

# Interim Remedial Measure Work Plan

## Robintech / Compudyne, Inc. Site

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NYSDEC Site Number 7-5-4007

June 2024

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**Signature Page**

# Interim Remedial Measure Work Plan

## Robintech / Compudyne, Inc. Site

I, Stephen Mirabello, PE certify that I am currently a New York State registered professional engineer and that this Interim Remedial Measure Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10) and DER Green Remediation (DER-31).

_____

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Date: 7 June 2024



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## Acronyms and Abbreviations

| Name | Description |
|---|---|
| BCS | Broadway Complex remedial site |
| bgs | Below ground surface |
| CAMP | Community Air Monitoring Plan |
| CCR | Construction Completion Report |
| COC | Constituent of concern |
| CVOC | Chlorinated volatile organic compound |
| DER | Division of Environmental Remediation |
| EDD | Electronic Data Deliverable |
| ERM | ERM Consulting & Engineering, Inc. |
| GPS | Global Positioning System |
| Hadco | Hadco Corporation |
| HASP | Health and Safety Plan |
| HGU | Hydrogeologic unit |
| IBM | International Business Machines |
| IRM | Interim Remedial Measure |

| | |
|---|---|
| IRMWP | Interim Remedial Measure Work Plan |
| ISS | In-Situ Solidification/Stabilization |
| µg/kg | Micrograms per kilogram |
| NYCRR | New York Codes, Rules, and Regulations |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| NYSDOT | New York State Department of Transportation |
| OSHA | Occupational Safety and Health Administration |
| PCB | Polychlorinated biphenyl |
| PMP | Performance Monitoring Program |
| PPE | Personal Protective Equipment |
| QAPP | Quality Assurance Project Plan |
| RAO | Remedial Action Objective |
| RAWP | Remedial Action Work Plan |
| RI | Remedial Investigation |
| Robintech | Robintech, Inc. |
| Sanmina | Sanmina Corporation |
| Site | Robintech/Compudyne site, located at 1200 Taylor Road in the Town of Owego, Tioga County, New York |
| SCG | Standards, Criteria, and Guidance |
| SCO | Soil Cleanup Objective |
| Source Area | Grossly contaminated media / source area in the subsurface under the former “clean room” / photo rooms within the main building at the Site |
| SSC | Sub-Surface Clearance |
| SSDS | Sub-slab depressurization system |
| SVOC | Semi-Volatile Organic Compound |
| USEPA | United States Environmental Protection Agency |
| VOC | Volatile Organic compound |

# 1. INTRODUCTION

ERM Consulting & Engineering, Inc. (ERM) prepared this Interim Remedial Measure (IRM) Work Plan (IRMWP) on behalf of the Sanmina Corporation (Sanmina) for the Robintech, Inc. / Compudyne site, located at 1200 Taylor Road in the Town of Owego, Tioga County, New York (the Site, New York State Department of Environmental Conservation [NYSDEC] Site No. 754007; see Figure 1) and for the abutting Broadway Complex remedial site (BCS, Site No. V00290) managed by International Business Machines (IBM).

The purpose of the IRMWP is to address the known grossly contaminated media/source area in the subsurface under the former “clean room”/photo rooms within the main building at the Site (the Source Area). Figure 2 presents a layout of the Site. This IRMWP addresses required elements for a Remedial Action Work Plan (RAWP) established within Section 5.3 of the NYSDEC’s Division of Environmental Remediation (DER) 10 (NYSDEC 2010).

The remedial action objectives (RAOs) selected for the IRM are as follows:

- To reduce, control, or eliminate the contamination present within the soils in the Source Area beneath the former photo rooms; and
- To prevent, to the extent possible, migration of contaminants in the soil to the groundwater.

The proposed IRM will facilitate protection of human health and the environment by reducing contaminant mass, reducing the potential for direct contact with the affected soil, and removal of the sources of contamination to groundwater, minimizing the potential for further migration.

This IRM was originally proposed as a remedial excavation in a report titled Interim Remedial Measure (30 Percent) Work Plan, dated July 2022, which was approved with comments for consideration in a letter dated 10 May 2023. Subsequently the approach to address the source area shifted from management of the impacted soil with excavation, transport, and disposal at a permitted facility, to sequential targeting the Source Area with In Situ Chemical Reduction (ISCR) followed by in-situ solidification/stabilization (ISS). Bench-scale studies were conducted to evaluate various amendments and dosing rates. Nano scale zero valence iron (ZVI) followed by stabilization with Portland cement, was found to meet the RAOs with the analytical data showing the concentration of volatile organic compounds (VOCs) in soil were reduced to below 6 NYCRR Part 375 Protection of Groundwater cleanup objectives. This green remediation approach will be more cost-effective, while reducing trucking/ transportation requirements, eliminates the need for incineration of soil, reduces landfilled waste, minimizes contact water treatment, and minimizes potential long-term risks associated with landfilling contaminated soil.

## 1.1 Project Organization

Sanmina’s environmental consultant, ERM, will perform the investigation. The NYSDEC, in consultation with the New York State Department of Health (NYSDOH), will oversee the investigation to verify that the work is performed in accordance with the approved work plan. Key personnel involved with the implementation of this work are listed below (if any of the key personnel change following acceptance of the work plan, their contact information will be updated accordingly).

**Representative**

| | | |
|---|---|---|
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| | | |
|---|---|---|
| **Regulatory Agency** | | |
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| **Environmental Consultant** | | |
| ERM | Robert Sents, P.G. | |
| ERM | Stephen Mirabello, P.E. | |

## 1.2 Applicable Standards, Criteria, and Guidance

The following standards, criteria, and guidance (SCGs) apply to the IRM.

- 6 New York Codes, Rules, and Regulations (NYCRR) Part 375—Environmental Remediation Programs (December 2006)
- 6 NYCRR Part 608—Use and Protection of Waters
- 6 NYCRR Parts 700-706—Water Quality Standards
- 29 Code of Federal Regulations (CFR) Part 1910.120—Hazardous Waste Operations and Emergency Response
- Occupational Safety and Health Administration (OSHA) requirements contained in 29 Code of Federal Regulations 1926, Safety and Health Regulations for Construction
- OSHA regulations on Trenching and Excavation Safety (OSHA 2015)

The following guidance may apply to this project:

- NYSDEC CP-51/ Soil Cleanup Guidance (October 2010)
- DER-10—Technical Guidance for Site Investigation and Remediation (May 2010)
- NYSDEC Division of Spills Management—Sampling Guidelines and Protocols: Technologies Background and Quality Control/Quality Assurance for the NYSDEC Spill Response Program
- Technical and Operational Guidance Series 1.1.1—Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
- NYSDOH's Soil Vapor Intrusion Guidance (NYSDOH 2006), including the Decision Matrices which were most recently revised in February 2024 (NYSDOH 2024)

## 1.3 Site Operational History and Description

The Site is an inactive hazardous waste disposal site under Consent Order Index #A701518809 dated 8 February 1989. The site was first developed for industrial use in 1956. The site was owned and operated by various organizations and the facility was expanded twice in the 1970s by Robintech, Inc. Hadco Corporation (Hadco) purchased the Site in 1979 and increased the size of the Site to its current size of 17.3 acres through the purchase of two abutting properties. During Hadco's operation, the facility was expanded five times and an on-Site biological treatment system was constructed in a separate building. Sanmina acquired Hadco in 2000 to expand their operations. Manufacturing operations were discontinued at the facility in 2018 and it is currently vacant, except for maintenance and security personnel.

The Site is bordered to west and north primarily by undeveloped land, with an ACHIEVE (A chapter of Arc NY, Inc.) complex located to the northeast. Abutting to the south is a municipal sewage treatment plant, a

wooded undeveloped property, and the BCS. Barnes Creek and a large manufacturing facility currently operated by the Lockheed Martin Corporation border the Site to the East. The Site is located approximately one-half mile north of New York Route 17 and New York Route 17C. The Susquehanna River is located approximately 0.65 miles south of the site (Figure 1).

Numerous investigations have been completed at the Site which were initiated in the late 1980s, and are summarized in subsequent Section 1.4. Based on these Site characterization and remedial activities at the Site, a Record of Decision was issued by NYSDEC for the Site in March 1995; with the Source Area identified at a former Robintech chemical storage area now located under the former “clean room” and photo room in the Main Building. The Source Area contains soil, groundwater and soil gas impacted by chlorinated ethenes, chlorinated ethanes, and minor concentrations of petroleum hydrocarbons, including benzene, toluene, ethyl-benzene and xylene (VOCs). A dissolved-phase plume emanates from the area and flows generally to the south-southwest. A long-term groundwater monitoring program was initiated at the Site on 16 April 1997 pursuant to an NYSDEC-approved Performance Monitoring Plan (PMP).

A groundwater pump and treat system was installed and has been in operation since 1993, which is removing VOCs mass but has not fully prevented the migration of VOCs offsite. At the request of the NYSDEC, additional Site characterization activities were completed in 2021 and 2022. The data collected was used to update the conceptual site model (CSM) in the Investigation Report dated February 2023, which was approved by the NYSDEC in May 2023. This updated CSM evaluated the effectiveness of this system to hydraulically control the dissolved phase plume. Based on the available data, the groundwater treatment system is minimizing the off-Site migration of VOCs toward the Owego Broadway Road Wastewater Treatment Plant in the shallow and deep overburden hydrogeologic units (HGU) but is not fully preventing off Site migration. Analytical data for the groundwater collected in close proximity to the Source Area is summarized in Table 3.

### *1.3.1 Geology*

The geologic conditions in the immediate Site vicinity have been characterized based on the observations of materials encountered during the drilling of monitoring wells at the Site during remedial investigation activities in 1992 and 1993, during the installation of recovery wells and monitoring wells in 1995 and has been further characterized during the 2021 and 2022 investigation.

The materials encountered in the overburden vary considerably across the Site. The near-surface materials encountered across most of the Site consist of fill near the building ranging in depths from 2 to 12 feet below ground surface (ft bgs) and glacial outwash deposits ranging in thicknesses from 25 feet up to 60 feet. Both the fill and outwash deposits are composed of sand and gravel, with varying degrees of silt and clay. Fine-grained silt and clay interbedded with fine sand and silt were encountered with varying thicknesses and distribution in the upper 20 feet across the Site, which is consistent with the alluvium deposition.

Underlying these glacial outwash and alluvium deposits is a very compact glacial till unit composed predominantly of silt, sand, and gravel with a higher percentage of silt and clay in the upper portion of the till. This glacial till was encountered between 39 to approximately 60 ft bgs and was observed above the bedrock at the majority of the drilling locations and was found to tilt to the west-southwest.

The bedrock unit encountered immediately below the overburden deposits beneath this Site consists of interbedded layers of siltstone and fine sandstone. The average depth to bedrock ranges from approximately 60 ft bgs near the facility to over 90 ft bgs near the southern property boundary.

Figure 3A and 3B present geologic cross sections across the Site.

### 1.3.2 Hydrogeology

The principal water transmitting zones at the Site are divided into three aquifers or HGU: shallow overburden (6 to 35 ft bgs), deep overburden (35 to 60 ft bgs), and bedrock (60 to 117 ft bgs). Water elevations are collected prior to each groundwater monitoring event and the potentiometric surfaces are contoured to illustrate the inferred horizontal groundwater flow direction of each HGU. For reference, representative groundwater contour maps for each HGU (May 2022) are attached as Figures 4A through 4C. The general flow direction of all three HGUs is south-southwest, toward the Susquehanna River, located approximately 0.65-miles south of the Site.

### 1.3.3 Constituents of Concern

Investigations completed at the Site to-date demonstrate that constituents of concern (COCs) within or near the source area are limited to the following organic compounds, which exceed the protection of groundwater soil cleanup objectives (SCOs).

**Table 1-1: Summary of COC Detections**

| | New York Part 375 CP51 Protection of Groundwater Standard | Unit | Minimum Detected Value | Maximum Detected Value |
|---|---|---|---|---|
| 1,1,1-Trichloroethane | **680** | µg/kg | 0.47 | 500,000 |
| 1,1-Dichloroethene | **330** | µg/kg | 0.81 | 9,000 |
| 2-Butanone | **120** | µg/kg | 0.46 | 430 |
| Acetone | **50** | µg/kg | 6.2 | 7,400 |
| Benzene | **60** | µg/kg | 0.08 | 1,100 |
| cis-1,2-Dichloroethene | **250** | µg/kg | 0.19 | 1,200 |
| Ethylbenzene | **1,000** | µg/kg | 0.18 | 12,000 |
| m,p-Xylenes | **1,600** | µg/kg | 0.5 | 55,000 |
| o-Xylene | **1,600** | µg/kg | 0.21 | 12,000 |
| Tetrachloroethene | **1,300** | µg/kg | 0.41 | 140,000 |
| Toluene | **700** | µg/kg | 0.22 | 110,000 |
| Trichloroethene | **470** | µg/kg | 0.27 | 9,900,000 |
| Vinyl chloride | **20** | µg/kg | 12 | 37 |

*Note: µg/kg = micrograms per kilogram.*

## 1.4 Investigation and Remediation to Date

Investigations implemented at the Site prior to 1991 included a Preliminary Site Evaluation; a Phase 1 Hydrogeologic Investigation; a Phase 2 Hydrogeologic Investigation; and a preliminary remedial investigation (RI) tasks. A network of 16 monitoring wells was installed and a Site-specific compound list was established. The formal RI was conducted between February 1991 and December 1992 which included three major components: a source area investigation, a hydrogeologic investigation and a surface water evaluation:

- The source area investigations were focused on the former septic leach field under the former wet process area/ metal plating area and the former Robintech chemical storage area now located under a portion of the Main Building most recently used as a “clean room.” Figure 2 presents a

layout of the Site. To minimize disturbance to facility operations this investigation was limited to 6 soil borings.

- The hydrogeologic investigation activities included the installation of four (4) bedrock wells, five (5) deep overburden monitoring wells and two (2) shallow overburden monitoring wells. The monitoring well network was used for static groundwater gauging, collection of groundwater samples and in situ hydraulic conductivity testing.
- The surface water investigation included the collection of four (4) surface water and sediment samples.

The former chemical storage area was identified as a source area containing soil, groundwater and soil gas impacted by VOCs including chlorinated ethenes, chlorinated ethanes, and minor concentrations of petroleum hydrocarbons, including benzene, toluene, and xylene. A dissolved-phase plume emanates from the area and flows generally to the south-southwest. A detailed account of this sampling activity and results is included in the Preliminary RI Report dated April 1992 (Blasland, Bouck & Lee 1992a). This report was submitted to the NYSDEC, who then requested further characterization of the Site, including evaluation of groundwater beyond the southern Site boundary, evaluation of inorganic compounds in select locations, surface soil sampling for inorganics and an ecological assessment. The supplemental RI activities were completed in August and September of 1992 which included:

- Twelve (12) soil borings proximal to the former chemical storage area to further evaluate the distribution of VOC and inorganic compounds;
- Nine (9) shallow soil boring (less than 2 feet below surface grade [ft bgs]) near monitoring wells MW-3, MW-7 and MW-11 to evaluate inorganic compounds;
- Installation of a deep overburden monitoring well (MW-29);
- Installation of two well clusters south of Site boundary (MW30/31 and MW-32/33);
- Installation of a recovery well and with performance testing;
- Groundwater sampling of 17 monitoring wells; and
- Vapor extraction pilot testing.

The following conclusions were made based on the data collected during these investigations:

- The principal source of VOCs is the former chemical storage area and the former leach field did not appear to be acting as a source area;
- Dissolved inorganics were observed in groundwater collected from monitoring wells MW-3, MW-7 and MW-11. Follow-up shallow soil sampling in the vicinity of these wells identified copper and chromium concentrations were above background;
- Dissolved VOCs in shallow groundwater extend the length of the Site. The highest concentrations were observed immediately downgradient of the former chemical storage area;
- Dissolved phase VOCs in groundwater have migrated vertically into the deep overburden aquifer. Concentrations are highest downgradient of the former chemical storage area and extend to the off Site well clusters at relatively low concentrations;
- Dissolved phase VOCs were observed in bedrock aquifer at low concentrations;
- There were no adverse impacts to surface water or sediment associated with the Site. There were some indications of an upstream source in surface water collected from Barnes Creek (Blasland, Bouck & Lee 1992b).

An interim remedial measure (IRM) was implemented between August and October 1993 based on the design drawings approved by the NYSDEC on 21 June 1993 (Blasland, Bouck & Lee 1993). The groundwater IRM consisted of the following:

- Groundwater collection pumping system connected to pumping wells (PW-3/ RW-3);
- Installation of a low-profile air stripper; and
- A water discharge pipe to the existing sanitary sewer.

A Focused Feasibility Study (FFS) was submitted to the NYSDEC to evaluate potential remedial alternatives to address soil and groundwater identified at the Site. Each alternative was described technically and preliminary screened for effectiveness and implementability. Based on the screening, Alternative 2 groundwater withdrawal and treatment was recommended to meet the remedial action alternatives (ROA; Blasland, Bouck & Lee 1993).

A Record of Decision (ROD) was issued by NYSDEC for the Site in March 1995 with the following remedial goals:

- Reduce, control or eliminate the contamination present within the soil on Site;
- Mitigate the impacts to groundwater and to the environment;
- Prevent, to the extent possible, migration of contaminants in soil to the groundwater; and
- Provide for attainment of groundwater quality standards at the limits of the area of concern.

Based on the NYSDEC's review of the RI and FSS, Alternative 6 was selected which included the following:

- Installation of additional recovery wells downgradient of the former chemical storage source area (RW-4) and along the southern Site boundary (RW-6). These wells were to be tested to establish optimum pumping rate and performance criteria;
- All extracted groundwater to be pretreated with the groundwater treatment system and discharged in accordance with the Site discharge permit;
- Confirmation sampling and gauging to be used to determine the effectiveness of source control and hydraulic containment of the plume;
- Following the remediation of saturated overburden, the need and feasibility of remediating the bedrock aquifer will be evaluated; and
- A long-term monitoring program will be instituted to monitor the effectiveness of the selected remedy and will be a component of operation and maintenance on Site.

A work plan was submitted to install the expanded groundwater recovery and transmission system design in September 1995 (ERM 1995). Additional recovery wells were installed between September and October 1995. Hydraulic testing to optimize groundwater recovery was initiated in October 1995 and continued through January 1996. Groundwater recovery and treatment continued in RW-3 installed during the IRM. Recovery wells RW-4 (shallow overburden downgradient of the source area) and RW-6 (deep overburden on southern boundary) were added to the IRM groundwater system and pumping began on 22 April 1997. A long-term groundwater monitoring program was initiated at the Site on 16 April 1997 pursuant to a NYSDEC-approved PMP dated 21 February 1997. The analytical data collected through the PMP has shown the system is reducing the concentration of the dissolved phase plume but does not fully hydraulically control the plume.

At the request of the NYSDEC, a limited emerging contaminant investigation was completed in October 2018. Perfluorooctane sulfonate and perfluorooctanoic acid were detected at minor concentrations that

did not warrant further evaluation. A low-level 1,4-dioxane plume was identified that was concurrent with the VOC plume emanating from the former chemical storage area. In addition, polychlorinated biphenyls were identified in soil in the former chemical storage area during the source area remedy evaluation completed in 2017(ERM 2019a).

A sub-slab depressurization system (SSDS) was installed to minimize potential vapor intrusion proximal to the source area in May 2005. The system has been operated by Sanmina since the installation. At the request of the NYSDEC, the SSDS effectiveness was evaluated in February 2019. The results showed the SSDS is depressurizing a portion of the building and has reduced the potential for vapor intrusion. In addition, indoor air monitoring in the depressurized portion of the building shows there were no exceedances of the NYSDOH guidance values for indoor air. Routine monitoring of the SSDS is completed on a monthly basis. PMP reports are submitted to the NYSDEC and NYSDOH on a semi-annual basis summarizing groundwater and SSDS monitoring data.

Sanmina removed the operations being conducted in the “clean room”/ photo room in 2016, which allowed for further evaluation of the underlying Source Area with minimum disruption to Site operations. Six soil borings (SAB-1 through SAB-6) were completed within the photo room in August 2016. Soil samples were submitted for VOC analysis and soil samples from select borings were submitted for waste characterization parameters to evaluate remedial options. The soil submitted for waste characterization identified Polychlorinated biphenyls (PCBs; SAB-1 and Sab-3) as a potential COC within the Source Area. Further delineation of the Source Area was completed in January 2017 with an additional four soil borings (SAB-8 through SAB-10 and SAB-14) completed within the building and two soil borings (SAB-12 and SAB-13) south of the photo room in the exterior alley way. The current conditions are summarized in the drawings in Appendix A Sheet 2 and the analytical data is summarized in Tables 1, 2A through 2C.

## 1.5 Photo Room

The former photo room or “clean room” was built during the Hadco expansion in 1975. The expansion was completed over a former Robintech chemical storage area. The photo room was originally assessed in 1992 during the RI; however, access was limited due to operation of the photo room as a “clean room” (Blasland, Bouck & Lee 1992). This put limitations on being able to complete an intrusive investigation within these rooms due to the potential introduction of airborne contamination that could occur and the potential to disrupt the manufacturing process. Operations in the photo room ceased in 2016 and all equipment was removed from the area. ERM completed investigations in August 2016 and January 2017 to further define the extent of the Source Area and to verify concentrations from the RI. The investigation concluded that the area of “grossly contaminated media” was limited to an area of approximately 1,650 square feet, with a chlorinated VOC (CVOCs) plume emanating from the Source Area. CVOC concentrations were similar to those reported in the RI (Blasland, Bouck & Lee 1992). At the NYSDEC’s request, an additional investigation was completed in 2021—including soil borings and the installation of new monitoring wells both upgradient, downgradient, and side gradient of the Source Area (ERM 2020). These data helped to further define the extent of the Source Area. CVOC analytical data collected proximal to the Source Area are summarized in Table 1 and in Figure 5.

PCBs, of unknown origin, were also identified within the Source Area in 2016. PCBs were included as a potential COC during the 2021 investigation, confirming a limited distribution at the Site within the Source Area (Figure 6). The PCBs are comingled with the highest concentrations of CVOCs and are limited to an area of approximately 1,200 square feet. The PCB analytical data and other waste characterization parameters are summarized in Table 2C. Although identified in soils in the source area, concentration of PCBs did not exceed the NYSDEC Protection of Groundwater or the Restricted Industrial Use SCOs.

The soil under the photo room consists of sand and gravel from below the building slab to 12 feet bgs. The silt content in the soil increases below 12 feet bgs, which retarded the downward migration of COC within the Source Area. Soil boring SAB-3 had the highest concentrations with a total VOC concentration of 10,854,800 micrograms per kilogram (µg/kg) in a soil sample collected 9 to 10 ft bgs. The concentration decreased by more than 99 percent to 36,250 µg/kg in the soil sample collected within the underlying silty soil from 15 to 16 ft bgs. (Table 1, Appendix A Sheet 05). The goal of the proposed IRM will be to address the Source Area through in-situ mixing of high kinetic ZVI with source materials followed by stabilization with Portland cement. Details of the proposed IRM are included in Section 3 of this IRMWP and as shown in the conceptual design drawing (Appendix A).

# 2. REMEDIAL BASIS

The proposed IRM includes ISCR via soil mixing with ZVI, followed by ISS of contaminated soil; however, soil containing COCs at concentrations above applicable SCOs as defined in 6 NYCRR Part 375-6.8, will not be fully removed/ treated due to the limitation caused by the presence of the onsite buildings. The IRM incorporates removal or destruction and encapsulation of COCs in the top 15 feet of a 1,632 square foot area that encompasses the majority of the COC mass in the Source Area and is consistent with the NYSDEC's land use category in 6 NYCRR Part 375 (NYSDEC 2006). The proposed IRM will generate significantly less waste, will eliminate the need to incinerate COC impacted soil, and will minimize the construction schedule when compared to excavation. The current and contemplated future use for the Site is industrial.

## 2.1 Protective of Human Health and the Environment

The IRM will reduce VOCs in the affected soil to the extent practicable that could represent a potential source of leaching to groundwater and be performed in a manner protective of human health from exposure risk. During the IRM activities, air monitoring for dust and VOCs will be performed as outlined in the Community Air Monitoring Program (CAMP; Appendix B) and in Section 3.4. All work will be conducted in accordance with ERM's Health and Safety Plan (HASP; Appendix C) and the selected remedial subcontractor's HASP and job hazard analysis. Therefore, the remedial approach is protective of human health and the environment.

## 2.2 Minimization of Remedy Construction Phase Impacts

The overall project will be conducted over a period of several months. During this period, it is anticipated that there will be a slight increase in truck traffic for a portion of this time associated with transportation of equipment and materials to the Site. Therefore, the short-term impacts associated with this project are minimal. The IRM will provide adequate short-term effectiveness by reducing the VOC levels in soil that present a source to VOCs in groundwater.

## 2.3 Long-Term Effectiveness and Impacts

The IRM will result in the permanent~~ly~~ reduction, removal and/or encapsulation of impacted soils by excavation and/or the destruction of organic contaminants via ISCR/ ISS remedial technology. The proposed IRM approach provides adequate long-term effectiveness and permanence, while reducing the generation of waste that will be landfilled and/ or incinerated at an off Site permitted facility. The ISCR/ ISS will result in a solid subsurface monolith, which will minimize climate change and extreme weather event vulnerabilities. Existing institutional controls will remain in place to restrict future use of the Site, to control potential exposure pathways, and will promote green and sustainable remediation principals to the extent feasible in the Site management of the remedy as per DER-31.

## 2.4 Reduction of Toxicity, Mobility, and Volume

The IRM will permanently reduce mobile COCs within the Source Area, thereby reducing the volume and mobility of COCs. Appendix D provided a summary of the ISCO and ISCR treatability test results conducted on Source Area soil collected from the interval with the highest documented concentrations of VOCs. This study showed the highest concentrations of VOC within the Source Area could be reduced through ISCR to concentrations below 6 NYCRR Part 375 Protection of Groundwater cleanup objectives within a 30-day reaction period. Toxicity will be lowered through mass reduction and mobility will be significantly reduced through ISS.

## 2.5 Implementability

The proposed IRM approach is readily implementable but will require partial building demolition for access. The proximity of the IRM to the Main Building and Broadway Building will necessitate engineering controls given the excavation size/ treatment area and the contaminated soil's horizontal and vertical limits. The remediation incorporates earth retention systems to protect the structural integrity of adjacent walls. Access to the alley way between the Main and Broadway buildings will limit means of access and egress and, thereby, reduce production rates. Once the proposed IRM is approved by the NYSDEC and the NYSDOH, the equipment is readily available to perform the soil excavation, in-situ mixing for ISCR with high kinetic ZVI, followed by ISS with Portland cement and restoration work. Approvals from other agencies or entities should not be required for the IRM. A summary of the proposed implementation is summarized in Section 3.

# 3. PROPOSED SCOPE OF IRM

ERM will coordinate with Sanmina, the NYSDEC, remedial contractors, and other stakeholders to implement the proposed IRM. An ERM representative will be onsite during all aspects of the remedial activities and will be under the supervision or responsible charge of a professional engineer. The goal of the IRM will be to address the Source Area with ZVI to significantly reduce COC concentrations in source materials. This will be followed with solidification and stabilization with Portland cement. The focus of the ISS is to return structural integrity to the soils; however, there will be the added benefit of further management of residual COCs through binding and encapsulation.

The data collected to date defines the Source Area and characterizes the distribution of COCs in this area sufficiently to design and implement an IRM. Sanmina will continue to collect the data necessary and requested by the NYSDEC to further evaluate and monitor the CVOC groundwater plume downgradient of the Source Area (ERM 2023). Figures 5 and 6 and the IRM Design Drawings (Appendix A) present the proposed extent of the IRM, which takes into consideration the limitations presented by the Main Building and the southern Broadway Building.

## 3.1 Site Preparation

The following Site preparation elements are essential to construction and will be implemented prior to initiation of full-scale earthworks activities.

### *3.1.1 Permits*

The implementation of all mitigation measures will be performed in accordance with technical requirements of applicable local construction codes. The local authority having jurisdiction (Town of Owego, New York) will be consulted and local permits will be obtained if necessary. It is anticipated that

state or local permits will not be required for the currently contemplated scope of work described below in Section 3.2.

### 3.1.2 Site Access

Access to the Site will be coordinated with Sanmina management and arrangements will be made at least two weeks prior to mobilization. Equipment, supplies, and subcontractors including the project laboratory, remediation contractor, and specialties will be procured. The NYSDEC will be notified at least one week prior to the initiation of work at the Site as indicated in Section 4.

### 3.1.3 Subsurface Clearance

UDig New York will be notified prior to the initiation of intrusive activities at the properties and requested to identify, locate, and mark member-company utilities in areas proposed for subsurface intrusive investigation. An independent underground utility locating service will be contracted to locate and mark out all utilities prior to the commencement of subsurface intrusive activities. Additionally, the former subsurface sanitary sewer pipe that runs through the proposed IRM area to the BCS Site, former IBM septic tank, will be located and the storm sewer will be evaluated for the best approach to protect or be temporarily diverted during the proposed IRM activities.

### 3.1.4 Sanitation and Storm Sewer Line

Utility lines run through the IRM footprint or in very close proximity and will require protection or replacement as part of the work. The location of these lines relative to the IRM footprint will be a focus of the preparatory subsurface clearance.

The first is a sanitary sewer that is no longer in use at the facility, which traverses north to south across the IRM footprint and is found at a depth of approximately four feet bgs. The sanitary sewer will be exposed during the shallow excavation preparation work and will be temporarily decommissioned and reinstalled during backfill installation. The backfill and compaction of pipe conduit media will be in accordance with applicable local and construction codes. The second line is a storm sewer that runs parallel to the IRM footprint. Based upon the proximity to the area of disturbance, the pipeline is likely to be exposed and will require appropriate protection. If unfeasible, the sewer line will be removed and restored as part of the work. All pipe penetrations at the edge of the IRM footprint will be temporarily plugged in the event of removal and reinstallation. The catch basins associated with the storm sewer will be protected with silt sock or other equivalent inlet protections.

For all lines, the backfill and compaction of pipe conduit material will be in accordance with applicable local construction codes. Additionally, the contractor will install trench plugs or an equivalent along the pipeline conduit to prevent the preferential flow of groundwater along these paths. The location of the pipelines is shown on Figure 2.

### 3.1.5 Building Demolition

The former photo room will be demolished to gain adequate access to the subsurface as part of this work. This section of the building is constructed independently from the adjacent building and does not contribute significantly to the overall structural integrity of the complex. Prior to remedial action, the remedial subcontractor will demolish the former photo rooms exterior walls and roof, leaving the floor accessible. The area being demolished is presented in Appendix A Sheet 4 and Sheet 5. Building debris will be segregated and disposed of separately from soils unless otherwise approved by the property owner and the disposal facility.

As part of the building demolition, the SSDS will need to be shut down, as transmission piping from the blower for the main building to several suction points, run through the proposed demolition area. ERM proposes to shut down the SSDS prior to building demolition. The SSDS transmission piping would be cut and capped at the extent of the demolition work. Both blowers would be turned off and all valves would be shifted to a closed position. The building is currently unoccupied except for security in the north end of the building and away from the area where sub-slab soil gas concentrations have been identified. If the building is sold or if the occupancy within this area of the building changes, the need for the SSDS will be reassessed. This change will be further discussed in the construction completion report and during revisions to the ROD following the IRM.

### *3.1.6 Decommissioning of Current Wells*

There are wells present within the excavation/ treatment footprint, specifically MW-19, MW-23, RW-4, and RW-5. These wells will be decommissioned in accordance with NYSDEC guidelines with casing removed during excavation. Wells RW-4 and RW-5 are part of the groundwater treatment system and will require additional steps prior to decommissioning, inclusive of removal of pumps and sensors for retainage and tracing the groundwater conduits to the edge of the IRM footprint. After equipment is removed, the wells—inclusive of concrete vaults—will be decommissioned in accordance with NYSDEC guidelines and removed during the excavation process of the IRM. Prior to backfilling, the conduit pipes for the groundwater extraction wells will be capped/sealed at the edge of excavation or within the building. ERM does not anticipate replacing these wells as the area will be a solid monolith following the ISS, and would not yield groundwater. Furthermore, the treatability study has shown that the highest VOC concentrations within the Source Area were reduced to below the protection of groundwater cleanup goals. Monitoring wells MW-105, MW-106 and MW-108 are located hydraulically downgradient of the excavation/ treatment footprint and can be utilized to monitor the plume emanating from the former Source Area. Following two rounds of groundwater monitoring and evaluation, further discussion with the NYSDEC will be conducted on COC trends in downgradient groundwater and the need for well replacement.

### *3.1.7 Survey, Field Mark-out, and As-Built Drawings*

The existing conditions of the Site were surveyed by a New York-licensed land surveyor during multiple previous mobilizations. The remediation contractor will be required to contract with a New York-licensed land surveyor to provide confirmation that the final ZVI and ISS design mixing depths are reached continuously throughout the IRM activities. In addition, when the backfilling and restoration work is completed, a New York-licensed land surveyor will perform a survey of final conditions. A final as-built survey drawing will be prepared following Site restoration activities and included in the final Construction Completion Report (CCR).

## 3.2 Implementation of IRM

### *3.2.1 Mobilization*

The initial mobilization activity will consist of an onsite meeting with the engineer and the remedial contractor’s construction supervisor to review the details of the project, tour the Site, and discuss implementation details, safety concerns, quality control, soil staging activities, etc.

### 3.2.2 Temporary Soil Erosion and Sediment Controls, Stormwater Controls, and Stormwater Management

#### 3.2.2.1 Temporary Controls

The New York State Instruction Manual for Stormwater Construction Permits requires an Erosion & Sediment Control Plan for any construction activity that disturbs one acre or more. This remediation is anticipated to disturb approximately 0.06 acres; therefore, an Erosion Control Plan is not required. However, stockpile controls inclusive of silt socks, perimeter haybales, or silt fence or equivalent and daily covering will be utilized if materials are stored without cover. Import backfill and support materials will be staged in a separate staging area from waste materials.

### 3.2.3 Traffic Flow and Support Facilities

#### 3.2.3.1 Support Facilities and Work Zones

Site support facilities will be established in a designated support area onsite. Construction equipment (i.e., excavators, loaders, etc.) will be mobilized and staged in a designated equipment staging area during the project. A decontamination area for construction vehicles and equipment will be established prior to initiating work. All vehicles and equipment that come into contact with impacted soils will be decontaminated prior to leaving the Exclusion Zone.

Personnel and equipment decontamination will be performed during the remedial action to minimize or eliminate the potential for exposure of Site personnel to contaminants and cross-contamination of samples and sampling equipment and to protect the public. Detailed decontamination procedures for personnel, Site equipment, and vehicles will be presented in the environmental subcontractors' job hazard analysis and HASP.

The traffic plan for the Site will include two separate staging areas and routes to the IRM area and overall Site ingress/egress routes. Based upon the limited direct access to the Storage Room and the adjacent alley, it is intended to route truck traffic through the building interior. The property owner will construct truck access gates in the building exterior as necessary to facilitate access. The building interior will be prepared by either filling trenches with vehicle supportive structural fill or by placing road/steel plates. The interior access routes will be monitored regularly, and materials will be routinely swept/cleaned. Excavated materials will be transported directly to staging areas. The proposed traffic flow and storage areas for the project are provided on Appendix A, Sheet 03.

### 3.2.4 Contact Water Management

The proposed treatment depth of 15 feet below grade will overlap the shallow overburden HGU (6 feet to 35 feet below grade) and groundwater management controls will be necessary. Groundwater / contact water will be managed throughout the IRM and backfill process. Contact water will be pumped out from sump(s) as necessary to support IRM activities and ZVI installation. It is not intended to dewater the area via a well-point system or similar but rather to conduct the following activities:

1. Perform drying of excavated material as necessary and in preparation for offsite disposal or beneficial on-Site reuse (if appropriate based on NYSDEC review and approval); and
2. Backfill with structural fill to return to pre-construction grades.

Contact water generation will be minimized but as generated will be pumped into a frac tank either for pretreatment followed by discharge to the local POTW or to be staged for transport off-Site for management/ disposal at a permitted facility. If the water is to be discharged, the removed water will as necessary be filtered via bag filtration and possibly via carbon vessels through an external unit before

being conveyed to the onsite groundwater treatment system. Treated water is currently discharged through a permitted outfall for additional treatment via the nearby publicly owned treatment works (POTW).

### 3.2.5 Geotechnical Considerations

The proposed mixing depth (15 feet below ground surface) and excavation depth of 5 feet below grade will necessitate the installation of an excavation support system that will enable material management and mixing while providing protection of the existing building and foundational system to remain. This system will be coordinated with ERM and the contractor and determined prior to mobilization with necessary design elements and peer acknowledgement by ERM.

### 3.2.6 Vibration Monitoring

The proposed IRM footprint is located immediately adjacent to two buildings and will require vibration monitoring. A baseline evaluation will be completed by a New York-licensed geotechnical engineer prior to IRM activities. During IRM activities, continuous monitoring will be conducted and will include surrounding buildings and nearby underground utilities during the proposed construction.

## 3.3 IRM Construction

### 3.3.1 IRM Limits

The extent of the proposed IRM footprint is 51 feet wide by 32 feet long and 15 feet deep and is the approximate extent of the Source Area defined by Site investigations. The existing cover materials include cement floors within the Storage Room and asphalt paving in the adjacent alleyway, both of which will be removed during initial construction activities.

### 3.3.2 IRM Sequencing

The general sequence of the IRM work described in this section and shown in Appendix A includes the following:

- Notice will be provided to the NYSDEC at least seven (7) days prior to the start of remedial activities.
- Prior to the start of the IRM activities, the Storage Room building will be demolished and wells will be decommissioned to provide access for the IRM.
- The equipment, materials, and supplies necessary to complete the work will be mobilized to the Site.
- ERM will conduct onsite air monitoring throughout management of excavation soils consistent with the requirements of the NYSDOH's CAMP (Appendix B) and the project HASP (Appendix C).
- The extent of the IRM footprint will be surveyed and marked out using spray paint, tape, and/or other means.
- ERM compliant sub-surface clearance (SSC) procedures and verification of protection for utilities will be completed during all stages of work.
- Vibration monitoring equipment will be set up and continuous vibration monitoring will be performed until earthworks are complete.
- The excavation support system will be installed.

- Maintenance dewatering system pump(s), sump(s) hosing, and frac/weir tank and remaining components of pre-treatment system will be set up.
- The pump will be placed in the lowest part of the proposed IRM area or in an excavated sump.
- Asphalt, the concrete floor, and well vault at the surface of the IRM will be removed and waste will be segregated as necessary.
- The existing sanitary sewer will be cut and capped within the IRM footprint.
- Soil excavation to the target depths of 5-ft will be implemented and post-excavation samples will be collected from sidewalls, if feasible given the excavation support system and OSHA excavation safety requirements.
- Mixing of ZVI will be performed from 5-ft below ground surface to 15 ft below ground surface. The mass of ZVI emplaced will be 3% wt/wt (ZVI:soil) at a minimum and is further described in Appendix D ISCO and ISCR Treatment Test Results. The 51 feet wide by 32 feet long area will be divided into discrete cells for mixing of the ZVI material. The size of cells will be determined by the contractor and reviewed by ERM for verification of appropriate size to enable ZVI mixing rate effectiveness. To document the mix, grab samples of the soil within each cell will be field screened. Soil samples will be dried, magnetically separated and the mass of the soil and ZVI will be measured with a calibrated scale. If necessary based on the field results, further mixing and/ or the addition of ZVI maybe necessary to meet the target ratio. Once the target ratio has been met and documented, the contractor will move on to mixing the next cell. It is anticipated that two excavators will be utilized for the ZVI mixing. One machine will be equipped with the mixing head for ZVI blending, and the other will be equipped with a bucket that will be used to remove obstructions and apply the ZVI materials to the soil surface for mixing prior to blending. The number of excavators and mixing tooling type maybe altered during the procurement process.
- This IRM is utilizing a fast kinetics ZVI, which based on manufacturer's recommendations and the results of the ZVI bench scale study will require 30 days post mixing treatment timeframe. The construction will pause for this period and the IRM area will be secured with temporary chain-link fencing or equivalent. After 30 days of ZVI treatment samples will be collected and submitted for laboratory analysis,
- If insufficient contaminant reduction is achieved (i.e. concentrations are reduced to below 6 NYCRR Part 375 Restricted-Residential soil cleanup criteria), there will be a second round of ZVI treatment repeated with additional testing 30 days post supplemental mixing.
- Following laboratory confirmation of ZVI treatment success, Portland cement will be mixed at a depth from 5-ft below ground surface to 15-ft below ground surface. The mass of Portland cement emplaced shall be 5% at a minimum. The 51 feet wide by 32 feet long area will be divided into discrete cells for mixing of the Portland cement. It is anticipated two excavators will be utilized for the ISS mixing. One machine will be equipped with a rotary mixing head or equivalent, and the other will be used to apply the Portland materials to the soil surface. Post ISS, samples will be collected to document unconfined compression strength (UCS).
- After ISS is complete, the previously cut and capped sanitary sewer will be reinstalled within the open IRM footprint. Trenching may need to be performed through ISS swell generated from the addition of material from the ZVI and the ISS processes.
- The open IRM footprint will be covered with separation geotextile and covered with dense graded aggregate or equivalent from the top of swell to the existing ground surface.
- The final surface of crushed stone or equivalent will be installed.

- Shallow soil excavated is anticipated to be a mix of potential beneficial reuse and/ or non-hazardous soil; this will be confirmed with analytical data prior to developing the proper management strategy, as discussed further in the Soil Management Plan (Appendix E). Soils will be staged within a controlled stockpile on asphalt (covered with polyethylene sheeting and surrounded by silt socks or jersey barriers) or alternate or in lined/ covered roll-off containers.
- The final horizontal and vertical extents of IRM activities and the post- sampling locations will be documented via field measurements and surveying by a New York-licensed surveyor, and/or Global Positioning System (GPS) coordinates.
- Any asphalt or concrete removed from the excavations will be transported, recycled, or disposed of offsite.
- If necessary, landscaped areas will be re-seeded and restored.

### 3.3.3 Post IRM Sampling

Documentation soil samples will be collected from the mixed soil and from the side walls of the IRM area as engineering controls allow. In these areas, soil samples will be collected upon completion of the extent of shallow excavation (0-5 ft bgs) in preparation for soil mixing. Samples will be collected at the frequency, locations, and methods as described in DER-10 Section 5.4(b) 5 for surface soil remediation excavations with a perimeter of greater than 20 feet. Samples will be collected from each excavation side wall for every 30 linear feet of sidewall for a total of six samples. All samples will be analyzed for Target Compound List (TCL) VOCs by United States Environmental Protection Agency (USEPA) method 8260C and PCBs by USEPA method 8082A.

Samples of the mixed soil will be collected approximately 30 days following mixing of the ZVI and prior to Portland ISS. Proposed sampling locations are presented in Figure 7. Six documentation samples will be collected in a representative grid from within the ZVI treated soil at varying depths (1 sample per 100 cubic yards of ISCR treated soil). The sample results will be compared to the 6 NYCRR Part 375 Restricted-Residential soil cleanup objectives. If two or more samples exceed this guideline the soil will be remixed with additional ZVI, followed by a 30-day reaction time and resampling (Note following the ISCR treatment; ISS will be implemented which will further reduce VOC concentrations and will effectively immobilize remaining residual COC mass). All samples will be analyzed for TCL VOCs USEPA by method 8260C and PCBs by USEPA method 8082A.

As necessary and contingent upon final ZVI documentation samples, additional samples may be collected for total VOC and Synthetic Precipitation Leaching Procedure VOC, unconfined strength testing and permeability following the Portland ISS step to document the success of the ISS mix. These documentation sample are intended for geotechnical purposes related to the proximity of the IRM to the building. It is not our intent to compare the results of the geotechnical testing to the Interstate Technology Regulatory Council ISS performance criteria for strength (50 pounds per square inch) or hydraulic conductivity ($1 \times 10^{-6}$ cm/s; ITRC 2011) to demonstrate success of the IRM unless other lines of evidence are required (i.e. the ISCR treated soil does not meet ROA). Up to six geotechnical samples will be collected post ISS.

Compliance groundwater samples will be collected from three monitoring wells (MW-105, MW-106 and MW-108) hydraulically downgradient of the excavation/ treatment area. These wells will be sampled following completing of the ISCR and ISS mixing, and as practical will be aligned with the broader PMP monitoring events in 2025. These three wells will be low-flow purged and sampled for TCL VOCs by USEPA method 8260C and PCBs by USEPA method 8082A.These data will be compared to historic groundwater data collected from these monitoring well. With the Source Area removed/ treated it is

expected to start to see decreasing trends in groundwater concentrations. These data will be evaluated and used to make recommendation on next steps in the construction completion report.

The Quality Assurance Project Plan (QAPP; Appendix F) will be followed when collecting the confirmation samples. The results will be validated and presented in the CCR.

### 3.3.4 Backfill, Grading, and Surface Restoration

Backfill material—including structural fill and/ or topsoil—will be selected to meet 6 NYCRR 375-6.7(d) and applicable DER-10 requirements. Documentation on the sources of structural fill will be presented to the NYSDEC for approval prior to usage. As discussed with the NYSDEC, no sampling is required for structural fill that contain less than 10 percent fines (No. 80 sieve). Soil samples will be collected from sources of cover soil and topsoil and analyzed for appropriate COCs in accordance with the requirements presented in 6 NYCRR Part 360; analytical results will be submitted to the NYSDEC for approval prior to import to the Site.

ERM will maintain documentation demonstrating that each load of imported fill came from an approved source and will provide copies of these documents to the NYSDEC.

Structural Fill

Material used as structural fill shall be imported from an NYSDEC-approved source, meeting the gradation in the Drawings (Appendix A) and in accordance with New York State Department of Transportation (NYSDOT), and obtained from NYSDEC-approved borrow sources. It shall not contain objectionable quantities of debris, roots, or organic matter and shall be free of frozen materials, rock, gravel, or clods of clay larger than 3 inches in any dimension.

Topsoil

Topsoil shall be imported from an NYSDEC-approved source and will consist of friable loamy soil (as classified by the United States Department of Agriculture Handbook No. 18, Soil Survey Manual) and free of subsoil, roots, grass, excessive amounts of weeds, refuse, foreign matter, rocks, and stones over 1.25 inches in diameter. Soils shall fall within a pH range of 5.5 to 7.5 and contain a minimum of 3 percent and a maximum of 10 percent organic matter.

Placed topsoil shall be lightly compacted to prevent excessive erosion prior to seeding. Topsoil areas shall be left clean and raked, ready to receive landscaping.

Unless vegetated areas are disturbed or other requested by the property owner, top soil is not anticipated to be used as a restoration material.

### 3.3.5 IRM Waste

Solid and potentially liquid waste will be generated during the excavation and cover activities and during equipment decontamination activities. Materials that may become Investigation Derived Waste and require proper management include the following:

- Demolition debris;
- Excavated soil;
- Decontamination fluids, such as wash water;
- Dewatered groundwater;
- Personal protective equipment (PPE); and
- Disposable sampling equipment.

Appendix D provides the IRM Waste Management Plan.

### 3.3.6 Offsite Soil Transportation

Prior to mobilization, one or more potential disposal facilities for the excavated soil will be selected. Prior to offsite disposal, waste classification will be performed for disposal and evaluation for potential beneficial reuse on site purposes, by sampling and analysis in accordance with the requirements of the potential disposal facility(ies) and DER-10 and as outlined in Appendix E. If soil meets the requirements for beneficial reuse, the NYSDEC will be petitioned.

If soil does not meet the requirements for beneficial reuse; soil will be transported in triaxle trucks, dump trailers, or roll-off boxes to the selected offsite disposal facility(ies). Any water in the frac tanks will be transported via vacuum truck or drums to an offsite disposal facility or treated with the onsite treatment system or a temporary skid-mounted groundwater treatment technology prior to discharge under existing or modified permit. All offsite transport vehicles (or roll-off boxes) will be equipped with a weatherproof tarp that will be secured over each shipment leaving the Site or upon placement of waste within the container.

Each transport vehicle will be visually inspected and decontaminated if required to ensure that no loose soil or other material is tracked offsite. Particular attention will be paid to removing materials from tires, undercarriages, and portions of vehicles that may have been in contact with soil materials during loading operations.

The waste materials will be manifested on either non-hazardous waste manifest forms or hazardous waste manifest forms as appropriate. Weight tickets will be obtained from the disposal facility(ies) for each shipment of waste from the Site. Transport vehicles will not exceed NYSDOT weight limits and the necessary and up-to-day waste transporter permits.

## 3.4 Restoration, Cleanup, and Demobilization

### 3.4.1 Cleanup and Demobilization

Once the remedial action is complete, all construction equipment will be decontaminated and removed from the Site—including any temporary enclosures, trailers, etc. All disturbed areas will be restored in kind to the extent reasonably possible or as agreed upon with the property owner.

## 3.5 Support Documents

The work will be performed in conformance with the approved supporting documents from the IRMWP, such as the QAPP (Appendix F) and the CAMP (Appendix B). The approved IRM HASP (Appendix C) will be revised to address potential risks associated with the tasks outlined in this IRMWP. The revised HASP will be reviewed and approved by ERM's senior health and safety team prior to mobilization to the Site. It is envisioned that the proposed work can be completed using "Level D" PPE.

## 3.6 Reporting

Upon completion of the activities presented in this IRMWP, a Draft CCR will be prepared that conforms to the requirements of DER-10 Section 5.8 and will be based on the most recent template document available at the DER's website. The CCR will include the following items:

1. Signed certification statement following the requirements of DER-10 Section 1.15;
2. Synopsis of all work performed, extent of waste removed from the Site, problems encountered, and changes from the original IRMWP;

3. Results of all sampling and analyses from the remedial action including quality assurance/quality control (QA/QC) data and chain-of-custody records;
4. Lists of all laboratories, transporters, and disposal or recycling firms used during the IRM;
5. Copies of all manifests and bills of lading generated in connection with the transportation of materials offsite;
6. As-built drawings showing final monitoring point locations;
7. Summary of restoration activities; and
8. Identification of institutional controls required—including mechanisms to implement, maintain, monitor, and enforce such controls.

The CCR will be submitted electronically in accordance with NYSDEC guidance for submittal of electronic documents (DER-10).

With the exception of waste characterization sampling results, ERM will submit the chemistry data collected as part of the remedial action as Electronic Data Deliverables (EDDs) in EQuIS format in accordance with NYSDEC guidance for data submission. The EDDs will be e-mailed to the NYSDEC's Electronic Information Management System Administrator and the NYSDEC Project Manager.

# 4. SCHEDULE

A general schedule of anticipated related activities is presented below. Subsequent to receipt of the NYSDEC's approval, subcontractor procurement and approvals will be pursued with the intent ~~of~~ to mobilize to the Site within the 2024 construction season. NYSDEC will be notified a minimum of seven (7) days in advance of mobilization activities to the Site.

- Submittal of revised RAWP—6 June 2024
- NYSDEC approval of RAWP—21 June 2024
- Complete Subcontractor Procurement—28 June 2024
- Submit final drawing, including final engineering controls for the IRM area for NYSDEC review—8 July 2024
- Mobilization—5 August 2024

All dates are subject to change based on review periods, subcontractor availability, waste approvals, and weather. ERM will provide regular updates on any changes to the schedule.

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# TABLES

***Table 1***
***Soil Summary Table- VOCs Samples Collected in or Near the IRM Area***
***Robintech/Compudyne, Inc. Site Facility***
***Owego, New York***

| Analyte | NY-375-2-CP51-PROTECT GROUND WATER-2010 | NY-375-6-CP51-RESTRICTED INDUSTRIAL-2010 | Location ID | SAB-1 | SAB-1 | SAB-1 | SAB-1 | SAB-2 | SAB-2 | SAB-3 | SAB-3 | SAB-3 | SAB-4 | SAB-5 | SAB-6 | SAB-6 | SAB-7 | SAB-7 | SAB-8 | SAB-8 | SAB-9 | SAB-12 | SAB-12 | SAB-12 | SAB-13 | SAB-13 | SAB-13 | SAB-13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample Date | 25-Aug-16 | 25-Aug-16 | 25-Aug-16 | 25-Aug-16 | 23-Aug-16 | 23-Aug-16 | 25-Aug-16 | 25-Aug-16 | 25-Aug-16 | 25-Aug-16 | 24-Aug-16 | 24-Aug-16 | 25-Aug-16 | 24-Aug-16 | 24-Aug-16 | 6-Jan-17 | 6-Jan-17 | 5-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 |
| | | | Sample Type | N | N | FD | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | | | Depth | 9 - 10 ft | 15 - 16 ft | 15 - 16 ft | 20 - 21 ft | 10 - 11 ft | 15 - 16 ft | 9 - 10 ft | 12 - 13 ft | 15 - 16 ft | 4 - 5 ft | 6 - 6.5 ft | 4 - 5.5 ft | 3 - 4 ft | 3 - 4 ft | 9 - 9.8 ft | 2 - 3 ft | 8 - 9 ft | 4 - 5 ft | 1 - 2 ft | 10 - 11 ft | 27 - 28 ft | 4 - 5 ft | 10 - 11 ft | 21 - 22 ft | 27 - 28 ft |
| | | | Unit | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | **680** | 1,000,000 | µg/kg | **28,000** | **780** | **790** | 61 | *< 57* | *< 46* | **500,000** | **440,000** | **3,700** | 1.2 | *< 0.68* | *< 0.66* | 0.72 | *< 0.81* | **980** | *< 0.95* | 1.8 | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | 380 | 140 |
| 1,1,2,2-Tetrachloroethane | NS | NS | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) | NS | NS | µg/kg | *< 63,000* | *< 3,200* | *< 5,700* | *< 1,300* | *< 1,100* | *< 920* | 23,000 | 4,500 | 280 | *< 17* | *< 14* | *< 13* | *< 14* | *< 16* | *< 10,000* | *< 19* | *< 21* | *< 20* | *< 19* | *< 1,300* | *< 1,300* | *< 19* | *< 1,400* | *< 11,000* | *< 5,000* |
| 1,1,2-Trichloroethane | NS | NS | µg/kg | *< 4,700* | *< 240* | *< 430* | *< 97* | *< 85* | *< 69* | *< 14,000* | *< 1,600* | *< 460* | *< 1.2* | *< 1.0* | *< 0.98* | *< 1.0* | *< 1.2* | *< 780* | *< 1.4* | *< 1.6* | *< 1.5* | *< 1.4* | *< 97* | *< 95* | *< 1.4* | *< 110* | *< 860* | *< 380* |
| 1,1-Dichloroethane | 270 | 480,000 | µg/kg | *< 4,700* | *< 240* | *< 430* | *< 97* | *< 85* | *< 69* | *< 14,000* | *< 1,600* | *< 460* | 0.12 | *< 1.0* | *< 0.98* | *< 1.0* | *< 1.2* | *< 780* | *< 1.4* | 0.33 | *< 1.5* | *< 1.4* | *< 97* | *< 95* | *< 1.4* | *< 110* | *< 860* | *< 380* |
| 1,1-Dichloroethene | **330** | 1,000,000 | µg/kg | *< 3,200* | 130 | 190 | *< 64* | *< 57* | *< 46* | **6,300** | **9,000** | **460** | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | 3.6 | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | 220 | 87 |
| 1,2,3-Trichlorobenzene | NS | NS | µg/kg | *< 16,000* | 25 | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| 1,2,4-Trichlorobenzene | NS | NS | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| 1,2-Dibromo-3-chloropropane | NS | NS | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| 1,2-Dichlorobenzene | 1,100 | 1,000,000 | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| 1,2-Dichloroethane | 20 | 60,000 | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| 1,2-Dichloropropane | NS | NS | µg/kg | *< 11,000* | *< 570* | *< 1,000* | *< 220* | *< 200* | *< 160* | *< 34,000* | *< 3,700* | *< 1,100* | *< 2.9* | *< 2.4* | *< 2.3* | *< 2.4* | *< 2.8* | *< 1,800* | *< 3.3* | *< 3.7* | *< 3.4* | *< 3.4* | *< 220* | *< 220* | *< 3.3* | *< 250* | *< 2,000* | *< 880* |
| 1,3-Dichlorobenzene | 2,400 | 560,000 | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| 1,4-Dichlorobenzene | 1,800 | 250,000 | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| 1,4-Dioxane | 100 | 250,000 | µg/kg | *< 320,000* | *< 16,000* | *< 28,000* | *< 6,400* | *< 5,700* | *< 4,600* | *< 970,000* | *< 110,000* | *< 30,000* | *< 84* | *< 68* | *< 66* | *< 69* | *< 81* | *< 52,000* | *< 95* | *< 100* | *< 98* | *< 96* | *< 6,400* | *< 6,400* | *< 93* | *< 7,200* | *< 57,000* | *< 25,000* |
| 2-Butanone | **120** | 1,000,000 | µg/kg | *< 32,000* | *< 1,600* | **430** | *< 640* | *< 570* | *< 460* | *< 97,000* | *< 11,000* | *< 3,000* | *< 8.4* | *< 6.8* | 0.46 | *< 6.9* | 1.2 | *< 5,200* | *< 9.5* | *< 10* | *< 9.8* | *< 9.6* | *< 640* | *< 640* | *< 9.3* | *< 720* | *< 5,700* | *< 2,500* |
| 2-Hexanone | NS | NS | µg/kg | *< 32,000* | *< 1,600* | *< 2,800* | *< 640* | *< 570* | *< 460* | *< 97,000* | *< 11,000* | *< 3,000* | *< 8.4* | *< 6.8* | *< 6.6* | *< 6.9* | *< 8.1* | *< 5,200* | *< 9.5* | *< 10* | *< 9.8* | *< 9.6* | *< 640* | *< 640* | *< 9.3* | *< 720* | *< 5,700* | *< 2,500* |
| 4-Methyl-2-pentanone | NS | NS | µg/kg | *< 32,000* | *< 1,600* | *< 2,800* | *< 640* | *< 570* | *< 460* | *< 97,000* | *< 11,000* | *< 3,000* | *< 8.4* | *< 6.8* | *< 6.6* | *< 6.9* | *< 8.1* | *< 5,200* | *< 9.5* | *< 10* | *< 9.8* | *< 9.6* | *< 640* | *< 640* | *< 9.3* | *< 720* | *< 5,700* | *< 2,500* |
| Acetone | **50** | 1,000,000 | µg/kg | *< 32,000* | *< 1,600* | **2,300** | *< 640* | *< 570* | **62** | *< 97,000* | **7,400** | *< 3,000* | **69** | 45 | **85** | **86** | **55** | *< 5,200* | *< 9.5* | 6.2 | 19 | *< 9.6* | *< 640* | **130** | *< 9.3* | *< 720* | *< 5,700* | *< 2,500* |
| Benzene | **60** | 89,000 | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | 9.2 | 8.1 | **1,100** | **420** | *< 300* | *< 0.84* | *< 0.68* | 0.08 | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Bromodichloromethane | NS | NS | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Bromoform | NS | NS | µg/kg | *< 13,000* | *< 650* | *< 1,100* | *< 260* | *< 230* | *< 180* | *< 39,000* | *< 4,200* | *< 1,200* | *< 3.3* | *< 2.7* | *< 2.6* | *< 2.8* | *< 3.2* | *< 2,100* | *< 3.8* | *< 4.2* | *< 3.9* | *< 3.9* | *< 260* | *< 250* | *< 3.7* | *< 290* | *< 2,300* | *< 1,000* |
| Bromomethane | NS | NS | µg/kg | *< 6,300* | *< 320* | *< 570* | *< 130* | 26 | 16 | *< 19,000* | *< 2,100* | *< 610* | *< 1.7* | *< 1.4* | *< 1.3* | *< 1.4* | *< 1.6* | *< 1,000* | *< 1.9* | 25 | *< 2.0* | *< 1.9* | 31 | 29 | *< 1.9* | 43 | *< 1,100* | *< 500* |
| Carbon disulfide | NS | NS | µg/kg | *< 32,000* | *< 1,600* | *< 2,800* | *< 640* | *< 570* | *< 460* | *< 97,000* | *< 11,000* | *< 3,000* | *< 8.4* | *< 6.8* | *< 6.6* | *< 6.9* | *< 8.1* | *< 5,200* | *< 9.5* | *< 10* | *< 9.8* | *< 9.6* | *< 640* | *< 640* | *< 9.3* | *< 720* | *< 5,700* | *< 2,500* |
| Carbon tetrachloride | 760 | 44,000 | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Chlorobenzene | 1,100 | 1,000,000 | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Chlorobromomethane | NS | NS | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| Chloroethane | NS | NS | µg/kg | *< 6,300* | *< 320* | *< 570* | *< 130* | *< 110* | *< 92* | *< 19,000* | *< 2,100* | *< 610* | *< 1.7* | *< 1.4* | *< 1.3* | *< 1.4* | *< 1.6* | *< 1,000* | *< 1.9* | *< 2.1* | *< 2.0* | *< 1.9* | *< 130* | *< 130* | *< 1.9* | *< 140* | *< 1,100* | *< 500* |
| Chloroform | 370 | 700,000 | µg/kg | *< 4,700* | *< 240* | *< 430* | *< 97* | *< 85* | *< 69* | *< 14,000* | *< 1,600* | *< 460* | *< 1.2* | *< 1.0* | *< 0.98* | *< 1.0* | *< 1.2* | *< 780* | *< 1.4* | *< 1.6* | *< 1.5* | *< 1.4* | *< 97* | *< 95* | *< 1.4* | *< 110* | *< 860* | *< 380* |
| Chloromethane | NS | NS | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | 0.54 | *< 3.3* | *< 3.4* | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| cis-1,2-Dichloroethene | **250** | 1,000,000 | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | 0.19 | *< 0.66* | *< 0.69* | *< 0.81* | **1,200** | *< 0.95* | 28 | 0.38 | *< 0.96* | *< 64* | *< 64* | *< 0.93* | 41 | **800** | 220 |
| cis-1,3-Dichloropropene | NS | NS | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Cyclohexane | NS | NS | µg/kg | *< 63,000* | *< 3,200* | *< 5,700* | *< 1,300* | 79 | *< 920* | 9,400 | *< 21,000* | *< 6,100* | *< 17* | *< 14* | *< 13* | *< 14* | *< 16* | 99 | *< 19* | *< 21* | *< 20* | *< 19* | *< 1,300* | *< 1,300* | *< 19* | 27 | *< 11,000* | *< 5,000* |
| Dibromochloromethane | NS | NS | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Dichlorodifluoromethane (Freon 12) | NS | NS | µg/kg | *< 32,000* | *< 1,600* | *< 2,800* | *< 640* | *< 570* | *< 460* | *< 97,000* | *< 11,000* | *< 3,000* | *< 8.4* | *< 6.8* | *< 6.6* | *< 6.9* | *< 8.1* | *< 5,200* | *< 9.5* | *< 10* | *< 9.8* | *< 9.6* | *< 640* | *< 640* | *< 9.3* | *< 720* | *< 5,700* | *< 2,500* |
| Ethylbenzene | **1,000** | 780,000 | µg/kg | **1,300** | 69 | 82 | 23 | *< 57* | *< 46* | **12,000** | **7,800** | 140 | 1.4 | *< 0.68* | *< 0.66* | 0.18 | 0.20 | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Ethylene dibromide | NS | NS | µg/kg | *< 13,000* | *< 650* | *< 1,100* | *< 260* | *< 230* | *< 180* | *< 39,000* | *< 4,200* | *< 1,200* | *< 3.3* | *< 2.7* | *< 2.6* | *< 2.8* | *< 3.2* | *< 2,100* | *< 3.8* | *< 4.2* | *< 3.9* | *< 3.9* | *< 260* | *< 250* | *< 3.7* | *< 290* | *< 2,300* | *< 1,000* |
| Isopropylbenzene (Cumene) | NS | NS | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | 280 | *< 300* | 0.11 | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| m,p-Xylenes | **1,600** | 1,000,000 | µg/kg | **5,400** | 220 | 260 | 82 | 13 | *< 92* | **55,000** | **29,000** | 450 | 5.9 | *< 1.4* | *< 1.3* | 0.76 | 0.89 | 120 | *< 1.9* | *< 2.1* | *< 2.0* | *< 1.9* | *< 130* | *< 130* | *< 1.9* | *< 140* | *< 1,100* | *< 500* |
| Methyl acetate | NS | NS | µg/kg | *< 63,000* | 350 | 380 | 290 | 440 | 430 | *< 190,000* | *< 21,000* | 410 | *< 17* | *< 14* | *< 13* | *< 14* | *< 16* | *< 10,000* | *< 19* | *< 21* | *< 20* | *< 19* | *< 1,300* | *< 1,300* | *< 19* | *< 1,400* | *< 11,000* | *< 5,000* |
| Methyl tert-butyl ether | 930 | 1,000,000 | µg/kg | *< 6,300* | *< 320* | *< 570* | *< 130* | *< 110* | *< 92* | *< 19,000* | *< 2,100* | *< 610* | *< 1.7* | *< 1.4* | *< 1.3* | *< 1.4* | *< 1.6* | *< 1,000* | *< 1.9* | *< 2.1* | *< 2.0* | *< 1.9* | *< 130* | *< 130* | *< 1.9* | *< 140* | *< 1,100* | *< 500* |
| Methylcyclohexane | NS | NS | µg/kg | *< 13,000* | *< 650* | *< 1,100* | *< 260* | 420 | 74 | 86,000 | *< 4,200* | 1,100 | *< 3.3* | *< 2.7* | *< 2.6* | *< 2.8* | *< 3.2* | 1,200 | *< 3.8* | *< 4.2* | 25 | *< 3.9* | 13,000 | *< 250* | *< 3.7* | *< 290* | *< 2,300* | *< 1,000* |
| Methylene chloride | 50 | 1,000,000 | µg/kg | *< 32,000* | *< 1,600* | *< 2,800* | *< 640* | *< 570* | *< 460* | *< 97,000* | *< 11,000* | *< 3,000* | *< 8.4* | *< 6.8* | *< 6.6* | *< 6.9* | *< 8.1* | *< 5,200* | *< 9.5* | *< 10* | *< 9.8* | *< 9.6* | *< 640* | *< 640* | *< 9.3* | *< 720* | *< 5,700* | *< 2,500* |
| o-Xylene | **1,600** | 1,000,000 | µg/kg | 1,200 | 57 | *< 570* | *< 130* | *< 110* | *< 92* | **12,000** | **7,700** | 130 | 1.9 | *< 1.4* | *< 1.3* | *< 1.4* | 0.21 | *< 1,000* | *< 1.9* | *< 2.1* | *< 2.0* | *< 1.9* | *< 130* | *< 130* | *< 1.9* | *< 140* | *< 1,100* | *< 500* |
| Styrene | NS | NS | µg/kg | *< 6,300* | *< 320* | *< 570* | *< 130* | *< 110* | *< 92* | *< 19,000* | *< 2,100* | *< 610* | *< 1.7* | *< 1.4* | *< 1.3* | *< 1.4* | *< 1.6* | *< 1,000* | *< 1.9* | *< 2.1* | *< 2.0* | *< 1.9* | *< 130* | *< 130* | *< 1.9* | *< 140* | *< 1,100* | *< 500* |
| Tetrachloroethene | **1,300** | 300,000 | µg/kg | **32,000** | 210 | 260 | 73 | *< 57* | *< 46* | **140,000** | **51,000** | 480 | 2.9 | *< 0.68* | *< 0.66* | 0.69 | 0.62 | 900 | *< 0.95* | 0.82 | *< 0.98* | 0.66 | *< 64* | 19 | 0.41 | 20 | 270 | 280 |
| Toluene | **700** | 1,000,000 | µg/kg | **9,500** | 540 | 680 | 98 | 19 | 16 | **110,000** | **90,000** | **1,100** | 3.8 | 0.22 | 0.23 | 1.6 | 1.7 | **1,100** | *< 1.4* | *< 1.6* | *< 1.5* | *< 1.4* | *< 97* | *< 95* | *< 1.4* | *< 110* | 160 | 74 |
| trans-1,2-Dichloroethene | 190 | 1,000,000 | µg/kg | *< 4,700* | *< 240* | *< 430* | *< 97* | *< 85* | *< 69* | *< 14,000* | *< 1,600* | *< 460* | *< 1.2* | *< 1.0* | *< 0.98* | *< 1.0* | *< 1.2* | *< 780* | *< 1.4* | *< 1.6* | *< 1.5* | *< 1.4* | *< 97* | *< 95* | *< 1.4* | *< 110* | *< 860* | *< 380* |
| trans-1,3-Dichloropropene | NS | NS | µg/kg | *< 3,200* | *< 160* | *< 280* | *< 64* | *< 57* | *< 46* | *< 9,700* | *< 1,100* | *< 300* | *< 0.84* | *< 0.68* | *< 0.66* | *< 0.69* | *< 0.81* | *< 520* | *< 0.95* | *< 1.0* | *< 0.98* | *< 0.96* | *< 64* | *< 64* | *< 0.93* | *< 72* | *< 570* | *< 250* |
| Trichloroethene | **470** | **400,000** | µg/kg | **820,000** | **14,000** | **20,000** | **1,900** | 79 | 170 | **9,900,000** | **3,900,000** | **28,000** | 50 | 1.3 | 0.52 | 21 | 1.1 | **56,000** | 0.27 | **610** | 12 | 0.82 | *< 64* | **1,200** | 0.64 | **2,900** | **36,000** | **20,000** |
| Trichlorofluoromethane (Freon 11) | NS | NS | µg/kg | *< 16,000* | *< 810* | *< 1,400* | *< 320* | *< 280* | *< 230* | *< 48,000* | *< 5,300* | *< 1,500* | *< 4.2* | *< 3.4* | *< 3.3* | 0.54 | *< 4.1* | *< 2,600* | *< 4.7* | *< 5.2* | *< 4.9* | *< 4.8* | *< 320* | *< 320* | *< 4.7* | *< 360* | *< 2,900* | *< 1,200* |
| Vinyl chloride | **20** | 27,000 | µg/kg | *< 6,300* | *< 320* | *< 570* | *< 130* | *< 110* | *< 92* | *< 19,000* | *< 2,100* | *< 610* | *< 1.7* | *< 1.4* | *< 1.3* | *< 1.4* | *< 1.6* | *< 1,000* | *< 1.9* | *< 2.1* | *< 2.0* | *< 1.9* | *< 130* | *< 130* | *< 1.9* | *< 140* | *< 1,100* | *< 500* |
| Xylene, Total | 1,600 | 1,000,000 | µg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TICs (Calculated), Total | NS | NS | µg/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Notes:**
< = Compound not detected at concentrationsabove the laboratory reporting detection limit.The laboratory reporting detection limit is shown.
-- = Not analyzed
NS = No Standard
N = Normal Environmental Sample
FD = Field Duplicate Sample
µg/kg = micrograms per kilogram

***Table 1***
***Soil Summary Table- VOCs Samples Collected in or Near the IRM Area***
***Robintech/Compudyne, Inc. Site Facility***
***Owego, New York***

| Analyte | NY-375-2-CP51-PROTECT GROUND WATER-2010 | NY-375-6-CP51-RESTRICTED INDUSTRIAL-2010 | Location ID | SAB-14 | SAB-14 | SAB-14 | SAB-14 | SAB-14 | B-101 | B-103 | B-103 | B-104 | B-104 | B-104 | B-105 | B-105 | B-105 | B-106 | B-107 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample Date | 5-Jan-17 | 6-Jan-17 | 6-Jan-17 | 6-Jan-17 | 6-Jan-17 | 26-May-21 | 20-May-21 | 20-May-21 | 25-May-21 | 25-May-21 | 25-May-21 | 1-Jun-21 | 1-Jun-21 | 1-Jun-21 | 2-Jun-21 | 27-May-21 |
| | | | Sample Type | N | N | FD | N | N | N | N | N | N | FD | N | N | FD | N | N | N |
| | | | Depth | 2 - 3 ft | 9 - 10 ft | 9 - 10 ft | 11 - 12 ft | 14 - 15.3 ft | 7 - 13 ft | 10 - 11 ft | 14 - 15 ft | 6 - 8 ft | 6 - 8 ft | 14 - 15 ft | 14 - 16 ft | 14 - 16 ft | 20 - 21 ft | 15 - 16 ft | 13 - 14 ft |
| | | | Unit | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | **680** | 1,000,000 | µg/kg | *< 1.0* | 0.67 | *< 64* | *< 63* | 0.47 | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | 0.83 | 130 | 230 | 270 | *< 4.4* | *< 5.0* |
| 1,1,2,2-Tetrachloroethane | NS | NS | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) | NS | NS | µg/kg | *< 21* | *< 22* | *< 1,300* | *< 1,200* | *< 22* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,1,2-Trichloroethane | NS | NS | µg/kg | *< 1.6* | *< 1.6* | *< 96* | *< 94* | *< 1.7* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,1-Dichloroethane | 270 | 480,000 | µg/kg | *< 1.6* | 1.0 | *< 96* | *< 94* | 0.98 | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,1-Dichloroethene | **330** | 1,000,000 | µg/kg | *< 1.0* | 1.4 | *< 64* | *< 63* | 0.90 | *< 4.3* | *< 4.9* | 0.81 | *< 5.3* | *< 5.5* | 0.84 | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,2,3-Trichlorobenzene | NS | NS | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trichlorobenzene | NS | NS | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,2-Dibromo-3-chloropropane | NS | NS | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,2-Dichlorobenzene | 1,100 | 1,000,000 | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,2-Dichloroethane | 20 | 60,000 | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,2-Dichloropropane | NS | NS | µg/kg | *< 3.6* | *< 3.8* | *< 220* | *< 220* | *< 3.9* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,3-Dichlorobenzene | 2,400 | 560,000 | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,4-Dichlorobenzene | 1,800 | 250,000 | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| 1,4-Dioxane | 100 | 250,000 | µg/kg | *< 100* | *< 110* | *< 6,400* | *< 6,300* | *< 110* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Butanone | **120** | 1,000,000 | µg/kg | *< 10* | *< 11* | *< 640* | *< 630* | *< 11* | *< 22* | *< 24* | *< 21* | *< 26* | *< 28* | *< 31* | *< 2,100* | *< 2,600* | *< 3,100* | *< 22* | *< 25* |
| 2-Hexanone | NS | NS | µg/kg | *< 10* | *< 11* | *< 640* | *< 630* | *< 11* | *< 22* | *< 24* | *< 21* | *< 26* | *< 28* | *< 31* | *< 2,100* | *< 2,600* | *< 3,100* | *< 22* | *< 25* |
| 4-Methyl-2-pentanone | NS | NS | µg/kg | *< 10* | *< 11* | *< 640* | *< 630* | *< 11* | *< 22* | *< 24* | *< 21* | *< 26* | *< 28* | *< 31* | *< 2,100* | *< 2,600* | *< 3,100* | *< 22* | *< 25* |
| Acetone | **50** | 1,000,000 | µg/kg | *< 10* | 23 | *< 640* | **130** | *< 11* | *< 22* | *< 24* | *< 21* | *< 26* | *< 28* | 16 | *< 2,100* | *< 2,600* | *< 3,100* | *< 22* | *< 25* |
| Benzene | **60** | 89,000 | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Bromodichloromethane | NS | NS | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Bromoform | NS | NS | µg/kg | *< 4.2* | *< 4.3* | *< 260* | *< 250* | *< 4.5* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Bromomethane | NS | NS | µg/kg | *< 2.1* | *< 2.2* | *< 130* | *< 120* | *< 2.2* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Carbon disulfide | NS | NS | µg/kg | *< 10* | *< 11* | *< 640* | *< 630* | *< 11* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Carbon tetrachloride | 760 | 44,000 | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Chlorobenzene | 1,100 | 1,000,000 | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Chlorobromomethane | NS | NS | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroethane | NS | NS | µg/kg | *< 2.1* | *< 2.2* | *< 130* | *< 120* | *< 2.2* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Chloroform | 370 | 700,000 | µg/kg | *< 1.6* | *< 1.6* | *< 96* | *< 94* | *< 1.7* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Chloromethane | NS | NS | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| cis-1,2-Dichloroethene | **250** | 1,000,000 | µg/kg | *< 1.0* | 97 | 100 | 88 | 45 | *< 4.3* | 1.8 | 3.3 | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | **260** | **380** | *< 4.4* | 1.1 |
| cis-1,3-Dichloropropene | NS | NS | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Cyclohexane | NS | NS | µg/kg | *< 21* | 2.2 | *< 1,300* | *< 1,200* | 1.6 | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Dibromochloromethane | NS | NS | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Dichlorodifluoromethane (Freon 12) | NS | NS | µg/kg | *< 10* | *< 11* | *< 640* | *< 630* | *< 11* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Ethylbenzene | **1,000** | 780,000 | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Ethylene dibromide | NS | NS | µg/kg | *< 4.2* | *< 4.3* | *< 260* | *< 250* | *< 4.5* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Isopropylbenzene (Cumene) | NS | NS | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| m,p-Xylenes | **1,600** | 1,000,000 | µg/kg | *< 2.1* | 0.50 | 25 | *< 120* | *< 2.2* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methyl acetate | NS | NS | µg/kg | *< 21* | *< 22* | *< 1,300* | *< 1,200* | *< 22* | *< 22* | *< 24* | *< 21* | *< 26* | *< 28* | *< 31* | *< 2,100* | *< 2,600* | *< 3,100* | *< 22* | *< 25* |
| Methyl tert-butyl ether | 930 | 1,000,000 | µg/kg | *< 2.1* | *< 2.2* | *< 130* | *< 120* | *< 2.2* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Methylcyclohexane | NS | NS | µg/kg | *< 4.2* | 12 | 1,800 | 290 | 9.3 | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Methylene chloride | 50 | 1,000,000 | µg/kg | *< 10* | *< 11* | *< 640* | *< 630* | *< 11* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| o-Xylene | **1,600** | 1,000,000 | µg/kg | *< 2.1* | *< 2.2* | *< 130* | *< 120* | *< 2.2* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Styrene | NS | NS | µg/kg | *< 2.1* | *< 2.2* | *< 130* | *< 120* | *< 2.2* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Tetrachloroethene | **1,300** | 300,000 | µg/kg | *< 1.0* | 0.75 | *< 64* | *< 63* | 0.56 | *< 4.3* | 1.5 | 1.4 | *< 5.3* | *< 5.5* | *< 6.2* | 87 | 120 | 270 | *< 4.4* | *< 5.0* |
| Toluene | **700** | 1,000,000 | µg/kg | *< 1.6* | *< 1.6* | *< 96* | *< 94* | *< 1.7* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| trans-1,2-Dichloroethene | 190 | 1,000,000 | µg/kg | *< 1.6* | *< 1.6* | *< 96* | *< 94* | *< 1.7* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| trans-1,3-Dichloropropene | NS | NS | µg/kg | *< 1.0* | *< 1.1* | *< 64* | *< 63* | *< 1.1* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Trichloroethene | **470** | **400,000** | µg/kg | 0.45 | 130 | *< 64* | *< 63* | 87 | *< 4.3* | 160 | **950** | *< 5.3* | 1.3 | 4.2 | **15,000** | **17,000** | **25,000** | 3.4 | 5.8 |
| Trichlorofluoromethane (Freon 11) | NS | NS | µg/kg | *< 5.2* | *< 5.4* | *< 320* | *< 310* | *< 5.6* | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Vinyl chloride | **20** | 27,000 | µg/kg | *< 2.1* | 17 | *< 130* | 12 | **37** | *< 4.3* | *< 4.9* | *< 4.2* | *< 5.3* | *< 5.5* | *< 6.2* | *< 420* | *< 520* | *< 620* | *< 4.4* | *< 5.0* |
| Xylene, Total | 1,600 | 1,000,000 | µg/kg | -- | -- | -- | -- | -- | *< 8.7* | *< 9.7* | *< 8.4* | *< 11* | *< 11* | *< 12* | *< 850* | *< 1,000* | *< 1,200* | *< 8.7* | *< 10* |
| TICs (Calculated), Total | NS | NS | µg/kg | -- | -- | -- | -- | -- | 54 | 5.2 | 16.9 | 0 | 0 | 0 | 0 | 1,700 | 0 | 14 | 11.6 |

**Notes:**
< = Compound not detected at concentrationsabove the laboratory reporting detection limit.The laboratory reporting detection limit is shown.
-- = Not analyzed
NS = No Standard
N = Normal Environmental Sample
FD = Field Duplicate Sample
µg/kg = micrograms per kilogram

***Table 2A***
***Soil Summary Table- TCLP Samples Collected in or Near the IRM Area***
***Robintech/Compudyne, Inc. Site Facility***
***Owego, New York***

| Analyte | | 40 CFR 261.24 Toxicity Characteristic Maximum Concentration | Location ID | SAB-1 | SAB-3 |
|---|---|---|---|---|---|
| | | | Sample Date | 25-Aug-16 | 25-Aug-16 |
| | | | Sample Type | N | N |
| | | | Depth | 2 - 3 ft | 10 - 12 ft |
| | | | Unit | | |
| TCLP VOCs | 1,1-Dichloroethene | 700 | µg/L | *< 5.0* | 310 |
| | 1,2-Dichloroethane | 500 | µg/L | *< 5.0* | *< 5.0* |
| | 1,4-Dichlorobenzene | 7,500 | µg/L | *< 25* | *< 25* |
| | 2-Butanone | 200,000 | µg/L | *< 50* | *< 50* |
| | Benzene | 500 | µg/L | *< 5.0* | 43 |
| | Carbon tetrachloride | 500 | µg/L | *< 5.0* | *< 5.0* |
| | Chlorobenzene | 100,000 | µg/L | *< 5.0* | 7.6 |
| | Chloroform | 6,000 | µg/L | *< 7.5* | 5.6 |
| | Tetrachloroethene | **700** | µg/L | 4.3 | **3,900** |
| | Trichloroethene | **500** | µg/L | 5.1 | **300,000** |
| | Vinyl chloride | 200 | µg/L | *< 10* | *< 10* |
| TCLP SVOCs | 2,4,5-Trichlorophenol | 400,000 | µg/L | *< 25* | *< 25* |
| | 2,4,6-Trichlorophenol | 2,000 | µg/L | *< 25* | *< 25* |
| | 2,4-Dinitrotoluene | 130 | µg/L | *< 25* | *< 25* |
| | Hexachlorobenzene | 130 | µg/L | *< 10* | *< 10* |
| | Hexachlorobutadiene | 500 | µg/L | *< 10* | *< 10* |
| | Hexachloroethane | 3,000 | µg/L | *< 10* | *< 10* |
| | m,p-cresol | 200,000 | µg/L | *< 25* | *< 25* |
| | Nitrobenzene | 2,000 | µg/L | *< 10* | *< 10* |
| | o-Cresol | 200 | µg/L | *< 25* | *< 25* |
| | Pentachlorophenol | 100,000 | µg/L | *< 50* | *< 50* |
| | Pyridine | 5,000 | µg/L | *< 25* | *< 25* |
| TCLP Metals | Arsenic | 5 | mg/L | *< 1.0* | *< 1.0* |
| | Barium | 100 | mg/L | 0.58 | 0.06 |
| | Cadmium | 1 | mg/L | *< 0.10* | *< 0.10* |
| | Chromium | 5 | mg/L | *< 0.20* | 0.71 |
| | Lead | 5 | mg/L | *< 0.50* | *< 0.50* |
| | Mercury | 0.2 | mg/L | *< 0.0010* | *< 0.0010* |
| | Selenium | 1 | mg/L | *< 0.50* | *< 0.50* |
| | Silver | 5 | mg/L | *< 0.10* | *< 0.10* |
| General Chemistry | Solids, Total | NS | % | 92.1 | 79.2 |
| | pH, Lab | NS | pH units | 7.9 | 5.4 |
| | Flash Point | NS | degrees F | 150 | 111 |

