond to the spoken word. Most reflexes cease to function. Heartbeat becomes erratic
Below 78	25.5	Cardiac and respiratory centers of the brain fail. Ventricular fibrillation occurs; probably edema and hemorrhage in the lungs; death.

6. *Treatment of hypothermia:* Keep worker dry. Remove any wet clothing and replace with dry clothes, or wrap person in dry blankets. Keep person at rest. Do not allow him/her to move around. Transport the victim to a medical facility as soon as possible.

TABLE 3⁽¹⁾
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS AN
EQUIVALENT TEMPERATURE (UNDER CALM CONDITIONS)

Estimated wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	10	20	30	40	50	60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	15	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-146
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER in < hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute				GREAT DANGER Flesh may freeze within 30 seconds.			
	Trench foot and immersion foot may occur				at any point on this chart							

Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

(1) Reproduced from American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1985-1986, p.01.



APPENDIX D

MEDICAL DATA SHEET

Medical Data Sheet	
Name:	
Date:	
Phone:	
Emergency contact:	
Medical Conditions:	
Allergies:	
Current Medications:	



APPENDIX E

GENERAL HEALTH AND SAFETY WORK PRACTICES



GENERAL HEALTH AND SAFETY WORK PRACTICES

1. Site personnel must attend each day's Daily Briefing and sign the attendance sheet.
2. Any individual taking prescribed drugs shall inform the FTL/HSO of the type of medication. The FTL/HSO will review the matter with the HSM and the Corporate Medical Consultant (CMC), who will decide if the employee can safely work on-site while taking the medication.
3. The personal protective equipment specified by the FTL/HSO and/or associated procedures shall be worn by site personnel. This includes hard hats and safety glasses which must be worn in active work areas.
4. Facial hair (beards, long sideburns or mustaches) which may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.
5. Personnel must follow proper decontamination procedures and shower as soon as possible upon completion of work shift.
6. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the exclusion zone or the contamination reduction zone. (Exceptions may be permitted by the HSM to allow fluid intake during heat stress conditions).
7. Lighters, matches, cigarettes and other forms of tobacco are prohibited in the Exclusion Zone.
8. Signs and demarcations shall be followed. Such signs and demarcation shall not be removed, except as authorized by the FTL/HSO.
9. No one shall enter a permit-required confined space without a permit and appropriate training. Confined space entry permits shall be implemented as issued.
10. Personnel must follow Hot Work Permits as issued.
11. Personnel must use the Buddy System in the Exclusion Zone.
12. Personnel must follow the work-rest regimens and other practices required by the heat stress program.



13. Personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.
14. No person shall operate equipment unless trained and authorized.
15. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.
16. Ladders and scaffolds shall be solidly constructed, in good working condition, and inspected prior to use. No one may use defective ladders or scaffolds.
17. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.
18. Safety belts, harnesses and lanyards must be selected by the Supervisor. The user must inspect the equipment prior to use. No defective personal fall protection equipment shall be used. Personal fall protection that has been shock loaded must be discarded.
19. Hand and portable power tools must be inspected prior to use. Defective tools and equipment shall not be used.
20. Ground fault interrupters shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out walkways and puddles unless protected and rated for the service.
21. Improper use, mishandling, or tampering with health and safety equipment and samples is prohibited.
22. Horseplay of any kind is prohibited.
23. Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.
24. Incidents, no matter how minor, must be reported immediately to the Supervisor.
25. Personnel shall be familiar with the Site Emergency Action Plan, which is contained in Section 12 of the HASP/EAP.

The above Health and Safety Rules are not all inclusive and it is your responsibility to comply with regulations set forth by OSHA, the client, Castleton Supervisors, and the FTL/HSO.

