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Pre-Design Investigation Scope of Work
Katzman Recycling Site
NYSDEC Site No. 558035
Granville, New York

This Pre-Design Investigation (PDI) Scope of Work describes proposed investigation activities for the Katzman Recycling Site (the Site) located at 24 County Route 26 in the Town of Granville, Washington County, New York (refer to **Figure 1** for Site Location). The specific focus of this Scope of Work is related to further defining the lateral and vertical extent of polychlorinated biphenyl (PCB) impacts in surface and subsurface soil at the Site, to provide a basis for volume estimates and a remediation cost estimate, and to support final design of the remedial action.

This PDI Scope of Work has been prepared, consistent with the Record of Decision (ROD) for the Site, and in accordance with Title 6 of New York Codes, Rules and Regulations (6 NYCRR) Part 375 and New York State Department of Environmental Conservation (NYSDEC) Technical Guidance for Site Investigation and Remediation (DER-10).

The results of the Scope of Work will be provided to the United States Environmental Protection Agency (USEPA) in the Risk-Based Disposal Approval application, to be submitted after completion of the investigation. We anticipate implementing this PDI Scope of Work in June 2022, and expect to submit the Risk-Based Disposal Approval application in December 2022.

1.0 INTRODUCTION

1.1 General

The Site is managed under the NYSDEC inactive hazardous waste disposal site program (State Superfund Program) and is listed as Site No. 558035. The investigation and design tasks are being completed by TRC Engineers, Inc. (TRC) under a Superfund Standby Engineering Contract with the NYSDEC. The activities described in this document will be performed in accordance with TRC's Field Activities Plan (FAP), Health & Safety Plan (HASP), and Quality Assurance Project Plan (QAPP), prepared for this Contract and applicable to the work assignment. In addition, a Site-Specific HASP has been developed for this project and can be found in **Appendix A**.

During ground intrusive activities, air monitoring for volatile organic compounds (VOCs) and particulate matter will be accomplished at the upwind and downwind Exclusion Zone (EZ) perimeter to document real time contaminant and dust levels potentially migrating away from the work area. All Community Air Monitoring Plan (CAMP) activities, response levels, and actions will be in accordance with requirements of NYSDEC DER-10, Appendices 1A and 1B, NYSDOH Generic CAMP and Fugitive Dust and Particulate Monitoring, respectively (**Appendix B**).

1.2 Site Description

There is no known zoning plan in the Town of Granville; however, according to the Washington County property description records, the property is zoned Commercial. The surrounding parcels are currently used for a combination of commercial, agricultural, and residential purposes. The approximately 20.3-

acre Site is bounded by County Route 26 and commercial properties to the west (refer to **Figure 2**). Adjacent to the Site along the southwestern boundary is a tractor equipment supplier and New York State Route 22. Warner's Auto Body, an auto sales and repair business, is directly north of the western portion of the property, and vehicles associated with the auto body property have been observed encroaching on the Site. Further north are athletic fields and farmland. Directly east of the Site is a former Delaware and Hudson Railroad roadbed that has been converted into a recreational trail. Further to the east are agricultural land and undeveloped land.

1.3 Site History and Use

In or around 1949, the property was purchased by Samuel Katzman, who subsequently operated the Site as a facility which accepted various metal products for recovery and recycling. This operation continued for about 58 years, until approximately 2007. A former incinerator building used during historical operations is centrally located on the Site (refer to **Figure 3**). Associated incinerator waste (i.e., used auto parts, carburetors, chain saws, automobiles, heavy equipment, white goods, transformer carcasses, capacitors, and other electrical equipment) is present to the north, west, and south of the structure, as well as in a pile located along the embankment in the southwest part of the Site. The area east of the former incinerator building has been identified as a location where capacitors and transformers were likely dismantled. Additionally to the east of the former incinerator building, several older model automobiles were discovered, scattered throughout the woods. There is a dilapidated pole barn, which was potentially used for storage and mechanical work, near the northwestern corner of the Site. Note that detailed operational records for the Site are not available.

1.4 Investigation and Remediation History

Investigation of the Site began in 2006, when the NYSDEC conducted a limited Site sampling event to identify contaminants of concern south and east of the former incinerator building. Based on the findings, the Site was classified as a Class 2 Inactive Hazardous Waste Disposal Site by the NYSDEC and assigned Site No. 558035.

Between October 2014 and January 2015, an Interim Remedial Measure (IRM) was implemented which included the excavation of surface soil and former transformer "windings" impacted with polychlorinated biphenyls (PCBs), lead, and arsenic south and east of the incinerator building. Approximately 2,200 tons of soil were removed and transported off-Site for disposal. The excavations were reportedly backfilled to ground surface with imported soil.

Between December 2015 and June 2017, a Remedial Investigation (RI) was undertaken. Field activities consisted of wetland and waterbody delineation; a land survey of property boundaries, topography, prominent Site features/structures, and RI sampling locations; advancement of test pits and direct push soil borings; installation of groundwater monitoring wells; collection and laboratory analysis of soil, groundwater, surface water, and sediment samples; and the removal of a 2,000-gallon aboveground storage tank (AST) from the former incinerator building. Detailed descriptions of the RI field activities and findings are included in the RI Report and are summarized within this document. The RI results indicated that PCB impacts were present in several areas across the Site, but most consistently associated with areas surrounding the former incinerator building.
A Focused Feasibility Study (FFS), prepared by TRC, was completed in August 2018 to evaluate remedial alternatives for PCB impacts in soil. A ROD was subsequently issued in February 2020, describing the selected remedy: Excavation to Commercial Use Soil Cleanup Objectives (CU-SCO) with future Site

Management. The ROD further identifies the CU-SCO for total PCBs in soil as 1 milligram per kilogram (mg/kg) in surface soils and 10 mg/kg in subsurface soils.

1.5 Planned Remedial Design and Remedial Action

Based on the selected remedy, the primary elements of the Planned Remedial Design and Remedial Action include:

- Pre-Design and Remedial Design Activities:
  - Site clearing, sorting, and consolidation of the various piles of rubbish and debris;
  - Demolition of the former incinerator building;
  - Completion of a PDI to further define the horizontal and vertical extents of PCB impacts, delineating to a target of 1 mg/kg (subject of this Scope of Work); and
  - Completion of the Remedial Design.
- Remedial Action Activities:
  - Excavation and removal of PCB impacted surface soil (>1 mg/kg, 1-foot depth) and subsurface soil (>10 mg/kg); approximate volume of 9,400 cubic yards;
  - Verification sampling consistent with NYSDEC guidelines (30-foot grid);
  - Disposal of excavated soil with PCBs >10 mg/kg and <50 mg/kg at a permitted off-Site disposal facility;
  - Disposal of excavated soil with PCBs ≥50 mg/kg at a Toxic Substances Control Act (TSCA)-regulated facility;
  - Reuse of excavated soil ≤10 mg/kg as backfill, 1 foot or greater below ground surface;
  - Completion of backfilling of the subsurface zone using supplemental imported backfill material; and,
  - Importing and placing a clean soil cover consistent with NYSDEC Part 375 Regulations and vegetation.
- Engineering and Institutional Controls:
  - Cover System – Where a soil cover is to be used it will be a minimum of one foot of soil placed over a demarcation layer, with the upper six inches of soil of sufficient quality to maintain a vegetative layer;
  - Institutional Controls – Imposition of an institutional control in the form of an environmental easement for the controlled property; and,
  - Site Management Plan – The Site Management Plan will be prepared following completion of the Remedial Action and will describe the soil below the cover layer (subsurface soil with PCB concentrations equal to or less than 10 mg/kg and above 1 mg/kg) and applicable land and groundwater use restrictions and engineering controls for the Site. The Site Management Plan will detail the steps and media-specific requirements necessary to ensure the institutional and engineering controls remain in place and effective.

The project is currently in the PDI phase, with upcoming activities including debris sorting and consolidation of the various debris piles, as well as demolition of the former incinerator building. Completion of these activities will provide access to previously inaccessible areas and facilitate completion of the PDI. The following sections discuss the data collected and delineation activities performed to date, as well as the planned PDI and delineation activities to be performed in advance of the Remedial Design.

2.0 SUMMARY OF FOCUSED PCB DELINEATION ACTIVITIES AND RESULTS

2.1 Investigation Summary

In November 2016, as part of the RI field work, a supplemental subsurface investigation was completed for the purpose of further defining the extent of PCB impacts in soil. Soil samples were collected from a total of 36 locations where PCBs had previously been identified above the SCOs, extending both horizontally and vertically beyond the limits of previously identified impacts. The additional soil boring locations were advanced on an approximately 40-foot by 40-foot grid over the former waste accumulation area (refer to **Figures 4** through **10**). Sample locations were adjusted in the field as necessary to account for large debris piles, trees, and the former incinerator building.

Soil samples were collected continuously in 5-foot long by 2-inch diameter macro-core samplers to a minimum depth of 10 feet below ground surface (bgs). Borings were advanced an additional 4 feet in 2 locations (KTZ-SB-C7 and KTZ-SB-D2) where debris was encountered at or near 10 feet bgs. Soil samples collected from each boring were screened with a photoionization detector (PID) and inspected for indications of impacts (e.g., staining, odors, etc.).

Soil samples were divided into 2-foot long intervals for laboratory analysis of PCBs by USEPA Method 8082A. The specific intervals submitted for laboratory analysis were 0 – 2 feet bgs, 2 – 4 feet bgs, 4 – 6 feet bgs, 6 – 8 feet bgs, 8 – 10 feet bgs, 10 – 12 feet bgs (2 borings), and 12 – 14 feet bgs (2 borings). The results of the analyses are summarized below and on **Figures 5** through **10**.

2.2 Summary of Results

0 – 2 feet bgs:

Twenty-four of the 36 soil samples collected from the 0 – 2 feet bgs interval exhibited total PCB concentrations above the surface soil CU-SCO of 1 mg/kg (refer to **Figures 4** and **5**). The locations included: KTZ-SB-A1, KTZ-SB-A2, KTZ-SB-A3, KTZ-SB-B1, KTZ-SB-B2, KTZ-SB-B3, KTZ-SB-B4, KTZ-SB-C1, KTZ-SB-C2, KTZ-SB-C3, KTZ-SB-C4, KTZ-SB-C5, KTZ-SB-D3, KTZ-SB-D5, KTZ-SB-D6, KTZ-SB-E1, KTZ-SB-E2, KTZ-SB-E3, KTZ-SB-E4, KTZ-SB-E5, KTZ-SB-E6, KTZ-SB-E7, KTZ-SB-F3, and KTZ-SB-F7. Total PCB concentrations ranged from 1.77 mg/kg (KTZ-SB-A3) to 1,093 mg/kg (KTZ-SB-C4).

Concentrations of PCBs in samples collected from several test pit locations also exceeded the CU-SCO for surface soil. As appropriate, these test pit sample locations (KTZ-TP-7, KTZ-TP-13, KTZ-TP-17, AND KTZ-TP-22) are also shown on **Figure 5**.

Samples from six isolated locations beyond the main waste accumulation area also contained concentrations that slightly exceeded the CU-SCO for surface soil. Concentrations at these outlying locations ranged from 1.22 mg/kg (KTZ-SS-27) to 4.95 mg/kg (KTZ-TP-28).

2 – 4 feet bgs:

Eight of the 36 soil samples collected from the 2 – 4 feet bgs interval exhibited total PCB concentrations above the subsurface soil CU-SCO of 10 mg/kg (refer to **Figures 4** and **6**). The eight locations are as follows: KTZ-SB-B2, KTZ-SB-B3, KTZ-SB-B6, KTZ-SB-C5, KTZ-SB-C7, KTZ-SB-D2, KTZ-SB-D4, and KTZ-SB-E4. Total PCB concentrations ranged from 10 mg/kg (KTZ-SB-B2) to 120 mg/kg (KTZ-SB-C5).

Concentrations of PCBs in samples collected from several test pit locations also exceeded the CU-SCO for subsurface soil. As appropriate, these test pit sample locations (KTZ-TP-11, KTZ-TP-13, and KTZ-TP-15) are also shown on **Figure 6**.

4 – 6 feet bgs:

Six of the 36 soil samples collected from the 4 – 6 feet bgs interval exhibited total PCB concentrations above the subsurface soil CU-SCO of 10 mg/kg (refer to **Figures 4 and 7**). The six locations are as follows: KTZ-SB-B5, KTZ-SB-B6, KTZ-SB-C2, KTZ-SB-C6, KTZ-SB-D4, and KTZ-SB-E6. Total PCB concentrations ranged from 11.2 mg/kg (KTZ-SB-C2) to 180 mg/kg (KTZ-SB-B5).

The concentration of PCBs in a sample from test pit location KTZ-TP-18 also exceeded the CU-SCO for subsurface soil as shown on **Figure 7**.

6 – 8 feet bgs:

Four samples collected from the 6 – 8 feet bgs interval exhibited total PCB concentrations above the subsurface soil CU-SCO of 10 mg/kg (refer to **Figures 4** and **8**). The four locations are as follows: KTZ-SB-B6, KTZ-SB-C6, KTZ-SB-D1, and KTZ-SB-D3. Total PCB concentrations ranged from 11.31 mg/kg (KTZ-SB-D3) to 24.9 mg/kg (KTZ-SB-B6).

8 – 10 feet bgs:

Two soil samples collected from the 8 – 10 feet bgs interval exhibited total PCB concentrations above the subsurface soil CU-SCO of 10 mg/kg (refer to **Figures 4** and **9**). Total PCB concentrations at these two locations were 33 mg/kg at KTZ-SB-D2 and 36 mg/kg at KTZ-SB-C6.

10 – 12 feet bgs:

Two of the soil borings (KTZ-SB-C7 and KTZ-SB-D2) were advanced to 12 feet bgs and 1 soil sample collected from 10 – 12 feet bgs from each boring was submitted for analysis. Neither sample exhibited a total PCB concentration above the subsurface soil CU-SCO.

12 – 14 feet bgs:

Two of the soil borings (KTZ-SB-C7 and KTZ-SB-D2) were advanced to 14 feet bgs and 1 soil sample collected from 12 – 14 feet bgs from each boring was submitted for analysis. Neither sample exhibited a total PCB concentration above the subsurface soil CU-SCO.

3.0 PLANNED PRE-DESIGN INVESTIGATION SCOPE OF WORK

In order to complete the delineation of the horizontal and vertical extent of PCB impacts in soil for the remedial design, a PDI soil sampling program has been developed and is described in this section. **Figure 10** illustrates the proposed sampling locations and **Table 1** presents the sampling intervals proposed for analysis. As part of the soil boring program, soil sampling will additionally be performed in the wooded area east of the former incinerator building, in response to questions expressed during the ROD public comment period. Additionally, borings will be advanced into the slope southwest of the former incinerator building to further characterize the nature and extent of the debris in this part of the Site.

The PDI scope of work has been developed targeting a Site-wide PCB delineation value of 1 mg/kg (surface and subsurface), in response to a USEPA request. Delineation and removal of surface soil with PCB concentrations greater than 1 mg/kg is consistent with the ROD. However, remediation of subsurface soil with concentrations greater than 1 mg/kg PCBs is not a requirement of the ROD.

Impacted subsurface soil with PCBs concentrations above 1 mg/kg PCBs will be identified, documented and included in the Site Management Plan as part of the remedy.

A direct push drill rig will be used to advance soil borings to further define the lateral and vertical extent of PCB impacts (i.e., PCB concentrations greater than 1 mg/kg in surface and subsurface soil) and to further delineate the areas of PCB concentrations in soil equal to or greater than 50 mg/kg. The locations proposed for these soil borings are illustrated on **Figure 10**, and the sampling plan is provided in **Table 1**. Soil samples will be collected continuously from ground surface to their completion depth (at most locations), inspected and classified by soil type, and screened with a PID. Samples from selected intervals (indicated in **Table 1**) will be placed in laboratory provided glassware, and shipped to an analytical laboratory for analysis. Surface soil samples will be collected using a dedicated/disposable scoop or spoon. Additional details regarding the proposed sampling plan are presented below.

- Approximately 14 soil borings (KTZ-SB-201 through KTZ-SB- 214) will be advanced in and around areas that were previously inaccessible (below waste piles and beneath the former incinerator building). These borings will be advanced to a depth of 12 feet bgs and sampled continuously. Including surface soil samples collected from the upper 2 inches of soil, approximately 98 samples will be submitted to the analytical laboratory for analysis of PCBs. Refer to **Table 1** for the intervals targeted for laboratory analysis.

- Approximately 5 soil borings (KTZ-SB-215 through KTZ-SB- 219) will be advanced within the footprint of the large debris/waste accumulation area located southwest of the former incinerator building, along the slope. These borings will be advanced to a depth of up to 20 feet or 2 feet into native material, whichever is shallower, and sampled continuously. Due to the difference in surface elevations, borings KTZ-SB-215 and KTZ-SB-219 are expected to be advanced to the full depth of 20 feet, while at KTZ- SB-216, KTZ-SB-217, and KTZ-SB-218, it is expected that native material will be encountered at shallower depth (16 feet bgs is expected). Samples will be collected as noted above, except surface soil samples will not be collected in this area due to the non-native nature of the material. Approximately 28 samples will be submitted to the analytical laboratory for analysis for PCBs. Refer to **Table 1** for the intervals targeted for laboratory analysis.
- Approximately 9 soil borings (KTZ-SB-220 through KTZ-SB- 228) will be advanced in areas where PCBs were previously found at concentrations at or above 50 mg/kg, to further delineate (laterally), with the objective of minimizing the volume of soil that will need to be managed as TSCA-regulated material. These borings will be advanced to the depths that PCBs were previously detected at elevated concentrations and sampled continuously. Approximately 32 samples will be submitted to the analytical laboratory for analysis of PCBs. Refer to **Table 1** for the intervals targeted for laboratory analysis.

- Approximately 12 soil borings (KTZ-SB-229 through KTZ-SB- 240) will be advanced around the perimeter of the main waste accumulation area, focusing on locations where PCBs have been previously detected at concentrations above 1 mg/kg in surface and/or subsurface soil. These borings will be advanced to the depths that PCBs were previously detected at elevated concentrations and sampled continuously. Approximately 42 samples will be submitted to the analytical laboratory for analysis of PCBs. Refer to **Table 1** for the intervals targeted for laboratory analysis.

- Up to six composite soil samples will be collected from selected borings for waste characterization purposes. These samples will be submitted to the analytical laboratory for analysis of full waste characterization parameters.

- Four borings will be advanced at previously investigated location KTZ-SB-C4, KTZ-SB-C5, KTZ-SB-C6, and KTZ-SB-D4, to further delineate the vertical extent of contamination at these locations. These borings will be advanced to a depth of 10 feet bgs without sampling. Each boring will then be extended to an overall depth of 14 feet bgs, and 2 samples (from each boring) will be collected and submitted to the analytical laboratory for analysis for PCBs. Refer to **Table 1** for the intervals targeted for laboratory analysis.

- Up to 10 surface soil samples will be collected and analyzed for PCBs. The surface soil samples will be collected in the vicinity of the "outlying" locations discussed previously, where surface soils with PCB concentrations above 1 mg/kg were identified (locations KTZ-SS-2, KTZ-SS-5, and KTZ-SS-16 [not shown on the map]).

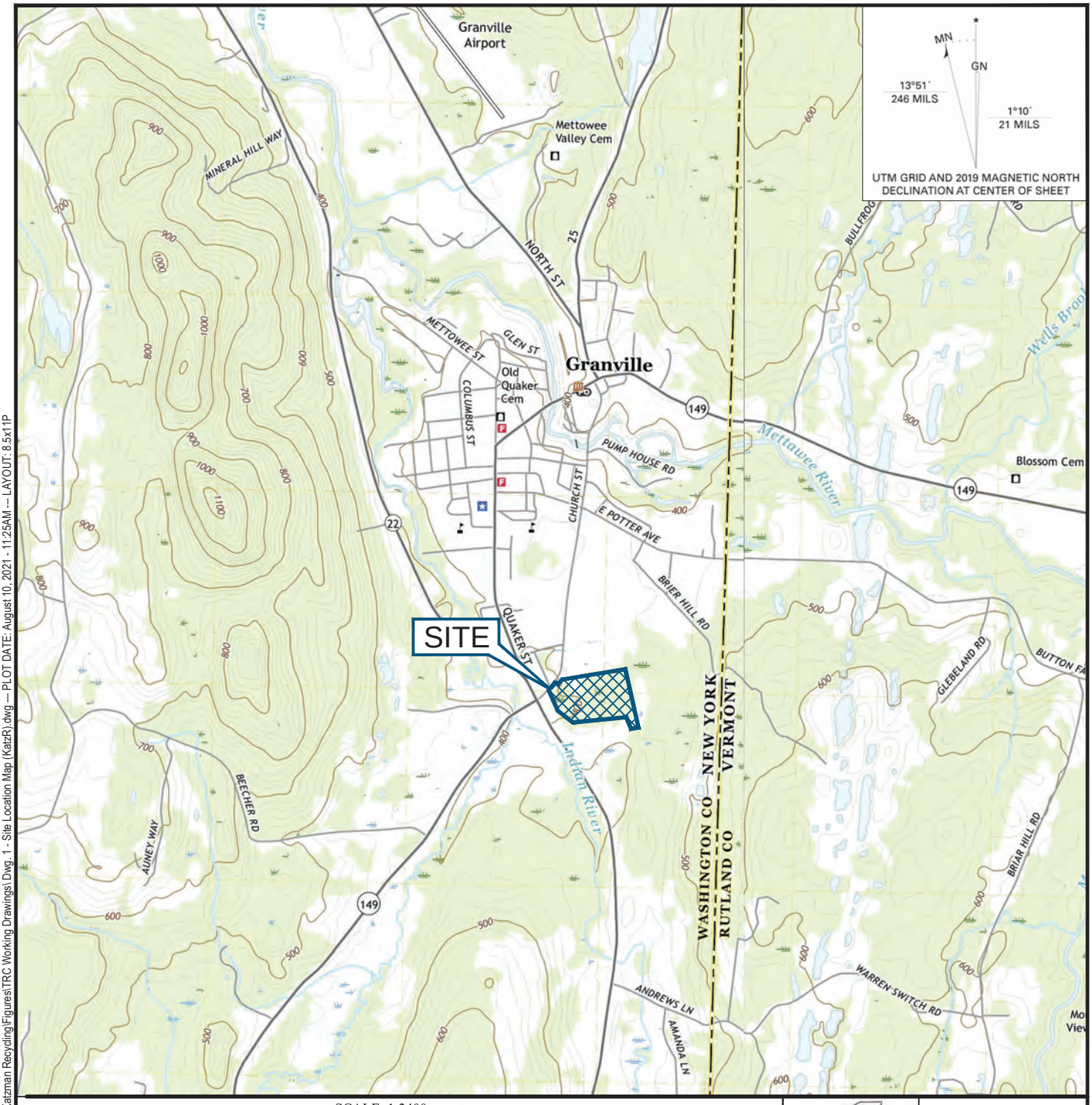
- Additionally, up to 10 soil borings will be advanced in the eastern portion of the Site. The locations will be selected in the field based on surface conditions and access. Samples will be collected from the surface (0 to 2 inches) and from 2 – 4 feet bgs. Soil samples will be inspected, classified by soil type, and screened with a PID. Each sample (i.e., a total of approximately 20 soil samples) will be submitted to the analytical laboratory for analysis of PCBs.

Groundwater samples from two monitoring wells, KTZ-MW-3 and KTZ-MW-4, will be collected and analyzed for Target Compound List (TCL) Volatile Organic Compounds (VOCs), TCL Semi-Volatile Organic Compounds (SVOCs), PCBs, Target Analyte List (TAL) metals (including mercury and cyanide), pesticides, and herbicides to determine treatment needs (if any) associated with potential dewatering of the remedial excavations. Both filtered and unfiltered samples will be analyzed.

4.0 REPORTING

The results of the PDI will be used to finalize the impacted material volume estimates above the target delineation value of 1 mg/kg, as well as above the CU-SCOs of 1 mg/kg for surface soil and 10 mg/kg for subsurface soil, which is consistent with the ROD. The PDI results will be further used to refine the remedial action cost estimate, as well as to support the design of the remedy. The results will also be used for preparation of a Risk-Based Disposal Application in accordance with Title 40 of the Code of Federal Regulations (40 CFR) Part 761.61(c). The Risk-Based Application is expected to be submitted for USEPA review in December 2022.

Figures



SCALE: 1:2400

1 0.5 0 KILOMETERS 1 2

1000 500 0 METERS 1000 2000

1 0.5 0 1

MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

FEET

MAP INCLUDES INFORMATION FROM THE FOLLOWING MAP SHEET(S):
TP, GRANVILLE, NY, 7.5 MINUTE DATED 2019,
E, WELLS, VT, 7.5 MINUTE DATED 2019.

MAP OBTAINED THROUGH USE OF TOPOVIEW WITH THE INTERFACE CREATED BY THE NATIONAL GEOLOGIC MAP DATABASE PROJECT (NGMDB), IN SUPPORT OF THE TOPOGRAPHIC MAPPING PROGRAM, MANAGED BY THE USGS NATIONAL GEOSPATIAL PROGRAM (NGP).

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PROJECT:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING - SITE NO. 558035
GRANVILLE, NY 12822

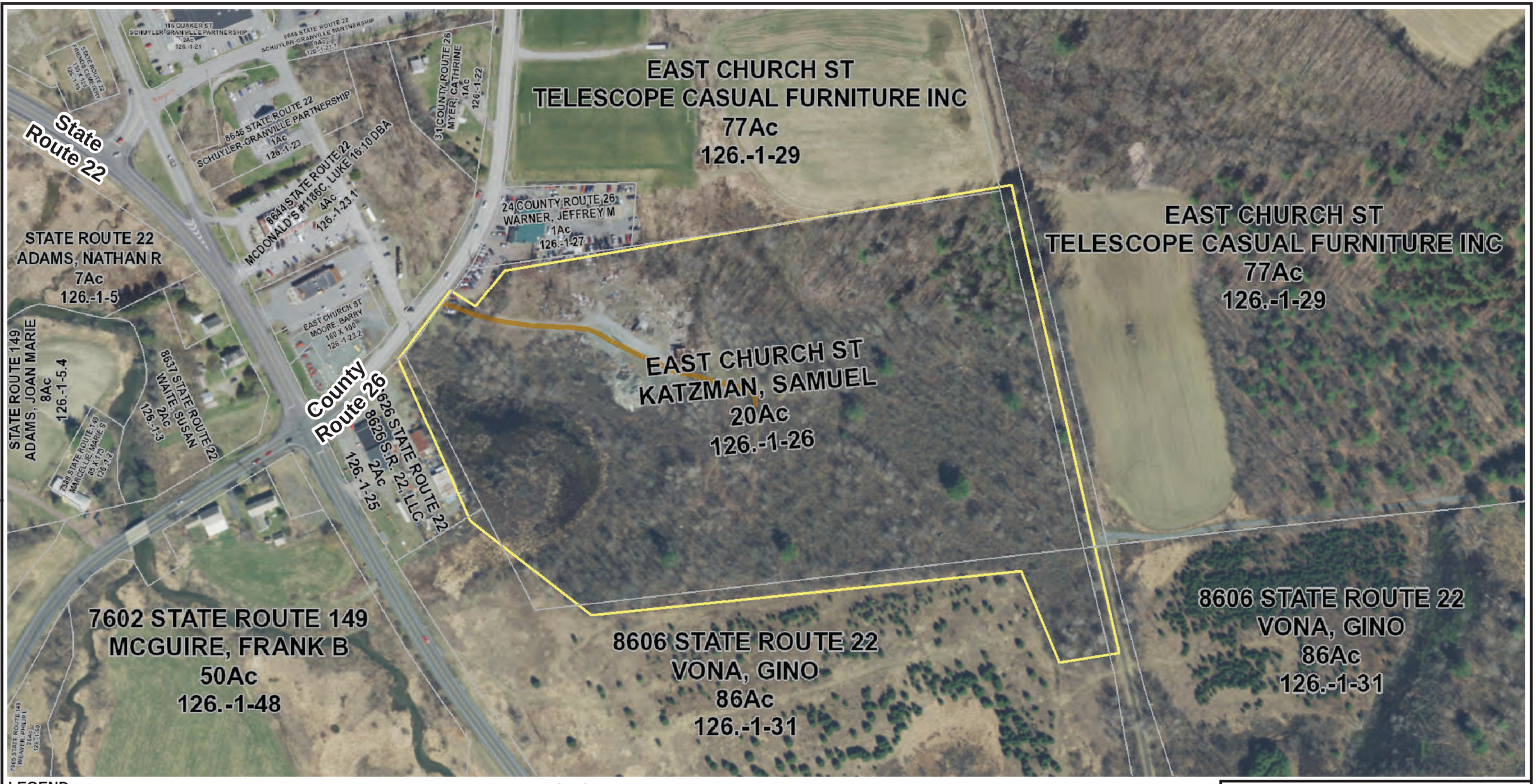
TITLE:

SITE LOCATION MAP

DRAWN BY:	H. DELGADO
CHECKED BY:	J. LAROCK
APPROVED BY:	K. SULLIVAN
DATE:	MARCH 2022
PROJ. NO.:	432260.0000.0000
FILE:	Dwg. 1 - Site Location Map (KatzR).dwg

FIGURE 1

8.5x11 --- ATTACHED XREF'S: --- ATTACHED IMAGES: NY_Granville_20190920_TM; VT_Wells_20190702_TM;
DRAWING NAME: B:\NYSDEC\D009812\Work Assignments\D009812-16 Katzman Recycling\Figures\TRC Working Drawings\ Dwg. 1 - Site Location Map (KatzR).dwg --- PLOT DATE: August 10, 2021 - 11:25AM --- LAYOUT: 8.5x11P



LEGEND

- ACCESS ROAD
- PROJECT AREA
- PARCELS

NOTES

1. BASE MAP IMAGERY FROM ESRI, VERMONT 2016.
2. PARCELS FROM WASHINGTON COUNTY NEW YORK, GIS WEBMAP.

N

0 200 400 Feet

1 " = 200 '

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING - SITE NO: 558035
GRANVILLE, NY 12832

TITLE:
PROJECT LIMITS AND VICINITY MAP

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		FIGURE 2
DATE:	MARCH 2022		

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FILE NO.: 240658-0004-001.mxd