**Notes:**
< = Compound not detected at concentrations above the laboratory reporting detection limit.
The laboratory reporting detection limit is shown.
NS = No Standard
N = Normal Environmental Sample
mg/L = milligrams per liter
µg/L = micrograms per liter

***Table 2B***
***Soil Summary Table- Metals Samples Collected in or Near the IRM Area***
***Robintech/Compudyne, Inc. Site Facility***
***Owego, New York***

| Analyte | NY-375-2-CP51-PROTECT GROUND WATER-2010 | NY-375-6-CP51-RESTRICTED INDUSTRIAL-2010 | Location ID | SAB-1 | SAB-1 | SAB-2 | B-101 | B-101 | B-103 | B-103 | B-104 | B-104 | B-104 | B-104 | B-105 | B-105 | B-106 | B-106 | B-107 | B-107 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample Date | 25-Aug-16 | 25-Aug-16 | 23-Aug-16 | 26-May-21 | 26-May-21 | 20-May-21 | 20-May-21 | 25-May-21 | 25-May-21 | 25-May-21 | 25-May-21 | 1-Jun-21 | 1-Jun-21 | 2-Jun-21 | 4-Jun-21 | 27-May-21 | 27-May-21 |
| | | | Sample Type | N | N | N | N | N | N | N | N | N | FD | N | N | N | N | N | N | N |
| | | | Depth | 8 - 9 ft | 9 - 10 ft | 4 - 5 ft | 4 - 5 ft | 7 - 13 ft | 5 - 6 ft | 10 - 11 ft | 4 - 5 ft | 6 - 8 ft | 6 - 8 ft | 15 - 16 ft | 4 - 5 ft | 35 - 36 ft | 4 - 5 ft | 25 - 27 ft | 4 - 5 ft | 33 - 36 ft |
| | | | Unit | | | | | | | | | | | | | | | | | |
| Aluminum | NS | NS | mg/kg | -- | -- | -- | 16,700 | 18,500 | 19,600 | 18,000 | 19,600 | 19,800 | 16,100 | 8,170 | 17,700 | 14,400 | 18,300 | 15,400 | 17,900 | 14,000 |
| Antimony | NS | NS | mg/kg | -- | -- | -- | *< 14.9* | *< 18.4* | *< 18.0* | *< 17.8* | *< 15.6* | *< 18.0* | *< 18.7* | *< 18.4* | *< 16.3* | *< 16.2* | *< 15.7* | *< 16.6* | *< 16.7* | *< 14.9* |
| Arsenic | 16 | 16 | mg/kg | -- | -- | -- | 13.9 | 10.1 | 11.7 | 11.2 | 11.2 | 15.4 | 10.8 | 6.1 | 7.6 | 7.9 | 9.8 | 8.6 | 12.3 | 7.0 |
| Barium | 820 | 10,000 | mg/kg | -- | -- | -- | 103 | 128 | 115 | 111 | 149 | 117 | 94.7 | 159 | 92.4 | 69.9 | 106 | 93.6 | 103 | 81.0 |
| Beryllium | 47 | 2,700 | mg/kg | -- | -- | -- | 0.68 | 0.73 | 0.61 | 0.74 | 0.77 | 0.79 | 0.70 | 0.41 | 0.60 | 0.51 | 0.70 | 0.65 | 0.80 | 0.52 |
| Cadmium | 7.5 | 60 | mg/kg | -- | -- | -- | 0.11 | 0.14 | 0.24 | 0.12 | 0.25 | 0.20 | 0.17 | 0.13 | 0.093 | 0.075 | 0.10 | 0.096 | 0.10 | 0.068 |
| Calcium | NS | NS | mg/kg | -- | -- | -- | 1,280 | 1,560 | 1,490 | 1,090 | 1,260 | 1,410 | 1,260 | 907 | 3,380 | 1,470 | 1,220 | 1,200 | 1,520 | 1,930 |
| Chromium | NS | 6,800 | mg/kg | -- | -- | -- | 28.3 | 42.5 | 516 | 416 | 65.0 | 30.7 | 29.2 | 12.1 | 20.6 | 64.7 | 21.9 | 21.4 | 23.1 | 20.3 |
| Cobalt | NS | NS | mg/kg | -- | -- | -- | 15.0 | 15.2 | 18.0 | 14.3 | 15.1 | 15.0 | 13.4 | 7.7 | 17.0 | 13.3 | 14.7 | 12.4 | 16.1 | 12.2 |
| Copper | 1,720 | 10,000 | mg/kg | -- | -- | -- | 27.0 | 39.4 | 369 | 251 | 1,430 | 513 | 389 | 28.9 | 45.1 | 28.2 | 20.3 | 27.8 | 24.8 | 28.2 |
| Cyanide CN- | 40 | 10,000 | mg/kg | -- | -- | -- | *< 0.93* | *< 1.0* | *< 1.1* | *< 1.1* | *< 0.94* | *< 1.1* | *< 1.1* | *< 1.1* | *< 0.97* | *< 1.0* | *< 1.0* | *< 0.93* | *< 0.98* | *< 0.94* |
| Iron | NS | NS | mg/kg | 15,000 | 31,000 | 7,300 | 34,300 | 37,900 | 41,700 | 38,000 | 36,500 | 39,900 | 31,600 | 28,900 | 35,600 | 31,800 | 36,100 | 31,900 | 37,700 | 30,200 |
| Lead | 450 | 3,900 | mg/kg | -- | -- | -- | 19.5 | 17.0 | 33.1 | 26.3 | 58.6 | 21.0 | 25.0 | 27.9 | 15.5 | 21.2 | 17.2 | 15.7 | 22.8 | 12.4 |
| Magnesium | NS | NS | mg/kg | -- | -- | -- | 4,550 | 5,340 | 5,410 | 5,100 | 5,020 | 5,410 | 4,210 | 2,080 | 5,180 | 4,360 | 5,190 | 4,510 | 4,610 | 4,220 |
| Manganese | **2,000** | 10,000 | mg/kg | 160 | 480 | 260 | 568 | 463 | 749 | 441 | 729 | 419 | 586 | **2,570** | 513 | 338 | 677 | 404 | 682 | 682 |
| Mercury | 0.73 | 5.7 | mg/kg | -- | -- | -- | 0.063 | 0.015 | 0.032 | 0.022 | 0.027 | 0.010 | 0.014 | 0.011 | 0.014 | 0.0087 | 0.013 | 0.0096 | 0.021 | 0.013 |
| Nickel | 130 | 10,000 | mg/kg | -- | -- | -- | 35.6 | 42.9 | 58.5 | 42.0 | 70.5 | 82.5 | 79.1 | 27.1 | 35.2 | 34.0 | 36.6 | 33.6 | 37.0 | 29.8 |
| Potassium | NS | NS | mg/kg | -- | -- | -- | 1,700 | 1,890 | 1,530 | 1,660 | 2,070 | 1,870 | 1,590 | 853 | 1,540 | 1,150 | 1,610 | 1,540 | 1,840 | 1,340 |
| Selenium | 4 | 6,800 | mg/kg | -- | -- | -- | *< 4.0* | *< 4.9* | 3.2 | 3.0 | *< 4.2* | *< 4.8* | *< 5.0* | *< 4.9* | *< 4.3* | *< 4.3* | *< 4.2* | *< 4.4* | *< 4.5* | *< 4.0* |
| Silver | 8.3 | 6,800 | mg/kg | -- | -- | -- | *< 0.60* | *< 0.74* | *< 0.72* | *< 0.71* | 1.8 | *< 0.72* | *< 0.75* | 0.29 | *< 0.65* | *< 0.65* | *< 0.63* | *< 0.66* | *< 0.67* | *< 0.60* |
| Sodium | NS | NS | mg/kg | -- | -- | -- | 91.8 | 113 | 109 | 119 | 275 | 202 | 224 | 320 | 82.4 | 65.5 | 59.9 | 116 | 71.8 | 81.9 |
| Thallium | NS | NS | mg/kg | -- | -- | -- | *< 6.0* | *< 7.4* | *< 7.2* | *< 7.1* | *< 6.3* | *< 7.2* | *< 7.5* | 0.45 | *< 6.5* | *< 6.5* | *< 6.3* | *< 6.6* | *< 6.7* | *< 6.0* |
| Vanadium | NS | NS | mg/kg | -- | -- | -- | 23.1 | 24.8 | 26.8 | 23.9 | 26.2 | 26.7 | 22.1 | 12.6 | 22.9 | 19.1 | 24.1 | 20.3 | 24.4 | 17.7 |
| Zinc | 2,480 | 10,000 | mg/kg | -- | -- | -- | 70.9 | 80.8 | 84.0 | 78.8 | 81.7 | 86.8 | 70.1 | 39.3 | 74.3 | 70.2 | 75.7 | 70.3 | 76.2 | 65.4 |

**Notes:**
< = Compound not detected at concentrationsabove the laboratory reporting detection limit.The laboratory reporting detection limit is shown.
-- = Not analyzed
NS = No Standard
N = Normal Environmental Sample
FD = Field Duplicate Sample
µg/kg = micrograms per kilogram

***Table 2C***
***Soil Summary Table- PCBs Samples Collected in or Near the IRM Area***
***Robintech/Compudyne, Inc. Site Facility***
***Owego, New York***

| Analyte | NY-375-2-CP51-PROTECT GROUND WATER-2010 | NY-375-6-CP51-RESTRICTED INDUSTRIAL-2010 | Location ID | SAB-1 | SAB-3 | SAB-8 | SAB-8 | SAB-10 | SAB-12 | SAB-12 | SAB-12 | SAB-13 | SAB-13 | SAB-13 | SAB-13 | SAB-14 | SAB-14 | SAB-14 | SAB-14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample Date | 25-Aug-16 | 25-Aug-16 | 6-Jan-17 | 6-Jan-17 | 6-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 4-Jan-17 | 6-Jan-17 | 6-Jan-17 | 6-Jan-17 | 6-Jan-17 |
| | | | Sample Type | N | N | N | N | N | N | N | N | N | N | N | N | N | N | FD | N |
| | | | Depth | 2 - 3 ft | 10 - 12 ft | 2 - 3 ft | 8 - 9 ft | 0 - 1 ft | 3 - 4 ft | 10 - 11 ft | 27 - 28 ft | 4 - 5 ft | 10 - 11 ft | 21 - 22 ft | 27 - 28 ft | 9 - 10 ft | 11 - 12 ft | 11 - 12 ft | 14 - 15.3 ft |
| | | | Unit | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | *< 34.8* | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | *< 35.6* | *< 35.7* | *< 38.0* | *< 37.0* | *< 37.2* | *< 39.2* |
| Aroclor 1221 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | *< 34.8* | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | *< 35.6* | *< 35.7* | *< 38.0* | *< 37.0* | *< 37.2* | *< 39.2* |
| Aroclor 1232 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | *< 34.8* | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | *< 35.6* | *< 35.7* | *< 38.0* | *< 37.0* | *< 37.2* | *< 39.2* |
| Aroclor 1242 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | *< 34.8* | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | *< 35.6* | *< 35.7* | *< 38.0* | *< 37.0* | *< 37.2* | *< 39.2* |
| Aroclor 1248 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | *< 34.8* | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | *< 35.6* | *< 35.7* | *< 38.0* | *< 37.0* | *< 37.2* | *< 39.2* |
| Aroclor 1254 | 3,200 | 25,000 | µg/kg | 162 | 1,850 | *< 35.9* | *< 39.4* | 418 | *< 36.3* | 366 | 9.10 | *< 35.7* | 84.2 | *< 35.6* | *< 35.7* | 8.55 | 200 | 10.9 | *< 39.2* |
| Aroclor 1260 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | 73.8 | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | 40.7 | *< 35.7* | *< 38.0* | 28.5 | *< 37.2* | *< 39.2* |
| Aroclor 1262 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | *< 34.8* | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | *< 35.6* | *< 35.7* | *< 38.0* | *< 37.0* | *< 37.2* | *< 39.2* |
| Aroclor 1268 | 3,200 | 25,000 | µg/kg | *< 34.1* | *< 405* | *< 35.9* | *< 39.4* | *< 34.8* | *< 36.3* | *< 37.3* | *< 38.3* | *< 35.7* | *< 38.5* | *< 35.6* | *< 35.7* | *< 38.0* | *< 37.0* | *< 37.2* | *< 39.2* |
| PCBs, Total | 3,200 | 25,000 | µg/kg | 162 | 1,850 | *< 35.9* | *< 39.4* | 492 | *< 36.3* | 366 | 9.10 | *< 35.7* | 84.2 | 40.7 | *< 35.7* | 8.55 | 229 | 10.9 | *< 39.2* |

| Analyte | NY-375-2-CP51-PROTECT GROUND WATER-2010 | NY-375-6-CP51-RESTRICTED INDUSTRIAL-2010 | Location ID | B-101 | B-101 | B-103 | B-103 | B-104 | B-104 | B-104 | B-105 | B-105 | B-106 | B-106 | B-107 | B-107 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample Date | 26-May-21 | 26-May-21 | 20-May-21 | 20-May-21 | 25-May-21 | 25-May-21 | 25-May-21 | 1-Jun-21 | 1-Jun-21 | 2-Jun-21 | 4-Jun-21 | 27-May-21 | 27-May-21 |
| | | | Sample Type | N | N | N | N | N | FD | N | N | N | N | N | N | N |
| | | | Depth | 4 - 5 ft | 7 - 13 ft | 5 - 6 ft | 12 - 13 ft | 4 - 5 ft | 6 - 8 ft | 15 - 16 ft | 4 - 5 ft | 35 - 36 ft | 4 - 5 ft | 25 - 27 ft | 4 - 5 ft | 33 - 36 ft |
| | | | Unit | | | | | | | | | | | | | |
| Aroclor 1016 | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |
| Aroclor 1221 | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |
| Aroclor 1232 | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |
| Aroclor 1242 | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |
| Aroclor 1248 | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |
| Aroclor 1254 | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |
| Aroclor 1260 | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |
| PCBs, Total | 3,200 | 25,000 | µg/kg | *< 200* | *< 200* | *< 260* | *< 0.22* | *< 0.19* | *< 0.22* | *< 0.27* | *< 0.25* | *< 0.19* | *< 0.22* | *< 0.24* | *< 0.20* | *< 0.24* |

**Notes:**

< = Compound not detected at concentrationsabove the laboratory reporting detection limit.The laboratory reporting detection limit is shown.
NS = No Standard
N = Normal Environmental Sample
FD = Field Duplicate Sample
µg/kg = micrograms per kilogram

***Table 3***
***Groundwater Summary Table- Wells in or near the IRM Area***
***Robintech/Compudyne, Inc. Site Facility***
***Owego, New York***

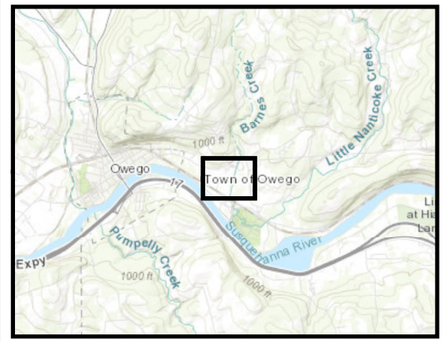
| Analyte | | NY-TOGS1.1.1-DW-CLASSGA-TAB1-1998-2004 | Location ID | IW-4 | MW-103 | MW-105 | MW-19 | MW-23 | RW-4 | RW-4 | RW-4 | RW-4 | RW-4 | RW-4 | RW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Sample Date | 22-Aug-16 | 16-Jul-21 | 16-Jul-21 | 22-Aug-16 | 22-Aug-16 | 29-Apr-16 | 12-Oct-16 | 26-Apr-17 | 26-Apr-17 | 4-Oct-17 | 24-Oct-18 | 24-Oct-18 |
| | | | Sample Type | N | N | N | N | N | N | N | N | FD | N | N | FD |
| | | | Depth | - | 9 - 19 ft | 12 - 22 ft | 9.5 - 19.5 ft | 30 - 35 ft | 5 - 20 ft | 5 - 20 ft | 5 - 20 ft | 5 - 20 ft | 5 - 20 ft | 5 - 20 ft | 5 - 20 ft |
| | | | Unit | | | | | | | | | | | | |
| VOCs | 1,1,1-Trichloroethane | **5** | µg/L | **5,700** | *< 20* | *< 500* | **42,000** | **11,000** | **13,000** | **11,000** | **11,000** | **11,000** | **12,000** | **18,000** | **18,000** |
| | 1,1,2,2-Tetrachloroethane | 5 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | 1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113) | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 1,1,2-Trichloroethane | 1 | µg/L | *< 3,000* | *< 20* | *< 500* | *< 3,000* | *< 600* | *< 3,000* | *< 1,500* | *< 3,000* | *< 3,000* | *< 1,500* | *< 1,500* | *< 1,500* |
| | 1,1-Dichloroethane | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 1,1-Dichloroethene | **5** | µg/L | *< 1,000* | *< 20* | *< 500* | **6,600** | **1,100** | **1,800** | **1,600** | **1,700** | **1,800** | **2,000** | **3,200** | **3,100** |
| | 1,2,3-Trichlorobenzene | 5 | µg/L | *< 5,000* | -- | -- | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 1,2,4-Trichlorobenzene | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 1,2-Dibromo-3-chloropropane | 0.04 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 1,2-Dichlorobenzene | 3 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 1,2-Dichloroethane | 0.6 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | 1,2-Dichloropropane | 1 | µg/L | *< 2,000* | *< 20* | *< 500* | *< 2,000* | *< 400* | *< 2,000* | *< 1,000* | *< 2,000* | *< 2,000* | *< 1,000* | *< 1,000* | *< 1,000* |
| | 1,3-Dichlorobenzene | 3 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 1,4-Dichlorobenzene | 3 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | 2-Butanone | 50 | µg/L | *< 10,000* | *< 200* | *< 5,000* | *< 10,000* | *< 2,000* | *< 10,000* | *< 5,000* | *< 10,000* | *< 10,000* | *< 5,000* | *< 5,000* | *< 5,000* |
| | 2-Hexanone | 50 | µg/L | *< 10,000* | *< 100* | *< 2,500* | *< 10,000* | *< 2,000* | *< 10,000* | *< 5,000* | *< 10,000* | *< 10,000* | *< 5,000* | *< 5,000* | *< 5,000* |
| | 4-Methyl-2-pentanone | NS | µg/L | *< 10,000* | *< 100* | *< 2,500* | *< 10,000* | *< 2,000* | *< 10,000* | *< 5,000* | *< 10,000* | *< 10,000* | *< 5,000* | *< 5,000* | *< 5,000* |
| | Acetone | 50 | µg/L | *< 10,000* | *< 200* | *< 5,000* | *< 10,000* | *< 2,000* | *< 10,000* | *< 5,000* | *< 10,000* | *< 10,000* | *< 5,000* | *< 5,000* | *< 5,000* |
| | Benzene | 1 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | Bromodichloromethane | 50 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | Bromoform | 50 | µg/L | *< 4,000* | *< 20* | *< 500* | *< 4,000* | *< 800* | *< 4,000* | *< 2,000* | *< 4,000* | *< 4,000* | *< 2,000* | *< 2,000* | *< 2,000* |
| | Bromomethane | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Carbon disulfide | 60 | µg/L | *< 10,000* | *< 20* | *< 500* | *< 10,000* | *< 2,000* | *< 10,000* | *< 5,000* | *< 10,000* | *< 10,000* | *< 5,000* | *< 5,000* | *< 5,000* |
| | Carbon tetrachloride | 5 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | Chlorobenzene | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Chlorobromomethane | 5 | µg/L | *< 5,000* | -- | -- | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Chloroethane | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Chloroform | 7 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Chloromethane | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | cis-1,2-Dichloroethene | **5** | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | **6,900** | **1,400 J** | **1,500 J** | **1,900 J** | **1,900 J** | **2,100 J** | **2,400 J** | **2,400 J** |
| | cis-1,3-Dichloropropene | 0.4 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | Cyclohexane | NS | µg/L | *< 20,000* | *< 20* | *< 500* | *< 20,000* | *< 4,000* | *< 20,000* | *< 10,000* | *< 20,000* | *< 20,000* | *< 10,000* | *< 10,000* | *< 10,000* |
| | Dibromochloromethane | 50 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | Dichlorodifluoromethane (Freon 12) | 5 | µg/L | *< 10,000* | *< 20* | *< 500* | *< 10,000* | *< 2,000* | *< 10,000* | *< 5,000* | *< 10,000* | *< 10,000* | *< 5,000* | *< 5,000* | *< 5,000* |
| | Ethylbenzene | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Ethylene dibromide | 0.0006 | µg/L | *< 4,000* | *< 20* | *< 500* | *< 4,000* | *< 800* | *< 4,000* | *< 2,000* | *< 4,000* | *< 4,000* | *< 2,000* | *< 2,000* | *< 2,000* |
| | Isopropylbenzene (Cumene) | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | m,p-Xylenes | **5** | µg/L | *< 5,000* | -- | -- | **1,700 J** | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Methyl acetate | NS | µg/L | *< 4,000* | *< 50* | *< 1,300* | *< 4,000* | *< 800* | *< 4,000* | *< 2,000* | *< 4,000* | *< 4,000* | *< 2,000* | *< 2,000* | *< 2,000* |
| | Methyl tert-butyl ether | 10 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Methylcyclohexane | NS | µg/L | *< 20,000* | *< 20* | *< 500* | *< 20,000* | *< 4,000* | *< 20,000* | *< 10,000* | *< 20,000* | *< 20,000* | *< 10,000* | *< 10,000* | *< 10,000* |
| | Methylene chloride | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | o-Xylene | 5 | µg/L | *< 5,000* | -- | -- | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Styrene | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Tetrachloroethene | **5** | µg/L | **2,700** | *< 20* | *< 500* | **760 J** | *< 200* | **800 J** | **810** | **760 J** | **800 J** | **970** | **1,700** | **1,500** |
| | Toluene | **5** | µg/L | **1,900 J** | *< 20* | *< 500* | **6,900** | *< 1,000* | **2,300 J** | **2,300 J** | **2,200 J** | **2,300 J** | **2,400 J** | **3,100** | **3,000** |
| | trans-1,2-Dichloroethene | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | trans-1,3-Dichloropropene | 0.4 | µg/L | *< 1,000* | *< 20* | *< 500* | *< 1,000* | *< 200* | *< 1,000* | *< 500* | *< 1,000* | *< 1,000* | *< 500* | *< 500* | *< 500* |
| | Trichloroethene | **5** | µg/L | **290,000** | **750** | **20,000** | **240,000** | **19,000** | **150,000** | **160,000** | **140,000** | **140,000** | **150,000** | **210,000** | **210,000** |
| | Trichlorofluoromethane (Freon 11) | 5 | µg/L | *< 5,000* | *< 20* | *< 500* | *< 5,000* | *< 1,000* | *< 5,000* | *< 2,500* | *< 5,000* | *< 5,000* | *< 2,500* | *< 2,500* | *< 2,500* |
| | Vinyl chloride | 2 | µg/L | *< 2,000* | *< 20* | *< 500* | *< 2,000* | *< 400* | *< 2,000* | *< 1,000* | *< 2,000* | *< 2,000* | *< 1,000* | *< 1,000* | *< 1,000* |
| | Xylene, Total | 5 | µg/L | -- | *< 40* | *< 1,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | TICs (Calculated), Total | NS | µg/L | -- | 0 | 0 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dissolved Gases | Ethane | NS | µg/L | *< 0.500* | *< 7.5* | *< 7.5* | 0.744 | *< 0.500* | -- | -- | -- | -- | -- | -- | -- |
| | Ethene | NS | µg/L | *< 0.500* | *< 7.0* | *< 7.0* | 0.958 | *< 0.500* | -- | -- | -- | -- | -- | -- | -- |
| | Methane | NS | µg/L | 14.3 | *< 4.0* | 58 | 33.3 | 11.6 | -- | -- | -- | -- | -- | -- | -- |
| PCBs | Aroclor 1016 | 0.09 | µg/L | -- | *< 0.50* | *< 0.50* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Aroclor 1221 | 0.09 | µg/L | -- | *< 0.50* | *< 0.50* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Aroclor 1232 | 0.09 | µg/L | -- | *< 0.50* | *< 0.50* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Aroclor 1242 | 0.09 | µg/L | -- | *< 0.50* | *< 0.50* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Aroclor 1248 | 0.09 | µg/L | -- | *< 0.50* | *< 0.50* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Aroclor 1254 | 0.09 | µg/L | -- | *< 0.50* | *< 0.50* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Aroclor 1260 | 0.09 | µg/L | -- | *< 0.50* | *< 0.50* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PFAS | Perfluorobutanoic acid (PFBA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.23 | 2.26 |
| | Perfluoropentanoic acid (PFPeA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.38 | 2.35 |
| | Perfluorohexanoic acid (PFHxA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.27 | 2.37 |
| | Perfluoroheptanoic acid (PFHpA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1.78 J | 1.83 J |
| | Perfluorooctanoic acid (PFOA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7.75 | 7.73 |
| | Perfluorononanoic acid (PFNA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.500 J | 0.538 J |
| | Perfluorodecanoic acid (PFDA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | Perfluoroundecanoic acid (PFUnDA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | Perfluorododecanoic acid (PFDoDA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | Perfluorotridecanoic acid (PFTrDA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | Perfluorotetradecanoic acid (PFTeDA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | Perfluorobutane sulfonic acid (PFBS) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1.25 J | 1.36 J |
| | Perfluorohexane sulfonic acid (PFHxS) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3.97 | 3.27 |
| | Perfluoroheptane sulfonic acid (PFHpS) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3.22 | 3.60 |
| | Perfluorooctane sulfonic acid (PFOS) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 39.0 | 41.0 |
| | Perfluorodecane sulfonic acid (PFDS) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | Perfluorooctane sulfonamide (FOSA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | 6:2 Fluorotelomer sulfonic acid (6:2 FTS) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 86.7 | 23.2 |
| | 8:2 Fluorotelomer sulfonic acid (8:2FTS) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | N-ethyl perfluorooctanesulfonamidoacetic acid (NEtPFOSAA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| | N-Methyl perfluorooctanesulfonamidoacetic acid (NMePFOSAA) | NS | ng/l | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *< 1.81* | *< 1.89* |
| 1,4-Dioxane | 1,4-Dioxane | NS | µg/L | -- | 0.35 | 2.8 | -- | -- | -- | -- | -- | -- | -- | 15,700 | 14,000 |
| Total Metals | Aluminum | NS | mg/L | -- | 4.0 | 0.84 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Antimony | 0.003 | mg/L | -- | *< 0.020* | *< 0.020* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Arsenic | 0.025 | mg/L | -- | *< 0.015* | *< 0.015* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Barium | 1 | mg/L | -- | 0.049 ^ | 0.031 ^ | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Beryllium | 0.003 | mg/L | -- | 0.00045 JB | 0.00039 JB | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Cadmium | 0.005 | mg/L | -- | *< 0.0020* | *< 0.0020* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Calcium | NS | mg/L | -- | 37.5 | 26.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Chromium | **0.05** | mg/L | -- | **0.062** | **0.30** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Cobalt | NS | mg/L | -- | 0.028 | 0.0034 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Copper | 0.2 | mg/L | -- | 0.18 | 0.015 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Iron | NS | mg/L | 9.62 | 1.3 | 0.087 | 5.17 | 8.75 | -- | -- | -- | -- | -- | -- | -- |
| | Lead | 0.025 | mg/L | -- | *< 0.010* | *< 0.010* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Magnesium | 35 | mg/L | -- | 10.8 | 4.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Manganese | NS | mg/L | 1.78 | 3.6 | 1.2 | 14.2 | 7.74 | -- | -- | -- | -- | -- | -- | -- |
| | Mercury | 0.0007 | mg/L | -- | *< 0.00020* | *< 0.00020* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Nickel | **0.1** | mg/L | -- | **0.19** | 0.012 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Potassium | NS | mg/L | -- | 3.8 | 3.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Selenium | 0.01 | mg/L | -- | *< 0.025* | *< 0.025* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Silver | 0.05 | mg/L | -- | *< 0.0060* | *< 0.0060* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Sodium | **20** | mg/L | -- | **77.0** | **27.0** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Thallium | 0.0005 | mg/L | -- | *< 0.020* | *< 0.020* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Vanadium | NS | mg/L | -- | 0.0021 J | *< 0.0050* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Zinc | 2 | mg/L | -- | 0.13 | 0.0032 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dissolved Metals | Iron | NS | mg/L | 7.8 | -- | -- | 5.1 | 7.1 | -- | -- | -- | -- | -- | -- | -- |
| | Manganese | NS | mg/L | 1.82 | -- | -- | 14.7 | 7.94 | -- | -- | -- | -- | -- | -- | -- |
| General Chemistry | Dissolved Organic Carbon | NS | mg/L | 50 | -- | -- | 12 | 1.4 | -- | -- | -- | -- | -- | -- | -- |
| | Organic Carbon, Total | NS | mg/L | -- | 1.2 | 1.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Sulfate | 250 | mg/L | 114 | 98.7 | 49.5 | 132 | 164 | -- | -- | -- | -- | -- | -- | -- |
| | Sulfide | NS | mg/L | *< 0.10* | *< 1.0* | *< 1.0* | *< 0.10* | *< 0.10* | -- | -- | -- | -- | -- | -- | -- |
| | Nitrate as N | 10 | mg/L | -- | 1.6 | 2.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Nitrite as N | 1 | mg/L | -- | 0.036 JTH | 0.057 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | Nitrite + Nitrate as N | NS | mg/L | 1.9 | -- | -- | *< 0.10* | *< 0.10* | -- | -- | -- | -- | -- | -- | -- |
| | Cyanide CN- | 0.2 | mg/L | -- | *< 0.010* | *< 0.010* | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Notes:**

< = Compound not detected at concentrationsabove the laboratory reporting detection limit.The laboratory reporting detection limit is shown.
J = The analyte was positively identified; associated numerical value is the approximate concentration of the analyte in the sample.
B = Possible Laboratory Contamination of the Sample
TH = QC Recovey is outside acceptable limits biased high
^ = Instrument related QC is outside acceptance limits
-- = Not analyzed
NS = No Standard
FD = Field Duplicate Sample
N = Normal Environmental Sample
ng/l = nanogram per liter
µg/L = micrograms per liter
mg/L = milligrams per liter
BOLD and Grey Cells indicate exceedance of NYS Standard

# FIGURES




**Legend**

- Creek
- Railroad
- Building Outline
- Robintech Compudyne Site Boundary
- Broadway Complex Site Boundary
- Town of Owego POTW Boundary

**NOTES:**

- Site features are digitized using IBM site figure and are approximate
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

N

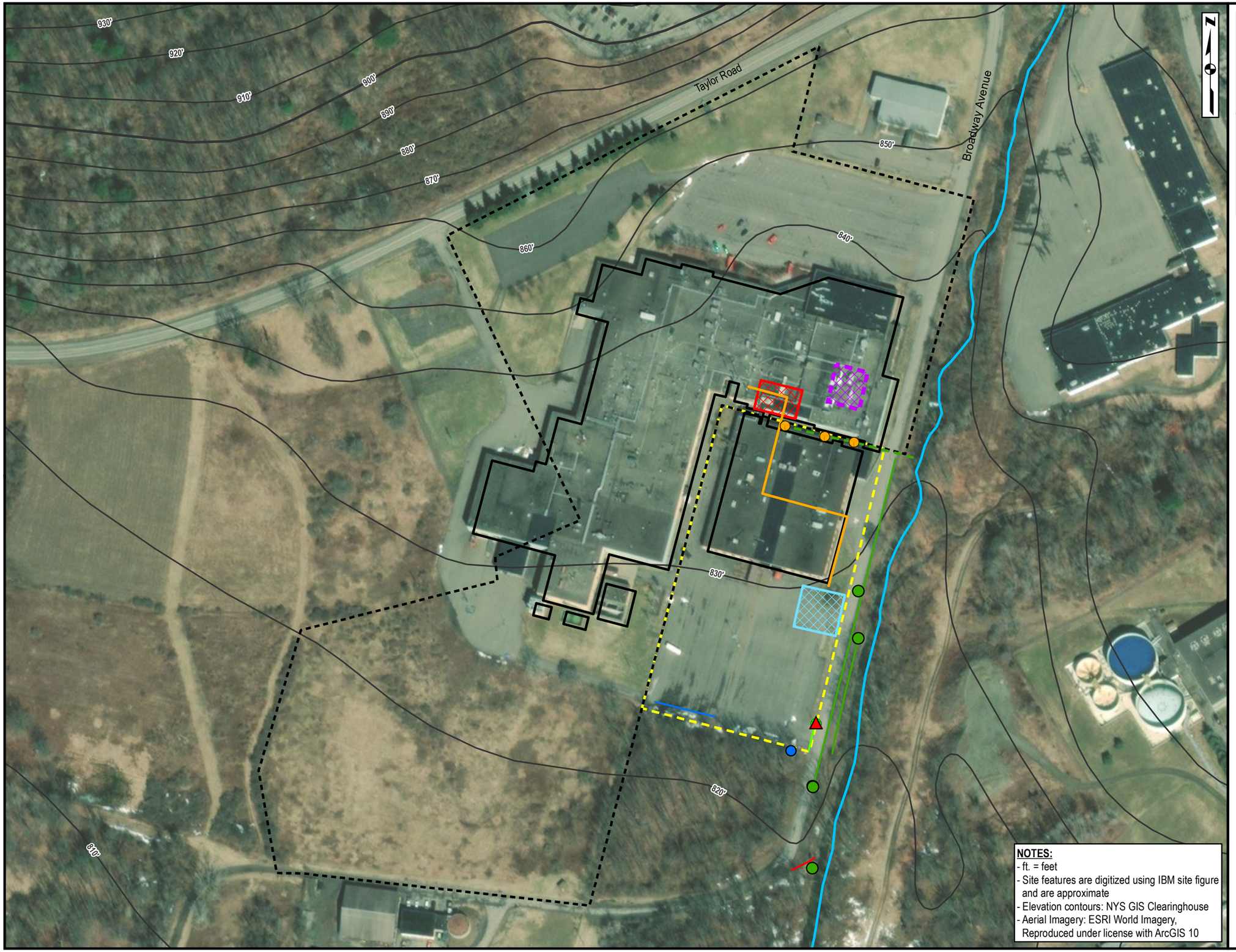
0 160 320 480 640

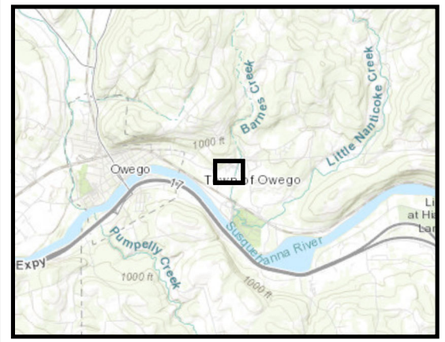
Feet

**Figure 1:** Site Location
Sanmina
Owego, NY

ERM

M:\US\Projects\US\Sanmina\Owego_NY\MXD\RIM_WorkPlan_2022\Figure1_SiteLocationMap_20220524.mxd - Orval Bolting - 2/6/2023




## Legend

**Utility Point**

- Electrical
- Sanitary Sewer
- Storm Drain
- Water
- Catch Basin

**Utility Line**

- Electric
- Sanitary Sewer
- Stormwater
- Water Main
- Storm Sewer
- Former Sanitary Sewer
- Approximate location of Former Septic Tank and Leach Area

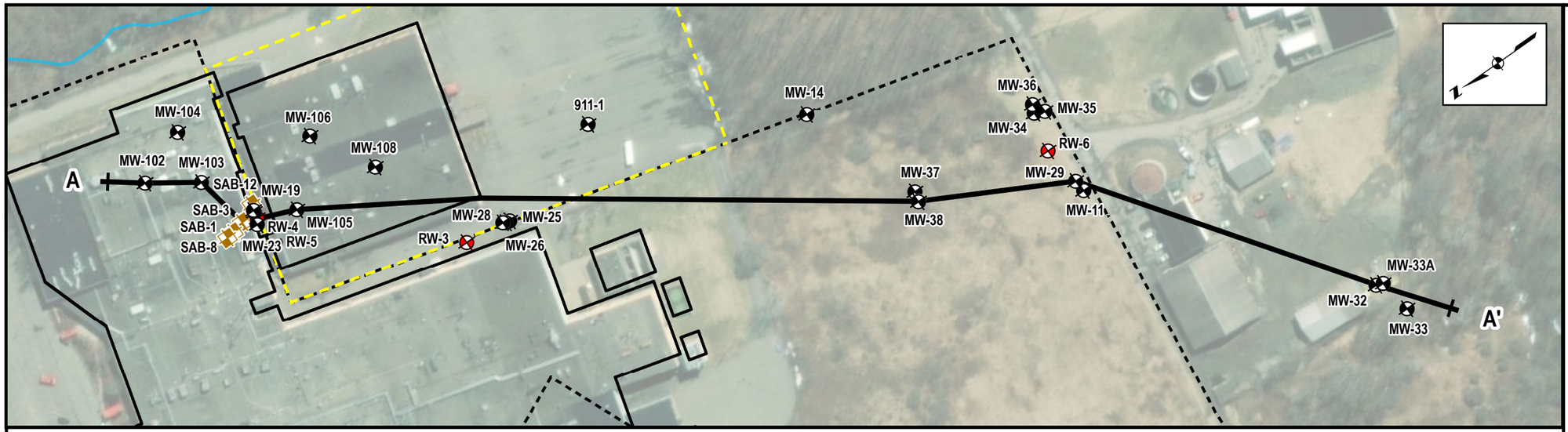
**Former Structure**

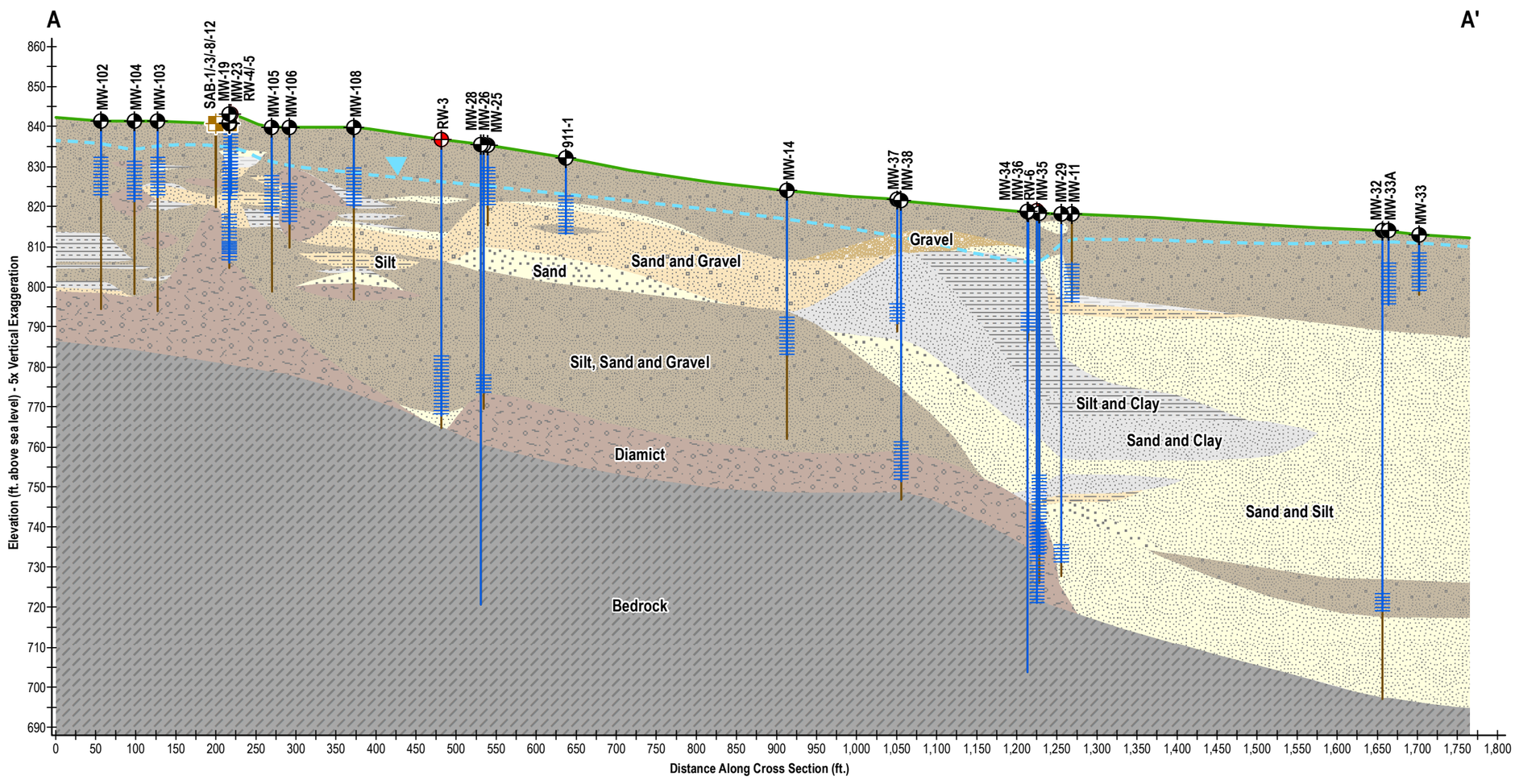
- Former Chemical Storage Area/ Photo Room
- Former IBM Septic Tank
- Creek
- Elevation Contour - 10 ft.
- Building Outline
- Robintech Compudyne Site
- Broadway Complex Site Boundary

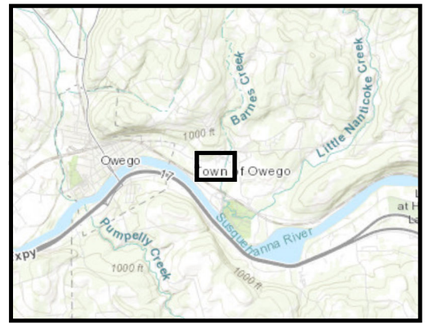
0 80 160 240 320
Feet

**Figure 2:** Site Layout, Topography and Utilities
Sanmina
Owego, NY

\\CPSBOC\FILE01\Data\Boston\team\DMM\Clients_Q_U\Sanmina\MXD\RM_WorkPlan_2022\Figure7_SiteLayout_Topo_20220516.mxd - Olivia.Botting - 5/25/2022




**Legend**

- Monitoring Well
- Recovery Well
- Soil Boring
- Surface Profile
- Monitoring Well Trace
- Soil Boring Trace
- Well Screen
- Water Table
- Creek
- Transect
- Building Outline
- Broadway Complex Site Boundary
- Robintech Compudyne Site Boundary

**Lithology**

- Clay
- Sand
- Sand and Clay
- Sand and Gravel
- Sand and Silt
- Silt
- Silt and Clay
- Silt, Sand and Gravel
- Gravel
- Diamict
- Bedrock

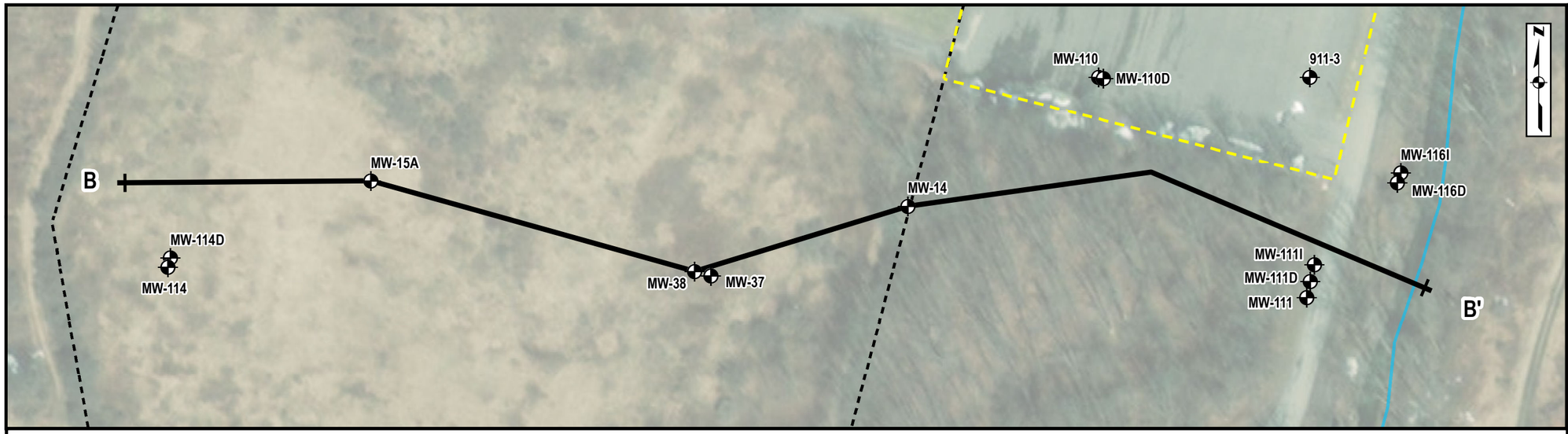
**NOTES:**

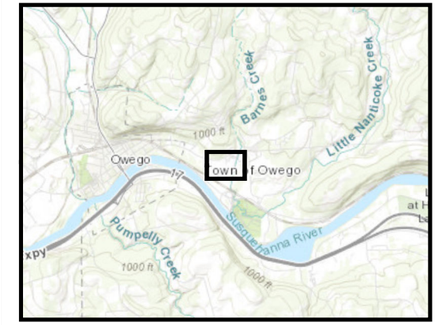
- ft. = feet
- Elevation is reported as feet above mean sea level.
- Geologic units estimated based on interpolation of borelog information.
- Water table interpreted from shallow monitoring wells groundwater elevations.
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

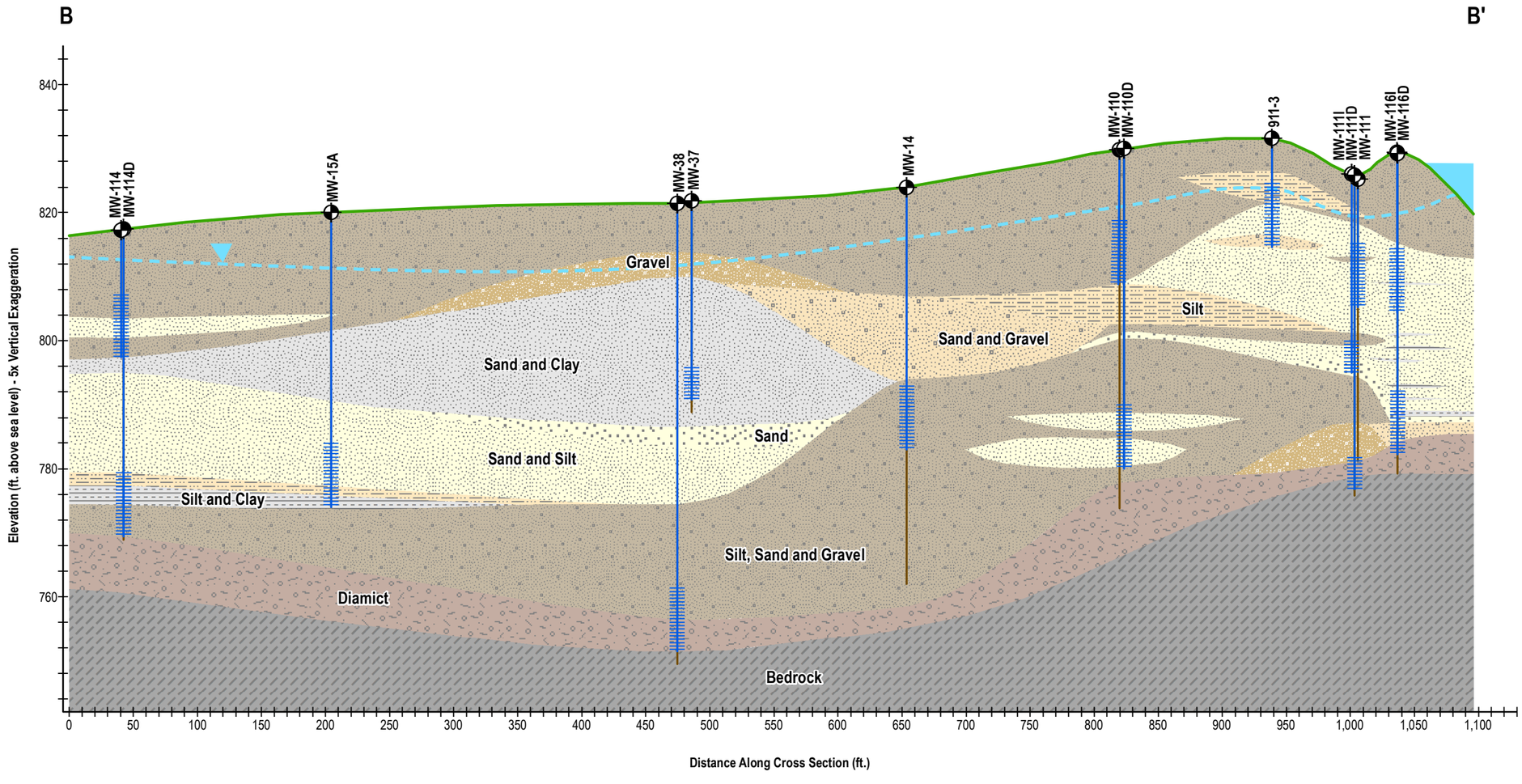
**FIGURE 3A**
Cross Section A-A'
Sanmina
Owego, NY

ERM

\\OPSBDCFILE01\Data\Boston\Team\DMMV\Clients_O_U\Sanmina\MXD\CrossSections\Figure_CrossSection_A-A'_20220519.mxd - Olivia.Botting - 6/1/2022




## Legend

- Monitoring Well
- Surface Profile
- Monitoring Well Trace
- Soil Boring Trace
- Well Screen
- Water Table
- Creek
- Surface Water
- Transect
- Broadway Complex Site Boundary
- Robintech Compudyne Site Boundary

### Lithology

- Sand
- Sand and Silt
- Sand and Clay
- Sand and Gravel
- Silt
- Silt and Clay
- Silt, Sand and Gravel
- Gravel
- Diamict
- Bedrock

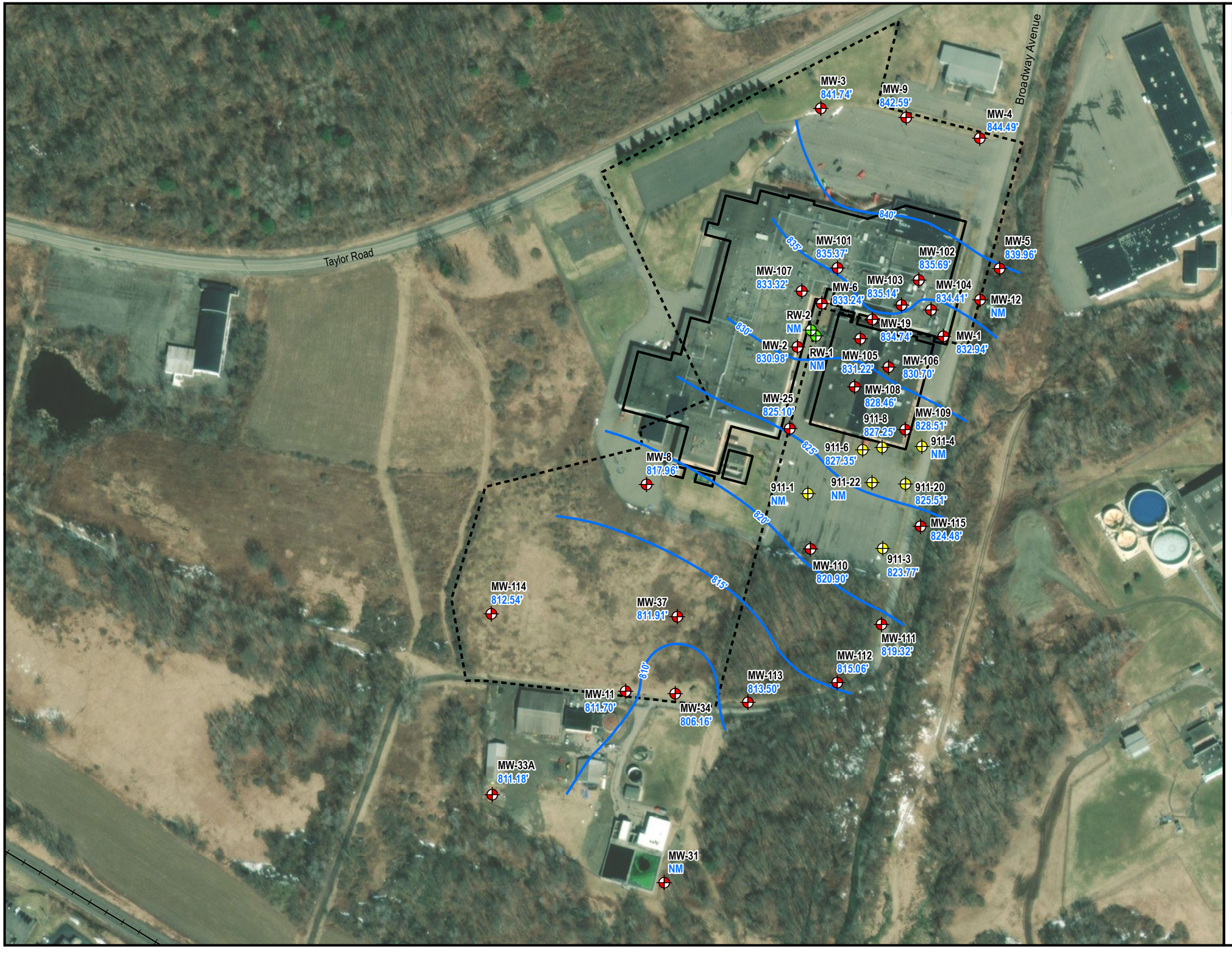
**NOTES:**

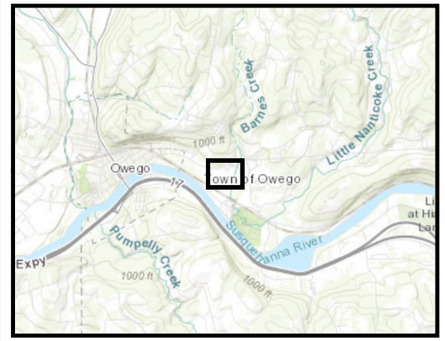
- ft. = feet
- Elevation is reported as feet above mean sea level.
- Geologic units estimated based on interpolation of borelog information.
- Water table interpreted from shallow monitoring wells groundwater elevations.
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

**FIGURE 3B**
Cross Section B-B'
Sanmina
Owego, NY

ERM

\\OPSBDCFILE01\Data\Boston\Team\DMMV\Clients_Q_U\Sanmina\MXD\CrossSections\Figure_CrossSection_B-B' -20220512.mxd - Olivia.Botting - 6/1/2022




## Legend

- Shallow Overburden Monitoring Well
- Shallow Overburden Recovery Well
- IBM Shallow Overburden Monitoring Well
- 839.83' Groundwater Elevation (ft.)
- Groundwater Elevation Contour (ft.)
- Railroad
- Building Outline
- Robintech Compudyne Site Boundary

**NOTES:**

- Groundwater elevation was measured on 3 May 2022.
- ft. = feet
- NM = Not measured
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

N

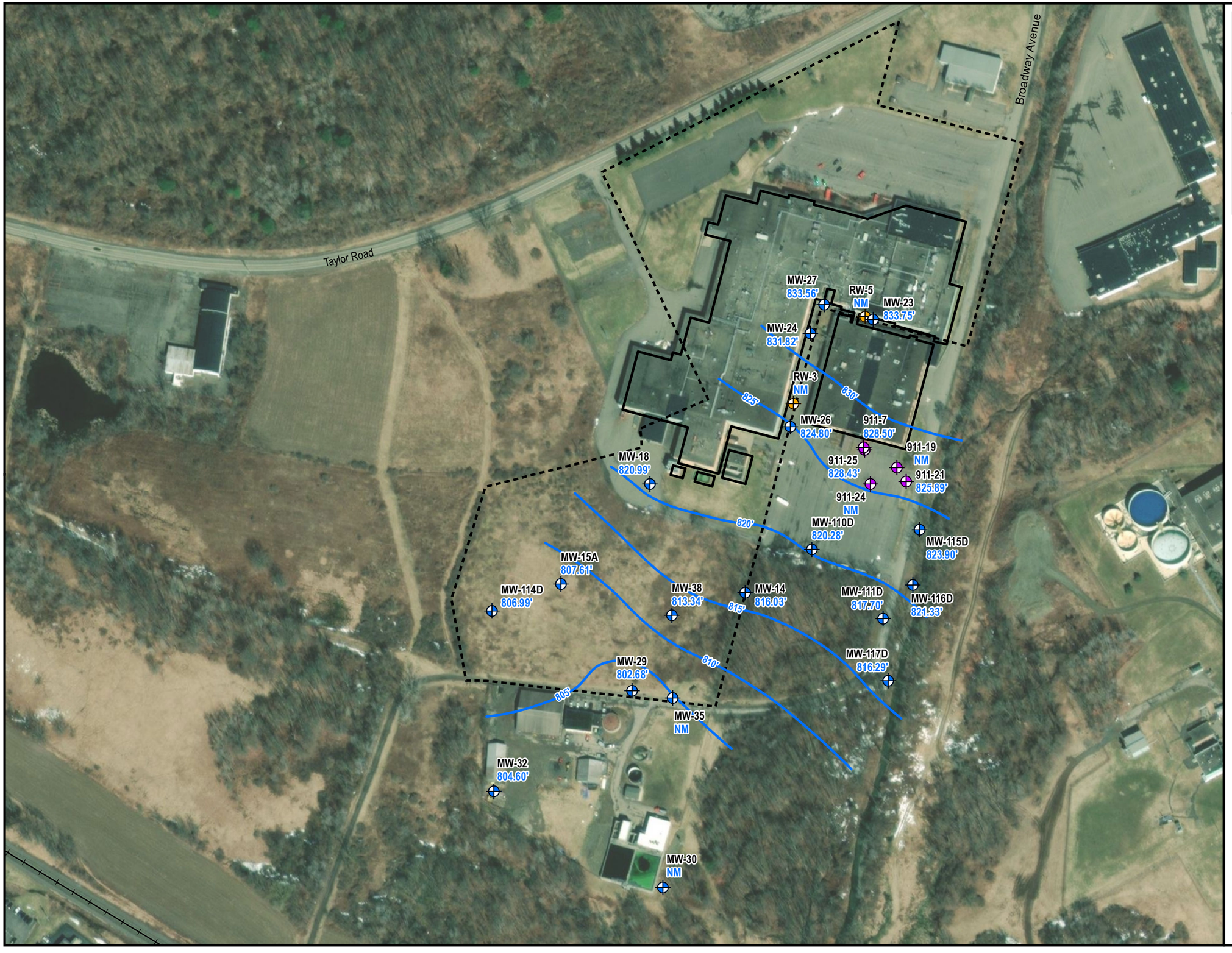
0 100 200 300 400

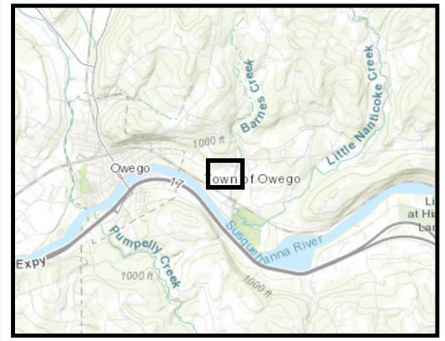
Feet

**Figure 4A:** Shallow Overburden Groundwater Contour Map
Sanmina
Owego, NY

ERM

\\opsboston\Data\Boston\Team\DMV\Clients_Q_U\Sanmina\MXD\GroundwaterContours\2022_May\Sanmina_May22_ShallowGroundwaterContours_20220601.mxd - Jonathan.Mills - 02/06/2022




- Deep Overburden Monitoring Well
- Deep Overburden Recovery Well
- IBM Deep Overburden Monitoring Well
- 839.83' Groundwater Elevation
- Groundwater Elevation Contour (ft.)
- Railroad
- Building Outline
- Robintech Compudyne Site Boundary

**NOTES:**

- Groundwater elevation was measured on 3 May 2022.
- ft. = feet
- NM = Not measured
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

N

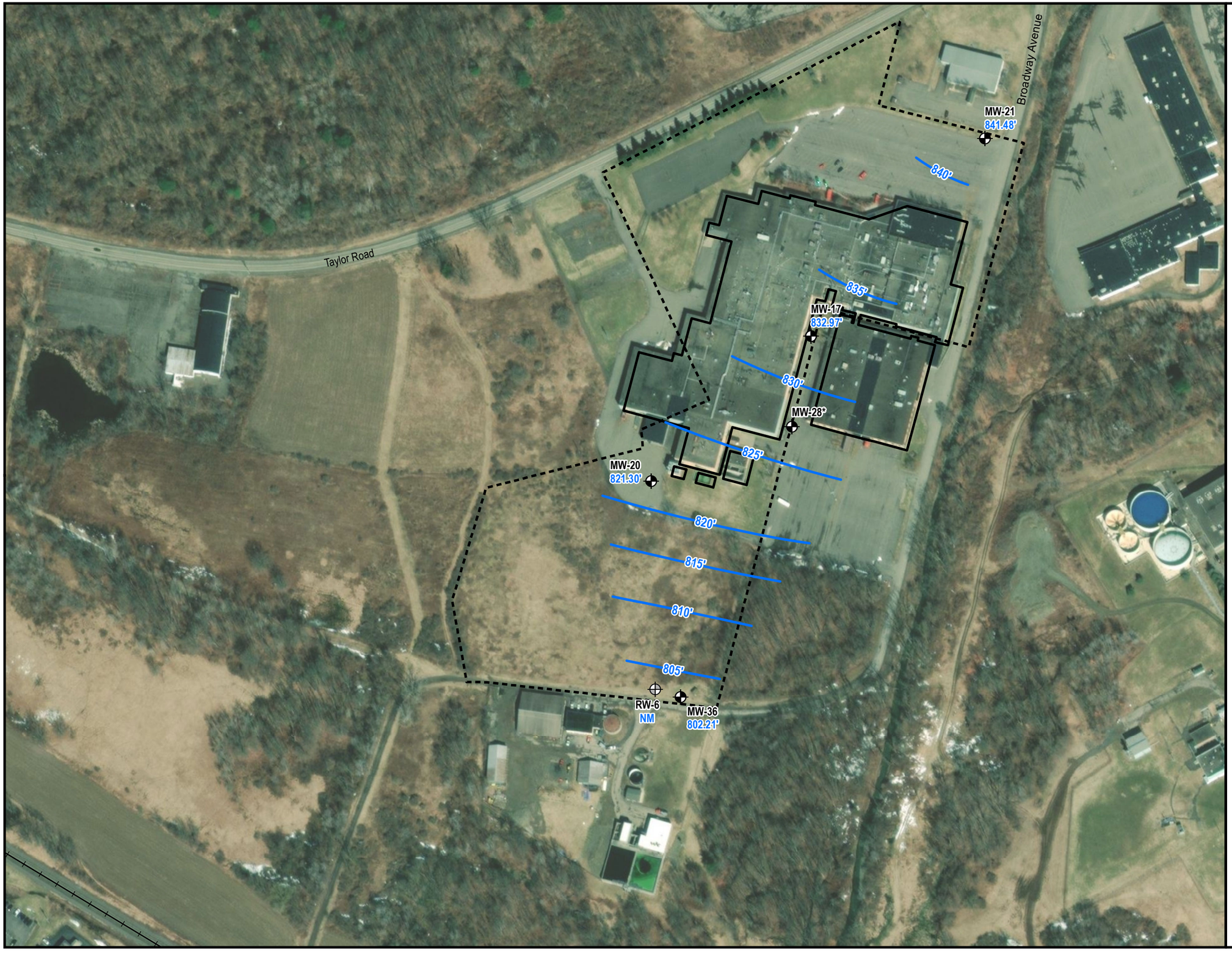
0 100 200 300 400

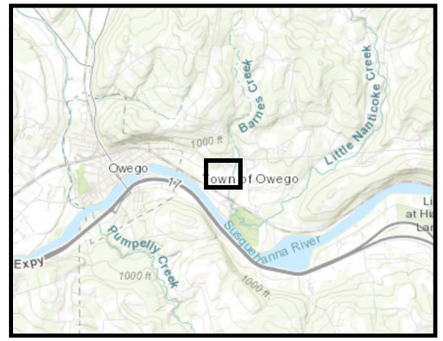
Feet

**Figure 4B:** Deep Overburden Groundwater Contour Map
Sanmina
Owego, NY

ERM

\topsbdcifer\Data\Boston\Team\DMW\Clients_Q_Z\Sanmina\MXD\GroundwaterContours\2022_MaySanmina_May22_DeepGroundwaterContours_20220601.mxd - Jonathan.Mills - 02/06/2022




## Legend

- Bedrock Monitoring Well
- Bedrock Recovery Well
- 839.83' Groundwater Elevation (ft.)
- Groundwater Elevation Contour (ft.)
- Railroad
- Building Outline
- Robintech Compudyne Site Boundary

**NOTES:**

- Groundwater elevation was measured on 3 May 2022.
- ft. = feet
- NM = Not measured
- * = Bedrock groundwater elevation measured in MW-28 during May 2022 event is not included in the contour figure. The well was redeveloped and has not recovered back to within the historic range.
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

N

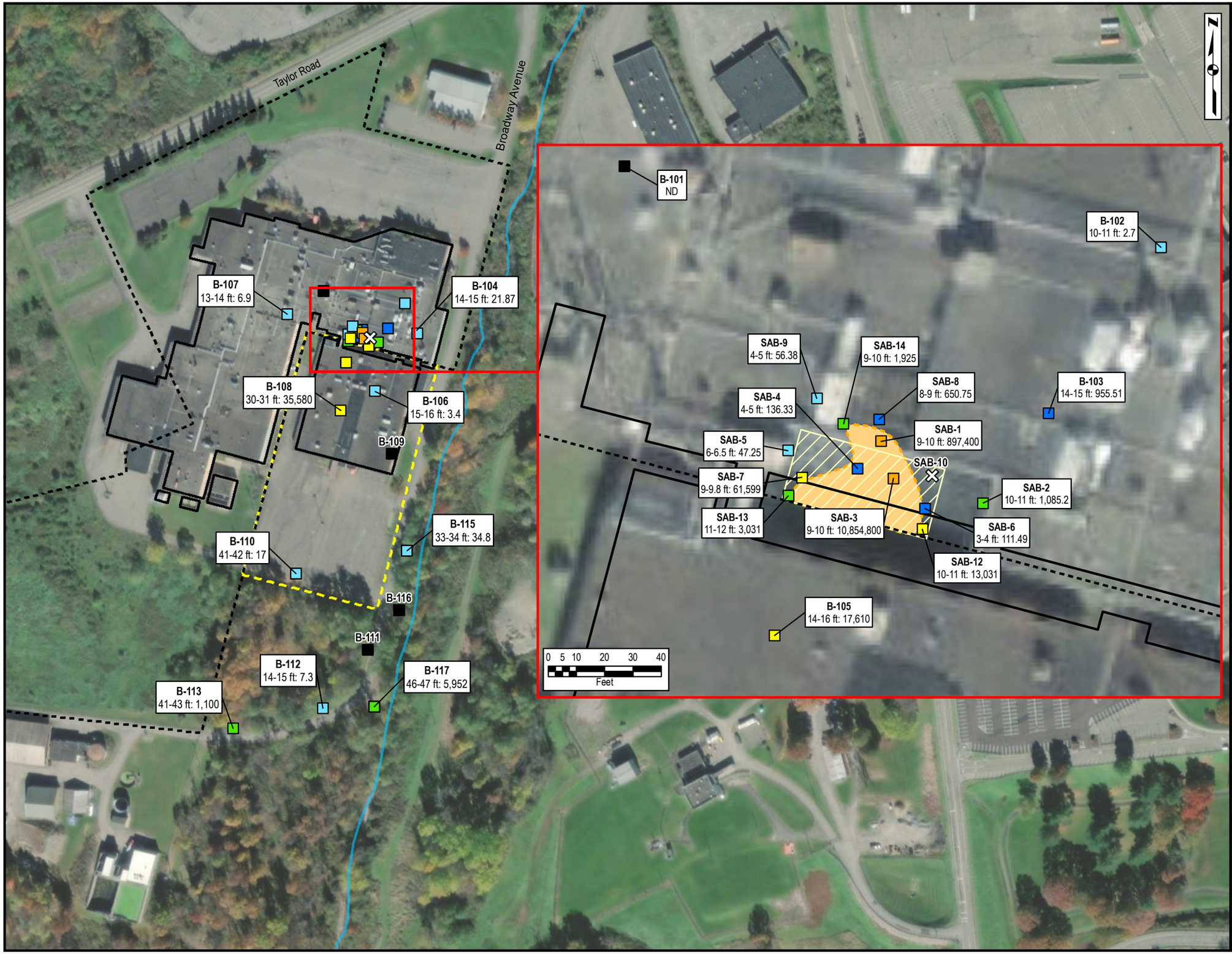
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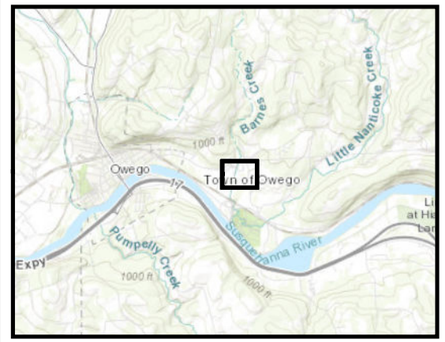
Feet

**Figure 4C:** Bedrock Groundwater Contour Map
Sanmina
Owego, NY

ERM

\\opsbdcifer\Data\Boston\Team\DMW\Clients_Q_U\Sanmina\MXD\GroundwaterContours_2022\May22_BedrockGroundwaterContours_20220801.mxd - Jonathan.Mills - 01/06/2022




## Legend

**tVOC Concentrations in Soil (µg/kg)**

- <100
- 100 - <1,000
- 1,000 - <10,000
- 10,000 - <100,000
- >100,000
- Non-Detect
- Not Sampled for VOCs
- Creek
- Building Outline
- Robintech Compudyne Site Boundary
- Broadway Complex Site Boundary
- Proposed Excavation Area
- Approximate Area of Highest tVOC Concentrations

**NOTES:**

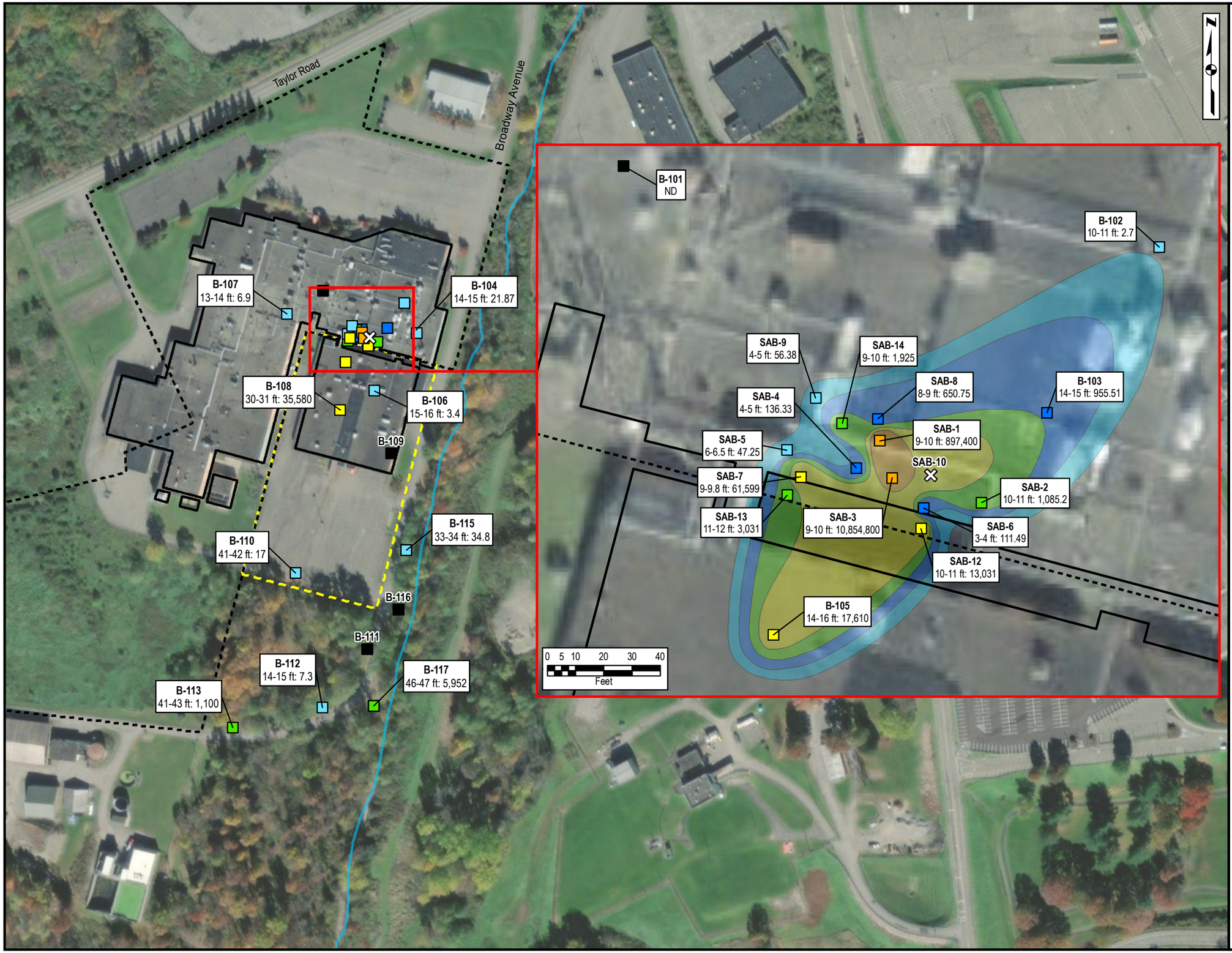
- tVOC = Total Volatile Organic Compounds
- ft = feet
- µg/kg = micrograms per kilogram
- Soil samples were collected in 2021 except for SAB soil samples which were collected in 2016/2017.
- Highest tVOC results are shown for soil samples collected from 0-16 feet below ground surface.
- Proposed excavation area approximately 1,355 square feet.
- The northern extent of the excavation are limited by a low bearing wall.
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

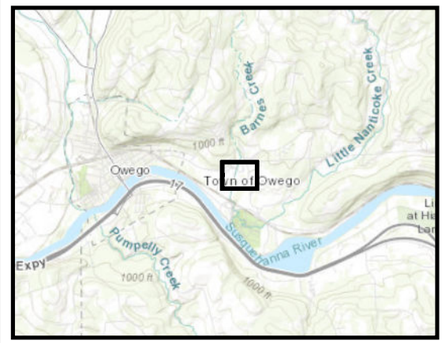
0 50 100 200 300 400
Feet

**Figure 5:** tVOC Distribution Under Photo Room
Sanmina
Owego, NY

ERM

M:\US\Projects\US\Sanmina\Owego_NY\MXD\RAP_WorkPlan_2022\Figure5A_SoilBorings_tVOC_Distribution_PhotoRoom_ExcavationExtent_20230516.mxd - Olivia.Botting - 5/19/2023




## Legend

**tVOC Concentrations in Soil (µg/kg)**

- <100
- 100 - <1,000
- 1,000 - <10,000
- 10,000 - <100,000
- >100,000
- Non-Detect
- Not Sampled for VOCs
- Creek
- Building Outline
- Robintech Compudyne Site Boundary
- Broadway Complex Site Boundary

**NOTES:**

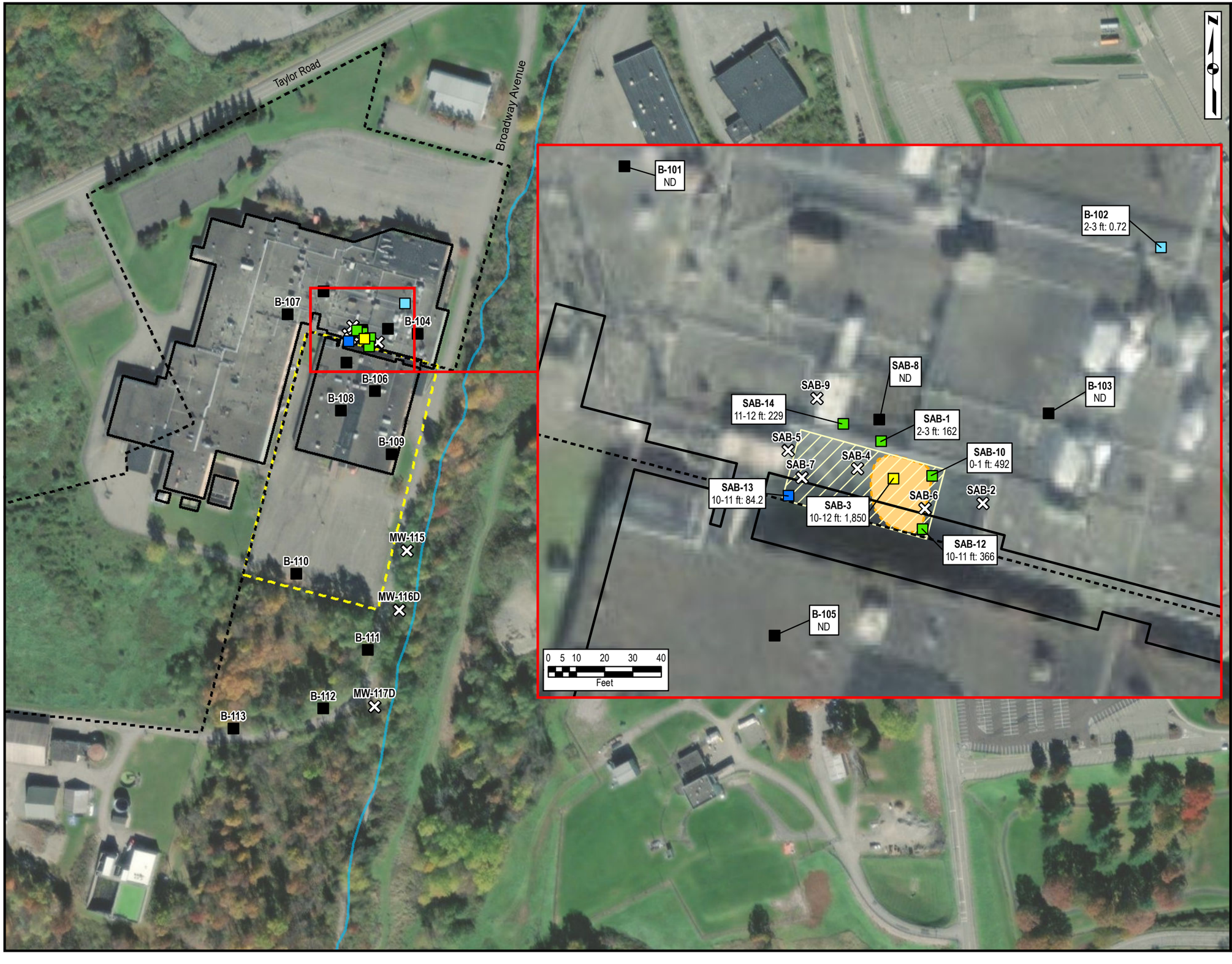
- tVOC = Total Volatile Organic Compounds
- ft = feet
- µg/kg = micrograms per kilogram
- Soil samples were collected in 2021 except for SAB soil samples which were collected in 2016/2017.
- Highest tVOC results are shown for soil samples collected from 0-16 feet below ground surface.
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

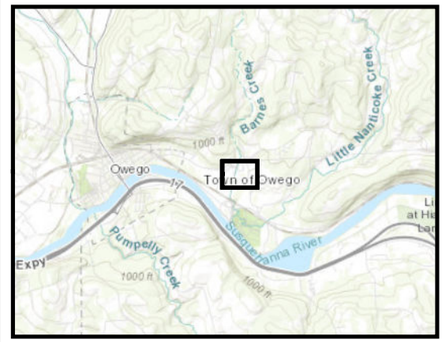
0 50 100 200 300 400
Feet

**Figure 5A:** tVOC Distribution Proximal to Photo Room
Sanmina
Owego, NY

ERM

M:\US\Projects\US-Sanmina\Owego_NY\MXD\RAP_WorkPlan_2022\Figure5B_SoilBorings_tVOC_Distribution_PhotoRoom_CVOCExtent_20230512.mxd - Olivia.Botting - 5/19/2023




## Legend

**Total PCB Concentrations (µg/kg)**

- <10
- 10 - <100
- 100 - <1,000
- >1,000
- Non-Detect
- Not Sampled
- Creek
- Building Outline
- Robintech Compudyne Site Boundary
- Broadway Complex Site Boundary
- Proposed Excavation Area
- Approximate Area of Highest tPCB Concentrations

**NOTES:**

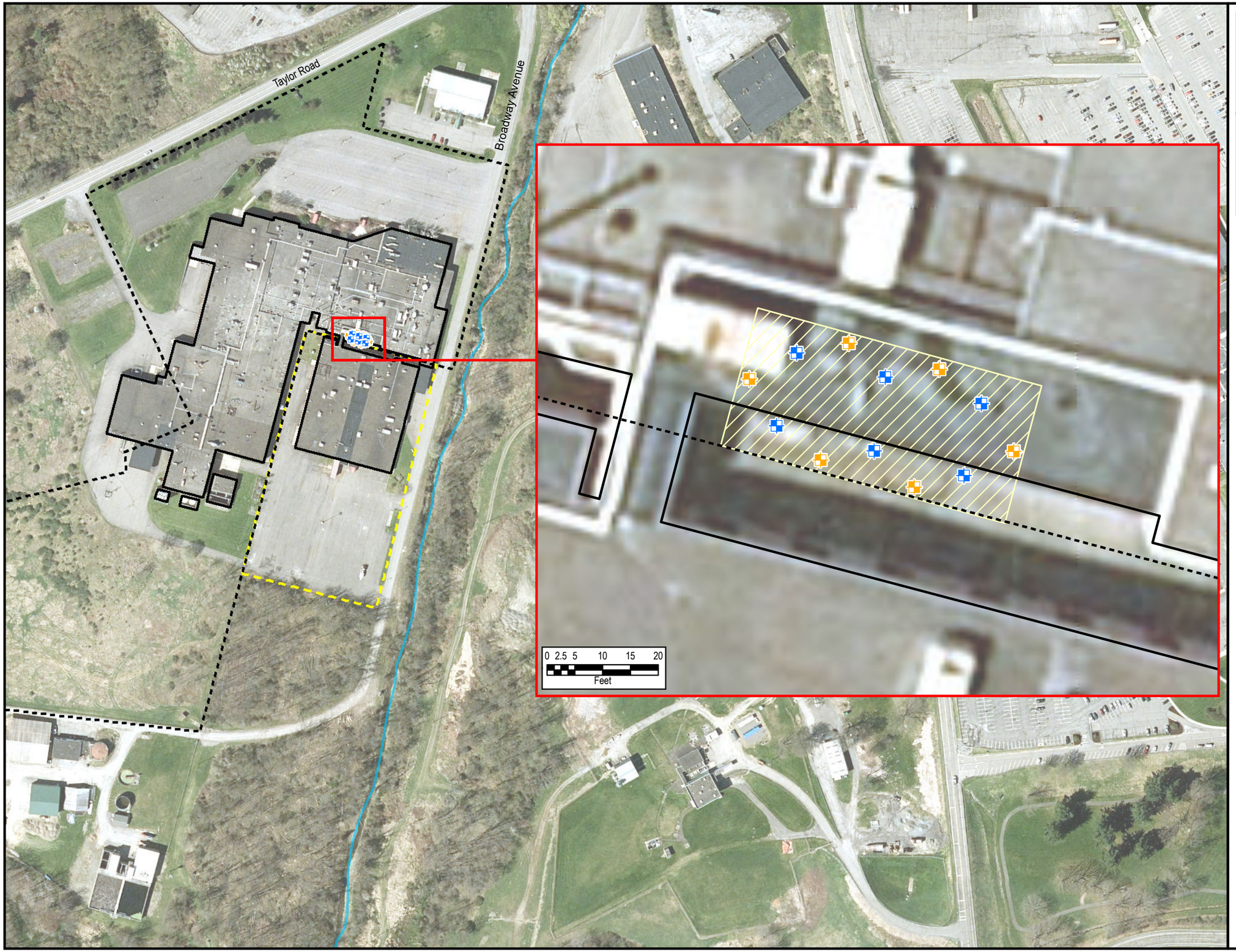
- tPCBs = Total polychlorinated biphenyls
- ft = feet
- µg/kg = micrograms per kilogram
- Soil samples were collected in 2021 except for SAB soil samples which were collected in 2016/2017.
- Highest tPCB results are shown for soil samples collected from 0-12 feet below ground surface.
- Proposed excavation area approximately 1,355 square feet.
- The northern extent of the excavation are limited by a low bearing wall.
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10

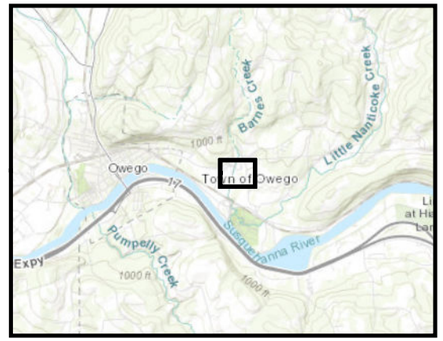
0 50 100 200 300 400
Feet

**Figure 6:** tPCB Distribution Proximal to Photo Room
Sanmina
Owego, NY

ERM

M:\US\Projects\US\sanmina\Owego_NY\MXD\RM_WorkPlan_2022\Figure6_SoilBorings_PCB_Distribution_PhotoRoom_20220913.mxd - Olivia.Botting - 5/19/2023




**Legend**

- Proposed Documentation Sample - Excavation Side Wall
- Proposed Documentation Sample of ZVI Mixed Soil
- Creek
- Building Outline
- Robintech Compudyne Site Boundary
- Broadway Complex Site Boundary
- Proposed Excavation Area

**NOTES:**

- Proposed excavation area approximately 1,355 square feet.
- The northern extent of the excavation are limited by a low bearing wall.
- Aerial Imagery: ESRI World Imagery, Reproduced under license with ArcGIS 10.8.2

N

0 50 100 200 300 400
Feet

**Figure 7:** Proposed Post Excavation Soil Sampling
Sanmina
Owego, NY

ERM

M:\US\Projects\S-U\Sanmina\Owego_NY\MXD\NM_Workplan_2022\Figure 7_ProposedPostExcavation_SoilSamples_PhotoFrom_20230519.mxd - Olivia.Bolting - 5/22/2024

# APPENDIX A IRM DESIGN DRAWINGS

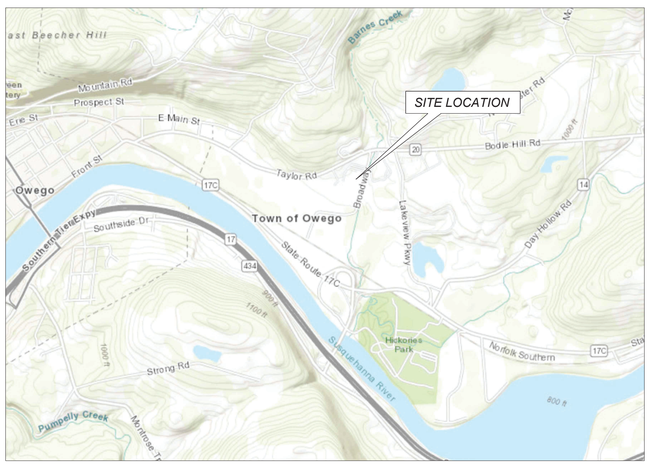
# INTERIM REMEDIAL MEASURES

## SANMINA - OWEGO FACILITY
## 1200 TAYLOR ROAD
## OWEGO, NY 13827

SITE VICINITY MAP




SITE LOCATION MAP




ISSUED FOR BID
MARCH 2024

PREPARED FOR
SANMINA CORPORATION

DRAWING INDEX


| | |
|---|---|
| 00 | COVER SHEET |
| 01 | NOTES AND LEGEND |
| 02 | EXISTING CONDITIONS PLAN |
| 03 | TRAFFIC PLAN |
| 04 | PROPOSED DEMOLITION, EXCAVATION, ZVI, ISS, AND RESTORATION PLAN |
| 05 | EXISTING CONDITIONS, DEMOLITION, AND EXCAVATION PROFILES |
| 06 | ZVI, ISS AND RESTORATION PROFILES |
| 07 | CONSTRUCTION DETAILS |


PREPARED BY


ERM

ERM Consulting and Engineering, Inc.