APPENDIX F

HOSPITAL ROUTE MAP AND DIRECTIONS

9 min (2.8 miles)



via Carman Ave

Best route now due to traffic conditions

125 State St

Westbury, NY 11590

↑ Head south on State St toward Summa Ave

331 ft

← Turn left at the 1st cross street onto Summa Ave

0.3 mi

↪ Turn right onto Frost St

 Pass by Starbucks (on the right in 0.2 mi)

0.2 mi

↪ Turn right onto Old Country Rd

302 ft

← Turn left onto Carman Ave Ext

0.2 mi

↑ Continue onto Carman Ave

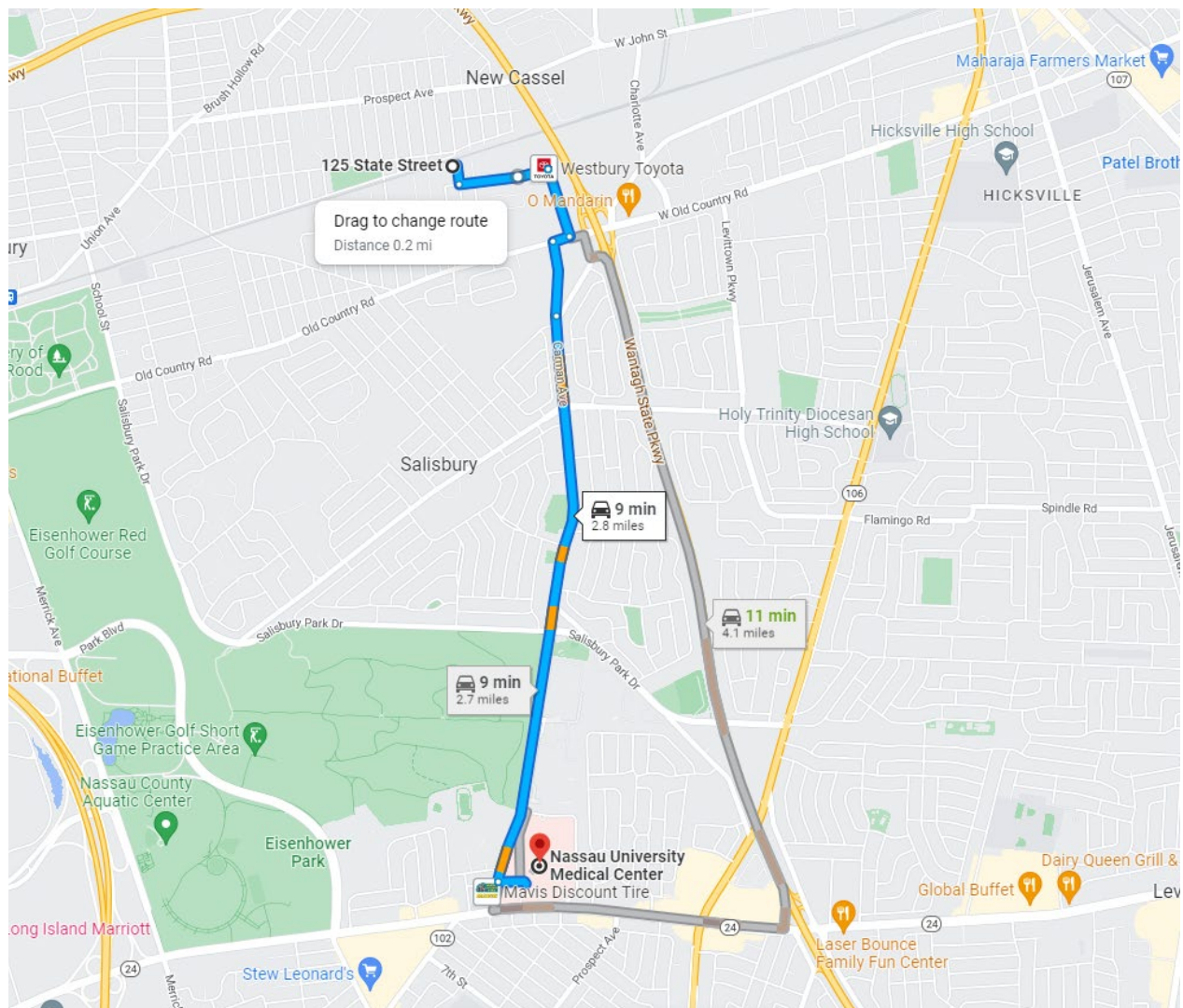
1.8 mi

← Turn left at Dofena Ln

499 ft

Nassau University Medical Center

2201 Hempstead Tpke, East Meadow, NY 11554





APPENDIX G

INCIDENT REPORT FORM/INVESTIGATION FORM

INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 1 OF 2		
TYPE OF INCIDENT - CHECK ALL THAT APPLY		
☐ INJURY/ILLNESS	☐ VEHICLE DAMAGE	☐ PROPERTY DAMAGE
☐ SPILL/RELEASE	☐ PERMIT EXCEEDENCE	☐ NEAR MISS
☐ FIRE		
☐ OTHER		
GENERAL INFORMATION		
PROJECT NAME:	DATE OF REPORT:	REPORT NO.:
DATE OF INCIDENT:	TIME:	DAY OF WEEK:
LOCATION OF INCIDENT:		
WEATHER CONDITIONS: ADEQUATE LIGHTING AT SCENE? ☐ YES ☐ NO ☐ N/A		
DESCRIBE WHAT HAPPENED (STEP BY STEP - USE ADDITIONAL PAGES IF NECESSARY)		
AFFECTED EMPLOYEE INFORMATION		
NAME:	EMPLOYEE: ☐ YES ☐ NO	
HOME ADDRESS:		
SOCIAL SECURITY NO.:	HOME PHONE NO.:	
JOB CLASSIFICATION:	YEARS IN JOB CLASSIFICATION:	
HOURS WORKED ON SHIFT PRIOR TO INCIDENT: AGE:		
DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION? ☐ YES ☐ NO		
INJURY/ILLNESS INFORMATION		