TRC - GIS
Coordinate System: NAD 1983 UTM Zone 18N (Meter)
Map Rotation: 0
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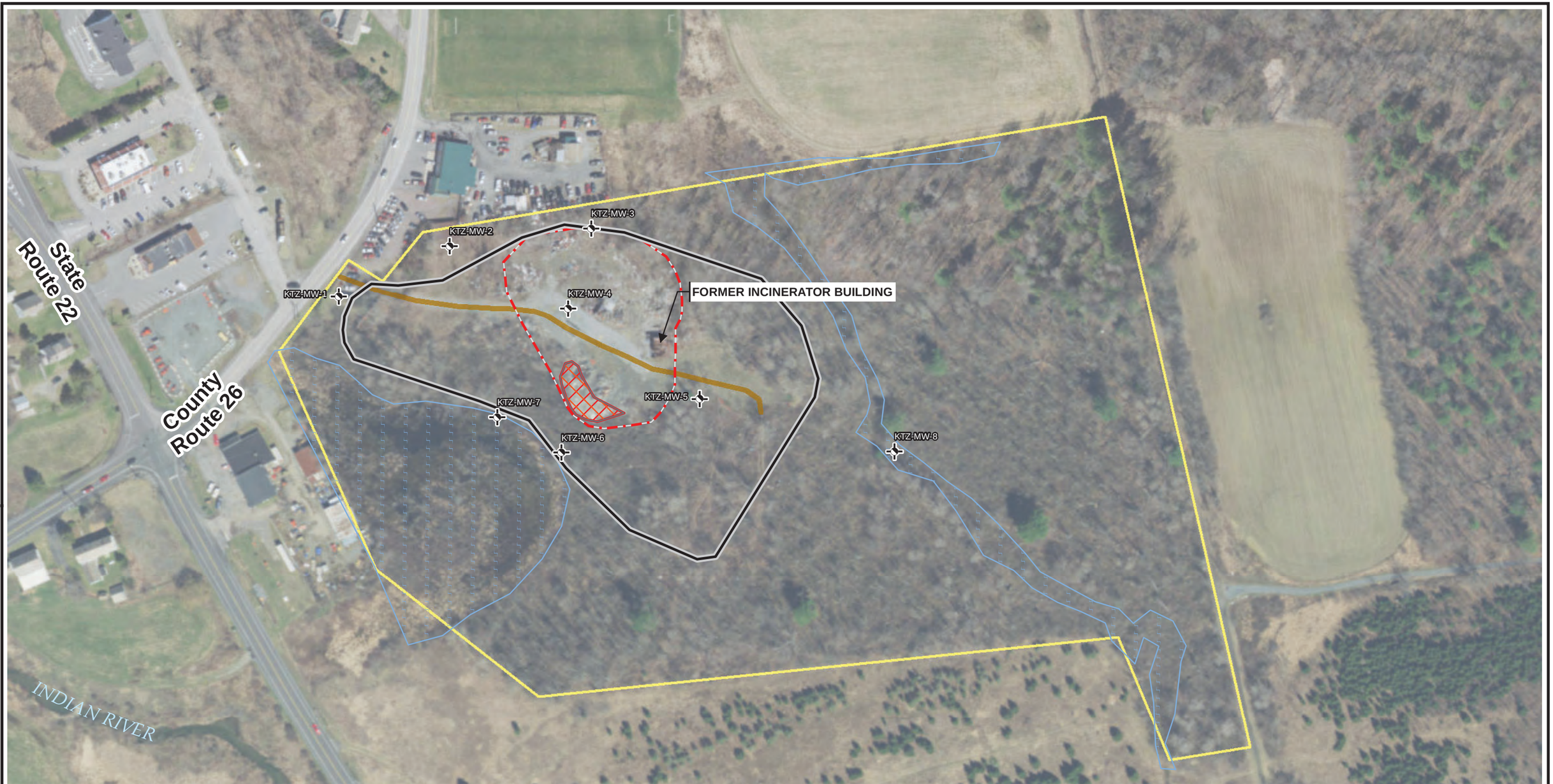

LEGEND

- GROUNDWATER MONITORING WELL LOCATION
- APPROXIMATE AREA OF CONCERN
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- DEBRIS PILE
- DELINEATED WETLAND
- PROJECT AREA
- ACCESS ROAD

NOTES

1. BASE MAP IMAGERY FROM ESRI, VERMONT 2016.

0 150 300 Feet

1 " = 150 '

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING - SITE NO: 558035
GRANVILLE, NY 12832

TITLE:
SITE LAYOUT

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		FIGURE 3
DATE:	MARCH 2022		

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FILE NO.: 240658-0004-002.mxd

Plot Date: 12/27/2017, 14:15:55 PM by BDEEGAN -- LAYOUT: ANSI B(11"x17")
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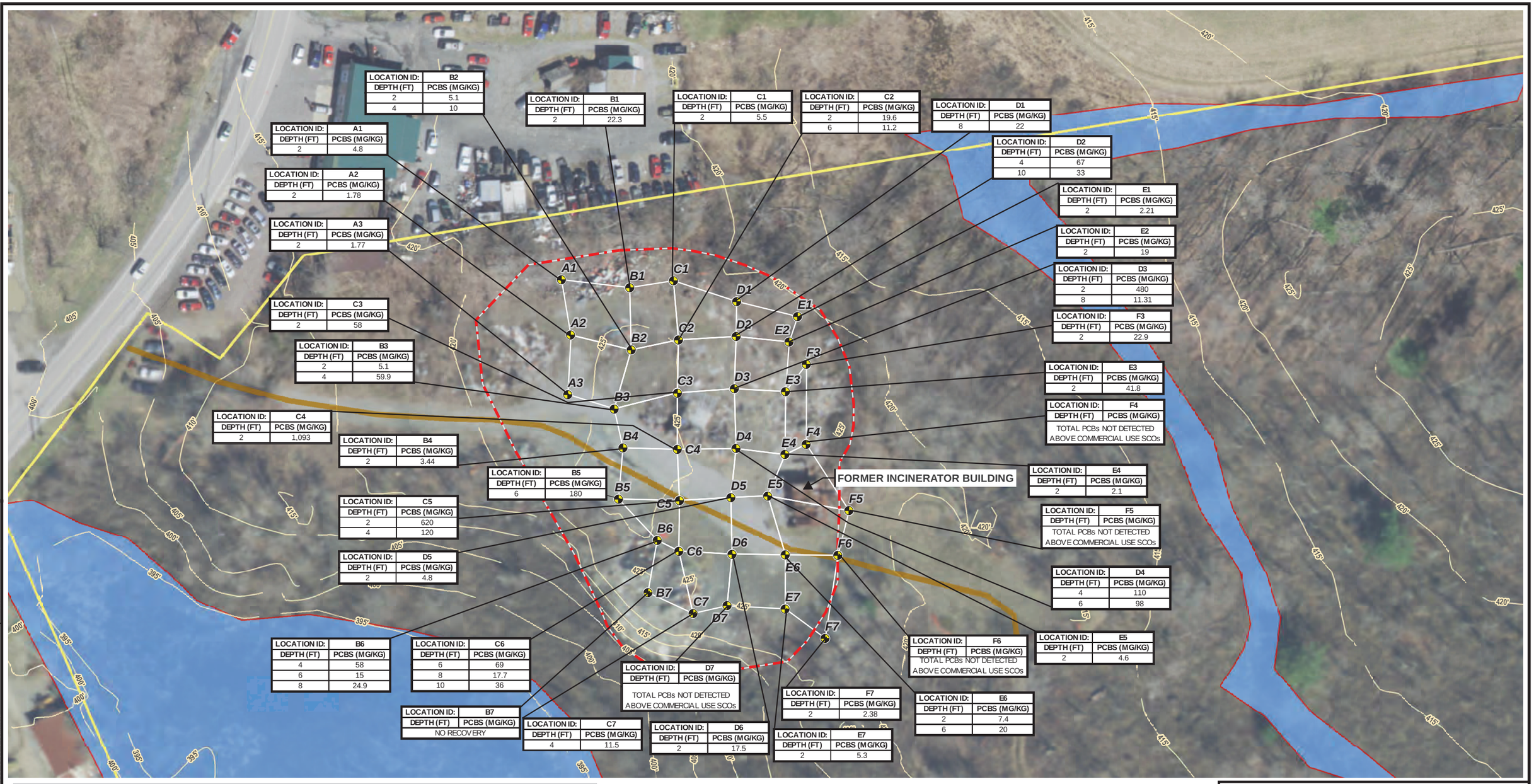
Map Rotation: 0

TRC - GIS



LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT
- PROJECT AREA
- ACCESS ROAD
- DELINEATED WETLAND
- GROUND SURFACE ELEVATION CONTOUR (FEET)
- SAMPLING GRID
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA

PCB DATA

LOCATION ID:	C4
DEPTH (FT)	PCBS (MG/KG)
2	1,093
6	6.5
8	6.1
10	1.94

PCBs-POLYCHLORINATED BIPHENYLS
MG/KG-MILLIGRAMS PER KILOGRAM
FT-FEET
SCO-SOIL CLEANUP OBJECTIVE

NOTES

1. BASE MAP IMAGERY FROM ESRI/VERMONT, 2016
2. ANALYTICAL RESULTS SHOWN EXCEED NYSDEC COMMERCIAL USE SCO FOR PCBs (1.0 MG/KG FOR SURFACE SOILS, 10 MG/KG FOR SOILS AT DEPTH).
3. CORRESPONDING ANALYTICAL QUALIFIERS ARE SHOWN ON TABLE 7 INCLUDED IN THE KATZMAN RECYCLING SITE REMEDIAL INVESTIGATION REPORT.

N

0 70 140 Feet

1 " = 70 '

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO:558035
GRANVILLE, NY 12832

TITLE: **SUPPLEMENTAL SOIL PCB INVESTIGATION ANALYTICAL SUMMARY NOVEMBER 2016**

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		**FIGURE 4**
DATE:	MARCH 2022		

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FILE NO.: 240658-0003-015a.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane New York East FIPS 3101 Feet (Foot US)
Map Rotation: 0
Plot Date: 7/20/2018, 09:37:21 AM by SMAJOR -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\NYSDEC\240658 Katzman\240658-0003-015a.mxd

TRC - GIS

KTZ-SS-27	
ANALYTE	CONCENTRATION (MG/KG)
PCBs	
TOTAL PCBs	1.22

KTZ-SS-1	
ANALYTE	CONCENTRATION (MG/KG)
PCBs	
TOTAL PCBs	4.0

KTZ-SS-2	
ANALYTE	CONCENTRATION (MG/KG)
PCBs	
TOTAL PCBs	2.18

KTZ-SS-5	
ANALYTE	CONCENTRATION (MG/KG)
PCBs	
TOTAL PCBs	4.5

KTZ-SS-16	
ANALYTE	CONCENTRATION (MG/KG)
PCBs	
TOTAL PCBs	2.0

KTZ-TP-28	
ANALYTE	CONCENTRATION (MG/KG)
PCBs	
TOTAL PCBs	4.95

LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT - NO RECOVERY
- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING
- SOIL BORING LOCATION - JULY 2016 SAMPLING
- SURFACE SOIL SAMPLING LOCATION
- TEST PIT SOIL SAMPLING LOCATION
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- ACCESS ROAD
- GROUND SURFACE ELEVATION CONTOUR (FEET)
- APPROXIMATE AREA OF PCB CONCENTRATIONS THAT EXCEED COMMERCIAL USE SCO (1.0 MG/KG)
- SAMPLE GRID
- PROJECT AREA
- DELINEATED WETLAND

NOTES

1. BASE MAP IMAGERY FROM ESRI.VERMONT, 2016.
2. AREAS THAT ARE NOT SHADED DID NOT EXHIBIT PCB CONCENTRATIONS GREATER THAN THE COMMERCIAL USE SOIL CLEANUP OBJECTIVE (SCO).
3. MG/KG – MILLIGRAMS PER KILOGRAM
4. ANALYTICAL RESULTS SHOWN EXCEED NYSDEC COMMERCIAL USE SCO FOR PCBs (1.0 MG/KG)
5. CORRESPONDING ANALYTICAL DATA AND ASSOCIATED QUALIFIERS ARE SHOWN ON TABLES 1C, 2C, 5C, AND 7 INCLUDED IN THE KATZMAN RECYCLING SITE REMEDIAL INVESTIGATION REPORT.

0 100 200 Feet

1 " = 100 '

PROJECT:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO: 558035
GRANVILLE, NY 12832

TITLE:

PCBs IN SOIL @ 0-2' BGS
NOVEMBER 2016

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		**FIGURE 5**
DATE:	MARCH 2022		

TRC
10 Maxwell Drive, Suite 200
Clifton Park, NY 12065
Phone: 518.348.1190
www.trcsolutions.com

FILE NO.: 240658-0003-015d2.mxd

Coordinate System: NAD 1983 UTM Zone 18N (Meter)
Map Rotation: 0
Plot Date: 1/11/2018, 12:50:56 PM by SMAJOR -- LAYOUT: ANSI B(11"x17")
Path: D:\PROJECTS\AUGUSTA\RMD\240658_Katzman\240658-0003-015d2.mxd

TRC - GIS

Coordinate System: NAD 1983 UTM Zone 18N (Meter)
Map Rotation: 0

Plot Date: 4/20/2018, 08:02:32 AM by BDEEGAN – LAYOUT: ANSI B (11"x17")
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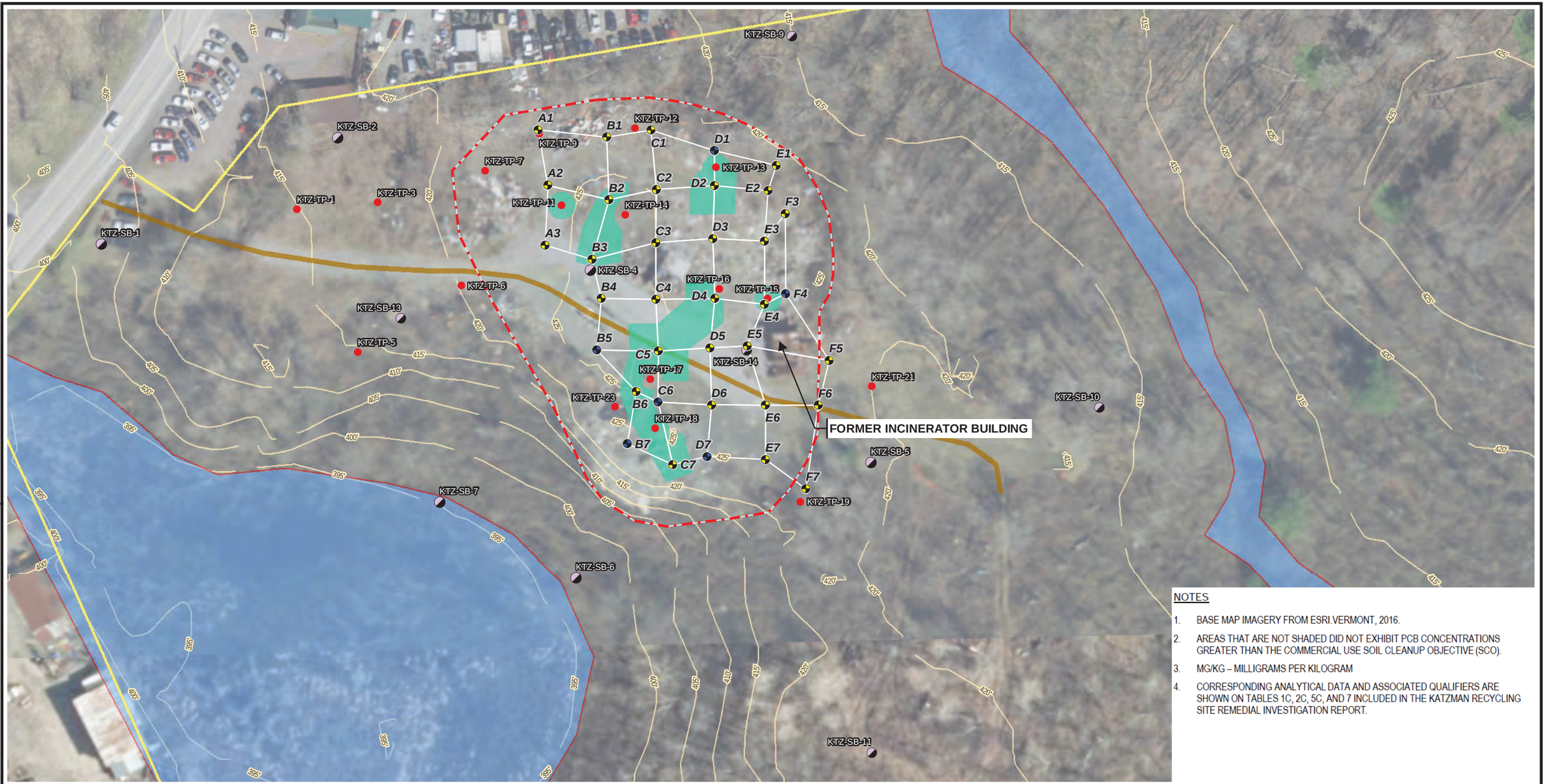

NOTES

1. BASE MAP IMAGERY FROM ESRI.VERMONT, 2016.
2. AREAS THAT ARE NOT SHADED DID NOT EXHIBIT PCB CONCENTRATIONS GREATER THAN THE COMMERCIAL USE SOIL CLEANUP OBJECTIVE (SCO).
3. MG/KG – MILLIGRAMS PER KILOGRAM
4. CORRESPONDING ANALYTICAL DATA AND ASSOCIATED QUALIFIERS ARE SHOWN ON TABLES 1C, 2C, 5C, AND 7 INCLUDED IN THE KATZMAN RECYCLING SITE REMEDIAL INVESTIGATION REPORT.

LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT - NO RECOVERY
- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT
- SOIL BORING LOCATION - JULY 2016 SAMPLING
- TEST PIT SOIL SAMPLING LOCATION
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- ACCESS ROAD
- GROUND SURFACE ELEVATION CONTOUR (FEET)
- APPROXIMATE AREA OF PCB CONCENTRATIONS THAT EXCEED COMMERICAL USE SCO (10.0 MG/KG) FOR SOILS >1' BGS
- SAMPLE GRID
- PROJECT AREA
- DELINEATED WETLAND

N

0 70 140 Feet

1 " = 70 '

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO: 558035
GRANVILLE, NY 12832

TITLE:
PCBs IN SOIL @ 2-4' BGS
NOVEMBER 2016

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		**FIGURE 6**
DATE:	MARCH 2022		

TRC
10 Maxwell Drive, Suite 200
Clifton Park, NY 12065
Phone: 518.371.0780
www.trcsolutions.com

FILE NO.: 240658-0003-015g.mxd

TRC - GIS

Coordinate System: NAD 1983 UTM Zone 18N (Meter)
Map Rotation: 0

Plot Date: 4/20/2018, 08:05:05 AM by BDEEGAN -- LAYOUT: ANSI B(11"x17")
Path: S:\11-PROJECTS\NYSDEC\240658_Katzman\240658-0003-015j.mxd

County Route 26

KTZ-SB-9
KTZ-SB-3
KTZ-TP-12
KTZ-TP-9
KTZ-TP-7
KTZ-TP-1
KTZ-TP-13
KTZ-SB-4
KTZ-SB-13
KTZ-SB-14
KTZ-TP-21
KTZ-SB-10
KTZ-TP-23
KTZ-TP-18
KTZ-SB-5
KTZ-SB-7
KTZ-SB-8
KTZ-SB-11

A1 B1 C1 D1 E1 F1
A2 B2 C2 D2 E2 F2
A3 B3 C3 D3 E3 F3
B4 C4 D4 E4 F4
B5 C5 D5 E5 F5
B6 C6 D6 E6 F6
B7 C7 D7 E7 F7

FORMER INCINERATOR BUILDING

NOTES

1. BASE MAP IMAGERY FROM ESRI.VERMONT, 2016.
2. AREAS THAT ARE NOT SHADED DID NOT EXHIBIT PCB CONCENTRATIONS GREATER THAN THE COMMERCIAL USE SOIL CLEANUP OBJECTIVE (SCO).
3. MG/KG – MILLIGRAMS PER KILOGRAM
4. CORRESPONDING ANALYTICAL DATA AND ASSOCIATED QUALIFIERS ARE SHOWN ON TABLES 1C, 2C, 5C, AND 7 INCLUDED IN THE KATZMAN RECYCLING SITE REMEDIAL INVESTIGATION REPORT.

LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT - NO RECOVERY
- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT
- SOIL BORING LOCATION - JULY 2016 SAMPLING
- TEST PIT SOIL SAMPLING LOCATION
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- ACCESS ROAD
- GROUND SURFACE ELEVATION CONTOUR (FEET)
- APPROXIMATE AREA OF PCB CONCENTRATIONS THAT EXCEED COMMERICAL USE SCO (10.0 MG/KG) FOR SOILS >1' BGS
- SAMPLE GRID
- PROJECT AREA
- DELINEATED WETLAND

N

0 70 140 Feet

1 " = 70 '

PROJECT:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO: 558035
GRANVILLE, NY 12832

TITLE:

PCBs IN SOIL @ 4-6' BGS
NOVEMBER 2016

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		**FIGURE 7**
DATE:	MARCH 2022		

TRC
10 Maxwell Drive, Suite 200
Clifton Park, NY 12065
Phone: 518.371.0780
www.trcsolutions.com

FILE NO.: 240658-0003-015j.mxd

TRC - GIS

Coordinate System: NAD 1983 UTM Zone 18N (Meter)
Map Rotation: 0

Plot Date: 4/20/2018, 08:07:25 AM by BDEEGAN -- LAYOUT: ANSI B (11"x17")
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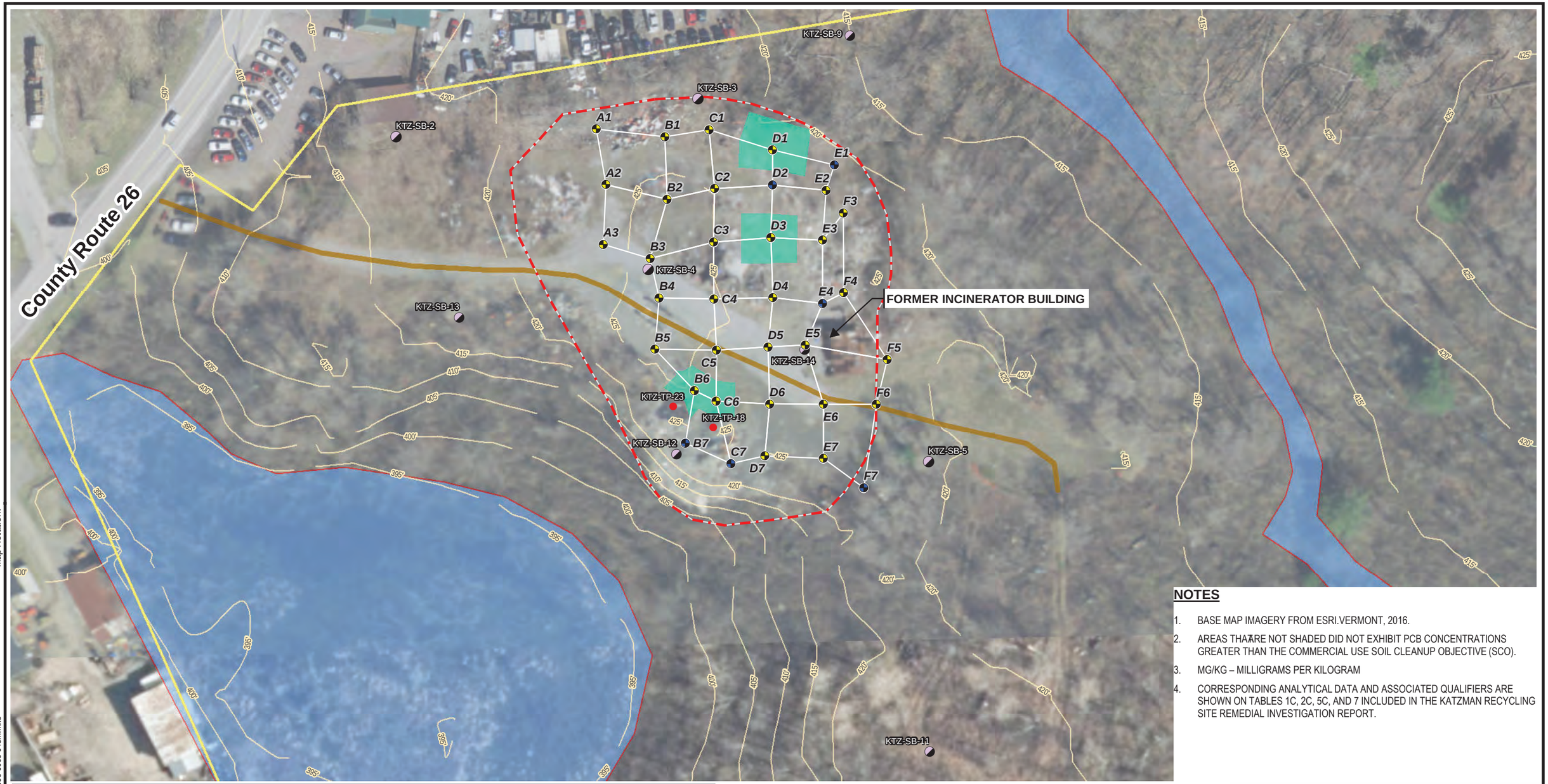


NOTES

1. BASE MAP IMAGERY FROM ESRI.VERMONT, 2016.
2. AREAS THAT ARE NOT SHADED DID NOT EXHIBIT PCB CONCENTRATIONS GREATER THAN THE COMMERCIAL USE SOIL CLEANUP OBJECTIVE (SCO).
3. MG/KG – MILLIGRAMS PER KILOGRAM
4. CORRESPONDING ANALYTICAL DATA AND ASSOCIATED QUALIFIERS ARE SHOWN ON TABLES 1C, 2C, 5C, AND 7 INCLUDED IN THE KATZMAN RECYCLING SITE REMEDIAL INVESTIGATION REPORT.

LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT-NO RECOVERY
- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT
- SOIL BORING LOCATIONS - JULY 2016 SAMPLING EVENT
- TEST PIT SOIL SAMPLING LOCATION
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- ACCESS ROAD
- GROUND SURFACE ELEVATION CONTOUR (FEET)
- APPROXIMATE AREA OF PCB CONCENTRATIONS THAT EXCEED COMMERICAL USE SCO (10.0 MG/KG) FOR SOILS >1' BGS
- SAMPLE GRID
- PROJECT AREA
- DELINEATED WETLAND

N

0 70 140 Feet

1 " = 70 '

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO: 558035
GRANVILLE, NY 12832

TITLE:
PCBs IN SOIL @ 6-8' BGS
NOVEMBER 2016

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		
DATE:	MARCH 2022		

FIGURE 8

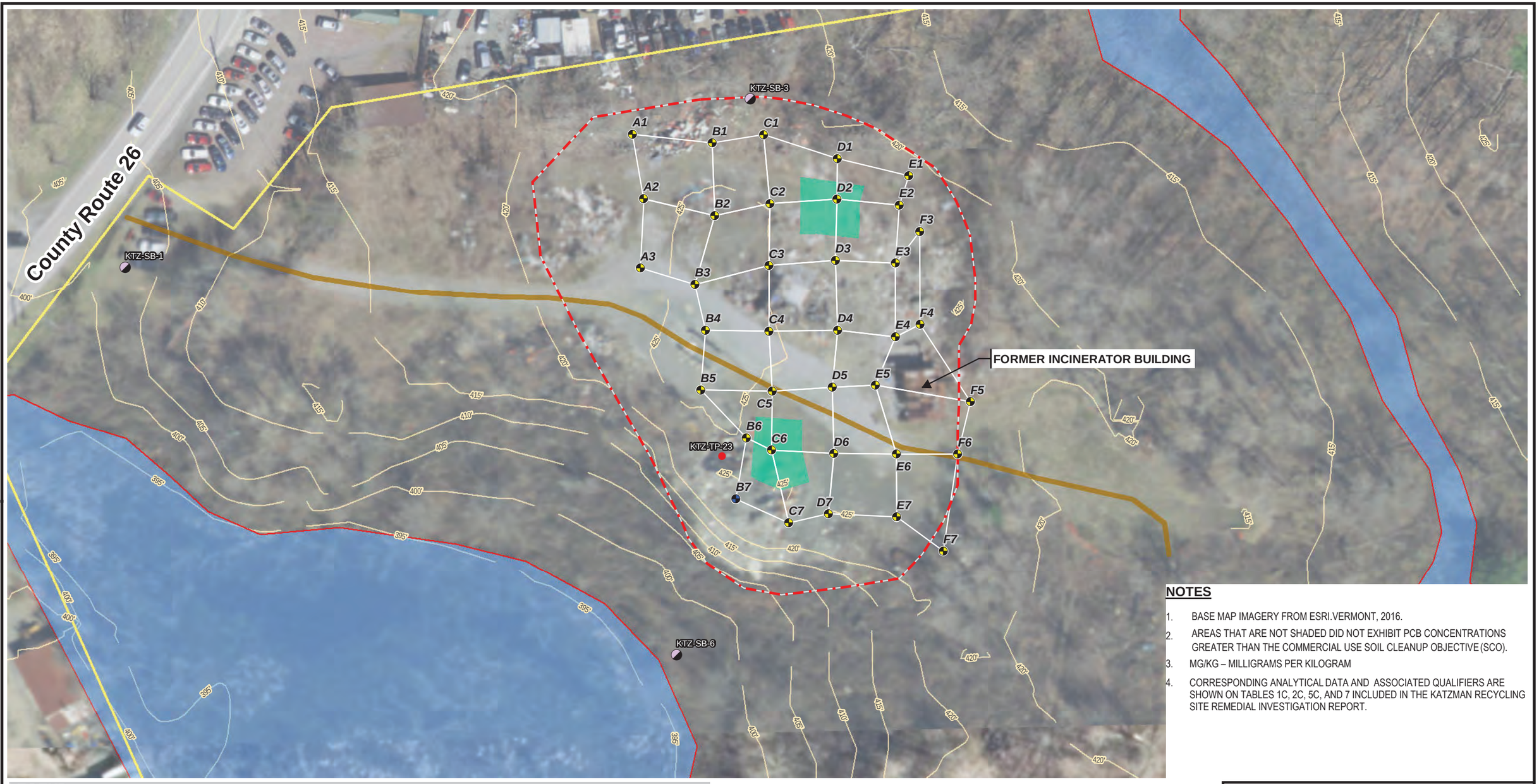
TRC
10 Maxwell Drive, Suite 200
Clifton Park, NY 12065
Phone: 518.348.1190
www.trcsolutions.com

FILE NO.: 240658-0003-015m.mxd

TRC - GIS

Coordinate System: NAD 1983 UTM Zone 18N (Meter)
Map Rotation: 0

Plot Date: 4/20/2018, 08:32:02 AM by BDEEGAN -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\NYSDEC\240658_Katzman\240658-0003-015p.mxd



NOTES

1. BASE MAP IMAGERY FROM ESRI.VERMONT, 2016.
2. AREAS THAT ARE NOT SHADED DID NOT EXHIBIT PCB CONCENTRATIONS GREATER THAN THE COMMERCIAL USE SOIL CLEANUP OBJECTIVE (SCO).
3. MG/KG – MILLIGRAMS PER KILOGRAM
4. CORRESPONDING ANALYTICAL DATA AND ASSOCIATED QUALIFIERS ARE SHOWN ON TABLES 1C, 2C, 5C, AND 7 INCLUDED IN THE KATZMAN RECYCLING SITE REMEDIAL INVESTIGATION REPORT.

LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT-NO RECOVERY
- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT
- TEST PIT SOIL SAMPLING LOCATION
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- ACCESS ROAD
- GROUND SURFACE ELEVATION CONTOUR (FEET)
- APPROXIMATE AREA OF PCB CONCENTRATIONS THAT EXCEED COMMERICAL USE SCO (10.0 MG/KG) FOR SOILS >1' BGS
- PROJECT AREA
- SAMPLE GRID
- DELINEATED WETLAND

N

0 60 120 Feet

1 " = 60 '

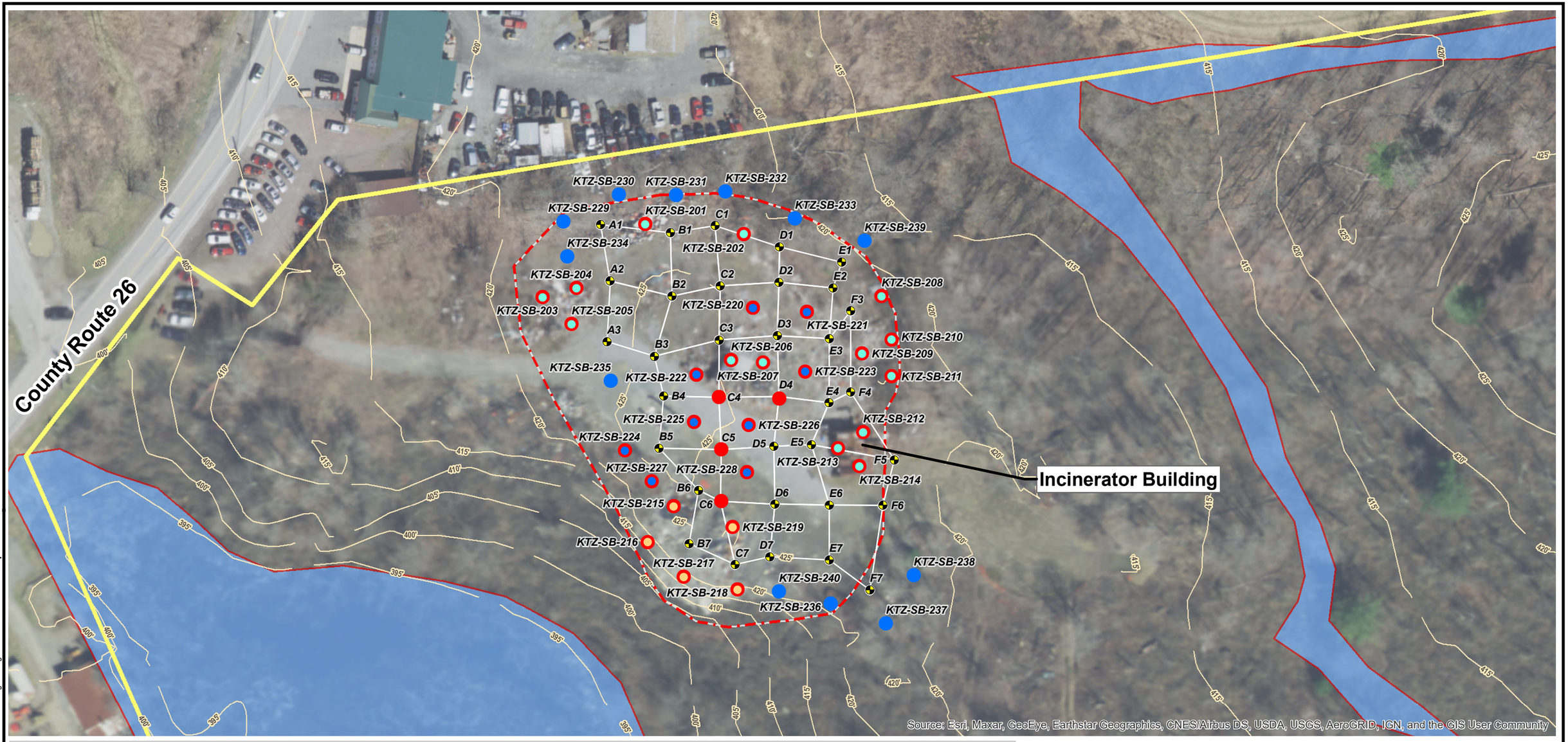
PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO: 558035
GRANVILLE, NY 12832

TITLE:
PCBs IN SOIL @ 8-10' BGS
NOVEMBER 2016

DRAWN BY:	B. DEEGAN	PROJ NO.:	432260.0000
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		**FIGURE 9**
DATE:	MARCH 2022		

10 Maxwell Drive, Suite 200
Clifton Park, NY 12065
Phone: 518.348.1190
www.trcsolutions.com

FILE NO.: 240658-0003-015p.mxd



LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT
- 14 BORINGS IN PREVIOUSLY INACCESSIBLE AREAS
- 5 BORINGS IN LARGE DEBRIS WASTE ACCUMULATION AREA
- 9 BORINGS TO DELINEATE ≥ 50 PPM PCBs
- 12 BORINGS TO COMPLETE THE HORIZONTAL DELINEATION OF THE IMPACTED AREA
- 4 BORINGS TO COMPLETE THE VERTICAL DELINEATION OF THE IMPACTED AREA
- SITE/PROPERTY BOUNDARY (APPROXIMATE)
- ACCESS ROAD
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- GROUND SURFACE ELEVATION CONTOUR (FEET NAVD88)
- APPROXIMATE LIMIT OF DELINEATED WETLANDS
- SAMPLING GRID

NOTES

1. UP TO 10 PRE-DESIGN BORINGS IN THE EASTERN PORTION OF THE PROPERTY WILL BE SELECTED IN THE FIELD BASED ON ACCESSIBILITY. LOCATIONS ARE NOT SHOWN ON MAP.
2. UP TO 10 PRE-DESIGN SURFACE SOIL SAMPLES WILL BE COLLECTED (TARGETING PRIOR SURFACE SAMPLE LOCATIONS KTZ-SS-2, KTZ-SS-5, AND KTZSS-16). LOCATIONS WILL BE SELECTED IN THE FIELD AND ARE NOT SHOWN ON THE MAP.

N

0 70 140 Feet

1 " = 70 '

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO. 558035
GRANVILLE, NY 12832

TITLE:
PROPOSED PRE-DESIGN SAMPLING LOCATIONS

DRAWN BY:	L. BOCHKIS	PROJ NO.:	432260
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		**FIGURE 10**
DATE:	APRIL 2022		

TRC
10 Maxwell Drive, Suite 200,
Clifton Park, NY 12065
Phone: 518.348.1190
www.trccompanies.com

FILE NO.: Figure 1 - Proposed Pre-Design Boring Locations 0422.mxd

Plot Date: 4/18/2022, 09:47:05 AM by LBOCHKIS – LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\NYSDEC\240658_Katzman\2021\Figure 1 - Proposed Pre-Design Boring Locations 0422.mxd
Coordinate System: NAD 1983 StatePlane New York East FIPS 3101 Feet (Foot US)
Map Rotation: 0
TRC - GIS

Table

Table 1
New York State Department of Environmental Conservation
Katzman Recycling Site
Pre-Design Investigation Sampling Plan

Boring ID No.	Proposed Depth Intervals to be Submitted for Laboratory Analysis											Focus of Boring Location
	0 in – 2 in	0 ft - 2 ft	2 ft – 4 ft	4 ft – 6 ft	6 ft – 8 ft	8 ft – 10 ft	10 ft – 12 ft	12 ft – 14 ft	14 ft – 16 ft	16 ft – 18 ft	18 ft – 20 ft	
Previously Inaccessible Locations												
KTZ-SB-201	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-202	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-203	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-204	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-205	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-206	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-207	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-208	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-209	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-210	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-211	X	X	X	X	X	X	X					Former waste pile
KTZ-SB-212	X	X	X	X	X	X	X					Former incinerator building
KTZ-SB-213	X	X	X	X	X	X	X					Former incinerator building
KTZ-SB-214	X	X	X	X	X	X	X					Former incinerator building
Large Debris/Waste Accumulation Area												
KTZ-SB-215		X	X		X		X		X		X	Buried waste pile
KTZ-SB-216		X		X		X		X	X			Buried waste pile
KTZ-SB-217		X		X		X		X	X			Buried waste pile
KTZ-SB-218		X		X		X	X	X	X			Buried waste pile
KTZ-SB-219		X	X		X		X		X		X	Buried waste pile
Delineation of PCBs > 50 PPM												
KTZ-SB-220		X	X	X								Delineation of >50 ppm at D2, D3
KTZ-SB-221		X	X	X								Delineation of >50 ppm at D2, D3
KTZ-SB-222		X	X				X					Delineation of >50 ppm at C4
KTZ-SB-223		X	X	X			X					Delineation of >50 ppm at D3, D4
KTZ-SB-224			X	X	X							Delineation of >50 ppm at B5
KTZ-SB-225		X	X	X	X		X					Delineation of >50 ppm at B5, C4, C5
KTZ-SB-226		X	X	X			X					Delineation of >50 ppm at C4, C5, D4
KTZ-SB-227			X	X	X							Delineation of >50 ppm at B5
KTZ-SB-228		X	X	X			X					Delineation of >50 ppm at C5
Main Waste Accumulation Area, Horizontal and Vertical Delineation												
KTZ-SB-229	X	X										5.4 ppm at A1 at surface
KTZ-SB-230	X	X										5.4 ppm at A1 at surface
KTZ-SB-231	X	X	X	X	X		X					27.7 ppm at B1, former waste pile
KTZ-SB-232	X	X	X									7.1 ppm at C1 at surface
KTZ-SB-233				X	X	X						27 ppm at D1 at 8 feet
KTZ-SB-234	X	X	X									5.4 ppm at A1, 2.5 ppm at A2
KTZ-SB-235	X	X	X	X								A3, B3, B4 delineation
KTZ-SB-236	X	X	X	X	X	X	X					6.1 ppm at E7, 3.03 ppm at F7
KTZ-SB-237	X	X										3.03 ppm at F7 at surface
KTZ-SB-238	X	X										3.03 ppm at F7 at surface
KTZ-SB-239	X	X										2.21 ppm at E1 at surface
KTZ-SB-240	X	X	X	X	X	X						Surface and subsurface samples at D7
C4							X	X				Sampling deeper at prior location
C5							X	X				Sampling deeper at prior location
C6							X	X				Sampling deeper at prior location
D4							X	X				Sampling deeper at prior location

Appendix A
Site Specific Health and Safety Plan

SITE-SPECIFIC HEALTH AND SAFETY PLAN

KATZMAN RECYCLING
GRANVILLE, NEW YORK 12832
NYSDEC Site No. 558035
Work Assignment No. D09812-16

Prepared for:
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 12th Floor
Albany, NY 12233

Prepared by:
TRC Engineers, Inc.
1430 Broadway
New York, New York 10018

TRC Project No.: 432260.0000.0000

June 2021

Table of Contents

List of Tables

List of Appendices

1. Site/Project Contact Information

Table 1 – Site/Project Contact Information			
Site Information			
Site Name	**Site No.**	**Address**	
Katzman Recycling	558035	24 County Road 26, Granville, NY	
Client Contact			
Name	**Organization**	**Title**	**Primary Phone No.**
Brianna Scharf	NYSDEC	Assistant Engineer	(518) 402-5987
Sarah Saucier	NYSDEC	Chief	(518) 402-9675
TRC Personnel and Project Role			
Name	**Role**	**Email**	**Primary Phone No.**
Michael Glenn	Health and Safety Officer (HSO)	mglenn@trccompanies.com	(949) 697-7418 (cell)
David Sullivan	Assistant HSO	dsullivan@trccompanies.com	(978) 758-2809 (cell)
James Magda	Contract Manager	jmagda@trccompanies.com	(315) 415-4315 (cell)
Kevin Sullivan	Project Manager	ksullivan@trccompanies.com	(716) 713-8688 (cell)
Steve Johansson	Office Safety Coordinator (OSC)	sjohansson@trccompanies.com	(518) 419-2219
Justin King	On-Site HSO	jking@trccompanies.com	(518) 860-7656 (cell)
Andrew Fishman	Field Staff	afishman@trccompanies.com	(518) 478-5210 (cell)
Lexie Lill	Field Staff	llill@trccompanies.com	(518) 641-8478 (cell)
Subcontractor Information			
Company Name	**Service**	**Primary Contact**	**Primary Phone No.**
Emergency Assistance			
Service	**Name**	**Emergency No.**	**Primary Phone No**
Ambulance	Granville Rescue Squad	911	(518) 642-1830
Early Incident Intervention	WorkCare	1-888-449-7787	Not applicable
Fire	Whitehall Volunteer Fire Company Inc.	911	(518) 499-0720
Hospital	Glens Falls Hospital	911	(518) 642-0612
Police	Village of Granville Police Department	911	(518) 642-1414
Poison Control Center	Upstate NY Poison Control Center	1-800-222-1222	(315) 464-5424
Spill	CHEMTREC	Not applicable	1-800-424-9300 (TRC No. CCN 671126)
Spill (Federal)	National Response Center	1-800-424-8802	Not applicable
Spill (State)	New York State Spill Hotline	1-800-457-7362	Not applicable

2. Medical Facility Identification and Directions

Nearest Hospital: Glens Falls Hospital

Hospital Address: 100 Park Street, Glens Falls, New York 12801

Hospital Telephone Number: (518) 926-1000

Directions to Hospital (see attached Map):

24 Co Rd 26
Granville, NY 12832

1. Head southwest on Co Rd 26 toward NY-149 E/NY-22 N
19 s (0.1 mi)

Continue on NY-149 W. Take NY-196 W to School St in Glens Falls
34 min (23.1 mi)

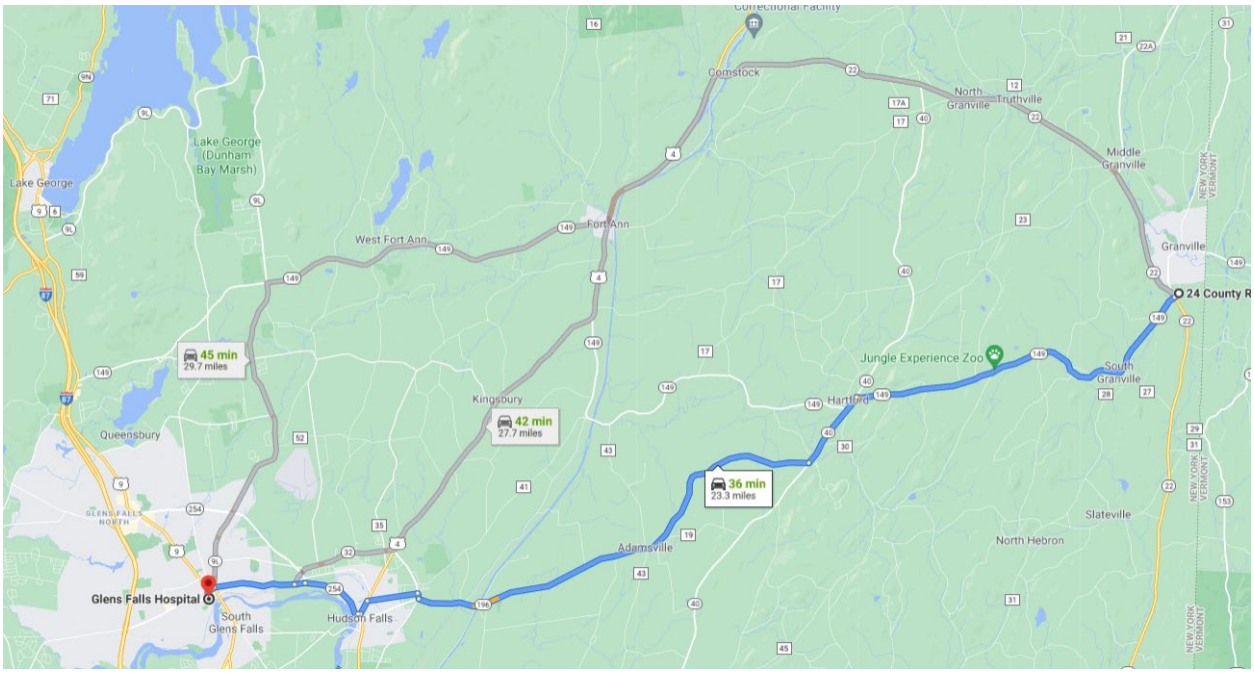
2. Continue straight onto NY-149 W
7.6 mi
3. Turn left onto NY-149 W/NY-40 S
Continue to follow NY-40 S
1.6 mi
4. Turn right onto NY-196 W
9.1 mi
5. Turn right onto NY-32 S
0.1 mi
6. Turn left onto Martindale Ave
1.0 mi
7. Turn left onto Main St
0.3 mi
8. Main St turns right and becomes Park Pl
253 ft
9. Continue straight onto NY-254 W/NY-32B
Continue to follow NY-254 W
1.3 mi
10. Continue onto NY-911E
0.2 mi
11. Continue onto NY-32 S/Warren St
1.6 mi
12. At Centennial Cir, continue straight onto Hudson Ave
0.2 mi

Continue on School St to your destination
59 s (0.1 mi)

13. Turn left onto School St
272 ft
14. Continue straight
262 ft

Glens Falls Hospital
100 Park St, Glens Falls, NY 12801

Map to Hospital:



3. Utility Clearance

Dig Safely New York and non-member utilities will be notified at least 72 hours prior to commencing any ground intrusive work. Prior to the start of work, confirmation receipts will be reviewed, and utility mark-outs will be verified.

A private utility survey will be required to survey the proposed soil boring, monitoring well and test pit locations using at a minimum Ground Penetrating Radar (GPR) and Electro-Magnetic/Radio Frequency (EM/RF) Pipe, Cable and Box locator. The survey shall encompass an area extending in all directions at least 10 feet beyond each of the locations.

Prior to the operation of any heavy equipment, the site shall be inspected for potential overhead hazards (e.g., wires, tree branches, etc.). A minimum clearance of 10 feet must be maintained between equipment and overhead utility lines. If contact is possible (i.e., equipment, drill rig, excavator, etc.) one or more of the following will be done: 1) Power sources will be disconnected by the utility; 2) Power sources will be shielded by the utility; 3) Object will get no closer than 10 feet to prevent arcing, unless site specific conditions or weather conditions warrant greater separation per best professional judgment, or as directed by utility representatives; and, 3) Evaluate the need for shielding and coordinate with local utility representatives.

4. Scope of Work Summary

Per the Scope of Work provided in the Work Assignment package, Task numbers and associated field

activities will include the following:

Task 2 – Asbestos and Hazardous Materials Surveys

- TRC will mobilize a New York State Licensed Department of Labor Asbestos Inspector to inspect the debris piles and onsite Incinerator Building for evidence of suspect asbestos containing material (ACM). As part of this inspection, the inspector will identify suspect ACM, photo-document the suspect ACM, collect Global Positioning System (GPS) coordinates and mark the material in the field with paint or another identifier. Up to 50 samples will be collected in the field for asbestos analysis from suspected ACM. Suspected ACM samples will be analyzed by a TRC subcontracted laboratory. Additionally, up to 20 wipe samples of formerly oil-filled electrical equipment will be collected and analyzed for polychlorinated biphenyls (PCBs). Wipe samples will be analyzed by a Department Call-out Laboratory. Drums and other containers, potentially containing free liquids, if identified, will be sampled for waste characterization parameters: Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), Resource Conservation and Recovery Act (RCRA) metals, PCBs, pesticides and herbicides, corrosivity, reactivity and ignitability. Collection of up to 10 samples for waste characterization analysis by the Department's Call-Out Laboratory is included in this scope of work.

Task 3 - Debris Pile Consolidation and Incinerator Building Demolition

This task will be completed to facilitate the completion of the pre-design investigation activities and allow for an estimate of the lateral and vertical extent of PCBs in Site soil to be prepared. Under this task, the Incinerator Building will be demolished and debris piles will be relocated and consolidated beyond the limits of proposed pre-design investigation soil sampling. The following activities will be completed under Task 3:

- TRC will direct and oversee the demolition of the Incinerator Building and consolidation of the debris piles. To the extent practical, separate piles of each of the following waste types will be created:
    - Tires;
    - Metal, including empty drums, vehicles and miscellaneous scrap;
    - Construction and demolition debris (CDD);
    - Universal Waste;
    - Confirmed asbestos containing waste; and
    - Former and currently oil-filled electrical equipment suspected or confirmed to contain PCBs (based on the results of Task 2).
- Limited exploratory excavation under each debris pile will be conducted to determine if buried debris is present.
- An air monitoring program in support of the ACM removal or demolition of asbestos containing building materials will be included in the demolition Technical Scope of Work. Implementation of the air monitoring program will be the responsibility of the Department's Call-Out Contractor.

- A Community Air Monitoring Plan (CAMP) will be implemented (as necessary) during the field activities in accordance with the New York State Department of Health (NYSDOH) generic CAMP.

Task 4 - Pre-Design Investigation

In order to refine the lateral and vertical extent of PCB impacts in soil, including in locations below the previously inaccessible areas (i.e., below debris piles and the Incinerator Building), a soil boring program will be completed under this task. As part of the soil boring program, soil sampling will be performed in the wooded area east of the Incinerator Building, between the area of planned remedial excavation and the rail trail, in response to concerns expressed during the public comment period. Additionally, borings will be advanced into the slope southwest of the Incinerator Building to further characterize the nature and extent of the debris in this part of the Site.

The soil boring program will include the following:

- Under subcontract to TRC, a direct push drill rig will be used to advance up to 35 soil borings to further define the lateral and vertical extent of PCB impacts (i.e., PCB concentrations greater than 1 part per million [ppm] in surface soil [upper 0 to 2 inches] and PCB concentrations greater than 10 ppm in subsurface soil) and to further delineate the areas of PCB concentrations equal to or greater than 50 ppm. The locations proposed for these soil borings are illustrated on Figure 1 – Proposed Pre-Design Sampling Locations. Soil samples will be collected continuously from ground surface to completion depth, inspected by a TRC geologist/environmental scientist, characterized by soil type and screened with a photoionization detector (PID).
- Two geotechnical borings will be advanced within the waste accumulation area to determine physical characteristics and determine the depth of competent material for support of excavation design. Standard Penetration Testing (SPT) will be performed at each geotechnical boring. Soil samples will be collected continuously at 2-foot intervals from ground surface to completion depth at each boring, inspected by a TRC geologist/engineer, and visually classified by soil type. These locations will be selected in the field based on conditions observed during the investigation borings.
- Up to ten direct-push soil borings will be advanced, by a TRC-subcontracted driller, in the eastern portion of the property. The locations will be selected in the field based on surface conditions and access. Samples will be collected from the surface (0 to 2 inches) and from 2 to 4 feet bgs. Soil samples will be inspected by a TRC geologist/environmental scientist, characterized by soil type and screened with a PID. Each sample (i.e., a total of 20 soil samples) will be submitted to a Department Call-out Laboratory for PCB analysis. If contamination or impacted soil is observed at the bottom of a boring, the boring will be advanced an additional 6 feet, and one additional sample will be submitted for laboratory analysis: the first interval without evidence of impact or the 8 to 10 feet bgs interval, whichever is shallowest.
- Samples from two monitoring wells, KTZ-MW-3 and KTZ-MW-4, will be collected and shipped to a Department Call-out Laboratory for analysis of TCL VOCs, TCL SVOCs, PCBs, Target Analyte List (TAL) metals (including mercury and cyanide), pesticides, and herbicides to determine treatment needs (if any) associated with potential dewatering of the remedial excavations.

5. Hazard Assessment

This Health and Safety Plan (HASP) assumes that an ongoing hazard assessment process with the HSO (or his/her designee), Project Manager, OSC and field staff (including the On-Site HSO) will take place regularly (via meetings/teleconferences), supplemented by as needed communication on project safety needs, to ensure the project work is conducted at a high level of technical excellence both safely and efficiently. Where the on-going hazard assessment indicates the presence of hazards, tasks, or other activities that are not adequately covered by the HASP and supporting documentation and/or staff training levels, supplemental planning will be conducted and documented in a revised or higher-level HASP document and appropriately trained personnel assigned.

5.1 Chemical Hazards

The following contaminants are known and/or suspected to be present at the site:

- PCBs
- Metals – barium, cadmium, arsenic, lead, chromium

TRC also anticipates the presence of the following chemicals in laboratory bottles used as sample preservatives: hydrochloric acid, nitric acid, sulfuric acid, methanol, hexane. In addition, TRC anticipates the use of methyl alcohol (methanol) during decontamination procedures. Safety Data Sheets (SDS) for preservatives and decontamination products are provided in **Appendix A**. Sample bottles containing hazardous preservatives will be handled with care. Sample bottles will be checked for leaks and lids tightened. Cut resistant and chemical resistant gloves and safety glasses will be worn at all times when handling sample bottles (see Section 5.2 for information concerning edges and material handling).

Isobutylene may be used for brief periods each work day to calibrate a photoionization detector (PID). One hundred parts per million (ppm) isobutylene will be primarily contained in a Tedlar® bag. Any gas that is released to the air will quickly disperse and will not pose a threat to on-site workers. No further monitoring is required for isobutylene

5.2 Physical Hazards

Physical hazards that may be encountered at the site are outlined below. If hazards are identified by the ongoing hazard assessment process, which are not address by this HASP, work shall be stopped and the HSO (or his/her designee), Project Manager, OSC or On-Site OSC, as appropriate, shall be contacted to determine if additional safety procedures and programs should be employed at the site.

Asbestos – Be cognizant that any building and waste materials onsite could potentially contain asbestos. Asbestos containing materials (ACMs) are defined as those containing greater than 1% asbestos, as determined by laboratory analysis (40 CFR 763 – NESHAPS). Work in sampling and handling ACM will only be conducted by appropriately licensed personnel. At all times when handing ACMs, at minimum, half face respirators with P100 cartridges (with proper fit test, training and medical monitoring) will be worn.

Dust – When conducting any ground disturbing activities, be cognizant that the dust has potential to contain hazardous chemicals and should not be inhaled. Whenever possible dust reduction by wetting shall be used. If dust is billowing, wetting the area, letting the dust settle, working from an upwind direction, and/or respirator with P100 cartridges (with proper fit test, training and medical monitoring) is recommended to reduce exposure.

Edges/Material Handling – Cut resistant gloves are required to be worn at all times while performing tasks that have the potential for hand injuries. A glove selection guideline is presented in **Appendix B**.

Excavations – Stay clear of excavation walls. TRC personnel will not enter an excavation, in accordance with 1926 Sub Part P. Subcontractor must provide a competent person on site, if one is required by the planned activities. Side cuts should conform to 1926 Subpart P requirements, or shoring should be used. All open excavations should be secured using traffic cones, barrier tape, or barricade signs stating "Do Not Enter Excavations", especially if left open overnight. See **Appendix C** for an Excavation Hazard Recognition Guide for Trenching and Shoring and Site Assessment Questions to facilitate your understanding of potential hazards and other guidance.

Ground Fault Circuit Interrupters (GFCI) and Electrical Cords – GFCIs will be used on all 120 volt, single phase, 15 and 20-ampere receptacle outlets when electrical equipment is used on-site. Electrical cords will be inspected for cracks, tears, or general wear to the outer protective casing. If the wiring of the cord is exposed, the cord will be repaired, if possible, or discarded. All extension cords will contain a grounding prong. If the grounding prong is missing, or if the cord was designed to contain only two prongs, the cord will not be allowed for use. These cords are dangerous and cannot be grounded through the use of a GFCI.

Hand Tools – Use only the appropriate tool for the task at hand. Use the tool(s) as designed, described, and intended by the manufacturer. Hand tools will meet the manufacturer's safety standards. Hand tools will not be altered in any way. Makeshift tools will not be used. At a minimum, hand and eye protection will be used when working with hand tools (see glove selection guide provided herein). Wrenches, including adjustable, pipe, end and socket wrenches, will not be used when jaws are sprung to the point that slippage occurs. Impact tools such as drift pins, wedges and chisels, will be kept free of mushroom heads. Wooden handles will be free of splinters or cracks and secured tightly to the tool. At all times use appropriate hand protection when utilizing hand tools.

Heavy Equipment/Drill Rigs – Use caution around drill rigs, construction equipment, and open excavations. Ensure the equipment operator is aware of the location of on-site personnel at all times to avoid potential injuries (e.g., maintain eye contact with the equipment operator). A spotter should be used to direct the movement of heavy equipment. A swing zone should be established with cones behind any excavators to prevent injury during movement of equipment. Exercise caution and wear protective equipment as noted herein around the equipment to guard against crushing and pinching hazards. On-site personnel will maintain a distance (approximately 10 feet) from mechanical hazards associated with heavy equipment. All field team members working near or with equipment with emergency shut-off switches should be aware of the locations and situations when these switches should be used.

Hostile Individual(s) – Most personnel who are encountered during work will not be hostile, however if a hostile individual is encountered you should not confront them. You should back away and go to your vehicle or other safe location where you can isolate yourself from the hostile person(s). Once safe, if you are continuing to be harassed you should contact the local police for assistance. Contact the Project Manager or OSC once the situation is safe and under control.

Hunters/Firing Range, etc. – Be aware of surrounding activities that may involve hunting, firearms, etc. that may not be in your immediate area, but could be create an unsafe work environment.

Lighting – There are areas/time within the work area(s) at the site which will potentially have little to no lighting. Lighting shall be utilized to make the work area and nearby hazards are illuminated. If gasoline powered equipment must be used to power portable lights, the generator shall be placed outside in a well ventilated area.

Manual Lifting – Improper lifting can lead to a variety of injuries including back strains, muscle pulls and joint damage. It is important for all personnel to understand proper lifting techniques and to utilize safe lifting procedures when handling materials. Generally, no one person should lift more than 50 pounds without assistance. Mechanical means should be used whenever possible.

Noise – Hearing protection must be worn when noise levels exceed 85 dBA in the work area. If you need to raise your voice to be heard at the work site, then hearing protection should be worn. Hearing protection will be worn near drill rigs.

Power Tools – All power tools will be inspected regularly (at least on a daily basis) and used in accordance with the manufacturer's instructions and its capabilities. Electrical tools will not be used in flammable areas, unless they are approved for that purpose. Portable electric tools will be used only with a GFCI. Proper hand, eye and hearing protection will be used when working with power tools and all appropriate safety guards must be in place. Personnel will be trained in the proper use of the specific tool. Any defective

power tools will be immediately tagged and removed from service. Tools will be stored properly after use.

Pressurized Fluids/Gases – All compressed gases are hazardous due to the high pressures inside the cylinders. Even at a relatively low pressure, gas can flow rapidly from an open or leaking cylinder. Damaged cylinders can become projectiles resulting in severe injury and property damage. An unsecured or uncapped cylinder can become a cause of a major accident. Cylinders shall be secured when not in use, in transport, and as much as possible when in use.

Slips, Trips and Falls – Be aware of uneven ground and buried debris (e.g., metal, plastic, etc.) to avoid potential slip/trip/fall hazards, and use caution near open excavations. Maintain good housekeeping practices to minimize physical hazards.

Traffic Hazards – Driving to and from the site each day is considered a physical hazard. Directions and travel time to the site should be determined in advance (a.k.a. Journey Management Planning) and adequate time should be allocated to drive safely. The use of cellular phones is prohibited, and distracted driving should be avoided. Seatbelts shall be worn at all times while the vehicle is moving. Use caution around traffic flow. Ensure proper traffic control (e.g., signs, traffic cones, barriers, etc.) are in place prior to and throughout the work day where work takes place in or near traffic. Work personnel must wear ANSI-rated class 3 reflective traffic vests at all times. A site-specific traffic management plan describing procedures to be employed, including barriers, signage, etc., will be used for each drilling location.

Utilities – Dig Safely New York and non-member utilities must be notified at least 72 hours prior to commencing any intrusive activities. Use extreme caution when operating heavy equipment near utilities. Excavation and drilling locations will be selected that are located at safe distances from utility hazards. Prior to the operation of any heavy equipment, the site shall be inspected for potential overhead hazards (e.g., wires, tree branches, etc.). A minimum clearance of 10 feet must be maintained between equipment and overhead utility lines. If contact is possible (i.e., equipment, drill rig, excavator, etc.) one or more of the following will be done: 1) Power sources will be disconnected by the utility; 2) Power sources will be shielded by the utility; 3) Object will get no closer than 10 feet to prevent arcing, unless site specific conditions or weather conditions warrant greater separation per best professional judgment, or as directed by utility representatives; and, 3) Evaluate the need for shielding and coordinate with local utility representatives.

Weather – Heat and cold stress are a potential concern for on-site workers. Take breaks as needed to cool down, replenish fluids and/or warm up. Please refer to **Appendix D** for the signs, symptoms and precautions for cold and heat stress. Work may occur during a time of year when thunderstorms are possible/likely. If thunder or lightning is noted by onsite personnel, work will cease until the storm passes (thunder and/or lightning ceases and is not observed over at least a 30-minute period). Personnel will seek shelter in buildings or vehicles.

Working Over/Near Water – All workers working over/near water will be required to wear a Type I, II, or III Personal Floatation Device (PFD). When continuous fall protection is used (without exception) to prevent employees from falling into the water, the drowning hazard has effectively been removed. Therefore PFDs are not required when utilizing continuous fall protection.

5.3 Biological Hazards

Biological Waste – This includes feces, urine, needles/sharps and other materials which may contain biological matter from humans or animals. This material should be avoided and not handled in any way. If biological waste impedes the planned scope of work the Project Manager or OSC should be contacted to discuss appropriate actions.

Blood-Borne Pathogens – Injuries received in the field may require assistance from a field team member with appropriate first aid/first responder training to perform first aid. Contact with blood and certain body fluids can contain pathogens that may be transmitted by contact with an open wound by the caregiver. The following precautions should be used when giving first aid:

- Use nitrile gloves to avoid contact with blood/fluids. Spent bandages and gloves used to perform first aid should be placed in a plastic bag and properly disposed.
- Blood/fluid should be cleaned from surfaces that may be contacted by other individuals.
- Use an appropriate barrier if required to perform rescue breathing.

Ticks - Ticks generally favor areas of high grass and dense vegetation so to the extent possible, these areas should be avoided. It is advisable when entering these areas to tuck pants into socks and to wear a light colored long sleeve shirt to help spot ticks before they bite. DEET-based insect repellents may be worn to repel ticks but hands should be washed thoroughly after use and DEET should not be sprayed directly onto the skin surface. Self-checks should be made frequently and at least at the end of the field day for ticks when working in or near vegetated areas.