Syracuse Office 315-445-2534

STEPHEN ANTHONY MIRABELLO, P.E.
NEW YORK PROFESSIONAL ENGINEER LICENSE NO. PE
LICENSE # 089550



\\US8DCFS02\data\Philadelphia\Team\DMMV\CAD\Drawings\Sanmina Corporation\0589878-Concept Design Owego, NY\Cover Sheet.dwg

**GENERAL NOTES:**

1. DEFINITIONS
   A. WHEREVER THE FOLLOWING TERMS ARE USED IN THESE DRAWINGS, IT IS UNDERSTOOD THAT THEY REPRESENT THE FOLLOWING:
      i. PROPERTY OWNER: SANMINA CORPORATION
      ii. OWNER: SANMINA CORPORATION
      iii. OWNER'S REPRESENTATIVE: ERM CONSULTING AND ENGINEERING, INC.
      iv. ENGINEER: ERM CONSULTING AND ENGINEERING, INC.
      v. SITE CONTRACTOR: THE INDIVIDUAL, FIRM, PARTNERSHIP, AND ANY OF ITS SUBCONTRACTORS THAT IS CONTRACTED BY OWNER'S REPRESENTATIVE TO PERFORM ON-SITE WORK.
2. DRAWING BASEMAP
   A. SEE SHEET 02-EXISTING CONDITIONS FOR INFORMATION ON CREATION OF THE BASE MAP AND THE COORDINATE SYSTEM.
3. SUB-SURFACE CLEARANCE
   A. ALL WORK ON-SITE MUST FOLLOW ERM'S SUB-SURFACE CLEARANCE (SSC) POLICY.
   B. AN ERM SSC EXPERIENCED PERSON (EP) MUST BE ON-SITE TO DIRECTLY MANAGE AND OVERSEE ALL SUB-SURFACE CLEARANCE ACTIVITIES. SUB-SURFACE ACTIVITIES ARE DEFINED AS INCLUDING BUT NOT LIMITED TO: EXCAVATION, TRENCHING, DRILLING, SHOVELING, INSTALLING STAKES, OR ANY OTHER MEANS OF BREAKING THE EXISTING GROUND OR FLOOR SURFACE.
   C. MECHANICAL DIGGING OF ANY KIND IS PROHIBITED WITHIN TEN FEET, HORIZONTALLY OR VERTICALLY, OF ANY KNOWN UTILITY.
      i. A SPOTTER SUPPLIED BY THE CONTRACTOR, INDEPENDENT OF THE SSC EP, SHALL BE USED DURING ALL MECHANICAL DIGGING DURING THE TRENCHING FOR THE CONVEYANCE PIPE. THE SPOTTER SHALL STOP THE OPERATOR SHOULD HE/SHE OBSERVE ANY UTILITY/STRUCTURE OR POTENTIAL FOR UTILITY/STRUCTURE SUCH AS CHANGE OF SUBSURFACE MATERIAL FROM NATURAL MATERIAL TO DISTURBED OR PIPE BEDDING MATERIAL. SHOULD ANY INDICATIONS OF SUBSURFACE UTILITIES/STRUCTURE BE IDENTIFIED, MECHANICAL DIGGING SHALL STOP AND SOFT DIG SHALL BE USED IN AN ATTEMPT TO LOCATE THE UTILITY/STRUCTURE.
   D. THE SSC EP SHALL HAVE ULTIMATE AUTHORITY IN ALL SUBSURFACE ACTIVITIES.

**CONSTRUCTION SEQUENCE:**

1. CONTACT NEW YORK ONE CALL AND REQUEST MARK OUT.
2. PERFORM PRIVATE UTILITY LOCATE.
3. INSTALL BMPS AND STOCK PILE AREAS AS NECESSARY.
4. DEMOLISH EXTERIOR AND INTERIOR WALLS AND ABANDON WELLS.
5. CUT AND CAP EXISTING SANITARY SEWER.
6. EXCAVATE SHALLOW SOIL AND CONCRETE WITHIN THE MIXING ZONE.
7. CONDUCT ZVI MIXING IN THE MIXING ZONE.
8. CONDUCT ISS MIXING IN THE MIXING ZONE.
9. REINSTALL SANITARY SEWER WITHIN MIXING ZONE.
10. INSTALL BACKFILL AND FINAL GRADING TO THE MIX AREA WITH BENEFICIAL REUSE MATERIAL OR DGA.
11. REMOVE AND STABILIZE AREAS OF TEMPORARY BMPS.
12. DEMOBILIZATION.

## LEGEND

- EXISTING WATER SOURCE
- EXISTING SOIL BORINGS
- EXISTING SSDS SUCTION POINT
- EXISTING WELL
- EXISTING COLUMN
- <100 µg/kg TOTAL VOC CONCENTRATIONS IN SOIL CONTOUR
- 100 -<1,000 µg/kg TOTAL VOC CONCENTRATIONS IN SOIL CONTOUR
- 1,000 -<10,000 µg/kg TOTAL VOC CONCENTRATIONS IN SOIL CONTOUR
- 10,000 -<100,000 µg/kg TOTAL VOC CONCENTRATIONS IN SOIL CONTOUR
- >100,000 µg/kg TOTAL VOC CONCENTRATIONS IN SOIL CONTOUR
- EXISTING TRENCH
- SS — EXISTING SANITARY LINE (APPROXIMATE LOCATION)
- FM — EXISTING FORCE MAIN LINE (APPROXIMATE LOCATION)
- SW — EXISTING STORM LINE (APPROXIMATE LOCATION)
- EXISTING SHALLOW GROUND WATER CONTOURS (OCT 2020)
- SSDS — EXISTING SUB SLAB DEPRESSURIZATION PIPING
- X — PROPOSED TEMPORARY FENCE FOR ZVI ACTIVITIES
- PROPOSED WALLS TO BE DEMOLISHED
- EXISTING AREA WITH NO BUILDING ROOF (OPEN TO AIR)
- EXISTING CONCRETE VAULT
- PROPOSED EXCAVATION BOUNDARY
- PROPOSED CONCRETE VAULT TO BE DEMOLISHED
- PROPOSED ZVI
- PROPOSED ISS
- PROPOSED BACKFILL
- PROPOSED ABANDONED WELL
- 644.55 — TOTAL VOC (µg/kg)
- <39.4 — TOTAL PCB (µg/kg)
- PROPOSED VEHICLE ROUTE (OPTION 1)
- PROPOSEDVEHICLE ROUTE (OPTION 2)
- PROPOSED VEHICLE INGRESS
- PROPOSED VEHICLE EGRESS

## ABBREVIATIONS

BMPS- BEST MANAGEMENT PRACTICES
DGA- DENSE GRADE AGGREGATE
ERM - ENVIRONMENTAL RESOURCES MANAGEMENT INC.
FM- FORCEMAIN
ISS- IN SITU STABILIZATION
PCB- POLYCHLORINATED BIPHENYL
SAB- SOIL BORING
SS- SANITARY SEWER
SSC - SUB SURFACE CLEARANCE
SSDS - SUB SLAB DEPRESSURIZATION SYSTEM
SW- STORM LINE (STORM WATER)
VOC - VOLATILE ORGANIC COMPOUNDS
ZVI- ZERO VALENT IRON

DISCLAIMER: ERM DEVELOPED THESE DRAWINGS IN ACCORDANCE WITH SANMINA CORPORATION REQUEST AND WITH RELIANCE ON INFORMATION PROVIDED BY OR ON BEHALF OF SANMINA CORPORATION AND/OR OTHER PERSONS. THE INFORMATION CONTAINED IN THE DRAWINGS IS TRUE AND CORRECT TO THE BEST OF ERM'S KNOWLEDGE AD OF THE DATE OF THIS RFP, HOWEVER ERM HAS NOT ASSESSED ALL CONDITIONS AND CIRCUMSTANCES THAT IMPACT OR COULD IMPACT THE SITE AND/OR THE PROJECT. AS SUCH, NO REPRESENTATION OR WARRANTY IS GIVEN BY ERM AS TO THE ACCURACY OR COMPLETENESS OF THE DRAWING OR AS TO CONDITIONS OR OBJECTS, OR ABSENCE THEREOF, ON THE SITE THAT WERE NOT READILY APPARENT TO ERM AT THE TIME OF ITS SITE VISIT.

BY SUBMITTING A BID TO THIS RFP, YOU AGREE AND ACCEPT THE TERMS OF THE DISCLAIMER SET FORTH ABOVE.

IT IS VIOLATION OF NEW YORK EDUCATION LAW ARTICLE 145, SECTION 7209 FOR ANY PERSON TO ALTER ANY DOCUMENT THAT BEARS THE SEAL OF A PROFESSIONAL ENGINEER, UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF THE LICENSED PROFESSIONAL ENGINEER.

STATE OF NEW YORK · STEPHEN ANTHONY MARSHALL · 089550 · LICENSED PROFESSIONAL ENGINEER

| Rev. | Date | Description | By | Chk |
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ERM

NOTES AND LEGEND

DISCIPLINE NO.

SANMINA - OWEGO FACILITY
FORMER CHEMICAL STORAGE AREA - REMEDIAL EVALUATION
1200 TAYLOR ROAD
OWEGO, NY 13827

REV. 0

| SCALE | DESIGNED BY | PROJECT NUMBER | SHEET NO. |
|---|---|---|---|
| AS SHOWN | M. LUBBERS | | 01 |
| DATE DRAWN | DRAWN BY | | |
| MARCH 2024 | C. MORGAN | | |

ERM Consulting & Engineering, Inc.

FILE PATH: \\USBOCFS02\data\Philadelphia\Team\DMMV\CAD\Drawings\Sanmina Corporation\0589878-Concept Design, Owego, NY\RIM Work Plan Drawing Set 03.14.24 Design.dwg NOTES AND LEGEND, PRINTED ON 3/14/2024 BY James Hockel

ESTIMATED LOCATION OF EXISTING WATER SOURCE (SEE NOTE4)

PROPOSED EXCAVATION AND MIXING ZONE

EXISTING EXTRACTION WELLS IN CONCRETE VAULT

ESTIMATED LOCATION OF EXISTING WATER SOURCE (SEE NOTE 4)

ESTIMATED LOCATION OF EXISTING WATER METER (SEE NOTE 4)

0501

0502

0+00

0+50

0+80

835'

834'

833'

832'

831'

830'

B-102

B-103

B-105

SAB-8

SAB-9

SAB-14

RW-5

RW-4

MW-19

MW-23

Catch Basin Rim Elevation 839.24

Catch Basin Rim Elevation 839.10

Catch Basin Rim Elevation 839.03

0 10 20

SCALE (IN FEET)

GENERAL NOTES:

1. THIS DRAWING IS REFERENCED HORIZONTALLY TO THE NORTH AMERICAN DATUM OF 1983, PROJECTED ON THE NEW YORK STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE), AND VERTICALLY TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. THE PLAN VIEW SOIL BORING RESULTS ONLY REPRESENTS TOTAL VOC RESULTS, REFER TO THE WORK PLAN FOR PCB RESULTS.
3. UTILITY LOCATIONS SHOWN ARE APPROXIMATE.
4. POTABLE WATER IS AVAILABLE AT AN AVERAGE OF 85 PSI AND MEASURED FLOW RATE OF APPROXIMATELY 21.3 GPM.

REFERENCE DRAWINGS:

1. "OWEGO MASTER PLANT LAYOUT 2013" SENT TO ERM FROM SANMINA ON MARCH 26, 2022.
2. "OWEGO MASTER PLANT LAYOUT 2013" ROTATED TO ALIGN WITH THE SURVEY POINTS TAKEN BY THEW ASSOCIATES ON MAY 3, 2022.

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089550
LICENSED PROFESSIONAL ENGINEER

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EXISTING CONDITIONS PLAN

DISCIPLINE NO.

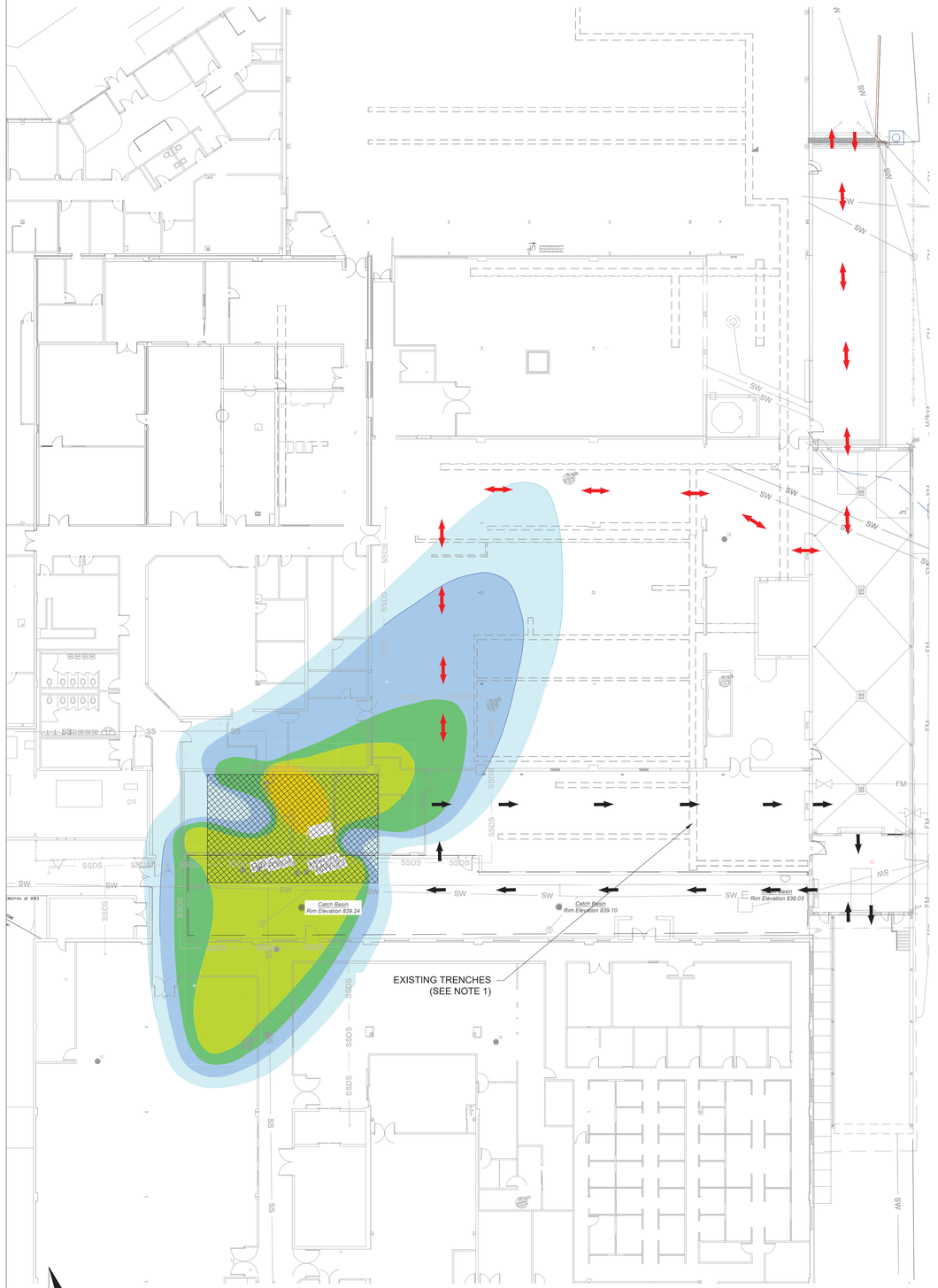
SANMINA - OWEGO FACILITY
FORMER CHEMICAL STORAGE AREA - REMEDIAL EVALUATION
1200 TAYLOR ROAD
OWEGO, NY 13827

REV. 0

| SCALE | DESIGNED BY | PROJECT NUMBER | SHEET NO. |
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| DATE DRAWN | DRAWN BY | | |
| MARCH 2024 | C. MORGAN | | |

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NOTES:

1. STONE OR ROAD PLATES SHALL BE INSTALLED IN EXISTING INTERIOR BUILDING TRENCHES WHERE TRUCKS NEED TO TRAVEL.




0
100
200
SCALE (IN FEET)

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| Rev. | Date | Description | By | Chk |
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TRAFFIC CONTROL PLAN

DISCIPLINE NO.:

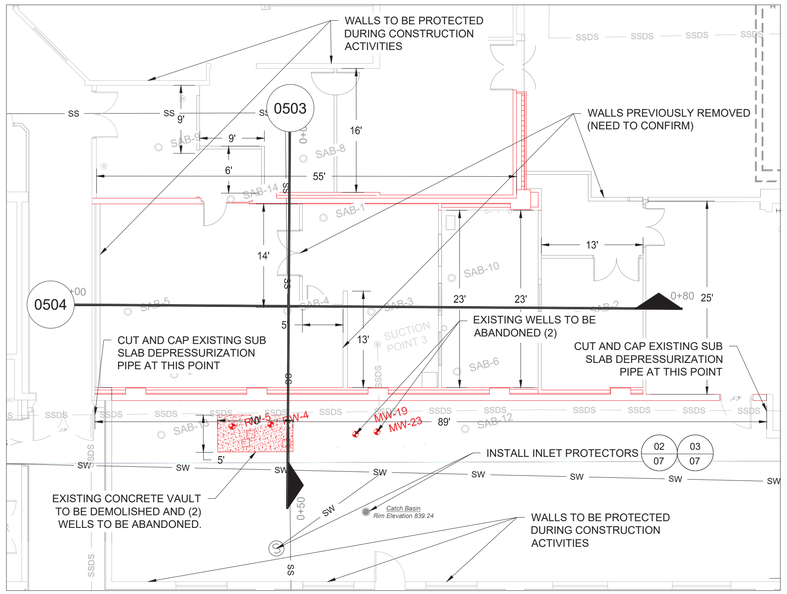
SANMINA - OWEGO FACILITY
FORMER CHEMICAL STORAGE AREA - REMEDIAL EVALUATION
1200 TAYLOR ROAD
OWEGO, NY 13827

REV.: 0

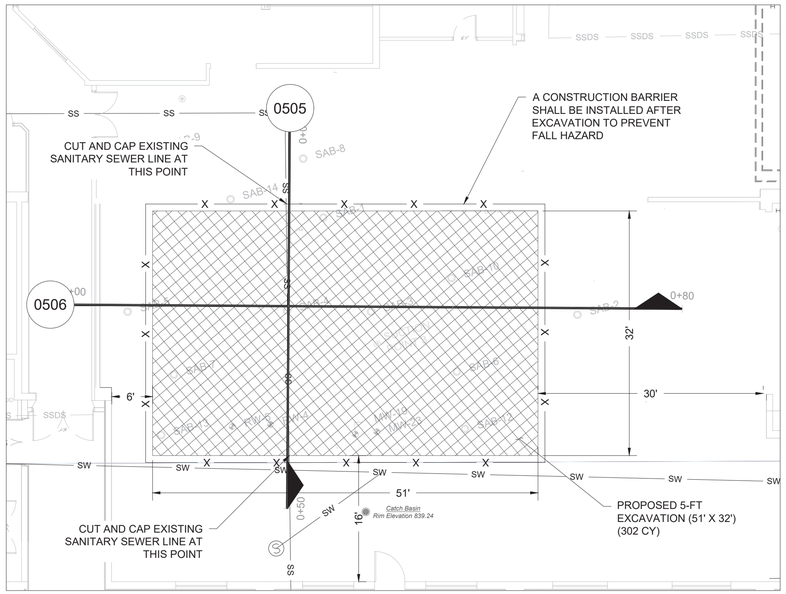
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| DATE DRAWN | DRAWN BY | | |
| MARCH 2024 | C. MORGAN | | |

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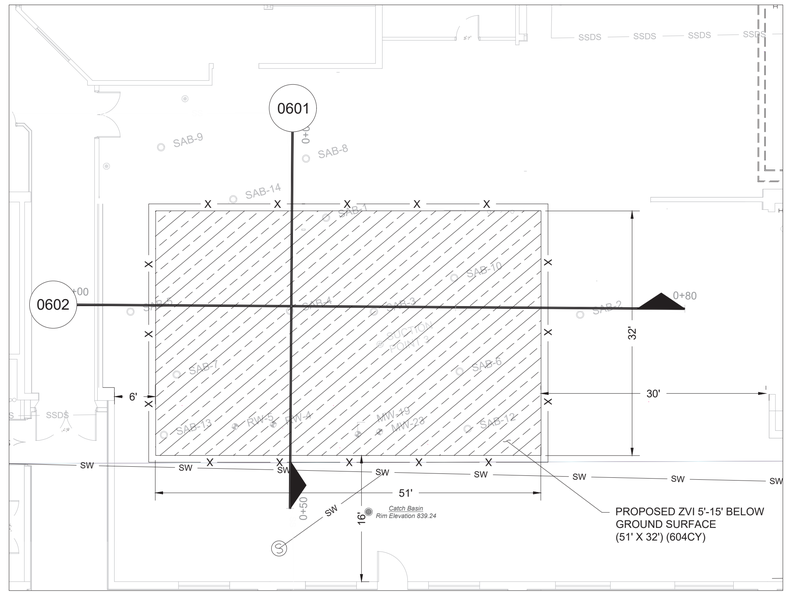
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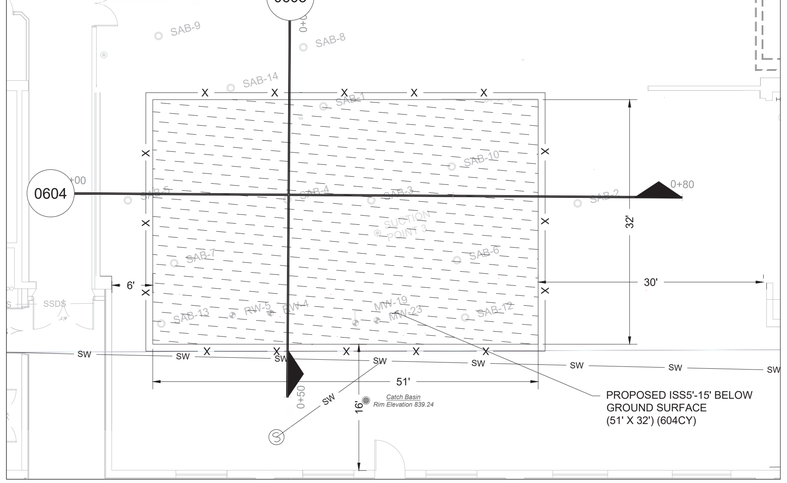

INSET 01 DEMOLITION PLAN



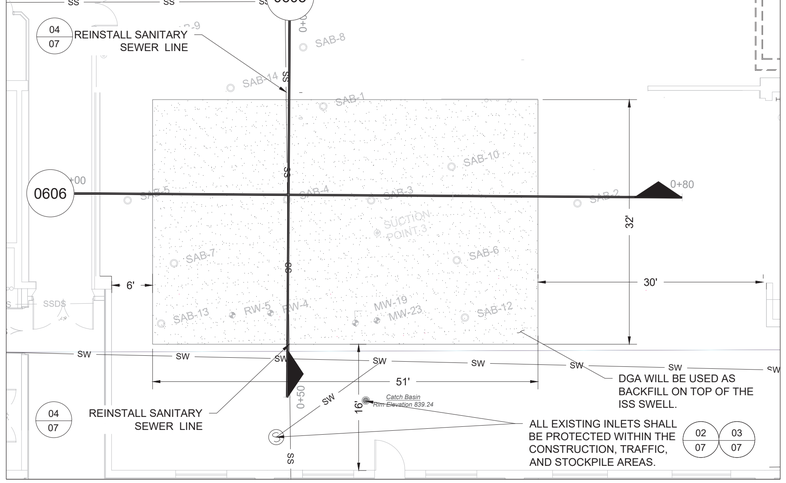

INSET 02 EXCAVATION PLAN




INSET 03 ZVI PLAN




INSET 04 ISS PLAN




INSET 05 RESTORATION PLAN

NOTES:

1. ALL EXISTING WALLS CALLED OUT ON PLAN SHALL BE PROTECTED BY THE CONTRACTOR.
2. EXCAVATION SUPPORT SYSTEM TO BE DESIGNED BY THE CONTRACTOR'S ENGINEER.
3. STONE OR ROAD PLATES SHALL BE INSTALLED IN EXISTING BUILDING INTERIOR TRENCHES WHERE TRUCKS NEED TO TRAVEL.

0 10 20
SCALE (IN FEET)

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PROPOSED DEMOLITION, EXCAVATION, ZVI, ISS AND RESTORATION PLAN

SANMINA - OWEGO FACILITY
FORMER CHEMICAL STORAGE AREA - REMEDIAL EVALUATION
1200 TAYLOR ROAD
OWEGO, NY 13827

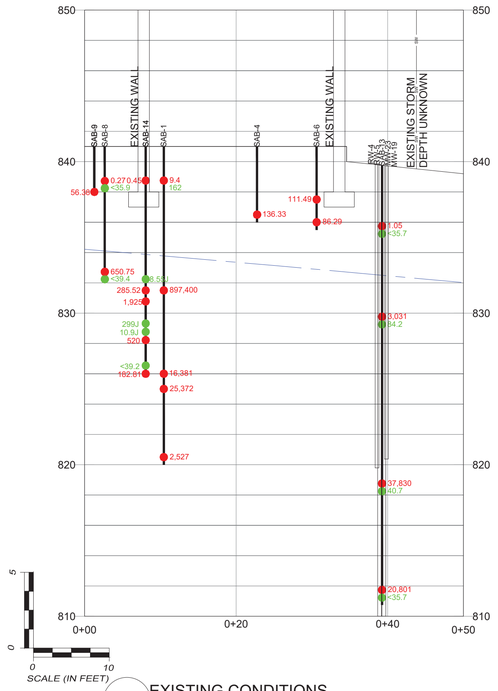
DISCIPLINE NO.

REV. 0

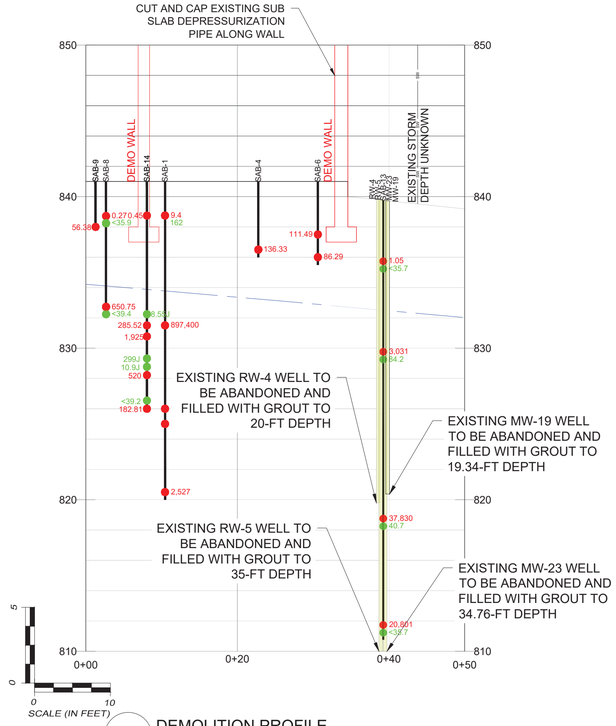
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| MARCH 2024 | C. MORGAN | | |

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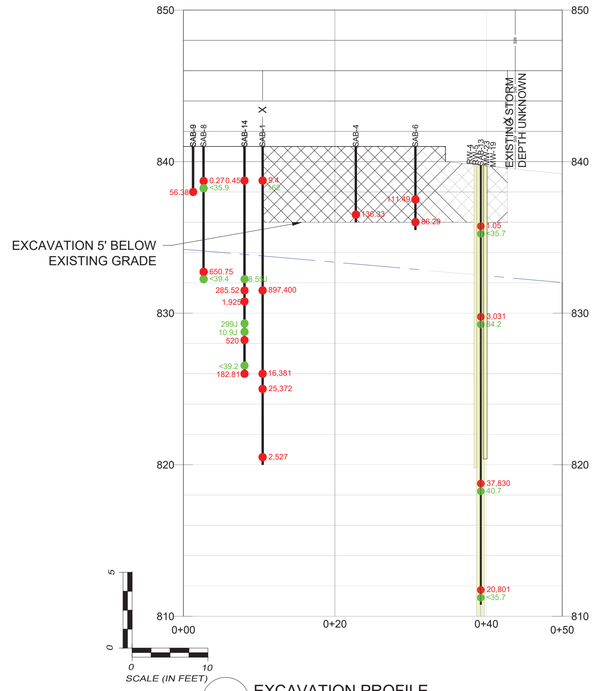
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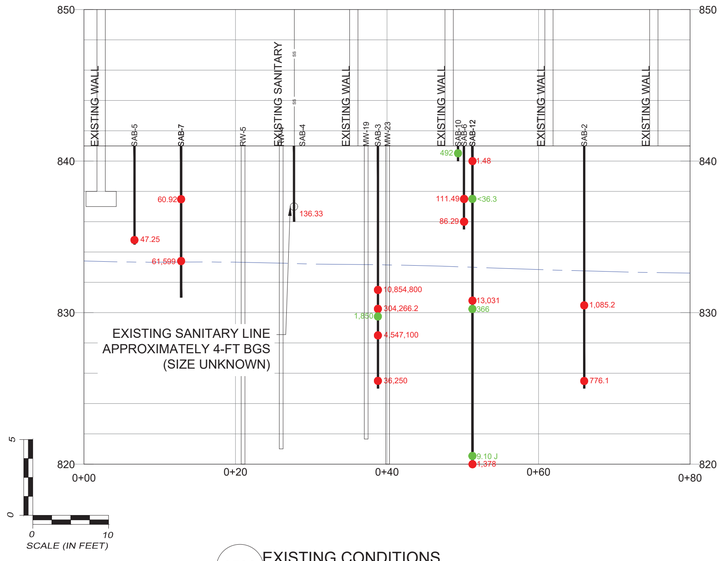

0501 EXISTING CONDITIONS



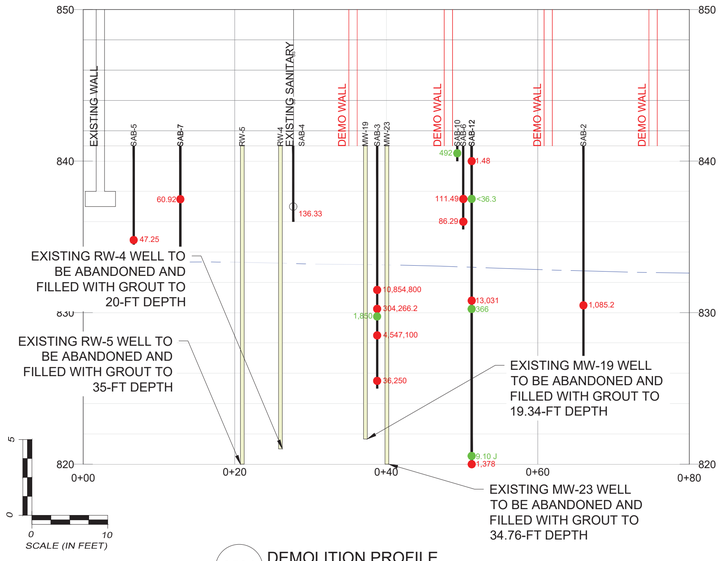

0503 DEMOLITION PROFILE



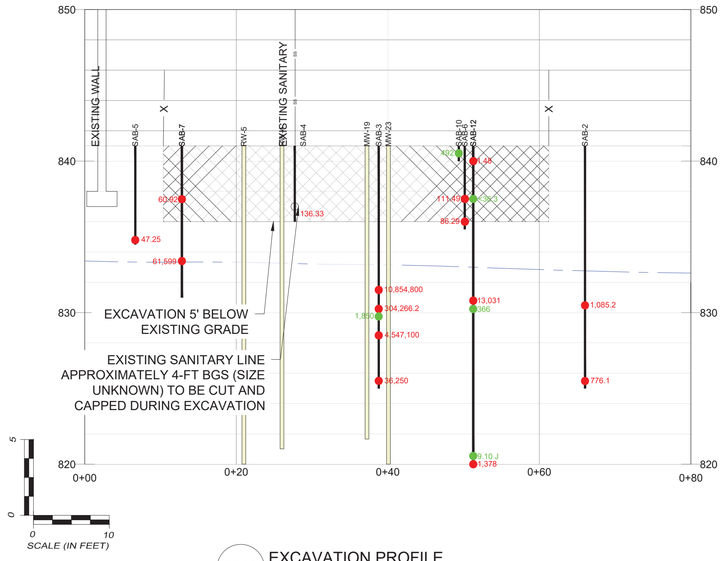

0505 EXCAVATION PROFILE




0502 EXISTING CONDITIONS




0504 DEMOLITION PROFILE




0506 EXCAVATION PROFILE

## LEGEND

644.55 TOTAL VOC (µg/kg)

<39.4 TOTAL PCB (µg/kg)

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EXISTING CONDITIONS, DEMOLITION, AND EXCAVATION PROFILES

DISCIPLINE NO.:

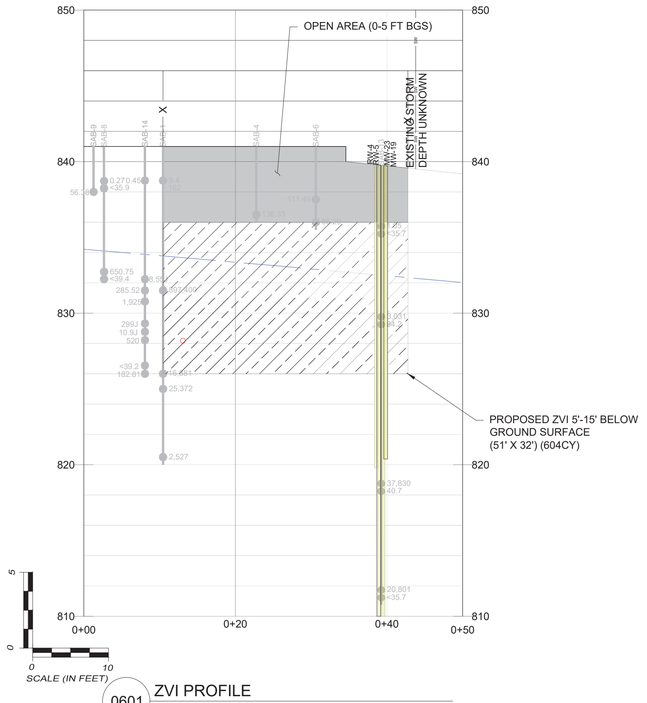
SANMINA - OWEGO FACILITY
FORMER CHEMICAL STORAGE AREA - REMEDIAL EVALUATION
1200 TAYLOR ROAD
OWEGO, NY 13827

REV.: 0

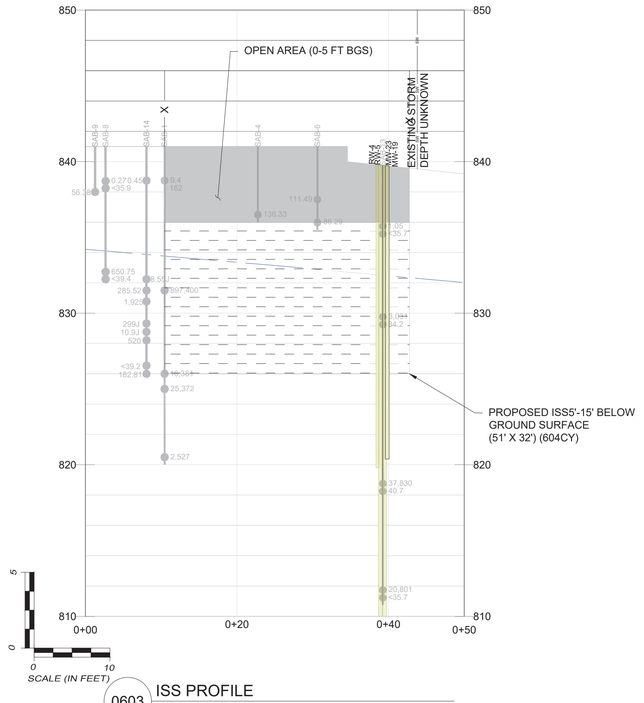
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| AS SHOWN | M. LUBBERS | | 05 |
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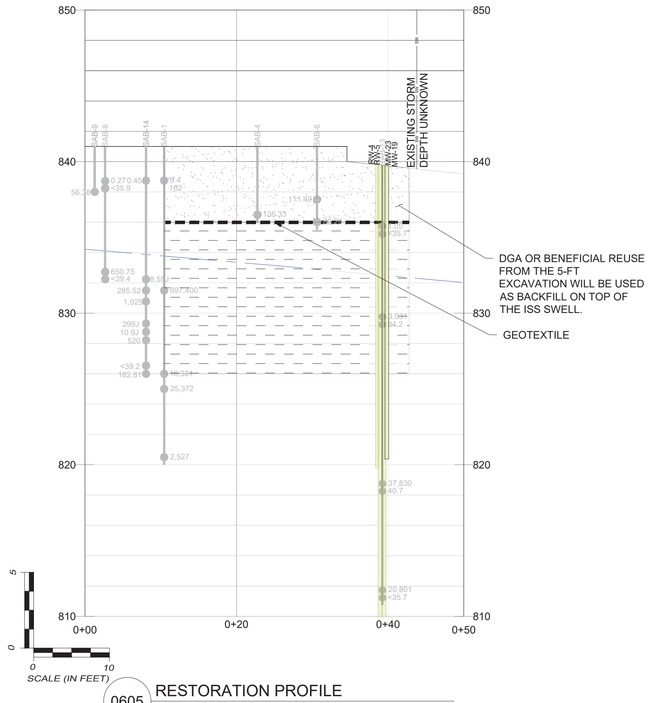
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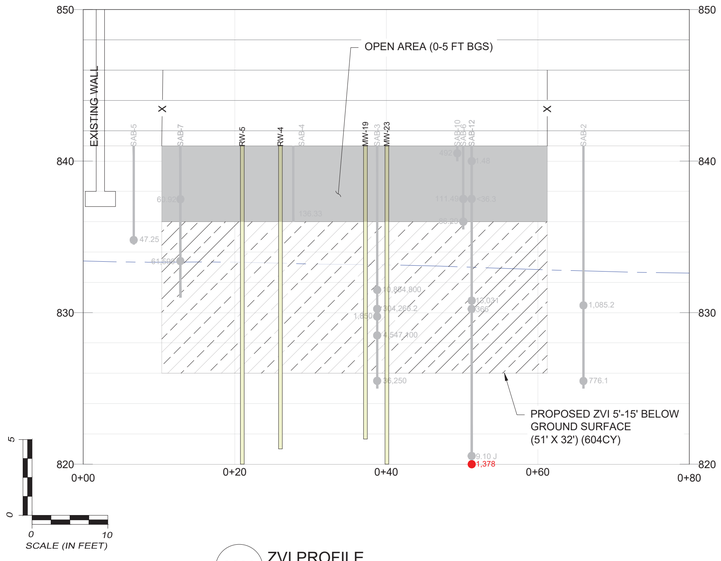

0601 ZVI PROFILE



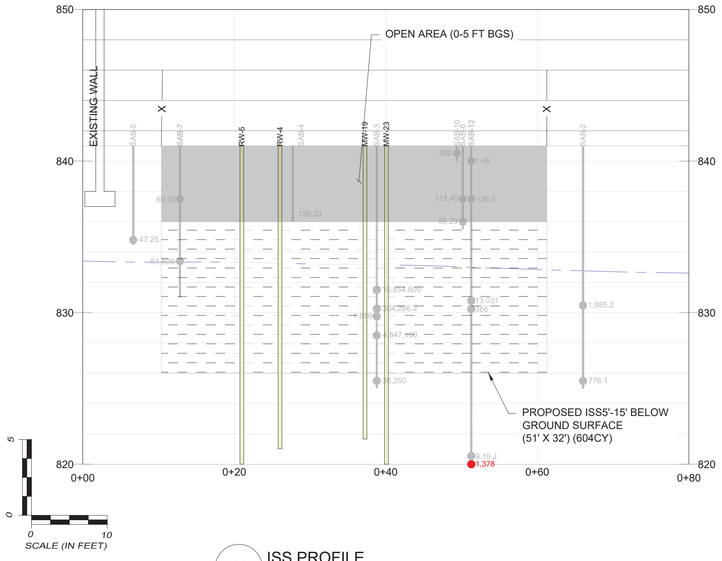

0603 ISS PROFILE



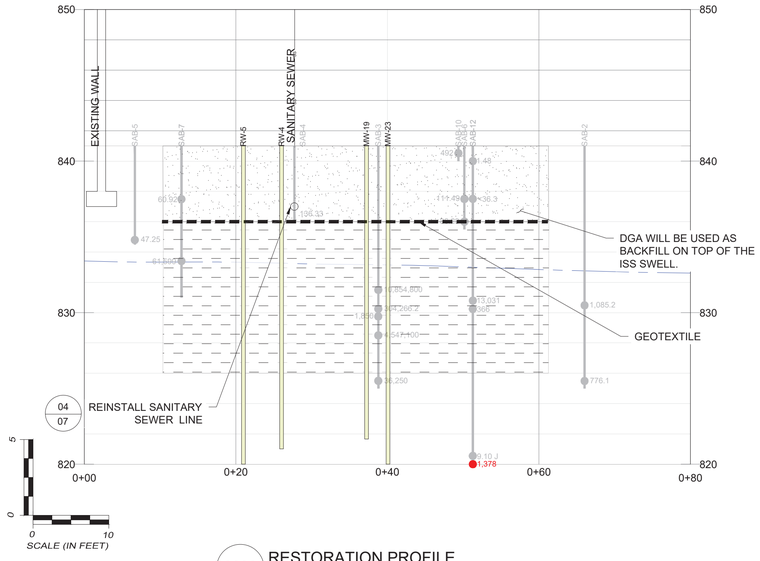

0605 RESTORATION PROFILE




0602 ZVI PROFILE




0604 ISS PROFILE




0606 RESTORATION PROFILE

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ZVI, ISS, AND RESTORATION PROFILES

DISCIPLINE NO.:

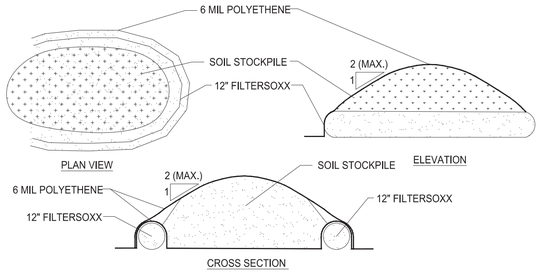
SANMINA - OWEGO FACILITY
FORMER CHEMICAL STORAGE AREA - REMEDIAL EVALUATION
1200 TAYLOR ROAD
OWEGO, NY 13827

REV.: 0

| SCALE | DESIGNED BY | PROJECT NUMBER | SHEET NO. |
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| MARCH 2024 | C. MORGAN | | |

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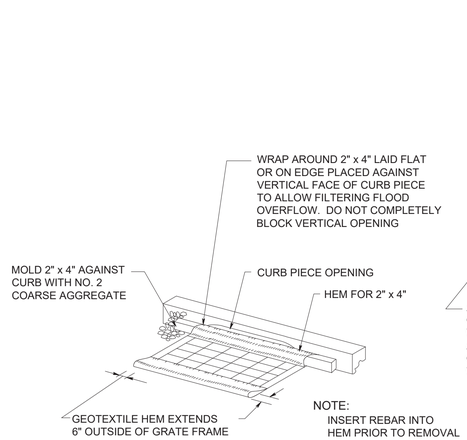
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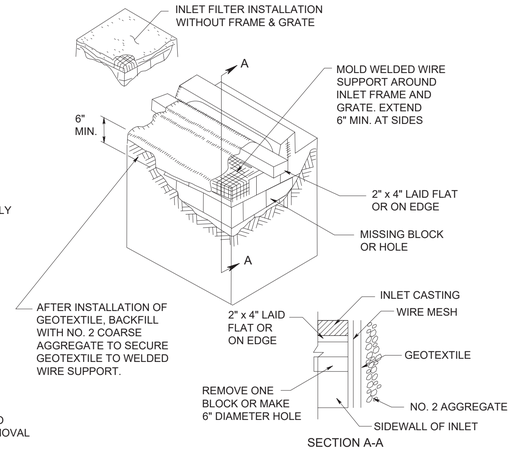



NOTES:

1. THE STOCKPILE AREA SHALL BE LINED BELOW AND ABOVE THE SOIL WITH A MINIMUM 6 MIL POLYETHENE SHEETING.
2. FILTERSOXX TO BE PLACED AROUND THE PERIMETER OF THE STOCKPILE.
3. POSSIBLE CHANGES MAY BE MADE TO DETAIL PENDING STATUS OF THE MATERIAL DISPOSITION DETERMINATION.

01/07 SOIL STOCKPILE AREA DETAIL
N.T.S.

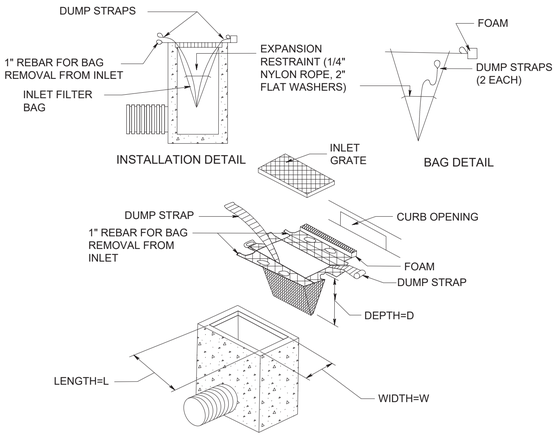






02/07 INLET FILTER, TYPE 1 DETAIL
N.T.S.

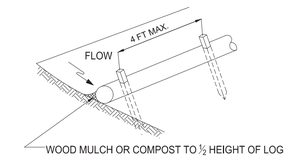


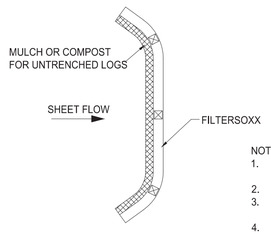

03/07 INLET FILTER, TYPE 2 DETAIL
N.T.S.




04/07 PROPOSED UTILITY CORRIDOR FOR SANITARY SEWER LINE INSTALLATION
N.T.S.




FILTERSOXX MANUFACTURED BY FILTREXX SUSTAINABLE TECHNOLOGIES

| Slope Percent | Maximum Slope Length Above SiltSoxx™ in Feet (meters)* | | | | |
|---|---|---|---|---|---|
| | 8 in (200 mm) SiltSoxx™ | 12 in (300 mm) SiltSoxx™ | 18 in (450 mm) SiltSoxx™ | 24 in (600mm) SiltSoxx™ | 32 in (800mm) Silt-Soxx™ |
| | 6.5 in (160 mm)** | 9.5 in (240 mm) ** | 14.5 in (360 mm) ** | 19 in (480 mm) ** | 26 in (650 mm) ** |
| 2 (or less) | 600 (180) | 750 (225) | 1000 (300) | 1300 (400) | 1650 (500) |
| 5 | 400 (120) | 500 (150) | 550 (165) | 650 (200) | 750 (225) |
| 10 | 200 (60) | 250 (75) | 300 (90) | 400 (120) | 500 (150) |
| 15 | 140 (40) | 170 (50) | 200 (60) | 325 (100) | 450 (140) |
| 20 | 100 (30) | 125 (38) | 140 (42) | 260 (80) | 400 (120) |
| 25 | 80 (24) | 100 (30) | 110 (33) | 200 (60) | 275 (85) |
| 30 | 60 (18) | 75 (23) | 90 (27) | 130 (40) | 200 (60) |
| 35 | 60 (18) | 75 (23) | 80 (24) | 115 (35) | 150 (45) |
| 40 | 60 (18) | 75 (23) | 80 (24) | 100 (30) | 125 (38) |
| 45 | 40 (12) | 50 (15) | 60 (18) | 80 (24) | 100 (30) |
| 50 | 40 (12) | 50 (15) | 55 (17) | 65 (20) | 75 (23) |

* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.
** Effective height of SiltSoxx™ after installation and with constant head from runoff as determined by Ohio State University.

NOTES:

1. THE FILTERSOXX SHALL BE PLACED PERPENDICULAR TO FLOW DIRECTION AND PARALLEL TO THE SLOPE. WITH THE ENDS TURNED UPGRADE TO PREVENT BYPASS.
2. THE FILTERSOXX MEDIA SHALL BE BIODEGRADABLE, AND NOT BE PHOTODEGRADABLE.
3. FILTERSOXX SHALL BE STAKED FOR THE ENTIRE LENGTH OF THE LOG, EVERY 4 FT (MAX) AS SHOWN HEREIN.
4. CONTRACTOR SHALL USE STAKES WITH A NOMINAL CROSS SECTION OF 2X2 INCHES AND OF SUFFICIENT LENGTH TO ATTAIN A MINIMUM 12 INCHES BELOW GROUND SURFACE AND 3 INCHES PROTRUDING ABOVE THE LOG.
5. WHERE MORE THAN ONE LOG IS REQUIRED, CONTRACTOR SHALL OVERLAP ENDS 12 INCHES MINIMUM AND STAKE.

05/07 FILTER SOXX DETAIL
N.T.S.

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STATE OF NEW YORK · STEPHEN ANTHONY MINTZELLO · 089550 · LICENSED PROFESSIONAL ENGINEER

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CONSTRUCTION DETAILS

DISCIPLINE NO.

SANMINA - OWEGO FACILITY
FORMER CHEMICAL STORAGE AREA - REMEDIAL EVALUATION
1200 TAYLOR ROAD
OWEGO, NY 13827

REV. 0

| SCALE | DESIGNED BY | PROJECT NUMBER | SHEET NO. |
|---|---|---|---|
| AS SHOWN | M. LUBBERS | | 07 |
| DATE DRAWN | DRAWN BY | | |
| MARCH 2024 | C. MORGAN | | |

ERM Consulting & Engineering, Inc.

FILE PATH: \\US5DCF502\data\Philadelphia\Team\DMM\CAD\Drawings\Sanmina Corporation\0589878-Concept Design Owego, NY\RM Work Plan Drawing Set 1.10.23 Design.dwg CONSTRUCTION DETAILS, PRINTED ON 3/13/2024 BY James Hockel

# APPENDIX B COMMUNITY AIR MONITORING PLAN

***COMMUNITY AIR MONITORING PLAN***
***SANMINA CORPORATION FACILITY***
***1200 TAYLOR RD– OWEGO, NEW YORK***

This Community Air Monitoring Plan (CAMP) involves real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of the designated work area when outdoor intrusive activities are in progress. Outdoor intrusive activities may include soil excavation and mixing, grading, staging, movement, or handling; test pitting or trenching; and/or the installation of soil borings and monitoring wells. The CAMP provides a measure of protection for on-Site workers and the downwind community (i.e., potential off-Site receptors including residences, parks, businesses, etc.) not directly involved with the subject work activities. Routine monitoring is required to evaluate concentrations and corrective action and/or work stoppage may be required to abate emissions detected at concentrations above specified action levels. Routine data collected during implementation of the CAMP may also help document that work activities did not spread compounds of potential concern off-Site through the air. Reliance on the procedures and action levels described in this CAMP should not preclude simple, common sense measures to keep VOCs, dust, and odors at a minimum around work areas.

***COMMUNITY AIR MONITORING PLAN***

VOC concentrations in air will be measured using calibrated photoionization detectors (PIDs). Particulate matter concentrations will be measured using calibrated electronic aerosol monitors.

Relevant weather conditions including wind direction, speed, humidity, temperature, and precipitation will be evaluated and recorded prior to the initiation of subsurface intrusive activities. Background readings of VOCs and particulate matter will be collected on Site prior to the initiation of field work on each day that subsurface intrusive work will be performed. Additional background measurements may be collected if weather conditions change significantly.

Continuous monitoring for VOCs and particulate matter will be performed upwind and downwind of the work area during outdoor subsurface intrusive activities.

Periodic monitoring for VOCs will be performed during non-intrusive activities if requested by a New York State Department of Environmental Conservation (NYSDEC) and/or New York State Department of Health (NYSDOH) on-Site representative. Non-intrusive activities include any work activity that does not disturb the subsurface or staged soil piles, including routine Site visits,

installation of remedial equipment, operations and maintenance (O&M), surveying, etc. Periodic monitoring, if performed, will consist of collecting readings downwind of the work area at the following intervals:

- upon arrival at a sample location or other work activity location;
- during performance of the relevant work activity; and
- prior to leaving a sample location or other work activity location.

***VOC MONITORING, RESPONSE LEVELS, AND ACTIONS***

VOCs will be monitored at the downwind perimeter on a continuous basis during outdoor intrusive activities. Upwind concentrations will be measured continuously or at the start of each workday, during the work activity, and at the end of each work day to establish background conditions. Monitoring equipment will be calibrated at least once a day (excludes equipment that requires factory calibration). Calibration may be performed more frequently if Site conditions or instrument operating conditions are highly variable. The monitoring equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below. The monitoring equipment will be equipped with an alarm to indicate an exceedance of a specified action level.

1. If the ambient air concentration of total VOCs at the downwind perimeter exceeds 5 parts per million (ppm) above background (upwind perimeter) for the 15-minute time-weighted average, work activities will be temporarily halted and monitoring continued. If the total VOC concentration readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total VOC concentrations at the downwind perimeter persists at concentrations greater than 5 ppm over background but less than 25 ppm, work activities will be halted, the source of the VOCs identified, corrective action will be taken to abate emissions (if the source is related to Site remedial activities), and monitoring will be continued. After these steps, work activities will resume provided that the total VOC concentration 200 feet downwind of the work area, or half the distance to the nearest potential receptor, whichever is less (but in no case less than 20 feet), is below 5 ppm above background for the 15-minute average.

3. If the total VOC concentration is greater than 25 ppm above background at the downwind perimeter, intrusive work activities will be halted and the source of the VOCs will be identified. Work will resume when additional continuous monitoring demonstrates that VOC concentrations have dropped below 25 ppm for a minimum of one-half hour, and the total VOC concentration 200 feet downwind of the work area, or half the distance to the

nearest potential receptor, whichever is less (but in no case less than 20 feet), is below 5 ppm above background for the 15-minute time-weighted average.

4. All 15-minute readings will be recorded and will be available for review by NYSDEC and/or NYSDOH personnel. Instantaneous VOC readings (if any) used for decision purposes will also be recorded.

***PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS***

Fugitive dust migration from the work area will be visually assessed during outdoor intrusive activities. Particulate concentrations will be monitored continuously at the downwind perimeter during outdoor intrusive activities. Particulate monitoring will be performed using real-time electronic aerosol 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 for comparison to the airborne particulate action levels referenced below. The monitoring equipment will be equipped with an alarm to indicate an exceedance of a specified action level.

1. If the downwind PM-10 concentration is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background for the 15-minute period, or if airborne dust is observed leaving the work area, dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind PM-10 concentration does not exceed 150 $\mu g/m^3$ above background and provided that significant visible dust is not migrating from the work area.

2. If downwind PM-10 concentrations are greater than 150-$\mu g/m^3$ above background after the implementation of dust suppression activities, intrusive activities will be stopped and a re-evaluation of the intrusive activities will be initiated. Work can resume provided that dust suppression measures and/or other controls are successful in reducing the downwind PM-10 concentration to within 150 $mcg/m^3$ of background and in preventing significant visible dust migration.

3. All 15-minute readings will be recorded and will be available for review by NYSDEC and/or NYSDOH personnel. Instantaneous readings (if any) used for decision purposes will also be recorded.

# APPENDIX C HEALTH AND SAFETY PLAN

# Level 2 Health and Safety Plan

## Administrative Information

***This document is valid for a maximum time period of one year after approval. The document must be reviewed if the scope of work or nature of site hazards change and must be updated as warranted.***

### Does this Level 2 HASP reflect a unified safety planning document?

☐ Y ☐ N ☐ NA (ERM is the only entity involved)

If No, please list the Attachment Name and Number for the Safety Bridging Document: Click here to enter text.

| | |
|---|---|
| Project Name: Sanmina Corporation 2022 PMP and Supplemental Investigation | Site Name & Location: Sanmina Corporation, Owego, NY |
| Client Contact and Phone: Earl Kimble | Client: Earl Kimble |
| GMS Project #: 589878 | Field Work Start Date: Click here to enter a date. |
| Partner in Charge: Ernie Rossano | Anticipated Field Work End Date: Click here to enter a date. |
| Project Manager: Rob Sents | Short Service Employees (SSE): Alexis Harford |
| Field Safety Officer: Katherine Popyack, Kevin Warner and/or Rob Sents | SSE Mentor: Katherine Popyack and/or Kevin Warner |
| Field Team Leader: Katherine Popyack, Kevin Warner, Rob Sents, and/or Tim Daniluk | SSC EP (if applicable): Katherine Popyack, Kevin Warner, Rob Sents, and/or Tim Daniluk |
| Additional ERM personnel on site: Dikshya Khanal, Jonathan Mills, Alexis Harford | |

## Subject Matter Expert Review

***SME review is required if the project includes any work over or in water, any use of mobile construction equipment (excluding drilling equipment), or any subcontractor activities performed without direct ERM supervision.***

| | |
|---|---|
| SME Review Required: ☒ Yes ☐ No | If Yes, Provide name(s) of SME(s): Brian Murphy |
| If Yes, Have recommendations resulting from SME Review been included: ☐Yes ☐No | List recommendations resulting from the SME Review: Click here to enter text. |

## Site Description

***Include relevant background information regarding the site, such as location, size, type of facility, topography, weather, infrastructure, security, previous site use, etc. Describe nature and extent of any soil/air/water/groundwater contamination. Describe any other aspects of the site that may potentially affect the health, safety, or security of on-site personnel.***

The Sanmina Corporation (Sanmina) – Owego Division facility is located at 1200 Taylor Road in the Town of Owego, Tioga County, New York (Site; Facility). The site is an approximately 17-acre area bounded by Taylor Road to the north, Town of Owego POTW to the south, Broadway Avenue and Barnes Creek to the east, and undeveloped land to the west. The plant covers 339,036 ft2 and operations were ceased at this location in 2019. The facility is located on relatively flat land in an industrial area. Sanmina operates a pump and treat system at the facility to manage VOC contaminated groundwater and ERM complete semi-annual groundwater sampling on Sanmina's behalf. All maintenance associated with the pump and treat system is completed by Sanmina personal. The main Source Area for VOC is located under the building and is the result of a former chemical storage area that was built over during a building expansion in the 1970's. The Source Area has been largely inaccessible since the building expansion over the Source Area. The main

contaminants of concern for this Source Area are chlorinated VOC (e.g. TCE and it degradation daughter products). This proposed IRM will address the Source Area through excavation and transportation for offsite management.

# Level 2 Health and Safety Plan

| **Project Background and Scope of Work**<br>***Include list of tasks to be completed by ERM personnel during this project, and a separate list of tasks to be completed by any subcontractors at the site. A site-specific Job Hazard Analysis (JHA) must be completed for each task to be performed.*** | |
|---|---|
| | |
| ERM Task 1: community air monitoring | ☐ JHA Attached? |
| ERM Task 2: construction oversight | ☐ JHA Attached? |
| ERM Task 3: confirmation soil sampling | ☐ JHA Attached? |
| ERM Task 4: Click here to enter text. | ☐ JHA Attached? |
| ERM Task 5: Click here to enter text. | ☐ JHA Attached? |
| | |
| Subcontractor Task 1: excavation, excavation controls, and ISS | ☐ JHA Reviewed? |
| Subcontractor Task 2: dewatering | ☐ JHA Reviewed? |
| Subcontractor Task 3: materials management | ☐ JHA Reviewed? |
| Subcontractor Task 4: backfill and restoration | ☐ JHA Reviewed? |
| Subcontractor Task 5: Click here to enter text. | ☐ JHA Reviewed? |
| Subcontractor Task 7: Click here to enter text. | ☐ JHA Reviewed? |

| Subcontractor(s) to be used: | Prescreened and selected in accordance with the SUBS process? |
|---|---|
| TBD in bidding process | ☐ Yes ☐ No |
| Click here to enter text. | ☐ Yes ☐ No |
| Click here to enter text. | ☐ Yes ☐ No |
| Click here to enter text. | ☐ Yes ☐ No |

| **Site Type (check all applicable boxes)** | |
|---|---|
| ☒ Industrial | ☐ Contaminated Site Cleanup |
| ☐ Residential | ☐ Remote site or inactive facility |
| ☐ Unsecured | ☐ Other (specify): Click here to enter text. |
| ☐ Coastal/offshore (on or near water) | ☐ Other (specify): Click here to enter text. |

# Level 2 Health and Safety Plan

| **High Hazard Work Elements (Require H&S Team Coordination)** ***Additional control measures may be required beyond JHA.*** **(check all applicable boxes)** | |
|---|---|
| ☐ Aerial Lift Use (e.g., Scissor Lifts, Cherry Pickers) | ☒ Heavy Equipment Use |
| ☐ All-Terrain Vehicle/Snowmobile Use | ☐ Helicopter/Fixed Wing Aircraft Transportation[2] |
| ☐ ASTs/USTs | ☐ Hot Work (Welding, Cutting, Brazing)[1] |
| ☐ Chemical Mixing/Injection | ☐ Off-Shore Platform Work[5] |
| ☐ Confined Space Entry[1] | ☐ Overhead Power Lines |
| ☒ Construction | ☐ Rigging/Lifting[1] |
| ☐ Control of Hazardous Energy (i.e., Lockout/Tagout)[1] | ☐ Scaffold Use[1] |
| ☒ DDD Operations[1] | ☒ Subsurface Clearance (Buried Utilities)[1] |
| ☐ Diving | ☐ Working on/over/near Water (including transport) |
| ☒ Excavation/Trenching/Drilling | ☐ Unexploded Ordnance/Munitions and Explosives of Concern (UXO/MEC) |
| ☐ Explosives Use[1] | ☐ Other (specify): Click here to enter text. |
| ☒ Falls from height (>4 feet)[1] | ☐ Other (specify): Click here to enter text. |
| ☒ Forklift/Industrial Truck Use | |

| **Other Hazards (check all applicable boxes)** | |
|---|---|
| ☐ Biological Hazards | ☐ Mining (Surface/Underground) |
| ☒ Chemical Exposure Potential (including asbestos) | ☒ Natural Hazards (Plants, Animals, Insects) |
| ☐ Compressed Gas | ☐ Portable/Fixed Ladders |
| ☒ Ergonomics/Material Handling | ☐ Radiation (Ionizing/Non-ionizing) |
| ☐ Extended or Nonstandard Work Shifts (>14 hours) | ☐ Shift Work (e.g., night work) |
| ☐ Extreme Weather | ☒ Short Service Employees |
| ☒ Hand/Power Tool Use | ☒ Slips/Trips |
| ☒ High Noise (>85 dBA) | ☐ Other (specify): Click here to enter text. |
| ☐ International Travel[3] | ☐ Other (specify): Click here to enter text. |
| ☐ Long Distance/Duration Driving[4] | ☐ Other (specify): Click here to enter text. |

1 An ERM or equivalent client-required permit must be completed.

2 If traveling using a helicopter or fixed wing aircraft, ERM employees are required to follow the provisions of the *Fixed Wing Aircraft and Helicopter Safety* process.

3 A Travel Risk Assessment (TRA) is required for all international travel.

4 If driving more than 500 km (310 miles) in a single day, driving in excess of 4.5 hours in a single day, or driving in a remote location, a Journey Management Plan is required and should be appended to this HASP.

5 If performing work over water, you should consult the requirements of the Aquatic Work Management Program.

# Level 2 Health and Safety Plan

| **Societal / Social** *Consider challenges for project team members associated with the societal biases relevant to where the project is being performed (e.g., gender, racial, sexual orientation, religious, etc.). When such biases are identified, describe mitigation steps that have been discussed with and agreed to by all project team members.* | |
|---|---|
| Considered?<br>☒ Yes<br>☐ No | ***Not applicable*** |
| **Accessibility Considerations** *Consider any barriers members of the project team may face that impact their ability to participate fully (e.g. physical, technological, cultural, etc.); remember, these barriers may not always be visible to you. Note: do not record information specific to individuals, rather, describe mitigation steps that have been discussed with and agreed to by all project team members* | |
| Considered?<br>☒ Yes<br>☐ No | ***There will be barriers, it is a construction site with limitation caused by the current infrastructure within the build and around the excavation area.*** |

## Chemicals of Concern

### Chemical Products Used or Stored On-Site

For each chemical product identified, a Safety Data Sheet (SDS) must be attached to this HASP.

| | |
|---|---|
| ☒ Alconox or Liquinox | ☐ Household bleach (NaOCl) |
| ☒ Hydrocholoric acid (HCl) | ☒ Calibration gas |
| ☒ Nitric acid ($HNO_3$) | ☐ Other (specify): Click here to enter text. |
| ☐ Sulfuric acid ($H_2SO_4$) | ☐ Other (specify): Click here to enter text. |
| ☐ Sodium hydroxide (NaOH) | ☐ Other (specify): Click here to enter text. |
| ☐ Isopropyl alcohol | ☐ Other (specify): Click here to enter text. |

Note: Emergency eyewash solution must be readily available on all project sites where materials are used or stored that pose a risk of getting into the eyes via splashing or through contact with airborne gases, vapors, dusts, or mists. This includes sample preservatives. The size and flushing capability of the eyewash must be proportional to the potential for contact with corrosive or injurious materials in the field and the resulting potential for injury. Contact your BU H&S Director for additional information or assistance.

# Level 2 Health and Safety Plan

| Known or Suspected Chemicals of Concern |
|---|
| Are there known or suspected chemicals of concern present on the site? ☐ Yes ☒ No |
| TCE and it degradation daughter products and PCBs |
| **Monitoring Equipment** |
| Will ERM staff be using equipment on the project site to monitor potential exposures to known or suspected chemicals of concern? ☒ Yes ☐ No |
| A community air monitoring program is included as Appendix B of the IRM Work Plan |
| All monitoring equipment on site must be calibrated per manufacturer specifications (including daily bump tests) and results recorded. |

**Personal Protective Equipment**

***Req = Required PPE for one or more tasks to be performed; required on site at all times. NA = Not applicable to this project.***

| Equipment | Req | NA | Supplies | Req | NA |
|---|---|---|---|---|---|
| Safety Footwear | ☒ | ☐ | Inner Chemical Gloves | ☐ | ☒ |
| Outer Disposable Boots | ☐ | ☒ | Outer Chemical Gloves | ☒ | ☐ |
| Long Sleeve Shirt/Pants | ☒ | ☐ | Leather or Kevlar Gloves | ☐ | ☒ |
| Tyvek Suit | ☐ | ☒ | Safety Glasses/Goggles | ☒ | ☐ |
| Poly-Coated Tyvek Suit | ☐ | ☒ | Face Shield | ☐ | ☒ |
| Fully Encapsulated Chemical Suit | ☐ | ☒ | Hearing Protection | ☒ | ☐ |
| Flame Resistant Clothing/Coveralls | ☐ | ☒ | Half-face Respirator | ☐ | ☒ |
| High Visibility Traffic Vest | ☒ | ☐ | Full-face Respirator | ☐ | ☒ |
| Hard Hat/Approved Helmet | ☒ | ☐ | Personal Floatation Device | ☐ | ☒ |
| Wet Suit/Dry Suit | ☐ | ☒ | If either half or full-face respirator checked:<br>• Define cartridge type: Click here to enter text.<br>• Define cartridge change frequency: Click here to enter text. | | |
| Other (specify): Click here to enter text. | ☐ | ☐ | | | |

Respirator selection should be based on the Assigned Protection Factor (APF) and the Maximum Use Concentration (MUC). To determine the appropriate respirator selection, the lowest appropriate published exposure guideline should be known. The Business Unit H&S Director or project H&S consultant can provide assistance in defining the APF and MUC, as necessary. They can also assist in defining actions levels and cartridge change schedules when air-purifying respirators are used. Note that cartridge change schedules must be outlined above and in the JHA for any task requiring respiratory protection.

Use of respiratory protection requires three elements: training in respiratory protection techniques, completion of medical surveillance confirming that you are fit to wear a respirator, and fit testing with the make and model of respirator you will be using.

**Training, Medical Surveillance, and Safety Supplies**

***Req = Required; requirements are based on the specific tasks and clearly identified in JHA. NA = Not applicable to this project.***

# Level 2 Health and Safety Plan

| Training | Req | NA | Medical Surveillance* | Req | NA |
|---|---|---|---|---|---|
| First Aid/CPR | ☐ | ☐ | Medical Clearance | ☒ | ☐ |
| ERM Field Safety Officer (FSO) | ☐ | ☐ | Respirator Clearance and Fit Test | ☐ | ☒ |
| DDD Practice FSO/DM | ☐ | ☐ | Blood Lead and ZPP | ☐ | ☒ |
| Subsurface Clearance - EP | ☐ | ☐ | Client Drug/Alcohol Testing | ☐ | ☐ |
| Subsurface Clearance - GE | ☐ | ☐ | Other (specify): Click here to enter text. | ☐ | ☐ |
| International Traveler - Basic | ☐ | ☐ | **Safety Supplies** | **Req** | **NA** |
| Int'l Traveler – High Risk | ☐ | ☐ | First Aid Kit | ☒ | ☐ |
| Malaria Awareness | ☐ | ☐ | Emergency Eyewash Solution | ☒ | ☐ |
| Respirator Use and Fit Testing | ☐ | ☐ | Air Horn | ☐ | ☒ |
| Client/Facility Induction | ☐ | ☐ | Decontamination Supplies | ☒ | ☐ |
| BOSIET/TBOSIET (Basic Offshore) | ☐ | ☐ | Fire Extinguisher | ☒ | ☐ |
| H.U.E.T. (Helicopter) | ☐ | ☐ | Potable Water | ☒ | ☐ |
| Other (specify): Click here to enter text. | ☐ | ☐ | Toilets | ☒ | ☐ |
| Other (specify): Click here to enter text. | ☐ | ☐ | Other (specify): Click here to enter text. | ☐ | ☐ |

* Physical examination requirements should be discussed with Regional H&S Director well in advance of project to allow adequate time to schedule exams.

## Work Zones

***Complete if exclusion zones are necessary because of chemical and/or equipment hazards. Describe the set-up of these zones. Include landmarks, dimensions (as necessary), and whether they are for equipment or personnel decontamination.***

The alley way within the building, the former wet process room, and waste storage areas will be the exclusion zone. Entrances within the building will mark off these areas and temporary fencing will be used on the exterior of the building. Each of these areas will require both equipment and personnel will be in the exclusion zone.

*Contamination Reduction Zone requirements will be defined in the contracting process and the HASP updated.*

Support Zone requirements will be defined in the contracting process and the HASP updated.

## Site Access/Control

***Describe procedures for limiting unauthorized entry to the work zone(s). Describe any security requirements.***

The building is locked and there is one security guard. All exterior storage areas will utilize temporary fencing.

## Decontamination Procedures

***Describe procedures for the decontamination of personnel and equipment.***

This will be defined in the contracting process and the HASP will be updated.