NATURE OF INJURY OR ILLNESS:		
OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM:		
FIRST AID PROVIDED? ☐ YES ☐ NO		
IF YES, WHERE WAS IT GIVEN: ☐ ON-SITE ☐ OFF-SITE		
IF YES, WHO PROVIDED FIRST AID:		
WILL THE INJURY/ILLNESS RESULT IN: ☐ RESTRICTED DUTY ☐ LOST TIME ☐ UNKNOWN		

INCIDENT / NEAR MISS REPORT AND INVESTIGATION - PAGE 2 OF 2		REPORT NO.
MEDICAL TREATMENT INFORMATION		
WAS MEDICAL TREATMENT PROVIDED? ☐ YES ☐ NO		
IF YES, WAS MEDICAL TREATMENT PROVIDED: ☐ ON-SITE ☐ DR.'S OFFICE ☐ HOSPITAL		
NAME OF PERSON(S) PROVIDING TREATMENT:		
ADDRESS WHERE TREATMENT WAS PROVIDED:		
TYPE OF TREATMENT:		
VEHICLE AND PROPERTY DAMAGE INFORMATION		
VEHICLE/PROPERTY DAMAGED:		
DESCRIPTION OF DAMAGE:		
SPILL AND AIR EMISSIONS INFORMATION:		
SUBSTANCE SPILLED OR RELEASED:		FROM WHERE: TO WHERE:
ESTIMATED QUANTITY/DURATION:		
CERCLA HAZARDOUS SUBSTANCE? ☐ YES ☐ NO		
REPORTABLE TO AGENCY? ☐ YES ☐ NO SPECIFY:		
WRITTEN REPORT: ☐ YES ☐ NO TIME FRAME:		
RESPONSE ACTION TAKEN:		
PERMIT EXCEEDENCE		
TYPE OF PERMIT:		PERMIT #:
DATE OF EXCEEDENCE:		DATE FIRST KNOWLEDGE OF EXCEEDENCE:
PERMITTED LEVEL OR CRITERIA:		
EXCEEDENCE LEVEL OR CRITERIA:		
REPORTABLE TO AGENCY? ☐ YES ☐ NO SPECIFY:		
WRITTEN REPORT: ☐ YES ☐ NO TIME FRAME:		
RESPONSE ACTION TAKEN:		
NOTIFICATIONS		
NAMES OF PERSONNEL NOTIFIED:		DATE/TIME:
CLIENT NOTIFIED:		DATE/TIME:
AGENCY NOTIFIED:		DATE/TIME:
CONTACT NAME:		
PERSONS PREPARING REPORT		
EMPLOYEE'S NAME:(PRINT)		SIGN:
SUPERVISOR'S NAME:(PRINT)		SIGN:

INVESTIGATIVE REPORT			
DATE OF INCIDENT:		DATE OF REPORT: REPORT NUMBER:	
INCIDENT COST: ESTIMATED: \$		ACTUAL: \$	
OSHA RECORDABLE(S): ☐ YES ☐ NO		# RESTRICTED DAYS	# DAYS AWAY FROM WORK
CAUSE ANALYSIS			
IMMEDIATE CAUSES - WHAT ACTIONS AND CONDITIONS CONTRIBUTED TO THIS EVENT?			
BASIC CAUSES - WHAT SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT?			
ACTION PLAN			
REMEDIAL ACTIONS - WHAT HAS AND OR SHOULD BE DONE TO CONTROL EACH OF THE CAUSES			
ACTION	PERSON RESPONSIBLE	TARGET DATE	COMPLETION DATE
PERSONS PERFORMING INVESTIGATION			
INVESTIGATOR'S NAME: (PRINT)		SIGN:	DATE:
INVESTIGATOR'S NAME: (PRINT)		SIGN:	DATE:
INVESTIGATOR'S NAME: (PRINT)		SIGN:	DATE:
MANAGEMENT REVIEW			
PROJECT MANAGER: (PRINT)		SIGN:	DATE:
COMMENTS:			
H&S MANAGER: (PRINT)		SIGN:	DATE:
COMMENTS:			



EXAMPLES OF IMMEDIATE CAUSES

Substandard Actions

1. Operating equipment without authority
2. Failure to warn
3. Failure to secure
4. Operating at improper speed
5. Making safety devices inoperable
6. Removing safety devices
7. Using defective equipment
8. Failure to use PPE properly
9. Improper loading
10. Improper placement
11. Improper lifting
12. Improper position for task
13. Servicing equipment in operation
14. Under influence of alcohol/drugs
15. Horseplay

Substandard Conditions

1. Guards or barriers
2. Protective equipment
3. Tools, equipment, or materials
4. Congestion
5. Warning system
6. Fire and explosion hazards
7. Poor housekeeping
8. Noise exposure
9. Exposure to hazardous materials
10. Extreme temperature exposure
11. Illumination
12. Ventilation
13. Visibility

EXAMPLES OF BASIC CAUSES

Personal Factors

1. Capability
2. Knowledge
3. Skill
4. Stress
5. Motivation
6. Work Standards
7. Wear and tear
8. Abuse or misuse

Job Factors

1. Supervision
2. Engineering
3. Purchasing
4. Maintenance
5. Tools/equipment

MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS

1. Leadership and administration
2. Management training
3. Planned inspections
4. Task analysis and procedures
5. Task observation
6. Emergency preparedness
7. Organizational rules
8. Accident/incident analysis
9. Personal protective equipment
10. Health control
11. Program audits
12. Engineering controls
13. Personal communications
14. Group meetings
15. General promotion
16. Hiring and placement
17. Purchasing controls



APPENDIX H

DAILY BRIEFING SIGN-IN SHEET



DAILY BRIEFING SIGN-IN SHEET

Date: _____

Project Name/Location: _____

Person Conducting Briefing: _____

1. AWARENESS (topics discussed, special safety concerns, recent incidents, etc.)

2. OTHER ISSUES (HASP/EAP changes, attendee comments, etc.)

3. ATTENDEES (Print Name):

1.	21.
2.	22.
3.	23.
4.	24.
5.	25.
6.	26.
7.	27.
8.	28.
9.	29.
10.	30.
11.	31.
12.	32.
13.	33.
14.	34.
15.	35.
16.	36.
17.	37.
18.	38.
19.	39.
20.	40.