If discovered, the tick should be removed with a pair of tweezers and saved in a sealed plastic bag. Sometimes, tick bites occur but the tick may not stay attached, followed by a rash developing in the area within a few days of the bite**. If bitten by a tick or a bulls-eye like rash develops, it is advisable to consult WorkCare**.

Spiders – Spiders typically seek cover in dark protected areas. Common areas where spiders may be encountered are heavy vegetation and trees. Spiders also are found in basements and enclosed spaces such as sheds, protective well covers, etc. Spider bites may cause swelling, pain and respiratory problems. Avoid dense vegetation, and use caution when sampling in dark poorly illuminated locations. If bitten, wash the

area and use ice on the bite area to reduce swelling. If respiratory stress, significant pain or swelling is noted, or discoloration around the bite area occurs, seek immediate medical attention.

Stinging Insects – Like spiders, wasps and yellow jackets often nest in dense vegetation and in the ground, or in protective casings on monitoring wells and shielded gate locks. A sting from these insects can cause pain, swelling, and respiratory problems that may be life-threatening to certain individuals. If stung, remove stinger (if present) using tweezers, or similar, and wash the area and use ice on the sting area to reduce swelling. If respiratory stress, significant pain or swelling is noted, or discoloration around the sting area occurs, seek immediate medical attention.

Dogs and Wild Animals – Dogs often are not leashed and may be unfriendly. Bites from dogs and wild animals can cause infections or transmit disease. In general, it is best to not approach dogs even if they appear to be friendly, and wild animals should never be approached. If bitten, the area should be washed with soap and water. If the bite resulted in puncturing or tearing of the skin, the wound should be covered with a sterile dressing and medical attention should be sought immediately. A description of the dog should be noted and if possible, the dog's owner.

Plants – There are many types of plants which can cause irritation or allergic type reactions. Examples of some encountered on TRC sites include the following:

Poison Ivy – the trademarks of this plant are its solid green, pointed leaves that hang from the stem in groups of three. It grows as both a vine and a shrub. The look of poison ivy can change with the seasons. It produces yellow-green flowers in the spring and its green leaves can change to yellow and red in autumn.

Wild Parsnip/Giant Hogweed – Both plants are part of the carrot family and can grow up to 15 feet tall. They look similar to giant Queen Anne's lace with bristly stalks. Contact with the sap from the plant can cause phytophotodermatits or irritation (sometimes severe) when skin is exposed to sunlight.

Pandemic Preparedness – A "pandemic" refers to an epidemic that has spread over several countries or continents, usually impacting a large number of people. A pandemic has the potential to significantly impact routine services. A pandemic disease presents a serious health risk and could prevent TRC from performing project-related tasks. The risk to employee health and the business will vary based on the geographic area of the pandemic and the potential severity of the disease. Pandemic risk assessments will be performed by the TRC Corporate Safety team who will provide direction to field personnel.

TRC will follow health and travel precautions issued by the respective authorities. Employees should stay at home when sick or otherwise experience symptoms that are consistent with the pandemic disease. When at a project site, infection control measures should be enacted, which are essential components of pandemic management and a component of public health measures. These essential measures include:

- Practice frequent hand washing. According to the CDC, washing hands with soap and water is the best way to get rid of germs in most situations. If soap and water are not readily available, you can use an alcohol-based hand sanitizer that contains at least 60 percent alcohol. You can tell if the sanitizer contains at least 60 percent alcohol by looking at the product label.
- Obtain immunizations recommended by healthcare providers to help avoid disease.
- Practice social distancing to increase the space between employee work areas and decreasing the possibility of contact by limiting large or close contact gatherings and avoid shaking hands.
- Frequently disinfect all areas that are likely to have frequent hand contact (like doorknobs, faucets, handrails, etc.).

5.4 Radiological Hazards

No radiological hazards are expected at the site. If any new condition is encountered during this activity, the HASP will be adjusted accordingly.

Radiation (ionizing) – Exposure to ionizing radiation can be controlled by one of three methods. Time, distance, or shielding. Limit your time near the radioactive source. Keep your distance from the radioactive source. Shield yourself from the radioactive source with appropriate shielding material. If the radioactive source(s) are from TRC equipment, the TRC employee using the equipment needs required training to use the equipment, and must be monitored using a dosimeter badge. Update contact information for TRC subject matter expertise and regulatory authorities.

X-Ray Fluorescence Instruments (a.k.a., XRF Guns) – XRF units for field metals analysis are only to be used by trained employees with radiation safety training. Licensing requirements can vary by state. Coordinate with the TRC Corporate Safety team before utilizing in the field to set up dosimetry protocols and instrument specific safety procedures.

6. Personal Protection Monitoring

Personal Protection Monitoring Equipment and Use Recommendations: The following table outlines monitoring equipment needs and rationale. Note that an upgrade to a higher level of respiratory protection (C or higher) will warrant revision or addendum to this HASP and consultation with the TRC Corporate Safety team before work recommences.

Table 2: Monitoring Equipment Use Recommendations

Instrument	Use Code	Action Levels	Notes/Rationale
PID	C	5 ppmv*	Recommended for VOC screening to monitor airborne VOC concentrations in breathing zone levels. If PID readings are sustained above 5 ppmv in the breathing zone for at least 5 minutes, move to an upwind location for 15 minutes. After 15 minutes, measure again. If PID readings are still above 5 ppmv in the breathing zone, contact the Project Manager or OSC to evaluate suitable response actions. Any upgrade in respiratory protection will be coordinated with the TRC Corporate Safety team. Withdraw from area if PID readings exceed 50 ppmv.
TSI Dustrak™ (or equivalent)	C	> 150 µg/m3; 15 minute average**	Used where contaminants could adhere to fugitive dust, and where fugitive dust migration could potentially serve as a significant exposure pathway. Half-faced APR for particulates to be used intermittently/temporarily where dust control measures cannot maintain dust levels below action level. Use is optional for dust levels below the action level. Use of a half-face APR for dust does not require CIH approval where dust action level excursions are limited in duration, and where dust control measures will be implemented until below the action level. However, personnel must be medically qualified, fit tested for half-face APR use, and trained in the use of the APR.
Air Sampling Pump and Particulate Cassettes	C	Greater than or equal to 0.01 fiber per cubic centimeter (Code Rule 56)	Used during the abatement, movement, and/or consolidation of ACMs to detect concentrations of airborne particulates. Use of this equipment will be performed by NYSDOL licensed Project Monitor and in accordance with the Asbestos Project Design and Variance (where applicable).
O^2/LEL	C	19.5%	Recommended for landfill, lagoon, excavation, sewer, and anaerobic degradation site work. Required for confined space work.
H_2S Meter	C	1 ppm	Recommended for landfill, lagoon, excavation, sewer, and anaerobic degradation site work. Required for confined space work.

Table 2: Monitoring Equipment Use Recommendations			
Instrument	**Use Code**	**Action Levels**	**Notes/Rationale**
CO	C	25 ppm	½ of the PEL (PEL = 50 ppm)
CGI	C	10% LEL	Recommended safe level to prevent explosive conditions.
MINIRAM (or equivalent)	O		Supplement operation of Dustrak™ stations for work near sensitive receptors.
Radiation meters	N/A		Not known or anticipated to be a Contaminant of Concern.

Notes:
* Site/project specific action levels for VOCs may be established in consultation with the OSC.
** Above background upwind levels

PID – Photoionization detector
H_2S – Hydrogen Sulfide
CGI – Combustible Gas Indicator
APR – Air Purifying Respirator
µg/m3 – micrograms per cubic meter
LEL – Lower Explosive Limit
CO – Carbon Monoxide
VOC – Volatile organic compound
CIH – Certified Industrial Hygienist
O_2 – Oxygen
ppm – Parts per Million
ppmv – Parts per Million Volume
PEL – Permissible Exposure Limit

Use Codes: R – Required, C – Condition specific, O – Optional, N/A – Not applicable

Personal Protection Monitoring Procedures: When necessary, the OHSO will measure organic vapor concentrations in the breathing zone using a PID. Fugitive dust emissions are not anticipated to be a concern. When required, air monitoring for dust will be performed using a combination of real-time dust monitoring upwind and downwind of the work area, and at a point near the closest receptor.

Personal Protection Exposure Limits: The following table summarizes anticipated concentrations and accepted exposure limits of chemicals potentially present within the work site.

Table 3: Summary of Exposure Limits – Known or Suspected Site Impacts		
Chemical of Concern	**Highest Detected Concentration**	**OSHA PEL/ACGIH TLV**
Volatile Organic Compounds (VOCs)	14,000 mg/kg (total xylenes) – SB-4 (2.5') 2016	200 ppm (OSHA PEL for PCE) 200 ppm (OSHA PEL for TCE) 200 ppm (OSHA PEL for DCE)
Semi-volatile Organic Compounds (SVOCs)	830 mg/kg (pentachlorophenol) – SB-4 (2.5') 2016	0.2 mg/m^3 (OSHA PEL for PAHs)
Polychlorinated Biphenyls (PCBs)	13.3 mg/kg (total) – SB-12 (13.5) 2016	1,000 µg/m^3 (OSHA PEL for PCBs containing 42% chlorine) 500 µg/m^3 (OSHA PEL for PCBs containing 54% chlorine)
Metals	205,000 mg/kg (iron) – SB-12 (7') 2016	50 µg/m^3 (OSHA PEL for lead) 10 µg/m^3 (OSHA PEL for arsenic) 0.2 mg/m^3 (OSHA PEL for cadmium) 0.5 mg/m^3 (OSHA PEL for chromium)

Table 3: Summary of Exposure Limits – Known or Suspected Site Impacts		
Chemical of Concern	**Highest Detected Concentration**	**OSHA PEL/ACGIH TLV**
		0.2 mg/m^3 (OSHA PEL for selenium) 0.01 mg/m^3 (OSHA PEL for silver) 0.5 mg/m^3 (OSHA PEL for barium) 1.0 mg/10m^3 (OSHA PEL for mercury)
Asbestos	Unknown	0.1 fibers/cc of air per TWA (OSHA PEL for asbestos)

Notes: Exposure and hazard data obtained from the NIOSH Pocket Guide to Chemical Hazards unless otherwise noted.

ppm – parts per million
OSHA – Occupational Safety and Health Administration
PCE – Tetrachloroethene
DCE – Dichloroethene
µg/m3 – micrograms per cubic meter
TLV – Threshold Limit Value
PEL – Permissible Exposure Limit
TCE – Trichloroethelene
PAHs – Polycyclic aromatic hydrocarbons

Table 4: Preservatives and Decontamination Products		
Chemical of Concern	**On-Site Usage and Potential Exposures**	**Control Method**
Hydrochloric Acid (HCl)	Less than 20 ml quantities used for sample preservation. Air phase exposure is expected to be minimal and incidental to sample containerization.	5 ppm (OSHA PEL)
Methyl Alcohol (methanol; MeOH)	Less than 20 ml quantities used for sample preservation. Air phase exposure is expected to be minimal and incidental to sample containerization.	200 ppm (OSHA PEL)
Nitric Acid (HNO_3)	Less than 20 ml quantities used for sample preservation. Air phase exposure is expected to be minimal and incidental to sample containerization.	5 mg/m3 (OSHA PEL)
Hexane	Less than 20 ml quantities used for preservation of PCB wipe samples. Larger quantities may be used for decontamination purposes.	500 ppm (OSHA PEL)
Isobutylene	100 ppm gas for use during calibration of PID instruments.	No specific exposure limits for isobutylene (simple asphyxiant). Maintain oxygen levels above 19.5%. Before attaching regulator to cylinder, verify that the regulator is off.

Table 4: Preservatives and Decontamination Products		
Chemical of Concern	**On-Site Usage and Potential Exposures**	**Control Method**
		Before opening regulator, make sure that tubing connecting regulator to monitoring device/ Tedlar® bag is secure. To use a Tedlar® bag, put bag control valve in an open position and close after filling. Before disconnecting gas from the instrument and/or Tedlar® bag, verify the regulator is closed. Empty bag of contents after calibration in a downwind position and/or to avoid inadvertent inhalation.
Notes: ppm – parts per million ml – milliliters PID – Photoionization Detector OSHA – Occupational Safety and Health Administration PEL – Permissible Exposure Limit		

7. Personal Protective Equipment

TRC personnel will use Level D PPE as noted/modified below:

Table 5: Level D Personal Protective Equipment

Item	Rationale/Notes
Hardhat	American National Standards Institute/International Safety Equipment Association (ANSI/ISEA) Z89.1-2009 rated hard hats will be worn by personnel at all times when overhead hazards are present, including electrical.
Hearing protection	Hearing protection will be worn by all personnel exposed to at least 85 dB of sound during the workday. A good rule of thumb to use in determining whether background noise is 85 dB or higher is if you must shout to be understood by somebody about one arm-length away, that background noise is hazardous.
Safety boots (steel or composite toe and shank)	Electrical Hazard (EH) rated safety-toe safety boots will be worn by all personnel during project work described in this HASP.
Eye protection (safety glasses)	ANSI rated eye protection (Z87 or Z87+) is required to be worn at all times when onsite or when personnel are exposed to flying debris, chemical vapors or particulates. Chemical splash goggles will be worn for protection against chemical gases, vapors or particulates. Safety glasses will be worn for protection against flying objects.
Safety vest	ANSI Class 2 safety vest is required at all times when onsite. Utilize in areas in or near vehicular traffic of any kind on or off property.
Chemical Protective Clothing (CPC) and Gloves	CPC and gloves will be inspected according to TRC's Personal Protective Equipment Program. CPC will be chosen with assistance from the OSC according to the chemical hazards present. Gloves are to be changed between samples to avoid cross-contamination.
Cut resistant work gloves	As indicated herein, use Cut and Abrasion Resistance Level 2 to Level 4 gloves when necessary for hand protection during field tasks. See **Appendix B** for a Glove Selection Guide. ***Leather work gloves are expressly prohibited.***
Electrical Safety	8 cal/cm^2 Flame Resistant (FR) clothing
Respirator	When handling ACM, at minimum, a half face negative air respirator equipped with P100 particulate cartridges will be worn. Individuals selected to wear respirators will be fit tested prior to issuance.
Personal Floatation Device (PFD)	Type I, II, or III PFD is required to be worn at all times when working over/near water.

A basic first aid kit will be readily available on-site in the event of an emergency.

Fire extinguishers should be present within 50 feet of wherever more than 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas are being used at the site, including operational equipment. All personnel working on or around the equipment should know the location of and how to operate the fire extinguisher. Ensure the fire extinguisher is in working order by checking the manufacture and/or most recent inspection dates.

8. Personnel and Equipment Decontamination Plan

At minimum, personnel and equipment decontamination will include the following:

Equipment Decontamination: There is a possibility that site media contacted during work activities contain compounds described in **Table 3**. All equipment that comes in contact with media needs to be decontaminated before it is removed from the job site. To properly decontaminate equipment that comes in contact with media, the following procedure should be followed:

- Brush accumulated material off equipment that has come in contact with impacted media. The material shall be returned to the location from which it came or disposed of properly;
- Wipe parts of the equipment that came in contact with the media down with cloth, rags or heavy-duty paper towel damp with non-phosphate concentrated laboratory-grade soap (i.e. Alconox© or Liquinox©);
- Follow up with a wipe from a separate cloth, rags or heavy duty paper towel damp with potable water; and
- PPE and cloth, rags or heavy duty paper towels can be disposed of in the regular waste stream.
- If equipment becomes grossly impacted with site media, equipment shall be steam cleaned over a decontamination pad.

Personnel Decontamination: In general, contamination of personnel shall be prevented through the use of PPE. At minimum, nitrile gloves shall be worn during contact with impacted material or chemical in addition to other Level D PPE.

9. Required Personnel Training

TRC field personnel will have the training outlined below before on-site work activities:

Table 6: Project Training Requirements

(* required for all sites; but minimum recommended)
Check "A" if training required for everyone, and check "T" if training required for specific task or per notations.

A	T	Subject	Reference	
			29 CFR 1910	29 CFR 1926 or Other
☒	☐	HAZWOPER 40 hour*	1910.120	1926.65
☒	☐	3-Day HAZWOPER Supervised On-site*	1910.120	1926.65
☒	☐	8-Hour HAZWOPER Refresher*	1910.120	1926.65
☐	☒	8-Hour Supervisor HAZWOPER*	1910.120	1926.65
☐	☒	First Aid, CPR*,1	1910.151	1926.23,.50
☒	☐	Hazard Communication (HAZCOM)	1910.1200	1926.59
☐	☒	DOT/IATA Shipping Training	1910.1201	49 CFR 172.704
☐	☒	Asbestos Building Inspector		29 CFR 1926.1101, AHERA, NY Code Rule 56
☐	☒	Asbestos Project Monitor		NY Code Rule 56
☐	☐			
Client-specific training:_____ ☐ Not Applicable ☐ Specify				
Client-specific training:_____ ☐ Not Applicable ☐ Specify				
Client-specific training:_____ ☐ Not Applicable ☐ Specify				

Note:
1 Per the TRC Health and Safety Policy and Procedure Manual, each TRC project will have at least one certified CPR/first aid trained person on site at all times. All Project Managers and anyone acting as the on-site Health and Safety Officer must be current in First Aid/CPR.

Project training requirements beyond those provided in the above table will require a HASP revision/upgrade or concurrence of the TRC Safety Director or ECR Safety Manager.

10. Medical Monitoring

Medical monitoring will apply routinely to all employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year (40 CFR 1910.120[f][2][i]). Said TRC field personnel will have the medical surveillance outlined in the table below prior to commencing on-site work activities.

Table 7: Medical Surveillance Required			
*Baseline is minimum recommended.			
	29 CFR 1910	**29 CFR 1926 or Other**	**Notes**
☒ HAZWOPER Physical - Baseline*	1910.120	1926.65	
☒ HAZWOPER Physical – Annual	1910.120	1926.65	
☐ HAZWOPER Physical - Biennial*	1910.120	1926.65	
☒ Asbestos Physical - Baseline*		1926.1101	Personnel specific
☒ Asbestos Physical – Annual		1926.1101	Personnel specific
Client-specific drug testing[1]	☐ Not Applicable ☐ Specify		
Client-specific medical monitoring[1]	☐ Not Applicable ☐ Specify		
Site-specific medical monitoring:	☐ Not Applicable ☐ Specify		
Note: [1] Client required drug testing or medical monitoring should be coordinated through the Project Manager.			

TRC has a Drug and Alcohol-Free Workplace Policy (TRC Academy Course #900013753). TRC may require employees or subcontractors to be tested upon reasonable suspicion, following accidents or incidents during work activities, or during travel to or from a project site. Client policies may be stricter in regard to procedures following an accident. Project Managers must be aware of these and inform employees and subcontractors of any additional requirements.

11. General Safety Requirements

The general safety rules listed below apply to all TRC personnel present at the site.

- A tailgate health and safety meeting will be held with all field team members each day prior to the start of work, the start of a new shift, upon changing of work conditions or job task duties, or when new field team members arrive onsite.
- Adhere to all requirements of this HASP.
- Wear protective clothing appropriate for the designated level of protection and decontaminate before entering clean areas when applicable.
- Use safety equipment in accordance with OSHA guidance and labeling instructions.
- Maintain safety equipment in good condition and proper working order and make sure that the equipment is calibrated prior to use.
- Immediately report unsafe acts or conditions to the Project Manager and OSC.
- Eating, drinking, and smoking are prohibited on site, except in designated areas.
- Maintaining a position upwind from intrusive activities is encouraged.
- The emergency shutoff switch should be demonstrated to be working prior to initiating drilling.
- An adequately stocked first-aid kit will be maintained at the work site.

12. Tailgate Safety Meetings

- A tailgate safety meeting will be conducted daily prior to commencement of the work day, the start of a new shift, upon changing of work conditions or job task duties, or when new field team members arrive onsite (see checklist provided in **Appendix E**).
- Topics covered by the tailgate safety meeting will include, but not be limited to, scope of work and who will conduct each task, potential hazards, weather forecast, PPE, emergency procedures and the route to the medical facility, site conditions and features, and, communication guidelines related to stakeholder engagement and visitors.
- Safety meetings must also be held to address modifications to this HASP and any addenda prepared to supplement the HASP.
- Subcontractors and personnel present at the tailgate safety meeting shall be required to sign an acknowledgement form after each meeting.

13. Emergency/Contingency Plan

Before commencing any on-site operations, the TRC OHSO will advise all personnel of potential emergencies. Personnel will be advised on their roles in the event of an emergency, and the steps to take for a timely and controlled response.

Communication networks/chain of command – All on-site personnel will communicate any accident, injury or near miss to the TRC OHSO who will provide instruction on how to proceed further.

First Aid / Safety Equipment – First aid equipment should be readily available in the event of an emergency. First aid equipment should include a well-stocked first aid kit, fire extinguisher and emergency eye wash.

Evacuation Plans and Refuge Area – All personnel should safely remove themselves from danger in the event of an emergency and safely access the refuge area. The refuge area should be in an upwind location a safe distance from the work zone. The refuge area will be determined during the daily safety briefing.

Notifications of Fire, Police and Emergency Facilities – In the event of an emergency that cannot be controlled by on-site personnel, the appropriate emergency contact shall be notified. All personnel shall remove themselves from the area of danger and wait for the arrival of help in the predetermined refuge area.

Non-Emergency Medical Assistance – If an injury does occur and it is not life threatening, then the employee or employee's supervisor/project manager should contact WorkCare as soon as possible, but within the first hour after an injury. WorkCare information is proved in **Appendix F**. This information will help assist the injured employee by connecting them with instant access to a medically qualified professional in order to provide guidance on appropriate first aid measures and medications.

14. Stop Work

TRC personnel are all empowered, responsible, authorized and obliged to stop work at any time we feel that our safety or the safety of others is, or could be, compromised. When a stop work occurs the Project Manager and/or OSC should be contacted to discuss the reason for the stop work and the corrective action(s) needed to resume work safely. Work on an activity shall not continue until the unsafe condition has been corrected.

15. Safe Catches

A "Safe Catch" is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee behaviors, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone's responsibility to report and/or correct these potential incidents immediately. Please complete the form provided in **Appendix G** as a means to report these "Safe Catch" situations and submit to your local OSC Representative and Mike Glenn, National Safety Director.

16. Observations

Note that the Project Manager and/or OSC may notify field staff that their site activities may be the subject of Safety Observation, an integral part of the continuous improvement safety culture promoted at TRC. If subject to an observation, please note the following:

- The Observation will tend to focus on the highest risk activity (as a general example, drilling in a public right-of-way).
- Follow-up observations may need to occur on previous observations, depending on prior data collected.
- The observer's preparation before visiting the site will be a review of the HASP, JSAs, client-specific requirements, etc., and a review of the work scope with the Project Manager to ensure the context of the work is well understood in advance.
- Review items may include PPE, body use and positioning, work environment, operating procedures, and tools and equipment.
- The observation should last between 30 and 60 minutes.

Both positive and negative observations are candidates for documentation and later discussion. The overarching goals are to identify and correct questionable practices and to identify and promote good, safe and efficient practices. It is a data gathering process that will allow TRC safety specialists to identify root causes for safety issues in both categories to better inform policy decisions.

17. Incident Reporting

In case of an incident, TRC personnel must report the incident immediately to their project manager/supervisor and/or OSC as well as the client's representative and follow the TRC Incident Response and Reporting Process (see **Appendix H -** In Case of Emergency and Incident Reporting). Required Incident Notification or Auto Incident Report forms must be completed within 24 hours following the incident. If neither is available, the incident shall be reported to the TRC Safety Director. Incident/injury/exposure information must be recorded per TRC policy and will be the basis of any incident investigations.

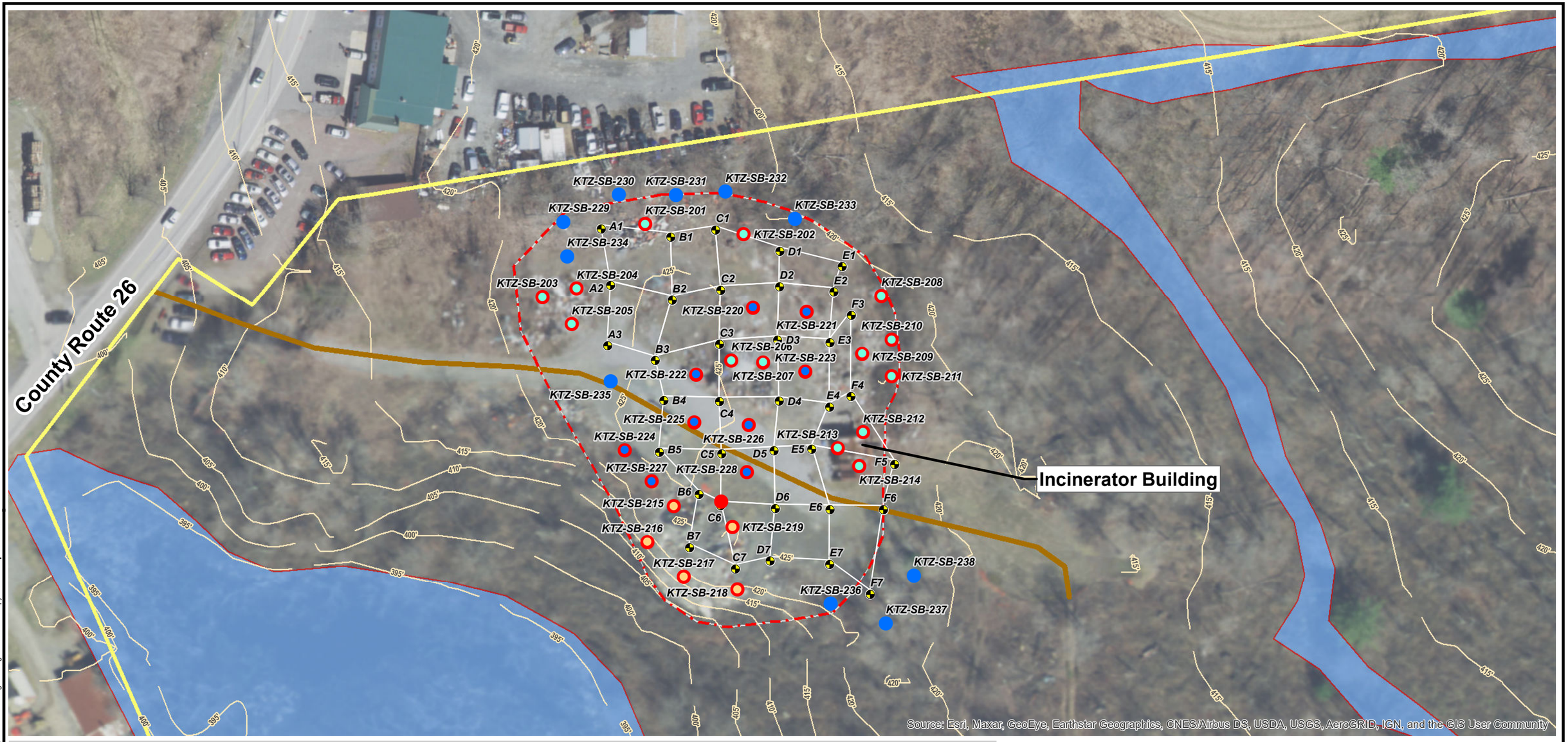
18. Job Safety Analysis

It is anticipated that the standard operating procedures (SOPs) detailed in the Generic Field Activities Plan (FAP) will be utilized for all work practices. If site specific activities require additional or alternate procedures, TRC will assess the task hazards and controls using separate job safety analysis forms (JSAs). Prior to use in the field, JSAs will be reviewed and approved by the TRC Project Manager and OSC. JSA forms can be found in **Appendix I**.

19. Acknowledgement

All TRC personnel operating under this HASP must read the HASP and sign the acknowledgment page in **Appendix J**.

Figure 1
Site Layout



LEGEND

- SOIL BORING LOCATION - NOVEMBER 2016 SAMPLING EVENT
- 14 BORINGS IN PREVIOUSLY INACCESSIBLE AREAS
- 5 BORINGS IN LARGE DEBRIS WASTE ACCUMULATION AREA
- 9 BORINGS TO DELINEATE ≥ 50 PPM PCBs
- 10 BORINGS TO COMPLETE THE HORIZONTAL DELINEATION OF THE IMPACTED AREA
- 1 BORING TO COMPLETE THE VERTICAL DELINEATION OF THE IMPACTED AREA
- SITE/PROPERTY BOUNDARY (APPROXIMATE)
- ACCESS ROAD
- APPROX. EXTENT OF MAIN WASTE ACCUMULATION AREA
- GROUND SURFACE ELEVATION CONTOUR (FEET NAVD99)
- APPROXIMATE LIMIT OF DELINEATED WETLANDS
- SAMPLING GRID

NOTES

1. UP TO 10 PRE-DESIGN BORINGS IN THE EASTERN PORTION OF THE PROPERTY (RAILS TO TRAILS) WILL BE SELECTED IN THE FIELD BASED ON ACCESSIBILITY. LOCATIONS ARE NOT SHOWN ON MAP.
2. LOCATIONS FOR 2 PRE-DESIGN GEOTECHNICAL SOIL BORINGS ARE NOT SHOWN ON MAP, AND WILL BE SELECTED IN THE FIELD BASED ON CONDITIONS OBSERVED, AS DESCRIBED IN THE SCOPE OF WORK.
3. UP TO 10 PRE-DESIGN SURFACE SOIL SAMPLES WILL BE COLLECTED (TARGETING PRIOR SURFACE SAMPLE LOCATIONS KTZ-SS-2, KTZ-SS-5, AND KTZ-SS-16). LOCATIONS WILL BE SELECTED IN THE FIELD AND ARE NOT SHOWN ON THE MAP.

N

0 70 140 Feet

1 " = 70 '

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
KATZMAN RECYCLING, SITE NO. 558035
24 COUNTY ROUTE 26
GRANVILLE, NY 12832

TITLE:
PROPOSED PRE-DESIGN SAMPLING LOCATIONS

DRAWN BY:	L. BOCHKIS	PROJ NO.:	432260
CHECKED BY:	J. LAROCK		
APPROVED BY:	K. SULLIVAN		**FIGURE 1**
DATE:	MARCH 2021		

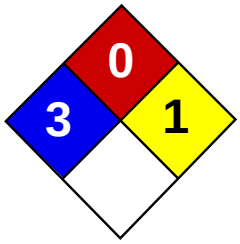
TRC
10 Maxwell Drive, Suite 200,
Clifton Park, NY 12065
Phone: 518.348.1190
www.trccompanies.com

FILE NO.: Figure 1 - Proposed Pre-Design Boring Locations - Copy.mxd

Plot Date: 3/31/2021, 11:28:48 AM by LBOCHKIS – LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\NYSDEC\240658_Katzman\2021\Figure 1 - Proposed Pre-Design Boring Locations - Copy.mxd
Coordinate System: NAD 1983 StatePlane New York East FIPS 3101 Feet (Foot US)
Map Rotation: 0

TRC - GIS

Appendix A
Safety Data Sheets



Material Safety Data Sheet
Hydrochloric acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Hydrochloric acid

Catalog Codes: SLH1462, SLH3154

CAS#: Mixture.

RTECS: MW4025000

TSCA: TSCA 8(b) inventory: Hydrochloric acid

CI#: Not applicable.

Synonym: Hydrochloric Acid; Muriatic Acid

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Hydrogen chloride	7647-01-0	20-38
Water	7732-18-5	62-80

Toxicological Data on Ingredients: Hydrogen chloride: GAS (LC50): Acute: 4701 ppm 0.5 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth. Repeated or prolonged exposure to the substance can produce target

organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

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

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of metals

Explosion Hazards in Presence of Various Substances: Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Non combustible. Calcium carbide reacts with hydrogen chloride gas with incandescence. Uranium phosphide reacts with hydrochloric acid to release spontaneously flammable phosphine. Rubidium acetylene carbides burns with slightly warm hydrochloric acid. Lithium silicide in contact with hydrogen chloride becomes incandescent. When dilute hydrochloric acid is used, gas spontaneously flammable in air is evolved. Magnesium boride treated with concentrated hydrochloric acid produces spontaneously flammble gas. Cesium acetylene carbide burns hydrogen chloride gas. Cesium carbide ignites in contact with hydrochloric acid unless acid is dilute. Reacts with most metals to produce flammable Hydrodgen gas.