# Level 2 Health and Safety Plan

| |
|---|
| **Spill Prevention and Response**<br>***Ensure all chemical containers on site are labeled and lids are secured when not in use. When transferring chemicals from one container to another, or when refueling vehicles or equipment, provide containment beneath the transfer point to capture potential spills. Immediately report all chemical spills to the PIC/PM and submit an ECS entry with 24 hours.*** |
| Will ERM staff or ERM subcontractors possess containerized chemicals on the project site? ☒ Yes ☐ No |
| If the answer to this question is **Yes**, each applicable JHA must identify the appropriate use, storage, disposal and transportation requirements for the chemicals to be used. |
| **Waste Management Planning** |
| Will ERM's project activities generate waste materials? ☒ Yes ☐ No |
| Will ERM have contractual responsibility for handling/transporting/disposing waste for the client? ☐ Yes ☒ No |
| If the answer to either of these questions is **Yes**, consult with Regional Legal and Safety Team and include an appropriate Waste Management Plan as an Attachment to this HASP |
| It is assumed ERM will manage the handling of the waste and a waste management plan is included in this work plan as Appendix D. |
| **Project Specific Emergency Response**<br>***In the event of an emergency, client-specific emergency response procedures may take precedence over ERM established procedures.***<br>***While engaging in field-related activities on an active client site, measures they have in place to signal either emergency response or evacuation need to be reviewed and documented.***<br>***Once completed, this summary should be discussed with all visitors, subcontractors, and others subject to HASP review upon site visit.*** |
| Describe any contributing factor potentially initiating emergency response will be finalized in the bidding process. |
| |
| |
| |
| |
| |
| |
| Is a map associated with evacuation attached? ☐Yes ☒ No |
| In the initial site induction, and periodically during daily tailgate safety meetings, all onsite employees (ERM and subcontractors) will be trained in the provisions of emergency response planning, site communication systems, and site evacuation routes. Note that clients may have their own procedures which may need to be followed. |

# Level 2 Health and Safety Plan

## Emergency Contacts

***All ERM employees and subcontractors are empowered to pause or stop work to address any unsafe acts/conditions, questions, concerns or changed conditions. All work-related safety events should be shared with the project team and entered into the Event Communication System (ECS) within 24 hours in accordance with ERM-1200-PR1.***

***FOR ALL MEDICAL EMERGENCIES, CALL THE LOCAL EMERGENCY NUMBER.***

***For ALL non-emergency incidents resulting in any injury or illness, you must:***

- *Give appropriate first aid care to the injured or ill individual and secure the scene.*
- *Immediately notify the PM, PIC, and the H&S Team.*
- *Follow any Client procedures related to reporting the incident.*

***For all incidents (injuries, illnesses, spills, fires, property damage, etc.) and significant near misses, enter the event into ECS within 24 hours.***

**Emergency Contact List**

| Contact | Name | Location | Phone |
|---|---|---|---|
| Hospital (attach map) | Binghamton General Hospital – United Health Services Hospital | 10-42 Mitchell Avenue Binghamton, NY 13903-1678 | 911 |
| Police | Owego Police Department | 90 Temple Rd, Owego | 911/607-687-2234 |
| Fire | Owego Fire Department | 87 North Ave, Owego | 911/607-687-1201 |
| Poison Control | National Poison Control | Binghamton | 800-222-1222 |
| Incident Intervention | WorkCare | NA | 888-449-7787 |
| Partner-in-Charge | Ernie Rosanno | Melville, NY | 631-756-8917 |
| Project Manager | Rob Sents | Syracuse, NY | 315-256-5350 |
| Field Manager (if not PM) | Kat Popyack | On Site | 315-559-2658 |
| Field Safety Officer (if not PM) | Kat Popyack | On Site | 315-559-2658 |
| SSC Experienced Person | Kat Popyack | On Site | 315-559-2658 |
| Business Unit H&S Lead | Dave Nickel | Minneapolis | 612-347-7863 |
| Regional H&S Director | Millard Griffin | Atlanta, GA | 678-294-8658 |
| Regional Legal Counsel | Click here to enter text. | Click here to enter text. | Click here to enter text. |
| BU Managing Partner | Click here to enter text. | Click here to enter text. | Click here to enter text. |
| Contractor Contact | Sean Pepling | Syracuse, NY | 315-447-2226 |
| Client Contact | Earl Kimble | Owego, NY | 607-239-9431 |
| Additional Contact | Kevin Warner | Syracuse, NY | 315-559-2666 |
| Additional Contact | Jason Reynolds | Click here to enter text. | 716-725-5369 |

# Level 2 Health and Safety Plan

| **Attachments**<br>***Check all appropriate documents to be attached to this HASP.*** | |
|---|---|
| ☒ Site-specific JHAs for all tasks (including subcontractors) | ☒ Map of route to hospital with turn-by-turn instructions |
| ☒ Subsurface Clearance (SSC) Project Plan | ☒ SNAP Cards |
| ☒ Site Safety Meeting Form | ☐ Field Audit Form |
| ☒ Vehicle Inspection Form | ☐ Waste Management Plan |
| ☐ Journey Management Plan (JMP) and/or High Risk JMP | ☐ Client-specific requirements |
| ☒ Safety Data Sheets (SDS) for chemicals brought to site | ☐ Other: Click here to enter text. |
| ☐ PLAN Risk Assessment | ☐ Other: Click here to enter text. |
| ☒ Facility site map(s) | ☐ Other: Click here to enter text. |
| **Applicable ERM Safety Standards/Procedures**<br>***Check procedures/standards that are applicable to this project. Refer to the documents for guidance and, where applicable, use forms, work instructions, and guidelines associated with these standards/procedures in the completion of site work. Indicated documents must be procured from ERM's Document Control System. Note that this list is not comprehensive!*** | |
| **Global Standards/Procedures** | |
| ☐ Short Service Employees | ☐ Travel Risk Assessment |
| ☐ Aquatic Work Management | ☒ Subsurface Clearance Standard |
| ☒ Driver and Vehicle Safety | ☐ Fixed Wing Aircraft/Helicopter Standard |
| ☐ Incident Reporting and Investigation | ☐ Subcontractor Management |
| **Regional Standards/Procedures** | |
| ☐ Fire Prevention | ☐ Demolition |
| ☐ Confined Space Entry | ☐ Excavation and Trenching |
| ☐ Fall Protection | ☐ Hazard Communication |
| ☐ Ladder Safety | ☒ Cold Stress |
| ☒ Hearing Conservation | ☒ Heat Stress |
| ☒ Medical Surveillance | ☒ Medical Services |
| ☐ Hot Work | ☒ Personal Protective Equipment |
| ☐ Blood-borne Pathogens | ☐ Respiratory Protection |
| ☒ Hand Tools/Portable Power Equipment | ☒ Insect Bite Prevention Standard |
| ☒ Electrical Safety | ☒ Incident/Illness Management |
| ☒ Waste Management Planning | ☐ Energy Isolation |

# Level 2 Health and Safety Plan

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| ☐ Work Over Water | ☒ Spill Prevention and Response |
| ☒ Fatigue Management | ☒ Safe Use of Cutting Tools |
| ☐ Lone Worker | ☒ Compressed Gas Cylinders |

## Management of Change and Control of Work

The following process will be followed in the event that any changes are identified with respect to schedule, equipment type, equipment installation/configuration, personnel and/or site conditions: Work in the impacted area will STOP

1. All impacted personnel (ERM and subcontractor staff) will discuss the change and suggest options for continuation
2. The ERM FSO and ERM Field Team Leader (FTL), after reaching agreement with any impacted subcontractor(s), will discuss options with PIC
3. PIC will determine appropriate course of action (may need to discuss options with Subject Matter Experts)
4. PIC will document necessary changes and get formal agreement with any impacted subcontractor(s)
5. PIC will communicate approved changes to ERM FSO and ERM FTL
6. ERM FSO and FTL will communicate changes to all impacted site staff, including subcontractor staff.
7. Work in impacted area can resume

The following process will be followed with respect to Control of Work:

1. The ERM FSO and ERM FTL will, prior to authorizing any new major definable feature of work, review the JHA and other applicable safety planning documents associated with the activity.
2. Once the JHA and other documents are approved by the ERM FSO and ERM FTL, the documents will be reviewed with all site staff involved and/or impacted by the activity (including subcontractor staff).
3. Once all staff involved and/or impacted understand and acknowledge they are in agreement with the documents, the ERM FTL can authorize work to commence.
4. Once work commences, the ERM FSO and FTL shall observe the work in accordance with defined project procedures to document compliance with agreed procedures and general safety best practices.
5. Once authorized work is completed the ERM FSO and FTL will document any opportunities for improvement or other lessons learned within the ERM CAPA system.

| See It; Own It; Share It | Stop Work Authority |
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| **It means that:**<br>• **We know that we have a responsibility to look out for each other, to intervene when necessary, to be proactive and to help keep safety issues from becoming problems.**<br>• **We also look out for ourselves. If we recognize that a situation is unsafe, we are expected to stop what we are doing, reassess the situation and consult with others if necessary before proceeding safely.**<br>• **We assign no blame to anyone who raises safety issues.**<br>• **We strive to learn lessons from the large and small events that are part of our daily experience.** | **It is ERM policy that all ERM and ERM Subcontractor employees have the authority, without fear of reprimand or retaliation to:**<br>• **Immediately stop any work activity that presents a danger to the site team or the public.**<br>• **Get involved, question and rectify any situation or work activity that is identified as not being in compliance with the HASP or with broader ERM health and safety policies.**<br>• **Report any unsafe acts or conditions to supervision or, preferably, intervene to safely correct such acts or conditions themselves.** |

# Level 2 Health and Safety Plan

| Reviews and Approval | |
|---|---|
| **Safety Team Review** | |
| Reviewer Name: Click here to enter text.<br>Review Date: Click here to enter a date. | Signature File: |
| **Project Manager Review** | |
| PM Name: Click here to enter text.<br>Review Date: Click here to enter a date. | Signature File: |
| **Subcontractor Representative Approval -** Signature indicates that you have personally reviewed and agree that known hazards and risks have been identified and appropriate controls are in place to start work | |
| Name: Click here to enter text.<br>Organization: Click here to enter text.<br>Approval Date: Click here to enter a date. | Signature File: |
| **Subcontractor Representative Approval -** Signature indicates that you have personally reviewed and agree that known hazards and risks have been identified and appropriate controls are in place to start work | |
| Name: Click here to enter text.<br>Organization: Click here to enter text.<br>Approval Date: Click here to enter a date. | Signature File: |
| **Subcontractor Representative Approval -** Signature indicates that you have personally reviewed and agree that known hazards and risks have been identified and appropriate controls are in place to start work | |
| Name: Click here to enter text.<br>Organization: Click here to enter text.<br>Approval Date: Click here to enter a date. | Signature File: |
| **PIC Approval -** Signature indicates that you have personally reviewed and agree that known hazards and risks have been identified and appropriate controls are in place to start work | |
| PIC Name: Click here to enter text.<br>Approval Date: Click here to enter a date. | Signature File: |

# Level 2 Health and Safety Plan

**Acknowledgement**

***I have read, understood, and agree with the information set forth in this health and safety plan (HASP), and will follow guidance in the plan and in ERM's Document Control System (DCS). I understand the training and medical monitoring requirements (if any) for conducting activities covered by this HASP and have met these requirements.***

| Printed Name | Signature | Organization | Date |
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ERM

# JHA
# Job Hazard Analysis

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| Project Number: | | Project / Client Name: | Sanmina Robintech/Compudyne Inc Site Investigation |
| Project Manager: | Robert Sents | Location: | 1200 Taylor Rd, Owego, New York |
| Partner-in-Charge: | Ernest Rossano | Date and Revision Number: | 2/17/2021 Rev. 0 |

| | |
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| **SPECIFIC TASK:** | **COVID-19 Specific Hazard Assement for Site Visits and General Field Work** |

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| Minimum Required PPE for Entire Task: | ☐ Hard Hat ☑ Safety-Toe Shoes ☐ Hearing Protection ☐ Goggles ☐ Face Shield ☐ Respirator <enter type and cartridge type> ☑ Other (specify): ☑ Safety Glasses ☑ Reflective Vest ☑ Gloves Nitrile ☑ PPE clothing Level D, Long Sleeves, Outer & Inner Layer if Possible Hand Sanitizer, Rubbing Alcohol, Antibacterial Soap | | |
| Additional Task-Step Specific PPE: (as indicated below under Controls) | Face coverings (as needed) | Equipment / Tools Required: | Face coverings, nitrile gloves, biocidal or antibacterial solutions/ soap, hand sanitizer. |
| Training Required for this Task: | Field work shall be conducted by those with ERM-specific trainings. Company updates to COVID-19 field work shall be followed. | Permits Required for this Task: | N/A |
| Forms Associated with This Task: | Refer to this JHA, Travel Position, ERM Control NAM-1363-GU1, Face Coverings Guidance, and COVID-19 Field Recommendations. | | |

| JHA Developed / Reviewed By: | | | JHA Review In Field |
|---|---|---|---|
| Name / Job Title: | Name / Job Title: | Name / Job Title: | Field supervisor to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. **Signature/Date:** |
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| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Probability | Consequence | RISK | Controls to Eliminate or Reduce Risks[3] | |
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| COVID | Pre-plan for work activity | 1a | Not having the current standards and procedures, including, but not limited to COVID-19 | **H&S** | Heard of | Medium | 6 | 1a | • Refer to the Centers for Disease Control (CDC) site for guidance.<br>• Refer to ERM COVID-19 Site and FAQs site for guidance.<br>• Contact client for any client or site specific requirements/restrictions. |
| | | | | **H&S** | Heard of | Medium | 6 | 1b | Conduct Pre-field work review with Local H&S, PM, and/or PIC to verify work can be performed safely with the following standards. |
| | Evaluate fitness for duty | 2a | Exposing others to infectious disease, including, but not limited to COVID-19 | **H&S** | Possible | Major | 20 | 2a | Please coordinate with the project team to verify and report your fitness for duty:<br><br>1) On a the day prior to the initiation of work*;<br>2) Prior to beginning work each day*;<br>3) Each day upon the completion of work activities; and,<br>4) Upon any perceived change to your fitness for duty.<br><br>*Determine and report prior to travel to the work site.<br><br>**Under any of the following circumstances, exercise your Stop Work Authority**:<br><br>If you are sick, have a fever, cough, and/or shortness of breath or have been in close contact with ANYONE (friend, family, etc.) – stay home.<br><br>If you have traveled to a high-risk area and/or have been in contact with someone who has or may have been infected with COVID-19 – stay home.<br><br>If you become sick while working in the field or at a client site, you should remove yourself from the site as soon as it is safe to do so and contact your personal health care physician (PHCP) for advice.<br><br>In all cases where an employee is sick, has symptoms of COVID-19, or has an elevated exposure potential due to travel or contact with others as outlined above, please contact your supervisor, PM, and PIC immediately. |

| | Task Steps[1] | | Potential Hazards & Consequences[2] | select | Probability | Consequence | RISK | | Controls to Eliminate or Reduce Risks[3] |
|---|---|---|---|---|---|---|---|---|---|
| COVID | | 2b | Anxiety stemming from the potential for exposure illness including COVID-19. | **H&S** | Possible | Medium | 8 | 2b | The most important thing for our employees to remember is that they have ultimate Stop Work authority. If you do not feel comfortable performing the indicated work, you should let your line manager, the PM, the PIC, BUMP, or BU H&S Director know as quickly as possible so alternate arrangements can be made. |
| | Evaluate Work Activities | 3a | Unable to perform work activities in compliance with the controls listed herein; increased exposure potential to COVID-19 | **H&S** | Heard of | Medium | 6 | 3a | Review the scope of work to be performed prior to mobilization to evaluate if the proposed tasks can be performed in accordance with these controls.<br><br>Please review your scope of work accordingly and identify any activities that would require a change in methodology or equipment. Coordinate with the project team to identify an acceptable alternative and develop a hazard assessment prior to mobilization.<br><br>Examples:<br>Okay to perform without further coordination after review of the associated activity JHA - Buddy system required to avoid lone worker - Under normal circumstances this can be completed while maintaining a physical buffer (6ft).<br><br>Requires additional coordination and a change in methodology or equipment to complete - Team lift required to move compact piece of equipment - To perform a team lift, personnel would violate the requirement to maintain a physical buffer (6ft). |
| | Practice good personal hygiene | 4a | Exposing others or yourself to infectious disease, including, but not limited to COVID-19 | **H&S** | Possible | Medium | 8 | 4a | Good hygiene must be practiced universally. If you think that you must sacrifice good personal hygiene to perform any of your work duties, please STOP WORK and contact the project team for guidance.<br><br>- Cover your nose and mouth with a flexed elbow or paper tissue when coughing or sneezing and dispose immediately of the tissue.<br>- Wash your hands often with soap and water for at least 20 seconds, especially after going to the bathroom; before eating; and after blowing your nose, coughing, or sneezing.<br>- If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol.<br>- Avoid close contact with people, particularly any who are sick.<br>- Avoid touching your eyes, nose, and mouth.<br>- Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe.<br>- CDC, at this time, does not recommend that people who are well wear a respirator/N-95 to protect themselves from respiratory diseases, including COVID-19, as there is no evidence that wearing a mask – of any type – protects non-sick persons. But wearing a face cover does prevent the spread of the virus from contagious persons who may not even know they are infected.<br>ERM staff are able to voluntarily wear a face cover if they so desire. Also, some local governments may start requiring the use of a face cover by everyone when in public - check your local requirements. |
| | Travel to the project Site | 5a | Exposure illness including COVID-19 | **H&S** | Likely | Significant | 20 | 5a | Do not carpool.<br><br>Utilize a company vehicle or your personal vehicle for transportation to the project site. If necessary, utilize a rental vehicle. When using a company vehicle or rental, disinfect the vehicle including door handles, steering wheel and other surfaces before and after use.<br><br>However, please practice the personal hygiene recommendations and try yo avoid travel by public transportation. This includes, but is not limited to:<br>- Buses<br>- Trains<br>- Light Rail<br>- Taxis<br>- Rideshares (e.g., Uber and Lift)<br>- Shared Rideables (e.g., Jump Bike and Lime Scooter) |

| | Task Steps[1] | | Potential Hazards & Consequences[2] | select | Probability | Consequence | RISK | | Controls to Eliminate or Reduce Risks[3] |
|---|---|---|---|---|---|---|---|---|---|
| COVID | Tailboard meeting, sign-in, JHA review, and activity associated documentation. | 6a | Exposure illness including COVID-19 - Subcontractors or vendors | **H&S** | Possible | Medium | 8 | 6a | Verbally discuss fitness for duty with any subcontractors, vendors, or other parties onsite. Review the signs and symptoms of COVID-19 (see below) and verify that they have not experienced these themselves and have not knowingly been in contact with someone who has exhibited or reported these symptoms.<br><br>- Fever<br>- Cough<br>- Shortness of breath |
| | | 6b | Exposure illness including COVID-19 - Inhalation | **H&S** | Possible | Serious | 12 | 6b | Conduct tailboard meetings outside in well ventilated areas. Avoid closed conditions such as job trailers.<br><br>**Utilize physical distancing (referenced commonly as social distancing):**<br>- Maintain a buffer of at least 6 feet (2 m) from other people.<br>- Avoid crowds |
| | | 6c | Exposure illness including COVID-19 - Personal Contact | **H&S** | Possible | Serious | 12 | 6c | As above, utilize physical distancing and avoid small enclosed areas. Abstain from normal social greetings (i.e., handshakes) |
| | | 6d | Exposure illness including COVID-19 - Surface Transmission | **H&S** | Possible | Serious | 12 | 6d | Implement the following controls to limit potential exposure while maintaining required documentation:<br><br>- Do not share or pass around writing implements, clipboards, or other supplies, bring your own pen;<br>- Don disposable gloves (e.g., nitrile) while signing;<br>- Take turns when signing to maintain physical distancing (6ft from others);<br>- Utilize magnets to hold signature pages on vehicles and limit handling;<br>- If possible have one person complete all required documentation; and,<br>- Change gloves before touching personal items.<br><br>**- Do not physically collect individual documentation (e.g., field notes) physically from the group. Instead convert to electronic on an individual basis and combine electronically. If dcouments must be touched then wear nitrile gloves while handling them and do not touch any part of your body or clothing while doing so. When finished, remove gloves and wash hands with soap.** |
| | | 6e | Exposure illness including COVID-19 | **H&S** | Possible | Serious | 12 | 6e | Review scope of work and determine if work can be divided to maximize the controls specified above. |
| | Perform work activities | 7a | Performance of work activities may lead to increased exposure potential to COVID-19 | **H&S** | Possible | Serious | 12 | 7a | If in the performace of the work activities you observe conditions that contradict the controls described herein, STOP WORK and contact the project team before proceeding.<br><br>Plan work so that at least 6 feet (2m) is maintained. Example one person touches equipment and collects samples and the second person is scribe and prepares labels/COC. |
| | | 7b | Exposure from Field office trailers | **H&S** | Possible | Serious | 12 | 7b | Project team should don proper gloves and wipe down work surface upon arrival at the trailer including but not limits to inside and out door handles, light switches, table/desks, and electronic devices.<br>- Do not maintain any trash cans inside the trailer. All trash including food waste should be removed.<br>- If an eating area is established in the trailer it should be wiped down before and after eating including tables, mocrowaves, coffee makers, and refrigerator handles.<br>- Limit time and the number of people in thr trailer. Maintian 6ft seperation. Keep heat/AC off if possible and maintin windows or doors open for fresh air<br>- Project team should perform cleaning of the trailer as in bullet one prior to depature for the day. |

| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Probability | Consequence | RISK | Controls to Eliminate or Reduce Risks[3] | |
|---|---|---|---|---|---|---|---|---|---|
| COVID | Demobilization | 8a | Exposing others to potential contact via surface tansmission | H&S | Possible | Significant | 16 | 8a | Don clean PPE and disinfect all rental and ERM equipment, coolers, sample container exteriors, and supplies prior to returning it to the vehicle. Properly dispose of all disposable PPE onsite prior to leaing. Do not transport back to the office. |
| | | 8b | Exposure illness including COVID-19 - Surface Transmission | H&S | Heard of | Serious | 9 | 8b | Remove and place field clothes in a bag prior to leaving the site. Wash all field clothes in warm to hot water to disinfect (virus can live for a couple of days on surfaces and clothing). |
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ONE JHA PER TASK. CONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.
INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT.
LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

1. Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.

2. List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use numbers and letters for each hazard/impact listed (1a, 1b, etc). Hazards should be described in terms of their specific origin and negative consequences (e.g., instead of “moving equipment”, write “injury from getting struck by forklift”).

3. Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of “use good body positioning,” write “don’t bend at waist or reach above head”). Use numbers and letters corresponding to listed hazards.

4. Select the probability of occurrence and consequence of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [ RISK = Likelihood x Severity].

**A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.**

**WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):**

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE

# JHA
# Job Hazard Analysis

| | | | |
|---|---|---|---|
| Project Number: | 589878 | Project / Client Name: | Sanmina Robintech/Compudyne Inc Site Investigation |
| Project Manager: | Robert Sents | Location: | Owego, NY |
| Partner-in-Charge: | Ernie Rossano | Date and Revision Number: | 3/24/22 |

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|---|---|
| **SPECIFIC TASK:** | **Drilling and SSC** |

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| Minimum Required PPE for Entire Task: | ☑ Hard Hat ☑ Safety-Toe Shoes ☑ Hearing Protection ☐ Goggles ☐ Face Shield ☐ Respirator <enter type and cartridge type> ☐ Other (specify): ☑ Safety Glasses ☑ Reflective Vest ☑ Gloves nitrile for sampling ☐ PPE clothing <enter type here (eg, Tyvek, FRC, long sleeves)> Sunglasses to reflect glare when necessary | | |
| Additional Task-Step Specific PPE: (as indicated below under Controls) | Cutting gloves if needed for splitting drilling sleeves | Equipment / Tools Required: | |
| Training Required for this Task: | SSC Classroom Training, SSC EP, ERM FSO training | Permits Required for this Task: | |
| Forms Associated with This Task: | SSC project plan addendum | | |

| JHA Developed / Reviewed By: | | | JHA Review In Field |
|---|---|---|---|
| Name / Job Title: | Name / Job Title: | Name / Job Title: | Field Safety Officer (FSO) to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. **FSO Signature/Date:** |
| K. Warner/ geologist | R. Sents/ PM | | |
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| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] | |
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| 1 | Identify a Client Contact Person | 1a | Client contacts that are not familiar with the site layout could cause critical information to be missed during safety planning. | H&S | 3 | 3 | 9 | 1a | Determine degree of knowledge of our client contact by evaluating their current job duties at the site, length of time they have worked at the site, and time in their current job. If the ERM team does not feel comfortable with the level of experience of our client contact, take additional measures to ensure all pertinent subsurface utilities and services information is gathered. |
| 2 | Engage Subcontractors | 2a | Subcontractors who have not been evaluated against ERM minimum safety standards or who do not meet minimum safety standards may pose more risk. | H&S | 3 | 3 | 9 | 2a | Use only ERM subcontractors who are identified as having met our minimum safety standards. In cases where using an already-qualified subcontractor is not possible, ensure extra precautions are taken to provide safety oversight to the work. |
| 3 | Appoint an ERM Subsurface Clearance "Experienced Person" to the project | 3a | ERM employees who are not experienced with SSC issues may not recognize critical zones or clues to other site utilities/services. | H&S | 3 | 4 | 12 | 3a | Ensure a "SSC Experienced Person" is assigned to the project to provide oversight of ground penetrations and to mentor less experienced ERM employees. |
| 4 | Develop the HASP | 4a | Using incorrect documents in safety planning may lead to not considering all pertinent information. | H&S | 3 | 3 | 9 | 4a | A Level 2 WARN HASP for Intrusive Work (minimum) must be used when performing any ground penetrations, with the exception of surface soil sampling. The Level 2 HASP contains a "Site Services Model" that ERM uses to evaluate SSC hazards. |
| 5 | Make Preliminary Determinations | 5a | Not recognizing or identifying critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities. | H&S | 3 | 4 | 12 | 5a | Establish critical zones and excavation buffers (if needed) for the work. Initial critical zone determinations may change in the field but are a good starting point in hazard identification. |
| 6 | Identify Preliminary Ground Disturbance Locations | 6a | Planning ground disturbance locations inside critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities. | H&S | 3 | 3 | 9 | 6a | Ensure critical zones have been identified using the Site Services Model and then identify locations outside those critical zones up-front, if possible. If a ground disturbance inside a critical zone is absolutely necessary, notify the site PIC and obtain guidance from him/her before proceeding. |
| 7 | Public and/or Private Utility Markout | 7a | Not having utilities marked may lead to a subsurface clearance strike. | PL | 3 | 3 | 9 | 7a | Contact public and private utility markout services giving them enough time to respond. A minimum of 24-hour notification to utility locators is required in most states, and may vary higher in some states. |
| 8 | Conduct the Site Walk | 8a | Inexperienced people conducting the site walk may miss pertinent information regarding utilities and/or services. | H&S | 3 | 4 | 12 | 8a | The "SSC Experienced Person" must lead the site walk and should be accompanied by our client contact. Each ground disturbance location should be approved by our client contact (written approval preferred, verbal approval acceptable). |

| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] | |
|---|---|---|---|---|---|---|---|---|---|
| 9 | Develop the Site Services Model | 9a | Critical zones and a whole-site view of utilities and services at the site are more difficult to do if not put into the Site Services Model. | H&S | 4 | 2 | 8 | 9a | Use the Site Services Model to identify gaps in knowledge from all drawings and other verbal information from our client contact. Identify locations of key isolation and shutoffs closest to the work area for each type of utility/service. |
| 10 | Inspect Each Ground Disturbance Location | 10a | Inexperienced people conducting inspection may miss pertinent information regarding utilities and/or services. | H&S | 3 | 4 | 12 | 10a | The "SSC Experienced Person" must lead inspection of each Ground Disturbance Location. Any visual clues of subsurface obstruction/utilities should be documented. Critical zones may have to be reassessed at this point. Use the SSC Checklist to document this inspection for each point inside a critical zone, at a minimum. |
| 11 | Finalize Critical Zone Determinations | 11a | Not performing this verification step in the field may lead to a SSC strike. | H&S | 3 | 4 | 12 | 11a | Use information gathered during pre-planning, utility markout, and site walk/inspection to verify critical zones that have been previously established. Revise critical zones as necessary. Use the SSC Checklist to document points inside critical zones. If points are confirmed inside critical zones, either step out and relocate the ground disturbance location, or contact the PIC for additional guidance. |
| 12 | Oversee setup of drilling equipment | 12a | Overhead electrical/other lines may come in contact with drill rigs. | H&S | 3 | 4 | 12 | 12a | Ensure drill rigs are set up in areas where they will not contact overhead lines when being positioned. The minimum distance for drill rig clearance is 25 feet unless special permission is granted by the utility company. When a drill rig must be maneuvered in tight quarters, the presence of a second person is required to ensure adequate clearance. If backing-up is required, two ground guides will be used: one in the direction the rig is moving and the other in the operator's normal field of vision. |
| | | 12b | Materials stored in the vicinity of drill rigs may pose various hazards to employees. | H&S | 3 | 4 | 12 | 12b | Move tools, materials, cords, hoses, and debris to prevent trip hazards and contact with moving drill rig parts. Secure tools and equipment subject to displacement or falling. Store any flammable materials away from ignition sources and in approved containers. |
| 13 | Physically Clear all Ground Disturbance Locations | 13a | Employees performing physical clearance could contact underground utility/service lines. | H&S | 4 | 3 | 12 | 13a | Use cable avoidance tools at each location that must be physically cleared (OSHA requirement). If using a hand-auger, ensure insulated handles are in-place before their use. |
| | | 13b | Drill rig could damage electrical/utility/service lines if not physically cleared first. | H&S | 3 | 4 | 12 | 13b | Mechanical ground penetration should not commence until a ground disturbance location is physically cleared. In certain situations drilling may occur without physical clearance – consult with the project PIC prior to making this determination. |
| 14 | Commence Drilling Operations | 14a | Rotating equipment could pull employees into equipment. | H&S | 3 | 4 | 12 | 14a | Do not wear loose or frayed clothing, loose long hair, or loose jewelry while working around rotating equipment. Tuck shirt-tails into pants. Never walk directly behind or beside drill rigs without the drill rig operator's knowledge. Keep all non-essential personnel out of the drill rig work area. |
| | | 14b | Poorly functioning drill-rig equipment could expose employees to hazardous conditions. | H&S | 3 | 4 | 12 | 14b | Ensure drill rigs and other machinery used is inspected daily by competent, qualified individuals. Instruct drill rig operators to report any abnormalities such as equipment failure, oozing liquids or unusual odors so they can be dealt with before proceeding with work. Do not eat, drink, or smoke near the drill rig. |
| | | 14c | Noisy environments may make it difficult to communicate by vocal means. | H&S | 3 | 4 | 12 | 14c | Wear hearing protection at all times when in the vicinity of the drill rig, or when you must raise your voice to be heard by co-workers. Maintain visual contact with the drill rig operator at all times and establish hand-signal communications for use when verbal communication is difficult. |
| 15 | Complete Drilling Operations | 15a | Equipment allowed to remain running poses pinch-point and potential explosion hazards to employees | H&S | 3 | 4 | 12 | 15 | Shut down drill rigs before repairing or lubricating parts (except those that must be in motion for lubrication). Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity. |

| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] | |
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ONE JHA PER TASK. SUBCONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.
INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT.
LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

1. Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.

2. List potential health & safety hazards and consequences - ONE PER ROW - and select "H&S" from the drop-down list. Then list any potential security, environmental, and/or property loss impacts - ONE PER ROW - and select the corresponding code(s) from the drop-down list. Use numbers and letters for each hazard/impact listed (1a, 1b, etc). Hazards should be described in terms of their specific origin and negative consequences (e.g., instead of “moving equipment”, write “injury from getting struck by forklift”).

3. Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of “use good body positioning,” write “don’t bend at waist or reach above head”). Use numbers and letters corresponding to listed hazards.

4. Select the likelihood of occurrence and severity of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [ RISK = Likelihood x Severity].

**A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.**

## WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE

# JHA
# Job Hazard Analysis

| | | | |
|---|---|---|---|
| Project Number: | 351288 | Project / Client Name: | Sanmina Robintech/Compudyne Inc Site Investigation |
| Project Manager: | Robert Sents | Location: | Owego, NY |
| Partner-in-Charge: | Ernie Rossano | Date and Revision Number: | 8/16/2016 |

| | |
|---|---|
| **SPECIFIC TASK:** | **Driving Field Vehicle** |

| | | | |
|---|---|---|---|
| Minimum Required PPE for Entire Task: | ☐ Hard Hat ☐ Safety-Toe Shoes ☐ Hearing Protection ☐ Goggles ☐ Face Shield ☐ Respirator <enter type and cartridge type> ☐ Other (specify): ☐ Safety Glasses ☐ Reflective Vest ☐ Gloves <enter type here> ☐ PPE clothing <enter type here (eg, Tyvek, FRC, long sleeves)> Sunglasses to reflect glare when necessary | | |
| Additional Task-Step Specific PPE: (as indicated below under Controls) | Sunglasses to reflect glare when necessary | Equipment / Tools Required: | Field Vehicle |
| Training Required for this Task: | Valid Driver's License, ERM FSO training | Permits Required for this Task: | Driver's License |
| Forms Associated with This Task: | ERM Vehicle Safety sheet | | |

| JHA Developed / Reviewed By: | | | JHA Review In Field |
|---|---|---|---|
| Name / Job Title: | Name / Job Title: | Name / Job Title: | Field Safety Officer (FSO) to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. **FSO Signature/Date:** |
| Dana Hall/Project Scientist | | | |
| | | | |
| | | | |

| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Inspect the vehicle | 1a | Tire pressure, brakes, steering, headlights, and other vehicle equipment malfunction can contribute to vehicle accidents and property damage | H&S | 3 | 3 | 9 | 1a | Use "ERM Vehicle Safety Form" to document daily inspections of the vehicle. In certain cases, a client-required form may be used instead. Do not operate any vehicle if its safety is in question. |
| | | 1b | Loose articles inside the vehicle and carried in the truck beds or on trailers can shift and cause distractions or traffic accidents | H&S | 3 | 3 | 9 | 1b | During vehicle inspection make sure any loose articles either inside the vehicle of in truck beds/on trailers are well-secured. |
| 2 | Get in and out of the vehicle | 2a | Hands, hair, or loose clothing can be caught in doors, trunk covers, and other vehicle equipment, causing injury. | H&S | 3 | 3 | 9 | 2a | When entering or exiting a vehicle, pay attention to what you are doing & be cognizant of potential hazards. |
| 3 | Driving the vehicle | 3a | Operating a vehicle presents many different hazards to employees that must be simultaneously mitigated. | H&S | 3 | 4 | 12 | 3a | Before moving vehicles always put your seat belt on, and stop using handheld electronics. Make sure any food or drink is secured and any electronics are programmed (GPS). When moving vehicles, follow all posted speed limits and posted signs. Do not pick up hitch-hikers, and never transport people in truck beds. |
| 4 | Driving when fatigued | 4a | Operating a vehicle after a full day of work or when you are fatigued drastically decreases focus and response time, and increasing the risk of being involved in a vehicle accident. | H&S | 3 | 4 | 12 | 4a | Avoid driving more than 8 hours in one workday. If the number of hours driving to/from a jobsite combined with the number of hours to be worked on the site will equal more than 14 total hours, alternate arrangements should be arranged. Be aware of your fatigue level while driving and stop to rest if you feel overly tired. |
| 5 | Stay focused on the road | 5a | Doing anything that distracts you from the road for more than 2 seconds highly increases the risk of being involved in a vehicle accident. In particular, driver inattention due to hand-held mobile phone use is currently thought to be responsible for approximately 80% of all vehicle accidents. | H&S | 3 | 4 | 12 | 5a | Do not operate a hand-held mobile phone while driving. Use a hands-free mobile solution instead, such as a Bluetooth headset or hardwired earpiece. In some cases, all mobile phone use while driving (including answering and dialing), may be prohibited by our client.<br>Do not perform activities while driving that will take your attention off the road for more than 2 seconds. A few of these types of activities could include programming GPS', applying makeup, changing the radio, or eating while driving. When these sorts of activities must be performed, pull to the side of the road and stop. |
| 6 | Leaving the vehicle | 6a | Leaving personal valuables and company equipment/documents in abandoned vehicles may attract thieves. | H&S | 3 | 3 | 9 | 6a | Turn off the engine and lock any vehicle being left for even a short period of time when not on a secure jobsite. If the vehicle will be left for long periods or overnight, remove any company documents, computers, and equipment, personal valuables, or any items that would attract thieves. |

| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] | |
|---|---|---|---|---|---|---|---|---|---|
| 7 | Report and Document Vehicle Accidents and Property Damage | 7a | Improper documentation of vehicle accidents and property damage caused by vehicle operation place ERM at risk. | PL | 3 | 3 | 9 | 7a | No matter how minor a vehicle accident or property damage event is, report it as a safety event. If involved in a vehicle accident, always call the police so a report will be available, to protect your liability, and to protect ERM liability. Take as many pictures as you can of the accident scene if you can do so without placing yourself in further danger. |

ONE JHA PER TASK. SUBCONTRACTORS MUST PROVIDE THEIR OWN JHAS. JHAS SHOULD BE WRITTEN IN PLAIN LANGUAGE AND SHOULD BE NO MORE THAN 2-3 PAGES IN LENGTH.
INSERT ADDITIONAL ROWS AS NEEDED ABOVE (MUST MANUALLY COPY AND PASTE FORMULA IN COLUMN H). ROW HEIGHTS MAY NEED TO BE MANUALLY EXPANDED TO VIEW ALL TEXT.
LEAVE SEVERAL BLANK OVERSIZED ROWS TO ALLOW HANDWRITTEN FIELD ADDITIONS. CAN ALSO DELETE UNNEEDED ROWS TO FIT PAGE(S).

1. Each task consists of a set of steps. List and number all the steps in the sequence they are performed. Specify the equipment or other details.
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3. Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of "use good body positioning," write "don't bend at waist or reach above head"). Use numbers and letters corresponding to listed hazards.
4. Select the likelihood of occurrence and severity of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [ RISK = Likelihood x Severity].

**A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.**

| Task Steps[1] | Potential Hazards & Consequences[2] select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] |
|---|---|---|---|---|---|

**WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):**

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE

# JHA
# Job Hazard Analysis

| | | | |
|---|---|---|---|
| Project Number: | 351288 | Project / Client Name: | Sanmina Robintech/Compudyne Inc Site Investigation |
| Project Manager: | Robert Sents | Location: | Owego, NY |
| Partner-in-Charge: | Ernie Rossano | Date and Revision Number: | 8/16/2016 |

| | |
|---|---|
| **SPECIFIC TASK:** | **Field Sampling** |

| | | | |
|---|---|---|---|
| Minimum Required PPE for Entire Task: | ☑ Hard Hat ☑ Safety-Toe Shoes ☑ Hearing Protection ☐ Goggles ☐ Face Shield ☐ Respirator <enter type and cartridge type> ☐ Other (specify): ☑ Safety Glasses ☑ Reflective Vest ☑ Gloves <enter type here> ☐ PPE clothing <enter type here (eg, Tyvek, FRC, long sleeves)> | | |
| Additional Task-Step Specific PPE: (as indicated below under Controls) | | Equipment / Tools Required: | PID |
| Training Required for this Task: | ERM FSO training | Permits Required for this Task: | None. |
| Forms Associated with This Task: | Soil Boring Logs | | |

| JHA Developed / Reviewed By: | | | JHA Review In Field |
|---|---|---|---|
| Name / Job Title: | Name / Job Title: | Name / Job Title: | Field Safety Officer (FSO) to ensure all personnel performing this task have reviewed JHA and agree to follow it. Site-specific changes to this JHA have been made as warranted based on this review. **FSO Signature/Date:** |
| Dana Hall/Project Scientist | | | |
| | | | |
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| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Ground Water sampling | 1a | Backsplash of water while sampling, tripping hazards | H&S | 3 | 3 | 9 | 1a | Proper PPE must be worn at all times to prevent ground water and any other possible contaminants from contacting samplers. All equipment should be properly packed and carried in a manner that does not add excessive stress to the sampler's back or impair seeing. If necessary, sampler will make additional trips to avoid potential trips and dropping equipment. |
| 2 | Soil Sampling | 2a | Soil contamination | H&S | 3 | 3 | 9 | 2a | The sampler must wear proper PPE at all times as to not contact any soil, which may or may not be contaminated. |
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| Task Steps[1] | | Potential Hazards & Consequences[2] | | select | Likelihood | Severity | RISK | Controls to Eliminate or Reduce Risks[3] | |
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3. Describe the specific actions or procedures that will be implemented to eliminate or reduce each hazard. Be clear, concise, and specific. Use objective, observable, and quantified terms (e.g., instead of “use good body positioning,” write “don’t bend at waist or reach above head”). Use numbers and letters corresponding to listed hazards.

4. Select the likelihood of occurrence and severity of each hazard, AFTER implementation of the planned control measures (use the Risk Matrix as a guide). The corresponding risk rating will then be automatically calculated [ RISK = Likelihood x Severity].

**A risk rating shaded red indicates that work cannot continue without additional control measures and approval of Partner-in-Charge.**

## WAYS TO ELIMINATE OR REDUCE RISKS (IN ORDER OF PREFERENCE):

ELIMINATE / AVOID --> SUBSTITUTE / MODIFY --> ISOLATE --> ENGINEER / SAFEGUARD --> TRAINING AND PROCEDURES --> WARNING AND ALERT MECHANISMS --> PPE

| | Applicability: | Form | Document Number: | Version: |
|---|---|---|---|---|
| ERM | North America | | NAM-1512-FM1 | 3 |
| | Title: **Excavation/Trench Inspection** | | **Last Revision Date:** | 8/20/20 |

| **Competent Person:** | **Date:** | |
|---|---|---|
| **Project Name:** | **Project Location:** | **Weather Conditions:** |

**Soil Classification:** ☐ **Stable Rock (no sloping required);** ☐ **Type A- ¾:1;** ☐ **Type B-1:1;** ☐ **Type C-1 ½:1**

| | Yes | No | N/A |
|---|---|---|---|
| Have all ERM subsurface clearance (SSC) activities been completed? | ☐ | ☐ | ☐ |
| Will employees enter the excavation? | ☐ | ☐ | ☐ |
| Are barricades or covers in place and in good conditions? | ☐ | ☐ | ☐ |
| Have tension cracks been observed along the top of any slopes? | ☐ | ☐ | ☐ |
| Is excavated material at least 2 feet (0.6 meters) from the edge of the excavation? | ☐ | ☐ | ☐ |
| Is excavation properly sloped or benched for the soil type?<br>Stable Rock: N/A, Type A- ¾:1, Type B-1:1, and Type C-1 ½:1 | ☐ | ☐ | ☐ |
| Is any water seepage noted in trench walls or bottoms? | ☐ | ☐ | ☐ |
| Are pumps in place or available if needed? | ☐ | ☐ | ☐ |
| Is bracing system installed in accordance with design? | ☐ | ☐ | ☐ |
| Is there any evidence of significant facture planes in soil or rock? | ☐ | ☐ | ☐ |
| Is there any evidence of caving or sloughing of soil since the last inspection? | ☐ | ☐ | ☐ |
| Are there any zones of unusually weak soils or materials not anticipated? | ☐ | ☐ | ☐ |
| Are hydraulic shores pumped to design pressure? | ☐ | ☐ | ☐ |
| Is shoring being used secure? | ☐ | ☐ | ☐ |
| Does plan include adequate safety factor for equipment being used? | ☐ | ☐ | ☐ |
| Is traffic adequately away from trenching operation? | ☐ | ☐ | ☐ |
| Are barricades up and secure? | ☐ | ☐ | ☐ |
| Is vibration from equipment or traffic too close to trenching operation? | ☐ | ☐ | ☐ |
| Are trench boxes certified? | ☐ | ☐ | ☐ |
| Are GFCIs used on all temporary electrical cords? | ☐ | ☐ | ☐ |
| Is access and egress located within 25 feet of entrants? | ☐ | ☐ | ☐ |
| Is hazardous atmosphere testing done on a regular basis? | ☐ | ☐ | ☐ |
| Have rescue procedures been established? | ☐ | ☐ | ☐ |
| Is emergency equipment immediately available? | ☐ | ☐ | ☐ |

Add comments below, as necessary, based on responses from previous page.

| Comment |
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# 11.0 HAZARD COMMUNICATION PROGRAM

## 11.1. PURPOSE

The Hazard Communication Program is designed to ensure that information necessary for the safe use, handling and storage of hazardous chemicals is provided and made available to all ERM employees.

This program must be reviewed with employees upon hiring if the employee has the potential to use chemicals. Employees with the potential to use chemicals would include all employees whose job requirements include fieldwork. As a general rule, employees such as administrative support staff would not be included. However, employees who have the opportunity to use or handle items like spray-on adhesives or copy machine toner would be included.

## 11.2. RESPONSIBILITIES

The Americas Health and Safety Director has overall responsibility for the corporate health and safety program that includes the Hazard Communication Program. The Director has the option of assigning these responsibilities to other individuals for completion. Responsibilities relating to the Hazard Communication Program include, but are not limited to, the following.

- Ensuring current Safety Data Sheets (SDS) are readily available to all employees;
- Maintaining a master chemical inventory list of all chemicals in the workplace; and
- Ensuring all containers of chemicals are properly labeled upon receipt at the workplace and that labels are not defaced or removed from the container until it is empty.

Project Managers are responsible for the following:

- Ensuring that the client informs that project team of the location of applicable SDS or provides a copy of applicable SDS;
- Ensuring SDS for each chemical brought onto the client's site is available on-site; and
- Ensuring that each ERM employee or subcontractor on a project is familiar with the chemicals and associated hazards.

Field Safety Officers (FSOs) are responsible for the following:

- Ensuring that all chemical containers are properly labeled

## 11.3. PROGRAM REQUIREMENTS

### 11.3.1. Labeling

Labels on all containers of chemicals whether used, handled, or stored in the field or on ERM property will minimally provide the following information:

- Identity of the hazardous chemical;
- Appropriate hazard warnings (words, pictures and/or symbols) which provide at least general information regarding the hazards; and
- Manufacturer or supplier of the chemical.

A container is defined as any bag, barrel, bottle, box, can, cylinder, drum, pail, reaction vessel, or storage tank containing a hazardous chemical. According to the OSHA Hazard Communication Standard, pipes or piping systems and engine, fuel tanks or other operating systems in a vehicle are not considered to be containers.

Portable containers into which chemicals are transferred from labeled containers do not have to be labeled providing:

- The person who transferred the chemical into the portable container is the only person who will use the chemical; and
- All of the chemical in the portable container will be used completely by the end of the work shift.

Personnel will not remove or deface any label on containers.

Labels and other forms of information will be legible, in English and prominently displayed at all times. In addition to English, labels and other forms of information may be presented in other languages. However, if a label or other form of information is in only one language, that language shall be English.

If non-English speaking employees are present in the work area, all labels and other forms of information will be available and presented in their language as well as English.

### 11.3.2. Chemical Inventory

The Field Safety Officer is responsible to oversee that a written list of chemicals used and stored on ERM property is maintained. The name of the chemical as it appears on the chemical inventory must allow individuals to be able to match the chemical with the SDS.

The chemical inventory will be updated and revised as necessary. The chemical inventory for field projects will be incorporated into the Site Specific HASP or listed on the JHA form.

11.3.3. Safety Data Sheets (SDS)

The SDS plays a vital role in the Hazard Communication Program since it provides written information for employees. At a minimum the following information must appear on SDS:

- Name, address and phone number of manufacturer;
- Date of preparation;
- Chemical/common name for all hazardous ingredients;
- Physical and chemical characteristics;
- Physical hazards;
- Health hazards;
- Signs and symptoms of exposure;
- Medical conditions aggravated by exposure;
- Primary routes of entry;
- Exposure limits;
- Designation as a carcinogen;
- Precautions for safe handling and use;
- Control measures such as appropriate engineering controls, work practices, or personal protective equipment; and
- Emergency and first aid procedures.

The Field Safety Officer is responsible for overseeing the maintenance of SDS for all chemicals used or stored on ERM property.

Project Managers will determine if ERM employees will use chemicals during the development of the HASP. SDS for chemicals used on a particular project will be attached to either the HASP or JHA and will be available at the job site.

SDS will be made available, upon request, to any ERM employees, subcontractor, or client. Upon receipt of an SDS, the Project Manager should review the SDS to ensure it is written in English, is legible, appears to be complete and is current, with an effective date of less than five years.

11.3.4. Subcontractors

The Project Manager or FSO will provide the following information to subcontractors prior to the start of any work at a client's site.

- Chemicals to which they may be exposed while at the facility including soil or groundwater contaminants;
- Hazards associated with the specific chemicals;

- Measures taken to reduce the hazard including use of personal protective equipment;
- Location of the SDS and safety showers or eye wash stations; and
- Emergency response procedures.

Prior to starting work, the subcontractor will provide the Project Manager or FSO with information about any chemicals brought onto the client's site. This information should include, at a minimum, the name of the chemical, the associated hazards and any personal protective equipment required.

Subcontractors will have a legible SDS for each chemical brought onto the client's site.

### 11.3.5. Employee Training

Training of all employees potentially exposed to hazardous materials on the job will be conducted as follows:

- Before new employees begin their jobs; and
- Whenever new chemicals are introduced into the workplace.

This training will include:

- Applicable regulatory requirements;
- Elements of this program;
- Location of the program, inventory and SDS;
- Chemicals used in their work areas and the associated hazards (chemical, physical and health);
- How to detect the presence or release of chemicals, including monitoring techniques, visual indicators, or odors;
- Protective measures to be used, including safe work/handling practices, use of personal protective equipment, and emergency response procedures;
- How to read and use SDS and labels; and
- How to obtain additional hazard information.

Where non-English speaking workers are employed, provisions for training in the appropriate language shall be arranged.

### 11.3.6. NON-ROUTINE TASKS

For projects involving field work at a client's site, ERM's client is responsible for informing ERM employees and subcontractors of the location of the applicable SDS and the hazards associated with any chemical ERM employees or subcontractors may come into contact with. For field projects requiring a site-specific health and safety plan, the hazards of the chemicals of concern will be summarized in the HASP.

In addition, the JHA form will be used to communicate all hazards, including chemical hazards associated with a task to all ERM employees or subcontractors involved in the completion of the task.

Attachment 11-1
Chemical Inventory Sheet

| Description | Container Size | Quantity | Location |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

**Attachment 11-2**

**Examples of Common Labeling Systems**

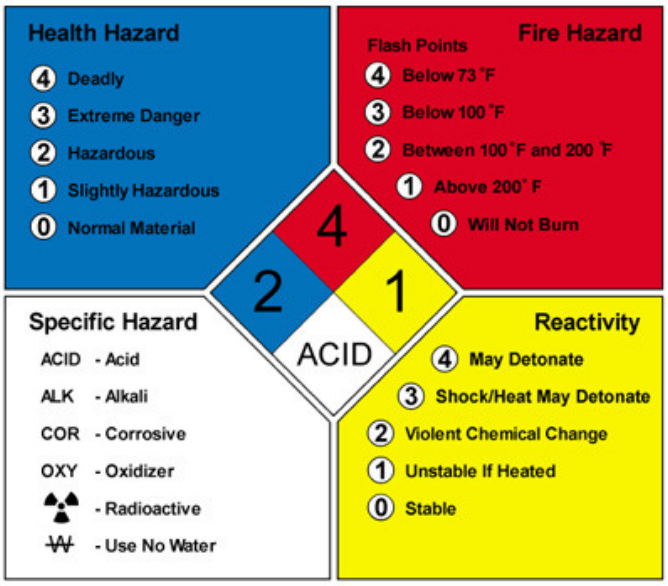
**GHS Format**

Each container of a classified hazardous chemical is to be labeled, tagged, or marked with the following elements:

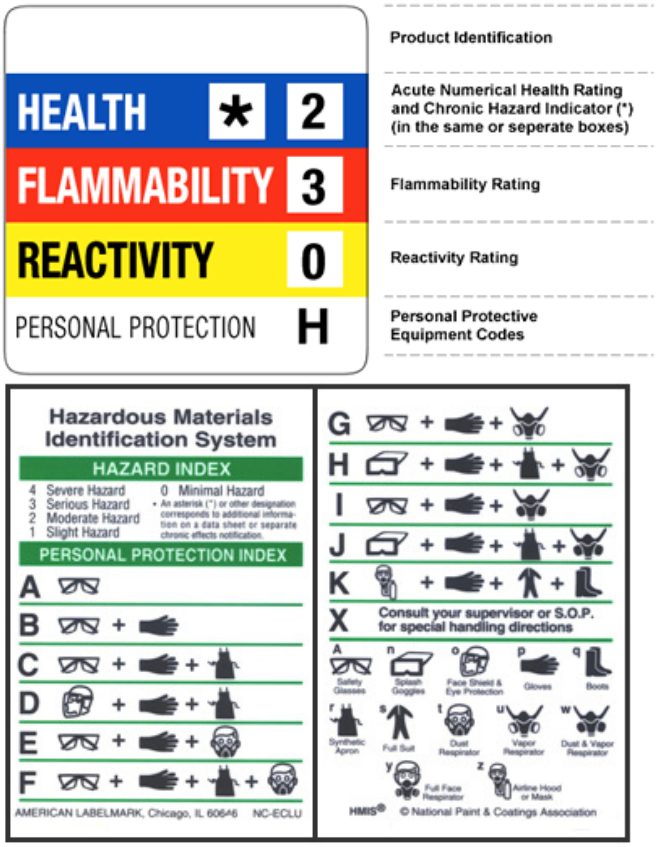
- Product or chemical identifier clearly indicated on the label that matches the product or chemical identifier on the SDS.
- Contact information for the product supplier, including the company name, address and telephone number.
- Hazard Pictograms. Pictograms have a black symbol on a white background with a red diamond frame.
- The signal word should be clearly marked at the top of the label beneath the product identifier. GHS permits the use of only two signal words (and only one at a time)—DANGER or WARNING— to emphasize the hazard and distinguish between hazard levels.
- A hazard statement that describes the level of hazard should appear under the signal word. Signal words, hazard statements and pictograms have all been harmonized and assigned to each hazard class and category in GHS. Once a chemical has been classified, the relevant harmonized information can be found in HCS under the new Appendix C.
- The label should include appropriate precautionary information. As of now, precautionary statements in the GHS are not harmonized. The intent is to harmonize precautionary statements in the future; until that time, OSHA is expected to mandate the use of the GHS examples, which it anticipates will end up being the harmonized statements.



**NFPA Diamond Format**




**HMIS Format**



# 14.0 HEARING CONSERVATION

The purpose of the Hearing Conservation Program is to prevent occupational noise-induced hearing loss in those employees working in potentially noisy areas.

## 14.1. RESPONSIBILITIES

The Americas Health and Safety Director has the overall responsibility for the Hearing Conservation Program. Some responsibilities may be delegated to others for implementation. Duties with respect to this program include:

- Ensuring engineering and administrative controls are implemented to reduce the potential for employee exposure;
- Providing a variety of suitable hearing protectors;
- Posting warnings signs for all high noise areas;
- Ensuring are noise surveys and personal noise monitoring is conducted to characterize potential noise exposure;
- Ensuring baseline and annual audiograms are conducted;
- Ensuing annual hearing conservation training is for employees with noise exposure equal to or exceeding an 8-hour time-weighted average (TWA) of 85 dBA; and
- Maintaining a copy of the OSHA standard (29 CFR 1910.95) in the workplace.

Employees are responsible for wearing hearing protectors in all designated areas.

## 14.2. GENERAL REQUIREMENTS

A Hearing Conservation Program is required whenever employee noise exposures equal or exceed an eight hour time-weighted average (TWA) of 85 dBA. Specific requirements for a Hearing Conservation Program are listed below:

- Noise Monitoring;
- Employee Notification;
- Observation of Monitoring;
- Audiometric Testing Program;
- Audiometric Testing Requirements;
- Hearing Protectors and Hearing Protector Attenuation;
- Training; and
- Recordkeeping

### 14.3. NOISE MONITORING

Noise monitoring to characterize potential employee noise exposure will be conducted either by a Subject Matter Expert or a Field Safety Officer that has received training in conducting noise monitoring. Both personal monitoring using noise dosimeters and area monitoring using a sound level meter will be conducted.

Noise monitoring will be repeated whenever a change in production, process equipment or controls occurs which could affect the number of employees exposed or render the attenuation of hearing protectors no longer effective.

### 14.4. EMPLOYEE NOTIFICATION

All employees participating in personal noise monitoring will be notified of their results. Any employee whose exposure is determined to have met or exceeded 85 dBA as an 8-hour TWA will be notified in writing within 15 calendar days. The results of area noise surveys will be communicated to project team members during the daily safety meeting.

### 14.5. OBSERVATION OF MONITORING

Employees or their designated representatives will be offered the opportunity to observe any noise monitoring conducted.

### 14.6. AUDIOMETRIC TESTING

ERM employees who are exposed to noise at or above 85 dBA as an 8-hour TWA within the working environment will receive a baseline audiogram within six months of the first exposure. Where mobile test vans are used to meet audiometric testing requirements, the baseline shall be completed within one year of the first exposure. Annually after obtaining the baseline audiogram, the employee shall receive a new audiogram for comparison to the baseline.

In preparation for both baseline and annual examinations, employees will be instructed to avoid noisy environments at both work and home for at least 14 hours before audiometric testing. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

Each employee's annual audiogram will be compared to the baseline audiogram. If the results of the annual audiogram indicate an average change in hearing threshold of 10 dB or more at the 2000, 3000, and 4000 Hz frequency in either ear relative to the baseline audiogram (defined as a standard threshold shift, or STS), the following actions will be taken (unless the shift has been determined to be non-occupational in nature):

- The employee will be notified within 21 days of the determination.
- The employee shall be referred for additional medical follow-up, as appropriate.
- Employees using hearing protectors will be refitted and retrained in their

use.

- Where necessary, hearing protectors with greater noise attenuation properties will be offered.
- Employees not using hearing protectors will be fitted with such, trained in their care and use, and required to use them.

Employees or their designated representatives will be offered the opportunity to observe any noise monitoring conducted. These tests are conducted at no cost to the employee. Results of audiograms and employee physicals will be forwarded directly to each employee within 10 working days of receipt of results.

## 14.7. HEARING PROTECTORS AND HEARING PROTECTOR ATTENUATION

A variety of hearing protectors will be provided to the employees at no cost. Hearing protectors will be maintained in good condition. Employees will wear hearing protectors in all designated high noise areas, while performing tasks that generated loud noises such as use of portable power tools, and while working within 25 feet of noisy operations such as drilling.

The adequacy of hearing protector attenuation will be evaluated to ensure that hearing protectors attenuate the employee exposure to an eight-hour TWA of 85 dBA or less. The Field Safety Officer is responsible for making this determination.

## 14.8. TRAINING

Hazard recognition and general awareness training on hearing conservation is provided to all ERM employees during the new hire orientation process, which occurs during the first week of employment. Recognition of completion of this training is performed by recording training in the ERM H&S training database, and a certificate of training is available to all employees. Annual training is required for all affected employees. The training will contain at least the following elements:

- Effects of noise on hearing;
- Purpose of hearing protectors and manufacturer's instructions on use and fitting;
- Advantages/disadvantages and attenuation of various types of hearing protectors;
- Instructions on selection, fitting, use and care of hearing protectors (in accordance with manufacturer instructions); and
- Purpose of audiometric testing program including an explanation of the test procedure.

Training will be updated, as needed, where changes in work processes or protective equipment has occurred.

## 14.9. RECORDKEEPING

Audiometric testing records will be maintained for each employee and contain the following information:

- Name and job classification;
- Date of audiogram;
- Name of person conducting audiogram;
- Date of last acoustic or exhaustive calibration of audiometer; and
- Employee's most recent noise exposure assessment.

As a good management practice, all audiometric testing records should be maintained for the duration of employment plus thirty years and all noise monitoring records should be maintained for the duration of employment.

# 15.0 HEAT AND COLD STRESS

## 15.1. GENERAL POLICY STATEMENT

It is the policy ERM to establish guidelines for work in environments where exposure to heat and cold stress are encountered and to provide guidance to evaluate and control these stressors.

In accordance with the ERM WARN process, an analysis will be conducted on each project to determine if heat or cold stress hazards exist, and if so mitigating measures will be enacted.

## 15.2. HEAT STRESS PROCEDURES

The effects of heat stress are dependent on a number of factors. These factors include the source of heat, whether it be radiant heat from an industrial process, or ambient temperature with or without sun loads, the type of work performed, duration of work activity, relative humidity, age and physical condition of the worker and the type of clothing worn (e.g., impervious clothing vs. standard work attire – Level D).

Given the variety of factors which can result in the development of a heat-related disorder, the following guidelines can be used to implement a work/rest regime based on the Permissible Heat Exposure Threshold limit Value (TLV) published by the American Conference of Governmental Industrial Hygienists (ACGIH). The work/rest regime is based on exposure to an acclimatized full-clothed worker wearing breathable (cotton) attire. The actual rest periods and frequency will be dependent on the worker's level of acclimatization, the type of heat stress environment encountered (e.g., radiant vs. solar), use of protective clothing and type of work performed.

The Permissible Heat Exposure Threshold Limit Values are presented in Table 1 as a guide to monitor and control worker exposure for heat stress environments. The Heat Stress TLV is based on the following Table. Heat stress measurement using the Wet Bulb Globe Temperature index on which the TLV is based.

**TABLE 1**
**PERMISSIBLE HEAT EXPOSURE THRESHOLD**
**LIMIT VALUES (IN DEGREES FAHRENHEIT WBGT)**

| WORK – REST REGIMEN | WORK LOAD | | |
|---|---|---|---|
| | LIGHT | MODERATE | HEAVY |
| Continuous Work | 86 | 80 | 77 |
| 75% Work – 25% Rest, each hour | 87 | 82 | 78 |
| 50% Work – 50% Rest, each hour | 89 | 85 | 82 |
| 25% Work – 75% Rest, each hour | 90 | 88 | 86 |

Definitions of work-load categories

- Light Work Load – sitting, standing to control machines, performing light hand and arm work.
- Moderate Work Load – walking about with moderate lifting and pushing.
- Heavy Work Load – pick and shovel work.

## 15.3. HEAT STRESS MEASUREMENTS

The method of heat stress measurement required to assess the permissible heat exposure TLV is by the Wet Bulb Globe Temperature Index (WBGT). This technique is the most practical method to evaluate environmental factors which most nearly correlate with deep body temperature and other physiological responses to heat.

WBGT measurements can be made with a Reuter-Stokes, or equivalent, direct reading Heat Stress Monitor. This instrument measures dry bulk temperature, natural aspirated wet bulb temperature, and Vernon globe equivalent temperature and electronically calculates the Wet Bulb Globe Temperature Index. An alternate method of measuring the WBGT Index using dry, natural wet bulb and globe temperature is presented in the ACGIH.

Threshold Limit Values for Chemical Substances and Physical Agents under "Heat Stress" Evaluation and Control.

**WBGT values are calculated using the following formula:**

**A. Outdoors with solar load:**
**WBGT = 0.7 NWB + 0.2 GT + 0.1 DB**

**B. Indoors or Outdoors with no solar load:**
**WBGT = 0.7 NWB + 0.3 GT**
**WBGT = Wet Bulb Globe Temperature Index**
**NWB – Natural Wet Bulb Temperature**
**DB – Dry Bulb Temperature**
**GT = Globe Temperature**

## 15.4. CLASSIFICATION AND PREVENTION OF HEAT ILLNESSES

### 15.4.1. Heat Stroke

- Condition: (a) hot dry skin: red, (b) high and rising core temperature 105°C and over; (c) brain disorders: mental confusion, loss of consciousness, convulsions, or coma, as core temperature continues to rise. Fatal if treatment is delayed.
- Predisposing Factors: (a) sustained exertion in heat by non-acclimatized workers; (b) obesity and lack of physical fitness; (c) recent alcohol intake, (d) dehydration; (e) individual susceptibility; (f) chronic cardiovascular disease in the elderly.
- Corrective Actions: immediate and rapid cooling by immersion in chilled water with massage, or by wrapping in wet sheet with vigorous fanning with cool dry air. Avoid overcooling. Treat shock if present. Seek medical attention.

- Prevention: medical screening of workers. Selection based on health and physical fitness. Acclimatization for 8 to 14 days by graded work and heat exposure. Monitoring workers during sustained work in severe heat environments.

### 15.4.2. Heat Exhaustion

- Clinical Features: (a) fatigue, nausea, headache, giddiness; (b) skin clammy and moist, complexion pale, muddy, or with hectic flush; (c) may faint on standing, with rapid pulse and low blood pressure.
- Predisposing Factors: (1) sustained exertion in heat, (2) lack of acclimatization, (3) failure to replace water and/or salt lost in sweat.
- Treatment: remove to cooler environment. Provide salted fluids such as Gatorade or equivalent. Seek medical attention.
- Prevention: acclimatize workers using a breaking-in schedule for 1 or 2 weeks. Supplement dietary salt only during acclimatization. Ample drinking water, Gatorade or equivalent, to be available at all times and taken frequently during work day.

### 15.4.3. Heat Cramps

- Clinical Features: painful spasms of muscles used during work (arms, legs, or abdominal). Onset can occur during or after work hours.
- Predisposing Factors: (1) heavy sweating during hot work, (2) drinking large volumes of water without replacing salt loss.
- Treatment: drinking liquids with salt supplement such as Gatorade or equivalent. Seek medical attention.
- Prevention: adequate salt intake with meals. In un-acclimatized men, provide salted (o.1 percent) drinking water.

### 15.4.4. Heat Rash

- Clinical Features: profuse tiny raised red blisters on affected areas. Pricking sensations during heat exposure.
- Predisposing Factors: unrelieved exposure to humid heat with skin continuously wet with un-evaporated sweat.
- Treatment: seek medical attention.
- Prevention: cooled resting and sleeping quarters to allow skin to dry between heat exposures.

## 15.5. TRAINING REQUIREMENTS

All field employees, including supervisors, are provided training annually on heat stress and working in hot environments during a "field season refresher" training module.

Employee training to recognize heat stress conditions and the methods necessary to prevent and treat heat stress should include:

- Proper clothing and PPE requirements.
- Recognition, prevention and first aid treatment for heat stress.
- Suggested work/rest regimes and fluid intake.
- Safe work practices in heat stress environments

## 15.6. HEAT STRESS CONTROL

Working in a hot environment requires that employees take precautions and provide adequate protection to prevent heat stress. The following are guidelines to recognize and prevent heat stress conditions.

Make assignments for work involving physical labor and/or involving heat stress, based on physical fitness level of available labor pool. Employees newly exposed to heat should begin their work level at 50% of suggested work schedule and increase level by 10% per day to allow for acclimatization.

Supervision and "buddy system" should be used to carefully observe workers in heat stress environments to evaluate each individual's susceptibility to heat stress. Any behavior exhibiting signs of heat stress should be promptly investigated.

Initiate a modified work/rest regimen when Ambient Temperatures and protective clothing create a potential heat stress hazard. If ambient temperatures exceed 75°F, the following work/rest regimen is recommended (guidelines assume light to moderate work):

| Temperature | Work Period | Rest Period |
|---|---|---|
| **75-80 °F** | **90 Minutes** | **15 Minutes** |
| **80-85 °F** | **60 Minutes** | **15 Minutes** |
| **85-90 °F** | **45 Minutes** | **15 Minutes** |
| **90-95 °F** | **30 Minutes** | **15 Minutes** |

Rest periods should be taken in a shaded area with open air movement if available, as this will considerably reduce the effects of heat stress.

- When temperatures reach above 75°F, the site supervisor will monitor the heat rate of each working employee every 90 minutes. When

temperatures are above 80°F, the heart rate will be monitored every 60 minutes and above 90°F, every 30 minutes.

- If individuals' heart rates are 110 beats per minute or less at the end of the rest period, they can resume work. If greater than 110 beats per minute, individuals will rest another 10 minutes. If the heart rate is reduced below 110 at the end of 10 minutes, the employee may return to work and the next work period should be reduced by 33 percent (e.g., at 75°F to 80°F, the work period should be reduced to 60 minutes, at 85°F to 90°F, reduced to 30 minutes; and at greater than 90°F, reduce to 20 minutes).
- If at the end of the 10-minute rest period, the heart rate is still above 110, the individual must leave the area through proper decontamination procedures and rest in a cool place outside the exclusion zone for one hour.
- The rest periods will be modified as the employees become acclimatize to heat.

Water and/or other fluid that replenishes electrolytes will be provided to employees at all times when working in hot environments. Provide plenty of water and/or other drink, which replenishes electrolytes (e.g., Gatorade) at each rest period. Generally, salt intake is sufficient from dietary intake; however, the best way to compensate for excessive sweat loss is to drink replacement fluids which contain electrolytes, including salt, such as Gatorade, or equivalent. Salt tablets should not be used. Workers on a low sodium diet should consult with their physician prior to engaging in work in heat stress environments.

Protective clothing inhibits the transfer of heat between the body and the surrounding environment. This can increase the onset of heat stress symptoms. The following consideration should be evaluated when protective clothing is worn in heat stress environments.

- More frequent rest breaks;
- Worker rotation to provide frequent breaks in cool areas;
- Wear ice vests or vortex tubes, if practical; and
- Schedule changes to accommodate work at night or early morning hours.

## 15.7. COLD STRESS PROCEDURE

Cold stress can present a significant hazard to workers and can result in hypothermia. Hypothermia is a potentially life threatening condition which results in a drop in the body's core temperature. At lower body temperatures the body can react by a reduction in mental awareness, reduced rational decision-making, loss of consciousness and death. Several factors incorporate the harmful effects of cold: wet clothing, smoking, drinking alcoholic beverages, fatigue,

emotional stress and certain diseases and medications. Workers exposed to severe cold can suffer hypothermia or frostbite.

We have conducted an assessment of the types of work ERM performs compared to the potential to be exposed to cold stress environments. Our employees typically work in an office environment or in a fieldwork environment, and all employees performing field work have the potential to be exposed to cold stress conditions.

## 15.8. CLASSIFICATION AND PREVENTION OF COLD ILLNESSES

The following are the most prevalent and significant cold stress conditions:

- Hypothermia: The signs and symptoms of hypothermia include shivering, dizziness, numbness, confusion, weakness, impaired judgment, impaired vision and drowsiness. The stages of hypothermia are: shivering, apathy, and loss of consciousness decreasing pulse rate and breathing rate and death.
- First aid measures for hypothermia are: Call emergency medical services and move the victim to a warm area and into dry clothing.
- Frostbite: Frostbite is the most common injury caused by cold. It happens when ice crystals form in body tissues, usually the nose, ears, chin, cheeks, fingers, or foes. This restricts blood flow to the injured parts. The effect is worse if the frostbitten parts are thawed and then refrozen.
- Signs and symptoms of frostbite may be that the skin is slightly flushed. The skin color then changes to white and then grayish blue. Pain is sometimes felt early but later goes away. The frostbitten parts feel very cold and numb, and the victim may not be aware of the injury. In severe cases, frostbite may result in blisters or gangrene.
- First aid measures for frostbite are: move the victim to a warm area and place the frozen parts in warm water (100-105°F). Handle them gently and do not rub or massage them. Loosely bandage the injured parts. Seek prompt medical attention.

## 15.9. TRAINING REQUIREMENT

Worker training should be provided to discuss the hazards of cold stress environments and to review preventative work practices. Training is conducted during daily tailgate safety meetings when working in cold environments. Additionally the job hazard analysis for "Work in Cold Environments" is covered with each employee performing work in these conditions. This ensures more effective and timely training than a once-annual session. The training should include:

- Proper clothing and PPE requirements.

- Recognition, prevention and first aid treatment of frostbite and hypothermia. Discussion should include re-warming procedures.
- Suggested work/rest regimes and eating/drinking habits.
- Safe work practices in cold stress environments.

## 15.10. RECOGNITION CONTROL AND PREVENTION

- The first signs of cold stress are pain in the extremities. Severe shivering may result as body temperature drops.
- Protection from cold stress must be considered in addition to provisions for personal protective equipment.
- Provisions for insulating dry clothing must be provided, regularly inspected, and replaced as required.
- Wind chill can substantially reduce the cooling rate experienced by personnel. Prevention of excessive cooling exacerbated by wind chill condition requires increased insulation value of the protective work clothing.
- The effects of wind chill and temperature can be referenced in the ACGIH TLVs for Chemical Substances and Physical Agents.
- The following work practices should be followed to minimize the effects of cold stress conditions.
- Wear adequate layers of insulating dry clothing. Keep a change of dry clothes available in case clothing becomes wet. Ensure adequate supplies of cold weather gear are available and stocked.
- Use the buddy system to look for signs of cold stress.
- If appropriate, use windshields to reduce the effects of wind.
- Heated warming shelters should be available when the Equivalent Chill Temperature (ECT) is less than 20°F (-7°FC). The ECT is used for the purpose of assessing the combined effects of wind and low air temperatures on exposed skin.
- To prevent dehydration, which can increase the susceptibility of workers to cold injuries, warm sweet drinks and soups should be provided. Coffee intake should be limited due to the diuretic effects.
- Should a work warming regime be necessary, the ACGIH TLVs should be consulted
- Ensure regularly-used travel pathways are kept clear of snow and ice as practicable.
- Be aware of the hazards of unstable snow and ice buildup, and avoid working close to areas of accumulated snow and ice whenever possible.

# 16.0 INCIDENT AND SAFETY EVENT MANAGEMENT

## 16.1 Concepts and Tools

### *16.1.1 Safety Event*

A Safety Event is any one of the following that occurs within or due to the working conditions within ERM's work environment:

| Event Type | Definition |
|---|---|
| Incident | • Someone gets hurt (Injury)<br>• Someone gets sick (Illness)<br>• Someone breaks or something, or there is an spill or environmental release (Property Damage) |
| Near Miss | An Incident that almost happened |
| Unsafe Act | An action that is, on its face, not safe |
| Unsafe Condition | A condition that is on its face not safe |
| Remarkable Safe Behavior | A positive action or attitude toward safety that an observer feels is deserving of recognition |

Injury and Illness Incidents may be "Recordable" depending on:

- The nature of the treatment the Injury or Illness receives,
- Whether or not work was missed as a result of the Injury or Illness, or
- Whether or not it was necessary for the affected employee to transfer to a different job or be restricted in his/her job duties as a result of the Injury or Illness.

ERM uses the US OSHA recordkeeping guidance concerning "recordability" as the formal criteria for "recordability" globally. ERM also tracks "locally recordable" Injuries and Illnesses against applicable jurisdictional criteria, where such exists and is different from US OSHA recordkeeping guidance.

### *16.1.2 Major Incident*

For purposes of response and investigation (or "follow-up") activity, a "Major Incident" will be defined as an Incident where the outcome resulted in:

- A fatality,
- Treatment by a health care professional and results in the permanent total, permanent partial or temporary total disability,
- Hospitalization of one or more people, or
- Significant damage to property or equipment in excess of $500.

In the event of a fatality or the hospitalization of three or more ERM employees from a single accident/incident, the ERM's management, with assistance from the NAHSD, is responsible for notifying OSHA within eight hours of the accident/incident.

### *16.1.3 Work Environment*

The "work environment" is generally defined as anywhere ERM and its subcontractors are doing or engaged in project work activity. This includes:

- During travel,
- At a client site (visits, meetings or field work), or
- In ERM offices.

### *16.1.4 Event Principals*

People who may be involved in Safety Events may be in any of the following three classes, which are referred to as "Event Principals":

- ERM employees,
- Subcontractors / subconsultants, and
- Clients or other "third parties".

### *16.1.5 Event Communication System*

The ERM Event Communication System (ECS) is the primary tool utilized for reporting (or, "communicating") the occurrence of Safety Events globally. All ERM employees have the ability to communicate the occurrence of a Safety Event directly into the ECS, though it is not always the appropriate tool for initial notifications of all Incidents and Near Misses.

The person who reports the occurrence of a Safety Event into the ECS is referred to as the "Reporting Person". The person who physically types the basic details of the Safety Event into the ECS is referred to as the "Input Person". The Input Person and Reporting Person do not need to be the same individual (e.g., when a Safety Event is "phoned in" from a field location).

The post-event investigation or "follow-up" is also documented in the ECS.

## 16.2 Immediate Response to Injury or Illness-type Incidents

The general steps for responding to an Injury or Illness-type Incident include, in order:

1. For emergency situations, including but not limited to heart attack, stroke, severe shortness of breath, sudden and severe pain, major injury (such as trauma), severe bleeding, or unconsciousness, employees should call 911.

2. For non-emergency situations, employees should give any necessary first aid care for the employee and secure the scene.

3. An ERM representative must accompany any injured or ill employees to the hospital.

4. Immediately after stabilizing the scene, employees should call ERM Incident Intervention services at 1-888-449-7787 to obtain expert medical first aid advice.

5. Immediately after calling Incident Intervention services, employees should call their PM (if in the field) or their Supervisor (if in the office) to report the event.

6. Within 24 hours, employees should enter the basic details into the ECS.

The above may change depending on specific site arrangements or client requirements. An emergency / Incident response procedure must be included in the project Health & Safety Plan.

## 16.3 Immediate Response to Property Damage-type Incidents and Near Misses

After the occurrence of a Property Damage-type Incident or Near Miss, work should be halted, the scene should be secured and initial facts gathered. Work should not continue until the causes of the Property Damage or Near Miss are understood and corrected.

If a spill or release occurs, then the site- / project- / office-specific spill response plan will be followed.

Within 24 hours of the occurrence of the Incident, enter the basic details into the ECS.

## 16.4 Responding to Unsafe Acts / Conditions & Remarkable Safe Behaviors

See Program Section 28 – Safety Behaviors and Feedback. Within 24 hours of the observation and correction of an Unsafe Act or Unsafe Condition, enter the basic details into the ECS.

Enter the basic details of a Remarkable Safe Behavior into the ECS as soon as possible after observation.

## 16.5 Follow-up to a Safety Event

### *16.5.1 ECS Information Routing*

After the basic details of a Safety Event are entered into the ECS, the system will automatically notify appropriate parties. Automatic notifications per Event Type are summarized below. All individuals included in the Automatic Notifications are included on the "Communication Chain" for the Safety Event's ECS record.

| Event Type | Automatically Notified |
|---|---|
| Incident | • Reporting Person<br>• BU Safety Team<br>• BU Managing Partner<br>• Regional Safety Advisor & Global Safety Director<br>• ERM Legal Team |
| Near Miss<br>Unsafe Act / Unsafe Condition<br>Remarkable Safe Behavior | • Reporting Person<br>• Business Unit Safety Team |

Any other ERM employee may be added to the Communication Chain for the ECS record. If a project number is assigned to the ECS record, the ERM Partner-in-Charge and ERM Project Manager will be automatically added to the Communication Chain.

### *16.5.2 The Nature of Follow-Up*

ERM follows-up and assigns and tracks to completion Corrective Actions to all Safety Events. The required detail of the follow-up and personnel involved in it is based on the Event Type and its actual or potential severity, as judged by the project and/or safety team. The Follow-Up record to the ECS event is meant to both guide the follow-up and document the findings.

At the option of the safety team, project team and/or Business Unit management, a more robust follow-up, including root cause analysis, may be made into any event or series of events.

### *16.5.3 Initiating and Conducting Follow-Up*

Within 24 hours of the initial communication of the Safety Event into the ECS, a member of the Business Unit Safety team (hereafter, the Follow-up Lead) will contact the reporting person to gather initial facts and begin the follow-up. The follow-up record in the ECS will guide the fact gathering, codification and corrective action assignment & tracking.

The Follow-up Lead will be responsible for:

- Stewarding the completion of follow-up with the project team / persons involved in the Safety Event, and
- Verifying that all assigned Corrective Actions have been completed.

### *16.5.4 Determining Recordability, Lost Time & Restricted Duty Time*

If the Safety Event is an Illness or Injury Incident, then the NAHSD will confer with ERM's Global Safety Director to determine recordability of that Safety Event, including calculation of lost work days and/or restricted duty / job transfer time. These determinations will be made based on the established facts of the Safety Event and according to US OSHA recordkeeping criteria.

### *16.5.5 Root Cause Analysis*

In general, a Root Cause Analysis (RCA) will be performed for all Recordable Incidents. A RCA will be performed for all Major Incidents, regardless of whether the incident is determined to be OSHA recordable. A RCA may be performed for other Safety Events (other Incidents, Near Misses, Unsafe Acts & Unsafe Conditions) of "high learning value", as determined by the Safety Team, Project Team or ERM Management.

The RCA process should begin as possible after all immediate response measures have been taken and the situation is under control.

The first step in the process is to form the RCA Team. The team should be led by a member of the ERM Safety Team (e.g., the BU H&S Advisor or the regional H&S Advisor for an event that involved several BUs) or another ERM employee trained in ERM's Root Cause Analysis method. Other team members may include:

- Partner-in-Charge and Project Manager of the project, and/or line manager of person(s) involved;
- Persons involved in the event;
- Other employees familiar with the activities during which the event happened;
- A subcontractor representative (if a subcontractor was involved); and
- For serious events, a senior person not involved in the event (e.g., Local Practice Leader or BU Managing Partner).

The RCA Team lead will facilitate the implementation of the process:

- Interviews and fact gathering,
- Causal factor determination,
- Root Cause Identification using the "5-why" method, and
- Corrective Action recommendation.

Target deadlines for completing a RCA are:

- Conduct interviews within five working days after the event.
- Distribute draft RCA report to investigation team within ten working days after the event.
- Issue full RCA report (including photos and RCA flowchart) within fifteen working days after the event.

The final RCA report will be uploaded to the ECS follow-up record for the event. Adopted Corrective Actions will be tracked to completion in the ECS.

### *16.5.5 Follow-up Approval and Record Finalization*

When the follow-up is completed and the corrective actions are verified as complete, the following individuals will "digitally sign" the ECS record for the event, indicating their approval of the follow-up, as follows

- For Incidents: the Business Unit Managing Partner, the NAHSD and the Follow-up Lead or BU Safety Advisor.
- For all other Safety Events: the Follow-up Lead or the BU Safety Advisor.

After all approvals are made, the Follow-up Lead will initiate the "finalization" check within the ECS to save and close the record. Future changes are locked-out after event finalization.

## 16.6 Additional Procedures for Major Incidents

If a major incident occurs, additional required steps are necessary to respond appropriately. These steps are as follows:

- Work will cease on the portion of the project site controlled by ERM until the actions below have been taken;
- An ERM employee must accompany the injured or ill person to the hospital;
- The ERM Supervisor or Project Manager must immediately call the NAHSD after securing the scene;
- The ERM Supervisor or Project Manager must immediately call the North America Legal Advisor after securing the scene;
- An ERM safety team representative will mobilize to the incident site to establish control of the scene and preserve evidence;
- An ERM safety team representative will form the incident investigation team as soon as practicable, and begin the incident investigation and RCA.

ERM has developed the "ERM Major Incident Checklist" to serve as a guide when responding to a Major Incident. This checklist is included in this guidance document.

### 16.7.1 Additional Procedures for Mine Safety and Health Administration (MSHA)-Covered Jobsites

Within 10 days of occurrence, ERM will submit a report of any "accidents" to MSHA using MSHA Form 7000-1. On project sites that occur at mines covered by MSHA regulations, addition requirements apply. Any "accident" that occurs on these sites must be reported to both the mine operator and MSHA immediately (no later than 15 minutes after it occurs). The MSHA definition of "accident" includes only the following:

- Death of an ERM employee at the mine;
- Injury to an ERM employee at the mine that has reasonable potential to cause death;
- Entrapment of an ERM employee for more than 30 minutes or which has the reasonable potential to cause death;

- An unplanned inundation of a mine by liquid or gas;
- An unplanned ignition or explosion of gas or dust;
- In underground mines, an unplanned fire not extinguished within 10 minutes of discovery;
- In surface mines, an unplanned fire not extinguished within 30 minutes of discovery;
- An unplanned ignition or explosion of a blasting agent or explosive;
- An unplanned roof fall at or above the anchorage zone in active workings where roof bolts are in use, or an unplanned roof or rib fall in active workings that impair ventilation or impede passage;
- A coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour;
- An unstable condition at an impoundment, refuse pile, or culm bank which requires emergency action to prevent failure, or which causes individuals to evacuate an area, or failure of an impoundment, refuse pile, or culm bank;
- Damage to hoisting equipment in a shaft or slope which endangers an individual or which interferes with use of the equipment for more than 30 minutes, and;
- An event at a mine which causes death or bodily injury to an ERM employee not at the mine when the event occurs.

Additionally, each calendar quarter, ERM will submit quarterly employment information to MSHA utilizing MSHA Form 7000-2. The form will be completed and submitted to MSHA no later than 15 days after the end of each calendar quarter.

## SAFETY EVENT INVESTIGATION CHECKLIST – MAJOR INCIDENTS

**A major incident is an incident where an ERM employee or ERM subcontractor:**

- **Suffers a fatality**
- **Is hospitalized (e.g., admitted) of 1 or more employees**
- **Is treated for the incident by a health care professional and results in permanent total, permanent partial or temporary total disability**
- **Significantly damages property or equipment**

**Initial Response Actions for All Parties:**

**Incident:**

- **ERM employee immediately contacts Incident Intervention Services at (888) 449-7787**
- **ERM employee contacts their supervisor (non-field setting) or project manager (field setting) as soon as possible**
- **Supervisor or Project Manager ensures that incident is entered into the ECS within 48 hours**
- **ERM representative must accompany injured or ill employee(s) to the hospital**
- **Supervisor or PM requests subcontractor incident report and investigation**
- **Safety Team provides follow-up as specified in this checklist**

**For a major incident the following additional steps are required:**

- **Supervisor or PM - Contact Americas Safety Director within 1 hour of event occurring (Richard Ecord, 404-769-4561)**
- **Supervisor or PM - Contact NA Legal Advisor within 1 hour of event occurring (Adam Thackston, #)**
- **Safety Team Representative - Form the Incident Investigation Team as specified in this document, including subcontractor(s) representative if subcontractor is primarily involved in event**
- **Safety Team Representative – Contact Supervisor or PM at the scene to ensure that appropriate, immediate response measures have been appropriately taken, and determine if work may resume safely.**

**Person(s) contacted: _____ Date and Time of Contact: _____**

**Secondary Response Actions for Safety Team:**

**Major Incident:**

- **Establish control of the scene and preserve evidence**
- **Go to the incident scene**
- **Identify any others that should serve on incident investigation team (specific disciplines or areas of expertise needed to adequately perform investigation)**

**Major Incident Corrective Action Requirements:**

| | |
|---|---|
| **Convene an Incident Investigation Team** | **Date Convened:** _____ |

**Incident Investigation Team Leader:** _____

**Suggested Members and Affiliations:**

| **Name** | **Affiliation** |
|---|---|
| _____ | **Western Division District Managing Partner** |
| _____ | **Northern Division District Managing Partner** |
| _____ | **Southern Division District Managing Partner** |
| _____ | **Division H&S Leader** |
| _____ | **Americas H&S Director** |
| _____ | **Division Managing Director (where incident occurred)** |

| | |
|---|---|
| **Date the team reviewed incident investigation and root cause analysis, and formulated corrective actions to prevent recurrence.** | |
| **Date corrective actions entered into ECS** | |
| **Date corrective actions verified as complete** | |
| **Final Comments** | |

## 1. Purpose and Scope

This document supports the Management System and establishes the procedures to ensure that ERM employees are provided with appropriate medical services as needed. This document applies to all ERM field and office locations.

## 2. Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensuring this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correcting any deficiencies in the implementation of this procedure as identified by the Division Health, Safety Security, and Environment (HSSE) Leader.

**Project Manager (PM)/Supervisor/Branch Manager (BM)**: Responsible for the following elements:

- Performing observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure;
- Pausing or stopping work where deviations from this procedure are observed; and
- Correcting, in conjunction with the PIC and the Division HSSE Leader, any observed deficiencies in the implementation of this procedure.

**Division HSSE Leader**: Responsible for the following elements:

- Evaluating implementation of this procedure during health and safety plan reviews and project audits; and
- Communicating identified deficiencies to the PIC.

## 3. Definitions

**Field Safety Officers:** Employees who are responsible for the day-to-day implementation of ERM's health and safety processes on project sites.

**Floor Wardens:** Employees responsible for monitoring the presence of co-workers and visitors within the immediate seating area or zone of their office, and assisting in the orderly and safe evacuation of those personnel during a building evacuation or emergency.

# 4. Procedure

## 4.1 First Aid Services

### 4.1.1 First Aid Responders

It is the expectation of ERM that our personnel who are qualified as Field Safety Officers (FSO) or who serve as Floor Wardens in our offices be trained and certified to render appropriate first aid, CPR, and be capable of operating an automated external defibrillator (AED). Other ERM employees are not obligated to participate in provided first aid/CPR training; however, if a session is offered staff participation is encouraged to fill any open positions in the training. If a client requires personnel working on their site to be first aid/CPR trained, ERM will ensure that appropriately trained personnel are assigned to such projects.

### 4.1.2 First Aid Kits

First aid supplies must be maintained and easily accessible at ERM job and office sites. At a minimum, first aid kits should contain the following items:

- Absorbent compress, 4” x 8” minimum (1 total)
- Adhesive bandages, 1” x 3” (16 total)
- Adhesive tape (5 yards)
- Antiseptic applications, 0.5 grams each (10 total)
- Burn treatment applications, 0.5 grams each (6 total)
- Sterile pads, 3” x 3” minimum (4 total), non-stick
- Medical exam gloves (2 pair)
- Triangular bandage, 40” x 40” x 56” (1 total)

On project sites, the contents of the kit must be inspected by the FSO prior to the start of the job and at least weekly during the job to ensure that items being used are replaced. Office first aid kits shall be inspected at least monthly.

### 4.1.3 Emergency Information

On project sites, the PM will identify the mode in which medical services and first aid will be administered in the health and safety plan (HASP). A drive to the hospital to ensure that directions are accurate is recommended. On complicated project sites, an emergency medical services drill may be advised.

In offices, the Branch Manager (BM) will identify the mode in which medical services and first aid will be administered in the local Emergency Action Plan (EAP).

These documents shall include directions and a map to the nearest medical facility, along with emergency telephone numbers. From time to time, emergency medical services drills may be in order to ensure proper response on the part of the responders and ERM staff.

### 4.1.4 Eyewash/Drench Facilities

At any jobsite where the eyes or body of any employee may be exposed to corrosive or otherwise hazardous chemicals, eyewash and body drench facilities must be available.

## 4.2 Availability of Medical Services

ERM has retained the services of WorkCare, Inc., a firm specializing in Occupational Medicine, to provide advice on medical issues and to administer physical and medical examinations as required for our medical surveillance program. Medical surveillance programs will be established with input from WorkCare to properly track the health status of ERM staff based upon their exposure risks. The Director of HSSE should be involved in establishing the examination criteria.

WorkCare additionally provides incident intervention services to our employees (and subcontractors as appropriate) 24 hours per day, 7 days per week, each day of the year.

Whenever first aid is administered by one of our employees, it is expected that WorkCare's Incident Intervention services will also be contacted for guidance.

Automatic External Defibrillators (AEDs) are also available in all offices of ERM. WorkCare must be involved anytime an AED is used at ERM. Contact your Division HSSE Leader for more information regarding AED use.

ERM HSSE staff should also be informed of the need to render first aid or seek additional medical treatment.

## 4.3 Bloodborne Pathogens Program

### 4.3.1 Exposure Determination

Due to the nature of ERM's typical office and field activities, it is highly unlikely that incidents involving ERM employees would result in exposure to blood or potentially infectious bodily fluids. Therefore, compliance with 29 CFR 1910.1030, *Bloodborne Pathogens*, is not required. Although a written exposure control plan is not required, the following sections outline basic requirements to be followed if ERM employees voluntarily render first aid/CPR. Exposure determinations, as well as the precautions and work practices discussed below, are without regard to the use of personal protective equipment.

### 4.3.2 Training and Recordkeeping

ERM periodically offers first aid/CPR training that includes bloodborne pathogens training to employees as part of the overall health and safety program. If a client requires personnel working on their site to be first aid/CPR trained, ERM will ensure that appropriately-trained personnel are assigned to staff such projects.

Training, if needed, will be provided at or before the time of initial assignment and will be repeated annually (i.e., within one year of previous training) for as long as the employee remains in a work environment requiring exposure to bloodborne pathogens.

Training records will be maintained in ERM's Academy Learning Management System (LMS). Any records maintained within the Academy LMS are available upon request by employees or their representatives and any government official.

The Medical Recordkeeping Coordinator is responsible for maintaining all medical records. Issues such as, but not limited to, access to medical records, transfer of records and retention of records are addressed in ERM's Access to Exposure and Medical Records document (Health and Safety Guidance Document #3). WorkCare currently serves as the Medical Recordkeeping Coordinator for ERM.

### 4.3.3 Universal Precautions

If an ERM employee voluntarily renders first aid/CPR, all human blood and bodily fluids will be treated as infectious for bloodborne pathogens.

### 4.3.4 Engineering Controls, Work Practices, and PPE

Since ERM is a consulting firm, there are no typical operations applicable to bloodborne pathogens requiring engineering controls. However, if conditions warrant (e.g., significant and continued exposure to sharps, site cleanups involving medical or infectious wastes) the use of engineering controls with regard to bloodborne pathogens, appropriate engineering controls will be developed, examined, and maintained or replaced on an annual basis to ensure their effectiveness.

While performing field-based work activities, toilet and hand-washing facilities must be available to employees. Hand-washing facilities will be provided with an appropriate combination of the following:

- Hot and cold running water or tepid running water;
- Soap or an antiseptic hand cleanser;
- Individual hand towels or warm air blowers; and
- Pre-moistened individual wipes.

If an ERM employee voluntarily renders first aid/CPR, the following PPE, supplied by ERM, will be used as appropriate:

- Nitrile surgical-type gloves; and
- CPR mouth guard (where needed).

These are provided to ERM employees in the PPE field bag issued upon their hire. Any blood or other bodily fluid-contaminated materials will be placed in red leak-proof plastic bags for disposal. Bags will be labeled with a biohazard sign and the words "Biohazard" in contrasting

colors. Surfaces that have been contaminated with blood or other bodily fluids will be cleaned with a disinfecting product as soon as practical.

### 4.3.5 Hepatitis B Vaccine

Since it is highly unlikely that incidents involving ERM employees would result in exposure to blood or potentially infectious bodily fluids, a Hepatitis B vaccination program is not typically required for ERM staff. However, if an employee believes that they have come into contact with potentially infectious blood or other bodily fluids while voluntarily rendering first aid/CPR, medical examinations, including Hepatitis B vaccine, will be made available at no charge to the employee.

### 4.3.6 Access to Written Program

All employees or their representatives and governmental officials may request a copy of any written program by contacting the Division HSSE Leader in their respective office.

## 5. References

- Occupational Safety and Health Administration (OSHA) 29 CFR 1910.151, *"Medical Services and First Aid"*
- OSHA 29 CFR 1910.1030, *"Bloodborne Pathogens"*
- American National Standards Institute (ANSI) Z308.1-1998, *"Minimum Requirements for Industrial Unit-Type First-aid Kits"*

**Document Control Information**

Original Effective Date: February 14, 2014

Policy Approval by: Philip Platcow on 2/14/14

Approval Signature: 

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | New document. | 2/14/14 |
| All | Reformatted to meet new Global documentation requirements. | 5/28/14 |

# 21.0 PERSONAL PROTECTIVE EQUIPMENT

ERM believes it is our obligation to provide a hazard-free environment to our employees. This written program documents steps ERM has taken to minimize injury resulting from various occupational hazards through the use of personal protective equipment (PPE). Other types of hazard mitigation, such as engineering or administrative controls, are the best methods of hazard mitigation, however in many cases the nature of consulting requires use of PPE to supplement or replace those methods. ERM performs much of its work on short-duration field projects, thus the hazards and the appropriate personal protective equipment (PPE) to protect employees from the hazards must be addressed for each project involving field activities.

Separate documents exist for two particular types of PPE: respiratory protection and hearing protection. This document covers the following topics related to PPE, except the two topics mentioned above:

- PPE Hazard Assessments
- PPE Selection
- Employee Training
- Cleaning and Maintenance of PPE
- Specific PPE information

## 21.1. WRITTEN PPE HAZARD ASSESSMENTS

For projects requiring a site-specific health and safety plan (HASP), the PPE requirements for project tasks will be addressed in the PPE section of the HASP. Site-specific HASP templates are located in the ERM's Health and Safety Minerva intranet site under the WARN Heading and specific work activity files.

PPE Hazard Assessments are included in site-specific safety documentation, and are performed by considering the following basic types of hazards:

- Impacts
- Heat or Cold
- Penetration
- Harmful Dust
- Compression (roll-over)
- Radiation
- Chemical Hazards
- Electrical Hazards

All site-specific HASPs will include a table outlining the actual PPE requirements and for which project tasks the PPE is required. For example, Level D PPE consisting of long pants and shirt with sleeves, steel-toed footwear, safety glasses, and hard hats are required for activities such as general site activities. In addition, all client-specific

requirements regarding PPE will be addressed on the PPE table. All project team members are required to be trained on the site-specific HASP, which includes training on what PPE is required for various tasks, prior to participating in field-based activities.

A completed JHA form addresses both the hazards specific to a job task and the appropriate controls which may include PPE. In addition, any client-specific PPE requirements will be addressed in the PPE section of the JHA. All project team members are required to review and sign the JHA prior to the commencement of field-based activities.

In general, tasks involving Level A or B PPE are not anticipated during routine field activities. If a project involves tasks requiring Level A or B PPE, a CIH or CSP will be consulted to ensure that the level of PPE is appropriate for the unique hazards and to ensure that project team members are adequately trained.

## 21.2. PPE SELECTION

Once hazards have been identified and evaluated through the PPE hazard assessment process, the general procedure for selecting PPE is to:

- Become familiar with potential hazards and the types of PPE available to mitigate those hazards;
- Compare available PPE to hazards associated with the project site;
- Select PPE meeting requirements found in OSHA regulations and that ensure a level of protection greater than the minimum required to protect employees;
- Fit the employees with proper, comfortable, and well-fitting PPE and instruct them on its care and use. Specific training on limitations of PPE is and important factor to consider during any PPE training.

If situations change on a project site, or in the case of PPE failure, PPE originally selected for employee protection must be re-evaluated. Re-evaluation should include the following elements:

- Adequacy of the PPE written program;
- Past safety event experience;
- Levels of exposure, through appropriate exposure monitoring;
- Adequacy of PPE originally selected;
- Number of hours PPE must be worn;
- Adequacy of training and fitting of PPE;
- Adequacy of PPE program records;
- Recommendations for H&S program improvement and modification;
- Coordination with the overall H&S program.

**21.2.1. Guidelines for selection of specific types of PPE are given below.**

Safety Goggles/Face Shields
When hazards are present as a result of flying particles, molten metal, liquid chemicals that are highly acidic or basic, chemical gases or vapors, or ionizing radiation, a combination of safety goggles with face shields should be worn. For employees who wear prescription glasses, the ERM Prescription Safety Glasses policy provides additional details regarding purchase and care of prescription safety glasses.

Foot Protection
ASTM-certified steel-toed shoes must be worn by all employees performing work in the field. Employees performing ancillary work activities, such as client meetings or work in the office environment at a client site, are not required to wear steel-toed shoes unless client requirements dictate their use. The ERM Boot Policy provides additional details regarding purchase and care of steel-toed shoes.

Gloves
Gloves provide protection against a wide variety of hazards, including chemical exposure, burns, cuts, and other hand injuries. The Job Hazard Analysis for Hand and Portable Power Tools provides more information on protection from cuts. The ERM Minerva site contains specific information related to selection of gloves to protect against chemical hazards.

Hard Hats
ANSI-approved hard hats must be worn whenever a hazard exists from falling objects or other impact/bump hazards. Hard hats should be replaced at least every 5 years, or immediately following a significant impact to the hard hat. The inner suspension of the hard hat should be inspected at least once every 6 months to ensure at least ¼" remains between the suspension and the hard hat shell.

## 21.3. TRAINING

Employees with the H&S job function code of "Hazardous Fieldworker" and "Nonhazardous Fieldworker" receive PPE training during their initial 40-Hour HAZWOPER training. Training topics include, but are not limited to, the following:

- Routes of exposure – inhalation, skin contact, ingestion, and injection;
- Categories of exposure – acute and chronic;
- Selection of chemical protective clothing;
- Eye and face protection – glasses, goggles, face shields, and splash hoods;
- Hand protection – skin contact with chemicals, cuts, abrasions, or burns;
- Foot protection – contact with chemicals, compression, crushing, punctures, or electrical hazards;
- Head protection;
- Storage, cleaning and maintenance of PPE;

- Proper donning/doffing procedures;
- Adjusting PPE and determining proper fit; and
- Disposal of PPE.

Retraining will be conducted at least annually for employees with the H&S job function codes "Hazardous Fieldworker" or "Nonhazardous Fieldworker", or if any of the following occur:

- Employee observed not using appropriate PPE for task;
- Employee observed using PPE in a mater that is inconsistent with previous training;
- Changes in types of PPE used; and
- New hazards identified at the job site which requires the use of a different level or type of PPE.

All training is tracked in the H&S training database. Because failure to comply with ERM policy concerning PPE can result in employee injury and regulatory infractions, an employee who does not comply with this program will be disciplined for non-compliance in accordance with the ERM Safety Progressive Discipline policy.

## 21.4. PPE USAGE, STORAGE, AND MAINTENANCE

It is important that all PPE be kept clean and properly maintained by the employee to whom it is assigned. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. PPE will be inspected, cleaned, and maintained by employees at regular intervals as part of their normal job duties. Project Managers are responsible for ensuring compliance with cleaning of PPE by employees working on their projects.

In ERM's typical role on projects, PPE does not become grossly contaminated. During projects where chemical contamination of PPE occurs, it and associated equipment will be decontaminated (if to be reused) or discarded in accordance with waste management practices for the project site. If gross contamination with liquid chemicals occurs, employees will immediately stop work and proceed to the decontamination area. Details of PPE and equipment decontamination are specified for each project in the site-specific health and safety plan.

Change-rooms and shower-rooms are not typically required for ERM projects due to several factors, including the short duration and non-permanency of the projects. In the case change-rooms or shower-rooms are required for a project, details will be included in the site-specific health and safety plan.

All PPE will be inspected prior to use and any damaged or defective PPE will not be used. All damaged or defective PPE will be immediately discarded. The drilling of

holes in a hard hat in order to attach items to the hard hat is prohibited. Hard hats that have sustained a major impact will be discarded.

## 21.5. ERM-PROVIDED PPE

ERM provides PPE to our employees with H&S job function codes "Hazardous Fieldworker" and "Nonhazardous Fieldworker" in accordance with all OSHA standards. Steel-toed footwear and prescription safety glasses are subsidized in accordance with the Boot Policy and Prescription Safety Glasses policies. This PPE is provided upon an employee's hire through arrangement with an outside vendor. It is our policy that all full-time, part-time, and temporary employees wear PPE approved by ANSI or ASTM, as appropriate.

Employees are discouraged from providing their own PPE. Employees are responsible to ensure that their steel-toed footwear is maintained and replaced as needed. During routine inspections of field-based activities, the FSO, PM or Project Health and Safety Consultant will observe steel-toed footwear.

# 23.0 PROJECT HEALTH AND SAFETY PROGRAM

Heath and safety planning is conducted prior to full project mobilization. This section presents a *general process* for health and safety planning of project activities from the first time employees visit a site to the generation of a project- or site-specific HASP. This process includes performing site characterizations and hazard assessments, selecting Standard Operating Procedures based on the scope of site activities, and collaborating with subcontractors to create Job Hazard Analyses which speak to the health and safety procedures and requirements associated with specific work activities.

Typical planning for any field project site at ERM is done by completing the WARN Planning Assistant process on the Minerva site. The WARN Planning Assistant is an electronic tool that assists employees select the proper safety documentation for their project and is suitable for most projects ERM performs. It consists of three steps:

1. Selecting the proper level of health and safety plan;
2. Selecting applicable Job Hazard Analyses (JHA);
3. Selecting applicable Client-Specific requirements.

For the most complex projects, the completion of health & safety planning activities may be documented on a Project Health, Safety, Security & Environmental (HSSE) Checklist. The HSSE Checklist is a useful tool that walks the project team through the project health & safety planning process described below. The HSSE Checklist is to be used by the PM when discussing the project with a North America H&S team member. The PM is responsible for ensuring that the project's HSSE Checklist is kept up-to-date.

## 23.1. THE ERM WARN PROCESS

The ERM Work Activity Risk Assessment (WARN) process is a screening-level hazard assessment process that assists ERM employees in determining the proper level of H&S planning necessary.

The HASP development process is described below.

## 23.2. SAFE WORK PRACTICES (SWP) AND JOB HAZARD ANALYSES (JHA)

Safe work Practices (SWPs) and Job Hazard Analyses (JHA) set forth ERM's guidelines and expectations for physical activities performed on site and help address the associated health and safety risks and regulatory requirements for those activities. This H&S Program contains a library of both SWPs and JHAs.

JHAs are the preferred document to be used for field activities. SWPs are currently being phased-out and replaced with more thorough H&S Guidance Documents. JHAs are selected based on an assessment of the scope of work envisioned for the project. For example, if ERM envisions working an open excavation as part of the

work scope, we may select JHAs that cover excavation safety and ladder safety. The JHA selection process will be performed by the PM and reviewed by a member of the H&S team during HASP review.

## 23.3. DEVELOPMENT OF THE HASP

The HASP establishes project-specific requirements for each site to protect the health and safety of personnel during all activities conducted at a site.

### 23.3.1. The Draft HASP

The HASP will address the health and safety hazards of each phase of project activities and will include the requirements and procedures for employee and subcontractor protection. It provides information to facilitate control of exposure to hazardous material or hazardous conditions and to educate so work may be conducted in a safe manner. In general, a HASP will do the following:

- Describe the known hazards and the risks associated with the site and with each activity conducted
- List key personnel and alternates responsible for managing site safety and protection of the public
- Specify any routine and special training required for site personnel
- Describe levels of protection to be worn by personnel and specifies PPE to be worn for each task and operation
- Establish procedures for site specific environments immediately dangerous to life and health (IDLH)
- Describe decontamination procedures for personnel and equipment
- Outline general procedures for the loss prevention and behavioral safety process on site
- Establish evacuation routes
- Identify emergency medical facility and best route
- Establish procedures to control site access
- Describe spill containment procedures
- Establish site emergency procedures
- Establish site control plan that includes delineated work
- Establish medical surveillance requirements for site personnel
- Address emergency medical care for injuries and toxicological problems
- Describe requirements for ambient air monitoring, personal monitoring and environmental sampling
- Establish procedures for protecting workers from weather related hazards
- Define confined space entry procedures

The Draft HASP will be completed under the direction of the PM. When possible, the Draft HASP should be included with bid packages sent to subcontractors.

### 23.3.2. Interfacing with Subcontractors: JHAs and Language Issues

After a subcontractor is appointed to perform the physical activities associated with the project work scope, they will be asked to complete Job Hazard Analyses (JHAs) that outline their procedures for ensuring that:

- Their personnel are protected against the site hazards included in our Site Hazard Analysis; and
- Their work activities will conform to the requirements of our SWPs.

JHAs will be reviewed by an H&S team member or Subject Matter Expert and included as an appendix to the final HASP.

To the extent practicable, our subcontractors, must read, speak and understand the English language. However, business situations may arise where subcontractors will not be able to provide an English-speaking workforce. If a non-English-speaking workforce must be mobilized by the subcontractor, then the following augmentation to the field team must be implemented:

- The ERM field team must include an appropriately trained bi-lingual person who can communicate with and confirm communications to the subcontractor.
- The subcontractor must provide a bi-lingual supervisor who can understand communications from and relay communications to the ERM field team.

### 23.3.3. HASP Finalization and Training

The ERM H&S team must review for Level 2 and 3 HASPs, and the project's PIC must approve it. A pre-entry briefing will be conducted by the FSO to train all personnel on the final HASP prior to personnel engaging in site activity. The final HASP must be read and signed by site personnel before they are permitted to perform project activities. The final HASP, including JHAs should be periodically reviewed to keep it current, technically correct, and effective.

### 23.3.4. Management of Change

The HASP will include an evaluation of site work hazards, by work task, in the various JHAs completed. Such an evaluation includes all known or suspected physical, biological, radiological or chemical hazards. It is important that such health-related data be kept up to date and included in the HASP.

At each phase of the work, information should be obtained and evaluated to define the hazards that the site may pose. This continual assessment can then be used to update the HASP. All site personnel should be constantly alert to changing site conditions. As air, water, soil, or hazardous substance monitoring and sampling data become available, it should be evaluated, significant risk or exposure to workers noted, potential impact on public assessed, and changes made in the HASP. These evaluations need to be repeated frequently since much of the plan is based on this information.

In addition, the FSO should conduct site safety inspections daily. These inspections will include those activities necessary to ensure safe operation and proper conditions of all equipment. Any inspections conducted during site operations will verify conformance with the HASP as well as identify changes in site conditions.

When a significant change occurs in site conditions or work activities, previously identified hazards should be reassessed. Some indicators for the need for hazard reassessment include the following:

- Commencement of a new work phase, such as the start of drum sampling;
- Change in subcontractor's means or methods;
- Change in job tasks during a work phase;
- Change of season or weather;
- Change in ambient levels of contaminants; and
- Introduction or discovery of a new contaminant in the work environment.

### 23.3.5. Employee Safety Meetings

The purpose of this section is to ensure that each ERM job site employee is involved in regularly scheduled safety meetings or tool box talks. Meetings are documented on the Daily Tailgate Meeting form.

- The Project Manager at each job site shall schedule safety meetings or tool box safety talks in advance with a pre-chosen topic. The topics for the meetings will be chosen from:
    - A listing of past Safety Alerts, available on the Minerva site.
    - A review of the causes of significant accidents or near misses and methods to prevent future incidents of a similar nature.
    - Hazardous conditions or materials newly introduced to the site.
    - Special subjects selected by the Project Manager and/or FSO
- To enhance the meeting, actual items of interest should be shown or demonstrated such as mushroomed or damaged tools, personal protective equipment, pictures of hazards, etc. Specialized safety training for certain groups of employees may be augmented by the use of videotapes.
- In addition to the safety talks. The following additional items should be covered:
    - Review any injuries the work group has experienced since the last meeting.
    - Review the safety violations noted during day-today observations or planned inspections.
    - Review the work planned for the week ahead, and discuss higher risk activity and necessary safeguards.
- Each meeting need not take much longer than five to ten minutes, but the information should be communicated in the presenter's own words.
- The frequency of the tool box meetings will depend on the nature of each job site. By their very nature work sites are generally in a state of constant change. Normally, this will require that tool box meetings be conducted on a daily basis.
- Each safety or tool box meeting will be fully documented regarding topic, participation, and resource material, and filed at the job office.
- Previous week's discussions or hazards are noted and corrections are made.

## 31.0 VEHICLE SAFETY

Every day ERM employees travel by truck, van, rental car, chauffeured car, and client and personal vehicles to conduct the work of the company. This normal and indispensable part of the workday includes risks that can be understood and managed. This guideline specifically supplements the general travel risk assessments implemented as part of ERM's Work Activity Risk Assessment (WARN) process.

The risks from vehicle travel include but are not limited to:

- Accident due to other driver's inattention
- Accident due to ERM driver inattention
- Vehicle malfunction during travel
- Accident due to weather and road conditions
- Injury while attending to maintenance problems near the road
- Accident due to lack of knowledge of vehicle functions
- Hijacking / theft

The purpose of this Vehicle Safety Guideline is to help ensure that ERM employees have formally considered the potential risks of vehicle transportation while on company business and that the risks are managed effectively. Situations covered by this guideline include the following:

- Use of company-owned/ long term leased vehicles
- Use of rental vehicles for company business
- Use of personal vehicles for company business
- Contract driver and car
- Hijacking

Below are the specific elements of the guideline. Each section dealing with ERM drivers contains information on conditions of use, inspection, maintenance and repair, and minimum safety equipment.

Of note, this Vehicle Safety Guideline is meant to cover non-commercial vehicles, or those with a Gross Motor Vehicle Weight of 10,001 pounds or less.

## 31.1 FLEET MANAGER ROLE

ERM owns or maintains long term lease arrangements for such vehicles as trucks, vans, and even automobiles. Control of maintenance, inspection, and repair functions is most efficient and effective when one person has been assigned responsibility as a Business Unit (BU) Fleet Manager and branch employees also take a role as Office Fleet Coordinator.

Each BU that owns or has long term leases for vehicles should develop a centralized fleet management process, sufficiently detailed to manage inspection and maintenance functions of its fleet. This may range from very simple systems to multi- person arrangements.

## 31.2 INCIDENT & NEAR-MISS REPORTING

The following incidents and near misses must be reported immediately to the Project Manager, Partner in Charge, and ERM BU or Division Health & Safety Leader, and reported to the ERM Event Communication System (ECS) within 24 hours. They should be investigated using ERM's standard incident investigation process. If the incident involves damage to a BU's fleet, then the Fleet Manager must also be informed.

a. ANY incident or potentially serious near miss occurring on the job site, regardless of injury or property damage.

b. ANY incident or potentially serious near miss occurring while driving to from the job site or office, regardless of injury or property damage.

c. ANY incident resulting in property damage (to company vehicle or other vehicles), filing of an insurance claim by either party, or filing of a police report, regardless of when/where it occurs.

Following any incident involving vehicles listed above, the driver of the vehicle may be asked to undergo drug and/or alcohol testing as part of the incident investigation. This determination will be made by the BU Health and Safety Leader and District or Division Managing Partner.

## 31.3 BASIC SAFE DRIVING POLICIES

The following rules cover ERM use of owned, leased, rented, and personal vehicles for work. **If they are not as stringent as certain specific state or local regulations or client requirements, then the more stringent requirements clearly must be met.**

- Employees should follow all posted signs and speed limits, all applicable laws and regulations, and any client-specific vehicle safety policies.
- Wearing of available seatbelts is required at all times while operating or riding in any motor vehicle on company business.
- All loose equipment must be secured before driving.
- Doors of vehicles that are unattended (even for a short period of time) should be locked so that all equipment inside them is secured. All critical documents and pieces of equipment should either be very well secured or removed from the vehicle if unattended for long periods of time, such as overnight.

- Never transport people in the bed of a pickup truck and never transport more people than the seating capacity of the vehicle allows.
- Refer to the vehicle owner's manual for safe towing capacity of vehicles and safe towing procedures. When towing equipment, ensure that weight is distributed evenly and that warning/signal lights are working properly.
- When driving vehicles with the ERM company name and logo on the side, whether on or off the job site, you are a representative of ERM and should act professionally.
- ERM drivers must be aware that fatigue affects driving safety and include this safety factor in project budgeting and trip planning. As a benchmark, ERM employees should avoid driving after doing work-related activity (including driving) for more than 14 hours and should avoid driving more than 8 hours in any one work day. Consecutive work days of 14 hours are discouraged, particularly if long periods of driving are involved.
- All ERM employees driving on company business will receive awareness training on driver fatigue.
- Effective September 30, 2012 - The use of cell phones and other portable electronic devices while driving (including texting) is distracting and increases your risk of having an accident. Mobile/Cell phones and PDAs, whether hands-free or hand-held, shall not be used while operating a personal, company-owned or rented vehicle (whether on a public highway or a private site) while performing work duties. Regardless of the circumstances, including slow or stopped traffic, employees are required to pull into a safe location such as: rest area, parking lot, or other appropriate stopping location before placing or accepting a call, texting, or emailing. Employees who violate this policy will be subject to appropriate discipline, up to and including termination. Please reference the following global policy for full text and additional information "Health and Safety – Mobile/Cellular Telephone and Personal Digital Assistant (PDA) Use While in a Vehicle" located on the Legal Department Minerva site, "Global Policies" section.

### 31.3.1 Conditions of Use

The vehicle driver must possess a valid governmental driver's license. Drivers must follow all posted signs, speed limits, and all applicable laws and regulations. Drivers must maintain a safe driving record. An employee considered a negligent driver by the authority issuing the driver's license may be restricted from operating a company vehicle.

Unless by special arrangement and considering all security issues, company and long term leased vehicles should not normally be taken to a residence unless authorized by a District or Division Managing Partner. The security of equipment, tools, and documents in vehicles must be managed. Depending on the significance and cost of the items, they should either be removed from vehicles each evening or securely locked and hidden away from sight in the vehicle. Permanent storage of equipment in the vehicle is not allowed.

### 31.3.2 Inspection, Maintenance, and Repair

Company-owned or long term leased vehicles should be inspected on a regular basis, typically prior to first use and daily/weekly/monthly. These inspections must be documented using a form such as the ERM Vehicle Safety Form (see attached) or client- required form. On a monthly basis, other operational aspects such as oil level and belts should be checked and the results documented as well.

Any deficiencies noted on inspection forms should be reported promptly to the Office Fleet Coordinator or BU Fleet Manager. It is advisable for the Office Fleet Coordinator to periodically review these inspection forms to note any important trends that we or our vehicle leasing company should know.

Routine scheduled maintenance and repairs should be managed according to each BU's Fleet Management Procedures.

### 31.3.3 Minimum Safety Equipment

At a minimum, the following safety equipment should be located in a company-owned or long term leased vehicle:

- fire extinguisher (type ABC), secured/mounted inside cab
- first aid kit
- spare tire and jack
- jumper cables (check instructions)
- flashlight
- a means of warning such as road flares or lighted triangles
- traffic cones or delineator posts (minimum of two)
- reflective safety vest
- disposable camera (critical for incident investigation and documentation)

## 31.4 RENTAL VEHICLES

### 31.4.1 Conditions of Use

All employees are strongly encouraged to rent vehicles from companies with which ERM has negotiated rates and contract terms. If employees cannot rent from a consistent provider, then they should purchase the collision damage waiver and personal accident insurance.

Drivers of rental vehicles must possess valid governmental Driver's Licenses. Drivers must follow all posted signs, speed limits, and all applicable laws and regulations.

The security of equipment, tools, and documents in rental vehicles must be managed. Depending on the significance and cost of the items, they should either be removed from vehicles each evening or securely locked in the vehicle.

### 31.4.2 Inspection, Maintenance, and Repair

If a rental vehicle is used for intrusive field activities, gauging/sampling, operations and maintenance (O&M), construction/demolition, or any work at remote sites, basic functional aspects of these vehicles should be checked at first rental and then on a regular basis. The security of equipment, tools, and documents in rental vehicles must be managed. Any items, such as equipment or personal items should either be removed from vehicles each evening or securely locked in the vehicle. This will reduce the chance of individual being "enticed" to break into the vehicle.

It is recommended that the drivers of rental vehicles used for other purposes also inspect the vehicle at least for damage on first receipt. Employees should not operate a rental vehicle that is in unsafe condition. Employees should contact the rental car company for maintenance/ repair/ or replacement of rental vehicles, and in the event of any property damage incurred.

### 31.4.3 Minimum Safety Equipment

When trucks and vans, or automobiles are rented **locally f**rfield activities, gauging/sampling, O&M, construction/demolition, or ANY work at remote sites, the following minimum safety equipment must be secured. It is most reliable when the equipment is always in the vehicle but it could also be present as part of an employee's field kit. From a vehicle safety standpoint this is the same situation as when using company-owned or leased vehicles:

- fire extinguisher (type ABC), secured/mounted inside cab
- first aid kit
- spare tire and jack
- jumper cables
- flashlight
- a means of alarming such as road flares or lighted triangles
- traffic cones or delineator posts (minimum of two)
- reflective safety vest
- disposable camera (critical for incident investigation and documentation)

If we are renting trucks and vans from locations that are a significant distance away from our normal sources of safety equipment, a reasonable effort should be made to acquire this equipment from the local ERM office or other provider.

## 31.5 PERSONAL VEHICLES

### 31.5.1 Conditions of Use

When a personal vehicle is used on a work site, it is part of the equipment that represents ERM on the job. Its condition should not present potential safety hazards or cause a negative impact on job completion. The security of equipment, tools, and documents in rental vehicles must be managed. Any items, such as equipment or personal items should either be removed from vehicles each evening or securely locked in the vehicle. This will reduce the chance of individual being "enticed" to break into the vehicle.

Drivers must possess a valid governmental Driver's License. They must follow all posted signs, speed limits, and all applicable laws and regulations.

The security of ERM equipment, tools, and documents in personal vehicles must be managed. Depending on the significance and cost of the items, they should either be removed from vehicles each evening or securely locked in the vehicle and stored out of sight.

### 31.5.2 Inspection, Maintenance, and Repair

Staff should not use personal vehicles for work purposes if they are not in safe and reliable condition. If a personal vehicle is used for intrusive field activities, gauging/sampling, O&M, construction/demolition, or any work at remote sites, basic functional aspects of these vehicles should be checked on a daily basis. These inspections must be documented using a form such as the ERM Vehicle Safety Form (see attached) or client-required form.

### 31.5.3 Minimum Safety Equipment

When personal vehicles are used for intrusive field activities, gauging/sampling, O&M, construction/demolition, or ANY work at remote sites, the following minimum safety equipment should be secured. It is most reliable when the equipment is always in the vehicle but it could also be present as part of an employee's field kit. From a vehicle safety standpoint this is the same situation as leasing or owning a field vehicle:

- Fire extinguisher (type ABC), secured/mounted inside cab
- First aid kit
- spare tire and jack
- jumper cables (check instructions)
- flashlight
- a means of alarming such as road flares or lighted triangles
- traffic cones or delineators (minimum of two)
- reflective safety vest
- disposable camera (critical for incident investigation and documentation)

## 31.6. CONTRACT DRIVER AND CAR

### 31.6.1 Conditions of Use

In certain regions ERM consistently hires vehicles and drivers rather than driving for work purposes. While ERM employees will not drive or fully inspect these cars and are only passengers, we should always aim for the following safety practices:

- Attempt to establish long term relationships with a select number of companies whose quality in equipment and drivers is known.
- Strongly emphasize our desire that the hired vehicles have seat belts in the front and rear – this is our goal.
- Insist on seeing documentation that the company has a preventative maintenance program for its vehicles (certificate in the vehicle or other documentation).
- Request a copy of the driver's license in advance of hire and keep it on file.
- Insist on having an experienced driver who has not just begun work as a professional driver.

## 31.7 HIJACKING

In certain parts of the world, hijacking of vehicles is an increasing risk for ERM drivers. Below is awareness information on how hijacking may occur and how to avoid it.

### 31.7.1 Awareness for Avoiding Hijacking

- Hijackers may attempt to open your car door on a badly lit street or spot, usually approaching you from behind your car.
- Stop-signs, traffic lights and traffic intersections are common hijacking locations. Hijackers sometimes disguise themselves as street vendors or people trying to get your attention, stop your vehicle, and open your door.
- Hijackers overpower motorists at car service stations and snatch the keys from startled attendants. It is safer to patronize service stations during normal hours (8 am to 5 pm) and busy periods when incidents like this are less likely to occur.
- Hijackers nudge a vehicle in the rear. When the victim gets out of the car to inspect the damage to the car, they jump into the empty car.
- Prime hijacking times are between 6 and 8 am and between 6 and 8 pm, and after schools close between 12 and 3 pm, but it can happen at any time.
- Recent studies indicate that most of the hijackings in urban areas occur in the driveways of residential or commercial properties. Be extremely careful
- When leaving or arriving at your hotel, your lodge or a residence.
- Hijackers and their accomplices sometimes lie in the road as a ploy to attack unsuspecting motorists. Be wary of stopping in these situations.

## 31.8. TRAINING

Employee Defensive Driving training is necessary due to the hazards posed by this activity. Each employee designated as a "Hazardous Fieldworker" or "Non-Hazardous Fieldworker" in the H&S training database must attend ERM Vehicle Safety training. This training should be repeated at least every 3 years. Training to meet client, personal insurance company, or other requirements would likely meet ERM's requirements.

### 31.8.1 Company Owned or Long Term Leased Vehicles

ERM employees should receive orientation prior to driving company-owned or long term leased vehicles for the first time. The BU Fleet Manager and/or Office Fleet Coordinator are responsible for developing and administering a process for orientations, performing training, and sending records of training to the Training Records Coordinator.

### 31.8.2 High-Mileage/High Frequency Business Drivers

- ERM employees, who frequently drive company-owned or leased vehicles and other high mileage / high frequency business drivers, as determined by the BU, should undergo a basic Defensive Driving class. Attendance at such training may also be one of the recommendations evolving from incident investigations of vehicle-related incidents. The class should include a test and a certificate of completion
- The <u>most highly recommended</u> class for these employees is one that involves an external expert trainer with an opportunity to demonstrate practical awareness through practice driving.
- An alternate method of providing defensive driving for this group includes on-line training. Generic defensive driving classes are available on the internet at a cost of approximately $40 US. One on-line source is the US National Safety Council. Search the internet for "NSC Defensive Driving Course" and locate *National Safety Council Defensive Driving Course 8/6.* It is available in English and Spanish.
- <u>Some level of refresher training</u> should be provided every 3 years for this category of driver and more frequently if an ERM driver is involved in a preventable accident with injury/property damage or there is any reason to believe that refresher training is necessary in the interim.

### 31.8.3. Other Drivers

As determined by BU management, other ERM employees who use rental or personal vehicles to conduct sales and project activity should receive **one-time** defensive driving awareness training. This training could take the form of in-house training, on-line training, or other means of training. ERM has developed a training presentation, entitled *Introduction* to *Defensive Driving* and a test for use in meeting this more basic training requirement.

# 1 Purpose

The purpose of this procedure is to help ensure that ERM employees have formally considered the potential risks associated with the use of cutting tools.

# 2 Scope

This document applies to all ERM work activities which involve the use of cutting tools, including activities within an office, equipment storage area, or field office/trailer. This procedure applies to all ERM employees, subcontractors and subconsultants. This applies to all cutting tools. Below are several examples, though this is not an exhaustive list:

- Knives
- Shears / Snips / Scissors
- Core Sleeve / Tubing Cutters
- Pruning tools
- Paper cutters
- Hand-held electric saws

# 3 Procedure

## 3.1 Hazard Assessments

ERM requires that hazard assessments be performed for all activities, including those that involve the use of cutting tools. A Job Hazard Analysis (JHA) or equivalent form should be used to identify and document the hazards and associated control measures, including selection of the most appropriate cutting tool(s) to be used. When considering how to manage cut / puncture hazards associated with cutting tool use, a recommended best practice is to apply the following control measures listed in order of priority:

1. Eliminate or avoid hazard
2. Reduce hazard by use of safer cutting tool(s), equipment or other engineering controls
3. Limit who is permitted to use cutting tools and/or the locations they are used, and train those employees only.
4. Train all employees on the proper use of cutting tools.
5. Utilize personal protective equipment (PPE) such as cut-resistant gloves. This should be considered the last line of defense and used in conjunction with other control measures.

## 3.2 Selecting the Right Cutting Tool for the Job Task

- Use the cutting tools designed for the job.
- Do not use inadequate, inappropriate, or unsafe tools simply because they are available. Take the time to acquire the correct tool for the job.
- Use scissors / snips, safety cutters with guarded, concealed, or self-retracting blades, or other safety cutting devices without open or exposed blades whenever possible. Examples include the following:




Safety cutter for opening packages



Snips




Guarded utility knife





Concealed blade cutters

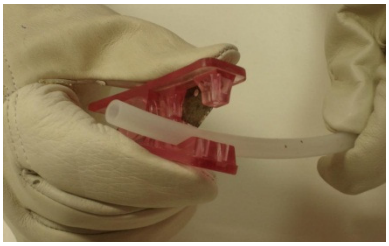



Sheet cutter / letter opener






Core sleeve cutters



Tubing cutter

- Fixed open-bladed knives (FOBKs) are dangerous tools, but they are used so routinely that their hazards are often underestimated or ignored. Examples include pocket knives (including Leatherman and similar multi-tools), utility knives, box cutters (including cutters with spring loaded blades), X-acto knives, and all other tools where the normal position and usage of the tool creates an unguarded razor or knife edge.








The uncontrolled and unsafe use of FOBKs is a common factor in hand injuries (lacerations) reported within our industry. **For this reason, FOBKs are prohibited from being used unless they are determined to be the safest tool for the task.** This determination should be made in consultation with the Partner-in-Charge, Project Manager, and Division Health and Safety (H&S) Leader. *Note that some clients prohibit the use of FOBKs altogether. Therefore, client expectations must be clearly known and understood.*

- If FOBKs are to be used, their safe use must be documented in written job procedures (e.g. JHA), the blade must be locked when in use and protected when not in use, personnel must have received training on how to correctly and safely use FOBKs, and cut-resistant gloves must be worn during use. FOBKs that cannot be locked in the open position shall not be used.

- Kitchen knives used in designated kitchen areas for food preparation may be used without the requirement to document in a written job procedure or provide formal training; however their use should be consistent with the guidance outlined below in Section 3.3.

- Paper shears pose a significant hazard and should only be used if no practicable alternative exists; a JHA has been performed and reviewed by H&S; and only trained employees are permitted to use it. The procedure must include locking the shear in the closed position when not in active use, and preferably includes the use of cut-resistant gloves unless safety interlocks are incorporated into the design. Options to purchase shears with safety interlocks must be considered at the first available opportunity.



## 3.3 Safe Cutting Tool Use

- Train personnel in the correct way to use cutting tools prior to use.
- Use the designated, safest cutting tool for the task and ensure it is sharp.
- Inspect cutting tools prior to use to confirm they are in good condition and safe to use.
- Always cut away from your hands and body, keeping all body parts behind the blade and out of the "line of fire".
- Ensure you and other people in the area are out of the "line-of-fire" of the cutting tool's path/potential path (in event of slippage, etc.).
- Put the object to be cut in a vise or on a flat surface, or use another tool to hold the object instead of holding in your hand or against your body (e.g., do not hold the object to be cut against your thigh).
- If the cutting tool is designed to be used with two hands then it must be held with two hands. Saws-alls and drills are designed to be held with two hands but are commonly incorrectly held with only one hand during use.
- Buddy System – utilizing a coworker to assist in cutting activities can often reduce the hazards associated with cutting lumber, tubing, and piping.
- Always return cutting tools to an appropriate storage location, DO NOT PLACE CUTTING TOOLS ON GROUND!

## 3.4 Personal Protective Equipment

Gloves that are appropriate for specific task hazards and in good condition can prevent some injuries; however, gloves (and all PPE) are considered as a final barrier against potential injury. Gloves must be used in conjunction with other control mechanisms (see Section 3.1) as well as the appropriate cutting tool for the job. *The use of cut resistant gloves does not remove the requirement to use the safest tool for the job task.*

- Specific glove requirements for tasks to be performed on site must be stated in the JHA or equivalent written job procedure.
- Common glove types and levels of protection are as follows:

| Glove Type | Protects From | Common Uses |
|---|---|---|
| Cotton / Canvas Cloth | Minor Abrasions, Chafing | Light Duty (e.g. sweeping) |
| Leather, Aramid Fiber, HexArmorTM | Abrasions, Punctures, Minor Lacerations | Handling Rough, Rigid or Abrasive Materials; Working with Hand and Power Tools (unless they may get caught) |
| Leather Reinforced with Metal or Metal Stitching | Abrasions, Lacerations | Handling Sharp-Edged Tools / Equipment. |
| Metal-Mesh; Stainless Core (stainless steel woven into material), Kevlar, HexArmor™ | Lacerations / Abrasions Associated with Glancing / Slicing Cuts | Using Cutting Tools; Handling Sharp/Jagged Tools and Materials. |
| Nitrile-coated Knit Gloves | Chemicals, Punctures | Clearing Demolition and Other Uncontrolled Debris |

More information may be obtained from your local PPE provider or at the links below:
http://www.grainger.com/Grainger/static/cut-resistant-glove-301.html
http://rs.nationalsafetyinc.com/company_79/Understanding%20Cut%20resistance.pdf

- Cut-resistant gloves must be worn when using FOBKs, at a minimum.
- When several hazards are encountered that one glove will not provide adequate protection against, gloves should be layered accordingly. For example, when handling contaminated materials with sharp edges, inner nitrile gloves may be worn to protect against chemical hazards with outer cut-resistant gloves to protect against cuts and abrasions.
- Protective gloves must be inspected before each use to ensure that they are not torn, punctured or made ineffective in any way (e.g., wet/water soaked or dirty gloves can become slippery).

# 4 Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects;
- See to the performance of periodic inspections in the office and at projects to identify inappropriate tools and procedures; and
- Correct any deficiencies in the implementation of this procedure as identified by the Division H&S Leader or other staff member.

**Project Manager/Supervisor/Branch Manager**: Responsible for the following elements:

- Perform observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure;
- Stop work where deviations from this procedure are observed; and

- Correct, in conjunction with the PIC and the Division H&S Leader, any observed deficiencies in the implementation of this procedure.

**Employees:** Responsible for the following elements:

- Perform all work in accordance with this procedure; and
- Formally assess risks from use of cutting tools and take actions to effectively manage those hazards prior to starting work.

**Division H&S Leader**: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

### Approvals

| Function | Name | Title | Signature | Date |
|---|---|---|---|---|
| Author | Steven Perkins / Brad Bishop | U.S. Western Division H&S Leader |  | 10/23/13 |
| Owner | Millard Griffin | U.S. Southern Division H&S Leader |  | 10/23/13 |
| Approval | Philip Platcow | U.S. H&S Leader |  | 10/24/13 |

# 5 References

5.1 None

## Appendix 1: Revision History

| Section | Reason for Revision | Date |
|---|---|---|
| All | New document developed. | 10/22/13 |
| | | |
| | | |
| | | |
| | | |
| | | |

## Appendix 2: Acronyms

| | |
|---|---|
| FOBKs | Fixed open-bladed knives |
| H&S | Health & Safety |
| JHA | Job Hazard Analysis |
| PIC | Partner in Charge |
| PPE | Personal protective equipment |

# Subsurface Clearance Project Plan

Site/Project Name: Sanmina
Client: Sanmina
ERM Project No.: 0589878

This Subsurface Clearance (SSC) Project Plan must be completed for each phase of ground disturbance activities at a project location. A copy of this document must be maintained at the project location for the duration of ground disturbance activities. The ERM Partner-in-Charge (PIC) and SSC Experienced Person (EP) or field team lead must review and approve the completed SSC Project Plan **prior to any point disturbance clearance or ground disturbance activities** (all approvals appear on final page of this document).

| **Administrative Information** | | |
|---|---|---|
| | Date Plan Started: 4/30/2021<br>Date Plan Completed: | Field Work Start Date: 5/11/2021<br>Field Work End Date: |
| | Project Manager: Rob Sents | Partner In Charge: Ernie Rossano |
| | SSC EP [1] / Field Team Lead: Jason Reynolds | Local MP or designee (for any waivers): Ernie Rossano |
| | List any additional SSC General Employees (GEs) working on this project: Kevin Warner | |
| | Describe the Scope of Ground Disturbance Activities:<br>10 indoor soil boring locations to be concrete cored and cleared to 5ft.<br>4 outdoor soil boring locations to be cleared to 5ft.<br>11 surface and near surface sampling locations. | *Check all that apply:*<br>☑ Point disturbances (manual / hand digging only)<br>☑ Point disturbances (using mechanized equipment)<br>☐ Excavation / trenching / grading<br>☑ Removal / coring / drilling of concrete, asphalt, etc.<br>☐ Other - Describe: |

| Project Information Summary | Yes | No | N/A | Comments |
|---|---|---|---|---|
| Knowledgeable Contact Person(s) identified, and presence requested during site walk. SSC Project Plan reviewed with knowledgeable contact person(s) | ✔ | | | Who: Earl Kimble |
| A log or register of all available information sources, including date(s) received, has been developed, and all documents reviewed by SSC EP. Information sources could include: as-built drawings, site plans, maps, aerial photographs, easements, right-of-ways, historical plot plans, current/historical aerial photographs, fire insurance plans, tank [dip] charts, SSC information obtained as part of previous site investigations, soil surveys, boring logs, etc. | ✔ | | | List information sources reviewed (including dates):<br>As built plans from 1974 reviewed onsite. |
| All subcontractors (including ground disturbance, private utility locating, concrete coring, etc.) prequalified and approved | ✔ | | | List Private Utility Locate Subcontractor(s):<br>NYLD |
| Specific SSC scope of work items in all work orders for subcontractors involved in SSC and ground disturbance activities (i.e. point disturbance clearance methods and required tools, field documentation and utility markout methods for private utility locate subcontractors, etc.) | ✔ | | | List all Ground Disturbance Subcontractors:<br>Parratt-Wolff |
| Additional client and/or regulatory requirements apply to the project and have been incorporated into H&S plan documents | | | ✔ | If yes, specify: |
| ERM / client / regulatory SSC requirements have been communicated to all field personnel including subcontractors (refer to SSC Review Checklist for Subcontractors - *ERM-1511-FM5*) | ✔ | | | |
| Current and valid SSC training certifications confirmed for all ERM staff (including PIC and PM) | ✔ | | | |
| Current and valid additional training certifications (e.g., detection equipment operation) confirmed for all ERM staff and subcontractor personnel | ✔ | | | List additional trainings: |
| UXO/MEC risks assessed: UXO/MEC is present or potentially present | | | ✔ | If Yes, stop work and contact PIC |
| Project location meets criteria for Remote/Greenfield Site | | ✔ | | If Yes, project teams can elect to complete the SSC Project Plan for Remote/Greenfield Sites (ERM-1511-FM2) instead of this form |

[1] Current certification on ERM Academy is required. SSC EP not required for Remote / Greenfield sites, as defined in the ERM Global SSC Procedure (ERM-1511-PR1).


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# Subsurface Clearance Project Plan

| Site Walk | | | | | | |
|---|---|---|---|---|---|---|
| **Identified Visual Clue** | **Yes** | **No** | | **Identified Visual Clue** | **Yes** | **No** |
| Lights | ✔ | | | Pipeline markers | ✔ | |
| Signage | ✔ | | | Fire hydrants | ✔ | |
| Sewer drains / cleanouts / drop inlets[2] | ✔ | | | Sprinkler systems | ✔ | |
| Cable markers | ✔ | | | Water meters | ✔ | |
| Utility poles with conduit leading to the ground | ✔ | | | Natural gas meters | ✔ | |
| Utility vaults / boxes[2] | ✔ | | | UST fill ports and vent pipes | | ✔ |
| Manholes[2] | ✔ | | | Equipment locations | ✔ | |
| Pavement scarring | ✔ | | | Steam lines | | ✔ |
| Distressed vegetation or vegetation in linear pattern | ✔ | | | Remote buildings with no visible utilities | | ✔ |
| Overhead utility lines | ✔ | | | Other (specify): | | |
| Solar panels / wind power generation | | ✔ | | Other (specify): | | |

Comments:

| Visual clues / site features integrated into Site Services Model | Yes | No | N/A | Comments |
|---|---|---|---|---|
| | ✔ | | | |

| Utility Markouts | Yes | No | N/A | Comments |
|---|---|---|---|---|
| Public Utility Locates completed (where available)? | ✔ | | | |
| Responses received from ALL companies notified? | ✔ | | | |

List utilities notified:
CHARTER COMMUNICATIONS BINGHAMTON 800-262-8600
NYSEG BINGHAMTON ELECTRIC 800-262-8600
NYSEG BINGHAMTON GAS 800-262-8600
SUEZ WATER OWEGO NICHOLS 607-687-1491 x13
TOWN OF OWEGO 607-625-2197
VERIZON SYRACUSE 855-226

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| Private Utility Locates completed [3] (waiver required if "NO") | ✔ | | | |
| Utilities clearly marked with agreed method? | ✔ | | | |
| Private locate findings documented? | ✔ | | | |

Private Utility Locate Performed by: NYLD

Years or experience operating detection equipment: 5
Date of most recent training on equipment operation: 2020

Type of equipment / methods used: GPR/EMF

Date(s) of most recent maintenance/servicing and calibration of detection equipment:

Note any limitations (e.g. sources of interference, geology, etc.):

Camera and routering in Sanitary sewer was only advanced ~90ft inside building to suspected 90 degree turn.

[2] Coordinate with site contacts to safely open and visually inspect any manholes, drains, vaults, cleanouts, or other similar structures.
[3] Not required for Remote / Greenfield sites, except where required by local regulations or client procedures.


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# Subsurface Clearance Project Plan

**Site Services Model**
Attach a site plan or drawing (to scale) showing planned ground disturbance location(s), the locations / routes of all identified or suspected subsurface and above-ground utilities and structures, and associated critical zones and excavation buffers.

| Utility / Structure | Present? Yes | Present? No | Present? Un-known | Anticipated depth (note units) | Located? Yes | Located? No | Status (active, inactive, abandoned / decommissioned, etc.) | Comments (For each, describe how the utility or structure was located – such as as-built drawings, private locate, public locate, visual clues, etc. – and quality of information available) |
|---|---|---|---|---|---|---|---|---|
| Electricity[4] | ✔ | | | | | | Active | Overhead inside, under ground outside |
| Gas | ✔ | | | | | | active | Overhead inside, underground outside |
| Petroleum Pipeline | | ✔ | | | | | | |
| Other Pressurized Lines | ✔ | | | | | | active | compressed air overhead inside |
| Process Sewer | | ✔ | | | | | | |
| Sanitary Sewer | ✔ | | | 2.4ft | | | active | GPR, camera, router |
| Storm Sewer | ✔ | | | | | | Active | GPR |
| Potable Water | ✔ | | | | | | Active | GPR |
| Telephone / Communication | ✔ | | | | | | Active | Overhead inside |
| Fiber Optic | ✔ | | | | | | Active | Overhead inside |
| Plant air / steam | | ✔ | | | | | | |
| Fuel / oil | | ✔ | | | | | | |
| Reclaimed / waste water | | ✔ | | | | | | |
| Fire suppression | ✔ | | | | | | Active | Hydrants in southern parking lot |
| Underground tank(s) | | ✔ | | | | | | |
| Other (Describe): | | | | | | | | |

Additional Notes on Site Services Model including identification of any data gaps:

**Contact Person(s) Approval of Ground Disturbance at All Locations**

| Name (Print) | Company | Name (Sign) | Date / Time |
|---|---|---|---|
| Earl Kimble (verbal) | Sanmina | | |

**Operating Critical Zone Determination**

**Are there any ground disturbance locations known or suspected to be inside Critical Zones?** ☑ **YES** ☐ **NO**

PIC and Local MP (or designee) must BOTH grant waiver for work within the Critical Zone. A sketch map must be developed for EACH ground disturbance location inside a Critical Zone (refer to template on last page)

[4] Work with site contact(s) to identify the presence of any high voltage electrical lines, 3-phase electrical lines, or lights that operate on a photocell / low-light sensor (only come on at night or in low light conditions). If high-voltage or 3-phase power is known or suspected, provide any available information to the private utility locator. Coordinate with the site contact(s) to energize any de-energized lines during the private utility locate to facilitate more accurate tracing.


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# Subsurface Clearance Project Plan

| Overhead Clearance | Yes | No | N/A | Comments |
|---|---|---|---|---|
| Overhead utility lines in the general vicinity of ERM work onsite? | ✔ | | | If NO, check N/A for remaining items in this section |
| If overhead utilities are present, has nominal voltage been determined? If yes, list in comments section. | | | ✔ | Voltage: |
| Overhead clearances confirmed with equipment operators for safely deploying equipment to the location? | ✔ | | | Clearance distance(s): |
| Proximity alarms, spotters, and /or warning signage necessary to ensure safe clearances? | ✔ | | | |
| If the equipment is closer than the minimum clearance distance to the overhead utility, can utility be de-energized? | | | ✔ | |
| If utility cannot be de-energized, alternate plan developed with approval from the PIC and client/site owner? | | | ✔ | |

| **Plan for point disturbance clearance at location(s):** 3.5 to 4ft inside and 5ft outside<br>*(Note that this plan must be reviewed and approved by the PIC before any clearance activities commence)* | *Attach additional sheets to completely describe clearance method, tools and depth if these will vary during the process from location to location.* | | | |
|---|---|---|---|---|
| | **Yes** | **No** | **N/A** | **Comments** |
| Clearance technique to be used (indicate which method):<br>☐ Compressed air excavation *(ERM preferred method)*<br>☐ Pressurized water excavation<br>☑ Hand digging<br>☑ Hand augering<br>☐ Soil probe rod<br>*Pick axes, pointed spades, or any other tool that comes to a point are NOT to be used for point disturbance clearance. Note: a waiver is required if no clearance will be performed prior to use of mechanized equipment* | ✔ | | | Provide rationale if NOT using preferred method of compressed air excavation:<br>☑ Scope of work limited to hand digging only<br>☐ Equipment not available<br>☐ Cannot meet technical objectives (e.g., vapor pins)<br>☐ Other (describe): |
| For locations that will be advanced with mechanized equipment (e.g., drill rig or direct-push) after initial clearance:<br>Diameter of clearance must be to LARGER OF: 4 inches (10 cm), or at least 125% of the diameter of largest downhole tool to be used | ✔ | | | Specify diameter (include units) of largest downhole tool: 3.25"<br>Specify diameter (include units) to be cleared: 6" |
| Depth of clearance:<br>☑ Outside Critical Zones, to a minimum of 5 feet (1.5 meters). *Note: typical site utility depths should be considered and may warrant deeper clearance*<br>☑ Inside Critical Zones, to a minimum of 8 feet (2.4 meters), and deeper if necessary to clear to depths greater than 8 feet for deeper utilities and structures.<br>☐ For locations with frozen soils, to 2 feet (0.6 meters) beyond the bottom of the frost line at the site. | | ✔ | | Specify depth(s) and units:<br>Physical clearance inside was limited to 3.5-4ft due to the numerous cobbles in the subsurface and the concrete cut out diameter of 1ft. |
| Concrete coring / cutting – personnel performing these activities have been verified as trained and competent? | ✔ | | | Describe risk mitigation techniques to be employed:<br>Private utility locate and onsite personnel. |

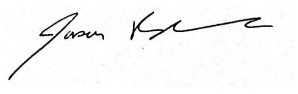
| **Excavation Plan**<br>*(Note that this plan must be reviewed and approved by the PIC before any disturbance activities commence)* | **Yes** | **No** | **N/A** | **Comments** |
|---|---|---|---|---|
| Communicate excavation plan and 2-foot (0.6-meter) Excavation Buffer location(s) to subcontractor(s). Delineate all Excavation Buffers. | | | ✔ | |
| If possible, work with contact person / site owner to de-energize subsurface services prior to beginning excavation | | | ✔ | |
| Risk mitigation measures reviewed and acceptable? | | | ✔ | Describe: |


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# Subsurface Clearance Project Plan

## Approvals

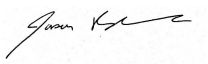
**Review Meeting**
The SSC Project Plan must be reviewed with the PIC BEFORE any point disturbance clearance or ground disturbance activities occur. It is the responsibility of the SSC EP to schedule this meeting and ensure it occurs; no ground disturbance may occur without receiving start-work authority from the PIC. This review must be completed through a verbal conversation, whether in person or by phone or video conference. Documentation of review can be indicated as "verbal" or be received via e-mail initially, but must be followed up with signatures in the final SSC Project Plan.

| Reviewed by | Signature | Date of Review | Comments |
|---|---|---|---|
| SSC EP or Field Team Lead (required review): |  | 5/27/2021 | |
| PIC (required review): | | 5/27/2021 | |
| Project Manager (optional review): | | 5/27/2021 | |

**Waiver Approvals**
**Two separate Partners are required to approve waivers. Both Partners must be SSC-certified (either GE or EP)**

| SSC Component Being Waived: | Waived By (PIC) | Waived by (Local MP) | Date | Rationale |
|---|---|---|---|---|
| Requirement for direct ERM supervision of ground disturbance activities:<br>• SSC EP to oversee execution of the SSC Process (can include the entire project or specific SSC-related tasks), or<br>• Direct oversight of subcontractors for Remote/Greenfield sites or shallow hand digging no deeper than 1.5 feet / 0.5 m) | | | | Specify scope of waiver: |
| Performance of private utility markouts | | | | |
| Clearance of point disturbance locations prior to advancing with mechanized equipment (including no clearance or partial clearance) | | | | Indicate specific locations and scope of waiver: |
| Prohibition of ground disturbance inside a Critical Zone | | | | Indicate specific locations:<br>B-108 |

**SSC Project Plan Close-out (SSC EP or Field Team Lead)**

| Jason Reynolds |  | |
|---|---|---|
| Name (Print) | Name (Sign) | Date / Time |

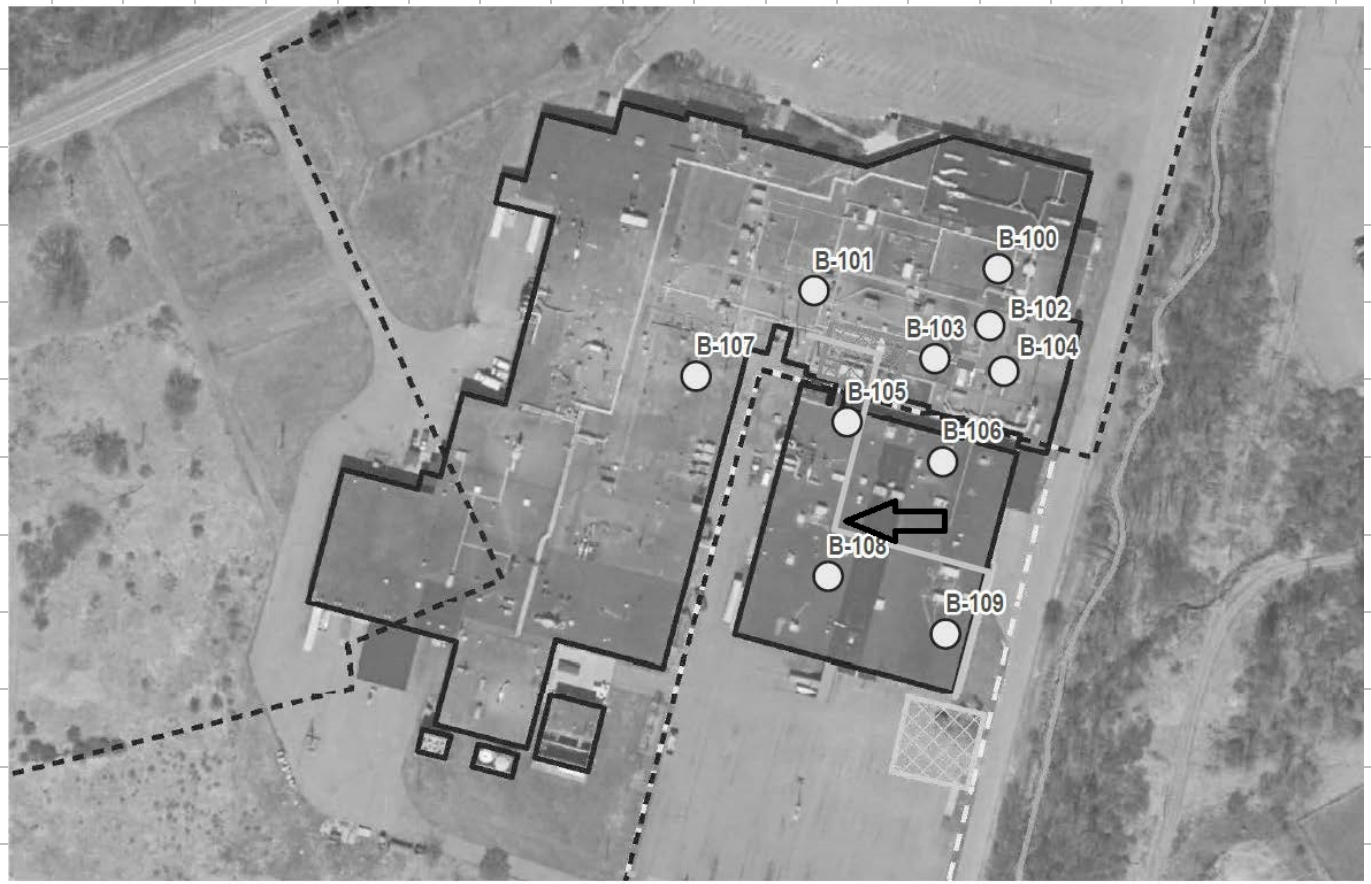
**Additional Notes or Learnings**


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# Subsurface Clearance
# Project Plan – Critical Zone Sketch Map

| | |
|---|---|
| Site/Project Name: | Sanmina |
| Client: | Sanmina |
| ERM Project No.: | 0589878 |
| SSC EP / Field Team Lead: | Jason Reynolds |

**A sketch map must be developed for each ground disturbance location inside a Critical Zone (one map per location – attach additional maps as needed). Disturbance within a Critical Zone can only proceed with both PIC and Local MP (or designee) approval.**




GROUND DISTURBANCE LOCATION ID:

B-108

GROUND DISTURBANCE LOCATION DESCRIPTION:

B-108 was moved from hallway location due to overhead utilities and placed in an adjacent room within 10ft of a known sanitary sewer that was located approx. 5ft away at a depth of 2.4ft.

Instructions:

1. Create a sketch of the disturbance (in the space to left or attach) that is drawn to scale and contains the following information:
   a. The disturbance location
   b. Surface landmarks and overhead obstructions (buildings, roads, overhead lines, etc.)
   c. Subsurface utilities and structures that are:
      i. Identified in the Site Service Model
      ii. Marked by public and private utility locators
      iii. Communicated by knowledgeable contact person(s)
   d. Any surface visual clues as to potential underground services (junction boxes, drains, disturbed concrete, signage, etc.)
2. Use your sketch to mark Critical Zones (3m / 10 feet) around underground utilities and structures.
3. For excavations, use your sketch to mark Excavation Buffers (0.6m or 2 feet) from subsurface utilities and structures.

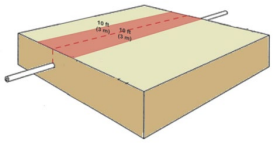


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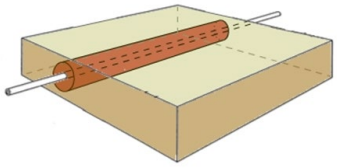
# Subsurface Clearance (SSC)
# Review Checklist for Subcontractors

| | |
|---|---|
| Site Name: | |
| Client: | |
| ERM Project No.: | |
| Contractor activities to be performed on site: | |

**Use this form to conduct and document review with contractor personnel, to ensure they have been properly briefed on the applicable components of ERM's SSC Procedure (ERM-1511-PR1).**

| TOPIC | REVIEWED | N/A | COMMENTS |
|---|---|---|---|
| All personnel on ERM projects are empowered to stop work, without fear of reprimand, if it is unsafe to proceed or if there are concerns or questions. | ☐ | ☐ | |
| If at any time during project execution, the scope of work or site conditions change, work should be stopped and the potential impacts of the change discussed. | ☐ | ☐ | |
| Ground disturbance activities may NOT be performed at any location without authorization by the ERM SSC Experienced Person (EP) or field team lead. Unless explicitly authorized by ERM's SSC EP, Partner-in-Charge and Local Managing Partner, clearance activities may NOT be performed at any location unless the ERM SSC EP or field team lead is physically present. | ☐ | ☐ | |
| Unless explicitly authorized by ERM's SSC EP, Partner-in-Charge and Local Managing Partner, ground disturbance may NOT be performed within 10 feet (3 meters) distance (referred to as the "Critical Zone") of any subsurface structure. | ☐ | ☐ | "The Critical Zone"  |
| Unless authorized by the ERM SSC EP, ground disturbance / clearance activities must NOT be performed in areas that are in direct conflict with any markings made by public or private utility locators. | ☐ | ☐ | |
| Unless explicitly authorized by ERM's Partner-in-Charge and Local Managing Partner, all borehole and small test pit locations must be cleared prior to use of mechanized equipment. Required clearance depths and diameters are as follows:<br>• Physically clear to a diameter that is the LARGER OF: 4 inches (10 cm), or at least 125% of the largest downhole tool to be used.<br>• Physically clear to a minimum depth as follows:<br>○ Outside Critical Zones, to 5 feet (1.5 meters).<br>○ Inside Critical Zones, to 8 feet (2.4 meters) at a minimum, and deeper if necessary to clear to depths greater than 8 feet for deeper utilities and structures.<br>○ For locations with frozen soils, to 2 feet (0.6 meters) beyond the bottom of the frost line at the site. | ☐ | ☐ | |


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| TOPIC | REVIEWED | N/A | COMMENT: |
|---|---|---|---|
| Mechanical digging is prohibited inside a 2-foot (0.6-meter) distance (referred to as the “Excavation Buffer”) in all directions from subsurface structures that will be intentionally exposed due to ground disturbance activities. Removal of material inside the Excavation Buffer may only proceed by hand or by compressed air excavation (if allowed by law and authorized in writing by the owner / operator the structure). | ☐ | ☐ | **“The Excavation Buffer”**  |
| For all equipment brought to the site, the minimum horizontal distance from any point on the equipment to the nearest overhead electrical power line must adhere to the minimum safe clearance requirements stipulated by regulation, utility companies, client requirements, and/or industry best practice. Other access constraints should be reviewed to plan vehicle moves accordingly. | ☐ | ☐ | |
| If subsurface structures are to be de-energized prior to ground disturbance activities, only trained personnel may do so via a formal, written energy isolation program. | ☐ | ☐ | |
| For compressed air excavation equipment, the operators should wear coveralls, ear, eye and hard hat protection. Safety precautions associated with compressed air must be employed. Grounding the hose and the tanker may also be required and should be assessed prior to start of operations. Filtering devices should be used to reduce release of materials and dust to the environment. | ☐ | ☐ | |
| Contractor personnel should be observant during ground disturbance activities for the presence of warning signs indicating non-native soil, fill materials, and/or the presence of unexpected subsurface structures. Any evidence of warning signs, unexpected encounters with subsurface structures, or any other near misses or incidents must result in immediate work stoppage and be reported to the ERM SSC EP or field team lead. | ☐ | ☐ | |
| In the event of contact or potential contact with a subsurface structure, contractor personnel must observe a no touch principle. The service is to be considered live and potentially damaged, therefore hazardous, until investigated by a specialist. | ☐ | ☐ | |
| Once clearance is completed, holes must be secured or covered in order to prevent slips, trips and falls until mechanical advancement commences. | ☐ | ☐ | |
| Contractor personnel must participate, as requested, in investigations of near misses and incidents. | ☐ | ☐ | |
| Contractors must comply with all other applicable regulatory or client requirements. | ☐ | ☐ | |
| Other topics discussed: | ☐ | ☐ | |

N/A = Not applicable to this project.


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**REQUIREMENTS FOR TOOLS AND EQUIPMENT:**

- A JHA must be developed for each contractor task. JHAs must be specific to the general location of the project as well as the equipment and methods to be used. Unless the project team can positively determine that no subsurface structures are present, all tools and equipment used in the clearance process must be selected based on the potential risks (i.e., energized electrical lines, fiber optic cables, natural gas pipeline, etc.) that cannot be ruled out. In addition to selecting tools and equipment, appropriate safety measures, including the need for specialized PPE, must be evaluated with input from subject matter experts. JHAs must be reviewed by the SSC EP and PIC.
- Blades on shovels and post-hole diggers must have rounded or blunt edges. Tools that come to a point, e.g., pick axes or pointed spades, are not to be used for clearance.
- Crow bars, pinch bars or pry bars must not be used to break hardened soil or backfill. The ERM SSC EP or field team lead may authorize use of bars only to loosen materials like bricks or larger stones so that removal of these materials is possible. Bars must not be used with excessive force.
- Electric-powered equipment must have ground fault protection.
- Equipment must be inspected prior to use, maintained according to manufacturer recommendations, and operated only by trained personnel. Training documentation must be provided upon request.
- Manual / hand tools must be used properly and not "over-muscled." In case of refusal or difficult advancement, the contractor must stop work and notify the ERM EP or field team lead.
- Rig- or stand-mounted concrete coring equipment must be anchored to the ground/floor using proper anchors.

| **Checklist Completed By: (SSC Experienced Person or Field Team Lead)** | | |
|---|---|---|
| | | |
| Name (Print) | Name (Sign) | Date / Time |

| **Reviewed By: (All Contractor Personnel)** | | |
|---|---|---|
| | | |
| Name (Print) | Name (Sign) | Date / Time |


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## Perform

Conditions 1-4 require that you **STOP WORK** and consult with a second person. Conditions 5-9, proceed with caution.




**1** Refer to the appropriate partner to decide.
**2** Ask a specialist with more knowledge to advise.
**3** Consult with your supervisor before starting.
**4** Discuss with a colleague to assist.

**5** How can risk be reduced?
**6** Look for another way to do the job if possible.
**7** Re-check your safety controls (JSA, SWMS, PPE, Procedures).
**8** Re-check the area before proceeding.
**9** Proceed with the usual level of safety awareness.

M1-ERM-004-FM1, Version 6

## Scan

Take two minutes to: scan **LOW** scan **MEDIUM** scan **HIGH**

**Safety AT ERM**
Risk Management

SNAP Assessment
Scan
Notice
Analyze
Perform

ERM

*Activity Level Risk Review*

## Notice

Notice the hazards and the quality of the control measures in place.
Ask yourself the following questions…

| | | | |
|---|---|---|---|
| 1 | Have I looked and identified all the hazards? | ☐ Yes | ☐ No |
| 2 | Will the job be done as already discussed? | ☐ Yes | ☐ No |
| 3 | Are the resources I need available? (PPE, tools, people) | ☐ Yes | ☐ No |
| 4 | Can the job be done without causing an incident? | ☐ Yes | ☐ No |
| 5 | Is everything the same since I last did this task? | ☐ Yes | ☐ No |
| 6 | Are others protected from my activities in the area? | ☐ Yes | ☐ No |
| 7 | Have I identified emergency devices and locations and do I know what to do? | ☐ Yes | ☐ No |
| 8 | Do I have safe access to and from my work area? | ☐ Yes | ☐ No |
| 9 | Is my work area clean and tidy? | ☐ Yes | ☐ No |

**If you answered NO to any of the above then consider this when you ANALYZE**

## Analyze

What is the most likely adverse consequence from an incident?
What is the probability of this type of incident occurring?

### Probability of an incident

- Almost certain
- Has happened
- Possible
- Heard of
- Unlikely
- Almost impossible

### Exposure to the risk

- Weekly
- Daily
- Current Task

### Consequence/Outcome

| Injury | Impact |
|---|---|
| Multiple fatalities | Catastrophic |
| Fatality | Major |
| Disability | Significant |
| Serious (LTI) | Serious |
| Medical Treatment | Moderate |
| First Aid | Minor |



# Safety Management System – Global Procedure

## Operational Controls



Procedure Number: **M1-ERM-012-PR** Version: **1.0**

## 1 PURPOSE AND SCOPE

This document describes how ERM establishes and implements operational controls. Operational controls have been established to mitigate the identified risks associated with our activities.

## 2 ROLES AND RESPONSIBILITIES

**Regional CEO (RCEO), Divisional Managing Director (DMD), and Business Unit Managing Partner (BU MP).** Own applicable operational controls, in consultation with the H&S group.

**Regional Practice Leads.** Develop and own applicable Practice-specific operational controls, in consultation with the H&S group.

**Partner in Charge (PIC) and/or Key Client Director (KCD).** Develop and own applicable project- and/or client-specific operational controls, in consultation with the H&S group.

**Regional and BU H&S Leads**. Develop and communicate operational controls associated with their area of responsibility.

**Global Health and Safety Director (GHSD).** Own the Safety Management System (SMS) Operational Control process, and ensure that Global operational controls are developed and implemented.

## 3 DEFINITIONS

**Operational Control**. A procedure, process, or tool (e.g., personal protective equipment, signs) that is developed to control the risks associated with the activities of employees, contractors, members of the public and / or visitors.

**Document Control System**. The identified location(s) within Minerva where written SMS procedures are maintained.

## 4 PROCEDURE

### 4.1 Establishing Operational Controls

Operational controls mitigate the risk posed to people or the environment due to the activities performed. The level of rigor associated with an operational control is commensurate to the risk; therefore, a high risk activity may be controlled by a written operating procedure while a low risk activity may be controlled though on-the-job training.

Depending on the severity or the scope of the identified risk, operational controls may be developed for the ERM global population, or for a BU-, Division-, Regional-, Practice-, and/or client-specific audience.

- **Global controls** are developed based on the identified risks applicable to the global organization. Risks are documented in the Global Safety Risk Register, as described in the ***Hazard Identification and Risk Assessment*** Procedure. The development of global procedures is prioritized based on risk.

  Global controls may also be developed based on identified trends in incidents or near misses, as described in the ***Monitoring and Measurement*** Procedure. Finally, global controls have been developed to describe and support the overall SMS. A list of current global procedures is provided on ***M1-ERM-012-FM1***.

  Global safety controls are developed and owned by the GHSD.

- **Regional/Divisional/BU controls** are developed to address risks specific to a particular location or Region, or to address local regulatory requirements. Local controls may impose more (but not less) stringent requirements than global controls, if driven by local:

  - Regulatory requirements,



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- Risk profile,
- Management system certification expectations,
- Objectives or targets, etc.

Regional, Divisional and BU controls are developed and owned by the Regional CEO, the DMD or the BU MP, respectively, in consultation with members of the H&S group.

- **Practice-specific controls** are developed to address risks associated with a particular practice or sub-practice, but which may not apply to all of ERM. These controls may address elements beyond H&S, depending on their scope.

  Practice-specific controls are developed and owned by Regional Practice leads. H&S elements within these controls are developed in consultation with members of the H&S group, and shall be managed at the Global or Regional level.

- **Client-specific controls** are developed to meet particular client objectives. These controls typically address client requirements that are more stringent than global or regional/BU requirements.

  Client-specific controls are developed and owned by the PIC associated with the client. For global key clients (GKCs), the process is developed and owned by the designated KCD.

### 4.2 Implementation of Operational Controls

These controls are implemented in a number of ways:

- Written policies, procedure, or guidance documents;
- Formal or informal training, including mentoring or on-the-job training;
- Signs, communication, or postings; and/or
- Pre-job safety briefings.

In all cases, the operational controls required to mitigate risk associated with project activities are documented in the project Health and Safety Plan (HASP). Project HASP development and use is described in the ***Health and Safety Planning*** Procedure.

Written procedures are a particular subset of operational controls that are required to cover situations where their absence could lead to deviations from the Health, Safety, and Environment Policy Statement (***M1-ERM-001-FM1***). Written procedures will be approved and maintained in accordance with the ***Document Control and Record Keeping*** Procedure. Written SMS procedures are only acceptable for use if they are stored in the DCS.

### 4.3 Communication

Communication on the availability and applicability of operational controls is ongoing. Written procedures are available on Minerva and training is managed through the ERM Academy Learning Management System (LMS). PICs and PMs are responsible for ensuring that all employees comply with the operational controls applicable to their projects.

Additional information is available in the ***Communication, Participation and Consultation*** Procedure.

## 5 REFERENCES

- M1-ERM-012-FM1 – Global Written Operational Controls Register
- M1-ERM-001-FM1 – Health, Safety, and Environment Policy Statement
- M1-ERM-002-PR – Hazard Identification and Risk Assessment Procedure
- M1-ERM-008-PR – Competence, Training and Awareness Procedure
- M1-ERM-011-PR – Document Control and Record Keeping Procedure
- M1-ERM-014-PR – Monitoring and Measurement Procedure
- S1-ERM-002-PR – Health and Safety Planning Procedure



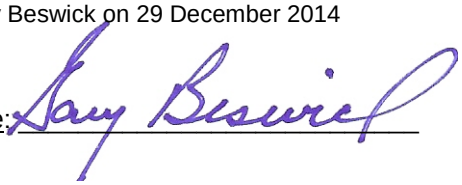
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**Document Control Information**

Original Effective Date: 1 April 2015

Version Number: 1.0

Approved by: Gary Beswick on 29 December 2014

Approval Signature: 

**Revision History**

| Section | Version: Reason for Revision | Date |
|---|---|---|
| All | 1.0: New document. | 29 Dec 2014 |
| | | |



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# Safety Management System – Global Procedure

## Emergency Preparedness and Response







Procedure Number: **M1-ERM-013-PR** Version: **2.0**

### 1 PURPOSE AND SCOPE

This document establishes the guidelines for emergency preparedness and response (EPR), and documents methods in place to help protect employees and visitors in the event of an emergency situation.

### 2 ROLES AND RESPONSIBILITIES

**Office Head.** Ensure the development and maintenance of an office-specific Emergency Action Plan (EAP); ensure annual training and evacuation drills are completed.

**Office Health and Safety (H&S) Coordinator.** Support the implementation of the EAP and ensure employee's awareness of and compliance to the plan; ensure a process is in place to inform office visitors of the relevant elements of the Office EPR plans.

**Partner in Charge (PIC)**. Ensure an emergency plan is in place for project sites, including field or temporary offices.

**Regional H&S Lead.** Develop Regional EPR plans as required; ensure Divisional/BU developed EPR plans are appropriate; ensure all permanent offices have and maintain a compliant EAP.

**Executive Committee**. Own, manage and periodically test the Global Crisis Management Plan.

**Global Health and Safety Director (GHSD).** Own the Safety Management System Emergency Preparedness and Response process.

### 3 DEFINITIONS

**Emergency Preparedness and Response (EPR) Plan**. Any process or document that describes ERM's approach to mitigating an emergency situation.

**Emergency Action Plan (EAP)**. A particular type of EPR Plan that is mandatory in all permanent and field offices.

**Permanent Office**. A permanent office is any ERM office, regardless of number of employees, which is not distinctly related to a particular project or client site. In cases of doubt, the Regional CEO shall determine whether an office is permanent or temporary.

### 4 PROCEDURE

ERM has established distinct EPR processes and procedures at the Global, Regional, office and project levels.

#### 4.1 Global Level EPR

The Executive Committee is responsible for maintaining the ERM ***Global Crisis Management Plan*** (CMP) which documents the response protocol to be used by the Executive Crisis Management Team in the event of a crisis event. The CMP is designed to help ERM identify, communicate and manage crisis events that will impact ERM's global operations. Among other topics, the CMP addresses the following:

- ERM's Crisis Management Policy, including the principles and approaches which the company will follow in all crisis situations;
- The procedure for Reporting a Crisis to the relevant parties at ERM;
- The criteria used to Assess the Situation and declare a crisis; and
- ERM's Crisis Management Protocol, including the specific steps to be taken during the crisis and when the crisis is over.

Given the sensitive nature of the information maintained in the CMP, the plan is not openly available to all employees. The document is controlled in accordance with the ***Document Control and Record Keeping*** Procedure, and has been assigned document number M1-ERM-013-PR2. To ensure that the document is readily accessible in the event of a crisis, it is posted on a limited-access internal website on



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Minerva. For awareness and communication, a ***Crisis Management Plan Overview*** guidance document has been prepared (M1-ERM-013-GU2).

The CMP is tested periodically through documented table top exercises and drills, and revised as needed.

### 4.2 Regional Level EPR

When required, or as directed by the RCEO, the Regional H&S Lead may develop regional (or sub-regional) EPR documents, procedures or communications. Situations requiring a regional response may include:

- Pandemic planning
- Security / social unrest
- Significant weather events

In addition, the Regional H&S Lead will coordinate with Division/BU H&S Coordinators to ensure Division/BU EPR plans that may have been developed are consistent with global policy, adequate for the risk, and appropriately maintained in place in each of the region's Divisions.

### 4.3 Office Level EPR

The Office Head in each permanent office is responsible to develop, maintain and annually review an Office Emergency Action Plan (EAP). In coordination with the Office H&S Coordinator, the location, content, and critical elements of the EAP shall be communicated to all employees at least annually. EAPs shall include, but are not limited to, the following information:

- Building evacuation routes and external assembly points
- Fire response procedures
- Employees (or visitor) injury/first aid measures
- Emergency telephone numbers
- Natural disaster preparedness plans (including contagious diseases, if applicable)
- Bomb threat procedures
- Visitor management and security
- Emergency event communication plan
- Spill response

The ***Emergency Action Plan Development*** Guidance Document is available to assist an office in the development of this plan. It is the responsibility of the Office Head to develop the EAP with sufficient level of detail to address their local risk.

In addition to the development of an EAP, all offices will comply with the following minimum expectations, without exception:

- Evacuation and assembly point maps will be prominently posted.
- Emergency response numbers, including the number of the internal medical / case management provider, will be prominently posted.
- Illuminated (or fluorescing) Exit signs shall be posted at all emergency exit doors and along exit routes such that line-of-sign visibility is maintained from all locations within the occupied space.
- The EAP shall be reviewed and updated at least once per calendar year. The review shall be documented, even if no updates have been made.
- Evacuation drills shall be completed and documented at least once per calendar year.
- Failures of EAP implementation (i.e., as identified during actual emergencies or drills), shall be documented and addressed in accordance with the ***Event and Non-conformity Management*** Procedure.

The Office Head and the Office H&S Coordinator shall sign the document.

The Office H&S Coordinator shall develop a method of communicating relevant EPR information to all visitors.

The Regional H&S Lead is responsible for ensuring that each ERM office in their Region has an effective and thorough EAP in place.

### 4.4 Project Level EPR

At the project level, the Partner in Charge (PIC) is responsible for ensuring that a current and approved Health & Safety Plan (HASP) that contains a description of the responses to incidents and emergency situations is in place for all personnel. For



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more information on project level EPR, refer to the ***Health and Safety Planning*** Procedure.

All ERM operated field offices and/or temporary locations shall have a documented EAP, often included as part of the project H&S planning documents. A physical copy of the EAP shall be maintained at the site (in a prominent location), and shall include similar information as required in a permanent office, as deemed applicable. In addition, an emergency contact list and a hospital route/map shall be posted in any field or temporary office.

## 5 REFERENCES

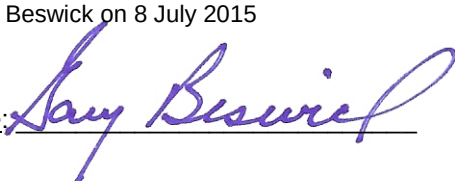
- M1-ERM-011-PR – Document Control and Record Keeping Procedure
- M1-ERM-013-PR2 – Global Crisis Management Plan (Confidential)
- M1-ERM-013-GU1 – Emergency Action Plan Development Guidance Document
- M1-ERM-013-GU2 – Crisis Management Plan Overview
- M1-ERM-015-PR – Event and Non-conformity Management Procedure
- S1-ERM-002-PR – Health and Safety Planning Procedure

**Document Control Information**

Original Effective Date: 1 April 2015

Version Number: 2.0

Approved by: Gary Beswick on 8 July 2015

Approval Signature: 

**Revision History**

| Section | Version: Reason for Revision | Date |
|---|---|---|
| All | 1.0: New document. | 29 Dec 2014 |
| 2.0; 4.3 | Clarified the responsibility of the Office Coordinator to establish a visitor communication process; modified the requirement to 'train' employees on the Office Level EPR to 'communicate to employees'. | 8 July 2015 |



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## 1. Purpose and Scope

This document establishes the requirements for vehicular travel while on ERM company business (excluding public transportation). This procedure defines the minimum requirements; more stringent local requirements may be applicable.