Special Remarks on Explosion Hazards:

Hydrogen chloride in contact with the following can cause an explosion, ignition on contact, or other violent/vigorous reaction: Acetic anhydride AgClO + CCl4 Alcohols + hydrogen cyanide, Aluminum Aluminum-titanium alloys (with HCl vapor), 2-Amino ethanol, Ammonium hydroxide, Calcium carbide Ca3P2 Chlorine + dinitroanilines (evolves gas), Chlorosulfonic acid Cesium carbide Cesium acetylene carbide, 1,1-Difluoroethylene Ethylene diamine Ethylene imine, Fluorine, HClO4 Hexalithium disilicide H2SO4 Metal acetylides or carbides, Magnesium boride, Mercuric sulfate, Oleum, Potassium permanganate, beta-Propiolactone Propylene oxide Rubidium carbide, Rubidium, acetylene carbide Sodium (with aqueous HCl), Sodium hydroxide Sodium tetraselenium, Sulfonic acid, Tetraselenium tetranitride, U3P4 , Vinyl acetate. Silver perchlorate with carbon tetrachloride in the presence of hydrochloric acid produces trichloromethyl perchlorate which detonates at 40 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
CEIL: 5 (ppm) from OSHA (PEL) [United States] CEIL: 7 (mg/m3) from OSHA (PEL) [United States] CEIL: 5 from NIOSH CEIL: 7 (mg/m3) from NIOSH TWA: 1 STEL: 5 (ppm) [United Kingdom (UK)] TWA: 2 STEL: 8 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pungent. Irritating (Strong.)

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Acidic.

Boiling Point:
108.58 C @ 760 mm Hg (for 20.22% HCl in water) 83 C @ 760 mm Hg (for 31% HCl in water) 50.5 C (for 37% HCl in water)

Melting Point:
-62.25°C (-80°F) (20.69% HCl in water) -46.2 C (31.24% HCl in water) -25.4 C (39.17% HCl in water)

Critical Temperature: Not available.

Specific Gravity:
1.1- 1.19 (Water = 1) 1.10 (20%and 22% HCl solutions) 1.12 (24% HCl solution) 1.15 (29.57% HCl solution) 1.16 (32% HCl solution) 1.19 (37% and 38%HCl solutions)

Vapor Pressure: 16 kPa (@ 20°C) average

Vapor Density: 1.267 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.25 to 10 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility: Soluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, water

Incompatibility with various substances:
Highly reactive with metals. Reactive with oxidizing agents, organic materials, alkalis, water.

Corrosivity:
Extremely corrosive in presence of aluminum, of copper, of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Reacts with water especially when water is added to the product. Absorption of gaseous hydrogen chloride on mercuric sulfate becomes violent @ 125 deg. C. Sodium reacts very violently with gaseous hydrogen chloride. Calcium phosphide and hydrochloric acid undergo very energetic reaction. It reacts with oxidizers releasing chlorine gas. Incompatible with, alkali metals, carbides, borides, metal oxides, vinyl acetate, acetylides, sulphides, phosphides, cyanides, carbonates. Reacts with most metals to produce flammable Hydrogen gas. Reacts violently (moderate reaction with heat of evolution) with water especially when water is added to the product. Isolate hydrogen chloride from heat, direct sunlight, alkalies (reacts vigorously), organic materials, and oxidizers (especially nitric acid and chlorates), amines, metals, copper and alloys (e.g. brass), hydroxides, zinc (galvanized materials), lithium silicide (incandescence), sulfuric acid(increase in temperature and pressure) Hydrogen chloride gas is emitted when this product is in contact with sulfuric acid. Adsorption of Hydrochloric Acid onto silicon dioxide results in exothmeric reaction. Hydrogen chloride causes aldehydes and epoxides to violently polymerize. Hydrogen chloride or Hydrochloric Acid in contact with the folloiwng can cause explosion or ignition on contact or

Special Remarks on Corrosivity:

Highly corrosive. Incompatible with copper and copper alloys. It attacks nearly all metals (mercury, gold, platinium, tantalum, silver, and certain alloys are exceptions). It is one of the most corrosive of the nonoxidizing acids in contact with copper alloys. No corrosivity data on zinc, steel. Severe Corrosive effect on brass and bronze

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
Acute oral toxicity (LD50): 900 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 1108 ppm, 1 hours [Mouse]. Acute toxicity of the vapor (LC50): 3124 ppm, 1 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. May cause damage to the following organs: kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of ingestion, . Hazardous in case of eye contact (corrosive), of inhalation (lung corrosive).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Doses (LDL/LCL) LDL [Man] -Route: Oral; 2857 ug/kg LCL [Human] - Route: Inhalation; Dose: 1300 ppm/30M LCL [Rabbit] - Route: Inhalation; Dose: 4413 ppm/30M

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (fetoxicity). May affect genetic material.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Corrosive. Causes severe skin irritation and burns. Eyes: Corrosive. Causes severe eye irritation/conjuntivitis, burns, corneal necrosis. Inhalation: May be fatal if inhaled. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Inhalation of hydrochloric acid fumes produces nose, throat, and larryngeal burning, and irritation, pain and inflammation, coughing, sneezing, choking sensation, hoarseness, laryngeal spasms, upper respiratory tract edema, chest pains, as well has headache, and palpitations. Inhalation of high concentrations can result in corrosive burns, necrosis of bronchial epithelium, constriction of the larynx and bronchi, nasospetal perforation, glottal closure, occur, particularly if exposure is prolonged. May affect the liver. Ingestion: May be fatal if swallowed. Causes irritation and burning, ulceration, or perforation of the gastrointestinal tract and resultant peritonitis, gastric hemorrhage and infection. Can also cause nausea, vomitting (with "coffee ground" emesis), diarrhea, thirst, difficulty swallowing, salivation, chills, fever, uneasiness, shock, strictures and stenosis (esophogeal, gastric, pyloric). May affect behavior (excitement), the cardiovascular system (weak rapid pulse, tachycardia), respiration (shallow respiration), and urinary system (kidneys- renal failure, nephritis). Acute exposure via inhalation or ingestion can also cause erosion of tooth enamel. Chronic Potential Health Effects: dyspnea, bronchitis. Chemical pneumonitis and pulmonary edema can also

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Hydrochloric acid, solution UNNA: 1789 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Hydrochloric acid Illinois toxic substances disclosure to employee act: Hydrochloric acid Illinois chemical safety act: Hydrochloric acid New York release reporting list: Hydrochloric acid Rhode Island RTK hazardous substances: Hydrochloric acid Pennsylvania RTK: Hydrochloric acid Minnesota: Hydrochloric acid Massachusetts RTK: Hydrochloric acid Massachusetts spill list: Hydrochloric acid New Jersey: Hydrochloric acid New Jersey spill list: Hydrochloric acid Louisiana RTK reporting list: Hydrochloric acid Louisiana spill reporting: Hydrochloric acid California Director's List of Hazardous Substances: Hydrochloric acid TSCA 8(b) inventory: Hydrochloric acid TSCA 4(a) proposed test rules: Hydrochloric acid SARA 302/304/311/312 extremely hazardous substances: Hydrochloric acid SARA 313 toxic chemical notification and release reporting: Hydrochloric acid CERCLA: Hazardous substances.: Hydrochloric acid: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R34- Causes burns. R37- Irritating to respiratory system. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 1

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 05:45 PM

Last Updated: 06/09/2012 12:00 PM

Hexane (n-Hexane)

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Hexane (n-Hexane)**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: **S25352A**

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Environmentally Damaging
Chronic hazards to the aquatic environment, category 2

Flammable
Flammable liquids, category 2

Health hazard
Aspiration hazard, category 1
Reproductive toxicity, category 2

Irritant
Skin irritation, category 2
Specific target organ toxicity following single exposure, category 3

STOT SE 3
Aspiration Tox.1
Flammable Liq. 2
Aquatic Chronic 2
Reproductive 2
Skin Irritation, Category 2
STOT RE 2

Signal word :Danger

Hazard statements:
Explosive; mass explosion hazard
Explosive; severe projection hazard
Heating may cause an explosion
Heating may cause a fire or explosion

Heating may cause a fire
In contact with water releases flammable gases which may ignite spontaneously
May cause fire or explosion; strong oxidizer
Contains gas under pressure; may explode if heated
Toxic if swallowed
Fatal in contact with skin
May be harmful if swallowed
Toxic to aquatic life with long lasting effects
Precautionary statements:
Do not eat, drink or smoke when using this product
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
IF exposed or concerned: Get medical advice/attention
If skin irritation occurs: Get medical advice/attention
In case of fire: Use ... for extinction
Store in a well ventilated place. Keep container tightly closed
Store locked up
Dispose of contents/container to ...

Other Non-GHS Classification:

WHMIS

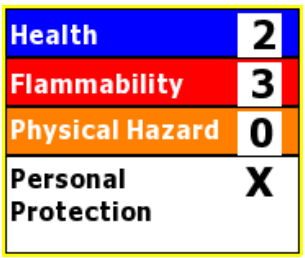
B2 

D2A 

D2B 

NFPA/HMIS

NFPA SCALE (0-4)



HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 110-54-3	n-Hexane	>95 %

Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.Seek medical advice if discomfort or irritation persists.

After skin contact: Wash affected area with soap and water. Rinse thoroughly. Seek medical attention if irritation, discomfort or vomiting persists.

After eye contact: Protect unexposed eye. Rinse/flush exposed eye(s) gently using water for 15-20 minutes. Remove contact lens(es) if able to do so during rinsing. Seek medical attention if irritation persists or if concerned.

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.

Most important symptoms and effects, both acute and delayed:

Irritation, Nausea,Headache, Shortness of breath.;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Carbon dioxide, dry chemical, foam, halon. If in laboratory setting, follow laboratory fire suppression procedures. Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.

Advice for firefighters:

Protective equipment:

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Use respiratory protective device against the effects of fumes/dust/aerosol. Keep unprotected persons away. Ensure adequate ventilation.Keep away from ignition sources. Protect from heat.Stop the spill, if possible. Contain spilled material by diking or using inert absorbent. Transfer to a disposal or recovery container.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13

Methods and material for containment and cleaning up:

If in a laboratory setting, follow Chemical Hygiene Plan procedures.Collect liquids using vacuum or by use of absorbents. Place into properly labeled containers for recovery or disposal. If necessary, use trained response staff/contractor.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Prevent formation of aerosols. Follow good hygiene procedures when handling chemical materials. Do not eat, drink, smoke, or use personal products when handling chemical substances. If in a laboratory setting, follow Chemical Hygiene Plan.Use only in well ventilated areas.Avoid splashes or spray in enclosed areas.

Conditions for safe storage, including any incompatibilities:

Store in a cool location. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store away from foodstuffs. Store away from oxidizing agents.Store in cool, dry conditions in well sealed containers. Keep container tightly sealed.

SECTION 8 : Exposure controls/personal protection

Control Parameters:	110-54-3, n-Hexan, ACGIH (TLV-TWA) 50 ppm TWA 110-54-3, n-Hexane, NIOSH (TWA) 50 ppm TWA; 180 mg/m3 TWA 110-54-3 , n-Hexane, OSHA (PELs) 500 ppm TWA; 1800 mg/m3 TWA 110-54-3 , n-Hexane, OSHA (STEL) 1000 ppm STEL; 3600 mg/m3 STEL 110-54-3, NIOSH , 1100 ppm IDLH (10% LEL)
Appropriate Engineering controls:	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.
Respiratory protection:	Not required under normal conditions of use. Use suitable respiratory protective device when high concentrations are present. Use suitable respiratory protective device when aerosol or mist is formed. For spills, respiratory protection may be advisable.
Protection of skin:	The glove material has to be impermeable and resistant to the product/ the substance/ the preparation being used/handled.Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.
Eye protection:	Safety glasses with side shields or goggles.
General hygienic measures:	The usual precautionary measures are to be adhered to when handling chemicals. Keep away from food, beverages and feed sources. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Do not inhale gases/fumes/dust/mist/vapor/aerosols. Avoid contact with the eyes and skin.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Form : liquid Colour : colourless	**Explosion limit lower**: **Explosion limit upper**:	Not Determined Not Determined
Odor:	gasoline	**Vapor pressure**:	341.3 hPa (256.0 mmHg) at 37.7 °C (99.9 °F) 176.0 hPa (132.0 mmHg) at 20.0 °C (68.0 °F)

Hexane (n-Hexane)

Odor threshold:	Not Determined	**Vapor density**:	Not Determined
pH-value:	7.0	**Relative density**:	0.659 g/mL at 25 °C (77 °F)
Melting/Freezing point:	- 95 °C (- 139 °F)	**Solubilities**:	Insoluble
Boiling point/Boiling range:	69 ° C (156 °F)	**Partition coefficient (n-octanol/water)**:	Not Determined
Flash point (closed cup):	- 26.0 °C (- 14.8 °F) - closed cup	**Auto/Self-ignition temperature**:	234.0 °C (453.2 °F)
Evaporation rate:	5.8	**Decomposition temperature**:	Not Determined
Flammability (solid,gaseous):	Not Determined	**Viscosity**:	a. Kinematic:Not Determined b. Dynamic: Not Determined
Density: Not Determined			

SECTION 10 : Stability and reactivity

Reactivity: Nonreactive under normal conditions.
Chemical stability: No decomposition if used and stored according to specifications.
Possible hazardous reactions: None under normal processing
Conditions to avoid: Store away from oxidizing agents, strong acids or bases.Heat, Sparks, Open Flames.
Incompatible materials: Strong acids.Strong bases.
Hazardous decomposition products: Carbon oxides (CO, CO2).

SECTION 11 : Toxicological information

Acute Toxicity:		
Oral:	110-54-3	LD50 Rat 25 g/kg
Dermal:	110-54-3	LD50 Rabbit 3000 mg/kg
Inhalation:	110-54-3	LC50 Rat 48000 ppm 4 h
Chronic Toxicity: No additional information.		
Corrosion Irritation: No additional information.		
Sensitization:		No additional information.
Single Target Organ (STOT):		No additional information.
Numerical Measures:		No additional information.
Carcinogenicity:		No additional information.
Mutagenicity:		No additional information.
Reproductive Toxicity:		No additional information.

SECTION 12 : Ecological information

Ecotoxicity

Fish (acute 110-54-3: : 96 Hr LC50 Pimephales promelas: 2.1 - 2.98 mg/L [flow-through]

Persistence and degradability: Readily degradable in the environment.
Bioaccumulative potential:
Mobility in soil: Aqueous solution has high mobility in soil.
Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Product/containers must not be disposed together with household garbage. Do not allow product to reach sewage system or open water.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). Consult federal state/ provincial and local regulations regarding the proper disposal of waste material that may incorporate some amount of this product.

SECTION 14 : Transport information

UN-Number

1208

UN proper shipping name

Hexanes

Transport hazard class(es)

Class:
3 Flammable liquids

Packing group:II
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

None of the ingredients is listed

SARA Section 313 (Specific toxic chemical listings):

110-54-3 n-Hexane

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

None of the ingredients is listed

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

110-54-3 n-Hexane

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:
IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

Effective date : 12.14.2014
Last updated : 03.19.2015

GASCO

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR

MSDS NO: 248 **Version:3** **Date: August, 2010**

1. Chemical Product and Company Identification

Gasco Affiliates, LLC
320 Scarlett Blvd.
Oldsmar, FL 34677

TELEPHONE NUMBER: (800) 910-0051 **24-HOUR EMERGENCY NUMBER: 1-800-424-9300**
FAX NUMBER: (866) 755-8920
E-MAIL: info@gascogas.com

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR
CHEMICAL NAME: Isobutylene in air
COMMON NAMES/ SYNONYMS: None
TDG (Canada) CLASSIFICATION: 2.2
WHIMIS CLASSIFICATION: A

2. COMPOSITION/ INFORMATION ON INGREDIENTS

INGREDIENT	%VOLUME	PEL-OSHA	TLV-ACGIH	LD_{50} or LC_{50} Route/Species
Isobutylene FORMULA: C_4H_8	0.0001-0.9	N/A	N/A	N/A
Air FORMULA: Mixture	99.0 to 99.9999	N/A	N/A	N/A

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Release of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene may cause drowsiness and other central nervous system effects in high concentrations; however, due to the low concentration of this gas mixture, this is unlikely to occur.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
No	No	No	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization	Reproductive Hazard	Mutagen
Yes	No	No	No	No

Carcinogenicity: --NTP: No IARC: No OSHA: No

EYE EFFECTS:
N/A.

SKIN EFFECTS:
N/A.

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR

INGESTION EFFECTS:
Ingestion unlikely. Gas at room temperature.

INHALATION EFFECTS:
Due to the small size of this cylinder, no unusual health effects from over-exposure are anticipated under normal routine use.

NFPA HAZARD CODES		HMIS HAZARD CODES		RATING SYSTEM
Health:	1	Health:	1	0= No Hazard
Flammability:	0	Flammability:	0	1= Slight Hazard
Reactivity:	0	Reactivity:	0	2= Moderate Hazard
				3= Serious Hazard
				4= Severe Hazard

4. FIRST AID MEASURES

EYES:
N/A

SKIN:
N/A

INGESTION:
Not required

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASED OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED THE SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

5. FIRE-FIGHTING MEASURES

These containers hold gas under pressure, with no liquid phase. If involved in a major fire, they should be sprayed with water to avoid pressure increases, otherwise pressures will rise and ultimately they may distort or burst to release the contents. The gases will not add significantly to the fire, but containers or fragments may be projected considerable distances - thereby hampering fire fighting efforts.

6. ACCIDENTAL RELEASE MEASURES

In terms of weight, these containers hold very little contents, such that any accidental release by puncturing etc. will be of no practical concern.

7. HANDLING AND STORAGE

Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Use only in well-ventilated areas. Do not heat cylinder by any means to increase rate of product from the cylinder. Do not allow the temperature where cylinders are stored to exceed 130^{o}F (54^{o}C).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Use adequate ventilation for extended use of gas.

PRODUCT NAME: ISOBUTYLENE (1 PPM – 0.9%) IN AIR

9. PHYSICAL AND CHEMICAL PROPERTIES

PARAMETER:	VALUE:
Physical state	: Gas
Evaporation point	: N/A
pH	: N/A
Odor and appearance	: Colorless, odorless gas

10. STABILITY AND REACTIVITY

Stable under normal conditions. Expected shelf life 48 months.

11. TOXICOLOGICAL INFORMATION

No toxicological damage caused by this product.

12. ECOLOGICAL INFORMATION

No ecological damage caused by this product.

13. DISPOSAL INFORMATION

Do not discharge into any place where its accumulation could be dangerous. Used containers are acceptable for disposal in the normal waste stream as long as the cylinder is empty and valve removed or cylinder wall is punctured; but GASCO encourages the consumer to return cylinders.

14. TRANSPORT INFORMATION

	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Compressed Gas N.O.S. (Isobutylene in Air)	Compressed Gas N.O.S. (Isobutylene in Air)
HAZARD CLASS:	2.2	2.2
IDENTIFICATION NUMBER:	UN1956	UN1956
SHIPPING LABEL:	NONFLAMMABLE GAS	NONFLAMMABLE GAS

15. REGULATORY INFORMATION

Isobutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

16. OTHER INFORMATION

This MSDS has been prepared in accordance with the Chemicals (Hazard Information and Packaging for Supply (Amendment) Regulation 1996. The information is based on the best knowledge of GASCO, and its advisors and is given in good faith, but we cannot guarantee its accuracy, reliability or completeness and therefore disclaim any liability for loss or damage arising out of use of this data. Since conditions of use are outside the control of the Company and its advisors we disclaim any liability for loss or damage when the product is used for other purposes than it is intended.

MSDS/S010/248/ August, 2010

Methanol (230, 232, 233)

000000011383

Version 3.1 Revision Date 03/26/2015 Print Date 03/08/2016

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Methanol (230, 232, 233)
MSDS Number	:	000000011383
Product Use Description	:	Solvent
Manufacturer or supplier's details	:	Honeywell International Inc. 115 Tabor Road Morris Plains, NJ 07950-2546
For more information call	:	1-800-368-0050 +1-231-726-3171 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
	:	
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	liquid, clear
Color	:	colourless
Odor	:	slight alcohol-like

Classification of the substance or mixture

Classification of the substance or mixture	:	Flammable liquids, Category 2 Eye irritation, Category 2A Reproductive toxicity, Category 2 Specific target organ toxicity - single exposure, Category 1, Eyes, Nervous system, Systemic toxicity

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word : Danger

Hazard statements : Highly flammable liquid and vapour.
Causes serious eye irritation.
Suspected of damaging fertility or the unborn child.
Causes damage to organs.

Precautionary statements : **Prevention:**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ ventilating/ lighting/ equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear protective gloves/ eye protection/ face protection.

Response:
IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed: Call a POISON CENTER or doctor/ physician.
If eye irritation persists: Get medical advice/ attention.
In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage:
Store in a well-ventilated place. Keep cool.

Store locked up.

Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : CH4O

Chemical nature : Substance

Chemical Name	CAS-No.	Concentration
Methanol	67-56-1	100.00 %

SECTION 4. FIRST AID MEASURES

Inhalation : Call a physician immediately. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present.

Skin contact : Wash off immediately with plenty of water for at least 15 minutes. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Call a physician.

Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician.

Ingestion : Call a physician immediately. Do NOT induce vomiting. Immediate medical attention is required. Never give anything by mouth to an unconscious person.

Notes to physician

Treatment : Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical
Cool closed containers exposed to fire with water spray.

Unsuitable extinguishing media : Do not use a solid water stream as it may scatter and spread fire.

Specific hazards during firefighting : Flammable.
Vapours may form explosive mixtures with air.
Vapours are heavier than air and may spread along floors.
Vapors may travel to areas away from work site before igniting/flashing back to vapor source.
In case of fire hazardous decomposition products may be produced such as:
Carbon monoxide
Carbon dioxide (CO2)
Formaldehyde

Special protective equipment for firefighters : Wear self-contained breathing apparatus and protective suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Wear personal protective equipment.
Immediately evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Ensure adequate ventilation.
Remove all sources of ignition.
Do not swallow.
Do not breathe vapours or spray mist.
Avoid contact with skin, eyes and clothing.

Environmental precautions : Prevent further leakage or spillage if safe to do so.

Prevent product from entering drains.
Discharge into the environment must be avoided.
Do not flush into surface water or sanitary sewer system.
Do not allow run-off from fire fighting to enter drains or water courses.

Methods for cleaning up : Ventilate the area.
No sparking tools should be used.
Use explosion-proof equipment.
Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Handling

Handling : Wear personal protective equipment.
Use only in well-ventilated areas.
Keep container tightly closed.
Do not smoke.
Do not swallow.
Do not breathe vapours or spray mist.
Avoid contact with skin, eyes and clothing.

Advice on protection against fire and explosion : Keep away from fire, sparks and heated surfaces.
Take precautionary measures against static discharges.
Ensure all equipment is electrically grounded before beginning transfer operations.
Use explosion-proof equipment.
Keep product and empty container away from heat and sources of ignition.
No sparking tools should be used.
No smoking.

Storage

Requirements for storage areas and containers : Store in area designed for storage of flammable liquids.
Protect from physical damage.
Keep containers tightly closed in a dry, cool and well-ventilated place.
Containers which are opened must be carefully resealed and

kept upright to prevent leakage.
Keep away from heat and sources of ignition.
Keep away from direct sunlight.
Store away from incompatible substances.
Container hazardous when empty.
Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures	:	Ensure that eyewash stations and safety showers are close to the workstation location.
Engineering measures	:	Use with local exhaust ventilation. Prevent vapour buildup by providing adequate ventilation during and after use.
Eye protection	:	Do not wear contact lenses. Wear as appropriate: Safety glasses with side-shields If splashes are likely to occur, wear: Goggles or face shield, giving complete protection to eyes
Hand protection	:	Solvent-resistant gloves Gloves must be inspected prior to use. Replace when worn.
Skin and body protection	:	Wear as appropriate: Solvent-resistant apron Flame retardant antistatic protective clothing. If splashes are likely to occur, wear: Protective suit
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Use NIOSH approved respiratory protection.
Hygiene measures	:	When using do not eat, drink or smoke. Wash hands before breaks and immediately after handling the product. Keep working clothes separately.

Do not swallow.
Do not breathe vapours or spray mist.
Avoid contact with skin, eyes and clothing.
This material has an established AIHA ERPG exposure limit.
The current list of ERPG exposure limits can be found at http://www.aiha.org/insideaiha/GuidelineDevelopment/ERPG/Documents/2011erpgweelhandbook_table-only.pdf.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
Methanol	67-56-1	TWA : time weighted average	(200 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Methanol	67-56-1	STEL : Short term exposure limit	(250 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Methanol	67-56-1	SKIN_DES : Skin designation:	Can be absorbed through the skin.	2008	ACGIH:US. ACGIH Threshold Limit Values
Methanol	67-56-1	REL : Recommended exposure limit (REL):	260 mg/m3 (200 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Methanol	67-56-1	SKIN_DES : Skin designation:	Can be absorbed through the skin.	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards

Methanol	67-56-1	STEL : Short term exposure limit	325 mg/m3 (250 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Methanol	67-56-1	PEL : Permissible exposure limit	260 mg/m3 (200 ppm)	02 2006	OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Methanol	67-56-1	TWA : time weighted average	260 mg/m3 (200 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)
Methanol	67-56-1	STEL : Short term exposure limit	325 mg/m3 (250 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)
Methanol	67-56-1	SKIN_FINAL : Skin designation (Final Rule Limit applies):	Can be absorbed through the skin.	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	:	liquid, clear
Color	:	colourless
Odor	:	slight alcohol-like
pH	:	Note: Not applicable

Melting point/freezing point	:	Note: Not applicable
Boiling point/boiling range	:	64.7 °C
Flash point	:	52 °F (11 °C) Method: closed cup
Evaporation rate	:	ca. 5 Method: Compared to Butyl acetate.
Lower explosion limit	:	6 %(V)
Upper explosion limit	:	36 %(V)
Vapor pressure	:	129.32 hPa at 20 °C(68 °F)
Vapor density	:	1.11 Note: (Air = 1.0)
Density	:	0.792 g/cm3 at 20 °C
Water solubility	:	Note: completely soluble
Ignition temperature	:	464 °C
Molecular weight	:	32.04 g/mol

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under recommended storage conditions.
Possibility of hazardous reactions	:	Hazardous polymerisation does not occur.
Conditions to avoid	:	Heat, flames and sparks. Keep away from direct sunlight.
Incompatible materials to avoid	:	Strong oxidizing agents Aluminium Magnesium May attack many plastics, rubbers and coatings.
Hazardous decomposition products	:	In case of fire hazardous decomposition products may be produced such as: Carbon monoxide Carbon dioxide (CO2) Formaldehyde

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	:	LD50: 5,628 mg/kg Species: Rat
Acute inhalation toxicity	:	LC50: 64000 ppm Exposure time: 4 h Species: Rat
Acute dermal toxicity	:	LD50: 15,800 mg/kg Species: Rabbit
Skin irritation	:	Species: Rabbit Classification: irritating Exposure time: 24 h

Eye irritation	:	Species: rabbit eye Classification: irritating
Repeated dose toxicity	:	Species: Rat Application Route: Inhalation Test substance: Methanol Note: Developmental Toxicity NOAEL (maternal toxicity) 10,000 ppm NOAEL (developmental toxicity) 5,000 ppm Skeletal and visceral malformations.
Genotoxicity in vitro	:	Note: In vitro tests did not show mutagenic effects
Genotoxicity in vivo	:	Note: In vivo tests did not show mutagenic effects

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish	:	LC50: 29,400 mg/l Exposure time: 96 h Species: Fathead minnow
Toxicity to daphnia and other aquatic invertebrates	:	LC50: 10,000 mg/l Exposure time: 24 h Species: Daphnia (water flea)
Toxicity to bacteria	:	EC50: 43,000 mg/l Exposure time: 5 min Species: Photobacterium phosphoreum
	:	EC50: 40,000 mg/l Exposure time: 15 min Species: Photobacterium phosphoreum
	:	EC50: 39,000 mg/l Exposure time: 25 min Species: Photobacterium phosphoreum

Further information on ecology

Additional ecological information	:	Accumulation in aquatic organisms is unlikely. The product is readily degradable in the environment.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods	:	Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

DOT	UN/ID No.	:	UN 1230
	Proper shipping name	:	METHANOL
	Class		3
	Packing group		II
	Hazard Labels		3

IATA	UN/ID No.	:	UN 1230
	Description of the goods	:	METHANOL
	Class	:	3
	Packaging group	:	II
	Hazard Labels	:	3 (6.1)
	Packing instruction (cargo aircraft)	:	364
	Packing instruction (passenger aircraft)	:	352
	Packing instruction (passenger aircraft)	:	Y341

IMDG	UN/ID No.	:	UN 1230
	Description of the goods	:	METHANOL
	Class	:	3
	Packaging group	:	II
	Hazard Labels	:	3 (6.1)
	EmS Number	:	F-E, S-D
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL.
Japan. Kashin-Hou Law List	:	On the inventory, or in compliance with the inventory
Korea. Toxic Chemical Control Law (TCCL) List	:	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances	:	On the inventory, or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	:	On the inventory, or in compliance with the inventory

National regulatory information

US. EPA CERCLA Hazardous Substances (40 CFR 302)	:	The following component(s) of this product is/are subject to release reporting under 40 CFR 302 when release exceeds the Reportable Quantity (RQ): Reportable quantity: 5000 lbs

	:	Methanol	67-56-1
SARA 302 Components	:	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.	
SARA 313 Components	:	The following components are subject to reporting levels established by SARA Title III, Section 313:	
	:	Methanol	67-56-1
SARA 311/312 Hazards	:	Fire Hazard Acute Health Hazard Chronic Health Hazard	
CERCLA Reportable Quantity	:	5000 lbs	
California Prop. 65	:	WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	
		Methanol	67-56-1
Massachusetts RTK	:	Methanol	67-56-1
New Jersey RTK	:	Methanol	67-56-1
Pennsylvania RTK	:	Methanol	67-56-1
WHMIS Classification	:	B2: Flammable liquid D1B: Toxic Material Causing Immediate and Serious Toxic Effects D2A: Very Toxic Material Causing Other Toxic Effects D2B: Toxic Material Causing Other Toxic Effects This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.	

SECTION 16. OTHER INFORMATION

		HMIS III	NFPA
Health hazard	:	2*	1
Flammability	:	3	3
Physical Hazard	:	0	
Instability	:		0

* - Chronic health hazard

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

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. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.
Previous Issue Date: 03/19/2014
Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

Material Safety Data Sheet
Nitric acid, 20-70%

ACC# 16550

Section 1 - Chemical Product and Company Identification

MSDS Name: Nitric acid, 20-70%
Catalog Numbers: AC124660000, AC124660010, AC124660011, AC124660025, AC124660026, AC124665000, AC124665001, AC133620000, AC133620010, AC133620011, AC133620025, AC133620026, AC424000000, AC424000025, AC424000026, AC424000250, AC424005000, AC424005001, AC613205000, A198C-212, A198C4X-212, A200-212, A200-500, A200-500LC, A200-612GAL, A200212LC, A200C-212, A200C212EA, A200C212LC, A200C4X-212, A200C4X212L, A200S-212, A200S-500, A200S212LC, A200SI-212, A206C-212, A206C4X-212, A467-1, A467-2, A467-250, A467-500, A483-212, A509-212, A509-212LC, A509-500, A509SK-212, A509SK-212LC, MCC-030822, NC9596579, S719721, S71972SC
Synonyms: Azotic acid; Engraver's acid; Aqua fortis.
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
7732-18-5	Water	30-80	231-791-2
7697-37-2	Nitric acid	20-70	231-714-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear to yellow liquid.
Danger! May be fatal if inhaled. Causes severe eye and skin burns. Causes severe respiratory and digestive tract burns. Strong oxidizer. Contact with other material may cause a fire. Acute pulmonary edema or chronic obstructive lung disease may occur from inhalation of the vapors of nitric acid. Corrosive to metal.
Target Organs: Lungs, eyes, skin, mucous membranes.