## 2. Roles and Responsibilities

**Business Unit (BU) Fleet Manager**. Implement written procedures to manage the BU fleet in accordance with this procedure.

**BU Managing Partner (MP)**. Establish driver training programs (as applicable); authorize employees that are permitted to operate a motor vehicle on company business; designate a BU Fleet Manager if the BU has leased or owned vehicles.

**Employees**. Notify their line manager within one day of suspension or revocation of their driver's license, if an Authorized Driver.

**Journey Leader.** Complete the JMP, pre-departure checks, and required check-in calls. The Journey Leader shall be identified in the JMP, and is typically the primary driver.

**Journey Point of Contact.** Receive the JMP identified check-in calls, initiate response plan in JMP if check-in call not received.

**Partner in Charge (PIC).** Ensure client-related driver training requirements have been communicated to the project team and implemented; approve Project-related Journey Management Plans (JMPs).

## 3. Definitions

**Authorized Driver**. ERM employee permitted by the BU MP to operate a motor vehicle while on company business.

**Company business**: All driving associated with ERM work, with the exception of an employee's standard commute from home to the office.

**Defensive Driving**: A driving technique that aims to reduce the likelihood of a serious accident by anticipating dangerous situations, despite adverse driving conditions or the mistakes of other drivers. In some locations, this is also known as Alert Driving.

**Gross Vehicle Weight Rating (GVWR)**: Maximum operating weight of a vehicle as specified by the manufacturer.

**Hired vehicle**: Vehicle provided by a vehicle rental company that includes a driver.



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**Leased vehicle**: A vehicle under a long-term rental agreement between the vehicle rental company and ERM.

**Off-road driving**: Any driving that does not occur on a permanently maintained road, with the exception of driving that occurs completely within the project site.

**Remote driving**: Driving in a location where emergency assistance may not be readily available or present (e.g., unpopulated areas on non-major highways), areas with known security concerns, or any other area deemed "remote" by the driver (i.e. driver is uneasy or uninformed about the destination).

**Rented vehicle**: Vehicle provided by a vehicle rental company that an ERM employee will be driving.

**Vehicle used for Field Work**: For the purposes of this Procedure, a vehicle is used for field work if the vehicle is driven for intrusive field activities, gauging, sampling, operations and maintenance (O&M), construction, demolition, or any work at remote sites; including motorcycles, motor bikes and all-terrain vehicles (ATVs).

# 4. Procedure

## 4.1 Risk Assessment and Planning

All vehicular travel shall be considered as a distinct task in the health and safety planning process, and shall have a Job Hazard Analysis (JHA) completed in accordance with *S1-ERM-002-PR – Project Health and Safety Planning* Procedure. In addition to the JHA, a documented and approved Journey Management Plan (JMP) is mandatory for the following conditions:

- Single day journey in excess of 500 km (310 miles)
- Single day estimated driving duration in excess of 4.5 hours
- Driving in a remote location (including off-road driving)
- Driving in any location/region identified as "High Risk" by Control Risk Group (CRG) and/or Regional H&S Lead

The JMP shall be completed using *S1-ERM-008-FM1*, shall designate a Journey Leader and a Journey Point of Contact, and shall be approved by the PIC (or the Journey Leader's supervisor if the Journey Leader is the PIC or there is no PIC associated with the travel). A copy of the JMP shall be maintained with the traveller and in the Project File.

## 4.2 Driver Requirements

### 4.2.1 Minimum Expectations

All Authorized Drivers shall meet the following requirements:



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- Hold a valid and current driver license for the class of vehicle to be operated. It is the responsibility of the employee to inform his/her supervisor within the next working day of a driver license suspension or revocation.
- Not use a mobile phone while operating a vehicle (per *ERM Global Policy – Mobile/Cellular Telephone and Personal Digital Assistant (PDA) Use While in a Vehicle*).
- Not be under the influence of alcohol or drugs, or any other substance or medication that could impair their ability to drive (per *ERM Global Policy – Drug and Alcohol Use*).
- Inspect vehicle prior to each use and confirm that there are no obstacles in the vehicles travel path or under the vehicle by completing a 360° walk around the entire vehicle.
- Follow all posted signs and speed limits, all applicable laws and regulations, and any client-specific or site specific vehicle safety policies.
- Not drive a vehicle (including a combination vehicle) with a combined gross vehicle weight rating (GVWR) in excess of 10,001 lbs (4,500 kg) without written authorization from the RCEO and appropriate regulatory licensing.

All Authorized Drivers should consider the following best practices:

- Utilize a "Back-In" or "First Move Forward" practice when parking a vehicle.
- Review weather conditions prior to travel and avoid driving in adverse conditions. Consider the anticipated road conditions and terrain and ensure the vehicle is fit for purpose.
- Obtain written directions prior to travel in an unfamiliar location.
- Be familiar with and comfortable operating the vehicle to be driven.

To avoid fatigued driving, all Drivers must:

- Plan a 15 minute break after every two hours of driving.
- Not drive more than 8 hours/day.

To avoid fatigued driving, all Drivers should:

- Avoid driving between 10 p.m. and 5 a.m.
- Share driving with others, if possible.
- Avoid driving if doing so will result in more than 12 hours of work-related activities (for example, limit driving to 4 hours after an 8 hour field day; limit driving to 6 hours after 6 hours in the office).
- Avoid driving after a flight of six hours or more without appropriate rest.

Project budgeting and trip planning must consider the above. Local regulations may be more stringent.



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### 4.2.2 Authorized Driver Training

It is the responsibility of the PIC to ensure client-related driver training requirements have been communicated to the project team and implemented. All personnel training required by this procedure shall be documented in ERM Academy.

All Authorized Drivers must certify, on an annual basis, that:

- They have read and understand the requirements of this Procedure; and
- They hold a current driver's license valid in the location where they will be driving.

All Authorized Drivers that operate a vehicle in excess of 5000 km/annum (3100 miles/annum) on company business must receive Defensive Driver training. Refresher training shall be provided once every three years.

It is the responsibility of the BU MP to:

- Develop and maintain a means of tracking an Authorized Driver's annual work related driving (note, this is not required if all Authorized Drivers receive defensive driving training regardless of miles driven)
- Establish a defensive driving training process, in consultation with the Regional H&S Lead.

Drivers that perform the following high risk activities must have specific training on safe methods for completing these activities:

- Towing of equipment or a trailer
- Off-road driving
- Driving a vehicle with GVWR greater than 10,001 lbs

## 4.3 Vehicle Operation

### 4.3.1 Minimum Requirements

The following minimum requirement shall apply:

- Passengers and drivers are required to wear available passenger restraints (i.e. seatbelts with shoulder harness) while operating or riding in a vehicle.
- The number of passengers carried shall not exceed the seating capacity specified for the vehicle.
- Transporting people in the bed of a pickup truck is prohibited.
- Smoking within a vehicle is prohibited.
- Loose equipment in passenger compartments, in the back of pickup trucks, and on trailers shall be secured before driving.
- Unattended vehicles (even for a short period of time) shall be locked so that all equipment inside them is secured (verify the vehicle is locked before walking away).



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Critical documents and equipment should be removed from the vehicle if unattended or locked in the trunk/boot of the vehicle.

A vehicle used for field work shall:

- Be inspected before the first use onsite and then on a weekly basis afterwards. These inspections shall be documented using *S1-ERM-008-FM2 - Vehicle Inspection Checklist*.
- Maintain the minimum safety equipment listed in Section 4.5.

### 4.3.2 Towing of Trailers or Equipment

No ERM employee shall tow a trailer or equipment without having first received documented training on safe towing methods. The BU MP shall establish a safe towing training process (if required), in consultation with the Regional H&S Lead.

At a minimum, an ERM employee towing a trailer or vehicle shall:

- Refer to and comply with the vehicle owner's manual for safe towing capacity.
- Conduct an equipment inspection prior to use to ensure that weight is distributed evenly and that warning/signal lights are working properly.
- Use a spotter when driving in reverse.

The use of straps or chains for towing purposes is prohibited.

### 4.3.3 Motorcycles, Motor Bikes and All-terrain Vehicles (ATVs)

At a minimum, the driver of a motorcycle or motor bike on company business shall comply with the following:

- No passengers shall be permitted.
- Driver shall wear a suitable helmet.
- The driver's helmet shall have a face-shield, unless the motorcycle / motor bike is equipped with a windshield.
- Nothing may be carried that is not fully enclosed within a worn backpack or within a permanently installed "saddlebag" or trunk.
- A specific JHA has been completed and approved by the BU MP for the motorcycle / motor bike travel, and no other means of travel is feasible.

ATVs may only be used if a specific JHA has been completed and approved by the BU MP. Three-wheeled ATVs are not permitted for use at any time.

Note that the use of motorcycles, motor bikes, and/or ATVs may be prohibited by certain clients.



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## 4.4 Vehicles

### 4.4.1 Minimum Expectations for All Vehicles

All vehicles used for company business (including vehicles provided by and/or driven by external vendors, clients, etc.) shall be in safe working order and suitable for the task. In addition, the vehicle used shall have a valid vehicle registration, valid insurance coverage and be current on all road taxes (where applicable) in accordance with the local regulatory requirements. Vehicles shall meet the following minimum expectations:

- Anti-lock braking system (ABS)
- Air bags fitted for driver and passenger side
- Three point lap/diagonal seat belts for front and rear outboard seats and lap belts for all other seats;

The PIC is required to specifically document and justify a variance from the above requirements in the travel JHA.

### 4.4.2 Rented or Hired Vehicles

When possible, the rental company should be a company with which ERM has negotiated rates and contract terms. When renting a vehicle:

- Proof of inspection must be available to the driver.
- If employees cannot rent from a preferred provider with negotiated contract terms, the employee should purchase the collision damage waiver and personal accident insurance.

When hiring a vehicle and driver, ensure that a means for identifying the car and driver has been established prior to pick-up.

### 4.4.3 Taxi Cabs and other Point-of-Hire Vehicles

Employees should avoid using taxi cabs without seat belts for all passengers. The employees should encourage the driver to wear their seat belt, not use their mobile devices, and follow all posted speed limits and traffic laws. The use of the Taxi Card (*S1-ERM-008-FM3*) is encouraged.

### 4.4.4 Personal Vehicle

The use of personal vehicles for driving on ERM business should be avoided. If personal vehicles are used, it is the employees responsibly to ensure that the vehicle has all required licensing and insurance coverage for business use, that all maintenance requirements are met and all safety equipment is available.



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### 4.4.5 Company Owned or Leased Vehicles

For any ERM BU with owned or long-term leased vehicles, it is the BU MP's responsibility to formally designate a BU Fleet Manager. The BU Fleet Manager is responsible for the maintenance, inspection and repair of fleet vehicles, including:

- Vehicles shall receive regular, documented maintenance in accordance with the manufacturer's recommended schedule
- Vehicles shall have appropriate and current insurance coverage and road taxes (where applicable)
- Vehicles shall have the following safety equipment, unless a written waiver is received from the RCEO:
  - Anti-lock braking system (ABS).
  - Air bags fitted for driver and passenger side.
  - Head rests for front seats.
  - High-level third brake light.
  - Functional hazard lights.
  - Laminated glass windscreens/windshields and tempered glass side & rear windows.
  - Mirrors, outboard driver and passenger side and internal rear view mirror.
  - Tires must be fit for purpose, terrain and season (i.e., snow, off-road, all terrain), and in good condition (e.g., with suitable tread depth).
  - Spare tire in new or in relatively good condition, and an operational jack.
  - Three point lap/diagonal seat belts for front and rear outboard seats and lap belts for all other seats.
- Vehicle shall be less than five years old and have fewer than 100,000 miles (160,000 km), unless a written waiver from the RCEO has been obtained.

Each BU that maintains a fleet shall maintain a written BU-specific Fleet Management Procedure that documents routine maintenance/inspection procedures to ensure vehicles are in safe operating conditions and is sufficiently detailed to ensure that these minimum requirements are achieved.

## 4.5 Minimum Safety Equipment

Vehicles used for field work shall maintain the following safety equipment (note: local regulations may require additional equipment):

- First aid kit.
- Spare tire and jack.
- Warning triangles (reflective) or road flares (flares may not be stored in the passenger compartment of the vehicle).
- Reflecting safety vests for all occupants of the vehicle (these should be stored in the passenger compartment and not in the boot/trunk of the vehicle).



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Recommended equipment includes:

- Jumper cables with instructions.
- Torch / flashlight.
- Fire extinguisher
- Camera capabilities (either cell phone, digital, or disposable camera) for incident investigation and documentation.

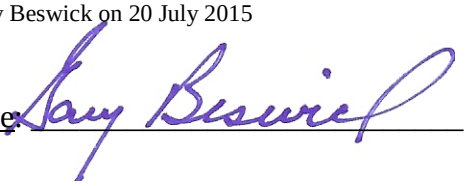
## 5. References

- ERM Global Policy – Mobile/Cellular Telephone and Personal Digital Assistant (PDA) Use While in a Vehicle
- ERM Global Policy – Drug and Alcohol Use
- S1-ERM-002-PR – Project Health and Safety Planning Procedure
- S1-ERM-008-FM1 - Journey Management Plan Template
- S1-ERM-008-FM2 – Vehicle Inspection Form
- S1-ERM-008-FM3 – Taxi Card

### Document Control Information

Original Effective Date: 1 April 2015

Approved by: Gary Beswick on 20 July 2015

Approval Signature: 

### Revision History

| Section | Version: Reason for Revision | Date |
|---|---|---|
| All | 1.0: New document. | 29 Dec 2014 |
| 4.2.1; 4.4.1; 4.4.5 | 2.0: Included driver 'best practice' considerations and clarified the requirements around driver fatigue management in Section 4.2.1; clarified that the minimum vehicle expectations apply to all vehicles that an ERM employee is riding in Section 4.4.1; modified the requirements on tire tread depth in Section 4.4.5. | 20 July 2015 |
| Header | 2.1: Modified date to show correct year. | 22 July 2015 |



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## 1. Purpose and Scope

This document establishes the criteria for consistent reporting and recording for work-related injuries and illnesses, and the methodology for calculating injury/illness related reporting metrics. **Figure 1** summarizes the Recordability Decision process.

In certain circumstances, ERM employees and entities may have a duty to record and report data on injuries and illnesses of certain ERM Agents or Contractors if the work of an Agent or Contractor is directly supervised by an ERM employee on a daily basis.

## 2. Roles and Responsibilities

**Global H&S Director (GHSD)**. Issue a final determination on whether an injury/illness is ERM Recordable in the event of disagreement, in consultation with the responsible Regional H&S Lead, Regional CEO, ERM Legal Department and Executive Committee.

**Regional Health and Safety (H&S) Lead**. Determine Recordability within 3 days of receiving notice of an injury or illness via ERM's Event Communication System (ECS); update the record as required until the event is complete and the employee has returned to normal duties; communicate with regulatory authorities regarding Regulatory Reportable or Recordable Injuries/Illnesses (in consultation with the GHSD and the Legal Department, and following approval by a member of the Executive Committee).

**All employees**. Immediately notify the PIC (for project-related events) or Office Head (for non-project related events), and the BU H&S Lead of a suspected work-related injury or illness, and enter the event into ECS within 24 hours.

## 3. Definitions

**Agent**. Any member of any ERM entity board, any officer of any ERM entity, hired personnel, consultants, intermediaries, lobbyists, agents, representatives, independent contractors, subcontractors, and any others who act on ERM's behalf.

**Aggravated Pre-existing Condition.** When an event or exposure in the work environment results in any of the following:

- Death provided that the pre-existing injury or illness would likely not have resulted in death but for the occupational event or exposure.
- Loss of consciousness provided that the pre-existing injury or illness would likely not have resulted in loss of consciousness but for the occupational event or exposure.
- One or more days away from work, or days of restricted work, or days of job transfer that otherwise would not have occurred but for the occupational event or exposure.



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- Medical treatment in a case where no previous medical treatment was needed for the pre-existing injury or illness before the workplace event or exposure, or a change in medical treatment was necessitated by the workplace event or exposure.

**Employee**. Any personnel hired directly by ERM (regardless of status classification of full-time, part-time, temporary, contract, etc.); interns (even if an intern does not receive payment by ERM); employees of other companies seconded into ERM, and any ERM employee seconded to a non-ERM company.

**ERM Recordable Incident**: A Medical Treatment Incident (MTI), Restricted Work Incident (RWI), Lost Time Incident (LTI), or fatality that meets the requirements in this procedure and which is used in establishing our externally reported Total Recordable Incident Rate (TRIR)..

**First aid**. First Aid Incident is any injury or illness that does not require medical treatment, require work restrictions or result in Lost Time away from work as defined below. The following are examples of this definition (but not limited to):

- Using a non-prescription medication at non-prescription strength (for medications available in both prescription and non-prescription form, a recommendation by a physician or other licensed health care professional to use a non-prescription medication at prescription strength is considered medical treatment);
- Administering routine preventative tetanus immunizations;
- Cleaning, flushing or soaking wounds on the surface of the skin;
- Using wound coverings such as bandages, Band-Aids™, gauze pads, etc.; or using butterfly bandages or Steri-Strips™ (other wound closing devices such as sutures, staples, etc., are considered medical treatment);
- Using hot or cold therapy;
- Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc. (devices with rigid stays or other systems designed to immobilize parts of the body are considered medical treatment);
- Using temporary immobilization devices while transporting an accident victim (e.g., splints, slings, neck collars, back boards, etc.);
- Drilling of a fingernail or toenail to relieve pressure, or draining fluid from a blister;
- Using eye patches;
- Removing foreign bodies from the eye using only irrigation or a cotton swab;
- Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means;
- Using finger guards;
- Using massages (physical therapy or chiropractic treatment are considered medical treatment for recordkeeping purposes); or
- Drinking fluids for relief of heat stress.



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Note: The above are considered first aid, whether or not treatment is accepted

**Lost Time Incident (LTI – Days Away from Work Recordable):** A work-related injury or illness that results in the affected party being unable to report to work for one or more days, excluding the day of injury or onset of illness.

**Medical Treatment Incident (MTI – Other Recordable):** A work-related injury or illness that requires professional medical treatment, not defined as first aid above, that should be administered by a physician. The following are examples of this definition (but not limited to):

- Sutures,
- Broken bones
- Recommendation of prescription medication
- Loss of consciousness
- Other injury or illness that is not considered first aid

Note: Observation, counselling and scans (xrays, MRI's etc) are not medical treatment.

**Near Miss:** An unplanned event that did NOT result in injury, illness, or damage – but had the potential to do so. Only a fortunate break in the chain of events prevented an injury, illness, property damage or environmental impact. For example, slipping on a staircase and falling to the ground that results in no injury, visible bruising and/or lasting impacts (i.e. pain/discomfort). If the same event were to result in visible bruising and/or lasting impacts with no medical treatment, the event would be classified as first-aid.

**Regulatory Recordable Incident**: An injury or illness that is considered recordable within the jurisdiction of the affected employee. These requirements may be more or less stringent than the ERM Recordable definition.

**Reportable Injury**: Any injury or illness that must be reported to a governmental authority within the jurisdiction of the affected employee.

**Restricted Work Incident (RWI)**. A work-related injury or illness where:

- The employee is restricted by an ERM manager from performing one or more of the routine functions of his or her job, or from working the full workday that he or she would otherwise have been scheduled to work; or
- A physician or other licensed health care professional recommends that the employee not perform one or more of the routine functions of his or her job, or not work the full workday that he or she would otherwise have been scheduled to work.

**Routine functions.** For recordkeeping purposes, an employee's "routine functions" are those work activities the employee regularly performs at least once per week.

**Workplace**: Any location where one or more employees are directly engaged in activities related to the performance of their work assignment, or are present as a condition of their employment.



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The workplace includes not only physical locations, but also the equipment or materials used by the employee during the course of work.

**Work Related**: An injury or illness is considered work-related if an event or exposure in the workplace either:

- caused or contributed to the resulting condition; or
- significantly aggravated a pre-existing injury or illness.

The following exceptions to "work-related" apply:

- At the time of the injury or illness, the employee was present in the work environment as a member of the general public rather than as an employee.
- The injury or illness involves signs or symptoms that surface at work but result solely from a non-work-related event or exposure that occurs outside the work environment.
- The injury or illness results solely from voluntary participation in a wellness program or in a medical, fitness, or recreational activity such as blood donation, physical examination, flu shot, exercise class, racquetball, or baseball.
- The injury or illness is solely the result of an employee eating, drinking, or preparing food or drink for personal consumption (whether bought on the employer's premises or brought in).
- The injury or illness is solely the result of an employee doing personal tasks (unrelated to their employment) at the establishment outside of the employee's assigned working hours.
- The injury or illness is solely the result of personal grooming, self medication for a non-work-related condition, or is intentionally self-inflicted.
- The injury or illness is caused by a motor vehicle accident and occurs on a company parking lot or company access road while the employee is commuting to or from work.
- The illness is the common cold or flu (note: other contagious diseases such as tuberculosis, brucellosis, hepatitis A, or plague may be considered work-related if the employee is confirmed as having been infected at work).
- The illness is a mental illness.

# 4. Procedure

## 4.1 Mandatory Notification

All Employees shall immediately notify their supervisor of any injury and/or illness suspected to be work-related.

Any injury or illness known or suspected to be work related shall also be verbally disclosed as quickly as possible following the occurrence, and no later than the end of the current work shift, to the PIC (for project-related events) or Office Head (for non-project related events), and the



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BU H&S Lead. In addition, the employee shall enter the event into ECS within 24 hours (if able; otherwise, the employee's Line Manager shall enter the event).

### 4.2 ERM Recordable Injury

Within three (3) days of receiving notification of an injury or illness, the Regional H&S Lead, or designee, shall document whether an event is Recordable within ECS. If information relevant to the injury or illness becomes available after the initial submittal of the event into ECS, the Regional H&S Lead shall update the record as soon as practical.

A separate ECS entry shall be completed for each ERM employee with an injury/illness.

In the event of dispute/disagreement, the GHSD, in consultation with the responsible Regional H&S Lead, RCEO, ERM Legal Department and Executive Committee leadership, will make final case determinations regarding ERM Recording of work-related injury and illness cases. Interpretation of the recording rationale will be documented and maintained by the GHSD, The final determination will be documented by the GHSD within 90 days of the incident, to the extent practicable based on the availability of necessary information.

#### 4.2.1 Determination of Work Related

The Regional H&S Lead shall determine if an injury is Work Related, based on the definitions and exceptions in Section 3. Two special conditions are discussed below.

Injury/illness while traveling. An injury/illness that occurs while an employee is travelling for business is work-related if, at the time of the injury or illness, the employee was engaged in work activities "in the interest of the employer" (e.g., travel to and from clients, conducting job tasks, site visits, and business entertaining). Exceptions to this requirement include:

- Home away from home. When a travelling employee checks into a hotel, motel, or into another temporary residence, he or she establishes a "home away from home." The employee's activities after he or she checks into the hotel, motel, or other temporary residence must be evaluated for their work-relatedness in the same manner as the activities of a non-travelling employee. When the employee checks into the temporary residence, he or she is considered to have left the work environment. When the employee begins work each day, he or she re-enters the work environment. If the employee has established a "home away from home" and is reporting to a fixed worksite each day, injuries/illnesses are not work-related if they occur while the employee is commuting between the temporary residence and the job location.
- Injuries that occur during a Personal Detour. Injuries or illnesses are not considered work-related if they occur while the employee is on a personal detour from a reasonably direct route of travel (e.g, has taken a side trip for personal reasons).

Injury/illness while working at home. An injury/illness that occurs while an employee is working at home, including work in a home office, is work-related if the injury/illness occurs while the



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employee is performing work for pay or compensation in the home, and the injury or illness is directly related to the performance of work rather than to the general home environment or setting.

### 4.2.2 Determination of ERM Recordable

A work-related injury or illness incurred by an ERM employee is considered ERM Recordable if it results in one or more of the following:

- Death;
- Days away from work;
- Restricted work or transfer to another job;
- Medical treatment beyond first aid;
- Loss of consciousness;
- Constitutes a needle stick or sharp injury; or
- A significant injury or illness diagnosed by a physician or other licensed health care professional as work related

The following medical activities are specifically excluded from the definition of "medical treatment" and do not trigger a recording requirement:

- Visits to a physician or other licensed health care professional solely for observation or counselling; and
- The conduct of diagnostic procedures, such as x-rays and blood tests, including the administration of prescription medications ( as defined by local jurisdictions) used solely for diagnostic purposes (e.g., eye drops to dilate pupils)
- First aid.
- If medical prophylaxis is used for the prevention of malaria or other diseases while travelling.
- If herbal or natural supplements are used.
- If oxygen is used while working at elevations as used a part of a normal work practice, not for the treatment of altitude sickness of other working at higher elevation illnesses.
- If medications for the prevention of seasickness or motion sickness are used.

### 4.2.3 Determining Duration of Hospitalization, Lost Time and Restricted Work

Within 3 days of receiving notice of an injury/illness from ECS, the Regional H&S Lead shall make a general estimate of the number of days that the employee may experience:

- Hospitalization: time spent within a hospital or other in-patient medical facility.
- Lost time: time spent away from work as designated by a physician or other licensed health care professional.



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- Restricted work: time when an employee cannot perform their routine duties, at the direction of a physician or other licensed health care professional, or their ERM Line Manager.

If the estimated duration has elapsed without the condition being resolved, the Regional H&S Lead shall update ECS with a revised estimate. Once the actual duration of these conditions is known, the Regional H&S Lead shall update ECS with the actual duration.

When determining duration, the following considerations apply:

- Do not count the day that the injury/illness occurred.
- Count calendar days from day following the occurrence of the injury/illness.
- If the injury/illness occurs prior to a day that the employee was not scheduled to work (e.g., holiday or weekend), these unscheduled days are only counted if you receive information from the physician or other licensed health care professional that the employee should not have worked, or should have performed restricted work, during the unscheduled period.
- The maximum total days of lost time plus restricted work that shall be recorded is 180 days (the 180-day cap).

### 4.3 Regulatory Recordable Injury and Reporting

Local regulatory recording and reporting requirements may be different from ERM recording requirements.

As appropriate following a proper review of the conditions/circumstances associated with the injury or illness, and in accordance with promulgated time expectations for reporting by the appropriate regulatory authorities, ERM will submit the required information to the respective entity(ies) [such as U.S. OSHA, U.S. Mine Safety and Health Administration (MSHA), UK Health and Safety Executive (HSE), etc.]. Communications with regulatory authorities will be conducted by the Business Unit Managing Partner (or designee), in consultation with the Regional H&S Lead, GHSD and the Legal Department.

### 4.4 Record Keeping

ERM maintains statistics associated with Injury and Illness Reporting that are submitted to the Senior Leadership Team on a monthly basis. The reports document, among other things, the Total Recordable Incident Rate (TRIR) and the number of Restricted Work Days and Lost Time Days.

#### 4.4.1 Calculating TRIR

TRIR is calculated as:



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$$TRIR = \frac{(Number\ of\ ERM\ Recordable\ Injuries\ \&\ Illnesses) * 200{,}000}{Number\ of\ Hours\ Worked\ by\ ERM}$$

Where:

- "Number of ERM Recordable Injuries & Illnesses" is as defined in Section 4.2. The calculation shall be based upon the rational identified within the completed "Recordability Review Form." If further investigation of the event results in a modification to the information on the form, the TRIR number will be modified accordingly.
- "200,000" is a standard normalization factor based on the typical number of hours worked by 100 employees
- "Number of Hours Worked by ERM" is based on info obtained from GMS for full- or part-time employees, and does not include recorded sick time, vacation time or holidays.

### 4.4.2 Calculating Restricted Work Day and Lost Time Days

Restricted Work Days and Lost Time Days shall be calculated as follows:

- The number of days reported on a monthly basis will be either:
  - For completed (or "Closed") events, where the employee has returned to full duty, the actual number of restricted or lost time days shall be reported.
  - For ongoing (or "Open") events, where the employee remains on restricted duty or off work, the number of total days reported shall be estimated.

- The number of days reported on annual reports will be either:
  - For completed (or "Closed") events, where the employee has returned to full duty, the actual number of restricted or lost time days shall be reported.
  - For ongoing (or "Open") events, where the employee remains on restricted duty or off work, the number of days reported shall be estimated, unless otherwise indicated. In this case, when the actual number of days becomes known, the subsequent annual report shall, if appropriate, report the revised "Final" data for the previous reporting year.

## 5. References

None

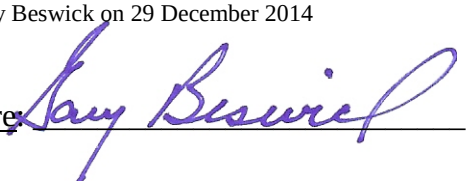


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**Document Control Information**

Original Effective Date: 1 April 2015

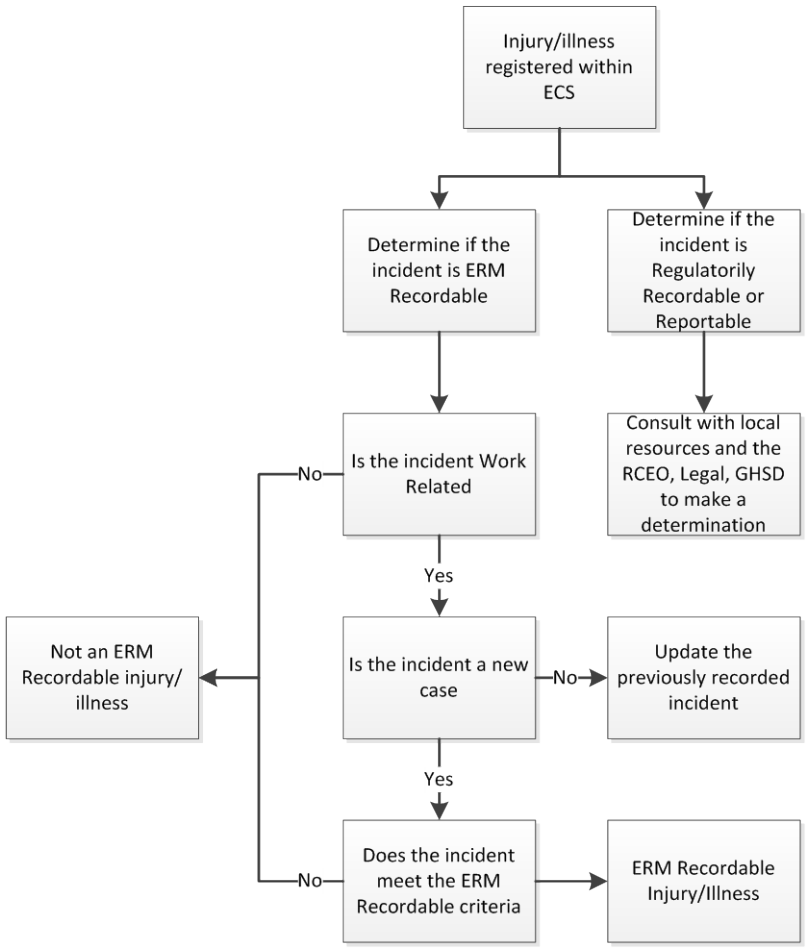
Approved by: Gary Beswick on 29 December 2014

Approval Signature: 



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**Figure 1 – Recordability Decision Process**




## Revision History

| Section | Version: Reason for Revision | Date |
|---|---|---|
| All | 1.0: New document. | 29 Dec 2014 |
| | | |



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# 8.0 EXCAVATION AND TRENCHING

Excavation is one of the most dangerous of all construction operations. More workers are killed or seriously injured in and around excavations than in most other phases of construction work.

The standard uses performance criteria where possible, rather than providing specific requirements. The added flexibility provides employers with options when classifying soil and when selecting methods to protect the employee from cave-ins.

Although the standard has been clarified and employers have options when meeting some of the requirements, employers must realize that the employee must be protected at all times. Decisions will have to be made from the planning stages through the completion of work. Some sections of the standard require that documentation be kept.

In some situations Professional Engineers will be required to plan or design the excavation and/or method of protecting the workers (such as when an excavation exceeds 20 feet in depth).

The purpose of this section is to provide information about the OSHA excavation standard. This section is not designed or intended to provide all the information, rules, regulations, and methods you may need to know in order to be a competent person or to perform all excavation work safely. Every plan involving excavation must be studied carefully to determine the specific hazards for each specific job.

## 8.1. COMPETENT PERSON RESPONSIBILITY

- Authority to stop work *[1926.651 (k)(2)]*
- Inspections of excavations *[1926.651 (k)(I)]*
- Daily for indication of:
  - Evidence of possible cave-ins
  - Failure of protective systems
  - Hazardous conditions
- Frequency of inspections:
  - Prior to start of work
  - As needed throughout shift
  - After rainstorms
  - After other hazard increasing occurrence
- Testing for hazardous atmospheres when such atmospheres exist or are reasonably likely to exist *[1962.651(g)(I)(I)*
- Inspection of material or equipment if damaged to determine if usable *[1926.652(d)(3)]*
- Monitoring of water removal equipment and operations *[1926.651(h)(2)]*
- Visual tests *[1926 Appendix A section (d)(I)(i)-(vii)]*

- Observe:
  - Samples of soil newly excavated and soil in sides of trench for range of particle size, relative amounts of particle size
  - Soil as it is being excavated for clumping and breaking
  - Sides of trench and adjacent areas for tension cracks and spalling
  - Adjacent areas for utility and other underground structures to identify previously disturbed soils
  - Sides of trench for layered soils
  - Sides and adjacent areas for evidence of water
  - Adjacent areas for sources of vibration
- Manual tests *[1926 Appendix A sections (d)(2)(I)-(v)]*
  - Plasticity – mold soil sample into ball and attempt to make 1/8 inch diameter thread
  - Dry Strength – how easily soil crumbles or breaks up when dry
  - Thumb Penetration – how easily thumb penetrates sample
  - Penetrometer or Shearvane to estimate unconfined compressive strength
  - Drying Test – Dry a sample of soil and look for cracks and how easily it can be broken by hand.

This list does not describe all of the OSHA requirements for excavations and is intended for use as a guide only. For further assistance consult the 29 CFR 1926 Subpart P regulations.

### 8.2. COMPETENT PERSON

The definition of a "competent person," as it applies to Subpart P, is the same as the definition found in Subpart C – 1926.32(f): one who is capable of identifying existing or 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.

When applied to trenching or excavation operations, the ***"Competent Person" must have specific training in, and be knowledgeable about, soil analysis, the use of protective systems, and the requirements of this standard. In addition, the "Competent Person" must have the authority to take immediate action if a hazard exists.***

## 8.3. FACTS

Every year:

- 100 to 400 people are killed by cave-ins
- 1,000 to 4,000 are injured

On average, workers that are killed by cave-ins are male, 20 to 30 years of age, and have had no training. Most deaths (79% from 1985 to 1989) occur in trenches 5 feet to 15 feet in depth. Cave-ins cause deaths and injuries by:

- Suffocating
- Crushing
- Causing loss of circulation
- Being struck by falling objects

Soil is made up of clay, silt, sand, organic material, and gravel. The competent person must be able to distinguish the difference between class A, B, or C type soil.

One cubic foot (12" x 12" x 12") of soil can weigh between 90 to 140 pounds. Therefore, one cubic yard (3' x 3' x 3') weighs as much as a pickup truck (approximately 3,000 pounds).

## 8.4. SCOPE AND APPLICATION

Subpart P applies to all open excavations in the earth's surface.

- All trenches are excavations
- All excavations are **not** trenches

## 8.5. DEFINITIONS

### 8.5.1. 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/or immobilize a person.

### 8.5.2. Trench

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. 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 or less (measured at the bottom), the excavation is also considered to be a trench.

#### 8.5.3. Registered Professional Engineer (RPE)

An RPE is a person who is registered as a Professional Engineer in the state where the work is 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.

#### 8.5.4. Accepted Engineering Practices

These are the requirements which are compatible with standards of practice required by a Registered Professional Engineer. When an inspection occurs and accepted engineering practices are required, the compliance officer will be looking for documentation indicating the PE or firm of record and the registration number. In addition, the compliance officer will also want to know if any other aspects of work is under direct supervision by a PE.

#### 8.5.5. Tabulated Data

Means tables and charts are approved by a Registered Professional Engineer and used to design and construct a protective system.

#### 8.5.6. 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.

##### 8.5.6.1. Protective System

A means of protecting employees from cave-ins. Protective systems include support systems (shoring), sloping, and benching systems, shield systems (trench boxes), and other systems that provide the necessary protection.

##### 8.5.6.2. Uprights

The vertical members of a trench shoring system placed in contact with the earth.

##### 8.5.6.3. Wales (Stringers, Rangers)

The horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members (uprights) of the shoring system.

## 8.6. GENERAL REQUIREMENTS

### 8.6.1. Surface Encumbrances

Rocks, trees, telephone poles, fire hydrants, etc. must be:

- Removed
- Supported

### 8.6.2. Underground Installations

Gas pipes, electrical, sewer, water, etc. must be:

- Located and marked prior to working in the area. Property owners and/or utility companies should be notified at least 24 hours prior to digging
- Protected, supported, or removed while the trench is open

### 8.6.3. Access and Egress

- Provide trenches 4 feet or more in depth with a means of egress.
- Spacing between ladders, stairs, or ramps should be no more than 50 feet. A worker should not have to travel more than 25 feet laterally to a means of egress.

  ***NOTE:*** *Ladders must be secured {1926.1053(b)(7)} and must extend 36 inches above the landing {1926.1053(b)(I)}.*

  ***NOTE:*** *Review requirements for not using metal ladders around electrical lines or where they can contact electrical conductors {1926.450(a)(11)}.*

  ***NOTE:*** *Review requirements for job made ladders {1926.450(b)}.*

- Structural ramps used solely by employees must be designed by a competent person.
- Structural ramps used by equipment must be designed by a competent person qualified in structural design (generally an RPE).
- Structural ramp components must be:
  - Connected together.
  - Uniform thickness.
  - Constructed so that cleats and other connectors do not create a tripping hazard.
  - Provided with cleats or other surface treatments to prevent slipping if ramps are used instead of steps.

### 8.6.4. Exposure to Vehicular Traffic

Protecting the employee from being struck by a car, truck, bus, etc. Employees must be provided with and must wear warning vests or highly visible garments when exposed to traffic.

***NOTE:*** *Signs, signals, barricades and/or flagmen may be required {1926.201}.*

### 8.6.5. Exposure to Falling Loads

Protecting the employee from being struck by an object falling from lifting or digging equipment.

- Employees are not permitted underneath raised loads.
- Employees are required to stand away from equipment that is being loaded or unloaded.
- Equipment operators or truck drivers may stay in equipment if it is properly equipped with a cab shield or adequate canopy {1926.601(b)(6)}.

### 8.6.6. Warning System for Mobile Equipment

Preventing vehicles from falling into the trench can be accomplished by providing:

- Barricades
- Hand or mechanical signals
- Stop logs
- Grade away from the excavation

### 8.6.7. Hazardous Atmospheres

Preventing exposure to hazardous materials in the air or dangerous environments.

- Oxygen deficient with less than 19.5% oxygen (Employee may become dizzy, have rapid heart beat, or have buzzing in the ear).
- Normal is 21% oxygen.
- Oxygen enriched atmospheres increase flammability of combustible materials.
- Carbon monoxide causes oxygen starvation and can be fatal at a concentration of 1% for one minute = 10,000 ppm. Threshold Limit Value = (construction only).
- Test the air, before employees enter a trench, if there is a possibility that a hazardous atmosphere exists or could be reasonable expected to exist.
- Provide respirators or ventilation when needed.

  ***NOTE:*** *The use of respirators by employees requires a respirator program {1926.103(c)}.*

- Ventilate trench if flammable gas exceeds 10% of the lower flammable limit.
- Test often to ensure that the trench remains safe.

### 8.6.8. Emergency Rescue Equipment

Must be available when a hazardous atmosphere exists or could reasonably be expected to exist. Respirator must be suitable for the exposure - - air-supplied or self-contained breathing apparatus is preferable. A harness and lifeline are required when an employee enters bell-bottom pier holes and other deep confined spaces. The lifeline must be attended at all times.

***NOTE:*** *Employee entering confined spaces must be trained {1926.21(b)(6)i.}*

***NOTE:*** *Specific requirements for welding in confined spaces {1926.352(g) and 1926.653(b)}.*

### 8.6.9. Water Accumulation

Must be controlled to prevent cave-ins.

- Methods for controlling accumulated water vary with each situation.
- Employees are not permitted to work in trenches where water accumulation exists, unless:
  - Special support systems or shield systems are used to protect employees from cave-ins.
  - Water removal equipment is used and monitored by a competent person to prevent water accumulation, and
  - Safety harnesses and lifelines are used to protect employees.
- Surface water must be diverted and controlled.
- Trenches must be inspected after each rainstorm.

### 8.6.10. Stability of Adjacent Structures

Structures to protect employees from cave-ins.

- Support systems such as shoring, bracing, or underpinning must be used to support structures that may be unstable due to excavation operations.
- Excavating below the base or footing of a foundation or wall is not permitted unless:
  - Support system is provided to ensure the stability of the structure;
  - The excavation is in stable rock; or
  - The operation is approved by a Registered Professional Engineer.
- Support systems must be provided for sidewalks, pavements, and other structures that may be affected by the excavation operations.

#### 8.6.11. Protection of Employees from Loose Rock or Soil

- Employees must be protected from being struck by materials falling or rolling from the edge and face of the trench.
- Spoils and equipment must be set back at least 2 feet from the edge of the trench and/or a retaining device must be installed.

#### 8.6.12. Fall Protection

Required for walkways and bridges over trenches. Bridges and walkways over excavations 6-feet or more in depth must be equipped with standard guardrails and toeboards. Other fall protection may also be required around wells, pits, shafts, and similar excavations

#### 8.6.13. Remotely Located Excavations

Excavations must be backfilled, covered, or barricaded (wells, pits, shafts, etc.).

#### 8.6.14. Inspections

Inspections **must** be made by a competent person. Document all inspections.

- Daily prior to starting work
- As needed throughout the shift
- After every rainstorm
- After other hazard increasing occurrence (snowstorm, windstorm, thaw, earthquake, etc.).
- Inspect the trench for indications of a possible cave-in (fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom).
- Adjacent areas (spoil piles, structures).
- Protective systems and their components (uprights, wales, sheeting, shields, hydraulics) before and during use.
- Check for indications of a hazardous or potentially hazardous atmosphere.
- Test the atmosphere if a hazard could reasonably be expected to exist.
- Remove employees from the trench when there are indications of possible cave-in, protective system failure, or other potentially hazardous conditions.

### 8.7. REQUIREMENTS FOR PROTECTIVE SYSTEMS

#### 8.7.1. Protection of Employees in Excavations

- All employees must be protected from cave-ins by shields, sloping or shoring except:
  - When the excavations are made in stable rock that is not fractured.

  ***NOTE:*** *Some states do not recognize stable rock.*

- In excavations less than 5 feet deep where there is no indication of possible cave-in as determined by a competent person.

***NOTE:*** *A competent person is required even when the trench is less than 5 feet deep.*

***NOTE:*** *Shallow trench cave-ins could be fatal or cause serious injuries.*

- Protective systems must have the strength to resist all intended or expected loads.
- Employees must be protected from cave-ins when entering and existing trench shields and protective systems.
- Employees are not permitted in shields when they are being installed, removed, or moved vertically.

***NOTE:*** *Employees may remain in the shield when shield is moved horizontally without lifting it re: page 45935 of the Federal Register (preamble).*

***Design of sloping and benching systems*** must be selected and constructed by the employers or their designees using one or more of four alternative methods.

- Option 1 - - Allowable configurations and slopes
  - Sloped at an angle of 34 degrees = 1-1/2 to 1.
  - Use of other configurations described in appendix B for Type C soil classifications.
- Option 2 - - Determination of sloping and benching configurations using appendices A and B.
  - Soil and rock must be classified based on:
    - Site and environmental conditions
    - The composition of the soil.
    - Acceptable visual and manual tests for classifying soils. Tests are described in Appendix A.
  - Select sloping or benching configuration from appendix B based on soil type.
- Option 3 - - Designs using other tabulated data, such as tables and charts, may be used to select sloping and benching configurations.
  - Identity of the RPE who approved the data must be stamped on the data.
  - The tabulated data must be in written form, describing detailed information on its use and limitations.
  - Tabulated data must be at the jobsite during construction of the protective system.
  - After construction of the protective system, the tabulated data may be kept off site but must be available for inspection.

- Option 4 - - Sloping and/or benching designs prepared and approved by a RPE may be used.
  - Identity of the RPE who approved the data must be stamped on the sloping and/or benching designs.
  - Designs must identify the project.
  - The configurations must be determined safe for the project.
  - Design must be at the jobsite during construction of the sloping and/or benching configuration.
  - After construction of the sloping configuration, the design may be kept off site, but must be available for inspection.

### 8.7.2. Excavations Greater than 20 Feet in Depth

Must be designed by an RPE and the tabulated data and design must be available for inspection.

### 8.7.3. Design of Support Systems

***Design of support systems,*** shield systems, and other protective systems must be selected and constructed by the employer or his designee using one or more of the alternative methods.

- Option 1 - - Designs using appendices A, C, and D may be used by the competent person.
  - Timber shoring is designed by using Appendices A and C.
  - Appendix A and D may be used for hydraulic shoring if the manufacturer's tabulated data is not available or cannot be used.
- Option 2 - - Designs using pre-manufactured protective systems (shoring, shields, or other) and components must be prepared using the manufacturer's tabulated data.
  - Deviations from the use of the manufacturer's specifications must be approved by the manufacturer.
  - Manufacturer's written approval to deviate from the specifications must be on site during construction of the system.
  - After construction of the system, the written approval may be kept off site but must be available for inspection.
- Option 3 - - Designs using other tabulated data, such as tables and charts, may be used to design support systems, shield systems, or other protective systems.
  - There must be enough information to make an accurate selection of the protective system.
  - Identify of the RPE who approved the data must be stamped on the data.
  - The tabulated data must be in written form, describing detailed

information on its use and limitations.
  - Tabulated data must be at the jobsite during construction of the protective system.
  - After construction of the protective system, the tabulated data may be kept off site but must be available for inspection.

- Option 4 - - Protective system designed and approved by a RPE may be used.
  - The plan must include the size, types, and configurations of the materials to be used.
  - Identify of the RPE who approved the data must be stamped on the sloping and/or benching designs.
  - Designs must identify the project.
  - The design configurations must be determined safe for the project.
  - Design must be at the jobsite during construction of the protective systems.
  - After construction of the protective system, the design may be kept off site but must be available for inspection.

### 8.7.4. Materials and Equipment used for Protective Systems

- Must be free from damage or defects.
- Must be maintained in good condition.
- Must be inspected by a competent person and removed from use if determined unsafe.
- If determined by a competent person to be unsafe must be evaluated and approved by an RPE before being returned to service.

### 8.7.5. Installation and Removal of Supports

- Members of the support system must be securely connected together.
- Employees must be protected from cave-ins and other hazards during installation and removal. Members of the support system may not be overloaded.
- Members of the support system may not be overlooked.
- Precautions must be taken to prevent cave-in during removal of structural supports. Removal must start from the bottom.
- Observe structure for indications of failure during removal of support systems.
- Backfill as removal of support systems progresses.

### 8.7.6. Additional Requirements for Support Systems

- Removal of materials to a depth 2 feet below the bottom of the support system is permitted if:
  - The system is designed to resist loads at the full depth of the trench.
  - There are no indications of the possible collapse of soil from behind or

below the bottom of the support system.

- Support systems must be installed as the excavation of the trench proceeds.

### 8.7.7. Sloping and Benching Systems

Employees are not permitted to work on the faces of sloped or benched excavations above other employees, unless the employees at the lower levels are protected from being struck by materials or equipment.

### 8.7.8. Shield Systems (Trench Boxes)

- Systems should not be overloaded
- Lateral or hazardous movement should be restricted.
- Employees must be protected from cave-ins when entering and exiting the shield.
- Employees are not permitted in shields during installation, removal, or vertical movement.
- Employees may remain in shield during horizontal movement as long as the shield is not lifted in any way.
- Removal of materials to a depth 2 feet below the bottom of the support system is permitted if:
  - The system is designed to resist loads at the full depth of the trench.
  - There are no indications of possible collapse of soil from behind or below the bottom of the support system.

### 8.7.9. SOIL CLASSIFICATION

Appendix A in the OSHA Excavation Standard describes methods of classifying soils based on site and environmental conditions. The standard requires that visual and manual tests be performed to classify soils. The tests must be completed by a competent person. The classifications are used when designing sloping and benching systems, when designing timer or aluminum hydraulic shoring systems, and when selecting trench shields.

Unconfined compressive strength is the load per unit area that will cause the soil to fail in compression. Unconfined compressive strength can be determined by using a picket penetrometer, shearvane (shear test), and thumb penetration test.

**8.7.10. OSHA recognizes four types of soils:**

**8.7.10.1. Stable Rock**

Difficult to determine without knowing if cracks slope into or away from trench.

**8.7.10.2. Type A**

Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater. Examples include clay, silty clay, sandy clay, clay loam, harpan, and cemented soils. No soil will be considered Type A if the soil is fissured, subjected to vibration, previously disturbed, part of a sloped layered system sloping into the trench at a slope greater than 4H:lV, or seeping water.

**8.7.10.3. Type B**

Cohesive soil with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf. Examples include angular gravel, silt, silt loam, previously disturbed soils unless otherwise classified Type C, dry unstable rock, sloped layered systems sloping into the trench at a slope less than 4H:lV.

**8.7.10.4. Type C**

Cohesive soil with an unconfined compressive strength of 0.5 tsf or less. Examples include granular soils, sand, loamy sand, submerged, soil with freely seeping water, any soil not otherwise classified. Field tests that can be used to classify cohesive and non-cohesive soils include but are not limited to the sedimentation test, wet shake test, dry strength test, thin thread test, or ribbon test.

## 8.8. SOIL ANALYSIS

**8.8.1. Pocket Penetrometer**

A direct reading device that is used to determine the approximate unconfined compressive strength of saturated cohesive soils. The spring-operated device uses a piston that is pushed into a soil up to a calibration grove. An indicator sleeve marks and retains the reading until it is read. The reading is calibrated in tsf or kilograms per square centimeter. Always follow manufacturer's use instructions.

### 8.8.2. Shearvane (Torvane)

Measures the approximate shear strength of saturated cohesive soils. The blades of the vane are pressed into a flat section of undisturbed soil, and the knob is turned slowly until soil failure. The dial is read directly when using the standard vane. The reading is calibrated in kilograms per square centimeter. This reading must be converted to the approximate unconfined compressive strength by multiplying a factor of two. The result will be in tons per square foot or kilograms per square centimeter. Always follow manufacturer's use instructions.

### 8.8.3. Thumb Penetration Test

The least accurate of all the tests; however, it is an acceptable method of determining approximate unconfined compressive strength of soils. It relies on the experience of the person performing the test. Type A soils can be readily indented by the thumb with difficulty. Type B soils can be indented by thumb with moderate effort. Type C soils can be easily penetrated by the thumb and can be molded by light finger pressure.

### 8.8.4. Dry Strength Test

Used to roughly determine the shear strength of a soil. If the soil is dry and crumbles without much effort the soil is granular (gravel, sand, or silt). If the soil is difficult to break, it is cohesive. If the soil is dry and falls apart into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with some difficulty, it may be clay in any combination with gravel, sand, or silt. If it breaks into clumps that do not break into smaller clumps, which can only be broken with difficulty, and there is no indication that the soil is fissured, the soil may be considered un-fissured cohesive soil.

### 8.8.5. Ribbon Test

Used to determine if the soil is cohesive or granular. This test is generally run on soil that passes the #40 sieve. A moist sample is rolled between the palms of the hands until a cylinder approximately ¾ inch thick by approximately 6 inches long is formed. The cylinder is then placed across the palm of the hand and squeezed between the thumb and index finger until it is approximately 1/8 inch thick. The squeezed portion is allowed to bend over the side of the hand. If it forms ribbons 6 inches in length or longer it is said to be cohesive. The longer the ribbon the more clay the soil may contain. If it forms shorter broken ribbons then the sample is considered granular. A clay loam will barely form a ribbon.

### 8.8.6. Thread Test

Used to determine if a soil is cohesive. A moist sample of soil is rolled into a thread between the palms. A thin thread approximately 1/8 inch thick by 2 inches or more in length is formed. The soil is considered to be cohesive if a 2-inch or longer piece can be held by one end without breaking.

### 8.8.7. Wet Shake Test

Used to determine if a soil is cohesive or granular. After removing gravel and coarse sand, add enough water to mold the sample into a ball that is soft but not sticky. The molded sample should be approximately ¾ inch in diameter. The sample is placed in the palm of the hand and shaken rapidly or struck with the other hand. If water comes to the surface the sample will become shiny, indicating that the soil is granular (sand, silt, or a combination). Fine sands react quickly to this test. Silt will react more slowly. Clays will not become shiny and will not react to the test.

### 8.8.8. Sedimentation Test

Used to determine the approximate amount of sand in a soil. This procedure can also be used to estimate the percentage of silt and clay in a soil. For our purposes we will use it to estimate the percentage of granular and fine materials in a field sample. A straight-sided jar or flask, 6 inches or more in height with a flat bottom is required (an olive jar can be used).

After removing granular materials larger than 2 millimeters (# 10 sieve) be sure to break up all clumps of fine materials. Place approximately 1-1/2 inches of soil sample in the jar and then fill with water. Shake until all the materials in the jar are suspended in water. Quickly set the jar on a flat surface and give it a quick half turn. After thirty seconds, place a mark at the top of the settled sand. After one minute mark the settled material again. The material between these two marks is mostly silt. Wait one hour and mark the top of the settled soil. The material between the top of the silt and the top of the settled soil will be mostly clay. Measure the height of the mark for the settled sand and divide by the height of the mark for the settled sample and multiply by 100. This calculation will provide the approximate percentage of sand in the soil. The distance between the top of the sand mark and the top of the silt divided by the total height of the settled sample multiplied by 100 is the percentage of silt. The amount of clay can also be measured and divided by the total height of the sample and multiplied by 100 to determine its percentage.

Using the triangular classification chart of the Textural Classification System and the approximate percentages of sand, silt, and clay, the texture of the soil can be determined.

## 1. Purpose and Scope

This procedure establishes minimum requirements for work in environments where exposures to heat stress are encountered and provides guidance to evaluate and control these stressors. This procedure is applicable to all North American operations, and will be made available to employees at the work site upon request.

## 2. Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure as identified by the Division Health and Safety (H&S) Leader or other staff member.

**Project Manager**: Responsible for the following elements:

- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Division H&S Leader, any observed deficiencies in the implementation of this procedure.

**Division H&S Leader**: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

## 3. Definitions

- **Acclimatization** – The temporary adaptation of the body to work in the heat. Acclimatization peaks in most people within 4 to 14 days of regular work for at least two hours per day in the heat.
- **Heat Illness** – A serious medical condition resulting from the body's inability to cope with a particular heat load; includes heat cramps, heat rash, heat exhaustion, and heat stroke.

- **Environmental risk factors for heat illness** – Working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees (e.g., impervious clothing vs. standard work attire).
- **Personal risk factors for heat illness** – Factors such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.
- **Shade** – Blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning. Shade may be provided by any natural or artificial means that does not expose employees to unsafe or unhealthy conditions and that does not deter or discourage access or use.
- **Temperature** – The dry bulb temperature in degrees Fahrenheit (°F) or Celsius (°C).

# 4. Procedure

## 4.1 Classification and Prevention

### 4.1.1 Heat Stroke

- Condition: (a) Hot dry red skin, (b) high and rising core temperature 105°F (40 °C) and over; and (c) brain disorders, including mental confusion, loss of consciousness, convulsions, or coma, as core temperature continues to rise. Fatal is treatment is delayed.
- Predisposing Factors: (a) Sustained exertion in heat by non-acclimatized workers; (b) obesity and lack of physical fitness; (c) recent alcohol intake; (d) dehydration; (e) individual susceptibility; and (f) chronic cardiovascular disease in the elderly.
- Corrective Actions: Immediate and rapid cooling by immersion in chilled water with massage or by wrapping in wet sheet with vigorous fanning with cool dry air. Avoid overcooling. Treat shock if present. Seek medical attention.
- Prevention: Medical screening of workers. Selection based on health and physical fitness. Acclimatization for 8 to 14 days by graded work and heat exposure. Monitoring workers during sustained work in severe heat environments.

### 4.1.2 Heat Exhaustion

- Clinical Features: (a) Fatigue, nausea, headache, giddiness; (b) skin clammy and moist, complexion pale, muddy, or with hectic flush; and (c) may faint on standing, with rapid pulse and low blood pressure.
- Predisposing Factors: (1) Sustained exertion in heat, (2) lack of acclimatization, and (3) failure to replace water and/or salt lost in sweat.
- Treatment: Remove to cooler environment. Provide fluids with electrolytes such as Gatorade™ or equivalent. Seek medical attention.
- Prevention: Acclimatize workers using a breaking-in schedule for 1 to 2 weeks. Supplement dietary salt only during acclimatization. Ensure ample drinking water, Gatorade™ or equivalent is available at all times and taken frequently during the day.

### 4.1.3 Heat Cramps

- Clinical Features: Painful spasms of muscles used during work (arms, legs, or abdominal). Onset can occur during or after work hours.
- Predisposing Factors: (1) Heavy sweating during hot work and (2) drinking large volumes of water without replacing salt loss.
- Treatment: Drinking liquids with salt supplement such as Gatorade™ or equivalent. Seek medical attention.
- Prevention: Adequate salt intake with meals. In un-acclimatized persons, provide salted (0.1 percent) drinking water.

### 4.1.4 Heat Rash

- Clinical Features: Profuse tiny raised red blisters on affected areas. Pricking sensations during heat exposure.
- Predisposing Factors: Unrelieved exposure to humid heat with skin continuously wet with un-evaporated sweat.
- Treatment: Seek medical attention.
- Prevention: Cooled resting and sleeping quarters to allow skin to dry between heat exposures.

## 4.2 Prevention Procedures

Working in a hot environment requires that employers take precautions and provide adequate protection to prevent heat stress. The following procedures should be utilized on ERM project sites to recognize and prevent heat stress conditions.

### 4.2.1 Monitoring and Risk Evaluation

- Track the weather forecast for the job site and use forecasted information to plan daily activities. Forecasts may be obtained from National Weather Service, Weather Channel, local news, or other available reliable source.
- Review this procedure at daily tailgate safety meetings, including:
  - Encouraging employees to drink plenty of water and not wait until they are thirsty,
  - Reminding employees of their right to take a cool-down rest in the shade when necessary,
  - Establishing the number and schedule of water and rest breaks, and
  - Reviewing the signs and symptoms of heat illness and emergency response procedures in the project-specific health and safety plan (HASP) with all workers onsite.
- Use a thermometer to measure the outdoor temperature in an area where there is no shade. While the temperature measurement must be taken in an area with full sunlight, the bulb or sensor of the thermometer should be shielded while taking the measurement (e.g., with the hand or some other object) from direct contact by sunlight.
- The U.S. Occupational Safety and Health Administration (OSHA) has made available a Heat Safety Tool for use on smartphones (https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html). The tool allows workers and supervisors to calculate the heat index for their worksite and, based on the heat index, display a risk level to outdoor workers. The tool also provides reminders about the measures that should be taken at that risk level to protect workers from heat-related illness.
- An alternative approach to heat stress measurement is the Permissible Heat Exposure Threshold limit Value (TLV) published by the American Conference of Governmental Industrial Hygienists (ACGIH). This approach utilizes the Wet Bulb Globe Temperature (WBGT) Index. This technique evaluates environmental factors which most nearly correlate with deep body temperature and other physiological responses to heat. WBGT measurements can be made with a Reuter-Stokes, or equivalent, direct-reading Heat Stress Monitor. This instrument measures dry bulb temperature, natural wet bulb (NWB) temperature, and Vernon globe equivalent temperature (GT) and electronically calculates the WBGT Index. An alternate method of calculating the WBGT Index is provided in the following formulas:

A. Outdoors with solar load:

WBGT = 0.7 NWB + 0.2 GT + 0.1 DB

B. Indoors or Outdoors with no solar load:

WBGT = 0.7 NWB + 0.3 GT

The Permissible Heat Exposure TLVs are presented in S3-NAM-015-WI1 (*Permissible Heat Exposure Threshold Limit Values*) as a guide to monitor and control worker exposure for heat stress environments.

### 4.2.2 Establishing Work Assignments and Work/Rest Regimens

- Make assignments for work involving physical labor and heat stress based on physical fitness level of available labor pool. Employees newly exposed to heat should begin their work level at 50% of suggested work schedule and increase level by 10% per day to allow for acclimatization.
- An employee who has been newly assigned to a high heat area should be closely observed by the supervisor or Field Safety Officer (FSO) for the first 14 days of the employee's employment.
- Supervision and the "buddy system" should be used to carefully observe workers in heat stress environments to evaluate each individual's susceptibility to heat stress. Any employee exhibiting signs of heat stress should be promptly investigated.
- All employees shall be closely observed by the supervisor or FSO during a heat wave. For purposes of this section, "heat wave" means any day in which the predicted high temperature for the day will be at least 80 °F (27 °C) and at least 10 °F (5 °C) higher than the average high daily temperature in the preceding five days.
- Initiate a modified work/rest regimen when ambient temperatures and protective clothing create a potential heat stress hazard. If ambient temperatures are greater than or equal to 75°F, the following work/rest regimen is recommended (guidelines assume light to moderate work):

| Temperature | Work Period | Rest Period |
|---|---|---|
| 75 – 80 °F/24 – 27 °C | 90 Minutes | 15 Minutes |
| 80 – 85 °F/27 – 29 °C | 60 Minutes | 15 Minutes |
| 85 – 90 °F/29 – 32 °C | 45 Minutes | 15 Minutes |
| 90 – 95 °F/32 – 35 °C | 30 Minutes | 15 Minutes |

- Rest periods should be taken in a shaded area as described in Section 4.2.3 with open air movement, if available, as this will considerably reduce the effects of heat stress.
- As an alternative, work/rest regimens can also be implemented based on the Permissible Heat Exposure TLVs as presented in S3-NAM-015-WI1 (*Permissible Heat Exposure Threshold Limit Values*).
- Employees shall be allowed and encouraged to take a preventative cool-down rest in the shade for a period of no less than five minutes at a time when they feel the need to do so to protect themselves from overheating. Such access to shade shall be permitted at all times. An individual employee who takes a preventative cool-down rest:
  - Shall be monitored and asked if he or she is experiencing symptoms of heat illness;
  - Shall be encouraged to remain in the shade; and
  - Shall not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event less than five minutes in addition to the time needed to access the shade.
- If an employee exhibits signs or reports symptoms of heat illness while taking a preventative cool-down rest or during a preventative cool-down rest period, the supervisor or FSO shall provide appropriate first aid or emergency response, as outlined in Section 4.2.5.
- Schedule physically demanding and strenuous tasks, or tasks requiring full-body chemical protection, for early in the day, if possible.
- Protective clothing inhibits the transfer of heat between the body and the surrounding environment. This can increase the onset of heat stress symptoms. The following consideration should be evaluated when protective clothing is worn in heat stress environments.
  - More frequent rest breaks in the shade;
  - Worker rotation to provide frequent breaks in cool areas;
  - Wear ice vests or vortex tubes, if practical; and
  - Schedule changes to accommodate work at night or early morning hours.

### 4.2.3 Provision of Water and Shade

- Employees shall have access to potable drinking water that is fresh, pure, suitably cool, and provided to employees free of charge. The water shall be located as close as practicable to the areas where employees are working. Where drinking water is not plumbed or otherwise continuously supplied, it shall be provided in sufficient

quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. Supervisors or FSOs may begin the shift with smaller quantities of water if they have effective procedures for replenishment during the shift as needed to allow employees to drink one quart or more per hour. The frequent drinking of water shall be encouraged.

- When the outdoor temperature in the work area exceeds 80 °F (27 °C), the supervisor or FSO must establish and maintain one or more areas with shade at all times while employees are present that are either open to the air or provided with ventilation or cooling. The amount of shade present shall be at least enough to accommodate 25% of the number of employees on recovery or rest periods, so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other. The shade must be located as close as practicable to the areas where employees are working.
- When the outdoor temperature in the work area does not exceed 80 °F (27 °C), the supervisor or FSO must either provide shade or provide timely access to shade upon an employee's request.
- Where it is infeasible or unsafe to have a shade structure, or otherwise to have shade present on a continuous basis, the project team may utilize alternative procedures for providing access to shade if the alternative procedures provide equivalent protection. Cooling measures other than shade (e.g., use of misting machines) may be provided in lieu of shade if these measures are at least as effective as shade in allowing employees to cool.

### 4.2.4 High Heat Procedures

When the temperature equals or exceeds 95 °F (35 °C), the following procedures will be implemented to the extent practicable:

- Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor or the FSO when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
- Observing employees for alertness and signs or symptoms of heat illness. The ERM project team must ensure effective employee observation/monitoring by implementing one or more of the following:
  - Supervisor or FSO observation of 20 or fewer employees,
  - Mandatory buddy system,
  - Regular communication with sole employee such as by radio or cellular phone, or
  - Other effective means of observation.

- Designating one or more employees on each worksite as authorized to call for emergency medical services, and allowing other employees to call for emergency services when no designated employee is available.
- Reminding employees throughout the work shift to drink plenty of water.
- Reviewing the heat stress procedures at daily tailgate safety meetings, encouraging employees to drink plenty of water, and reminding employees of their right to take a cool-down rest when necessary.

#### 4.2.5 Emergency Response Procedures

- If a supervisor or FSO observes, or any employee reports, any signs or symptoms of heat illness, the supervisor or FSO must take immediate action commensurate with the severity of the illness.
- When an employee displays possible signs or symptoms of heat illness, the supervisor or FSO will check the employee and determine whether resting in the shade and drinking cool water will suffice or if emergency service providers will need to be called. WorkCare Incident Intervention (888-449-7787) should also be contacted to provide guidance on appropriate care.
- An employee exhibiting signs or symptoms of heat illness must be monitored and not left alone or sent home without being offered onsite first aid and/or being provided with emergency medical services in accordance with the site HASP.
- If the signs or symptoms are indicators of severe heat illness (such as, but not limited to, decreased level of consciousness, staggering, vomiting, disorientation, irrational behavior or convulsions, incoherent speech, red and hot face), the supervisor or FSO must implement emergency response procedures outlined in the HASP. Emergency service providers must be contacted immediately, and while the ambulance is in route, initiate first aid (follow guidance in Section 4.1.1).
- In the event a heat stress related incident or near miss occurs, the supervisor or FSO will notify the PIC and PM and report the event following guidelines in the HASP.

### 4.3 Training Requirements

All field employees, including supervisors, shall be provided training on heat stress and working in hot environments in the language that they understand. Training shall be provided prior to working in hot environments and will be documented in ERM's Academy Learning Management System (LMS). Employee training to recognize heat stress conditions and the methods necessary to prevent and treat heat stress include:

- The environmental and personal risk factors for heat illness, as well as the added burden of heat load on the body caused by exertion, clothing, and personal protective equipment.

- How to monitor weather reports and how to respond to hot weather advisories.
- The procedures for providing water, shade, cool-down rests, and access to first aid as well as the employees' right to stop work without retaliation.
- The importance of frequent consumption of small quantities of water, up to four cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
- The concept, importance, and methods of acclimatization.
- The different types of heat illness, the common signs and symptoms of heat illness, and appropriate first aid and/or emergency responses to the different types of heat illness.
- The importance to employees of immediately reporting any symptoms or signs of heat illness in themselves or in co-workers.
- ERM procedures contained in the HASP for responding to signs or symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary.

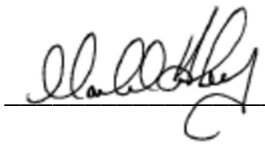
## 5. References

- ERM Work Instruction S3-NAM-015-WI1 (Permissible Heat Exposure Threshold Limit Values)
- California Division of Occupational Safety and Health (Cal/OSH) Heat Illness Prevention Standard – California Labor Code Section 226.7

**Document Control Information**

Original Effective Date: 10/23/13

Policy Approval by: Mark Hickey

Approval Signature: 

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | New document. | 4/26/10 |
| All | Reformatted document. Edits for clarity; additional of new regulatory information, | 6/5/15 |

## 1. Purpose and Scope

This document supports the Management System and establishes the procedures to ensure that safety events are being properly reported and investigated within ERM operations. This document applies to all ERM field and office locations.

## 2. Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensuring this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correcting any deficiencies in the implementation of this procedure as identified by the Division Health, Safety Security, and Environment (HSSE) Leader.

**Project Manager (PM)/Supervisor/Branch Manager (BM)**: Responsible for the following elements:

- Performing observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure; and
- Correcting, in conjunction with the PIC and the Division HSSE Leader, any observed deficiencies in the implementation of this procedure.

**Division HSSE Leader**: Responsible for the following elements:

- Evaluating implementation of this procedure by Division personnel during ECS reviews; and
- Communicating identified deficiencies to the PIC and Divisional management teams.

**Employee:** Responsible for the following elements:

- Completing ECS entries within 24 hours of a safety event; and
- Participating in the investigation of the event as directed by the ERM management and health and safety (H&S) teams.

## 3. Definitions

**Event Communication System (ECS):** The primary tool utilized at ERM for communicating the occurrence of safety events.

**Event Principals:** People who may be involved in safety events, including ERM employees, subcontractors, and third parties (including clients).

**5 Why:** A question-asking technique used to explore the cause and effect relationship underlying a problem or event.

**Incident:** One of the following:

- An employee becomes injured or is made ill;
- Useful property is damaged in some fashion;
- A hazardous material is spilled or released to air, water, or ground;
- Operational security is breached;
- A regulatory citation is issued; or
- A loss of reputation to clients or the general public is sustained.

**Near Miss:** An unplanned event that did not result in an incident, but had the potential to do so.

**Reporting Person:** The ERM employee entering the Safety Event into the ECS.

**Root Cause Analysis:** A method of problem solving that tries to identify the root causes of an issue. A root cause is one that, once removed, would have prevented the final undesirable event from occurring.

**Safe Behavior:** A positive action or attitude toward safety or that promoted safety within the workplace.

**Safety Event:** An incident, near miss, unsafe act/condition, or safe behavior occurring within or due to the working environment experienced by ERM personnel.

**Unsafe Act:** A task or activity conducted in a manner that may threaten the health and safety of co-workers.

**Unsafe Condition:** A condition in the work environment likely to lead an incident if not corrected.

Workcare: The occupational health consulting firm which assists ERM in management of its medical surveillance programs.

**Working Environment:** Anywhere ERM, its employees, and its subcontractors are engaged in work activity, including ERM offices, client sites (visits, meetings, field work, etc.), or during travel.

# 4. Procedure

## 4.1 Safety Event Initial Response

### 4.1.1 Injuries or Illnesses

The general steps for responding to an injury or illness incident include the following:

- For emergency situations, employees shall call 911. This would include chest pains, stroke, severe shortness of breath, sudden and severe pain, major injury (including potential fractures and trauma), uncontrolled bleeding, electrocution, second or third degree burns, or unconsciousness. If transport to an urgent care center or hospital is required, a second ERM employee must accompany or follow the injured or ill employee to the medical treatment center.
- For non-emergency situations, employees shall give necessary first aid care for the employee (if qualified to do so) and secure the scene.
- After stabilizing the scene and ensuring appropriate initial treatment is provided to the employee, contact the PM/Supervisor, who will then contact the BM and/or PIC, as well as the local and/or Division H&S team, to report the event.
- Immediately after contacting the ERM management and H&S personnel, an ERM representative shall call ERM's medical service provider (Workcare) to initiate the Incident Intervention process if follow-up medical treatment is deemed necessary by the management or health and safety team. The phone number is 888-449-7787.
- Within 24 hour, ERM employees shall enter the basic details of the event into the ECS.

Note that the above direction may change based on site-specific circumstances or client-specific requirements. Emergency response elements, including contact information and directions to urgent care facilities, will be included in the project health and safety plan (HASP) as well as the Emergency Action Plan (EAP) within each office.

In the event of a fatality or the hospitalization of three or more ERM employees from a single incident, ERM's management team with the assistance of the Regional H&S Director is responsible for notifying the Occupational Safety and Health Administration (OSHA) within eight hours of the incident.

### 4.1.2 Non-injury Incidents and Near Misses

After the occurrence of a work related non-injury incident (property damage, environmental release, etc.), work will be halted, the scene will be secured, and initial facts gathered regarding the event. Work should not continue until the causes of the incident or near miss are understood and corrected. Within 24 hours, ERM employees must enter the basic details of the event into the ECS.

### 4.1.3 Unsafe Acts and Conditions/Safe Behaviors

When a work related unsafe act or condition is identified, work will be halted until the act or condition is addressed and corrected. Similarly, when safe behaviors are identified, the employee(s) involved should be commended for their safe performance. Within 24 hours of the observation, ERM employees must enter the basic details of these events into the ECS.

## 4.2 Safety Event Follow-up

### 4.2.1 ECS Information Routing

After the basic details of a safety event are entered into the ECS by the employee or designated reporting person, the system will automatically notify appropriate parties. All individuals receiving automatic notification are included on the communication chain for the safety event's ECS record. Automatic notifications per Event Type are summarized in Appendix 1.

Any ERM employee may be added to the communication chain for an ECS record as an additional affected party.

### 4.2.2 Initiating and Conducting Follow-up

ERM assigns and tracks corrective actions for all safety events. The required detail of the follow-up and the personnel involved is based on the Event Type and its actual or potential severity, as judged by the project and/or safety team. The ECS record created by entering the Safety Event is meant to both guide follow-up and document the findings of the investigation.

At the option of ERM's safety and/or management team, or as required by actual or potential severity of the event, a more robust follow-up may be required, including root cause analysis.

Within 24 hours of the initial communication of the Safety Event into ECS, a member of the BU safety team will contact the Reporting Person to gather initial facts and begin the investigation. The safety team will be responsible for:

- Stewarding the completion of the investigation with the persons involved in the Safety Event; and
- Verifying that all assigned corrective actions have been completed.

### 4.2.3 Determining Recordability

If the Safety Event is an occupational illness or injury, then the Regional H&S Director will confer with ERM's Global H&S Director to determine recordability of the Safety Event. This will include a calculation of lost work days and/or restricted duty/job transfer time. These determinations will be made based on the established facts of the Safety Event and according to US recordkeeping criteria established by the OSHA. Collected data on events meeting OSHA's recordability definition will be summarized on OSHA Forms 300 and 300A and will be maintained as required by OSHA recordkeeping and reporting requirements.

### 4.2.4 Root Cause Analysis

A root cause analysis (RCA) will be performed for all recordable incidents and high value learning events as determined by the client, ERM management and/or the Regional H&S Director.

The RCA process should begin no less than two business days after all immediate response measures have been taken and the situation is under control. The default ERM RCA methodology in the "5 Why" technique, but ERM reserves the right to substitute other valid methods as deemed appropriate by management or the Regional H&S Director.

The first step in the process is to assemble the RCA team. The team shall be led by the PIC and facilitated by a member of the ERM safety team or another ERM employee trained in RCA methods. Other team members may include:

- The PM of the project;
- The BM (if the Safety Event was based in the office);
- The person directly involved in the event;
- Other employees familiar with the activities during which the event occurred;
- Subcontractor representatives (if a subcontractor was involved); and
- A senior ERM Partner not involved in the event (e.g., Practice Leader or BU Managing Partner).

The RCA team leader will facilitate the implementation of the process, which may include:

- Interviews and fact gathering;
- Casual factor determination;
- Root cause identification using the "5 Why" method; and
- Corrective action recommendation.

Target deadlines for completing an RCA are as follows:

- Conduct interviews within five working days after the event;
- Distribute draft RCA report to the RCA team for review within 10 working days after the event; and
- Issue the final RCA report, including photos and an RCA flowchart, within 15 working days after the event.

The final RCA report will be uploaded to the ECS record after the event. Adopted corrective actions will be tracked to completion in the ECS. All corrective actions must be completed within 30 days of the issuance of the RCA report. If additional time is needed to complete a corrective action, the Regional H&S Director must be notified.

### 4.2.5 Approval and Record Finalization

When the corrective actions are verified as complete, the following individuals will indicate their approval of the event:

- For incidents, the applicable Business Unit (BU) H&S Leader, the BU Managing Partner (MP), and the Regional H&S Director.
- For all other safety events, the BU H&S Leader.

After all approvals are made, the BU H&S Leader will initiate the finalization check within ECS to save and close the record. Future changes are locked out are event finalization.

### 4.3 Additional Procedures for Mine-Related Safety Events

For ERM projects covered by the regulatory statues of the Mine Safety and Health Administration (MSHA), additional recordkeeping is required when specific safety events occur. Safety events meeting one or more of the following criteria must be reported to both the mine operator and MSHA immediately (i.e., no later than 15 minutes after occurrence):

- Death of an ERM employee;
- Injury to an ERM employee at the mine that had the reasonable potential to cause death;
- Entrapment of an ERM employee for more than 30 minutes or which had the reasonable potential to cause death;
- An unplanned inundation of a mine by liquid or gas;
- An unplanned ignition or explosion of gas or dust;
- In underground mines, an unplanned fire not extinguished within 10 minutes of discovery;
- In surface mines, an unplanned fire not extinguished within 30 minutes of discovery;
- An unplanned ignition or explosion of a blasting agent or explosive;
- An unplanned roof fall at or above the anchorage zone in active workings that impair ventilation or impede passage;
- A coal or rock outburst that causes withdrawal of miners or which disrupts regular mining activity for more than one hour;
- An unstable condition at an impoundment, refusal pile, or culm bank which requires emergency action to prevent failure, or which cause individuals to evacuate an area, or failure of an impoundment, refuse pile, or culm bank;
- Damage to hoisting equipment in a shaft or slope which endangers an individual or which interferes with use of the equipment for more than 30 minutes, and
- An event at a mine which causes death or bodily injury to an ERM employee not at the mine when the event occurs.

Within 10 days of occurrence, ERM must submit a report of any work-related incidents to MSHA using MSHA Form 7000-1. Additionally, each calendar quarter, ERM must submit employment information to MSHA utilizing MSHA Form 7000-2. The form must be completed and submitted to MSHA no later than 15 days after the end of each calendar quarter.

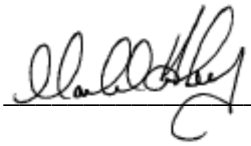
## 5. References

- Occupational Safety and Health Administration (OSHA) 29 CFR 1904, *"Recording and Reporting Occupational Injuries and Illnesses"*
- Mine Safety and Health Administration (MSHA) 30 CFR 50, *"Notification, Investigation, Reports, and Records of Accidents, Injuries, Illnesses, Employment, and Coal Production in Mines"*

**Document Control Information**

Original Effective Date: 10/17/14

Policy Approval by: Mark Hickey

Approval Signature: 

**Appendix 1: ECS E-mail Notification Matrix**

**Appendix 2: Event Severity Matrix**

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | Revised and edited to meet new Global SMS requirements and update procedures | 10/17/14 |
| | | |

## 1. Purpose and Scope

This document establishes the procedures to ensure that ERM employees are provided with appropriate medical services as needed. This document applies to all ERM field and office locations.

## 2. Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensuring this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correcting any deficiencies in the implementation of this procedure as identified by the Division Health and Safety (H&S) Leader.

**Project Manager (PM)/Supervisor/Branch Manager (BM)**: Responsible for the following elements:

- Performing observations of ERM work processes to assess whether or not employees are operating in accordance with this procedure;
- Pausing or stopping work where deviations from this procedure are observed; and
- Correcting, in conjunction with the PIC and the Division H&S Leader, any observed deficiencies in the implementation of this procedure.

**Division H&S Leader**: Responsible for the following elements:

- Evaluating implementation of this procedure during health and safety plan reviews and project audits; and
- Communicating identified deficiencies to the PIC.

## 3. Definitions

**Field Safety Officers:** Employees who are responsible for the day-to-day implementation of ERM's health and safety processes on project sites.

**Floor Wardens:** Employees responsible for monitoring the presence of co-workers and visitors within the immediate seating area or zone of their office, and assisting in the orderly and safe evacuation of those personnel during a building evacuation or emergency.

# 4. Procedure

## 4.1 First Aid Services

### 4.1.1 First Aid Responders

It is the expectation of ERM that our personnel who are qualified as Field Safety Officers (FSO) or who serve as Floor Wardens in our offices be trained and certified to render appropriate first aid, CPR, and be capable of operating an automated external defibrillator (AED). Other ERM employees are not obligated to participate in provided first aid/CPR training; however, if a session is offered staff participation is encouraged to fill any open positions in the training. If a client requires personnel working on their site to be first aid/CPR trained, ERM will ensure that appropriately trained personnel are assigned to such projects.

### 4.1.2 First Aid Kits

First aid supplies must be maintained and easily accessible at ERM job and office sites. At a minimum, first aid kits should comply with American National Standards Institute/International Safety Equipment Association (ANSI/ISEA) Standard Z308.1-2014. Specifically, first aid kits placed in ERM offices should be ANSI/ISEA Class B, Type 1 kits (use in stationary indoor settings) and should contain the following items:

- Adhesive bandages, 1” x 3” (50 total)
- Adhesive tape, 2.5 yards each (2 total)
- Antibiotic applications, 0.5 grams each (25 total)
- Antiseptic applications, 0.5 grams each (50 total)
- Breathing barrier (1 total)
- Burn dressing, 4” x 4” (2 total)
- Burn treatment applications, 0.9 grams each (25 total)
- Cold pack, 4” x 5” (2 total)
- Eye covering (with means of attachment), 2.9 square inches (2 total)
- Eye/skin wash, 4 fluid ounces total
- First aid guide
- Hand sanitizer, 0.9 grams each (10 total)
- Medical exam gloves, 4 pair
- Roller bandage, 2” by 4 yards (2 total)
- Roller bandage, 4” by 4 yards (1 total)
- Scissors (1 total)
- Splint, 4” x 24” (1 total)
- Sterile pads, 3” x 3” minimum (4 total), non-stick
- Tourniquet, 1” width (1 total)
- Trauma pad, 5” x 9” (4 total)

- Triangular bandage, 40” x 40” x 56” (2 total)

First aid kits placed in ERM field vehicles or field trailers should be ANSI/ISEA Class A, Type IV kits (mobile, waterproof, and subject to rougher handling) and should contain the following items:

- Adhesive bandages, 1” x 3” (16 total)
- Adhesive tape, 2.5 yards each (1 total)
- Antibiotic applications, 0.5 grams each (10 total)
- Antiseptic applications, 0.5 grams each (10 total)
- Breathing barrier (1 total)
- Burn dressing, 4” x 4” (1 total)
- Burn treatment applications, 0.9 grams each (10 total)
- Cold pack, 4” x 5” (1 total)
- Eye covering (with means of attachment), 2.9 square inches (2 total)
- Eye/skin wash, 1 fluid ounce total
- First aid guide
- Hand sanitizer, 0.9 grams each (6 total)
- Medical exam gloves, 2 pair
- Roller bandage, 2” by 4 yards (1 total)
- Scissors (1 total)
- Sterile pads, 3” x 3” minimum (2 total), non-stick
- Trauma pad, 5” x 9” (2 total)
- Triangular bandage, 40” x 40” x 56” (1 total)

On project sites, the contents of the kit must be inspected by the FSO prior to the start of the job and at least weekly during the job to ensure that items being used are replaced. Office first aid kits shall be inspected at least monthly.

### 4.1.3 Emergency Information

On project sites, the PM will identify the mode in which medical services and first aid will be administered in the health and safety plan (HASP). A drive to the hospital to ensure that directions are accurate is recommended. On complicated project sites, an emergency medical services drill may be advised.

In offices, the Branch Manager (BM) will identify the mode in which medical services and first aid will be administered in the local Emergency Action Plan (EAP).

These documents shall include directions and a map to the nearest medical facility, along with emergency telephone numbers. From time to time, emergency medical services drills may be in order to ensure proper response on the part of the responders and ERM staff.

### 4.1.4 Eyewash/Drench Facilities

At any jobsite where the eyes or body of any employee may be exposed to corrosive or otherwise hazardous chemicals, eyewash and body drench facilities must be available.

## 4.2 Availability of Medical Services

ERM has retained the services of WorkCare, Inc., a firm specializing in Occupational Medicine, to provide advice on medical issues and to administer physical and medical examinations as required for our medical surveillance program. Medical surveillance programs will be established with input from WorkCare to properly track the health status of ERM staff based upon their exposure risks. The Regional H&S Director should be involved in establishing the examination criteria.

WorkCare additionally provides incident intervention services to our employees (and subcontractors as appropriate) 24 hours per day, 7 days per week, each day of the year.

Whenever first aid is administered by one of our employees, it is expected that WorkCare's Incident Intervention services will also be contacted for guidance.

Automatic external defibrillators are also available in all offices of ERM. WorkCare must be involved anytime an AED is used at ERM. Contact your Division H&S Leader for more information regarding AED use.

ERM H&S staff should also be informed of the need to render first aid or seek additional medical treatment.

## 4.3 Bloodborne Pathogens Program

### 4.3.1 Exposure Determination

Due to the nature of ERM's typical office and field activities, it is highly unlikely that incidents involving ERM employees would result in exposure to blood or potentially infectious bodily fluids. Therefore, compliance with 29 CFR 1910.1030, *Bloodborne Pathogens*, is not required. Although a written exposure control plan is not required, the following sections outline basic requirements to be followed if ERM employees voluntarily render first aid/CPR. Exposure determinations, as well as the precautions and work practices discussed below, are without regard to the use of personal protective equipment.

### 4.3.2 Training and Recordkeeping

ERM periodically offers first aid/CPR training that includes bloodborne pathogens training to employees as part of the overall health and safety program. If a client requires personnel working on their site to be first aid/CPR trained, ERM will ensure that appropriately-trained personnel are assigned to staff such projects.

Training, if needed, will be provided at or before the time of initial assignment and will be repeated annually (i.e., within one year of previous training) for as long as the employee remains in a work environment requiring exposure to bloodborne pathogens. Training records will be maintained in ERM's Academy Learning Management System (LMS). Any records maintained within the Academy LMS are available upon request by employees or their representatives and any government official.

The Medical Recordkeeping Coordinator is responsible for maintaining all medical records. Issues such as, but not limited to, access to medical records, transfer of records and retention of records are addressed in S3-NAM-003-PR (*Access to Exposure and Medical Records*). WorkCare currently serves as the Medical Recordkeeping Coordinator for ERM.

### 4.3.3 Universal Precautions

If an ERM employee voluntarily renders first aid/CPR, all human blood and bodily fluids will be treated as infectious for bloodborne pathogens.

### 4.3.4 Engineering Controls, Work Practices, and PPE

Since ERM is a consulting firm, there are no typical operations applicable to bloodborne pathogens requiring engineering controls. However, if conditions warrant (e.g., significant and continued exposure to sharps, site cleanups involving medical or infectious wastes) the use of engineering controls with regard to bloodborne pathogens, appropriate engineering controls will be developed, examined, and maintained or replaced on an annual basis to ensure their effectiveness.

While performing field-based work activities, toilet and hand-washing facilities must be available to employees. Hand-washing facilities will be provided with an appropriate combination of the following:

- Hot and cold running water or tepid running water;
- Soap or an antiseptic hand cleanser;
- Individual hand towels or warm air blowers; and
- Pre-moistened individual wipes.

If an ERM employee voluntarily renders first aid/CPR, the following PPE, supplied by ERM, will be used as appropriate:

- Nitrile surgical-type gloves; and
- CPR mouth guard (where needed).

These are provided to ERM employees in the PPE field bag issued upon their hire. Any blood or other bodily fluid-contaminated materials will be placed in red leak-proof plastic bags for disposal. Bags will be labeled with a biohazard sign and the words "Biohazard" in contrasting colors. Surfaces that have been contaminated with blood or other bodily fluids will be cleaned with a disinfecting product as soon as practical.

### 4.3.5 Hepatitis B Vaccine

Since it is highly unlikely that incidents involving ERM employees would result in exposure to blood or potentially infectious bodily fluids, a Hepatitis B vaccination program is not typically required for ERM staff. However, if an employee believes that they have come into contact with potentially infectious blood or other bodily fluids while voluntarily rendering first aid/CPR, medical examinations, including Hepatitis B vaccine, will be made available at no charge to the employee.

### 4.3.6 Access to Written Program

All employees or their representatives and governmental officials may request a copy of any written program by contacting the Division H&S Leader in their respective office.

## 5. References

- ERM Procedure S3-NAM-003-PR – *Access to Medical and Exposure Records*
- Occupational Safety and Health Administration (OSHA) 29 CFR 1910.151, *"Medical Services and First Aid"*
- OSHA 29 CFR 1910.1030, *"Bloodborne Pathogens"*
- ANSI/ISEA Z308.1-2015, *"Minimum Requirements for Workplace First Aid Kits and Supplies"*

**Document Control Information**

Original Effective Date: February 14, 2014

Policy Approval by: Philip Platcow on 2/14/14

Approval Signature: 

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | New document. | 2/14/14 |
| All | Reformatted to meet new Global documentation requirements. | 5/28/14 |
| All | Updated first aid kit content lists and references; minor language changes for clarity | 7/20/15 |

# 21.0 PERSONAL PROTECTIVE EQUIPMENT

ERM believes it is our obligation to provide a hazard-free environment to our employees. This written program documents steps ERM has taken to minimize injury resulting from various occupational hazards through the use of personal protective equipment (PPE). Other types of hazard mitigation, such as engineering or administrative controls, are the best methods of hazard mitigation; however, in many cases the nature of consulting requires use of PPE to supplement or replace those methods. ERM performs much of its work on short-duration field projects, thus the hazards and the appropriate PPE to protect employees from those hazards must be addressed for each project involving field activities.

Note that respiratory protection (S3-NAM-026-PR) and hearing protection (S3-NAM-014-PR) are covered in other procedures.

## 21.1 Written PPE Hazard Assessments

For projects requiring a site-specific health and safety plan (HASP), the PPE requirements for project tasks will be addressed in HASP. PPE hazard assessments are performed by considering the following basic types of hazards:

- Impacts
- Heat or Cold
- Penetration
- Harmful Dust
- Compression (roll-over)
- Radiation
- Chemical Hazards
- Electrical Hazards

All site-specific HASPs will include a table outlining the actual PPE requirements and for which project tasks the PPE is required. For example, Level D PPE consisting of long pants and shirt with sleeves, steel-toed footwear, safety glasses, and hard hats are required for activities such as general site activities. In addition, all client-specific requirements regarding PPE will be addressed on the PPE table. All project team members are required to be trained on the site-specific HASP, which includes training on what PPE is required for various tasks, prior to participating in field- based activities.

A completed JHA form addresses both the hazards specific to a job task and the appropriate controls which may include PPE. In addition, any client-specific PPE requirements will be addressed in the PPE section of the JHA. All project team members are required to review the JHA prior to the commencement of field-based activities.

In general, tasks involving Level A or B PPE are not anticipated during routine field activities. If a project involves tasks requiring Level A or B PPE, a CIH or CSP will be consulted to ensure that the level of PPE is appropriate for the unique hazards and to ensure that project team members are adequately trained.

### 21.2. PPE Selection

Once hazards have been identified and evaluated through the PPE hazard assessment process, the general procedure for selecting PPE is to:

- Become familiar with potential hazards and the types of PPE available to mitigate those hazards;
- Compare available PPE to hazards associated with the project site;
- Select PPE meeting any applicable regulatory requirements and that ensure a level of protection greater than the minimum required to protect employees; and
- Fit the employees with proper, comfortable, and well-fitting PPE and instruct them on its care and use. Specific training on limitations of PPE is an important factor to consider during any PPE training.

If situations change on a project site or PPE fails for some reason, PPE originally selected for employee protection must be re-evaluated. Re-evaluation should include the following elements:

- Adequacy of the PPE written program;
- Past safety event experience;
- Levels of exposure, through appropriate exposure monitoring;
- Adequacy of PPE originally selected;
- Number of hours PPE must be worn;
- Adequacy of training and fitting of PPE;
- Adequacy of PPE program records;
- Recommendations for H&S program improvement and modification; and
- Coordination with the overall H&S program.

#### 21.2.1 Safety Glasses/Safety Goggles/Face Shields

When hazards are present as a result of flying particles, molten metal, liquid chemicals that are highly acidic or basic, chemical gases or vapors, or ionizing radiation, a combination of safety glasses, safety goggles, and/or face shields should be worn. For employees who wear prescription glasses, S3-NAM-021-WI1 (*Prescription Protective Eyewear*) provides additional details regarding purchase and care of prescription safety glasses.

21.2.2 Foot Protection

In most field situations, protective footwear should be worn by all employees performing work in the field. Employees performing ancillary work activities, such as client meetings or work in the office environment at a client site, are not required to wear protective footwear unless client requirements dictate their use. S3-NAM-021-WI1 (*Protective Footwear*) provides additional details regarding selection and purchase.

21.2.3 Gloves

Gloves provide protection against a wide variety of hazards, including chemical exposure, burns, cuts, and other hand injuries. The Job Hazard Analysis for Hand and Portable Power Tools provides more information on protection from cuts. The ERM Minerva site contains specific information related to selection of gloves to protect against chemical hazards.

21.2.4 Hard Hats

Hard hats approved by the American National Standards Institute (ANSI) must be worn whenever a hazard exists from falling objects or other impact/bump hazards. Hard hats should be replaced at least every 5 years or immediately following a significant impact to the hard hat. The inner suspension of the hard hat should be inspected at least once every 6 months to ensure at least ¼" remains between the suspension and the hard hat shell. ERM employees required to wear hard hats should generally utilize Class G (general) Type 1 hats, although others may be appropriate based on site conditions.

## 21.3 Training

Employees shall receive training on PPE. For many, this training occurs during their initial 40-Hour HAZWOPER training. Training topics include, but are not limited to, the following:

- Routes of exposure – inhalation, skin contact, ingestion, and injection;
- Categories of exposure – acute and chronic;
- Selection of chemical protective clothing;
- Eye and face protection – glasses, goggles, face shields, and splash hoods;
- Hand protection – skin contact with chemicals, cuts, abrasions, or burns;
- Foot protection – contact with chemicals, compression, crushing, punctures, or electrical hazards;
- Head protection;
- Storage, cleaning and maintenance of PPE;
- Proper donning/doffing procedures;
- Adjusting PPE and determining proper fit; and
- Disposal of PPE.

Retraining will be conducted if any of the following occur:

- Employee observed not using appropriate PPE for task;
- Employee observed using PPE in a manner that is inconsistent with previous training;
- Changes in types of PPE used; and
- New hazards identified at the job site which requires the use of a different level or type of PPE.

All training is tracked in the ERM's Academy Learning Management System (LMS).

### 21.4 PPE Usage, Storage, and Maintenance

It is important that all PPE be kept clean and properly maintained by the employee to whom it is assigned. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. PPE will be inspected, cleaned, and maintained by employees at regular intervals as part of their normal job duties. Project Managers are responsible for ensuring compliance with cleaning of PPE by employees working on their projects.

In ERM's typical role on projects, PPE does not become grossly contaminated. During projects where chemical contamination of PPE occurs, the PPE will be decontaminated (if to be reused) or discarded in accordance with waste management practices for the project site. If gross contamination with liquid chemicals occurs, employees will immediately stop work and proceed to the decontamination area. Details of PPE and equipment decontamination are specified for each project in the site-specific HASP and/or JHA.

Change-rooms and shower-rooms are not typically required for ERM projects due to several factors, including the short duration and non-permanency of the projects. In the event change-rooms or shower-rooms are required for a project, details will be included in the site-specific HASP.

All PPE will be inspected prior to use and any damaged or defective PPE will not be used. All damaged or defective PPE will be immediately discarded. The drilling of holes in a hard hat in order to attach items to the hard hat is prohibited. Hard hats that have sustained a major impact will be discarded.

### 21.5 ERM-Provided PPE

ERM provides PPE to our employees in accordance with applicable regulatory standards. Prescription safety glasses and protective footwear are subsidized (see S3-NAM-021-WI1 and S3-NAM-021-WI2, respectively). Employees are discouraged from providing their own PPE. Employees are responsible for ensuring that ERM-provided PPE is maintained and replaced as needed. During routine inspections of field-based activities, the Field Safety Officer (FSO), Project Manager, or Division Health and Safety Leader will observe the condition of employee PPE.

## 28.0 SAFE BEHAVIORS AND FEEDBACK

ERM strives to ensure that everyone – ERM employees, ERM subcontractors or anyone who comes within the ERM work environment – goes home safely at the end of each work day. This is one of ERM's Core Values. We live this Core Value through our Safety Culture, which is embodied by the phrase "You See It. You Own It. And Share It."

It means that:

- We know that we have a responsibility to look out for each other, to intervene with each other when necessary, to be proactive and to help keep safety issues from becoming problems.
- We also look out for ourselves. If we recognize that a situation is unsafe, we are expected to stop what we're doing, reassess the situation and consult with others if necessary before proceeding safely.
- We assign no blame to anyone who raises safety issues.
- We strive to learn big lessons from the big and especially small events that are part of our daily experience.

ERM believes that sustainable path to world-class safety performance is one where safe behaviors are engrained in the actions and decisions of our people.

### 28.1 Stop Work Authorization

It is ERM policy that all ERM and ERM subcontractor employees have the authority, without fear of reprimand or retaliation to:

- Immediately stop any work activity that presents a danger to the site team or the public.
- Get involved, question and rectify any situation or work activity that is identified as not being in compliance with the HASP or with broader ERM health & safety policies.
- Report any unsafe acts or conditions to supervision or, preferably, intervene to safely correct such acts or conditions themselves.

### 28.2The Observation & Feedback Program

The Observation & Feedback Program (OFP) is a comprehensive behavior-based approach to health and safety that stresses the importance of individuals acting as leaders to constructively challenge others' thoughts and actions about safety. ERM employees and ERM Subcontractors participate in OFP.

OFP is supported by three main processes:

- Seeing
- Owning
- Sharing

All ERM employees are trained in the elements of Observation & Feedback, described below.

### 28.3 Observation & Feedback Elements

Every employee at ERM is empowered to identify (See), intervene and correct (Own) unsafe acts and conditions both in the office and in the field – even if that requires calling a stop to work activities. ERM employees are likewise empowered to provide positive feedback to colleagues when they observe safe behaviors. This empowerment extends to ERM subcontractors.

The lessons learned from individual safety events which are seen, owned, and shared are pooled to form a robust operational picture of ERM's safety program in action. This picture can be used to highlight trends within or across projects that require attention or to identify innovative practices and exemplary behaviors that are worthy of elevation and recognition.

Operationally, this entails the following.

#### 28.3.1 Seeing

The "See" element involves a specific safety scanning technique whereby ERM employees are better able to recognize unsafe acts and unsafe conditions in their field of vision. "Seeing" emphasizes rapid hazard recognition, risk assessment and evaluating work spaces and tasks before beginning work.

#### 28.3.2 Owning

The "Own" element reinforces the empowerment that ERM employees have, as safety leaders, to safely correct unsafe conditions at work and unsafe actions they may see others doing through personal intervention, even if such requires issuing a "Stop Work" order. The Own element imparts Socratic teaching and coaching techniques to ERM employees that are designed to make personal safety interventions immediately effective and transformative in the long-run. The ultimate goal is to get the intervention target to "See" and "Own" the situation for themselves.

#### 28.3.3 Sharing

ERM seeks to lever what is learned from the individual events "Seen" and "Owned" through sharing of experiences through the Event Communication System (ECS; see S3-NAM-016-PR). The ECS allows data analysis to occur on the safety events entered or shared within the system. ERM can track trends occurring on a global scale, and issue Safety Alerts and Lessons Learned in real-time.

## 1. Purpose and Scope

This procedure describes:

- Contractor health, safety, security, and environmental (HSSE) performance expectations;
- The pre-evaluation process for approval of contractors, their safety programs, and their insurance documents;
- The evaluation of contractor safety performance while working for ERM; and
- The responsibilities of the ERM project team with respect to implementation of this program and oversight of contractor safety.

The procedure applies to all ERM work activities which are contracted to an outside firm, except those specifically excluded elsewhere in this document. This procedure does not apply to third party contractors which may be working on the same site as ERM, but do not have a contractual relationship with ERM.

## 2. Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensure a contractor management program is implemented, understood, and followed by employees under their charge and working on their projects;
- Appoint a Project Manager/Supervisor who will manage all aspects of conformance with the procedure;
- Approve and execute contractor agreements for each contractor working on ERM projects/sites and may participate in negotiations, as necessary;
- Assess, in conjunction with the Project Manager/Supervisor, the performance of ERM contractors based on observations and assessments in the field;
- Correct, in conjunction with the Project Manager/Supervisor, any observed deficiencies in the performance of the ERM contractor; and
- Correct any deficiencies in the implementation of the program as identified by the Division HSSE Leader.

**Project Manager/Supervisor**: Responsible for the following elements:

- Perform observations of contractor work processes to assess whether or not the contractor is operating in accordance with applicable health and safety requirements;

- Verify contractors are approved to provide services to ERM as established by ERM's Global Contractor Management Program.;
- Communicate ERM and client driven HSE requirements to project contractors by providing the standard contractor agreement or a project- or client-specific contractor agreement during project planning or scoping;
- Understand and confirm the competency of ERM contractor staff who will be providing field project support;
- Request required documentation from contractors as defined in any project-specific agreements (i.e., Contractor Health and Safety Plans, Job Hazard Analyses (JHAs), work procedures, etc.);
- Interact with and mentor contractors during the working relationship;
- Evaluate best practices provided by contractor personnel for potential inclusion in project work planning;
- Stop work where deviations from accepted health and safety requirements are observed;
- Correct, in conjunction with the PIC and the Division HSSE Leader, any observed deficiencies in the performance of the contractor;
- Work with the contractor to complete incident investigations and, where needed, root cause evaluations, for incidents and high-value near misses which occur on ERM job sites; and
- Contact ERM Legal in the event of serious or repeated breaches of health and safety requirements and assess whether action is warranted under the contract.

**Division HSSE Leader**: Responsible for the following elements:

- Evaluate implementation of these policies during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

**ERM Staff:** Responsible for the following elements:

- Attend and interact with contractors during safety meetings to ensure that the scope of work, risks and precautions are understood by all project participants;
- Raise any concerns of job performance with the project management and contractors as established in the project communications plan, including implementing stop work authority if there is an imminent risk of injury or property damage; and
- Utilize the Event Communication System (ECS) to report any incidents, near misses, unsafe acts and conditions and remarkable safe behaviors observed during work with contractors.

## 3. Definitions

A contractor is defined as a person or company engaged by ERM for work or services billed to a project, or work or services for ERM in an ERM office. The term "contractor" may include contractors, subcontractors, consultants, sub-consultants, vendors, and suppliers.

Companies that provide a professional service to ERM such as accounting, legal or professional services, travel planning, taxis, etc., or who provide a supply service to ERM offices, such as non-operated equipment rental, coffee vending, food vending, water cooler vending, etc. are not considered contractors under this procedure.

## 4. Procedure

### 4.1 Contractor Prequalification and Selection

Contractors desiring to perform work for ERM shall be required to be pre-qualified in accordance with ERM's Global Contractor Management Program. In the USA, Pacific Industrial Contractor Screening (PICS), a third-party service provider, qualifies and maintains updated information about suppliers and contractors based on the requirements of its clients. Contractors will submit a variety of information to PICS, including insurance limits, OSHA logs, safety and training programs, bonding capability, and diversity information. Potential contractors also have to agree to adhere to ERM's policies, including our Anti-Bribery and Corruption (ABC) Policy and Business Conduct and Ethics Agreement, and Subsurface Clearance Program (as applicable).

PICS shall evaluate the information provided by the proposed contractor and compares it to a detailed list of requirements provided by ERM. Information submitted by the contractor must be updated at least annually.

ERM's minimum safety criteria for US firms are as follows:

- No fatalities in the past 5 years;
- A Total Recordable Incidence Rate (TRIR) at or below the industry average for the past 3 years based on North American Industrial Classification System (NAICS) code;
- A Days Away/Restricted/Transfer (DART) rate at or below the industry average for the past 3 years based on NAICS code;
- An Experience Modification Rate (EMR) at or below 1.0 for the past 3 years; and
- No open or unresolved regulatory citations within the past 3 years.

Companies that service ERM offices such as coffee vendors, vending machine companies, water cooler vendors, etc. do not have to be qualified under this procedure. Additionally, retailers providing point-of-sale purchases (e.g., purchase of a tool from Home Depot) do not have to be qualified under this procedure.

Further information on prequalification can be found on the Contractor Prequalification Health and Safety Prequalification Process section of the Americas Health and Safety page on Minerva.

### 4.2 Contractor Interactions/Expectations

The Project Manager/Supervisor must ensure that the contractor is provided with necessary information to work safely, including, but not limited to:

- ERM contact name and phone number;
- ERM health and safety requirements;
- Client health and safety requirements (including any drug and alcohol policies);
- Site-specific emergency action plans; and
- Safety information from other ERM contractors or third-party contractors at the site.

The Project Manager/Supervisor must ensure that contractor personnel participate in site-related safety meetings, including pre-job meetings, safety orientations, daily tailgate safety meetings, and any job-related safety inspections.

Contractors must conform to all regulatory and policy driven HSSE requirements. Contractors are contractually and legally responsible for providing personnel who are qualified to meet or exceed the expectations of ERM and customer work scopes. Contractor agreements are used to clearly define contractor accountabilities and responsibilities.

Contractors are expected to conform to their internal HSE policies and requirements as well as those of ERM and ERM clients. Where conflicts exist between these policies and requirements, contractors must adhere to the most stringent policy and requirement. Where needed, the contractor should have the capability to develop additional safety procedures or hazard assessments for work that is performed exclusively by their employees and for which they may have superior knowledge.

Contractors will provide, upon request and at the time of proposing services, a description of their HSSE system, as well as resumes, training certificates, course rosters, and other documents confirming contractor employee qualifications and competencies. ERM or our selected pre-qualification vendors may audit these systems and documentation for conformance with defined expectations. Contractors will be provided the opportunity to close any gaps identified during this evaluation and Project Managers/Supervisors will ensure gaps are closed before work begins.

### 4.3 Assessment of Contractor Performance

The Project Manager/Supervisor should regularly assess the contractor's operations to determine their level of compliance with applicable health and safety requirements. This should also include a review of required health and safety documentation. Assessment can be performed directly by the Project Manager/Supervisor or delegated to appropriate field staff. ERM's Health and Safety Guidance Document #33 (Health and Safety Audits) or equivalent must be used to conduct and document contractor operations.

Where ERM personnel observe safety events (i.e., incidents, near misses, unsafe acts/conditions) related to contractor operations, they should bring the events to the attention of ERM's Project

Manager/Supervisor as well as the contractor management team for immediate resolution. Events should also be posted in ERM's Event Communication System (ECS). Staff shall take the opportunity to also note remarkable safe behaviors to leverage positive activities for continuous improvement in projects.

The Project Manager/Supervisor will evaluate the contractor's performance following completion of the contracted work activities. If a contractor's performance is such that the PIC or the Project Manager/Supervisor feels that they should be barred from further use by ERM, a formal variance should be sent to the Division Managing Director (DMD) providing the reasons for the request. The DMD will make a decision regarding the contractor after consultation with appropriate ERM team members and can decide to change the contractor's approval flag status in ERM's Global Contractor Management System.

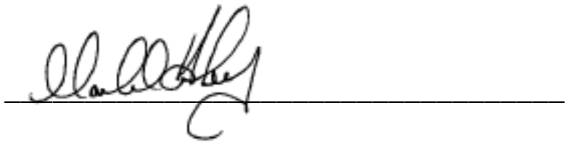
## 5. References

- PICS – www.picsauditing.com/
- ERM PICS Representative – Angela Wittman (awittman@picsauditing.com; 832-547-2710)
- ERM Health and Safety Guidance Document 33 (Health and Safety Audits)
- ERM Master Contractor Selection Flowchart
- ERM Variance Request Flowchart
- ERM Contractor Management Program Frequently Asked Questions (FAQs) Document

**Document Control Information**

Original Effective Date: 8/1/14

Policy Approval by: Mark Hickey

Approval Signature: 

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | New document | 3/6/14 |
| All | Revised format to meet new Global SMS requirements | 7/3/14 |
| All | Changed "subcontractor" to "contractor" throughout; addressed comments of Regional H&S Director | 8/1/14 |
| 4.2 | Updated to include transmission of client's drug and alcohol policies | 5/19/15 |

## 1. Purpose and Scope

This procedure establishes minimum requirements for work with hand tools and portable powered equipment. The purpose of this procedure is to ensure that hand tools and portable power equipment meet minimum safety requirements, are used in a the manner for which they are intended, and are maintained in a safe condition. This procedure is applicable to all North American operations.

## 2. Roles and Responsibilities

**Partner in Charge (PIC):** Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct any deficiencies in the implementation of this procedure as identified by the Division Health and Safety (H&S) Leader or other staff member.

**Project Manager:** Responsible for the following elements:

- Perform observations of ERM work processes to assess employee compliance with this
- procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Division H&S Leader, any observed deficiencies in the implementation of this procedure.

**Division H&S Leader:** Responsible for the following elements:

- Evaluate implementation of this procedure during project audits; and
- Communicate identified deficiencies to the PIC..

## 3. Definitions

**Portable Power Equipment:** Electric, pneumatic, gasoline or explosive-actuated hand tools.

**Ground Fault Circuit interrupters (GFCI):** A device that shuts off an electric power circuit when it detects that current is flowing along an unintended path, such as through water or a person.

**Underwriters Laboratories (UL):** A global product safety testing and certification organization.

# 4. Procedure

## 4.1 General Equipment Requirements

- All hand and portable power tools shall be maintained in safe working order and used only for the task for which they were designed.
- Hand and portable power tools, power supplies, and flexible cord sets (extension cords) shall be inspected prior to each use to identify any defects. Damaged or defective tools shall be immediately removed from service and identified through tagging or lockout of controls.
- Tool surfaces and handles shall be kept clean and free of dirt, grime, and excess oil to prevent slipping.
- Tools shall be cleaned and properly stored when not in use to prevent possible injuries and tool damage.
- Non-sparking tools shall be used in atmospheres with fire or explosive characteristics.
- Eye protection shall be used at all times during tool operation. Additional personal protective equipment (PPE) appropriate to the tool operation or work task shall be required and used, including face shields, hearing protection, respiratory protection and protective gloves.

## 4.2 Hand Tool Use

- Do not force tools beyond their capacity or use cheater bars or other instruments to increase their capacity.
- Do not use hand tools as pry bars.
- Do not throw tools from place to place or person to person.
- Do not drop tools from heights.
- Ensure that hands, fingers, and other body parts are out of the line of fire during tool usage.
- Brace yourself when using the tool in case the tool slips.

## 4.2 Portable Power Tool Use

- Loose clothing, long hair, loose jewelry, rings and chains are not allowed while working with power tools.
- Hands shall be kept clear of all cutting, rotating, or moving parts of powered tools.

- Portable power tools shall be safety tested and certified by Underwriters Laboratories (UL) or an equivalent authority.
- Electric power tools must be either double-insulated or equipped with a 3-wire grounded wiring and plug.
- Adapters which interrupt the continuity of the equipment grounding connection shall not be used.
- Tools shall only be used with a GFCI or a GFCI adapter. Do not handle wet cords and power tools unless they have been deenergized.
- Guards and safety devices provided by tool manufacturers shall not be removed or modified in any way which may interfere with their intended function.
- Portable equipment shall be handled in a manner which will not cause damage. Flexible electric cords shall not be used for raising or lowering the equipment and cords should not be fastened in any way that potentially damages the outer jacket or insulation.

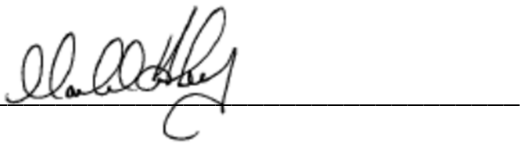
## 5. References

- Occupational Health and Safety Adminsitration (OSHA) Regulation 29 CFR 1910 Subpart P (Hand and Portable Powered Tools and Other Hand-Held Equipment)
- OSHA Regulation 29 CFR 1926 Subpart I (Tools – Hand and Power)

**Document Control Information**

Original Effective Date: 6/29/15

Policy Approval by: Mark Hickey

Approval Signature: 

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | New document. | 6/29/2015 |
| | | |

## 1. Purpose and Scope

This document establishes the procedures for implementing ERM's incident management strategy in the event of an injury or illness. Developing a strong incident management process is an essential part of promptly responding to occupational injuries and illnesses. This document applies to all ERM field and office locations.

## 2. Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensure the procedure is implemented, understood, and followed by employees under their charge and working on their projects; and
- Correct deficiencies in the implementation of the procedure as identified by the Division Health, Safety, Security, and Environment (HSSE) Leader.

**Project Manager (PM)/Supervisor/Branch Manager (BM)**: Responsible for the following elements:

- Perform observations of ERM work processes to assess whether or not employees are operating in accordance with the procedure; and
- Correct, in conjunction with the PIC and the Division HSSE Leader, any observed deficiencies in the implementation of the procedure.

**Division HSSE Leader**: Responsible for the following elements:

- Evaluate implementation of the procedure by Division personnel during ECS reviews; and
- Communicate identified deficiencies to the PIC and Divisional management teams.

**Employee:** Responsible for the following elements:

- Report work-related injuries/illnesses as soon as possible to their PM/Supervisor/BM;
- Comply with the requirements of the procedure during response to injury/illness events;
- Work with the ERM management, HSSE, and Human Resources (HR) teams to ensure the best outcome for the employee; and
- Notify the ERM management, HSSE, and HR teams of any change in injury/illness status, as well as providing copies of any appropriate paperwork supporting these changes from medical professionals.

## 3. Definitions

- Work-related injury/illness – An injury or illness that arises out of and in the course of employment.
- Injury – A wound caused by an external force that affects a specific part of function of the body and has an identifiable time and place.
- Illness – Systemic infections, exposure to hazardous materials, repeated stress and strain, and/or other repeated exposures to conditions that result in harm or loss of function, but do not meet the definition of an injury.

## 4. Procedure

### 4.1 Pre-Injury Management

#### 4.1.1 Work Site Evaluation

Project sites and offices shall evaluate a location for the potential to cause an injury or illness. This evaluation must consider the following, at a minimum:

- The types of injury or illness that could reasonably occur under given site conditions;
- The location of emergency and non-emergency medical centers;
- The anticipated response time for local emergency services (e.g., ambulance, paramedics, site emergency teams, etc.);
- The presence of hazardous materials or conditions;
- The types of training needed for employees to respond to identified hazards;
- The type of training needed for first aid responders; and
- The type of first aid supplies required for potential response to site hazards.

#### 4.1.2 Risk Assessment

A written Work Activity Risk Assessment (WARN) health and safety plan (HASP) must be prepared for all field projects. The HASP must contain contact information, including maps and phone numbers, for the nearest emergency medical services/hospital location, as well as for potentially needed emergency services (e.g., fire department, police, ambulance) and for Workcare, ERM's medical services provider. Advance contact with ambulance services to ensure they are familiar with location, access routes, and hospital locations is advised in remote or new locations.

An Emergency Action Plan (EAP) must be prepared for all ERM office locations. Since ERM offices are typically located in well-populated urban centers, the location of specific emergency medical services locations are not required to be posted in the EAP; however, emergency contact

information for potentially needed emergency services, building management staff, and Workcare must be provided.

#### 4.1.3 First Aid Services

The availability and application of first aid services, including first aid kits, is discussed in Section 4.1 of ERM H&S Procedure S3-USA-019-PR (*Medical Services*).

#### 4.1.4 First Aid Responders

Expectations regarding the availability of first aid responders in both field and office settings are discussed in Section 4.1.1 of ERM H&S Procedure S3-USA-019-PR (*Medical Services*). Trained first aid responders should be designated in such a fashion that employees know who they are and how to contact them.

#### 4.1.5 Eyewash Facilities

If corrosive materials are used, eyewash and body flush facilities must be provided. Where possible, these should provide large quantities of clean water. The water source must be pressure controlled and clearly identified.

### 4.2 Post-Injury Management

#### 4.2.1 Transportation

When employees require urgent medical attention as the result of a work-related injury/illness, transportation shall be provided to the urgent care facility via ambulance or similar method (if a critical condition) or ERM vehicle. Employees should not be permitted to drive themselves unless safe to do so.

#### 4.2.2 Treatment of Critical Injury/Illness

In the event of a critical injury or illness, employees must be seen by a medical professional as quickly as possible. For purposes of this procedure, critical injuries shall include, but not be limited to:

- Uncontrolled bleeding or significant blood loss;
- Chest pains;
- Breathing difficulty;
- Known or suspected bone fractures;
- Known or suspected internal injuries;
- Known or suspected overexposure to chemical, biological, or radiological hazards;
- Severe electric shock or electrocution;
- Second, third, or fourth degree thermal, chemical, electrical, or radiation burns;
- Loss of consciousness; or

- Sudden behavioral changes, including confusion, disorientation, or aggression.

In these situations, an ERM employee should always accompany the injured or ill employee to medical care. The accompanying employee should contact Workcare, ERM's medical consultant, as soon as possible to alert them to the injury. Where necessary, Workcare's occupational physicians will provide peer-to-peer interaction with emergency room physicians to ensure appropriate care is provided to our employees. The accompanying employee shall also be responsible for maintaining contact with appropriate ERM management and H&S team members to alert them to issues relating to the injured/ill employee and their condition.

### 4.2.3 Treatment of Non-critical Injury/Illness

In the event of a non-critical injury or illness, employees must call Workcare's Incident Intervention service (available 24 hours per day, 7 days per week). When contacted, an occupational nurse or physician provides medical advice to the injured or ill employee, which may include a referral to a medical clinic. If referral is required, Workcare's occupational physicians will provide peer-to-peer interaction with medical clinic physicians to ensure the level of care and treatment is appropriate to the symptoms presented. The employee is also responsible for maintaining contact with appropriate ERM management and H&S team members to alert them to issues relating to their condition.

### 4.2.4 Workers' Compensation

A workers' compensation claim will be filed for each instance where work-related medical treatment is provided to ERM employees. The HR team will be responsible for filing these claims, and will be informed by Workcare whenever a referral to a medical clinic is made for an ERM employee. Additionally, HR staff will:

- Serve as a point of contact for the workers' compensation insurance carrier adjuster; and
- Work with ERM providers to coordinate disability benefits associated with work-related injury/illness.

### 4.2.5 Return to Work

Employee supervisors, after consultation with the Division HSSE Leader and the HR team, may assign an employee who is recovering from a work-related injury or illness transitional employment during their recovery period, if such employment exists. Transitional employment includes temporary modified, restricted, or light duty work covering the time from the injury/illness until the release to full duty by the doctor. Each case will be evaluated individually.

Application of any transitional employment must be documented in writing and signed by a medical doctor before any action can be taken. The change in status will only be allowed for the period of time designated by the doctor. The employee must continue to comply with all doctor-mandated appointments and treatment during this time. Any changes in duty status as a result of an appointment or treatment visit must be provided to the employee supervisor in writing.

At a minimum, and regardless of the employee's current case status (i.e., lost time, restricted duty, etc.), the employee's supervisor will maintain contact with the employee on a weekly basis

A written work release for full and unrestricted duty from a medical doctor is required before the injured/ill employee may return to their original job duties.

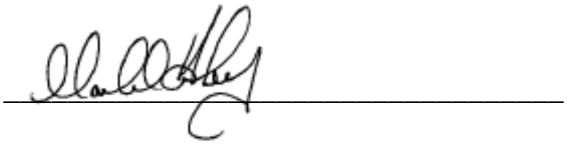
## 5. References

- ERM H&S Work Instruction S3-USA-037-WI1 (Injury/Illness Management Flow Chart)

**Document Control Information**

Original Effective Date: 8/5/14

Policy Approval by: Mark Hickey

Approval Signature: 

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | Revised and edited to meet new Global SMS requirements and update procedures | 8/5/14 |
| All | Changed "Case Management" to "Injury/Illness Management". | 12/30/14 |

## 1. Purpose and Scope

This procedure is designed to ensure that ERM employees have formally considered the potential risks associated with the use of cutting tools, including but not limited to knives, shears, snips, scissors, core sleeves, tubing cutters, pruning tools, paper cutters, and hand-held electric saws. The procedure applies to all ERM work activities which involve the use of these tools within offices, equipment storage areas, or field trailers as used by ERM employees, contractors, and consultants.

## 2. Roles and Responsibilities

**Partner in Charge (PIC)**: Responsible for the following elements:

- Ensure this procedure is implemented, understood, and followed by employees under their charge and working on their projects;
- See to the performance of periodic inspections in the office and at projects to identify appropriate tools and procedures; and
- Correct any deficiencies in the implementation of this procedure as identified by the Division Health and Safety (H&S) Leader or other staff member.

**Project Manager/Branch Manager**: Responsible for the following elements:

- Perform observations of ERM work processes to assess employee compliance with this procedure;
- Stop work where deviations from this procedure are observed; and
- Correct, in conjunction with the PIC and the Division H&S Leader, any observed deficiencies in the implementation of this procedure.

**Employees:** Responsible for the following elements:

- Perform all work in accordance with this procedure; and
- Formally assess risks from use of cutting tools and take actions to effectively manage identified hazards prior to starting work.

**Division H&S Leader**: Responsible for the following elements:

- Evaluate implementation of this procedure during health and safety plan reviews and project audits; and
- Communicate identified deficiencies to the PIC.

## 3. Definitions

**Fixed open bladed knife:** Any knife where the normal use and position of the tool creates an unguarded knife or razor edge.

## 4. Procedure

### 4.1 Hazard Assessment

ERM requires that hazard assessments be performed for all activities, including those that involve the use of cutting tools. A Job Hazard Analysis form (S1-ERM-002-FM4) should be used to identify and document the hazards and associated control measures, including selection of the most appropriate cutting tool(s) to be used. When considering how to manage cut/puncture hazards associated with cutting tool use, a recommended best practice is to apply the following control measures listed in order of priority:

- Eliminate or avoid the hazard.
- Reduce the hazard by using safer cutting tool(s)/equipment or other engineering controls.
- Limit who is permitted to use cutting tools and/or locations they are sued, and train those employees only.
- Train all employees on the proper use of cutting tools.
- Utilize personal protective equipment (PPE) such as cut-resistant gloves. This should be considered the last line of defense and used in conjunction with other control measures.

### 4.2 Cutting Tool Selection

- Use the cutting tools designed for the job.
- Do not use inadequate, inappropriate, or unsafe tools simply because they are available. Take the time to acquire the correct tool for the job.
- Use scissors/snips, safety cutters with guarded, concealed, or self-retracting blades; or other safety cutting devices without open or exposed blades whenever possible. Examples include the following:




Safety cutter for opening packages



Snips




Guarded utility knife





Concealed blade cutters

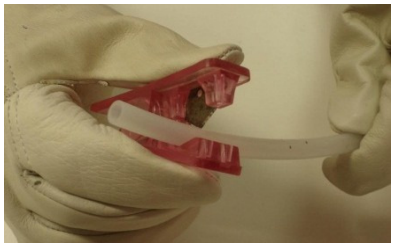



Sheet cutter/letter opener






Core sleeve cutters



Tubing cutter

- Fixed open-bladed knives (FOBKs) are dangerous tools, but they are used so routinely that their hazards are often underestimated or ignored. Examples include pocket knives (including Leatherman and similar multi-tools), utility knives, box cutters (including cutters with spring loaded blades), and X-acto knives.











The uncontrolled and unsafe use of FOBKs is a common factor in hand injuries (lacerations) reported within our industry. **For this reason, FOBKs are prohibited from being used unless they are determined to be the safest tool for the task**. This determination should be made in consultation with the PIC, Project Manager/Branch Manager, and Division H&S Leader. Note that some clients prohibit the use of FOBKs altogether; therefore, client expectations must be clearly known and understood.

- If FOBKs are to be used, their safe use must be documented in written job procedures (e.g. JHA), the blade must be locked when in use and protected when not in use, personnel must have received training on how to correctly and safely use the tool, and cut-resistant gloves must be worn during use. FOBKs that cannot be locked in the open position shall not be used.
- Kitchen knives used in designated kitchen areas for food preparation may be used without the requirement to document in a written job procedure or provide formal training; however their use should be consistent with other guidance outlined in Section 4.3.
- Paper shears pose a significant hazard and should only be used if no practicable alternative exists; a JHA has been prepared and reviewed by the H&S team; and only trained employees are permitted to use it. The procedure must include locking the shear in the closed position when not in active use, and preferably includes the use of cut-resistant gloves unless safety interlocks are incorporated into the design. Options to purchase shears with safety interlocks must be considered at the first available opportunity



### 4.3 Safe Cutting Tool Use

- Train personnel in the correct way to use cutting tools prior to use.
- Use the designated safest cutting tool for the task and ensure it is sharp.
- Inspect cutting tools prior to use to confirm they are in good condition and safe to sue.
- **Always cut away from your hands and body**, keeping all body parts behind the blade and out of the "line of fire".
- Ensure you and other people in the area are out of the “line of fire” of the cutting tool’s path/potential path (in event of tool slippage, etc.).
- Put the object to be cut in a vise or on a flat surface, or use another tool to hold the object instead of holding in your hand or against your body (e.g., do not hold the object to be cut against your thigh).

- If the cutting tool is designed to be used with two hands, then it must be held with two hands. Saws-alls and drills are designed to be held with two hands, but are commonly incorrectly held with one hand during use.
- Use the buddy system. Utilizing a co-worker to assist in cutting activities can often reduce hazards associated with cutting lumber, tubing, and piping.
- Always return cutting tools to an appropriate storage location. **Do not place cutting tools on the ground!**

### 4.4 Personal Protective Equipment

Gloves that are appropriate for specific task hazards and, in good condition, can prevent some injuries; however, gloves (and all PPE) are considered as a final barrier against potential injury. Gloves must be used in conjunction with other control mechanisms (see Section 4.1) as well as the appropriate cutting tool for the job.

Specific glove requirements for tasks to be performed on site must be stated in the JHA or equivalent written job procedure. Common glove types and levels of protection are as follows:

| Glove Type | Protects From | Common Uses |
|---|---|---|
| Cotton, canvas cloth | Minor abrasions, chafing | Light duty (e.g., sweeping) |
| Leather, Aramid fiber, HexArmor™ | Abrasions, punctures, minor lacerations | Handling rough, rigid or abrasive materials; working with hand and power tools (unless they may get caught) |
| Leather reinforced with metal or metal stitching | Abrasions, lacerations | Handling sharp-edged tools/equipment |
| Metal mesh, Stainless Core (stainless steel woven into material), Kevlar, HexArmor™ | Lacerations and abrasions associated with glancing/slicing cuts | Using cutting tools; handling sharp/jagged tools and materials. |
| Nitrile-coated knit gloves | Chemicals, punctures | Clearing demolition and other uncontrolled debris |

More information may be obtained from your local PPE provider or at the links below:

- http://www.grainger.com/Grainger/static/cut-resistant-glove-301.html
- http://rs.nationalsafetyinc.com/company_79/Understanding%20Cut%20resistance.pdf

Cut-resistant gloves must be worn when using FOBKs, at a minimum.

When several hazards are encountered that one glove will not provide adequate protection against, gloves should be layered accordingly. For example, when handling contaminated materials with sharp edges, inner nitrile gloves may be worn to protect against chemical hazards with outer cut-resistant gloves to protect against cuts and abrasions.

Protective gloves must be inspected before each use to ensure that they are not torn, punctured, or made ineffective in any way (e.g., wet/water soaked or dirty gloves can become slippery).

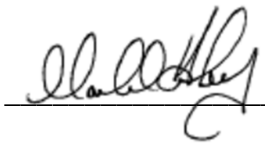
## 5. References

- ERM Form S1-ERM-002-FM4 (Job Hazard Analysis)

**Document Control Information**

Original Effective Date: 10/23/13

Policy Approval by: Mark Hickey

Approval Signature: 

**Revision History**

| Section | Reason for Revision | Date |
|---|---|---|
| All | New document. | 10/23/13 |
| All | Reformatted document. Minor edits for clarity. | 6/1/15 |



# ERM
# Global Contractor Management Program

2013

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# Global Contractor Management Program

## Frequently

## Asked

## Questions

# Introduction

We bring value to our clients by utilizing the best contractors and suppliers available, and by making sure that they share our commitment to health, safety and legal compliance, regardless of where we're working around the world. Contractors and suppliers must meet and maintain the standards we set in order to work on ERM projects or in ERM offices.

ERM's Global Contractor Management Program includes the use of an outside vendor, Pacific Industrial Contractor Screening (PICS). PICS is a global company that gathers, verifies, and maintains updated information about suppliers and subcontractors based on the requirements of ERM.

By partnering with PICS, we have streamlined our qualification process, reduced the potential for risk, and increased our ability to respond quickly to our client's needs. This will improve our overall performance as a company, and our ability to compete in the global marketplace.

For those ERM BUs where the updated Contractor Management Program has been rolled out, and the use of our third party vendor, PICS, is in place; all contractors engaged by ERM must be registered with PICS and "Green Flagged", prior to use.

The term "Contractor" is used throughout this and other Global Contractor Management Program related documents to refer to any number of entities that ERM uses both on projects, and in ERM offices. A "contractor" in this context, is loosely defined as a person or company engaged by ERM for work or services billed to a project, or work or services for ERM in an ERM office (e.g. electricians or plumbers)."Contractor" may include the following: Contractors, sub-contractors, consultants, sub-consultants, vendors, and suppliers.

Currently, companies that provide a professional service to ERM such as accounting, legal or professional services, travel planning, taxis, etc., or who provide a supply service to ERM offices, such as non-operated equipment rental, coffee vending, food vending, water cooler vending etc. do NOT have to be qualified in the PICS system in order to provide services to ERM.

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## Frequently Asked Questions

### *How does it work?*

ERM submits a detailed list of requirements to PICS and they gather and verify information from our contractors to ensure that they conform to those requirements. Information is then updated by PICS on a regular basis.

PICS contacts the supplier or subcontractor, obtains the information required to make a determination, and 'flags' the contractor based on whether or not they meet the standards ERM has set for safety, insurance, ABC compliance, and others.

If a contractor doesn't meet all of our standards initially, PICS customer service reps will work with the contractor to help them meet the standards we set if they are interested in getting approval.

### *One of my sub-consultants got a letter from PICS. She is an anthropologist and only produces written documents from her office. My contractor is a farmer and he got a letter from PICS. All he does is cut the grass on one of our client's sites. Why should these contractors/suppliers have to be qualified through the PICS system?*

In order to work for ERM contractors need to be prequalified in the PICS system similar to the way they were qualified when ERM handled the process internally. This is true whether they are implosion contractors used on demolition sites, or laboratories analysing samples or sub-consultants providing written reports. PICS gathers and maintains a host of information annually about our contractors.

This information includes, but is not limited to: proof of insurance, agreement to abide by our Code of Business Conduct and Ethics including our Anti-Bribery and Corruption policy, answers to legal questions, sustainability practices and of course, health and safety programmes and statistics. The specific criteria that need to be met depends on various factors, including the size of the contractor, their reporting requirements, and what they do (their safety risk factor). Different contractors have different criteria.

By requiring all of our contractors to be qualified through PICS, we streamline our management process, reduce our overall risk, and increase our ability to meet our clients' needs on a global basis.

### *Sometimes we have contractors work in our office space. Do these contractors need to be qualified in the PICS system?*

If a contractor is brought in to work in an ERM office space by the landlord or their representative as part of the lease agreement, the contractor does NOT have to be qualified in the PICS system prior to use.

If a contractor is brought in to work in an ERM office space to perform work outside of the landlord's obligations, for example they are engaged by ERM to service a fan in an IT room for which ERM is responsible, the contractor should be qualified in the PICS system prior to use. This is required for all of the same reasons that contractors on ERM jobsites are required to be prequalified before working on an ERM site. If a contractor is required to be in PICS because of the services they are providing to ERM, it doesn't matter whether that contractor is working on an ERM project in the field, or from an ERM office.

Every attempt should be made to eliminate the need for any contractors to be engaged directly by ERM within the office space through negotiations with the landlord, or other methods.

If there are no other options than for ERM to hire a contractor directly to work in the office, then that office should either find qualified contractors already in the PICS database, or qualify a new contractor in PICS before they are needed.

At this time, companies that provide a professional service to ERM, such as accounting, or legal advice: or who provide a supply service to ERM offices, such as coffee vending, food vending, water cooler vending etc. do NOT have to be qualified in the PICS system in order to provide a service to ERM.

### *What are the benefits to contractors for registering in PICS? What can I tell them they get for their registration, other than qualification to be considered for work with ERM?*

**Contractors can:**

Market the entire range of their services and service locations to all clients in PICS (e.g. they may only do lab work for ERM in Walnut Creek, but their company does sampling, surveying, and GPR in 10 states and we don't use them for any of that, yet). ERM is only 1 of 1000's of clients who require the use of PICS to qualify their contractors. The PICS database is the first place those companies search when they are trying to find qualified subs.

Market their services to ALL ERM offices around the world (they may do work in Northern California for ERM's Walnut Creek office, but 10 other ERM offices around the world may have work going on in Northern California and be looking for contractors).

Bid for work on a level playing field (All ERM contractors go through the process. Never have to bid against low-ball bidders with no safety programs and low insurance capacity).

PICS offers unlimited data storage for company records (Arrived at a client site and find that required paperwork on workers is missing? Download training records, Health and Safety data, insurance certificates, etc. from any device with access to the internet).

### *If a contractor is used by more than one ERM BU, does the contractor need to connect to multiple ERM locations (and potentially pay additional fees)?*

Some contractors, like laboratories, may work for many ERM BU's from a geographical location. These contractors will be qualified under a single ERM Global Client, so that they may be used by any ERM BU, regardless of location.

If a contractor works in more than one country, for more than one ERM Business Unit, it will be necessary for them to link to more than one ERM client (BU). The reason for multiple links is that different ERM BU's have different regulatory requirements. A contractor must comply with regulatory requirements in each country in which they work, and therefore their information must be verified against each country's requirements. This takes additional time and resources.

Because PICS utilizes a tiered-fee structure, a contractor who registers with multiple ERM BU's could incur some additional fees, though these fees are less than the initial registration fees.

### *What happens with contractors in countries where ERM does not have an office? How does PICS qualify these contractors?*

PICS collects similar information from all contractors, regardless of location, including health and safety data, insurance information, etc. (see last page of FAQ for full summary). Companies are required to have their insurance provider verify coverage and whenever possible, all other information collected is verified using available public records.

### *Will all ERMers have access to PICS or will this be like Salesforce where only licensed users have access?*

PICS is a web-based interface and will be available to anyone at ERM who needs to find a contractor who is qualified to work on ERM projects, or who wants to have a contractor added to the list of approved contractors. ERMers requiring access to PICS will need to be registered as users and will receive password protected access to the system.

To obtain a username and password, contact your supervising Partner and have them make the request through the BU's Account Manager with PICS.

### *Will I be able to query a listing of businesses in a certain geographic area that do a certain type of work? For example, can I easily get a list of excavation contractors with $10M in insurance in Sydney, or Chicago, or London?*

Absolutely! Contractors already in the PICS system can be searched by a number of criteria including location, trade, insurance limits, pre-qualification to work on specific client sites (such as our Global Key Clients), etc.

### *What is the status of the contractors that were previously approved to work for ERM under an older qualification process?*

In BUs where the updated Global Contractor Management Program has been rolled out, all of the contractors approved to work for ERM prior to the rollout will be required to register with the PICS system in order to work on future ERM projects. If any of our contractors are already PICS members, they will only have to resubmit ERM specific information, such as the agreement to comply with ERM's Anti-Bribery and Corruption Policy, etc.

### *How do I find out if a contractor is already qualified to work for ERM under the PICS system?*

Log into the PICS system at www.picsauditing.com with your assigned username and password using Internet Explorer. You can look up contractors by name, or area, or any number of other criteria to see if they are already PICS subscribers.

The simplest way to do so is by using the search box at the top-center of the Dashboard. Begin entering the contractor's name and a list of contractors will pop-up as you type. Select the contractor you wish to review and you will be taken to the contractor's home page where you can view their status and every piece of information collected from the contractor.

If the contractor does not appear in the "Contractor List", it is an indication that the contractor has not yet registered in PICS, and associated themselves with ERM.

If this is the case, you can search for a contractor in the greater database by pulling down the "Contractor" menu, selecting "Search for New" and entering the parameters of your search.

### *How do I get a contractor qualified to work for ERM with PICS if they are not already in the system?*

If a contractor is not already in the PICS system, there is a simple way to get started with the process by directing the contractor to the PICS website at www.picsauditing.com. You could also sign into your account with PICS, and enter a Registration Request using the contractor's name, a contact at the company, a phone number, and an email address for the contractor. Finally, you may call your local Account Manager and give them the contractor information. Their contact information can be found on your Dashboard page in the left-hand column in the "PICS Contacts" box

The contractor is contacted by a PICS customer service rep who informs them that ERM wishes to qualify them through PICS to work on ERM projects. PICS walks them through the process of submitting their information, assisting them as needed. Once all of the required information is submitted, PICS will 'flag' the contractor within 48 hours (see *How is the contractor "Flagged?*). ERM requires that all contractors that fall into the "high" safety-risk category submit their safety programs to PICS for examination by a PICS safety professional to ensure that all of the sections required by regulations are included in the manual based on the trades the contractors have selected. Manual audits of safety programmes required for certain 'high risk' contractors may take an additional 7 business days or more to complete, based on the response from the contractor.

### *What are the specific requirements for a contractor to become qualified to work for ERM?*

There is a list of specific global qualifications that a contractor must meet posted on the Contractor Management Program page on Minerva and a list of flaggable requirements on the PICS Dashboard, and is accessible to anyone who can log into the account. There may be BU specific requirements in addition to the Global requirements and these can be found by contacting your PICS Account Manager who can give you a detailed breakdown of all of the requirements.

It is also worth noting that ERMers will be able to search for contractors who are already pre-qualified to work for many of our Key Clients, but who are not yet approved to work for ERM.

ERM's overall requirements for qualification are substantially the same as they have been in the past, however the manner in which the data is collected, screened, and updated has been greatly streamlined.

### *How long does the process take on average?*

**The process is dependent on the contractor submitting the information that ERM has requested.**

In most cases the contractor fills out an extensive online questionnaire, or Pre-Qualification Form (PQF) that covers most of the information required. This can take anywhere from 2 to 4 hours on average. The contractor will then submit copies of his safety programme (if required), insurance information, and other ERM required paperwork either electronically, by fax, or by mail. In some cases, information can even be gathered by a PICS CSR by phone .

For low and medium risk contractors once the contractor has submitted the required information to PICS, PICS will make a determination within 48 hours and post the results to

the PICS website. Manual audits of a contractor's safety programme (for high risk contractors only) may take up to an additional 7 business days to complete depending on the response of the contractor.

### *What is the shortest possible time it could take for a contractor to become qualified through PICS to work for ERM?*

For low and medium risk contractors PICS guarantees to make a determination within 48 hours of the contractor submitting all of his information and documentation. If manual audit is required, add 24 hours.

### *What does the contractor need to do to start the process?*

If a contractor is new to ERM, he can go to the PICS website (www.picsauditing.com), register his company, and select ERM as a link. PICS will then contact him and begin the process of qualification. Or, a contractor can be directed to contact a PICS Customer Service Representative directly at a number found on your Dashboard after signing in to the PICS website.

### *How much will it cost the contractor on average?*

PICS charges the contractor based on the services required by its clients. In ERM's case, we require at least two services be used; DocuGuard, which maintains the contractors updated documents such as H&S logs; and InsurGuard, which maintains updated insurance information. For high risk contractors, ERM also requires a Manual Audit, which is a more detailed look into the contractor's safety and compliance programmes carried out by PICS safety professionals.

For low and medium risk companies, the annual fee is approximately $150.00 US. High risk companies that require a manual audit are charged an additional $399.00 US per year. For contractors not already in the PICS system, there is a one-time registration fee of $200.00 US. Rates are adjusted by location, but are generally comparable to the rates outlined above.

**This means that the maximum amount a company will pay if they are not already PICS subscribers is approximately $750.00 US for 1st –year high risk companies, and $350.00 US for 1st – year low and medium risk companies. $150.00 US (Medium and Low Risk) and $550.00 US (High Risk) annually for existing PICS subscribers.**

The contractor is entered into the PICS database, and any member company can search out the contractor based on what they do, their safety record, insurance coverage, etc. The contractor then has the choice of whether or not they want to be linked to any company that searches them out.

### *How is the contractor ranked for risk? What is a 'high risk' contractor?*

Each contractor has the ability to clearly define the services they offer and where those services are provided in the trade section of the pre-qualification form. PICS then does a full analysis of the contractor/suppliers trades. This risk assessment is repeated annually or as requested by ERM.

The following questions are asked each contractor during the registration process, in addition to the trade-related questions.

1. Can all the work you perform or the services you provide be conducted from an office at all times?
   Yes=Low, No=Medium
2. Do any of your employees ever use hand, power, pneumatic or hydraulic tools (i.e. drills, circular saw, jackhammer, grinders etc.)
   Yes=Medium, No=Low
3. Are your employees required to wear any personal protective equipment (PPE) (i.e. safety shoes, safety glasses, fire retardant clothing, hard hat, gloves hearing protection, etc.)?
   Yes=Medium, No=Low
4. Are you required to complete or maintain a "permit to work" (i.e. confined space permit, hot work permit, working at height permit, etc.) in order to conduct ANY of your operations?
   Yes=High, No=Medium
5. Do you use any mobile work equipment to carry out your operations (i.e. cranes, forklifts, bulldozers, bobcats, front-end loaders, etc.)?
   Yes=High, No=Medium
6. Regardless of the client site you are registering for, does your company at ANY TIME perform any of the following: abatement/remediation (asbestos/lead), confined space, demolition, lockout/tag-out, work at heights, mobile crane operation, electrical work, hazardous waste operations, hot work, work on, over or under water, rigging or trenching and excavations?
   Yes=High, Medium=No
7. What level of hazard exposure do your services place on employee health & safety? Please rank yourself below. This ranking is based on the job processes you perform and the operations you conduct and NOT the number of accidents/incidents you have.

Low – e.g. office janitorial, offsite/office engineering, lawn care/lawn maintenance, IT (information technology, software development, office equipment repair).
Medium – e.g. shipping and receiving activities, landscaping/weed abatement, pest control
High – e.g. abatement/remediation, confined space, demolition, lockout/tag-out, work at heights, mobile crane operation, electrical work, hazardous waste operations, hot work, work on, over or under water, rigging or trenching and excavations.

Should a contractor or ERM employee disagree with the ultimate categorization, the discrepancy is addressed by a PICS Safety Professional and a phone interview ensues.

Please contact your Account Manager for a Risk Category Review if you think it is appropriate. The person to contact can be found listed on the Dashboard when you first sign into PICS.

### *How is the contractor "Flagged"? (Red, Amber or Green)*

A contractor's record in the system will be 'flagged' based on an evaluation of the information they provided compared to ERM's minimum criteria. Green flags are given to contractors who have submitted all of the required documentation, and who meet the minimum standards that ERM has set in all of the flaggable categories. They could potentially be used on any ERM project for which they were otherwise qualified.

Amber flags are given to contractors for two reasons. Either the contractor has not yet turned in all of the required information to make a determination in a particular category, or the

contractor does not meet an ERM criterion that could be updated or changed by the contractor.

For example, additional insurance *could* be obtained and therefore a company would be flagged Amber for not meeting minimum insurance requirements, however the past reporting of a fatality could not be changed or updated by the contractor, and they would be flagged Red for this criteria. The PICS website will allow ERM users to see exactly what information may be missing for any contractor in the system.

A Red Flag is given to a contractor if they have not submitted all of the ERM specific documents (e.g. has not read and accepted ERM's Anti-Bribery and Corruption Policy or our Code of Business Conduct and Ethics). A Red Flag is also given to contractors who do not meet one or more of the other requirements set by ERM as minimum standards (e.g. no fatalities in last 5 years) that cannot be changed or influenced by the contractor, or who has significant negative feedback given on performance.

### *Can a contractor be qualified for some tasks and not for others?*

No. The PICS system evaluation is a baseline evaluation of the overall risk a contractor represents to ERM based on an evaluation of safety programmes, safety record, regulatory compliance, insurance capabilities, and willingness to abide by various ERM business practices in order to work for ERM. If a contractor meets or exceeds the minimum standards set by ERM, they may be considered for use on ERM projects.

The PICS system does not evaluate the capability of a contractor to perform the work he is hired for. It is not a substitute for the knowledge, judgment, and discretion of the Partner-in-Charge or Project Manager. Some contractors may be better suited to some jobs, and not others. The accountability still rests with the Partner-in-Charge to make the proper decision regarding the use of any contractor hired to work on an ERM or client project.

### *I submitted a contractor and he is red flagged. WHY?*

Sign-in to PICS, search for the contractor, and review the information presented in the contractor's record. The deficiencies are detailed in the record. If the contractor is "Red Flagged", either the contractor has failed to provide required information, or the contractor has submitted information, but has not met one or more of the minimum standards set by senior management at ERM in a category that cannot be amended or changed.

### *If I want to use a contractor who is Amber or Red Flagged, what are my alternatives?*

If a contractor is Amber or Red flagged, and you believe they should still be considered for approval, there is an established process.

There are essentially two sets of criteria used when qualifying contractors. The first set has been determined at the highest levels of ERM management to be Global Go/NO-GO criteria. These are the requirements that must be met. Examples of these criteria are: fatal accidents within the last five years, refusal to acknowledge and comply with ERM's Code of Business Conduct and Ethics or Anti-Bribery and Corruption Policy, or active trade sanctions against the company.

**If a contractor does not meet these criteria, that contractor may not be used by ERM.**

The second set of criteria can be evaluated for a variance. These include legal issues, health and safety issues, and regulatory citations.

The Regional CEO has the authority to override decisions regarding various legal issues, such as judgments or suits against the contractor.

The BU Managing Partner, in consultation with topic specialists (e.g. health and safety, insurance, and legal), can decide to override an Amber or Red Flag for such things as H&S issues, historical incident rates, regulatory citations and negative Partner-in-Charge feedback.

It is important to note that overrides of Amber or Red flags (or what's called a 'forced flag') are **NOT** job specific. If a contractor's flag is forced green, it will remain so until the next review period, or for a specified shorter length of time. Consequently, a contractor who is forced green for one project would be eligible to work on ALL ERM projects within the period of time the flagged was forced. A sufficient business case will be needed to convince the RCEO or BU Managing Partner to accept the increased risk of forcing a green flag.

### *Who can request a variance, and to whom should the request be directed?*

**Only ERM employees can request a variance for an Amber or Red Flagged contractor (see question above for all allowable variances).**

**Variances must only be submitted after ALL of the required information has been submitted and evaluated by PICS.**

Variances are granted to a contractor for a period of time, and not on a job by job basis. A business case for the variance request should be submitted to the Global Compliance Officer for compliance issues; the Global Insurance director, with a copy to the BU Legal Counsel for legal or insurance issues; and the BU H&S Manager for health and safety variances.

Please submit the request in email form with the words, "PICS Variance Request" in the subject line, and the message body. Once the request has been reviewed by the appropriate people, recommendations will be sent to the requester's BU Managing Partner/Director for their consideration. If a variance is approved, the contractor's flag will be forced green for a period of up to 1 year or less.

### *What information should the Variance Request include?*

The body of the email should include the contractor's name, their PICS Contractor ID Number, (which can be found on their contractor page in PICS), what services the contractor provides, the regions in which the contractor works for ERM, and your business case for granting the specific variance requested.

### *If a contractor remains Amber or Red Flagged after a review by senior management, is there a process to appeal the decision?*

The Global Go/No-Go criteria, along with the secondary criteria were determined at the highest levels of ERM Management. The decision to override the secondary criteria requirements has been placed with the BU Managing Partners, so that the overall level of risk to ERM can be consistently and adequately reviewed and evaluated. Once a Regional CEO or BU Managing Partner has determined the status of a contractor's flag, the contractor will have that flag until that contractor has conformed to the baseline criteria set out by ERM.

### *If a Green Flagged Contractor is used on an ERM job, and has serious performance issues outside of the PICS evaluated criteria, what can/should I do?*

If a Green Flagged contractor is used on a job, and their performance is such that the PIC or the PM feels that they should be barred from further use by ERM, they should send a formal variance request to the appropriate BU Managing Partner, with the subject stating "PICS Variance Request", and the body containing the reasons for barring future use. The BU Managing Partner will make a decision regarding the contractor after consultation with the appropriate people, and can decide to force the contractor's flag to RED status.

### *What happens if a contractor is currently working for ERM at a client's site and their status changes to other than Green while on the job?*

If an ERM employee finds that a contractor who is currently working for ERM, or is scheduled to work for ERM is not Green Flagged in the PICS system, they should immediately seek a variance through the variance process highlighted above in the question "*If I want to use a subcontractor who is Amber or Red Flagged, what are my alternatives*". A determination will be made by either the BU Managing Partner, or the Regional CEO, as appropriate.

### *Will Partners-in-Charge be able to make exceptions (force a flag) on a per project basis?*

No. The category rankings: Global Go/No-Go, legal and secondary criteria and their associated risk to ERM were determined at the highest levels. In order to ensure that the level of risk to ERM is managed consistently, a Partner-in-Charge will be able to request a review by the Regional CEO or the BU Managing Partner depending on the circumstances of the Red Flag.

## *PICS Gathers Information On:*

Legal Status

Trade sanctions
Conflicts of interest (governmental employees as officers of company, relatives etc.)
Recent or pending law suits.
Criminal investigations/convictions of principals for fraud, terrorism or money laundering
Officers/directors subject to blocking, seizure, forfeiture orders for money laundering, etc.
Open or unresolved regulatory citations, fines, or notice of violations.

Insurance Coverages

What type and how much insurance does the contractor have?
Proof of insurance for all insurance policies updated annually by PICS

Business Ethics

Understanding and acceptance of ERM's Code of Business Conduct and Ethics
Understanding and acceptance of ERM's Anti-Bribery and Corruption Policy

Sustainability and Reporting

Various criteria related to "Sustainability" used in ERM reporting to various global entities

Health and Safety (different standards depending on risk and other factors)

Statistical Reporting data
Fatalities in the past 5 years
Health and safety programs, plans, training, and policies.

## YOUR TRIP TO:

Lourdes Hospital

**26 MIN | 21.9 MI**

**Trip time based on traffic conditions as of 2:09 PM on August 18, 2016. Current Traffic:** Light

**1.** Start out going **west** on Taylor Rd/County Hwy-20/County Hwy-606 toward Davis Hill Rd.
Then 0.57 miles — 0.57 total miles

**2.** Taylor Rd/County Hwy-20/County Hwy-606 becomes E Front St.
Then 0.53 miles — 1.10 total miles

**3.** Turn **left** onto 5th Ave/NY-17C. Continue to follow NY-17C.
Then 1.26 miles — 2.37 total miles

**4.** Merge onto NY-17 E/Southern Tier Expy E toward **Binghamton**.
Then 16.41 miles — 18.78 total miles

**5.** Merge onto NY-201 S/State Highway 201 via EXIT 70S toward **Johnson City**.
Then 0.95 miles — 19.72 total miles

**6.** Take the **Riverside Dr** exit toward **Floral Ave**.
Then 0.10 miles — 19.82 total miles

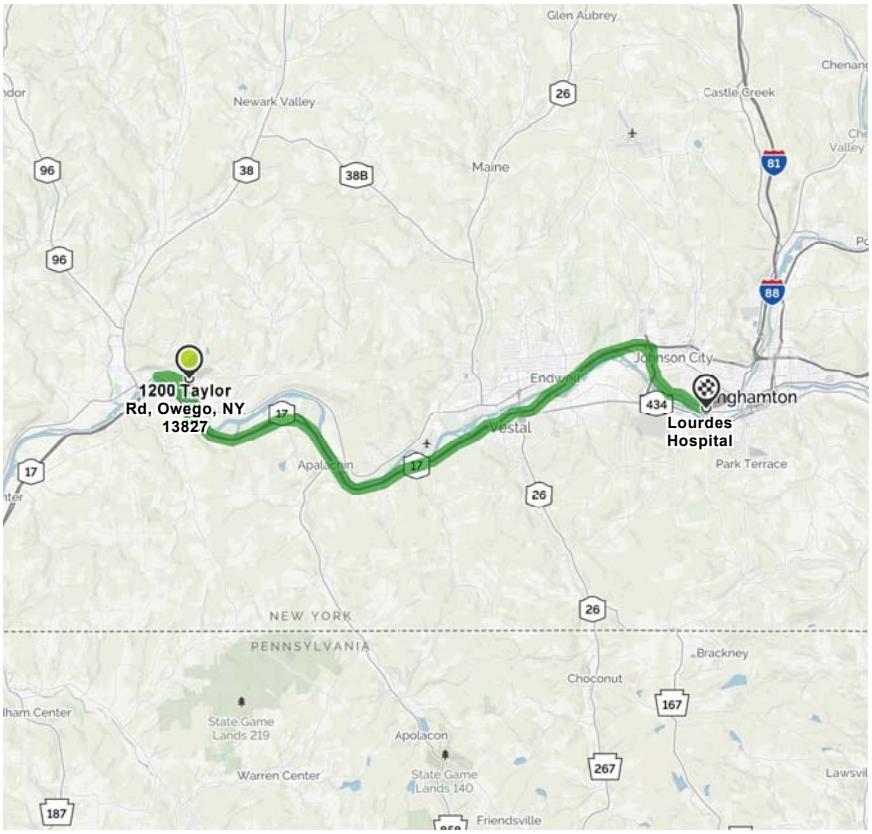
**7.** Keep **left** at the fork in the ramp.
Then 0.12 miles — 19.94 total miles

**8.** Enter next roundabout and take the 2nd exit onto Riverside Dr.
Then 1.93 miles — 21.87 total miles

**9.** Lourdes Hospital, 169 RIVERSIDE DR is on the **right**.
*Your destination is just past Lourdes Hospital Dr.*

*If you reach Rotary Ave you've gone a little too far.*

Use of directions and maps is subject to our Terms of Use. We don't guarantee accuracy, route conditions or usability. You assume all risk of use.



# APPENDIX D ISCO AND ISCR TREATABILITY TEST RESULTS

*VIA E-mail*

December 14, 2023

**Environmental Resources Management**
5784 Widewaters Parkway
Syracuse, NY 13214

Attn: Rob Sents, P.G.

**RE: ISCO and ISCR Treatability Test Results**
Former Chemical Storage Area, Sanmina-Owego Facility
Owego, New York

Dear Mr. Sents:

XDD Environmental (XDD), doing business as Loureiro Engineering Associates, Inc., is pleased to provide Environmental Resources Management (ERM) with the treatability test results in support of activities at the Former Chemical Storage Area, Sanmina-Owego Facility located in Owego, New York (site).

## 1.0 Introduction

XDD conducted a series of treatability tests on site media using three treatment technologies: two in situ chemical oxidant (ISCO)-based technologies including alkaline activated persulfate (AAP) and hydrogen peroxide (HP), and a third in situ chemical reduction (ISCR)-based technology using zero valent iron (ZVI). These are robust technologies capable of destroying the site contaminants of concern (COCs), primarily volatile organic compounds (VOCs). Although polychlorinated biphenyls (PCBs) are also present at the site, the focus of the treatability testing was to evaluate the effectiveness of destroying the VOCs. The current site strategy for remediation consists of excavating the source area for offsite transportation and disposal (T&D). ERM is considering treatment options for reducing project costs by changing the T&D hazardous waste class or changing the remedial strategy to in situ destruction. The goal of the treatability testing was to determine if soil concentrations can be reduced sufficiently using the proposed treatment technologies to warrant a change in the remedial site strategy. For a change in T&D waste class, treatment time would need to be relatively fast (on the order of days) and therefore, the kinetics of ISCO are such that it would be more applicable than ZVI, with HP having faster kinetics compared to AAP. For in situ destruction, ERM has indicated that the treatment time would not need to be as fast and therefore, all three technologies would be appropriate.

## 2.0 Scope of Work

The bench testing was conducted using a bulk soil sample and groundwater collected from the source area in the vicinity of the highest VOC impacts. Soil and groundwater used in the bench-scale testing were collected by ERM and upon arrival at XDD's laboratory, the soil was homogenized as efficiently as possible to minimize volatilization. ERM submitted baseline soil samples to Alpha Analytical for the analysis of VOCs using United States Environmental Protection Agency (EPA) Method 8260, toxicity characteristic leaching procedure (TCLP) VOCs using EPA Method 1311, and polychlorinated biphenyls (PCBs) using EPA Method 8082.

The soil and groundwater were stored at 4 degrees Celsius (˚C) until test setup. All tests were conducted using between 1 and 2.5 pore volumes of groundwater in contact with soil in individual batch reactors. The soils collected for the treatability were already saturated with 1 pore volume of groundwater. The AAP testing required an additional 1.5 pore volumes (2.5 pore volumes total) of site groundwater in contact with soil in order to provide sufficient water for the dissolution of the oxidant. The ZVI testing was conducted on the saturated soils as received (i.e., no additional groundwater was applied to each batch reactor). The batch reactors were maintained at 20 degrees ˚C throughout the duration of the testing.

### 2.1 ISCO Bench Testing

The ISCO testing was conducted in two phases. The Phase 1 testing for AAP included a total oxidant demand (TOD) test and a base buffering capacity test, which determines the minimum amount of base (sodium hydroxide) required to elevate the pH of the oxidant in contact with site media to 10.5 or greater. A pH of 10.5 or greater is required for alkaline activation of the persulfate. Determining the optimal sodium hydroxide dose is required to minimize any post treatment pH adjustment, particularly in the case of lowering the T&D waste class, which would require a pH less than 12. The Phase 1 testing for HP included a stability test in which HP with and without the presence of a catalyst and/or stabilizer was evaluated. The goal of this testing was to determine the optimal dosing of catalyst / stabilizer, if needed, such that the half-life of HP is long enough to have sufficient contact time for COCs destruction.

The Phase 1 tests help identify potential failure mechanisms with certain technologies (e.g., high oxidant demand, oxidant instability, high pH buffering capacity) and aid in refining oxidant dosage. Based on the Phase 1 results and following discussions with ERM, AAP was evaluated at one oxidant concentration, 8.7% by weight of dry soil (2.5 pore volumes of 175 grams per liter [g/L] AAP) in a Phase 2 contaminant destruction evaluation.

The Phase 2 test conditions were set up in individual batch reactors consisting of site soil and groundwater in contact with AAP. Controls were set up in the same manner but consisted of soil and groundwater only (no oxidant). Replicate batch reactors for the AAP and control test conditions were constructed for the evaluation of AAP treatment at two time points. Treatment durations of 14 days and 30 days were selected to determine the relative kinetics / treatment efficiency that could occur in a field application, the results of which would aid in the evaluation of the appropriate site remedial strategy.

All Phase 2 test conditions were set up on the same day. During set up, off gassing (e.g., oxygen, carbon monoxide, hydrogen sulfide, VOCs, etc.) was monitored with a calibrated 5-gas meter and recorded as part of the bench-scale testing.

After each treatment period, the soil from the controls and the AAP reactors were submitted to Alpha Analytical for the analysis of VOCs, TCLP VOCs, and PCBs. VOCs and TCLP VOCs were analyzed for the day 30 controls in duplicate. Refer to Section 2.3 for a summary of analyses.

### 2.2 Zero Valent Iron (ZVI)

The ZVI testing consisted of using a ZVI product with relatively fast kinetics (e.g., Hepure's Ferox Target) due to the limited timeframe for treatment. Unlike the ISCO testing, a phased approach (i.e., Phase 1 testing) was not required for the ZVI evaluation.

ZVI was applied at a dose of 3% by weight of dry soil, based on the manufacturer's recommendation and results from prior ZVI bench tests conducted by XDD at similar sites. Batch reactors were set up in a similar manner and at the same time as the AAP reactors for a contaminant destruction evaluation. During set up, off gassing (e.g., oxygen, carbon monoxide, hydrogen sulfide, VOCs, etc.) was monitored with a calibrated 5-gas meter and recorded.

ZVI treatment durations of 14 days and 30 days were evaluated, with a corresponding control for day 30 only. After each treatment period, soils from each test condition was submitted to Alpha Analytical for the analysis of VOCs, TCLP VOCs, PCBs, and iron using EPA 6010D. Refer to Section 2.3 for a summary of analyses.

### 2.3 Laboratory Analyses

The baseline and Phase 2 AAP and ZVI analyses are summarized below.

| Test Condition | | Soil VOCs | TCLP VOCs | Soil PCBs | Soil Iron |
|---|---|---|---|---|---|
| Baseline | | 1 | 1 | 1 | |
| **AAP** | | | | | |
| Day 14 | Control | 1 | 1 | 1 | |
| | 8.7% AAP | 1 | 1 | 1 | |
| Day 30 | Control | 1 | 1 | 1 | |
| | Control Duplicate | 1 | 1 | | |
| | 8.7% AAP | 1 | 1 | 1 | |
| **ZVI** | | | | | |
| Day 14 | 3% ZVI | 1 | 1 | 1 | 1 |
| Day 30 | Control | 1 | 1 | 1 | 1 |
| | 3% ZVI | 1 | 1 | 1 | 1 |
| **TOTAL** | | **9** | **9** | **8** | **3** |

## 3.0 Results and Discussion

### 3.1 ISCO Phase 1 Tests

#### 3.1.1 AAP

Base Buffering Capacity Test

The base buffering capacity test provides an evaluation of the amount of alkali solution required to maintain activation of AAP over the projected treatment period in situ. The quantity of base required to raise and maintain the pH above 10.5 was assessed (for alkaline activation of sodium persulfate) and calculated as grams (g) of sodium hydroxide per kilogram (Kg) of soil (mass loading).

Results from the base buffering capacity test are presented on Figure 1. Test results indicated that 3.35 g of sodium hydroxide per Kg of soil was required to elevate the pH to greater than the target pH of 10.5 by the end of the test. This is considered to be a moderate to high base buffering capacity. A field AAP application design needs to consider upscaling of the base buffering capacity results and take into account the additional alkali solution to neutralize the acid formed from the dissociation of the persulfate (2 to 1 sodium hydroxide to sodium persulfate molar basis).

Stability Test

The persulfate stability test and oxidant demand test (discussed in the next section) are performed simultaneously, using the same treatability test reactors. The persulfate stability test evaluates the persistence of AAP in the presence of site soil and groundwater in a series of test reactors. The test was performed with initial target concentrations of 3.7% (2.5 pore volumes at 75 g/L), 8.7% (2.5 pore volumes at 175 g/L), and 14.9% (2.5 pore volumes at 300 g/L) sodium persulfate dissolved in site groundwater in contact with soil. Controls consisted of unactivated persulfate at concentrations of 75 g/L, 175 g/L, and 300 g/L dissolved in distilled water only (i.e., no soil). The use of unactivated persulfate for the controls is a necessary component of the persulfate stability and oxidant demand tests for the calculation of TOD.

The stability test results are presented in Figure 2. The data show that the AAP in contact with soil decreased by approximately 57%, 63%, and 68% for the 3.7% (75 g/L), 8.7% (175 g/L), and 14.9% (300 g/L) AAP test conditions, respectively, by the end of the test period. The 14.9% (300 g/L) AAP test condition showed a dramatic drop in oxidant concentration after the first day of the test, which then steadily declined over the remainder of the test duration. The 3.7% (75 g/L) and 8.7% (175 g/L) AAP test conditions showed a relatively constant rate in decreasing oxidant concentrations over the test period. It is common to observe greater instability / oxidant auto-decomposition with an increase in oxidant concentration. The oxidant concentrations in the control reactors remained constant over the duration of the testing.

Total Oxidant Demand Test

Soil oxidant demand (SOD) typically refers to the demand on the oxidant from naturally occurring organics and minerals in uncontaminated soils. However, the TOD accounts for the oxidant consumed due to reactions with target sources (the contaminants) and non-target sources such as reduced minerals, naturally occurring organic compounds, and the activator (in the case of AAP). This report presents the TOD, which was calculated using the data generated from the oxidant stability test. The estimated TOD values are reported as the mass of oxidant (g) consumed per mass of dry soil (kg). For design purposes, the TOD of the selected oxidant and activator (as applicable) in the presence of a representative contaminated soil sample is used in the design of the field application oxidant loading.

Results from the TOD tests are presented on Table 1. The data show that after 14 days, the TOD values associated with 3.7% (75 g/L), 8.7% (175 g/L), and 14.9% (300 g/L) AAP were 16, 32, and 75 g oxidant per kg of soil, respectively. The TOD results are within the typical ranges observed compared to other sites XDD has tested. It is common to have TOD increase with increasing persulfate concentrations, as observed in the TOD values for AAP. pH remained above the target pH of 10.5 throughout the test duration.

### 3.1.2 Hydrogen Peroxide

Stability Test

The rate of decomposition of 4% and 8% HP in contact with soil was assessed under different stabilizing conditions. HP can decompose quickly in the presence of transition metals and often requires a stabilization agent to increase its longevity in the subsurface. Citric acid is a common chelating agent used to stabilize and extend the half-life of hydrogen peroxide in remedial applications. Test conditions included HP only (no stabilization agent), and HP with three concentrations of citric acid (25 millimolar [mM], 75 mM, and 150 mM citric acid). Control reactors consisted of HP and distilled water only (no soil). Residual HP was monitored at several time points.

The HP stability test results were evaluated by calculating the half-lives of HP for each test condition (refer to Table 2). All test conditions showed that HP decomposed quickly, resulting in half-lives of less than 3 hours. Citric acid added as a stabilizer had minimal improvement on the stability of the HP in the presence of the site soils. For this site, half-lives less than 3 hours would not likely result in sufficient treatment for an in situ soil mixing scenario.

## 3.2 Phase 2 Tests

The Phase 2 tests evaluated the ability of ISCO and ISCR technologies to treat the COCs under laboratory conditions. Based on the results of Phase 1 tests and following consultation with ERM, AAP was selected as the ISCO-based technology due to the instability of HP in the presence of site soils. AAP was tested at 8.7% (175 g/L) based on the residual persulfate present at the end of the Phase 1 stability test and its greater kinetics compared to 3.7% AAP. As discussed in Section 2.2, 3% ZVI was evaluated as the ISCR-based technology. AAP and ZVI were evaluated for treatment of COCs at two time points of 14 days and 30 days (refer to Section 2.3).