Potential Health Effects

Eye: Causes severe eye burns. Direct contact with liquid may cause blindness or permanent eye damage.
Skin: Causes skin burns. May cause deep, penetrating ulcers of the skin. Concentrated nitric acid dyes human skin yellow on contact.
Ingestion: May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May cause systemic effects.
Inhalation: Effects may be delayed. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause acute pulmonary edema, asphyxia, chemical pneumonitis, and upper airway obstruction caused by edema. Depending on the conditions, the vapor or fumes of nitric acid may actually be a mixture of nitric acid and various oxides of

nitrogen. The composition may vary with temperature, humidity, and contact with other organic materials.
Chronic: Exposure to high concentrations of nitric acid vapor may cause pneuomonitis and pulmonary edema which may be fatal. Symptoms may or may not be delayed. Continued exposure to the vapor & mist of nitric acid may result in a chronic bronchitis, & more severe exposure results in a chemical pneumonitis. The vapor & mists of nitric acid may erode the teeth, particularly affecting the canines & incisors.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively.

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. Strong oxidizer. Contact with other material may cause fire. 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. May react with metal surfaces to form flammable and explosive hydrogen gas. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products.
Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.
Flash Point: Not applicable.
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 0; Instability: 0; Special Hazard: OX

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Provide ventilation. Evacuate unnecessary personnel. Approach spill from upwind. Use water spray to cool and disperse vapors and protect personnel.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not breathe dust, mist, or vapor. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Discard contaminated shoes. Do not use with metal spatula or other metal items. Use only with adequate ventilation or respiratory protection.
Storage: Do not store near combustible materials. Do not store in direct sunlight. Keep container closed

when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Store away from alkalies. Separate from organic materials. Inspect periodically for damage or evidence of leaks or corrosion.

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. Use a corrosion-resistant ventilation system.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Water	none listed	none listed	none listed
Nitric acid	2 ppm TWA; 4 ppm STEL	2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH	2 ppm TWA; 5 mg/m3 TWA

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Nitric acid: 2 ppm TWA; 5 mg/m3 TWA

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.
Skin: Wear butyl rubber gloves, apron, and/or clothing.
Clothing: Wear appropriate clothing to prevent skin exposure.
Respirators: 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.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear to yellow
Odor: strong odor - acrid odor - suffocating odor
pH: 1.0 (0.1M soln)
Vapor Pressure: 51 mm Hg @ 25 deg C
Vapor Density: 2.17 (air=1)
Evaporation Rate: Not available.
Viscosity: 0.761 cps @ 25 deg C
Boiling Point: 86 deg C
Freezing/Melting Point:-42 deg C
Decomposition Temperature: Not available.
Solubility: Soluble in water.
Specific Gravity/Density:1.4
Molecular Formula:HNO3
Molecular Weight:63.01

Section 10 - Stability and Reactivity

Chemical Stability: Stable. Decomposes when in contact with air, light, or organic matter. The yellow color is due to release of nitrogen dioxide on exposure to light.
Conditions to Avoid: High temperatures, light, confined spaces.
Incompatibilities with Other Materials: Metals, reducing agents, strong bases, acetic acid, alcohols, acetone, aniline, hydrogen sulfide, metal powders, carbides, aldehydes, organic solvents, combustible materials, chromic acid, flammable liquids, cyanides, sulfides, Incompatible with many substances.

Hazardous Decomposition Products: Nitrogen oxides.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 7732-18-5: ZC0110000
CAS# 7697-37-2: QU5775000; QU5900000
LD50/LC50:
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;
.

CAS# 7697-37-2:
Inhalation, rat: LC50 = 260 mg/m3/30M;
Inhalation, rat: LC50 = 130 mg/m3/4H;
Inhalation, rat: LC50 = 67 ppm(NO2)/4H;
.

Carcinogenicity:
CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7697-37-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: No information found
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Terrestial: During transport through the soil, nitric acid will dissolve some of the soil material, in particular, the carbonate based materials. The acid will be neutralized to some degree with adsorption of the proton also occurring on clay materials. However, significant amounts of acid are expected to remain for transport down toward the ground water table. Upon reaching the ground water table, the acid will continue to move, now in the direction of the ground water flow.
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: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	NITRIC ACID	NITRIC ACID
Hazard Class:	8	8
UN Number:	UN2031	UN2031
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7697-37-2 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

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# 7697-37-2: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 7697-37-2: 1000 lb TPQ

SARA Codes

CAS # 7697-37-2: immediate, delayed, fire.

Section 313

This material contains Nitric acid (CAS# 7697-37-2, 20-70%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

CAS# 7697-37-2 is considered highly hazardous by OSHA.

STATE

CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
CAS# 7697-37-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

C

Risk Phrases:

R 35 Causes severe burns.

Safety Phrases:

S 23 Do not inhale gas/fumes/vapour/spray.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 7732-18-5: No information available.
CAS# 7697-37-2: 1

Canada - DSL/NDSL

CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7697-37-2 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of E, C, D1A.

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# 7697-37-2 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/30/1998
Revision #16 Date: 2/11/2008

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 10.18.2017 **Revision**: 10.18.2017

Trade Name: Alconox

1 Identification of the substance/mixture and of the supplier

1.1 Product identifier

Trade Name: Alconox
Synonyms:
Product number: 1104-1, 1104, 1125, 1150, 1101, 1103, 1112-1, 1112

1.2 Application of the substance / the mixture : Cleaning material/Detergent

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer
Alconox, Inc.
30 Glenn Street
White Plains, NY 10603
1-914-948-4040

Supplier

Emergency telephone number:
ChemTel Inc
North America: 1-800-255-3924
International: 01-813-248-0585

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:
Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

2.2 Label elements:

Skin irritation, category 2.
Eye irritation, category 2A.

Hazard pictograms:

Signal word: Warning

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 10.18.2017 **Revision**: 10.18.2017

Trade Name: Alconox

Additional information: None.

Hazard description

Hazards Not Otherwise Classified (HNOC): None

Information concerning particular hazards for humans and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients

3.1 Chemical characterization : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	12-28
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	2-16

3.4 Additional Information : None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

4.2 Most important symptoms and effects, both acute and delayed

None

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None

5.2 Special hazards arising from the substance or mixture :

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Protective equipment:

Wear protective eye wear, gloves and clothing.
Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures :

Ensure adequate ventilation.
Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None

7 Handling and storage

7.1 Precautions for safe handling :

Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.

7.2 Conditions for safe storage, including any incompatibilities :

Store in a cool, well-ventilated area.

7.3 Specific end use(s):

No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 10.18.2017 **Revision**: 10.18.2017

Trade Name: Alconox

8 Exposure controls/personal protection

8.1 Control parameters :

a) 7722-88-5, Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3

b) Dusts, non-specific OEL, Irish Code of Practice

(i) Total inhalable 10 mg/m3 (8hr)

(ii) Respirible 4mg/m3 (8hr)

(iii) Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3, (8hr)

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal use conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance or preparation. Protective gloves recommended to comply with EN 374. Take note of break through times, permeability, and special workplace conditions, such as mechanical strain, duration of contact, etc. Protective gloves should be replaced at the first sign of wear.

Eye protection:

Safety goggles or glasses, or appropriate eye protection. Recommended to comply with ANSI Z87.1 and/or EN 166.

General hygienic measures:

Wash hands before breaks and at the end of work.

Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	**Explosion limit lower:** **Explosion limit upper:**	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	**Vapor pressure at 20°C:**	Not determined or not available.
Odor threshold:	Not determined or not available.	**Vapor density:**	Not determined or not available.
pH-value:	9.5 (aqueous solution)	**Relative density:**	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	**Solubilities:**	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water):**	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature:**	Not determined or not available.
Evaporation rate:	Not determined or not available.	**Decompositio n**	Not determined or not available.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 10.18.2017 **Revision**: 10.18.2017

Trade Name: Alconox

Flammability (solid, gaseous):	Not determined or not available.	**Viscosity**:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
Density at 20°C:	Not determined or not available.		

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

11 Toxicological information

11.1 Information on toxicological effects :

Acute Toxicity:

Oral:

: LD50 > 5000 mg/kg oral rat - Product .

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Sodium Alkylbenzene Sulfonate: Causes skin irritation. .

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation .

Tetrasodium Pyrophosphate: Rabbit - Risk of serious damage to eyes .

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 10.18.2017 **Revision**: 10.18.2017

Trade Name: Alconox

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours. Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.
Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

PBT: No additional information.

vPvB: No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: ADR, ADN, DOT, IMDG, IATA	None
14.2 UN Proper shipping name: ADR, ADN, DOT, IMDG, IATA	None
14.3 Transport hazard classes: ADR, ADN, DOT, IMDG, IATA	**Class:** None **Label:** None **LTD.QTY:** None

US DOT

Limited Quantity Exception: None

Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Non Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 10.18.2017 **Revision**: 10.18.2017

Trade Name: Alconox

Comments: None	**Comments:** None
14.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
14.5 Environmental hazards :	None
14.6 Special precautions for user:	None
Danger code (Kemler):	None
EMS number:	None
Segregation groups:	None
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.	
14.8 Transport/Additional information:	
Transport category:	None
Tunnel restriction code:	None
UN "Model Regulation":	None

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.

North American

SARA

Section 313 (specific toxic chemical listings): None of the ingredients are listed.
Section 302 (extremely hazardous substances): None of the ingredients are listed.

CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable

Spill Quantity: None of the ingredients are listed.

TSCA (Toxic Substances Control Act):

Inventory: All ingredients are listed.
Rules and Orders: Not applicable.

Proposition 65 (California):

Chemicals known to cause cancer: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.

Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 10.18.2017 **Revision**: 10.18.2017

Trade Name: Alconox

Germany MAK: Not classified.
EC 648/2004 – This is an industrial detergent. Contains >30% phosphate, 15-30% anionic surfactant, <5% EDTA salts
EC 551/2009 – This is not a laundry or dishwasher detergent
EC 907/2006 – Contains no enzymes, optical brighteners, perfumes, allergenic fragrances, or preservative agents

Asia Pacific

Australia

Australian Inventory of Chemical Substances (AICS): All ingredients are listed.

China

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed.

Japan

Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed.

Korea

Existing Chemicals List (ECL): All ingredients are listed.

New Zealand

New Zealand Inventory of Chemicals (NZOIC): All ingredients are listed.

Philippines

Philippine Inventory of Chemicals and Chemical Substances (PICCS): All ingredients are listed.

Taiwan

Taiwan Chemical Substance Inventory (TSCI): All ingredients are listed.

16 Other information

Abbreviations and Acronyms: None

Summary of Phrases

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

NFPA: 1-0-0
HMIS: 1-0-0

Precautionary statements:
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

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 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.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

1 Identification of the substance/mixture and of the supplier

1.1 Product identifier

Trade Name: Liquinox
Synonyms:
Product number: 1232-1, 1232, 1201-1, 1201, 1205, 1215, 1255

1.2 Application of the substance / the mixture : Cleaning material/Detergent

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer **Supplier**
Alconox, Inc.
30 Glenn Street
White Plains, NY 10603
1-914-948-4040

Emergency telephone number:
ChemTel Inc
North America: 1-800-255-3924
International: 01-813-248-0585

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:
Alcohol ethoxylate
Sodium alkylbenzene sulfonate
Sodium xylenesulphonate
Lauramine oxide

2.2 Label elements:

Eye irritation, category 2A.
Skin irritation, category 2.

Hazard pictograms:

Signal word: Warning

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P501 Dispose of contents and container as instructed in Section 13.

Additional information: None.

Hazard description

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

Hazards Not Otherwise Classified (HNOC): None

Information concerning particular hazards for humans and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients

3.1 Chemical characterization : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	10-25
CAS number: 1300-72-7	Sodium Xylenesulphonate	Eye Irrit. 2; H319	2.5-10
CAS number: 84133-50-6	Alcohol Ethoxylate	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	2.5-10
CAS number: 1643-20-5	Lauramine oxide	Skin Irrit. 2 ; H315 Eye Dam. 1; H318	1-2

3.4 Additional Information: None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

4.2 Most important symptoms and effects, both acute and delayed

None

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None

5.2 Special hazards arising from the substance or mixture :

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Protective equipment:

Wear protective eye wear, gloves and clothing.
Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures :

Ensure adequate ventilation.
Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None

7 Handling and storage

7.1 Precautions for safe handling :

Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.
Conditions for safe storage, including any incompatibilities:
Store closed upright and in a cool dry place, should be 15 - 30 deg C or 60 - 90 deg F.

7.2 Specific end use(s):

No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

8 Exposure controls/personal protection

8.1 Control parameters :

No applicable occupational exposure limits

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	Pale yellow liquid	**Explosion limit lower:** **Explosion limit upper:**	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	**Vapor pressure at 20°C:**	Not determined or not available.
Odor threshold:	Not determined or not available.	**Vapor density:**	Not determined or not available.
pH-value:	8.5 as is	**Relative density:**	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	**Solubilities:**	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water):**	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature:**	Not determined or not available.
Evaporation rate:	Not determined or not available.	**Decomposition temperature:**	Not determined or not available.
Flammability (solid, gaseous):	Not determined or not available.	**Viscosity:**	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox	
Density at 20°C:	Not determined or not available.

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

11 Toxicological information

11.1 Information on toxicological effects :

Acute Toxicity:

Oral:

: LD50 >5000 mg per kg Rat, Oral) - product .

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Alcohol Ethoxylate: May cause mild to moderate skin irritation.

Sodium Alkylbenzene Sulfonate: Causes skin irritation.

Lauramine oxide: Causes skin irritation.

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation.

Alcohol Ethoxylate: Causes moderate to severe eye irritation and conjunctivitis.

Sodium xylenesulphonate: Rabbit: irritating to eyes.

Lauramine oxide: Causes serious eye damage.

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.
Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
Lauramine oxide: Fish, LC0 24.3 mg/l, 96h [Killifish (Cyprinodontidae)]
Lauramine oxide: Aquatic invertebrates, (LC50): 3.6 mg/l 96 hours [Daphnia (Daphnia)].
Lauramine oxide: Aquatic plants, EC50 Algae 0.31 mg/l 72 hours [Algae]
Alcohol Ethoxylate: Aquatic invertebrates, (LC50): 4.01 mg/l 48 hours [Daphnia (daphnia)].

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

PBT: No additional information.

vPvB: No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: None
ADR, ADN, DOT, IMDG, IATA

14.2 UN Proper shipping name: None
ADR, ADN, DOT, IMDG, IATA

14.3 Transport hazard classes:
ADR, ADN, DOT, IMDG, IATA

Class: None
Label: None
LTD. QTY: None

US DOT
Limited Quantity Exception: None

Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.
Comments: None

Non Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.
Comments: None

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

14.4 Packing group: ADR, ADN, DOT, IMDG, IATA	None
14.5 Environmental hazards :	None
14.6 Special precautions for user:	None
Danger code (Kemler):	None
EMS number:	None
Segregation groups:	None

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.

14.8 Transport/Additional information:

Transport category:	None
Tunnel restriction code:	None
UN "Model Regulation":	None

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.

North American

SARA

Section 313 (specific toxic chemical listings): None of the ingredients are listed.
Section 302 (extremely hazardous substances): None of the ingredients are listed.

CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable

Spill Quantity: None of the ingredients are listed.

TSCA (Toxic Substances Control Act):

Inventory: All ingredients are listed.
Rules and Orders: Not applicable.

Proposition 65 (California):

Chemicals known to cause cancer: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.

Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed.

Germany MAK: Not classified.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 05/17/2017 **Revision** : 05/17/2017

Trade Name: Liquinox

Asia Pacific

Australia

Australian Inventory of Chemical Substances (AICS): All ingredients are listed.

China

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed.

Japan

Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed.

Korea

Existing Chemicals List (ECL): All ingredients are listed.

New Zealand

New Zealand Inventory of Chemicals (NZOIC): All ingredients are listed.

Philippines

Philippine Inventory of Chemicals and Chemical Substances (PICCS): All ingredients are listed.

Taiwan

Taiwan Chemical Substance Inventory (TSCI): All ingredients are listed.

16 Other information

Abbreviations and Acronyms: None

Summary of Phrases

Hazard statements:

H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

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 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.

NFPA: 1-0-0

HMIS: 1-0-0

Sulfuric Acid, 70-100%

Safety Data Sheet

According to U.S. Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations and according to Canada's Hazardous Products Regulation, February 11, 2015.

Revision Date: 09/23/2019 Date of Issue: 05/31/2016 Version: 7.0

SECTION 1: IDENTIFICATION

Product Identifier

Product Form: Mixture

Product Name: Sulfuric Acid, 70-100%

Formula: H_2-O_4-S

Intended Use of the Product

Use Of The Substance/Mixture: Industrial use.

Name, Address, and Telephone of the Responsible Party

Manufacturer

CHEMTRADE LOGISTICS INC.
155 Gordon Baker Road
Suite 300
Toronto, Ontario M2H 3N5
For SDS Info: (416) 496-5856
www.chemtradelogistics.com

Emergency Telephone Number

Emergency Number : Canada/ US: CHEMTREC +1-800-424-9300
INTERNATIONAL: +1-703-741-5970
Chemtrade Emergency Contact: (866) 416-4404
For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident, call CHEMTREC – Day or Night

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

GHS Classification

Met. Corr. 1	H290
Skin Corr. 1A	H314
Eye Dam. 1	H318
Carc. 1A	H350
Aquatic Acute 3	H402

Full text of hazard classes and H-statements : see section 16

Label Elements

GHS Labeling

Hazard Pictograms :


GHS05


GHS08

Signal Word : Danger

Hazard Statements : H290 - May be corrosive to metals.
H314 - Causes severe skin burns and eye damage.
H318 - Causes serious eye damage.
H350 - May cause cancer (Inhalation).
H402 - Harmful to aquatic life.

Precautionary Statements : P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P234 - Keep only in original container.
P260 - Do not breathe vapors, mist, or spray.
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.
P273 - Avoid release to the environment.
P280 - Wear protective gloves, protective clothing, and eye protection.
P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313 - If exposed or concerned: Get medical advice/attention.
P310 - Immediately call a POISON CENTER or doctor.
P321 - Specific treatment (see section 4 on this SDS).
P363 - Wash contaminated clothing before reuse.
P390 - Absorb spillage to prevent material damage.
P405 - Store locked up.
P406 - Store in corrosive resistant container with a resistant inner liner.
P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Other Hazards

Exposure may aggravate pre-existing eye, skin, or respiratory conditions.

Unknown acute toxicity

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product Identifier	%*	GHS Ingredient Classification
Sulfuric acid**	(CAS-No.) 7664-93-9	70 - 100	Met. Corr. 1, H290 Skin Corr. 1A, H314 Eye Dam. 1, H318 Carc. 1A, H350 Aquatic Acute 3, H402
Water	(CAS-No.) 7732-18-5	0 - 30	Not classified

Full text of H-phrases: see section 16

*Percentages are listed in weight by weight percentage (w/w%) for liquid and solid ingredients. Gas ingredients are listed in volume by volume percentage (v/v%).

**Strong inorganic acid aerosols/mists containing this substance are carcinogenic to humans via inhalation. Under normal conditions of use this route of exposure is not expected.

SECTION 4: FIRST AID MEASURES

Description of First-aid Measures

General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

Inhalation: When symptoms occur: go into open air and ventilate suspected area. Obtain medical attention if breathing difficulty persists.

Skin Contact: Remove contaminated clothing. Immediately flush skin with plenty of water for at least 30 minutes. Get immediate medical advice/attention. Wash contaminated clothing before reuse.

Eye Contact: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

Ingestion: Rinse mouth. Do NOT induce vomiting. Obtain medical attention.

Most Important Symptoms and Effects Both Acute and Delayed

General: Corrosive to eyes, respiratory system and skin. May cause cancer.

Inhalation: May be corrosive to the respiratory tract.

Skin Contact: Causes severe irritation which will progress to chemical burns.

Eye Contact: Causes permanent damage to the cornea, iris, or conjunctiva.

Ingestion: May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

Chronic Symptoms: Strong inorganic acid mists containing sulfuric acid are carcinogenic to humans. Prolonged inhalation of fumes or mists may cause erosion of the teeth.

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Foam, carbon dioxide, dry chemical.

Unsuitable Extinguishing Media: Do not use water. Do not get water inside containers. Do not apply water stream directly at source of leak.

Special Hazards Arising From the Substance or Mixture

Fire Hazard: Not flammable.

Explosion Hazard: Product is not explosive.

Reactivity: May be corrosive to metals. Contact with metals may evolve flammable hydrogen gas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction. This product may act as an oxidizer.

Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.

Firefighting Instructions: Use water spray or fog for cooling exposed containers.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: Toxic fumes are released.

Other Information: Do not allow run-off from fire fighting to enter drains or water courses.

Reference to Other Sections

Refer to Section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Do not get in eyes, on skin, or on clothing. Do not breathe vapor, mist or spray. Do not handle until all safety precautions have been read and understood.

For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protective equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit. Ventilate area.

Environmental Precautions

Prevent entry to sewers and public waters. Avoid release to the environment.

Methods and Materials for Containment and Cleaning Up

For Containment: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. As an immediate precautionary measure, isolate spill or leak area in all directions.

Methods for Cleaning Up: Clean up spills immediately and dispose of waste safely. Absorb spillage to prevent material damage. Cautiously neutralize spilled liquid. Transfer spilled material to a suitable container for disposal. Contact competent authorities after a spill.

Reference to Other Sections

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle empty containers with care because they may still present a hazard. Do not get in eyes, on skin, or on clothing. Do not breathe vapors, mist, spray. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Additional Hazards When Processed: May be corrosive to metals. May release corrosive vapors. NEVER pour water into this substance; when dissolving or diluting always add it slowly to the water.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures.

Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Comply with applicable regulations.

Storage Conditions: Keep container closed when not in use. Store in a dry, cool place. Keep/Store away from extremely high or low temperatures and incompatible materials. Store in original container or corrosive resistant and/or lined container.

Incompatible Materials: Combustible materials. Reducing agents. Strong oxidizers. Strong bases. Metals. Water.

Specific End Use(s)

Industrial use.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), AIHA (WEEL), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government.

Sulfuric acid (7664-93-9)		
Mexico	OEL TWA (mg/m³)	1 mg/m³
USA ACGIH	ACGIH TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
USA ACGIH	ACGIH chemical category	Suspected Human Carcinogen contained in strong inorganic acid mists
USA OSHA	OSHA PEL (TWA) (mg/m³)	1 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	1 mg/m³
USA IDLH	US IDLH (mg/m³)	15 mg/m³
Alberta	OEL STEL (mg/m³)	3 mg/m³
Alberta	OEL TWA (mg/m³)	1 mg/m³
British Columbia	OEL TWA (mg/m³)	0.2 mg/m³ (Thoracic, contained in strong inorganic acid mists)
Manitoba	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
New Brunswick	OEL STEL (mg/m³)	3 mg/m³
New Brunswick	OEL TWA (mg/m³)	1 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
Nova Scotia	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
Nunavut	OEL STEL (mg/m³)	0.6 mg/m³ (thoracic fraction)
Nunavut	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic fraction)
Northwest Territories	OEL STEL (mg/m³)	0.6 mg/m³ (thoracic fraction, strong acid mists only)
Northwest Territories	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic fraction, strong acid mists only)
Ontario	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic)
Prince Edward Island	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
Québec	VECD (mg/m³)	3 mg/m³
Québec	VEMP (mg/m³)	1 mg/m³
Saskatchewan	OEL STEL (mg/m³)	0.6 mg/m³ (thoracic fraction)
Saskatchewan	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic fraction)
Yukon	OEL STEL (mg/m³)	1 mg/m³
Yukon	OEL TWA (mg/m³)	1 mg/m³

Exposure Controls

Appropriate Engineering Controls: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed.

Personal Protective Equipment: Gloves. Protective clothing. Protective goggles. Face shield. Insufficient ventilation: wear respiratory protection.

Materials for Protective Clothing: Acid-resistant clothing.

Hand Protection: Wear protective gloves.

Eye Protection: Chemical safety goggles and face shield.

Skin and Body Protection: Wear suitable protective clothing.

Respiratory Protection: If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn. In case of inadequate ventilation, oxygen deficient atmosphere, or where exposure levels are not known wear approved respiratory protection.

Other Information: When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State	:	Liquid
Appearance	:	Clear, Colorless to Amber, Oily
Odor	:	Pungent
Odor Threshold	:	Not available
pH	:	0.3
Evaporation Rate	:	Not available
Melting Point	:	10.56 °C (51.01 °F)
Freezing Point	:	-29 °C (-21 °F)
Boiling Point	:	279 °C (535 °F)
Flash Point	:	Not applicable
Auto-ignition Temperature	:	Not applicable
Decomposition Temperature	:	Not available
Flammability (solid, gas)	:	Not applicable
Lower Flammable Limit	:	Not applicable
Upper Flammable Limit	:	Not applicable
Vapor Pressure	:	0.00027 - 0.16 kPa at 25 °C (77 °F)
Relative Vapor Density at 20°C	:	3.4 (air = 1)
Relative Density	:	Not available
Specific Gravity	:	1.84
Solubility	:	Water: Miscible
Partition Coefficient: N-Octanol/Water	:	Not available
Viscosity	:	Not available

SECTION 10: STABILITY AND REACTIVITY

Reactivity: May be corrosive to metals. Contact with metals may evolve flammable hydrogen gas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction. This product may act as an oxidizer.

Chemical Stability: Stable under recommended handling and storage conditions (see section 7).

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Extremely high or low temperatures and incompatible materials.

Incompatible Materials: Combustible materials. Reducing agents. Strong bases. Strong oxidizers. Metals. Water.

Hazardous Decomposition Products: Thermal decomposition generates: Corrosive vapors.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity (Oral): Not classified

Acute Toxicity (Dermal): Not classified

Acute Toxicity (Inhalation): Not classified

LD50 and LC50 Data: Not available

Skin Corrosion/Irritation: Causes severe skin burns and eye damage.

pH: 0.3

Eye Damage/Irritation: Causes serious eye damage.

pH: 0.3

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity: May cause cancer (Inhalation).

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Effects After Inhalation: May be corrosive to the respiratory tract.

Symptoms/Effects After Skin Contact: Causes severe irritation which will progress to chemical burns.

Symptoms/Effects After Eye Contact: Causes permanent damage to the cornea, iris, or conjunctiva.

Symptoms/Effects After Ingestion: May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

Chronic Symptoms: Strong inorganic acid mists containing sulfuric acid are carcinogenic to humans. Prolonged inhalation of fumes or mists may cause erosion of the teeth.

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data:

Water (7732-18-5)	
LD50 Oral Rat	> 90000 mg/kg

Sulfuric acid (7664-93-9)	
LD50 Oral Rat	2140 mg/kg
LC50 Inhalation Rat	510 mg/m³ (Exposure time: 2 h)

Sulfuric acid (7664-93-9)	
IARC Group	1
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.

Strong inorganic acid mists containing sulfuric acid	
National Toxicology Program (NTP) Status	Known Human Carcinogens.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Ecology - General: Harmful to aquatic life.

Sulfuric acid (7664-93-9)	
LC50 Fish 1	500 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static])
LC50 Fish 2	42 mg/l (Exposure time: 96 h - Species: Gambusia affinis [static])

Persistence and Degradability

Sulfuric Acid, 70-100%	
Persistence and Degradability	Not established.

Bioaccumulative Potential

Sulfuric Acid, 70-100%	
Bioaccumulative Potential	Not established.

Sulfuric acid (7664-93-9)	
BCF Fish 1	(no bioaccumulation)

Mobility in Soil Not available

Other Adverse Effects

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Additional Information: Container may remain hazardous when empty. Continue to observe all precautions.

Ecology - Waste Materials: Avoid release to the environment. This material is hazardous to the aquatic environment. Keep out of sewers and waterways.

SECTION 14: TRANSPORT INFORMATION

The shipping description(s) stated herein were prepared in accordance with certain assumptions at the time the SDS was authored, and can vary based on a number of variables that may or may not have been known at the time the SDS was issued.

TRANSPORTATION CLASSIFICATION	DOT	TDG	IMDG	IATA
Identification Number	UN1830	UN1830	UN1830	UN1830
Proper Shipping Name	SULFURIC ACID	SULFURIC ACID	SULPHURIC ACID	SULPHURIC ACID
Transport Hazard Class(es)	8	8	8	8
				
Packing Group	II	II	II	II
Environmental Hazards	**Marine Pollutant :** No	**Marine Pollutant** : No	**Marine Pollutant** : No	**Marine Pollutant**: N/A
Emergency Response	**ERG Number :** 137	**ERAP Index:** 3 000	**EMS:** F-A, S-B	**ERG code (IATA):** 8L
Additional Information	Not applicable	Not applicable	Not applicable	Not applicable

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Chemical Name (CAS No.)	CERCLA RQ	EPCRA 304 RQ	SARA 302 TPQ	SARA 313
Sulfuric acid (7664-93-9)	1000 lb	1000 lb	1000 lb	Yes

SARA 311/312

Sulfuric Acid, 70-100%
Immediate (acute) health hazard. Delayed (chronic) health hazard. Reactive hazard

US TSCA Flags Not present

US State Regulations

California Proposition 65

Chemical Name (CAS No.)	Carcinogenicity	Developmental Toxicity	Female Reproductive Toxicity	Male Reproductive Toxicity
Sulfuric acid (7664-93-9)	Yes	No	No	No
Strong inorganic acid mists containing sulfuric acid	Yes	No	No	No

State Right-To-Know Lists

Sulfuric acid (7664-93-9)
U.S. - Massachusetts - Right To Know List - Yes U.S. - New Jersey - Right to Know Hazardous Substance List - Yes U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List - Yes U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances - No U.S. - Pennsylvania - RTK (Right to Know) List - Yes

Canadian Regulations

Sulfuric acid (7664-93-9)
Listed on the Canadian DSL (Domestic Substances List) Not listed on the Canadian NDSL (Non-Domestic Substances List)

International Inventories/Lists

Chemical Name (CAS No.)	Australia AICS	Turkey CICR	Korea ECL	EU EINECS	EU ELINCS	EU SVHC	EU NLP	Mexico INSQ
Sulfuric acid (7664-93-9)	Yes	No	Yes	Yes	No	No	No	No

Chemical Name (CAS No.)	China IECSC	Japan ENCS	Japan ISHL	Japan PDSCL	Japan PRTR	Philippines PICCS	New Zealand NZIOC	US TSCA
Sulfuric acid (7664-93-9)	Yes	Yes	No	Yes	No	Yes	Yes	Yes

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Date of Preparation or Latest Revision : 05/29/2019

Revision Summary

Section	Change	Date Changed
9	Amended information	09/23/2019

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 and Canada's Hazardous Products Regulations (HPR).

GHS Full Text Phrases:

Aquatic Acute 3	Hazardous to the aquatic environment - Acute Hazard Category 3
Carc. 1A	Carcinogenicity Category 1A
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Met. Corr. 1	Corrosive to metals Category 1
Skin Corr. 1A	Skin corrosion/irritation Category 1A
H290	May be corrosive to metals
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H350	May cause cancer
H402	Harmful to aquatic life

NFPA 704

NFPA Health Hazard : 3
NFPA Fire Hazard : 0
NFPA Reactivity Hazard : 2
NFPA Specific Hazards : W

HMIS Rating

Health : 3
Flammability : 0
Physical : 2
PPE See Section 8

Abbreviations and Acronyms

AICS – Australian Inventory of Chemical Substances
ACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
ATE - Acute Toxicity Estimate
BCF - Bioconcentration factor
BEI - Biological Exposure Indices (BEI)
CAS No. - Chemical Abstracts Service number
CERCLA RQ - Comprehensive Environmental Response, Compensation, and Liability Act - Reportable Quantity
CICR - Turkish Inventory and Control of Chemicals
DOT – 49 CFR – US Department of Transportation – Code of Federal Regulations Title 49 – Transportation.
EC50 - Median effective concentration
ECL - Korea Existing Chemicals List
EINECS - European Inventory of Existing Commercial Chemical Substances
ELINCS - European List of Notified Chemical Substances
EmS - IMDG Emergency Schedule Fire & Spillage
ENCS - Japanese Existing and New Chemical Substances Inventory
LC50 - Median Lethal Concentration
LD50 - Median Lethal Dose
LOAEL - Lowest Observed Adverse Effect Level
LOEC - Lowest-observed-effect Concentration
Log Pow - Octanol/water Partition Coefficient
NFPA 704 – National Fire Protection Association - Standard System for the Identification of the Hazards of Materials for Emergency Response
NIOSH - National Institute for Occupational Safety and Health
NLP - Europe No Longer Polymers List
NOAEL - No-Observed Adverse Effect Level
NOEC - No-Observed Effect Concentration
NZIOC - New Zealand Inventory of Chemicals
OEL - Occupational Exposure Limits
OSHA – Occupational Safety and Health Administration
PEL - Permissible Exposure Limits
PICCS - Philippine Inventory of Chemicals and Chemical Substances
PDSCL - Japan Poisonous and Deleterious Substances Control Law
PPE – Personal Protective Equipment

EPA – Environmental Protection Agency
EPCRA 304 RQ – EPCRA 304 Extremely Hazardous Substance Emergency Planning and Community Right-to-Know-Act – Reportable Quantity
ERAP Index – Emergency Response Assistance Plan Quantity Limit
ErC50 - EC50 in Terms of Reduction Growth Rate
ERG code (IATA) - Emergency Response Drill Code as found in the International Civil Aviation Organization (ICAO)
ERG No. - Emergency Response Guide Number
HCCL - Hazard Communication Carcinogen List
HMIS – Hazardous Materials Information System
IARC - International Agency for Research on Cancer
IATA - International Air Transport Association – Dangerous Goods Regulations
IDLH - Immediately Dangerous to Life or Health
IECSC - Inventory of Existing Chemical Substances Produced or Imported in China
IMDG - International Maritime Dangerous Goods Code
INSQ - Mexican National Inventory of Chemical Substances
ISHL - Japan Industrial Safety and Health Law
PRTR - Japan Pollutant Release and Transfer Register
REL - Recommended Exposure Limit
SADT - Self Accelerating Decomposition Temperature
SARA - Superfund Amendments and Reauthorization Act
SARA 302 - Section 302, 40 CFR Part 355
SARA 311/312 - Sections 311 and 312, 40 CFR Part 370 Hazard Categories
SARA 313 - Section 313, 40 CFR Part 372
SRCL - Specifically Regulated Carcinogen List
STEL - Short Term Exposure Limit
SVHC – European Candidate List of Substance of Very High Concern
TDG – Transport Canada Transport of Dangerous Goods Regulations
TLM - Median Tolerance Limit
TLV - Threshold Limit Value
TPQ - Threshold Planning Quantity
TSCA – United StatesToxic Substances Control Act
TWA - Time Weighted Average
WEEL - Workplace Environmental Exposure Levels

Handle product with due care and avoid unnecessary contact. This information is supplied under U.S. OSHA'S "Right to Know" (29 CFR 1910.1200) and Canada's WHMIS regulations. Although certain hazards are described herein, we cannot guarantee these are the only hazards that exist. The information contained herein is based on data available to us and is believed to be true and accurate but it is not offered as a product specification. No warranty, expressed or implied, regarding the accuracy of this data, the hazards connected with the use of the product, or the results to be obtained from the use thereof, is made and Chemtrade and its affiliates assume no responsibility. Chemtrade is a member of the CIAC (Chemistry Industry Association of Canada) and adheres to the codes and principles of Responsible Care™.

Responsible Care®
Our commitment to sustainability.

Gestion responsable™
Notre engagement envers le développement durable.

Chemtrade NA GHS SDS 2015

Appendix B
Glove Selection Guideline

APPENDIX B: GLOVE SELECTION GUIDELINE

HAZARD	EXAMPLE TASKS	ANSI CUT/ABRASION RATING*	REPRESENTATIVE GLOVE
Impact Hazards, Med/Heavy Duty Puncture Cut	Drilling/direct push activities. Construction. Heavy materials handling. Power tools. Air knifing. Excavation.	ANSI Cut and Abrasion Resistance **Level 5** **EN 388 4521**	Hexarmor®Chrome Hexarmor® GGT5 Hexarmor® L5 Hexarmor® SteelLeather III Ironclad® Kong Glove
Med/Heavy Duty Puncture Cut Oil/Solvent Resistant	Tasks where materials are treated with oil or solvents.	ANSI Cut and Abrasion Resistance **Level 3 - 4** **EN 388 4522**	Ansell Alpha-Tec ® Memphis® Ultra Tech Nitrile Cut & Splash Best® Neoprene 6780 Hexarmor™ TenX Threesixty
Medium Duty Cut/Puncture Gloves with Oily Surface Grip	Light materials handling, wet service	ANSI Cut and Abrasion Resistance **Level 3** **EN 388 44xx**	Best®Zorb-It Ultimate HV 4567 Ansell® Cut Protective Glove 97-505 Ansell HyFlex® 11-511 Ansell HyFlex® 11-624
Med/Heavy Duty Cut/Puncture	Light Materials Handling. System O&M. Use of Hand Tools. Hand Augering. Heavy Equipment Operator.	ANSI Cut and Abrasion Resistance **Level 2** **EN 388 33xx**	Perfect Fit® PF570 Hexarmor® Level Six 9010/9012 Ironclad® Cut Resistant Glove Ansell HyFlex® 11-511 Ansell HyFlex® 11-624 Ansell® Cut Protective Glove 97-505
Light Duty Cut/Puncture Abrasion Only	Handling soil and Groundwater Samples. Opening spoons. Well construction.	ANSI Cut and Abrasion Resistance **Level 2 - 4** **EN 388 21xx**	Memphis® Ninja Max N9676GL Memphis® UltraTech Dyneema 9676 Memphis® Ninja Ice (Cold Weather) Ansell HyFlex® 11-511 Ansell® Cut Protective Glove 97-505 Ansell® Powerflex 80-813 Ironclad™ Workforce
Light Duty Glove Cut/Abrasion (used under nitrile gloves)	Groundwater Sampling.	ANSI Cut and Abrasion Resistance **Level 2** **EN 388 21xx**	Ansell HyFlex® 11-500 Ansell HyFlex® 11-624 Ansell GoldKnit
* Reference to ANSI and EN 388 glove testing standards. Listed gloves meet the standards in the table, but are not the only gloves that meet the standard.			
This selection chart is not intended to address all chemical hazards. Gloves used for chemical protection shall provide cut/puncture resistance, or be used in tandem with cut/puncture protection. Nitrile gloves used for environmental sampling must be used in tandem with a cut/puncture resistant glove.			
Gloves available in high visibility colors have shown to be effective and are preferred.			

Appendix C
Excavation Hazard Recognition Guide (Trenching/Shoring), Site Assessment Questions, and Related Guidance

1. PURPOSE

TRC's Trench and Excavation Compliance Program has been developed based on the Occupational Safety and Health Administration (OSHA) standards for the construction industry (29 CFR 1926, Subpart P – Excavations).

2. SCOPE

This Compliance Program applies to all open excavations made in the earth's surface. Excavations are defined to include trenches. These guidelines apply to all Operating Unit facilities and project sites.

3. DEFINITIONS

Accepted engineering practices: Those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring: A pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole: A type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system): A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in: The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person: One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross braces: The horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation: Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or Sides: The vertical or inclined earth surfaces formed as a result of excavation work.

Failure: The breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous atmosphere: An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kick-out: The accidental release or failure of a cross brace.

Protective system: A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp: An inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer: A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

Sheeting: The members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system): A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring (Shoring system): A structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation, and which is designed to prevent cave-ins.

Sloping (Sloping system): A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock: Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural ramp: A ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support system: A structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated data: Tables and charts approved by a registered professional engineer, and used to design and construct a protective system.

Trench (Trench excavation): A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box: See Shield.

Trench shield: See Shield.

Type A soil: Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater. Examples of cohesive soils are clay, silty clay, sandy clay, clay loam, and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hard pan are also considered Type A. However, no soil is Type A if:

- The soil is fissured.
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects.
- The soil has been previously disturbed.
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater.
- The material is subject to other factors that would require it to be classified as a less stable material.

Type B soil**:** Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf; granular cohesion less soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and in some cases, silty clay loam and sandy clay loam; previously disturbed soils except those that would otherwise be classed as Type C soil; soil that meets the unconfined compressive strength or cementation requirements for Type A but is fissured or subject to vibration; dry rock that is not stable; material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C soil: Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; granular soils, including gravel, sand, and loamy sand; submerged soils, including soil from which water is freely seeping; submerged rock that is not stable; material in a sloped, layered system where the layers dip into the excavation at a slope of four horizontal to one vertical (4H:1V) or steeper.

Uprights**:** The vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

Wales: Horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

4. RESPONSIBILITIES

4.1 TRC's National Safety Director is responsible for establishing the Trench and Excavation Program requirements and providing/communicating them to the Health and Safety Network. The National Safety Director will review contract documents as required that include project and Client-Specific Requirements.

4.2 The Health and Safety Network is responsible for the Trench and Excavation Program implementation including, but not limited to:

- Qualifying or identifying Competent Person(s) for trench and excavation safety.
- Training new and existing TRC employees.
- Communicating and coordinating TRC's Trench and Excavation Program requirements with all TRC subcontractors, including identification of Subcontractor(s) Competent Person(s).
- Procuring TRC health and safety equipment (harnesses, lanyards, vertical and horizontal lifeline and other materials).
- Working in conjunction with identified Competent Person(s) to provide on-site direction on Trench and Excavation issues.
- Leading all investigations along with the Competent Person, Project Manager, Field Team Leader, and subcontractor health and safety representative or their designees, if a Trench and Excavation Program violation occurs on-site.
- Assisting in Trench and Excavation Program audits in conjunction with on-site TRC subcontractor, and the health and safety representatives or their designees.
- Maintaining records for health and safety activities on-site including equipment inspections and procedural audits of employee Trench and Excavation Program implementation.
- Coordinating assistance during emergency situations.

4.3 OSHA defines a Competent Person as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, who has authorization to take prompt corrective measures to eliminate them (29 CFR 1926.32[f]). By way of training and/or experience, a Competent Person is knowledgeable of applicable standards, and is capable of identifying workplace hazards related to the specific operation. Under TRC's Trench and Excavation Program the Competent Person will:

- Perform all duties as specified in the Trench and Excavation Program.

- Review and approve all Health and Safety Plans (HASPs) and Job Safety Analyses (JSAs) that include work in and around trenches and excavations.
- In the event of simultaneous operations, cooperate fully with the Subcontractor's Person in Charge.
- Communicate with performing authorities (i.e., employees working in or around trenches or excavations) regarding the presence of other operations on-site.
- Work with Project Manager and/or Field Team Leader to identify and manage the risks associated with the project site.
- Assist in the training of employees who will be performing tasks in and around a trench or excavation.
- Ensure that a rescue plan is established by working with the Project Manager and/or facility safety personnel prior to any employees entering or working around a trench or excavation.
- Provide guidance as required for Trench and Excavation Program issues and questions.
- Coordinate with Project Managers and Health and Safety Network on trench and excavation audits.
- Observe the implementation of Trench and Excavation Program and conduct audits as required or directed.

4.4 The Project Manager is responsible for assisting the Health and Safety Network in the implementation of the Trench and Excavation Program. Project Managers must hold all TRC and other project employees working on-site accountable (zero tolerance policy) for maintaining a safe work environment.

4.5 Project Managers and site employees shall be held accountable for performing work in a safe manner according to the requirements of the Trench and Excavation Program.

4.5.1 The Field Team Leader shall:

- Participate in Trench and Excavation Awareness training.
- Confirm that Competent Personnel prepared and/or reviewed the Site-Specific Rescue Plan if required.
- When required, confirm that everyone working under a specific permit adheres to the permit's documented conditions.

5. PROCEDURE

5.1 General Requirements Permit labor

The following guidelines establish the minimum requirements of the applicable state and federal safety regulations for all work in excavations and trenches that might expose employees to the hazards of moving ground:

- All surface encumbrances adjacent to an excavation that might create a hazard to employees must be removed, secured, or supported as necessary to protect employees.
- The estimated location of underground installations, such as sewer, telephone, electric, water, or other underground utilities must be identified before opening an excavation. Utility companies, owners, and local One Call locator services must be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations before the work begins.
- When excavations approach the estimated location of underground installations, the exact location is determined by probing or hand digging, as necessary, to prevent accidental contact with the underground installations. While the excavation is open, underground installations that create a hazard to employees will be supported, protected, or removed as necessary to protect employees.

5.1.1 Access and Egress - Structural ramps.

- Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.
- Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.
- Structural members used for ramps and runways shall be of uniform thickness.
- Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.
- Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments o the top surface to prevent slipping.
- Appropriate access and egress in the form of a stairway, ladder, or ramp must be provided in all excavations deeper than 4 feet (1.23 m). In trenches, the stairway, ladder, or ramp must be installed so that a worker does not have to travel farther than 25 feet (7.62 m) in any direction to exit.

- Employees exposed to vehicular traffic must wear safety vests or other equivalent apparel marked with or made of reflectorized or high-visibility material.
- No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with 1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.
- A warning system must be provided when mobile equipment is operated adjacent to an excavation and the operator does not have a clear and direct view of the edge of the excavation. The warning system may include barricades, signals, stop logs, or other authorized methods. If possible, the grade should be away from the excavation.
- When deemed necessary by a competent person, excavations where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.
- When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.
- Emergency rescue equipment, such as rescue breathing apparatus, a safety harness and line, or a basket stretcher must be available where a hazardous atmosphere exists or could be expected to develop in an excavation.
- Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.
- Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

- If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.
- Inspection of an excavation shall be made by a competent person when accumulation of water is present.
- If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person.
- The stability of adjacent structures, such as buildings, walls, and sidewalks must be maintained using a support system as necessary to protect employees.
- Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:
    - A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
    - The excavation is in stable rock; or
    - A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
    - A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.
- Sidewalks, pavements and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.
- Employees must be protected from loose rock or soil that could fall or roll into the excavation by placing and keeping such material at least 2 feet (0.61 m) from the edge of the excavation.
- A competent person must make daily inspections of excavations to identify and eliminate conditions that could result in cave-ins, failure of support systems, hazardous atmospheres, or other unsafe conditions. Inspections must be conducted before the start of work each day and after every rainstorm or other occurrence that might increase the hazard of moving ground. If problems are found, provisions should be made for immediate removal of personnel.

- Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.
- Where employees or equipment are allowed or required to cross over excavations that are 6 feet
- (1.83 m) or greater in depth, appropriate fall protection in the form of walkways or bridges with standard guardrails must be provided.
- An open excavation or trench that is left open overnight must be barricaded, covered, and secured in a manner that prevents anyone from entering the excavation intentionally or accidentally.

5.2 Protective Systems

Sloping, shoring, or shielding will be provided in excavations, except where the excavation is made in stable rock or the excavation is less than 5 feet (1.52 m) deep and an examination by a competent person does not indicate a potential for cave-in.

5.3 Sloping

When sloping or benching is chosen as the method to protect employees in an excavation, one of the following optional designs of sloping and benching systems must be used:

- Option 1 – Slope the excavation at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal).
- Option 2 – Perform a soil classification and determine the acceptable slopes required.
- Option 3 – Use a project-specific design prepared by a registered professional engineer.

  Engineered designs must be in writing, be rubber stamped, and must include the name and registration number of the engineer, detailed plans, the calculations used in the design, the magnitude of slopes, and the configurations determined to be safe. A copy of the design will be maintained at the jobsite during the use of the engineered system.

5.4 Shoring or Shielding

Only the following methods for support systems, shield systems, and other protective systems can be used at a TRC jobsite:

- Option 1 – Perform a soil classification and determine the appropriate support, shield or other protective system configuration using the shoring manufacturer’s tabulated data.

When using the manufacturer's tabulated data, the shoring system must be installed in accordance with all the specifications, recommendations, limitations, or approvals to deviate issued by the manufacturer. The manufacturer's tabulated data, specifications, recommendations, limitations, and any approval to deviate must be in writing, and maintained at the jobsite during the use of the shoring system.

- Option 2 – Use a project-specific design prepared by a registered professional engineer.

  Engineered designs must be in writing, be rubber stamped, and include the name and registration number of the engineer, detailed plans, the calculations used in the design, and the sizes, types, and configurations of materials to be used in the support system. A copy of the design must be maintained at the jobsite during the use of the engineered system.

5.5 General Guidelines

The materials and equipment used for protective systems must be free of damage or defects that might impair their proper functions. Manufactured materials and equipment must be used and maintained in accordance with the recommendations of the manufacturer. If material or equipment used in a protective system is damaged, it must be inspected by a competent person before being reused.

The installation and removal of protective systems must be performed in accordance with all of the following guidelines:

- Members of support systems must be securely fastened together to prevent sliding, falling, kick-outs, or other predictable failures.
- Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or being struck by members of the support system.
- Individual members of support systems must not exceed their design capacities.
- Before individual members can be removed, additional precautions must be taken to protect employees, including installing other structural members to support any additional load imposed on the support system.
- Removal begins at, and progresses from, the bottom of the excavation. Members must be released slowly to reduce the likelihood of failure of the remaining members or a cave-in.
- Backfilling must progress with the removal of support systems.
- Support systems must be coordinated with the excavation of trenches and must extend to within 2 feet (0.61 m) of the bottom of the trench, but only if the system is designed to resist the forces calculated for the full depth of trench, and there is no indication of a loss of soil from behind or below the bottom of the support system.

- Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.
- Shield systems must not be subjected to loads exceeding their design capacities. Shields must be installed in a manner that restricts lateral or hazardous movement in the event that a lateral load is applied suddenly. Employees must be protected when entering or exiting the areas protected by a shield. Employees are not allowed within the shield during installation, removal, or vertical movement.
- When shield systems are used in trenches, excavation of material may proceed 2 feet (0.61 m) below the bottom of the shield only if the shield is designed to resist the forces calculated for the full depth of trench and there is no indication of a loss of soil from behind or below the bottom of the shield.

5.6 Soil Classification

This section describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits.

- Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C, in accordance with the definitions set forth in this compliance program.
- Soil and rock deposits are classified based on the results of at least one visual and one manual analysis. These analyses must be conducted by a competent person using the tests described in this chapter or other approved methods of soil classification, such as those adopted by the American Society for Testing Materials (ASTM) or the United States Department of Agriculture (USDA).
- The methods used for visual and manual analyses must provide quantitative and qualitative information sufficient to identify the properties, factors, and conditions of the deposits.
- A layered system must be classified based on the weakest layer. However, each layer may be classified individually when a more stable layer lies below a less stable layer.
- If, after classifying a deposit, the properties, factors, or conditions change in any way, the changes must be evaluated by a competent person. The deposit must be reclassified as necessary to reflect the new circumstances.

5.7 Visual Analysis

The visual analysis is conducted to collect qualitative information about the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the excavation, and soil samples taken from the excavated material. The visual analysis includes:

- Observing samples of the soil that are excavated and soil in the sides of the excavation to estimate the range of particle sizes and the relative amounts of particle sizes. Fine-grained material is cohesive.
- Observing the soil as it is excavated to determine if it stays in clumps. Soil that breaks up easily and does not stay in clumps is granular.
- Observing sides of the opened excavation and the surface area adjacent to the excavation to identify tension cracks or fissured material.
- Observing the area adjacent to the excavation and the excavation itself to identify existing underground utilities, structures, or previously disturbed soils.
- Observing the opened sides of the excavation to identify layered systems. Examine layered systems to determine if the layers slope toward the excavation, and to estimate the degree of slope in the layers.
- Observing the area adjacent to the excavation and the areas within the excavation to identify potential sources of vibration that might affect the stability of the excavation.
- Observing the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the water table.

5.8 Manual Analysis

Manual analysis is conducted to collect quantitative and qualitative information about the properties of the soil, and to provide more information to properly classify the soil. The manual analysis includes some or all of the following methods:

- Evaluating the plasticity of the soil by molding a moist or wet sample of soil into a ball and attempting to roll it into threads as thin as 1/8 inch (0.32 cm) in diameter. Cohesive material can be rolled into a thread at least 2 inches (5.08 cm) long without crumbling or breaking.
- Evaluating the cohesiveness of the soil. If the soil is dry and crumbles into individual grains or fine powder with little or moderate pressure, it is granular. If the soil is dry and falls into clumps that break into smaller clumps but the smaller clumps can only be broken up with difficulty, it might be clay in combination with gravel, sand, or silt. If the dry soil breaks into small clumps that can only be broken with difficulty and there is no visual indication the soil is fissured, the soil may be considered unfissured.

- Applying the thumb penetration test to estimate the unconfined compressive strength of cohesive soils. Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb and can be molded by light finger pressure.
- The thumb test should be conducted on an undisturbed soil sample, such as a large clump of soil, as soon as possible after excavation to minimize the effects of drying. If the excavation is later exposed to rain, flooding, or other moisture, the classification of the soil must be changed accordingly.
- Estimating the unconfined compressive strength of soils by using a pocket penetrometer or a hand-operated shear vane in accordance with the manufacturer's recommendations.
- Performing a drying test to differentiate among cohesive material with fissures, unfissured cohesive material, and granular material. After thoroughly drying a sample of soil that is approximately 1 inch (2.54 cm) thick and 6 inches (15.24 cm) in diameter, evaluate the results as follows:
    - If the sample develops cracks as it dries, significant fissures are indicated.
    - If the sample dries without cracking and can be broken by hand, then the material is either unfissured cohesive or fissured cohesive.
    - If considerable force is necessary to break the sample, the soil has significant cohesive material content. The soil can be classified as unfissured cohesive material, and the unconfined compressive strength should be determined.
    - If the sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

5.9 Sloping and Benching Specifications

This section contains the specifications for using sloping and benching to protect employees working in excavations.

- These slope and bench specifications only apply if a soil classification has been conducted and the excavation will be 20 feet (6.10 m) deep or less.
- Determine the maximum allowable slope and configuration based on the soil classification by using the information in table(s) 1, 2 and 3.

Table 1 Maximum Allowable Slope Based on Soil Classification

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)[(1)] FOR EXCAVATIONS LESS THAN 20 FEET DEEP[(3)]
STABLE ROCK	VERTICAL (90º)
TYPE A[(2)]	3/4:1 (53º)
TYPE B	1:1 (45º)
TYPE C	1½:1 (34º)

1. The numbers shown in parentheses next to the maximum allowable slopes are angles expressed in degrees from the horizontal. The angles have been rounded off.
2. A short-term, maximum slope of 1/2:1 (63 degrees) is allowable in excavations in Type A soil less than 12 feet (3.66 m) deep. The short-term maximum allowable slopes for excavations deeper than 12 feet (3.66 m) is 3/4 (53 degrees).
3. Sloping or benching for excavations deeper than 20 feet (6.10 m) must be designed by a registered professional engineer.

Table 2 Excavations in Type A, B, and C Soils

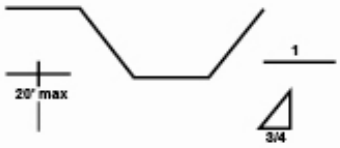
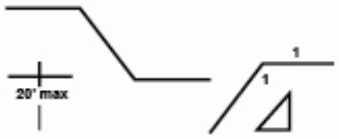
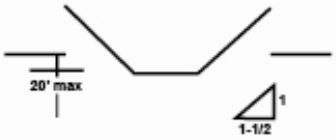
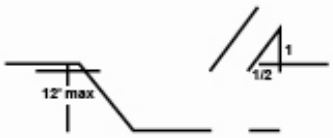
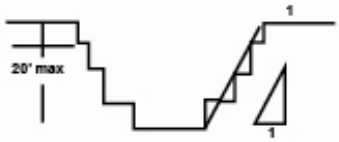
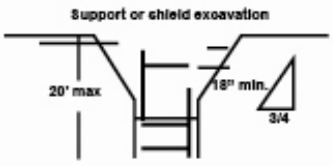
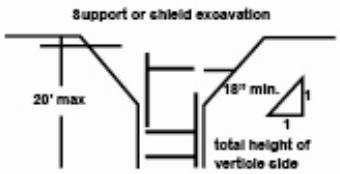
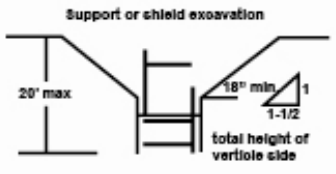
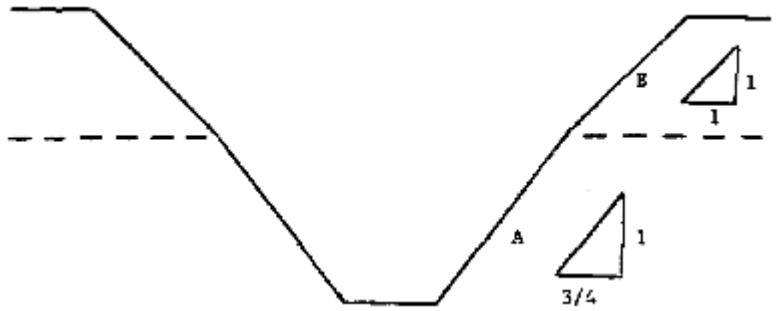
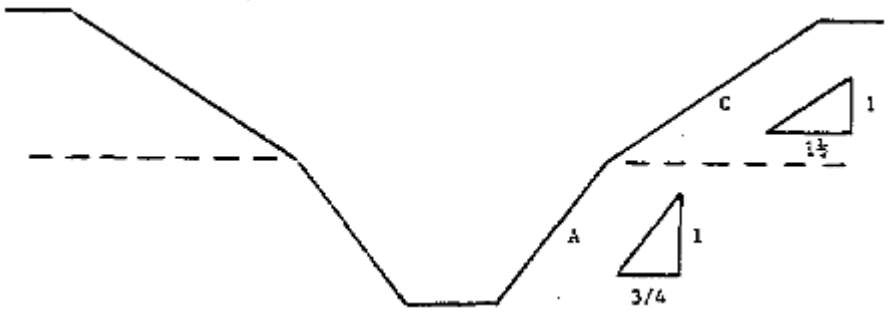
EXCAVATIONS IN TYPE A SOIL	EXCAVATIONS IN TYPE B SOIL	EXCAVATIONS IN TYPE C SOIL
SIMPLE SLOPES LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 3/4:1  SIMPLE SLOPE	SIMPLE SLOPES LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1:1  SIMPLE SLOPE	SIMPLE SLOPES LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1-1/2:1  SIMPLE SLOPE
EXCEPTION: SHORT-TERM SIMPLE SLOPES LESS THAN 12 FEET DEEP HAVE A MAXIMUM SLOPE OF 1/2:1  SIMPLE SLOPE SHORT-TERM		
BENCHED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 3/4:1  SIMPLE BENCH	BENCHED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1:1  SIMPLE BENCH	BENCHED EXCAVATIONS ARE NOT ALLOWED
 MULTIPLE BENCH	 MULTIPLE BENCH	BENCHED EXCAVATIONS ARE NOT ALLOWED
SUPPORTED OR SHIELDED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 3/4:1.  SUPPORTED LOWER PORTION	SUPPORTED OR SHIELDED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1:1.  SUPPORTED LOWER PORTION	SUPPORTED OR SHIELDED EXCAVATIONS LESS THAN 20 FEET DEEP WILL HAVE A MAXIMUM SLOPE OF 1-1/2:1.  SUPPORTED LOWER PORTION
THE SUPPORT OR SHIELD MUST EXTEND AT LEAST 18 INCHES ABOVE THE VERTICAL SIDE.	THE SUPPORT OR SHIELD MUST EXTEND AT LEAST 18 INCHES ABOVE THE VERTICAL SIDE.	THE SUPPORT OR SHIELD MUST EXTEND AT LEAST 18 INCHES ABOVE THE VERTICAL SIDE.

Table 3 Excavations Made in Layered Soils

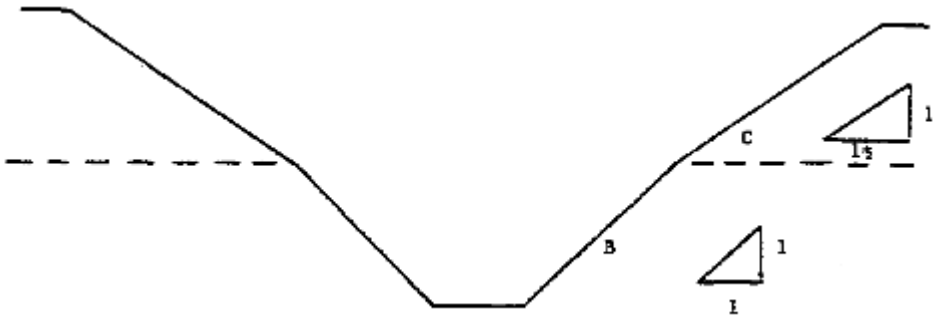
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



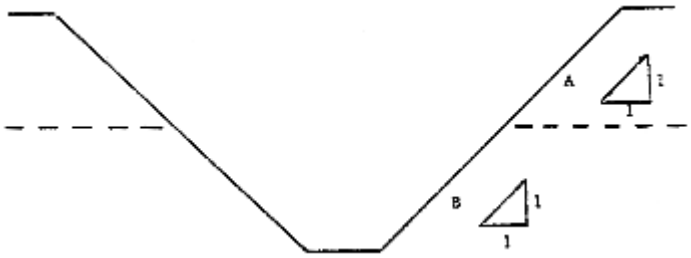
B OVER A



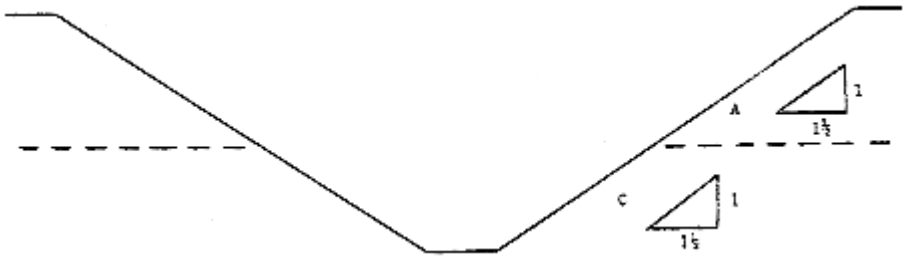
C OVER A



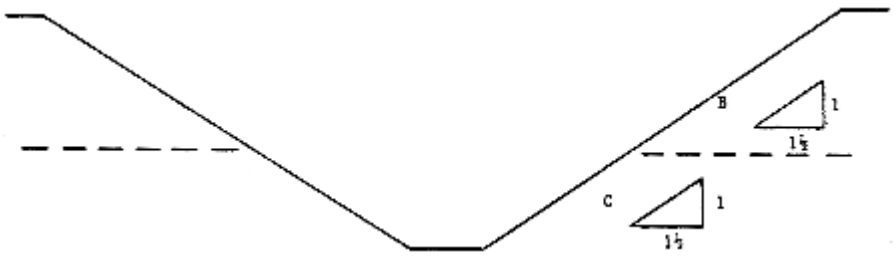
C OVER B



A OVER B



A OVER C



B OVER C

2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

6. REFERENCES / RELATED DOCUMENTS:

29 CFR 1926 Subpart P, Excavations

CP002 – Risk Analysis Site Specific Health and Safety Program

CP003 – Personal Protective Equipment Program

CP008 – Confined Space Entry Program

CP009 – Health and Safety Training Program

7. APPENDICES

Forms

A. TRC Site-Specific Excavation Plan
B. TRC Pre-Excavation Checklist
C. TRC Excavation Inspection Form
D. TRC Protective Systems Selection Flow Chart

FORMS

A. **TRC SITE-SPECIFIC EXCAVATION PLAN**
B. **TRC PRE-EXCAVATION CHECKLIST**
C. **TRC EXCAVATION INSPECTION FORM**
D. **TRC PROTECTIVE SYSTEMS SELECTION FLOW CHART**

Site Specific Excavation Plan

Project Name: **Project #:**

Location: **Date:**

Company:

Submitted By:

Surface Encumbrances

Have Surface encumbrances that may create a hazard been removed or supported?

☐ Yes

☐ N/A

Underground Installations

Have Utility companies or owners been contacted? ☐ Yes ☐ N/A

By whom: Work Order #: Date:

When excavation operations approach the estimated location of underground installations, how will the exact location of the installations shall be determined?

☐ Probing ☐ Hand digging ☐ Detecting equipment ☐ Other

How will underground installations be protected?

☐ Support ☐ Removal ☐ Other

Access and Egress

Will structural ramps be used? ☐ Yes ☐ N/A

Designed by a competent person? ☐ Yes ☐ N/A

Will excavations be 4 feet in depth or more? ☐ Yes ☐ N/A

Means of egress (requiring no more than 25 feet of lateral travel) ☐ Yes ☐ N/A

☐ Stairway(s) ☐ Ramp(s) ☐ Ladder(s) ☐ Other

Exposure to vehicular Traffic? ☐ Yes ☐ N/A (If yes workers shall wear warning vests or other suitable garments.)

Exposure to falling loads? ☐ Yes ☐ N/A

☐ No workers permitted underneath loads

☐ Workers shall be required to stand away from any vehicle being loaded or unloaded. (Operators may remain in cabs)

Warning System for Mobile Equipment

Will mobile equipment operated adjacent to, or approaching the edge of, excavations have a clear and direct view of the edge of the excavation?

☐ Yes ☐ N/A If yes what warning system will be utilized?

☐ Barricade(s) ☐ Hand Signals ☐ Stop logs ☐ Other

Hazardous Atmospheres

Can oxygen deficiency or a hazardous atmosphere reasonably be expected to exist? ☐ Yes ☐ N/A

If yes, how will atmospheres in excavations greater than 4 feet in depth be tested?

If atmospheres contain less than 19.5% oxygen or other hazardous substance how will it be remediated?

When controls are intended to reduce the level of contaminants to acceptable levels, testing shall be conducted:

☐ Continuously ☐ Periodically

Will emergency rescue equipment be utilized? ☐ Yes ☐ N/A If yes what type?

☐ SCBA ☐ Harness and line ☐ Basket stretcher ☐ Other

Site Specific Excavation Plan

Water Accumulation

Will workers work in excavations in which there is accumulated water? ☐ Yes ☐ N/A

If yes is water controlled or prevented from accumulating by water removal equipment? ☐ Yes ☐ N/A

Equipment type: Competent Person:

Does excavation work interrupt the natural drainage of surface water (such as streams)? ☐ Yes ☐ N/A

Method used to divert water:

Stability of Adjacent Structures

Will the stability of adjacent structures be endangered by excavation operations? ☐ Yes ☐ N/A

If yes, what type of support structure will be used?

☐ Shoring ☐ Bracing ☐ Underpinning ☐ Other

If yes, but support structures will not be used, one of the following must apply:

☐ The excavation is in stable rock

☐ A registered professional engineer has determined that such work will not pose a hazard.

Name of registered professional engineer:

Protection from Loose Rock or Soil

How will workers be protected from materials or equipment that could fall or roll into excavations?

☐ Material placed > 2 feet from edge Retaining devices

Inspections

☐ Inspections of all excavations, adjacent areas and protective systems shall be made by a competent person.

☐ Inspections shall be conducted by the competent person daily, prior to the start of work and as needed throughout the shift. Inspections shall be documented on a Daily Excavation Inspection Form.

☐ Inspections shall be made after every rainfall or other hazard increasing occurrence.

☐ Where the competent person finds evidence of hazardous conditions, workers shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Fall Protection

Will excavations be 6 feet or greater in depth? ☐ Yes ☐ N/A

If yes, fall protection will consist of:

☐ Barricades ☐ Fall restraint ☐ Harness ☐ Other

Will workers be required or permitted to cross over excavations? ☐ Yes ☐ N/A

If yes, guardrails shall be provided.

SIGNATURES

Supervisor General Supervisor

Project/Construction Manager Safety Representative

Pre-Excavation Checklist

Project Name:	**Project #:**
Location:	**Date:**
Company:	**One Call #**
Submitted By:	

The following procedures are mandatory. Failure to complete this check list could result in disciplinary action or termination:

Complete a pre-excavation walk-out of the entire job site. Your objective is to visually inspect the dig area to ensure all utilities are marked. Look for obvious signs of utilities in the immediate work area that may not be marked such as, above-ground pedestals, gas meters, man-hole covers, drains, or utility poles with cable risers. If you find these indicators and suspect that there is an unmarked utility DO NOT PROCEED**. Call your General Foreman or Locate Ticket Coordinator immediately.**

When you have completed your walk-out, complete the following check list:

1. Verify that the One-Call ticket covers the 'Scope of work' and 'Work to begin' date:
   I have verified the One-Call ticket covers the 'Scope of work' &'Work to begin' date ☐
2. What marked utilities did you observe?
   ☐Gas (Yellow) ☐Electric (Red) ☐Telephone (Orange) ☐Cable TV (Orange) ☐Water (Blue) ☐Sewer (Green)
3. Based on visual observation, did you see any obvious signs of unmarked utilities in the immediate work area?
   ☐Yes ☐No If Yes, please identify?
   ☐Gas (Yellow) ☐Electric (Red) ☐Telephone (Orange) ☐Cable TV (Orange) ☐Water (Blue) ☐Sewer (Green)
4. I have notified my Supervisor and Locate Ticket Coordinator ☐
5. Photograph the entire proposed work area including all locate marks.
   I have photographed the entire site including existing locate/markings prior to excavation ☐
6. Advise your crew members of the following: If they have to cross a marked Utility they must HAND DIG ONLY within 18" of the locate marks. For gas lines add half the diameter of the buried facility to the 18''. If necessary, dig a test-hole (pothole) using hand tools to determine the location of the facility.
   I have advised my crew of this rule ☐
7. When possible, all directional boring / drilling routes must be potholed every 50-80 feet prior to drilling.
   I have advised my crew accordingly and test-holes (potholes) have been dug ☐

~~~~~~~~~~~~~~~~~~~~~~~~~~~~ RESPECT THE MARKS! ~~~~~~~~~~~~~~~~~~~~~~~~~~~~

IN THE EVENT OF DAMAGE

- Notify your Supervisor and Locate Ticket Coordinator
- Complete the TRC Incident Notification Form
- Photograph entire area and damage location

PHOTOGRAPHY TIPS

- Make sure the correct date & time stamp is active on your camera
- Photograph the excavation itself (damage location) and cable depth (include tape measure in hole)
- Take photos from multiple vantage points and of surrounding area (360 degrees)
- If the utility was miss-marked, photograph the locate marks/flags (include tape measure in photo)
- If the utility was not marked, photograph the entire area and approaches to the cut site
- Show a quantifiable location/address (street sign, house number, mail box number etc.)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Excavation Flow Diagram

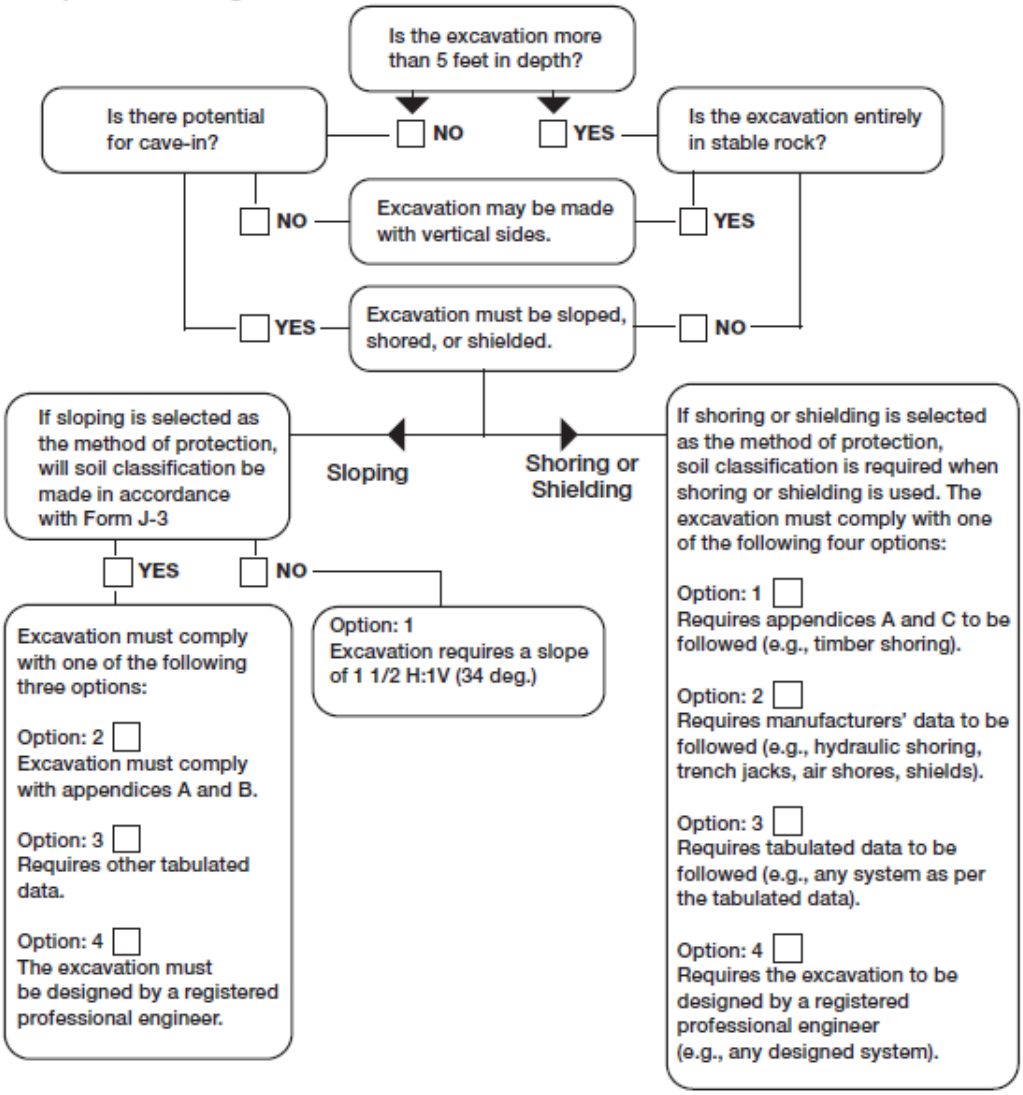
Project Name: **Project #:**

Location: **Date:**

Company:

Submitted By:

The following is a graphic summary of the requirements for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer.



Excavation Daily Inspection

Project Name: **Project #:**
Location: **Date:**
Company:
Submitted By:

Depth: _____ **Width:** _____ **Date Opened:** _____

Soil classification: ☐ A ☐ B ☐ C

Indicate how the classification was made:

Manual test(s)

a) plasticity			
b) dry strength			
c) thumb penetration			
d) pocket penetrometer			
e) other			

Visual test(s) **Do as many as possible**	**Cohesive Soil**	**Granular Soil**
a) Spoil pile	☐ **Remains in clumps**	☐ **Breaks up easily**
b) Trench Side	☐ **Stands vertical >2 hours**	☐ **Sloughs into trench**

The excavation is properly (circle one):

Shored/Shielded	**(indicate type of shoring)**	☐ **closed**	☐ **open**	☐ **wood**	☐ **metal**	☐ **shield**
Sloped/benched	**(indicate the slope)**	☐ **vertical sides**	☐ **3/4:1**	☐ **1:1**	☐ **1 1/2: 1**	☐ **2:1**

Excavation Checklist:	Morning	Mid-Day	Afternoon
Time:			
Weather:			
Was atmospheric testing required?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Was atmospheric testing done?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Is the spoil pile back 2' from the edge?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Have surface encumbrances been removed?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Are there any signs of sloughing or cave-in?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Is there water accumulation in the bottom?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Are there vibration sources near the excavation?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Is there adequate access/egress (ladder, ramp, etc.)	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Has the soil been disturbed previously?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Sides	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
Top	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**
If the excavation is > 20 feet deep, have engineering designs been documented and complied with?	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**	☐ **yes** ☐ **no**

SIGNATURES

Supervisor General Supervisor

Project/Construction Manager Safety Representative

Appendix D
Heat and Cold Stress

COLD STRESS

Ambient air temperatures during site activities may create cold stress for on-site workers. Procedures for recognizing and avoiding cold stress must be followed. Cold stress can range from frostbite to hypothermia. The signs and symptoms of cold stress are listed below.

Frostbite is defined as the actual freezing of one or more layers of skin. In severe cases, organs and structures below the skin can become frozen. Usually, body areas exposed to the most cold, and least body warmth, are affected first. These areas include fingers, toes, ears, and the tip of your nose. Frostbite is characterized by pain and loss of dexterity in the affected limb. The tissue initially appears reddened, but may progress to white, blue, or black.

> **FIRST AID:** Bring the affected employee indoors and call the local emergency clinic. Rewarming of frostbitten parts is best left to a medical doctor in a controlled setting.

Hypothermia is the condition that occurs when the body's natural warming mechanisms (muscle activity and shivering) cannot counteract the loss of body heat to the environment. The onset of hypothermia is greatly hastened by being wet. Hypothermia is marked by severe, uncontrollable shivering. The patient will show signs of excessive fatigue, drowsiness, irritability, or euphoria. As hypothermia progresses, the patient will begin to lose consciousness, blood pressure will drop, shivering will cease, and the patient may slip into a coma and possibly die.

> **FIRST AID:** If these symptoms occur, remove the patient to a warm, dry place. If clothing is wet, remove and replace with dry clothing. Keep the patient warm, but not overheated. The patient should be gradually rewarmed to prevent shock. If the patient is conscious and alert, warm liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Notify the emergency clinic if conditions worsen, the patient loses consciousness, or the patient has an altered mental status. Have the patient transported to an emergency facility.

General Precautions The reduction of adverse health effects from cold exposure can be achieved by adopting the following work practices.

- Provide adequate insulating clothing to maintain core temperature at 98.6° F if work is to be performed in air temperatures below 40° F. Wind chill cooling rates and the cooling power of air are critical factors. The higher the wind speed and the lower the air temperature in the work area, the greater the insulation value of the protective clothing should be.
- If the air temperature is 32° F or less, hands should be protected by mittens/gloves.
- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of clothing should be impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outer layer should be changed as it becomes wet. The outer garments should include provisions for easy ventilation in order to prevent wetting of the inner layer by sweat.
- If available clothing does not give adequate protection to prevent cold injury, work should be modified or suspended until adequate clothing is available, or until weather conditions improve.
- For prolonged work, heated shelters should be available. Workers should be encouraged to use these at regular intervals, with the frequency depending on the severity of the environmental exposure. When entering the shelter, the outer layer of clothing should be removed and the remainder of the clothing

loosened to permit heat evaporation, or a change of work clothing should be provided.

- Warm, sweet drinks, such as hot cocoa or soup, should be available at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of diuretic and circulatory effects.
- The weight and bulk of cold-weather gear should be included in estimating the required work performance and weights to be lifted in the field.

Workers should be instructed in safety and health procedures regarding cold work environments as part of the pre-work safety meeting. The training program should include instruction in preventing, recognizing, and treating cold stress conditions.

Wind Chill Chart

Wind (mph) \ Temperature (°F)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	29	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph) *Effective 11/01/01*

HEAT STRESS

There is a potential for heat stress from the use of protective clothing and climate conditions. One or more of the following procedures may be employed to alleviate potential heat stress problems in the event that site conditions warrant the use of personal protective equipment (PPE), or ambient temperatures exceed 85° F. Heat stress training must be emphasized during the daily safety meetings, and adequate supplies of potable water must be provided to workers each day.

General Precautions Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent saltwater solution, more heavily salted foods, or commercial drink mixes. The commercial mixes may be preferable for those employees on a low sodium diet. Employees on low sodium diets, or other special diets, are advised to contact their personal physician for recommendations regarding appropriate electrolyte replacement fluids/beverages.

In extremely hot weather, conduct operations in early morning or evening and rotate shifts of workers wearing impervious clothing. Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.

Ensure that adequate shelter is available for breaks to protect personnel against heat, which can decrease physical efficiency and increase the probability of accidents.

Acclimatization for workers not accustomed to working in elevated temperature environments will be considered and implemented as appropriate in accordance with American Conference of Governmental and Industrial Hygienists (ACGIH) Guidelines.

Heat Stress Monitoring

For monitoring the body's recuperative ability toward excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70° F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 80° F, regardless of the use of Personal Protective Equipment (PPE), workers will be monitored for heat stress after every work period.

Good hygienic standards must be maintained by the employee to aid in the prevention of heat stress illnesses. At a minimum, frequent changes of clothing and daily showering should occur with clothing being allowed to dry during rest periods. Persons who notice skin problems should immediately inform their supervisor.

Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 25 percent. The HR is then measured again, once each minute for 2 minutes (a total of three measurements), after the initial rest period measurement. The HR should decrease by ten beats per minute between each measurement (a total reduction of 20 beats). If the HR does not decrease, the work period should be reduced by an additional 25 percent.

Body temperature can be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99°F. If it is greater than 99°F, the next work period should be shortened by 25 percent. The OT should be measured again at the end of the rest period to make sure that it has dropped below 99° F.

Effects of Heat Street

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat loading, a number of physical reactions can occur. The severity of these reactions ranges from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to severe (fatal).

Heat-related illnesses include:

Heat rash (also known as prickly heat rash) is caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Heat rash decreases the ability to tolerate heat as well as being a nuisance. Signs are not limited to, but may include, a red prickly rash.

FIRST AID: Employees exhibiting signs of heat rash will be directed to shower and change into clean, dry clothing.

Heat cramps are caused by profuse perspiration with inadequate fluid intake and electrolyte replacement (especially salts). Signs are muscle spasms and pain in the extremities and abdomen, and may occur several hours after work has stopped.

FIRST AID: Employees showing signs of heat cramps will be directed to lie in a cool, shady area, and drink cool fluids. If symptoms persist or worsen, the employee will be transported to an emergency facility.

Heat exhaustion is caused by increased stress on various organs to meet increased demands to cool the body. Signs are shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

FIRST AID: Employees with signs of heat exhaustion will be brought to a cool, shady location and given fluids. After recovering, the employee will be dismissed for the day. If employee is unconscious, or conditions persist, the employee will be transported to a hospital.

Heat stroke is the most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and/or coma.

FIRST AID: HEAT STROKE IS A MEDICAL EMERGENCY. Employees will be brought to a cool area, aggressively treated by removing constricting clothes and applying wet towels or ice packs, and transported without delay to an emergency facility.

Appendix E
Tailgate Meeting/Checklist

Daily Pre-Job Safety Briefing

Project Name: _____ Project Number: _____

Work Location: _____ Date: _____

Tasks Performed: _____ Time: _____ AM PM

Client Name: _____ Submitted By: _____

Weather: _____

Refuge Area: _____

First Aid/CPR Persons: _____

Potential Hazards: _____

For Emergencies Dial 911 **For Non-Emergencies Dial WorkCare (888) 449-7787**

Personal Protective Equipment Required

	Yes	*No*	*Specify*
Clothing	☐	☐	_____
FR, reflective vest, chemical, other (specify)			
Eye/Face	☐	☐	_____
Safety glasses, goggles, face shield, other (specify)			
Respirator	☐	☐	_____
1/2 face, full face, other (specify)			
Foot Protection	☐	☐	_____
Safety toe, EH rated, rubber boots, other (specify)			
Hand Protection	☐	☐	_____
Kevlar, chemical, EH, other (specify)			
Head Protection	☐	☐	_____
hard hat, electrical hazard, other (specify)			
Fall Protection	☐	☐	_____
body harness, lifelines, barricades, other (specify)			
Hearing Protection	☐	☐	_____
Other:			_____

Procedures/Programs Required	*Yes*	*No*
Confined Space	☐	☐
Hot Work	☐	☐
Signs/Barricades	☐	☐
LOTO/Energy Control	☐	☐
Scaffolds/Aerial Lifts	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐
Employee Certification/Training Required		
HAZWOPWER	☐	☐
Asbestos Awareness	☐	☐
Asbestos Inspector	☐	☐
XRF Trained	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐

Additional Considerations

Work Procedures: ☐ Dig Safe

☐ Working clearances ☐ _____

☐ _____

People: ☐ Worker fatigue ☐ Other site activities

☐ Public safety ☐ Pedestrian control ☐ Experience

☐ Traffic control ☐ Other utilities

☐ _____

Tools/Equipment: ☐ Eye wash ☐ First Aid Kit

☐ Inspection of tools/equipment

☐ Specialized tools/equipment

☐ Correct tool/equipment for the job

☐ _____

Special Precautions: ☐ Environmental

☐ Condition of structures ☐ Weather conditions

☐ Lighting conditions ☐ Terrain ☐ Water bodies

☐ Adjacent structures

☐ _____

If Conditions CHANGE…Stop Work, Review and Revise the Plan!!

Daily Pre-Job Safety Briefing

Hazards Associated with the Job

☐ Hazardous Chemicals	☐ Heavy Equipment	☐ Slip/Trip and Falls	☐ Work in Active Rail ROW	☐ Confined space
☐ Biological Waste	☐ Hostile Individual(s)	☐ Traffic Hazards	☐ Work in Active Substation	☐ Hot Work
☐ Asbestos	☐ Ladder	☐ Trenches Excavations	☐ Animals/Insects	☐ Radioactive Materials
☐ Dust	☐ Lighting	☐ Utilities	☐ Plants	☐ Boom/Scissor Lift
☐ Edges/Material Handling	☐ Manual Lifting	☐ Water/Boat Safety	☐ _____	☐ _____
☐ Electricity	☐ Pressurized Fluids/Gases	☐ Weather (hot/cold)	☐ _____	☐ _____

List all hazards associated with this task	**Signature of Crew Members Present**	
	Print Name	Sign Name
Barriers to eliminate/control above hazards?		
Supervisor Signature:		

Post Task Safety Analysis

Did any injuries or incidents occur today? If yes, explain.

☐ Yes ☐ No

Was the injury or incident reported the safety department?

☐ Yes ☐ No ☐ N/A

What problems did you have with today's work assignment?

What can we do tomorrow to improve performance?

Appendix F
WorkCare Program Information

EARLY INCIDENT INTERVENTION®

Immediate Access to Medical Advice for Work Related Incidents

(888) 449-7787

INTRODUCTION

WorkCare, Inc. (WorkCare) and TRC have partnered together to promote Incident Intervention®, a resource designed to support company safety goals/targets—while reducing runaway-costs associated with workplace injuries and illnesses.

PURPOSE

Early Incident Intervention provides TRC employees with **IMMEDIATE** telephonic access to WorkCare clinicians at the time of a presumed, non-emergency workplace injury or illness. Clinicians provide expert guidance on the evaluation of symptoms, appropriate first aid, and the need for additional medical evaluation or treatment.

When utilizing this service within the first hour of an incident, known as the "Golden Hour," licensed medical staff can guide the case so that medical evaluation and treatment are rendered appropriately.

> ***"…helps the worker traverse the unpredictable terrain of work-related injuries and illness."***

PRINCIPLES OF EARLY INCIDENT INTERVENTION

- Utilizes principles of the "Golden Hour."
- Provides workers immediate clinician support at the time of an incident.
- Focuses on providing the right care, at the right time in the proper setting.

BENEFITS FOR EMPLOYEES

- Instant access to a medically qualified professional for evaluation of symptoms and possible outcomes.
- Professional guidance on appropriate first aid measures and medications.
- Professional advice regarding the need for additional medical evaluation or treatment.

BENEFITS FOR TRC

- Point of contact for emergency and non-emergency medical clinicians.
- Triages the incident to determine risk and urgency, delivering interventions that are consistent with medical guidelines for the specified injury and illness.
- Maintains communication with clinicians to ensure accurate and timely reporting.

Appendix G
Safe Catch Form

Safe Catch Report

A “Safe Catch” is a potential hazard or incident that has not resulted in any personal injury. Unsafe working conditions, unsafe employee behaviors, improper use of equipment or use of malfunctioning equipment have the potential to cause work related injuries. It is everyone’s responsibility to report and/or correct these potential incidents immediately. Please complete this form as a means to report these “Good Catch” situations and submit to your local OSC Representative and Mike Glenn, SVP/National Safety Director.

Complete ALL field entries:

Employee Name:		Date:	
Location:		Office:	
Project Number:		Practice:	

Conditions

Please check all appropriate conditions:

☐ Unsafe Act	☐ Unsafe Condition	☐ Unsafe Equipment	☐ Unsafe Use of Equipment

Description of Incident or Potential Hazard:

Task Performed at Time of Incident:

Causes (Primary and Contributing):

Corrective Action(s) Taken (remove the hazard, replace, repair, or retrain):

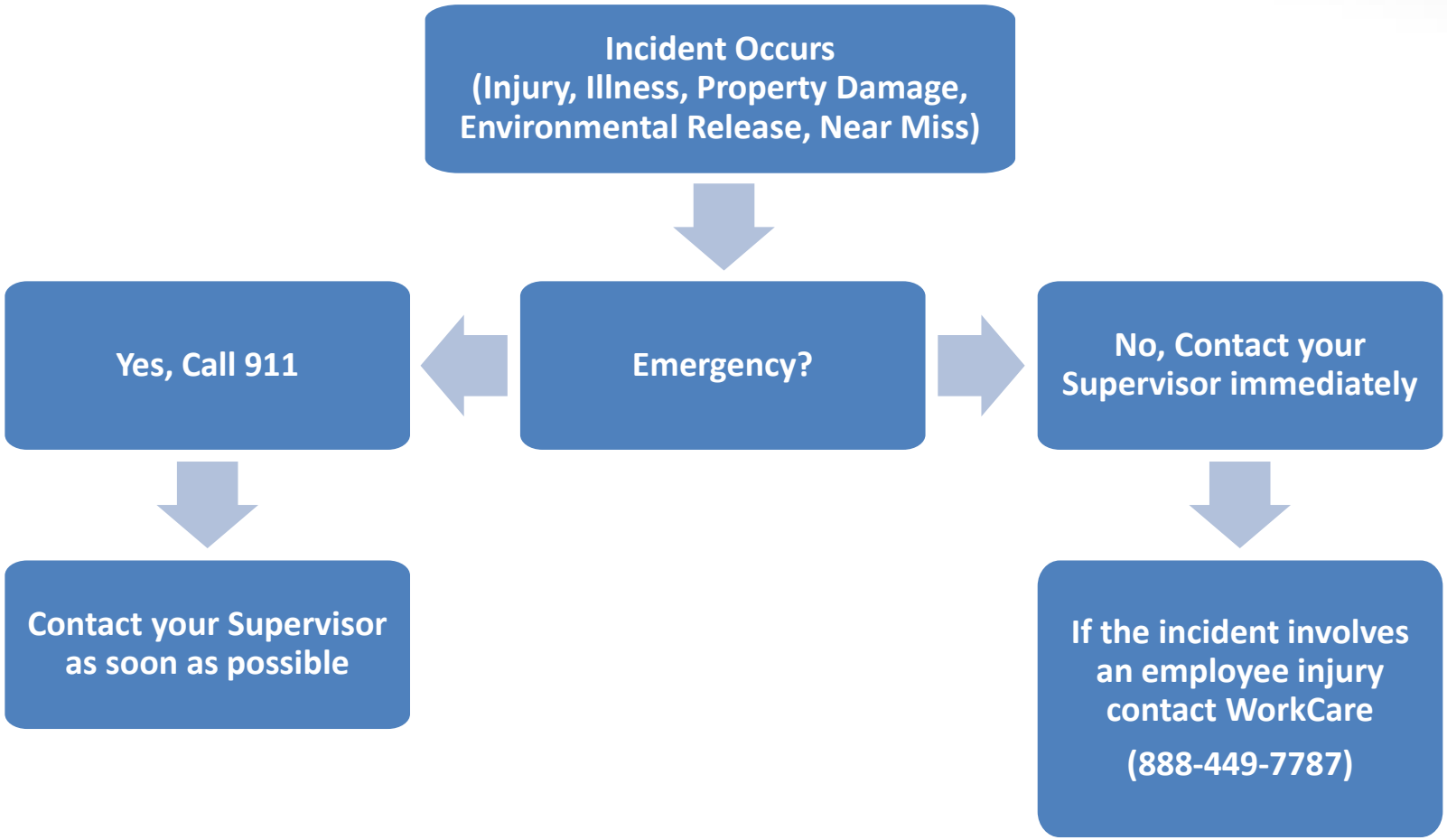
Employee Signature:		Date Completed:	

Our Mission: To reduce the frequency of incidents by applying local lessons learned globally.

If you have any questions about this report or would like additional information, please reference Compliance Program CP019 TRC Incident Response and Lessons Learned Program, located on TRCNET or contact Mike Glenn, SVP/National Safety Director at mglenn@trcsolutions.com.

Appendix H
In Case of Emergency and Incident Reporting

Incident Response Flow Chart - Employees



In Case of Injury at Work

1. If emergency care **is** needed, or if you are in a motor vehicle incident, call 9-1-1.

2. If emergency care **is not** needed, notify your supervisor **prior** to the initial contact with **WorkCare (888.449.7787).**

3. Supervisor must notify a Corporate Health and Safety Team Member.

Submit the appropriate form(s): TRC Incident Notification Report or TRC Auto Incident Report **within 24 hours** to Mike Glenn, VP, National Safety Director.

TRC
Results you can rely on

Appendix I
Job Safety Analysis Forms

Job Safety Analysis Template

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE PREPARED FOR HASP:	☐ NEW ☐ REVISED
TRC		
JSA WORK ACTIVITY (Description):	List of Contractor(s) and key work activity:	

SITE SPECIFIC JSA AUTHOR	POSITION / TITLE	DEPT	SIGNATURE

TRC HEALTH AND SAFETY MANAGEMENT	POSITION / TITLE	APPROVAL DATE

PERSONAL PROTECTION EQUIPMENT (PPE) QUICK SUMMARY
Required PPE (indicate with "R") vs. Must Have Available On-site (indicate "A")

___ REFLECTIVE VEST ____HARD HAT _____GLOVES: **ANSI Cut Level ____ Kevlar** ____SAFETY GLASSES _____GOGGLES _____FACE SHIELD	____ HEARING PROTECTION ___SAFETY SHOES: Protective Toe ____ 5pt.HARNESS / LANYARD PPE CLOTHING: ____Coveralls ___Tyvek Suit ____Nomex ___Other (specify):	RESPIRATORY PROTECTION: ☐ NA ____½ face Air Purifying Respirator (APR) ____Particulate Mask: ☐ PM100 ☐ PM95 ____ Cartridge: ☐ P100-Multigas ☐ _____ _____Full face ARP; specify cartridge type: ____ Air Supplied Respirator ____SCBA ____Air-line	Additional PPE: .

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.

[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
1)	a.	
	b.	

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day. Focus on each new task, procedures, and skill sets to be used.		
[1] JOB TASKS	[2] POTENTIAL HAZARDS	[3] HAZARD CONTROLS (beyond wearing "Required" PPE)
2)		
3)		

Always perform a Safety Assessment (Hazard Hunt): 1) prior to starting work; 2) when changing tasks; and 3) throughout the day.		
[1] JOB TASKS	**[2] POTENTIAL HAZARDS**	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
3)		
4)		
	LOCATION(S) WHERE HAZARD IS TO BE EXPECTED	**[3] HAZARD CONTROLS (beyond wearing "Required" PPE)**
1.	a.	a.
2.	a.	a.
3.	a.	a.

Field Notes:

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify key potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

Appendix J
Acknowledgement

PERSONAL ACKNOWLEDGEMENT

A component of the HASP, designed to provide personnel safety during work activities described herein, requires that you receive training as described in the HASP prior to working at this site. Additionally, you are required to read and understand the HASP. When you have fulfilled these requirements, please sign and date this personal acknowledgement:

Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date
Name (Printed)	Signature	Date

Appendix B
Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.