During set up of the treatment conditions, off gassing (e.g., carbon monoxide, carbon dioxide, hydrogen sulfide, VOCs, etc.) was monitored with a calibrated 5-gas meter and recorded. The data are summarized below. Based on the total VOCs data, health and safety precautions should be taken to protect the breathing space of workers during an in situ soil mixing application.

| | Oxygen | Carbon Monoxide | LEL | Hydrogen Sulfide | VOCs |
|---|---|---|---|---|---|
| | (%) | (ppm) | (%) | (ppm) | (ppm) |
| **Ambient Air** | 20.9 | 0 | 0 | 0 | 0 |
| **Soil Headspace Prior to Disturbance / Mixing** | 20.9 | 0 | 0 | 0 | 203 |
| **Soil Headspace Throughout Disturbance / Mixing** | 20.9 | 0 | 0 | 0 | > 999 |

Notes: ppm = parts per million LEL = lower explosive limit

The Phase 2 analytical results for VOCs, TCLP VOCs, and PCBs are shown on Table 3. The baseline results from soil submitted prior to starting the Phase 2 tests are also shown on Table 3. The table presents only those VOCs detected in one or more samples. The AAP and ZVI test conditions are compared to the corresponding controls for the calculation of percent reductions in COCs. Laboratory reports are attached in Appendix A. The Phase 2 analytical results are discussed below.

Baseline and Controls

Baseline samples were submitted for laboratory analysis after collection from the site. The controls were carried through the same procedures and duration of the test as the reactors with AAP or ZVI. Compared to the baseline results, the VOCs in the controls were lower. This difference between the baseline data and control samples is not uncommon and is likely attributed to:

- partitioning effects between the soil and groundwater in the control reactors (i.e., desorption of COCs in soil into the aqueous phase and/or sorption of COCs from groundwater onto soil). For the AAP test conditions, an additional 1.5 pore volumes (2.5 pore volumes total) was used in the treated reactors and corresponding controls. Due to the higher ratio of groundwater to soil, the partitioning effects would be different compared to the ZVI reactors and corresponding control, which received no additional groundwater.
- volatilization of VOCs in the controls upon preparation of the batch reactors and throughout the duration of the testing can contribute to the discrepancy between the baseline and control samples.

Since the controls are carried through the same conditions and duration of the testing as the reactors with amendments, the analytical results for the treated conditions are compared to their corresponding controls. The day 30 controls for the AAP test were analyzed in duplicate for VOCs and TCLP VOCs. The control duplicate shows much lower concentrations of VOCs in soil compared to the original day 30 control and the day 14 control. The poor precision between the duplicate soil VOC data is occasionally observed and is likely attributed to soil heterogeneities during sample preparation and extraction for analysis. An average of the day 30 duplicate controls were used for the calculation of the percent reductions in VOCs and TCLP VOCs for the day 30 AAP test condition.

AAP Treatment

Compared to the control, the TCLP data show that the 14-day AAP treatment resulted in a reduction in leached tetrachloroethene (PCE) and trichloroethene (TCE) concentrations of 35% and 98%, respectively. The TCLP VOC data for AAP treatment after 30 days show similar percent reductions and suggest that a majority of treatment occurred within the first 14 days. Likewise, the soil VOCs data show similar percent reductions for the 14-day and 30-day treatment periods; however, when evaluating the actual VOC concentrations, it is apparent that the calculation of percent concentration reductions is skewed by the difference between the control data. Specifically, the total VOCs detected in soil were 6,960 micrograms per kilogram (µg/Kg) after 14 days of treatment and 3,920 µg/Kg after 30 days of treatment. Total PCBs were reduced by 20% after the 30-day treatment period compared to the control.

Table 3 presents the data compared to New York Codes, Rules and Regulations (NYCRR) criteria. After 14 days of AAP treatment, PCE and TCE were above soil and TCLP criteria, and 1,1,1-trichloroethane (1,1,1-TCA) was above soil criteria. At the end of the 30-day treatment period with AAP, PCE remained above soil and TCLP criteria and TCE remained above TCLP criteria.

ZVI Treatment

Compared to the control, ZVI treatment following the 14-day and 30-day test periods resulted in similar percent reductions in soil VOC and TCLP VOC concentrations of 99% or greater for both treatment durations. Total PCBs were not effectively reduced following the 14-day or 30-day treatment periods compared to the control.

TCE slightly exceeded the TCLP criteria of 5 µg/L after 14 days of treatment, at 5.1 µg/L, which dropped to non-detect (< 5 µg/L) after 30 days of treatment. No VOCs were detected above criteria in soil after 14 days or 30 days of treatment with the exception of acetone. The production of ketones such as acetone are not uncommon and are generally transient byproducts of ISCR and ISCO processes. If acetate is present in the environment, acetone can be formed through abiotic reactions with oxidized iron. The persistence of byproducts will vary by site conditions and compound. As groundwater returns to pre-application conditions, it is expected that the byproducts will attenuate.

Iron was analyzed on soil samples from the ZVI amended reactors and control reactor following the treatment durations. The results are summarized below and show the percent differences between the ZVI added to the treated reactors and the iron detected on soil samples submitted for analysis at the end of the test durations. The native iron present in the control reactor was subtracted from the iron detected in the ZVI-treated reactors in the calculations. In comparison to the theoretical amounts of iron added, the percent differences range from 13% for the day 14 reactor and 33% for the day 30 reactor. These are considered reasonable percent differences due to factors such as soil heterogeneities, analytical variability, and incomplete recoveries during the metals digestion / extraction procedure.

| | **Iron Detected on Soil** | | **ZVI (iron) Addition** | **Iron Detected as a Result of ZVI Addition (ZVI reactor minus Control)** | **Percent Difference** |
|---|---|---|---|---|---|
| | (mg/Kg) | (mg) | (mg) | (mg) | (%) |
| **Control** | 29,500 | 14,401 | -- | -- | -- |
| **ZVI (Day 14)** | 55,800 | 27,240 | 14,645 | 12,839 | 13 |
| **ZVI (Day 30)** | 51,000 | 24,897 | 14,645 | 10,496 | 33 |

## CONCLUSIONS

The treatability results for the tested conditions support the following conclusions and recommendations:

- The bench test results suggest that either ISCO using AAP or ISCR using ZVI are feasible options for the site. ISCO using HP would not be recommended due to the concern with its instability / short longevity in the presence of the site soils. While AAP and ZVI are both viable remedies, ZVI may be more favorable due to the following:
    - ZVI treatment resulted in greater percent reductions of VOCs compared to AAP. In addition, there were VOCs remaining above criteria after the AAP 14-day and 30-day treatment durations. Given that residual concentrations of persulfate were present at the end of the 30-day test period, it is reasonable to expect treatment using AAP to occur in the field for greater than 30 days. However, 30 days is considered to be sufficient for reduction in COCs so the data suggests that more time is needed for desorption of COCs

from soil (specifically finer materials, which were observed to be present in site soils) into the aqueous phase, the phase in which treatment occurs. If the remedial strategy for the site consists of changing the T&D hazardous waste class, the timeframe for treatment would need to be less than 14 days. For a T&D scenario, ZVI would also be favorable over AAP in that a pH adjustment (to less than a pH of 12) may be needed following an AAP application.

- While acetone was detected on soils above regulatory criteria after treatment with ZVI, the regulatory agencies should be made aware that this may be produced in the field but is considered a transient byproduct that will attenuate over time. A comprehensive post-application sampling program should be established to monitor for byproducts in addition to trends in COC reductions.
- ZVI will have a greater longevity in the treatment area compared to AAP but the actual longevity of ZVI is site-specific and depends on many factors (i.e., groundwater geochemistry, level of COCs, and any potential for passivation of the ZVI). VOCs were effectively treated within a 30-day timeframe but the actual timeframe in an in situ mixing application will depend on achieving adequate contact between the COCs and ZVI. ZVI has been reported to have a greater potential for treating PCBs compared to AAP; a longer treatment duration of 30 days may be required to observe any degradation in PCB concentrations. This would be advantageous if the site remedial strategy were changed to in situ destruction.
- ZVI can be mixed into the saturated treatment area with little to no water addition. In contrast, AAP would require the addition of water to dissolve the oxidant in a holding tank and then mixing it in situ. The additional water would create instability and eventually require dewatering and / or cement addition post-treatment.
- Both AAP and ZVI applications have specific health and safety considerations, but with AAP being a multi-step process, there are inherent hazards due to the high pH and oxidative chemistry. ZVI is much less hazardous in terms of chemistry but the finer-grained ZVI products such as Ferox Target necessitate precautions for breathing space protection of airborne particles.
- Ferox Target ZVI has a lower cost compared to AAP on a pound per pound basis. However, the application dosing and cost to apply either amendment will impact the overall costs. A cost-benefit analysis could be incorporated into the design process.

We appreciate the opportunity to provide treatability services in support of remedial activities at the site. If you have any questions regarding this report, please contact me at 603-778-1100.

Sincerely,

**XDD Environmental**

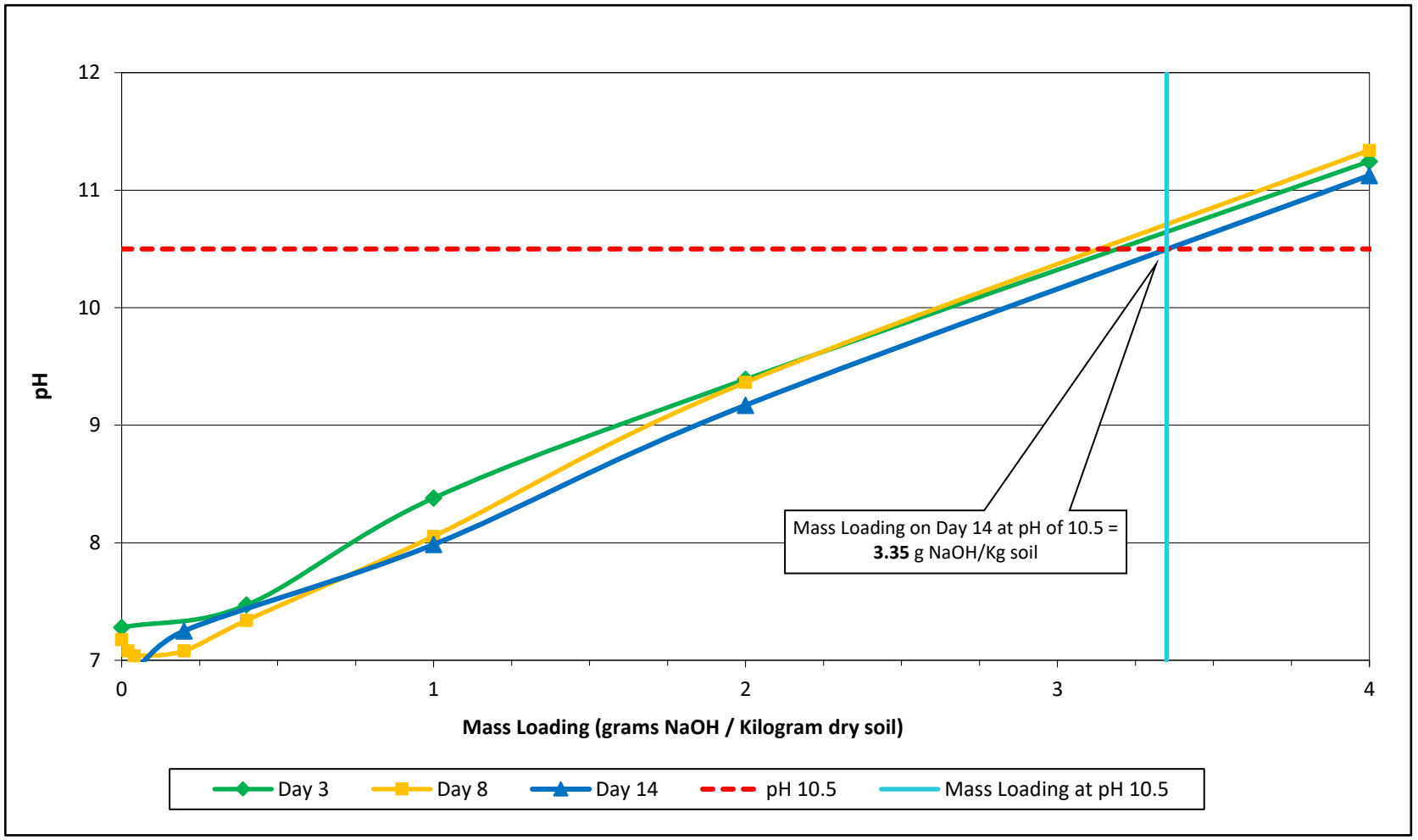


Laurel Crawford, Senior Project Manager

Attachments: Figures and Tables
Appendix A

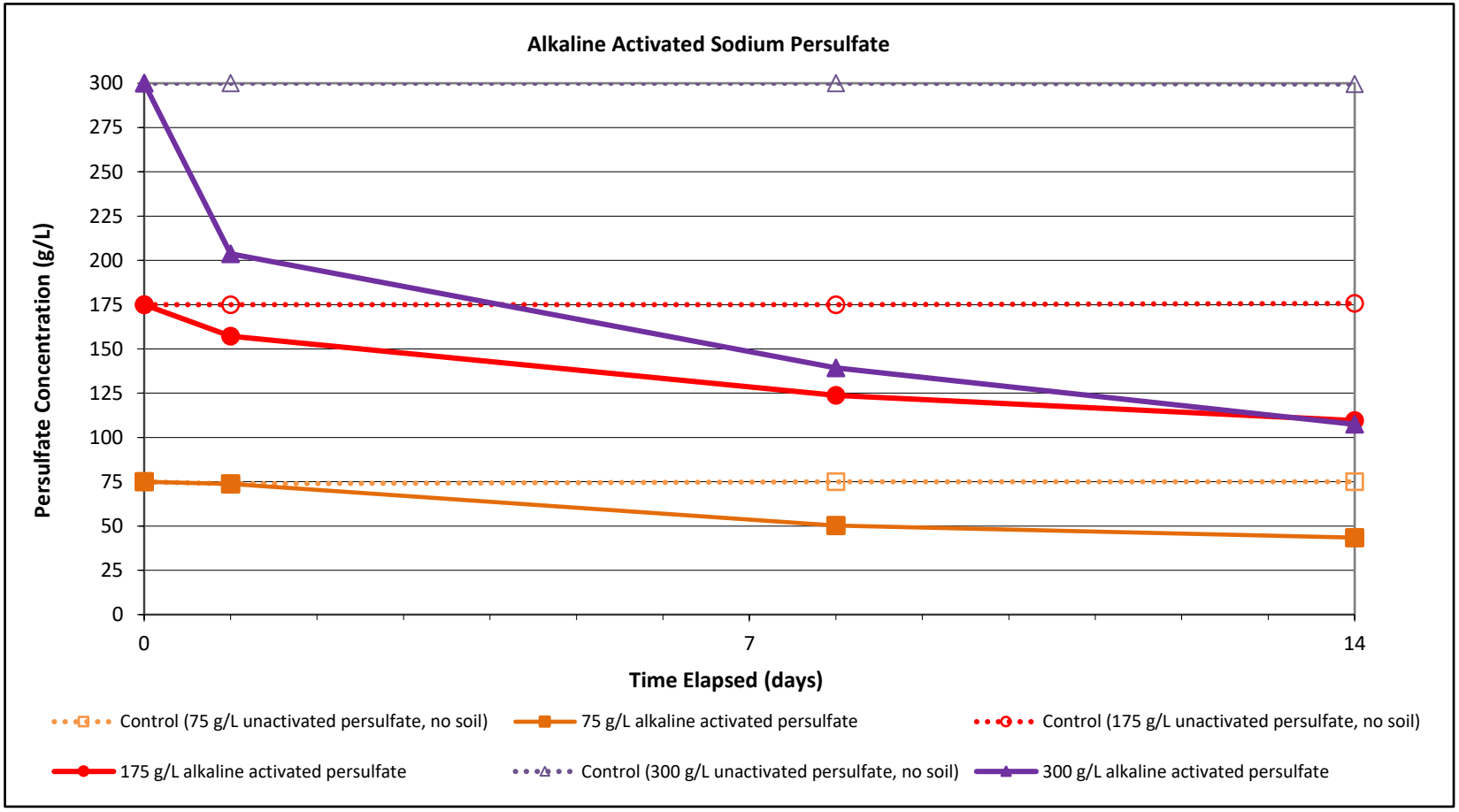
# FIGURES

**Figure 1**
**Base Buffering Capacity**
Former Chemical Storage Area, Sanmina-Owego Facility
Owego, New York




Notes:
NaOH = Sodium Hydroxide g = grams Kg = kilograms
Each test condition was performed in duplicate at ambient laboratory temperatures (20 degrees Celsius [°C]). The figure presents an average of the duplicates.

**Figure 2**
**Sodium Persulfate Stability**
Former Chemical Storage Area, Sanmina-Owego Facility
Owego, New York




Notes:
g/L = grams per liter
Each test condition was performed in duplicate at ambient laboratory temperatures (20 degrees Celsius [°C]). The figure presents an average of the duplicates.

# TABLES

**Table 1**
**Total Oxidant Demand**
Former Chemical Storage Area, Sanmina-Owego Facility
Owego, New York

| Treatment | Starting Persulfate Concentration | | Day 1 | | | Day 7 | | | Day 14 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Residual Persulfate | Total Oxidant Demand | pH | Residual Persulfate | Total Oxidant Demand | pH | Residual Persulfate | Total Oxidant Demand | pH |
| | (g/L) | (% by wt. dry soil) | (g/L) | (g oxidant / kg dry soil) | | (g/L) | (g oxidant / kg dry soil) | | (g/L) | (g oxidant / kg dry soil) | |
| **Alkaline Activated Persulfate** | 75 | 3.7% | 74 | 0.6 | 12.5 | 50 | 12 | 10.8 | 43 | 16 | 10.8 |
| | 175 | 8.7% | 157 | 8.8 | 13.5 | 124 | 25 | 13.8 | 110 | 32 | 13.0 |
| | 300 | 14.9% | 204 | 48 | 13.5 | 139 | 80 | 14.0 | 107 | 95 | 13.0 |

Notes:
g/L = grams per liter
kg = kilogram
Total Oxidant Demand = Soil Oxidant Demand + Activator Demand
Each test condition was performed in duplicate at ambient laboratory temperatures (20 degrees Celsius [°C]). The data presents an average of the duplicates.

**Table 2**
**Hydrogen Peroxide Stability Test: Half Life**
Former Chemical Storage Area, Sanmina-Owego Facility
Owego, New York

| Treatment | Half Life [1] (hours) |
|---|---|
| 4% $H_2O_2$, no Citric Acid | 0.2 |
| 4% $H_2O_2$, 25 mM Citric Acid | 0.6 |
| 4% $H_2O_2$, 75 mM Citric Acid | 0.8 |
| 4% $H_2O_2$, 150 mM Citric Acid | 3.0 |
| 8% $H_2O_2$, no Citric Acid | 0.1 |
| 8% $H_2O_2$, 25 mM Citric Acid | 0.5 |
| 8% $H_2O_2$, 75 mM Citric Acid | 0.5 |
| 8% $H_2O_2$, 150 mM Citric Acid | 2.5 |

Notes:

1. Based on pseudo-first order kinetic model of hydrogen peroxide decomposition.

% = percent

$H_2O_2$ = hydrogen peroxide

mM = millimolar

**Table 3**
**Analytical Results: AAP and ZVI Treatment**
Former Chemical Storage Area, Sanmina-Owego Facility
Owego, New York

**TCLP Data**

| | Analyte | NY 703.6 Table 3 GW Discharge to Class A Waters | Baseline (BSS-01) | AAP (8.7%) | | | | | | | ZVI (3% Ferox Target) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Day 14 Control[1] | Day 14 Treatment | Percent Reduction[2] | Day 30 Control[1] | Day 30 Control Dup[1] | Day 30 Treatment | Percent Reduction[2] | Day 14 Treatment | Percent Reduction[2] | Day 30 Control | Day 30 Treatment | Percent Reduction[2] |
| | | (µg/L) | (µg/L) | (µg/L) | (µg/L) | (%) | (µg/L) | (µg/L) | (µg/L) | (%) | (µg/L) | (%) | (µg/L) | (µg/L) | (%) |
| VOCs | Tetrachloroethene | 5 | **1,200** | **170** | **110** | 35 | **120** | **100** | **66** | 45 | 5 U | 97 | **190** | 5 U | 97 |
| VOCs | Trichloroethene | 5 | **16,000** | **1,100** | **27** | 98 | **1,200** | **900** | **21** | 98 | **5.1** | 100 | **1,800** | 5 U | 100 |
| VOCs | **Total Detected VOCs** | -- | **17,200** | **1,270** | **137** | 89 | **1,320** | **1,000** | **87** | 93 | **5.1** | 100 | **1,990** | **0** | 100 |

**Soil Data**

| | Analyte | NYCRR 675 Restricted Industrial | NYCRR 675 Protection of GW | Baseline (BSS-01) | AAP (8.7%) | | | | | | | ZVI (3% Ferox Target) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Day 14 Control[1] | Day 14 Treatment | Percent Reduction[2] | Day 30 Control[1] | Day 30 Control Dup[1] | Day 30 Treatment | Percent Reduction[2] | Day 14 Treatment | Percent Reduction[2] | Day 30 Control | Day 30 Treatment | Percent Reduction[2] |
| | | (µg/Kg) | (µg/Kg) | (µg/Kg) | (µg/Kg) | (µg/Kg) | (%) | (µg/Kg) | (µg/Kg) | (µg/Kg) | (%) | (µg/Kg) | (%) | (µg/Kg) | (µg/Kg) | (%) |
| VOCs | Acetone | 1,000,000 | 50 | 26,000 U | 510 U | 570 U | n/a | 620 U | 470 U | 560 U | n/a | **140** | n/a | 430 U | **230** E | n/a |
| VOCs | Benzene | 89,000 | 60 | 1,300 U | 25 U | 29 U | n/a | 31 U | 24 U | 28 U | n/a | **0.67** | n/a | 22 U | **0.82** | n/a |
| VOCs | 2-Butanone | 1,000,000 | 120 | 26,000 U | 510 U | 570 U | n/a | 620 U | 270 U | 560 U | n/a | **31** | n/a | 430 U | **32** | n/a |
| VOCs | n-Butylbenzene | 1,000,000 | 12,000 | na | **68** | 57 U | 16 | 62 U | **59** | 56 U | n/a | **4.0** | 94 | **68** | **3.7** | 95 |
| VOCs | sec-Butylbenzene | 1,000,000 | 11,000 | na | 51 U | 57 U | n/a | 62 U | 47 U | 56 U | n/a | **1.6** | n/a | 43 U | **1.3** | n/a |
| VOCs | Chlorobenzene | 1,000,000 | 1,100 | 1,300 U | 25 U | 29 U | n/a | 31 U | 24 U | 28 U | n/a | **0.65** | n/a | 22 U | **0.60** | n/a |
| VOCs | o-Chlorotoluene | -- | -- | na | **340** | 110 U | 68 | **400** | **270** | 110 U | 73 | **24** | 93 | **320** | **20** | 94 |
| VOCs | p-Chlorotoluene | -- | -- | na | **240** | 110 U | 54 | **280** | **190** | 110 U | 61 | **14** | 94 | **240** | **13** | 95 |
| VOCs | Ethyl Benzene | 780,000 | 1,000 | **1,400** J | **320** | 57 U | 82 | **380** | **210** | 56 U | 85 | **15** | 95 | **280** | **12** | 96 |
| VOCs | Hexachlorobutadiene | -- | -- | na | **210** | 230 U | nc | 250 U | 190 U | 230 U | n/a | 3.0 U | 99 | **260** | 2.8 U | 99 |
| VOCs | Isopropylbenzene | -- | -- | 2,600 U | 51 U | 57 U | n/a | 62 U | 47 U | 56 U | n/a | **2.5** | n/a | 43 U | **1.8** | n/a |
| VOCs | p-Isopropyltoluene | -- | -- | na | 51 U | 57 U | n/a | 62 U | 47 U | 56 U | n/a | **2.5** | n/a | 43 U | **2.1** | n/a |
| VOCs | 4-Methyl-2-Pentanone | -- | -- | na | 510 U | 570 U | n/a | 620 U | 470 U | 560 U | n/a | 7.4 U | n/a | 430 U | **8.2** | n/a |
| VOCs | Naphthalene | 1,000,000 | 12,000 | na | **750** | 230 U | 69 | **840** | **690** | 230 U | 73 | **50** | 94 | **820** | **58** | 93 |
| VOCs | n-Propylbenzene | 1,000,000 | 3,900 | na | 51 U | 57 U | n/a | 62 U | 47 U | 56 U | n/a | **3.5** | 92 | **46** | **2.9** | 94 |
| VOCs | Tert-butyl-alcohol | -- | -- | na | 1,000 U | 1,100 U | n/a | 1,200 U | 940 U | 1,100 U | n/a | **38** | n/a | 870 U | **62** | n/a |
| VOCs | Tetrachloroethene | 300,000 | 1,300 | **46,000** | **8,700** | **4,700** | 46 | **9,400** | **5,000** | **3,000** | 68 | 0.37 U | 100 | **7,700** | 0.34 U | 100 |
| VOCs | Toluene | 1,000,000 | 700 | **14,000** | **1,500** | 57 U | 96 | **1,900** | **900** | 56 U | 97 | **38** | 97 | **1,200** | **24** | 98 |
| VOCs | 1,1,1-Trichloroethane | 400,000 | 470 | **48,000** | **2,400** | **560** | 77 | **2,700** | **1,100** | **320** | 88 | **8.5** | 99 | **1,500** | 0.34 U | 100 |
| VOCs | Trichloroethene | 1,000,000 | 680 | **1,200,000** | **76,000** | **1,700** | 98 | **91,000** | **37,000** | **600** | 99 | **8.5** | 100 | **55,000** | **6.2** | 100 |
| VOCs | 1,2,4-Trichlorobenzene | -- | -- | 5,200 U | 100 U | 110 U | n/a | 120 U | 94 U | 110 U | n/a | 1.5 U | n/a | 87 U | **1.4** | n/a |
| VOCs | 1,2,4-Trimethylbenzene | 380,000 | 3,600 | na | **270** | 110 U | 59 | **300** | **220** | 110 U | 63 | **20** | 93 | **280** | **18** | 94 |
| VOCs | 1,3,5-Trimethylbenzene | 380,000 | 8,400 | na | 100 U | 110 U | n/a | 120 U | 94 U | 110 U | n/a | **7.2** | 93 | **97** | **6.0** | 94 |
| VOCs | Xylenes, Total | 1,000,000 | 1,600 | **7,600** | **2,000** | 57 U | 97 | **2,400** | **1,400** | 56 U | 98 | **97** | 95 | **1,800** | **78** | 96 |
| VOCs | **Total Detected VOCs** | -- | -- | **1,317,000** | **92,798** | **6,960** | 92 | **109,600** | **47,039** | **3,920** | 96 | **507** | 99 | **69,611** | **582** | 99 |
| **PCBs** | **Total Detected PCBs** | 3,200 | 25,000 | **189** | **270** | **354** | -31 | **547** | na | **436** | 20 | **469** | -4 | **453** | **545** | -20 |

Notes:
AAP = alkaline activated persulfate, 8.7% by weight dry soil / 2.5 pore volumes at 175 grams per liter
na = not analyzed
PCBs = polychlorinated biphenyls
TCLP = toxicity characteristic leaching procedure
VOCs = volatile organic compounds
µg/Kg = micrograms per kilogram
µg/L = micrograms per liter
ZVI = zero-valent iron, Hepure's Ferox Target, 3% by weight dry soil

Detected concentration exceeds criteria.
Result is non-detect but the reporting limit exceeds criteria.
- = no criteria

U = not detected above the indicated reporting limit (RL).
**Bold font indicates compound was detected at concentration above sample RL.**
1. The control reactors contained soil only.
2. Percent reductions calculated by comparing the contaminant concentrations in the test reactor to the control reactor. For the day 14 treatment with ZVI a day 14 control was not set up; therefore, percent reductions are compared to the day 30 control.
n/a = not applicable; compound not detected in the control and either not detected or detected at a concentration below the control sample RL in the test reactor.
nc = compound detected in the control and not detected in the test reactor, but the RL in the test reactor was higher than the control detected concentration.

# APPENDIX A

## Analytical Laboratory Reports

ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L2340459 |
| Client: | ERM, Inc.<br>5784 Wide Waters Parkway<br>Syracuse, NY 13214 |
| ATTN: | Rob Sents |
| Phone: | (315) 445-2553 |
| Project Name: | SANMINA |
| Project Number: | 0589878 |
| Report Date: | 07/28/23 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OH (CL108), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L2340459-01 | BSS-01-07142023 | SOIL | OWEGO, NY | 07/14/23 11:45 | 07/14/23 |

| | | | |
|---|---|---|---|
| **Project Name:** | SANMINA | **Lab Number:** | L2340459 |
| **Project Number:** | 0589878 | **Report Date:** | 07/28/23 |

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

**Case Narrative (continued)**

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Sample Receipt

The analyses performed were specified by the client.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly O'Neill

Title: Technical Director/Representative Date: 07/28/23

# ORGANICS

# VOLATILES

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

## SAMPLE RESULTS

Lab ID: L2340459-01
Client ID: BSS-01-07142023
Sample Location: OWEGO, NY
Date Collected: 07/14/23 11:45
Date Received: 07/14/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 07/27/23 09:37
Analyst: MCM
Percent Solids: 83%
TCLP/SPLP Ext. Date: 07/26/23 10:19

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | 2.2 | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | 1.3 | 10 |
| Tetrachloroethene | 1200 | | ug/l | 5.0 | 1.8 | 10 |
| Chlorobenzene | 2.5 | J | ug/l | 5.0 | 1.8 | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | 1.3 | 10 |
| Benzene | 2.8 | J | ug/l | 5.0 | 1.6 | 10 |
| Vinyl chloride | ND | | ug/l | 10 | 0.71 | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | 1.7 | 10 |
| Trichloroethene | 14000 | E | ug/l | 5.0 | 1.8 | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | 1.9 | 10 |
| 2-Butanone | ND | | ug/l | 50 | 19. | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 111 | | 70-130 |
| Toluene-d8 | 91 | | 70-130 |
| 4-Bromofluorobenzene | 88 | | 70-130 |
| dibromofluoromethane | 115 | | 70-130 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

## SAMPLE RESULTS

Lab ID: L2340459-01 D2
Client ID: BSS-01-07142023
Sample Location: OWEGO, NY

Date Collected: 07/14/23 11:45
Date Received: 07/14/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 07/26/23 23:17
Analyst: AJK
Percent Solids: 83%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 13000 | 5900 | 50 |
| 1,1-Dichloroethane | ND | | ug/kg | 2600 | 380 | 50 |
| Chloroform | ND | | ug/kg | 3900 | 360 | 50 |
| Carbon tetrachloride | ND | | ug/kg | 2600 | 600 | 50 |
| 1,2-Dichloropropane | ND | | ug/kg | 2600 | 320 | 50 |
| Dibromochloromethane | ND | | ug/kg | 2600 | 360 | 50 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 2600 | 690 | 50 |
| Tetrachloroethene | 46000 | | ug/kg | 1300 | 510 | 50 |
| Chlorobenzene | ND | | ug/kg | 1300 | 330 | 50 |
| Trichlorofluoromethane | ND | | ug/kg | 10000 | 1800 | 50 |
| 1,2-Dichloroethane | ND | | ug/kg | 2600 | 660 | 50 |
| 1,1,1-Trichloroethane | 48000 | | ug/kg | 1300 | 430 | 50 |
| Bromodichloromethane | ND | | ug/kg | 1300 | 280 | 50 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 2600 | 710 | 50 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 1300 | 410 | 50 |
| Bromoform | ND | | ug/kg | 10000 | 640 | 50 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 1300 | 430 | 50 |
| Benzene | ND | | ug/kg | 1300 | 430 | 50 |
| Toluene | 14000 | | ug/kg | 2600 | 1400 | 50 |
| Ethylbenzene | 1400 | J | ug/kg | 2600 | 360 | 50 |
| Chloromethane | ND | | ug/kg | 10000 | 2400 | 50 |
| Bromomethane | ND | | ug/kg | 5200 | 1500 | 50 |
| Vinyl chloride | ND | | ug/kg | 2600 | 870 | 50 |
| Chloroethane | ND | | ug/kg | 5200 | 1200 | 50 |
| 1,1-Dichloroethene | 700 | J | ug/kg | 2600 | 620 | 50 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 3900 | 350 | 50 |
| Trichloroethene | 1200000 | E | ug/kg | 1300 | 350 | 50 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 5200 | 370 | 50 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

## SAMPLE RESULTS

Lab ID: L2340459-01 D2
Client ID: BSS-01-07142023
Sample Location: OWEGO, NY
Date Collected: 07/14/23 11:45
Date Received: 07/14/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,3-Dichlorobenzene | ND | | ug/kg | 5200 | 380 | 50 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 5200 | 440 | 50 |
| Methyl tert butyl ether | ND | | ug/kg | 5200 | 520 | 50 |
| p/m-Xylene | 6100 | | ug/kg | 5200 | 1400 | 50 |
| o-Xylene | 1500 | J | ug/kg | 2600 | 750 | 50 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 2600 | 450 | 50 |
| Styrene | ND | | ug/kg | 2600 | 510 | 50 |
| Dichlorodifluoromethane | ND | | ug/kg | 26000 | 2400 | 50 |
| Acetone | ND | | ug/kg | 26000 | 12000 | 50 |
| Carbon disulfide | ND | | ug/kg | 26000 | 12000 | 50 |
| 2-Butanone | ND | | ug/kg | 26000 | 5700 | 50 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 26000 | 3300 | 50 |
| 2-Hexanone | ND | | ug/kg | 26000 | 3000 | 50 |
| Bromochloromethane | ND | | ug/kg | 5200 | 530 | 50 |
| 1,2-Dibromoethane | ND | | ug/kg | 2600 | 720 | 50 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 7800 | 2600 | 50 |
| Isopropylbenzene | ND | | ug/kg | 2600 | 280 | 50 |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 5200 | 830 | 50 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 5200 | 700 | 50 |
| Methyl Acetate | ND | | ug/kg | 10000 | 2400 | 50 |
| Cyclohexane | ND | | ug/kg | 26000 | 1400 | 50 |
| 1,4-Dioxane | ND | | ug/kg | 210000 | 91000 | 50 |
| Freon-113 | ND | | ug/kg | 10000 | 1800 | 50 |
| Methyl cyclohexane | ND | | ug/kg | 10000 | 1600 | 50 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 105 | | 70-130 |
| Toluene-d8 | 95 | | 70-130 |
| 4-Bromofluorobenzene | 104 | | 70-130 |
| Dibromofluoromethane | 95 | | 70-130 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

## SAMPLE RESULTS

Lab ID: L2340459-01 D
Client ID: BSS-01-07142023
Sample Location: OWEGO, NY
Date Collected: 07/14/23 11:45
Date Received: 07/14/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 07/27/23 21:33
Analyst: MCM
Percent Solids: 83%
TCLP/SPLP Ext. Date: 07/26/23 10:19

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Trichloroethene | 16000 | | ug/l | 100 | 35. | 200 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 119 | | 70-130 |
| Toluene-d8 | 93 | | 70-130 |
| 4-Bromofluorobenzene | 85 | | 70-130 |
| dibromofluoromethane | 127 | | 70-130 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

## SAMPLE RESULTS

Lab ID: L2340459-01 D
Client ID: BSS-01-07142023
Sample Location: OWEGO, NY
Date Collected: 07/14/23 11:45
Date Received: 07/14/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 07/26/23 16:56
Analyst: LAC
Percent Solids: 83%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 1200000 | | ug/kg | 2600 | 710 | 100 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 109 | | 70-130 |
| Toluene-d8 | 95 | | 70-130 |
| 4-Bromofluorobenzene | 102 | | 70-130 |
| Dibromofluoromethane | 96 | | 70-130 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/26/23 09:10
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 01 Batch: WG1807965-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | 110 |
| 1,1-Dichloroethane | ND | | ug/kg | 50 | 7.2 |
| Chloroform | ND | | ug/kg | 75 | 7.0 |
| Carbon tetrachloride | ND | | ug/kg | 50 | 12. |
| 1,2-Dichloropropane | ND | | ug/kg | 50 | 6.2 |
| Dibromochloromethane | ND | | ug/kg | 50 | 7.0 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 50 | 13. |
| Tetrachloroethene | ND | | ug/kg | 25 | 9.8 |
| Chlorobenzene | ND | | ug/kg | 25 | 6.4 |
| Trichlorofluoromethane | ND | | ug/kg | 200 | 35. |
| 1,2-Dichloroethane | ND | | ug/kg | 50 | 13. |
| 1,1,1-Trichloroethane | ND | | ug/kg | 25 | 8.4 |
| Bromodichloromethane | ND | | ug/kg | 25 | 5.4 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 50 | 14. |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | 7.9 |
| Bromoform | ND | | ug/kg | 200 | 12. |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | 8.3 |
| Benzene | ND | | ug/kg | 25 | 8.3 |
| Toluene | ND | | ug/kg | 50 | 27. |
| Ethylbenzene | ND | | ug/kg | 50 | 7.0 |
| Chloromethane | ND | | ug/kg | 200 | 47. |
| Bromomethane | ND | | ug/kg | 100 | 29. |
| Vinyl chloride | ND | | ug/kg | 50 | 17. |
| Chloroethane | ND | | ug/kg | 100 | 23. |
| 1,1-Dichloroethene | ND | | ug/kg | 50 | 12. |
| trans-1,2-Dichloroethene | ND | | ug/kg | 75 | 6.8 |
| Trichloroethene | ND | | ug/kg | 25 | 6.8 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | 7.2 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | 7.4 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/26/23 09:10
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 01 Batch: WG1807965-5 | | | | | |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | 8.6 |
| Methyl tert butyl ether | ND | | ug/kg | 100 | 10. |
| p/m-Xylene | ND | | ug/kg | 100 | 28. |
| o-Xylene | ND | | ug/kg | 50 | 14. |
| cis-1,2-Dichloroethene | ND | | ug/kg | 50 | 8.8 |
| Styrene | ND | | ug/kg | 50 | 9.8 |
| Dichlorodifluoromethane | ND | | ug/kg | 500 | 46. |
| Acetone | ND | | ug/kg | 500 | 240 |
| Carbon disulfide | ND | | ug/kg | 500 | 230 |
| 2-Butanone | ND | | ug/kg | 500 | 110 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 500 | 64. |
| 2-Hexanone | ND | | ug/kg | 500 | 59. |
| Bromochloromethane | ND | | ug/kg | 100 | 10. |
| 1,2-Dibromoethane | ND | | ug/kg | 50 | 14. |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | 50. |
| Isopropylbenzene | ND | | ug/kg | 50 | 5.4 |
| 1,2,3-Trichlorobenzene | 18 | J | ug/kg | 100 | 16. |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | 14. |
| Methyl Acetate | ND | | ug/kg | 200 | 48. |
| Cyclohexane | ND | | ug/kg | 500 | 27. |
| 1,4-Dioxane | ND | | ug/kg | 4000 | 1800 |
| Freon-113 | ND | | ug/kg | 200 | 35. |
| Methyl cyclohexane | ND | | ug/kg | 200 | 30. |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/26/23 09:10
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 01 Batch: WG1807965-5 | | | | | |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | | 70-130 |
| Toluene-d8 | 95 | | 70-130 |
| 4-Bromofluorobenzene | 102 | | 70-130 |
| Dibromofluoromethane | 99 | | 70-130 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/27/23 04:40
Analyst: MCM
TCLP/SPLP Extraction Date: 07/26/23 10:19
Extraction Date: 07/26/23 10:19

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab for sample(s): 01 Batch: WG1808391-5 | | | | | |
| Chloroform | ND | | ug/l | 7.5 | 2.2 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | 1.3 |
| Tetrachloroethene | ND | | ug/l | 5.0 | 1.8 |
| Chlorobenzene | ND | | ug/l | 5.0 | 1.8 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | 1.3 |
| Benzene | ND | | ug/l | 5.0 | 1.6 |
| Vinyl chloride | ND | | ug/l | 10 | 0.71 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | 1.7 |
| Trichloroethene | ND | | ug/l | 5.0 | 1.8 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | 1.9 |
| 2-Butanone | ND | | ug/l | 50 | 19. |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 108 | | 70-130 |
| Toluene-d8 | 92 | | 70-130 |
| 4-Bromofluorobenzene | 91 | | 70-130 |
| dibromofluoromethane | 116 | | 70-130 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/26/23 22:25
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1808588-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | 110 |
| 1,1-Dichloroethane | ND | | ug/kg | 50 | 7.2 |
| Chloroform | 10 | J | ug/kg | 75 | 7.0 |
| Carbon tetrachloride | ND | | ug/kg | 50 | 12. |
| 1,2-Dichloropropane | ND | | ug/kg | 50 | 6.2 |
| Dibromochloromethane | ND | | ug/kg | 50 | 7.0 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 50 | 13. |
| Tetrachloroethene | ND | | ug/kg | 25 | 9.8 |
| Chlorobenzene | ND | | ug/kg | 25 | 6.4 |
| Trichlorofluoromethane | ND | | ug/kg | 200 | 35. |
| 1,2-Dichloroethane | ND | | ug/kg | 50 | 13. |
| 1,1,1-Trichloroethane | ND | | ug/kg | 25 | 8.4 |
| Bromodichloromethane | ND | | ug/kg | 25 | 5.4 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 50 | 14. |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | 7.9 |
| Bromoform | ND | | ug/kg | 200 | 12. |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | 8.3 |
| Benzene | ND | | ug/kg | 25 | 8.3 |
| Toluene | ND | | ug/kg | 50 | 27. |
| Ethylbenzene | ND | | ug/kg | 50 | 7.0 |
| Chloromethane | ND | | ug/kg | 200 | 47. |
| Bromomethane | ND | | ug/kg | 100 | 29. |
| Vinyl chloride | ND | | ug/kg | 50 | 17. |
| Chloroethane | ND | | ug/kg | 100 | 23. |
| 1,1-Dichloroethene | ND | | ug/kg | 50 | 12. |
| trans-1,2-Dichloroethene | ND | | ug/kg | 75 | 6.8 |
| Trichloroethene | ND | | ug/kg | 25 | 6.8 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | 7.2 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | 7.4 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/26/23 22:25
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1808588-5 | | | | | |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | 8.6 |
| Methyl tert butyl ether | ND | | ug/kg | 100 | 10. |
| p/m-Xylene | ND | | ug/kg | 100 | 28. |
| o-Xylene | ND | | ug/kg | 50 | 14. |
| cis-1,2-Dichloroethene | ND | | ug/kg | 50 | 8.8 |
| Styrene | ND | | ug/kg | 50 | 9.8 |
| Dichlorodifluoromethane | ND | | ug/kg | 500 | 46. |
| Acetone | ND | | ug/kg | 500 | 240 |
| Carbon disulfide | ND | | ug/kg | 500 | 230 |
| 2-Butanone | ND | | ug/kg | 500 | 110 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 500 | 64. |
| 2-Hexanone | ND | | ug/kg | 500 | 59. |
| Bromochloromethane | ND | | ug/kg | 100 | 10. |
| 1,2-Dibromoethane | ND | | ug/kg | 50 | 14. |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | 50. |
| Isopropylbenzene | ND | | ug/kg | 50 | 5.4 |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 100 | 16. |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | 14. |
| Methyl Acetate | ND | | ug/kg | 200 | 48. |
| Cyclohexane | ND | | ug/kg | 500 | 27. |
| 1,4-Dioxane | ND | | ug/kg | 4000 | 1800 |
| Freon-113 | ND | | ug/kg | 200 | 35. |
| Methyl cyclohexane | ND | | ug/kg | 200 | 30. |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/26/23 22:25
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by GC/MS - Westborough Lab for sample(s): 01 Batch: WG1808588-5 | | | | | |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 106 | | 70-130 |
| Toluene-d8 | 96 | | 70-130 |
| 4-Bromofluorobenzene | 103 | | 70-130 |
| Dibromofluoromethane | 94 | | 70-130 |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 07/27/23 15:04
Analyst: MCM
TCLP/SPLP Extraction Date: 07/26/23 10:19
Extraction Date: 07/26/23 10:19

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab for sample(s): 01 Batch: WG1808893-5 | | | | | |
| Chloroform | ND | | ug/l | 7.5 | 2.2 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | 1.3 |
| Tetrachloroethene | ND | | ug/l | 5.0 | 1.8 |
| Chlorobenzene | ND | | ug/l | 5.0 | 1.8 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | 1.3 |
| Benzene | ND | | ug/l | 5.0 | 1.6 |
| Vinyl chloride | ND | | ug/l | 10 | 0.71 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | 1.7 |
| Trichloroethene | ND | | ug/l | 5.0 | 1.8 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | 1.9 |
| 2-Butanone | ND | | ug/l | 50 | 19. |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 109 | | 70-130 |
| Toluene-d8 | 92 | | 70-130 |
| 4-Bromofluorobenzene | 90 | | 70-130 |
| dibromofluoromethane | 111 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 01 Batch: WG1807965-3 WG1807965-4 | | | | | | | | |
| Methylene chloride | 83 | | 86 | | 70-130 | 4 | | 30 |
| 1,1-Dichloroethane | 113 | | 118 | | 70-130 | 4 | | 30 |
| Chloroform | 91 | | 93 | | 70-130 | 2 | | 30 |
| Carbon tetrachloride | 94 | | 99 | | 70-130 | 5 | | 30 |
| 1,2-Dichloropropane | 107 | | 110 | | 70-130 | 3 | | 30 |
| Dibromochloromethane | 88 | | 90 | | 70-130 | 2 | | 30 |
| 1,1,2-Trichloroethane | 84 | | 86 | | 70-130 | 2 | | 30 |
| Tetrachloroethene | 98 | | 101 | | 70-130 | 3 | | 30 |
| Chlorobenzene | 91 | | 94 | | 70-130 | 3 | | 30 |
| Trichlorofluoromethane | 90 | | 95 | | 70-139 | 5 | | 30 |
| 1,2-Dichloroethane | 104 | | 108 | | 70-130 | 4 | | 30 |
| 1,1,1-Trichloroethane | 100 | | 104 | | 70-130 | 4 | | 30 |
| Bromodichloromethane | 88 | | 91 | | 70-130 | 3 | | 30 |
| trans-1,3-Dichloropropene | 89 | | 91 | | 70-130 | 2 | | 30 |
| cis-1,3-Dichloropropene | 91 | | 94 | | 70-130 | 3 | | 30 |
| Bromoform | 81 | | 84 | | 70-130 | 4 | | 30 |
| 1,1,2,2-Tetrachloroethane | 73 | | 82 | | 70-130 | 12 | | 30 |
| Benzene | 91 | | 95 | | 70-130 | 4 | | 30 |
| Toluene | 92 | | 95 | | 70-130 | 3 | | 30 |
| Ethylbenzene | 96 | | 99 | | 70-130 | 3 | | 30 |
| Chloromethane | **134** | Q | **140** | Q | 52-130 | 4 | | 30 |
| Bromomethane | 99 | | 105 | | 57-147 | 6 | | 30 |
| Vinyl chloride | 118 | | 124 | | 67-130 | 5 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 01 Batch: WG1807965-3 WG1807965-4 | | | | | | | | |
| Chloroethane | 108 | | 114 | | 50-151 | 5 | | 30 |
| 1,1-Dichloroethene | 97 | | 102 | | 65-135 | 5 | | 30 |
| trans-1,2-Dichloroethene | 96 | | 99 | | 70-130 | 3 | | 30 |
| Trichloroethene | 101 | | 99 | | 70-130 | 2 | | 30 |
| 1,2-Dichlorobenzene | 89 | | 92 | | 70-130 | 3 | | 30 |
| 1,3-Dichlorobenzene | 92 | | 95 | | 70-130 | 3 | | 30 |
| 1,4-Dichlorobenzene | 89 | | 90 | | 70-130 | 1 | | 30 |
| Methyl tert butyl ether | 100 | | 102 | | 66-130 | 2 | | 30 |
| p/m-Xylene | 95 | | 97 | | 70-130 | 2 | | 30 |
| o-Xylene | 94 | | 96 | | 70-130 | 2 | | 30 |
| cis-1,2-Dichloroethene | 89 | | 96 | | 70-130 | 8 | | 30 |
| Styrene | 93 | | 97 | | 70-130 | 4 | | 30 |
| Dichlorodifluoromethane | 100 | | 106 | | 30-146 | 6 | | 30 |
| Acetone | 95 | | 92 | | 54-140 | 3 | | 30 |
| Carbon disulfide | 92 | | 98 | | 59-130 | 6 | | 30 |
| 2-Butanone | 86 | | 91 | | 70-130 | 6 | | 30 |
| 4-Methyl-2-pentanone | 108 | | 111 | | 70-130 | 3 | | 30 |
| 2-Hexanone | 96 | | 99 | | 70-130 | 3 | | 30 |
| Bromochloromethane | 88 | | 90 | | 70-130 | 2 | | 30 |
| 1,2-Dibromoethane | 88 | | 91 | | 70-130 | 3 | | 30 |
| 1,2-Dibromo-3-chloropropane | 81 | | 84 | | 68-130 | 4 | | 30 |
| Isopropylbenzene | 94 | | 98 | | 70-130 | 4 | | 30 |
| 1,2,3-Trichlorobenzene | 87 | | 90 | | 70-130 | 3 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 01 Batch: WG1807965-3 WG1807965-4 | | | | | | | | |
| 1,2,4-Trichlorobenzene | 89 | | 92 | | 70-130 | 3 | | 30 |
| Methyl Acetate | 96 | | 100 | | 51-146 | 4 | | 30 |
| Cyclohexane | 125 | | 132 | | 59-142 | 5 | | 30 |
| 1,4-Dioxane | 88 | | 93 | | 65-136 | 6 | | 30 |
| Freon-113 | 95 | | 101 | | 50-139 | 6 | | 30 |
| Methyl cyclohexane | 93 | | 96 | | 70-130 | 3 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 98 | | 98 | | 70-130 |
| Toluene-d8 | 98 | | 98 | | 70-130 |
| 4-Bromofluorobenzene | 105 | | 104 | | 70-130 |
| Dibromofluoromethane | 92 | | 93 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab Associated sample(s): 01 Batch: WG1808391-3 WG1808391-4 | | | | | | | | |
| Chloroform | 110 | | 110 | | 70-130 | 0 | | 20 |
| Carbon tetrachloride | 120 | | 120 | | 63-132 | 0 | | 20 |
| Tetrachloroethene | 120 | | 110 | | 70-130 | 9 | | 20 |
| Chlorobenzene | 100 | | 100 | | 75-130 | 0 | | 25 |
| 1,2-Dichloroethane | 100 | | 110 | | 70-130 | 10 | | 20 |
| Benzene | 110 | | 110 | | 70-130 | 0 | | 25 |
| Vinyl chloride | 87 | | 87 | | 55-140 | 0 | | 20 |
| 1,1-Dichloroethene | 120 | | 100 | | 61-145 | 18 | | 25 |
| Trichloroethene | 120 | | 110 | | 70-130 | 9 | | 25 |
| 1,4-Dichlorobenzene | 98 | | 97 | | 70-130 | 1 | | 20 |
| 2-Butanone | 77 | | 78 | | 63-138 | 1 | | 20 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 100 | | 103 | | 70-130 |
| Toluene-d8 | 99 | | 98 | | 70-130 |
| 4-Bromofluorobenzene | 86 | | 88 | | 70-130 |
| dibromofluoromethane | 108 | | 110 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1808588-3 WG1808588-4 | | | | | | | | |
| Methylene chloride | 92 | | 84 | | 70-130 | 9 | | 30 |
| 1,1-Dichloroethane | 122 | | 111 | | 70-130 | 9 | | 30 |
| Chloroform | 98 | | 90 | | 70-130 | 9 | | 30 |
| Carbon tetrachloride | 101 | | 91 | | 70-130 | 10 | | 30 |
| 1,2-Dichloropropane | 114 | | 105 | | 70-130 | 8 | | 30 |
| Dibromochloromethane | 94 | | 87 | | 70-130 | 8 | | 30 |
| 1,1,2-Trichloroethane | 90 | | 83 | | 70-130 | 8 | | 30 |
| Tetrachloroethene | 102 | | 93 | | 70-130 | 9 | | 30 |
| Chlorobenzene | 96 | | 89 | | 70-130 | 8 | | 30 |
| Trichlorofluoromethane | 98 | | 88 | | 70-139 | 11 | | 30 |
| 1,2-Dichloroethane | 113 | | 104 | | 70-130 | 8 | | 30 |
| 1,1,1-Trichloroethane | 106 | | 97 | | 70-130 | 9 | | 30 |
| Bromodichloromethane | 96 | | 89 | | 70-130 | 8 | | 30 |
| trans-1,3-Dichloropropene | 94 | | 86 | | 70-130 | 9 | | 30 |
| cis-1,3-Dichloropropene | 97 | | 90 | | 70-130 | 7 | | 30 |
| Bromoform | 87 | | 79 | | 70-130 | 10 | | 30 |
| 1,1,2,2-Tetrachloroethane | 82 | | 76 | | 70-130 | 8 | | 30 |
| Benzene | 99 | | 90 | | 70-130 | 10 | | 30 |
| Toluene | 97 | | 90 | | 70-130 | 7 | | 30 |
| Ethylbenzene | 101 | | 93 | | 70-130 | 8 | | 30 |
| Chloromethane | **139** | Q | 126 | | 52-130 | 10 | | 30 |
| Bromomethane | 112 | | 99 | | 57-147 | 12 | | 30 |
| Vinyl chloride | 126 | | 113 | | 67-130 | 11 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1808588-3 WG1808588-4 | | | | | | | | |
| Chloroethane | 116 | | 105 | | 50-151 | 10 | | 30 |
| 1,1-Dichloroethene | 104 | | 93 | | 65-135 | 11 | | 30 |
| trans-1,2-Dichloroethene | 102 | | 94 | | 70-130 | 8 | | 30 |
| Trichloroethene | 105 | | 94 | | 70-130 | 11 | | 30 |
| 1,2-Dichlorobenzene | 94 | | 87 | | 70-130 | 8 | | 30 |
| 1,3-Dichlorobenzene | 97 | | 88 | | 70-130 | 10 | | 30 |
| 1,4-Dichlorobenzene | 94 | | 86 | | 70-130 | 9 | | 30 |
| Methyl tert butyl ether | 108 | | 101 | | 66-130 | 7 | | 30 |
| p/m-Xylene | 100 | | 92 | | 70-130 | 8 | | 30 |
| o-Xylene | 97 | | 91 | | 70-130 | 6 | | 30 |
| cis-1,2-Dichloroethene | 97 | | 93 | | 70-130 | 4 | | 30 |
| Styrene | 99 | | 92 | | 70-130 | 7 | | 30 |
| Dichlorodifluoromethane | 105 | | 94 | | 30-146 | 11 | | 30 |
| Acetone | 94 | | 100 | | 54-140 | 6 | | 30 |
| Carbon disulfide | 98 | | 89 | | 59-130 | 10 | | 30 |
| 2-Butanone | 96 | | 77 | | 70-130 | 22 | | 30 |
| 4-Methyl-2-pentanone | 109 | | 104 | | 70-130 | 5 | | 30 |
| 2-Hexanone | 100 | | 93 | | 70-130 | 7 | | 30 |
| Bromochloromethane | 96 | | 88 | | 70-130 | 9 | | 30 |
| 1,2-Dibromoethane | 94 | | 87 | | 70-130 | 8 | | 30 |
| 1,2-Dibromo-3-chloropropane | 86 | | 78 | | 68-130 | 10 | | 30 |
| Isopropylbenzene | 100 | | 90 | | 70-130 | 11 | | 30 |
| 1,2,3-Trichlorobenzene | 93 | | 86 | | 70-130 | 8 | | 30 |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by GC/MS - Westborough Lab Associated sample(s): 01 Batch: WG1808588-3 WG1808588-4 | | | | | | | | |
| 1,2,4-Trichlorobenzene | 94 | | 87 | | 70-130 | 8 | | 30 |
| Methyl Acetate | 104 | | 94 | | 51-146 | 10 | | 30 |
| Cyclohexane | 130 | | 118 | | 59-142 | 10 | | 30 |
| 1,4-Dioxane | 93 | | 86 | | 65-136 | 8 | | 30 |
| Freon-113 | 102 | | 92 | | 50-139 | 10 | | 30 |
| Methyl cyclohexane | 99 | | 90 | | 70-130 | 10 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 102 | | 99 | | 70-130 |
| Toluene-d8 | 98 | | 98 | | 70-130 |
| 4-Bromofluorobenzene | 105 | | 104 | | 70-130 |
| Dibromofluoromethane | 94 | | 93 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab Associated sample(s): 01 Batch: WG1808893-3 WG1808893-4 | | | | | | | | |
| Chloroform | 110 | | 100 | | 70-130 | 10 | | 20 |
| Carbon tetrachloride | 120 | | 110 | | 63-132 | 9 | | 20 |
| Tetrachloroethene | 110 | | 100 | | 70-130 | 10 | | 20 |
| Chlorobenzene | 100 | | 98 | | 75-130 | 2 | | 25 |
| 1,2-Dichloroethane | 110 | | 110 | | 70-130 | 0 | | 20 |
| Benzene | 110 | | 100 | | 70-130 | 10 | | 25 |
| Vinyl chloride | 90 | | 79 | | 55-140 | 13 | | 20 |
| 1,1-Dichloroethene | 120 | | 110 | | 61-145 | 9 | | 25 |
| Trichloroethene | 110 | | 110 | | 70-130 | 0 | | 25 |
| 1,4-Dichlorobenzene | 100 | | 94 | | 70-130 | 6 | | 20 |
| 2-Butanone | 91 | | 95 | | 63-138 | 4 | | 20 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 102 | | 107 | | 70-130 |
| Toluene-d8 | 97 | | 96 | | 70-130 |
| 4-Bromofluorobenzene | 90 | | 92 | | 70-130 |
| dibromofluoromethane | 105 | | 107 | | 70-130 |

# PCBS

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

## SAMPLE RESULTS

Lab ID: L2340459-01
Client ID: BSS-01-07142023
Sample Location: OWEGO, NY

Date Collected: 07/14/23 11:45
Date Received: 07/14/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 07/27/23 02:47
Analyst: MEO
Percent Solids: 83%

Extraction Method: EPA 3546
Extraction Date: 07/26/23 04:45
Cleanup Method: EPA 3665A
Cleanup Date: 07/26/23
Cleanup Method: EPA 3660B
Cleanup Date: 07/26/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 55.1 | 4.90 | 1 | A |
| Aroclor 1221 | ND | | ug/kg | 55.1 | 5.52 | 1 | A |
| Aroclor 1232 | ND | | ug/kg | 55.1 | 11.7 | 1 | A |
| Aroclor 1242 | ND | | ug/kg | 55.1 | 7.43 | 1 | A |
| Aroclor 1248 | ND | | ug/kg | 55.1 | 8.27 | 1 | A |
| Aroclor 1254 | 189 | | ug/kg | 55.1 | 6.03 | 1 | B |
| Aroclor 1260 | ND | | ug/kg | 55.1 | 10.2 | 1 | A |
| Aroclor 1262 | ND | | ug/kg | 55.1 | 7.00 | 1 | A |
| Aroclor 1268 | ND | | ug/kg | 55.1 | 5.71 | 1 | A |
| PCBs, Total | 189 | | ug/kg | 55.1 | 4.90 | 1 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 44 | | 30-150 | A |
| Decachlorobiphenyl | 45 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 62 | | 30-150 | B |
| Decachlorobiphenyl | 62 | | 30-150 | B |

**Project Name:** SANMINA
**Project Number:** 0589878
**Lab Number:** L2340459
**Report Date:** 07/28/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8082A
Analytical Date: 07/26/23 23:11
Analyst: MEO

Extraction Method: EPA 3546
Extraction Date: 07/26/23 04:45
Cleanup Method: EPA 3665A
Cleanup Date: 07/26/23
Cleanup Method: EPA 3660B
Cleanup Date: 07/26/23

| Parameter | Result | Qualifier | Units | RL | MDL | Column |
|---|---|---|---|---|---|---|
| Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01 Batch: WG1807725-1 | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 47.1 | 4.18 | A |
| Aroclor 1221 | ND | | ug/kg | 47.1 | 4.72 | A |
| Aroclor 1232 | ND | | ug/kg | 47.1 | 9.99 | A |
| Aroclor 1242 | ND | | ug/kg | 47.1 | 6.35 | A |
| Aroclor 1248 | ND | | ug/kg | 47.1 | 7.07 | A |
| Aroclor 1254 | ND | | ug/kg | 47.1 | 5.16 | A |
| Aroclor 1260 | ND | | ug/kg | 47.1 | 8.71 | A |
| Aroclor 1262 | ND | | ug/kg | 47.1 | 5.98 | A |
| Aroclor 1268 | ND | | ug/kg | 47.1 | 4.88 | A |
| PCBs, Total | ND | | ug/kg | 47.1 | 4.18 | A |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 71 | | 30-150 | A |
| Decachlorobiphenyl | 56 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 68 | | 30-150 | B |
| Decachlorobiphenyl | 51 | | 30-150 | B |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** SANMINA

**Project Number:** 0589878

**Lab Number:** L2340459

**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits | Column |
|---|---|---|---|---|---|---|---|---|---|
| Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01 Batch: WG1807725-2 WG1807725-3 | | | | | | | | | |
| Aroclor 1016 | 76 | | 88 | | 40-140 | 15 | | 50 | A |
| Aroclor 1260 | 64 | | 64 | | 40-140 | 0 | | 50 | A |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria | Column |
|---|---|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 71 | | 73 | | 30-150 | A |
| Decachlorobiphenyl | 57 | | 57 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 66 | | 68 | | 30-150 | B |
| Decachlorobiphenyl | 52 | | 52 | | 30-150 | B |

# INORGANICS
# &
# MISCELLANEOUS

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

## SAMPLE RESULTS

Lab ID: L2340459-01
Client ID: BSS-01-07142023
Sample Location: OWEGO, NY

Date Collected: 07/14/23 11:45
Date Received: 07/14/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 83.2 | | % | 0.100 | NA | 1 | - | 07/15/23 12:42 | 121,2540G | ROI |
| pH (H) | 7.47 | | SU | - | NA | 1 | - | 07/27/23 13:06 | 1,9045D | LOF |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** SANMINA

**Project Number:** 0589878

**Lab Number:** L2340459

**Report Date:** 07/28/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| General Chemistry - Westborough Lab Associated sample(s): 01 Batch: WG1808585-1 | | | | | | | | |
| pH | 100 | | - | | 99-101 | - | | |

# Lab Duplicate Analysis

***Batch Quality Control***

**Project Name:** SANMINA
**Project Number:** 0589878

***Lab Number:*** L2340459
***Report Date:*** 07/28/23

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1803616-1 QC Sample: L2340624-21 Client ID: DUP Sample | | | | | | |
| Solids, Total | 84.6 | 85.0 | % | 0 | | 20 |
| General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG1808585-2 QC Sample: L2341852-01 Client ID: DUP Sample | | | | | | |
| pH | 12.0 | 12.0 | SU | 0 | | 5 |

**Project Name:** SANMINA
**Project Number:** 0589878

**Lab Number:** L2340459
**Report Date:** 07/28/23

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

### Cooler Information

| Cooler | Custody Seal |
|---|---|
| A | Absent |

### Container Information

| Container ID | Container Type | Cooler | Initial pH | Final pH | Temp deg C | Pres | Seal | Frozen Date/Time | Analysis(*) |
|---|---|---|---|---|---|---|---|---|---|
| L2340459-01A | Vial MeOH preserved | A | NA | | 5.4 | Y | Absent | | NYTCL-8260HLW-R2(14) |
| L2340459-01B | Vial water preserved | A | NA | | 5.4 | Y | Absent | 15-JUL-23 06:23 | NYTCL-8260HLW-R2(14) |
| L2340459-01C | Vial water preserved | A | NA | | 5.4 | Y | Absent | 15-JUL-23 06:23 | NYTCL-8260HLW-R2(14) |
| L2340459-01D | Plastic 2oz unpreserved for TS | A | NA | | 5.4 | Y | Absent | | TS(7) |
| L2340459-01E | Glass 60mL/2oz unpreserved | A | NA | | 5.4 | Y | Absent | | PH-9045(1),NYTCL-8082(365) |
| L2340459-01F | Vial Large Septa unpreserved (4oz) | A | NA | | 5.4 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2340459-01X | Vial unpreserved Extracts | A | NA | | 5.4 | Y | Absent | | TCLP-VOA(14) |
| L2340459-01Y | Vial unpreserved Extracts | A | NA | | 5.4 | Y | Absent | | TCLP-VOA(14) |



*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | SANMINA | **Lab Number:** | L2340459 |
| **Project Number:** | 0589878 | **Report Date:** | 07/28/23 |

## GLOSSARY

***Acronyms***

| | |
|---|---|
| DL | - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| EDL | - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME). |
| EMPC | - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration. |
| EPA | - Environmental Protection Agency. |
| LCS | - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LCSD | - Laboratory Control Sample Duplicate: Refer to LCS. |
| LFB | - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LOD | - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| LOQ | - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)<br><br>Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| MDL | - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| MS | - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values. |
| MSD | - Matrix Spike Sample Duplicate: Refer to MS. |
| NA | - Not Applicable. |
| NC | - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit. |
| NDPA/DPA | - N-Nitrosodiphenylamine/Diphenylamine. |
| NI | - Not Ignitable. |
| NP | - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil. |
| NR | - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests. |
| RL | - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| RPD | - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report. |
| SRM | - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples. |
| STLP | - Semi-dynamic Tank Leaching Procedure per EPA Method 1315. |
| TEF | - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD. |
| TEQ | - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values. |
| TIC | - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. |

*Report Format: DU Report with 'J' Qualifiers*

| | | | |
|---|---|---|---|
| **Project Name:** | SANMINA | **Lab Number:** | L2340459 |
| **Project Number:** | 0589878 | **Report Date:** | 07/28/23 |

***Footnotes***

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

***Terms***

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

***Data Qualifiers***

**A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively

*Report Format: DU Report with 'J' Qualifiers*

| | | | |
|---|---|---|---|
| **Project Name:** | SANMINA | **Lab Number:** | L2340459 |
| **Project Number:** | 0589878 | **Report Date:** | 07/28/23 |

***Data Qualifiers***

Identified Compounds (TICs). For calculated parameters, this represents that one or more values used in the calculation were estimated.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**V** - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

**Z** - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

| | | | |
|---|---|---|---|
| **Project Name:** | SANMINA | **Lab Number:** | L2340459 |
| **Project Number:** | 0589878 | **Report Date:** | 07/28/23 |

## REFERENCES


1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.


## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 624.1:** m/p-xylene, o-xylene, Naphthalene
**EPA 625.1:** alpha-Terpineol
**EPA 8260D:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270E:** NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
**SM4500**: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

**Mansfield Facility**
**SM 2540D:** TSS.
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
**Biological Tissue Matrix:** EPA 3050B

**The following analytes are included in our Massachusetts DEP Scope of Accreditation**

**Westborough Facility:**

***Drinking Water***
**EPA 300.0**: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
**EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

***Non-Potable Water***
**SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH:** Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
**EPA 624.1**: Volatile Halocarbons & Aromatics,
**EPA 608.3**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625.1**: SVOC (Acid/Base/Neutral Extractables).
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

**Mansfield Facility:**

***Drinking Water***
**EPA 200.7:** Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
**EPA 522, EPA 537.1.**

***Non-Potable Water***
**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
**EPA 200.8:** Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
**EPA 245.1** Hg.
**SM2340B**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

# NEW YORK CHAIN OF CUSTODY

ALPHA ANALYTICAL

Westborough, MA 01581
8 Walkup Dr.
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA 02048
320 Forbes Blvd
TEL: 508-822-9300
FAX: 508-822-3288

**Service Centers**
Mahwah, NJ 07430: 35 Whitney Rd, Suite 5
Albany, NY 12205: 14 Walker Way
Tonawanda, NY 14150: 275 Cooper Ave, Suite 105

Page 1 of 1

Date Rec'd in Lab: 7/15/23

ALPHA Job #: L2340459

## Client Information
Client: Rob Sents
Address: 5784 Widewaters Pkwy
Syracuse NY 13214
Phone: 315-256-5350
Fax:
Email: Rob.Sents@ERM.com

## Project Information
Project Name: Saminq
Project Location: Owego NY
Project # 0589878
(Use Project name as Project #) ☐
Project Manager: Rob. Sents
ALPHAQuote #:

## Turn-Around Time
Standard ☒ Due Date:
Rush (only if pre approved) ☐ # of Days:

## Deliverables
☐ ASP-A ☒ ASP-B
☒ EQuIS (1 File) ☐ EQuIS (4 File)
☒ Other EQUIS EDD

## Billing Information
☐ Same as Client Info
PO #

## Regulatory Requirement
☐ NY TOGS ☐ NY Part 375
☐ AWQ Standards ☐ NY CP-51
☐ NY Restricted Use ☐ Other
☐ NY Unrestricted Use
☐ NYC Sewer Discharge

## Disposal Site Information
Please identify below location of applicable disposal facilities.
Disposal Facility:
☐ NJ ☐ NY
☐ Other:

These samples have been previously analyzed by Alpha ☐

**Other project specific requirements/comments:**

Email:
EDD@ERM.com
Kevin.Warner@ERM.com

**Please specify Metals or TAL.**

## ANALYSIS

| ALPHA Lab ID (Lab Use Only) | Sample ID | Collection Date | Collection Time | Sample Matrix | Sampler's Initials | SM 2540 (KP) Solids, Total | EPA 8260D/5035 High TCL Volatiles | EPA 8082A TCL PCBs | EPA 8260C/1311 TCLP Volatile Organics | Sample Filtration | Sample Specific Comments | Total Bottle |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40459-01 | BSS-01-07142023 | 7/14/23 | 1145 | Soil | KP | X | X | X | X | | PID: 787.3 ppm | 6 |

Sample Filtration: ☐ Done ☐ Lab to do
Preservation: ☐ Lab to do
NA (Please Specify below)

Preservative Code:
A = None
B = HCl
C = $HNO_3$
D = $H_2SO_4$
E = NaOH
F = MeOH
G = $NaHSO_4$
H = $Na_2S_2O_3$
K/E = Zn Ac/NaOH
O = Other

Container Code
P = Plastic
A = Amber Glass
V = Vial
G = Glass
B = Bacteria Cup
C = Cube
O = Other
E = Encore
D = BOD Bottle

Westboro: Certification No: MA935
Mansfield: Certification No: MA015

| | | | | |
|---|---|---|---|---|
| Container Type | P | V | A | A |
| Preservative | A | F/HC | A | A |

| Relinquished By: | Date/Time | Received By: | Date/Time |
|---|---|---|---|
| | 7/14/23 1214 | | 7/14/23 1227 |
| | 7/14/23 1520 | | 7/14/23 1520 |
| | 7/14/23 1520 | | 7/15/23 0040 |

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. BY EXECUTING THIS COC, THE CLIENT HAS READ AND AGREES TO BE BOUND BY ALPHA'S TERMS & CONDITIONS. (See reverse side.)

Form No: 01-25 HC (rev. 30-Sept-2013)

ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L2361346 |
| Client: | Loureiro Engineering Associates, Inc.<br>100 Northwest Drive<br>Plainville, CT 06062 |
| ATTN: | Laurel Crawford |
| Phone: | (860) 410-3040 |
| Project Name: | ERM OSWEGO |
| Project Number: | Not Specified |
| Report Date: | 10/26/23 |

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Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L2361346-01 | ZVI 14 DAY | SOIL | Not Specified | 10/15/23 15:00 | 10/17/23 |
| L2361346-02 | AAP 14 DAY | SOIL | Not Specified | 10/15/23 15:10 | 10/17/23 |
| L2361346-03 | AAP CTRL 14 DAY | SOIL | Not Specified | 10/15/23 15:20 | 10/17/23 |

| | | | |
|---|---|---|---|
| **Project Name:** | ERM OSWEGO | **Lab Number:** | L2361346 |
| **Project Number:** | Not Specified | **Report Date:** | 10/26/23 |

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

| | | | |
|---|---|---|---|
| **Project Name:** | ERM OSWEGO | **Lab Number:** | L2361346 |
| **Project Number:** | Not Specified | **Report Date:** | 10/26/23 |

**Case Narrative (continued)**

Sample Receipt

L2361346-01 through -03: The water-preserved VOA vials for Volatile Organics Low-Level analysis were received at the laboratory beyond the 48 hour holding time required for freezing. The client was notified and the results of the analysis are reported.

PCBs

L2361346-03: The internal standard (IS) response for 1-bromo-2-nitrobenzene (353%) was above the acceptance criteria on column A; however, the sample was not re-analyzed due to obvious interferences. Since the IS response was above method criteria, all associated compounds reported from this column are considered to have a potentially low bias. The surrogate recoveries are outside the method acceptance criteria for 2,4,5,6-tetrachloro-m-xylene (19%) and decachlorobiphenyl (21%) due to interference with the Internal Standard.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Caitlin Walukevich

Caitlin Walukevich

Title: Technical Director/Representative

Date: 10/26/23

# ORGANICS

# VOLATILES

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-01
Client ID: ZVI 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:00
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 10/26/23 01:30
Analyst: MCM
Percent Solids: 79%
TCLP/SPLP Ext. Date: 10/24/23 06:33

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | 5.1 | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 102 | | 70-130 |
| Toluene-d8 | 96 | | 70-130 |
| 4-Bromofluorobenzene | 97 | | 70-130 |
| dibromofluoromethane | 90 | | 70-130 |

**Project Name:** ERM OSWEGO
**Lab Number:** L2361346
**Project Number:** Not Specified
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-01
Client ID: ZVI 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:00
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 10/26/23 14:29
Analyst: AJK
Percent Solids: 79%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 Low - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 3.7 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 0.74 | -- | 1 |
| Chloroform | ND | | ug/kg | 1.1 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 0.74 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 0.74 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 0.74 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 0.74 | -- | 1 |
| Tetrachloroethene | ND | | ug/kg | 0.37 | -- | 1 |
| Chlorobenzene | 0.65 | | ug/kg | 0.37 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 3.0 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 0.74 | -- | 1 |
| 1,1,1-Trichloroethane | ND | | ug/kg | 0.37 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 0.37 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 0.74 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 0.37 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 0.37 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 0.37 | -- | 1 |
| Bromoform | ND | | ug/kg | 3.0 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 0.37 | -- | 1 |
| Benzene | 0.67 | | ug/kg | 0.37 | -- | 1 |
| Toluene | 38 | | ug/kg | 0.74 | -- | 1 |
| Ethylbenzene | 15 | | ug/kg | 0.74 | -- | 1 |
| Chloromethane | ND | | ug/kg | 3.0 | -- | 1 |
| Bromomethane | ND | | ug/kg | 1.5 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 0.74 | -- | 1 |
| Chloroethane | ND | | ug/kg | 1.5 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 0.74 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 1.1 | -- | 1 |

**Project Name:** ERM OSWEGO **Lab Number:** L2361346

**Project Number:** Not Specified **Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-01 Date Collected: 10/15/23 15:00

Client ID: ZVI 14 DAY Date Received: 10/17/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 Low - Westborough Lab** | | | | | | |
| Trichloroethene | 8.5 | | ug/kg | 0.37 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 1.5 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 1.5 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 1.5 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 1.5 | -- | 1 |
| p/m-Xylene | 75 | | ug/kg | 1.5 | -- | 1 |
| o-Xylene | 22 | | ug/kg | 0.74 | -- | 1 |
| Xylenes, Total | 97 | | ug/kg | 0.74 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 0.74 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 0.74 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 1.5 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 1.5 | -- | 1 |
| Styrene | ND | | ug/kg | 0.74 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 7.4 | -- | 1 |
| Acetone | 140 | | ug/kg | 19 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 7.4 | -- | 1 |
| 2-Butanone | 31 | | ug/kg | 7.4 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 7.4 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 7.4 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 1.5 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 3.0 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 1.5 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 0.74 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 0.37 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 1.5 | -- | 1 |
| n-Butylbenzene | 4.0 | | ug/kg | 0.74 | -- | 1 |
| sec-Butylbenzene | 1.6 | | ug/kg | 0.74 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 1.5 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 1.5 | -- | 1 |
| o-Chlorotoluene | 24 | | ug/kg | 1.5 | -- | 1 |
| p-Chlorotoluene | 14 | | ug/kg | 1.5 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 2.2 | -- | 1 |
| Hexachlorobutadiene | ND | | ug/kg | 3.0 | -- | 1 |
| Isopropylbenzene | 2.5 | | ug/kg | 0.74 | -- | 1 |
| p-Isopropyltoluene | 2.5 | | ug/kg | 0.74 | -- | 1 |
| Naphthalene | 50 | | ug/kg | 3.0 | -- | 1 |
| n-Propylbenzene | 3.5 | | ug/kg | 0.74 | -- | 1 |

**Project Name:** ERM OSWEGO
**Lab Number:** L2361346
**Project Number:** Not Specified
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-01
Client ID: ZVI 14 DAY
Sample Location: Not Specified
Date Collected: 10/15/23 15:00
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 Low - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 1.5 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 1.5 | -- | 1 |
| 1,3,5-Trimethylbenzene | 7.2 | | ug/kg | 1.5 | -- | 1 |
| 1,2,4-Trimethylbenzene | 20 | | ug/kg | 1.5 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 1.5 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 1.5 | -- | 1 |
| Tert-Butyl Alcohol | 38 | | ug/kg | 15 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 1.5 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 1.5 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 60 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 94 | | 70-130 |
| Toluene-d8 | 106 | | 70-130 |
| 4-Bromofluorobenzene | 124 | | 70-130 |
| Dibromofluoromethane | 79 | | 70-130 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-02
Client ID: AAP 14 DAY
Sample Location: Not Specified
Date Collected: 10/15/23 15:10
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 10/26/23 01:54
Analyst: MCM
Percent Solids: 72%
TCLP/SPLP Ext. Date: 10/24/23 06:33

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | 110 | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | 27 | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | | 70-130 |
| Toluene-d8 | 90 | | 70-130 |
| 4-Bromofluorobenzene | 93 | | 70-130 |
| dibromofluoromethane | 96 | | 70-130 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-02
Client ID: AAP 14 DAY
Sample Location: Not Specified
Date Collected: 10/15/23 15:10
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 10/24/23 13:52
Analyst: JIC
Percent Solids: 72%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 290 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 57 | -- | 1 |
| Chloroform | ND | | ug/kg | 86 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 57 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 57 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 57 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 57 | -- | 1 |
| Tetrachloroethene | 4700 | | ug/kg | 29 | -- | 1 |
| Chlorobenzene | ND | | ug/kg | 29 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 230 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 57 | -- | 1 |
| 1,1,1-Trichloroethane | 560 | | ug/kg | 29 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 29 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 57 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 29 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 29 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 29 | -- | 1 |
| Bromoform | ND | | ug/kg | 230 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 29 | -- | 1 |
| Benzene | ND | | ug/kg | 29 | -- | 1 |
| Toluene | ND | | ug/kg | 57 | -- | 1 |
| Ethylbenzene | ND | | ug/kg | 57 | -- | 1 |
| Chloromethane | ND | | ug/kg | 230 | -- | 1 |
| Bromomethane | ND | | ug/kg | 110 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 57 | -- | 1 |
| Chloroethane | ND | | ug/kg | 110 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 57 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 86 | -- | 1 |

**Project Name:** ERM OSWEGO **Lab Number:** L2361346

**Project Number:** Not Specified **Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-02 Date Collected: 10/15/23 15:10

Client ID: AAP 14 DAY Date Received: 10/17/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 1700 | | ug/kg | 29 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 110 | -- | 1 |
| p/m-Xylene | ND | | ug/kg | 110 | -- | 1 |
| o-Xylene | ND | | ug/kg | 57 | -- | 1 |
| Xylenes, Total | ND | | ug/kg | 57 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 57 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 57 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 110 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 110 | -- | 1 |
| Styrene | ND | | ug/kg | 57 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 570 | -- | 1 |
| Acetone | ND | | ug/kg | 570 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 570 | -- | 1 |
| 2-Butanone | ND | | ug/kg | 570 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 570 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 570 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 110 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 230 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 110 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 57 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 29 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 110 | -- | 1 |
| n-Butylbenzene | ND | | ug/kg | 57 | -- | 1 |
| sec-Butylbenzene | ND | | ug/kg | 57 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| o-Chlorotoluene | ND | | ug/kg | 110 | -- | 1 |
| p-Chlorotoluene | ND | | ug/kg | 110 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 170 | -- | 1 |
| Hexachlorobutadiene | ND | | ug/kg | 230 | -- | 1 |
| Isopropylbenzene | ND | | ug/kg | 57 | -- | 1 |
| p-Isopropyltoluene | ND | | ug/kg | 57 | -- | 1 |
| Naphthalene | ND | | ug/kg | 230 | -- | 1 |
| n-Propylbenzene | ND | | ug/kg | 57 | -- | 1 |

**Project Name:** ERM OSWEGO **Lab Number:** L2361346

**Project Number:** Not Specified **Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-02 Date Collected: 10/15/23 15:10

Client ID: AAP 14 DAY Date Received: 10/17/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 110 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 110 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 110 | -- | 1 |
| Tert-Butyl Alcohol | ND | | ug/kg | 1100 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 110 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 110 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 4600 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 98 | | 70-130 |
| Toluene-d8 | 98 | | 70-130 |
| 4-Bromofluorobenzene | 98 | | 70-130 |
| Dibromofluoromethane | 91 | | 70-130 |

**Project Name:** ERM OSWEGO
**Lab Number:** L2361346
**Project Number:** Not Specified
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-03
Client ID: AAP CTRL 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:20
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 10/26/23 02:17
Analyst: MCM
Percent Solids: 77%
TCLP/SPLP Ext. Date: 10/24/23 06:33

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | 170 | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | 1100 | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 103 | | 70-130 |
| Toluene-d8 | 97 | | 70-130 |
| 4-Bromofluorobenzene | 98 | | 70-130 |
| dibromofluoromethane | 87 | | 70-130 |

**Project Name:** ERM OSWEGO
**Lab Number:** L2361346
**Project Number:** Not Specified
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-03
Client ID: AAP CTRL 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:20
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 10/24/23 14:15
Analyst: JIC
Percent Solids: 77%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 51 | -- | 1 |
| Chloroform | ND | | ug/kg | 76 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 51 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 51 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 51 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 51 | -- | 1 |
| Tetrachloroethene | 8700 | | ug/kg | 25 | -- | 1 |
| Chlorobenzene | ND | | ug/kg | 25 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 200 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 51 | -- | 1 |
| 1,1,1-Trichloroethane | 2400 | | ug/kg | 25 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 25 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 51 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 25 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 25 | -- | 1 |
| Bromoform | ND | | ug/kg | 200 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | -- | 1 |
| Benzene | ND | | ug/kg | 25 | -- | 1 |
| Toluene | 1500 | | ug/kg | 51 | -- | 1 |
| Ethylbenzene | 320 | | ug/kg | 51 | -- | 1 |
| Chloromethane | ND | | ug/kg | 200 | -- | 1 |
| Bromomethane | ND | | ug/kg | 100 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 51 | -- | 1 |
| Chloroethane | ND | | ug/kg | 100 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 51 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 76 | -- | 1 |

**Project Name:** ERM OSWEGO **Lab Number:** L2361346

**Project Number:** Not Specified **Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-03 Date Collected: 10/15/23 15:20

Client ID: AAP CTRL 14 DAY Date Received: 10/17/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 94000 | E | ug/kg | 25 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 100 | -- | 1 |
| p/m-Xylene | 1600 | | ug/kg | 100 | -- | 1 |
| o-Xylene | 410 | | ug/kg | 51 | -- | 1 |
| Xylenes, Total | 2000 | | ug/kg | 51 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 51 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 51 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 100 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 100 | -- | 1 |
| Styrene | ND | | ug/kg | 51 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 510 | -- | 1 |
| Acetone | ND | | ug/kg | 510 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 510 | -- | 1 |
| 2-Butanone | ND | | ug/kg | 510 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 510 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 510 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 100 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 200 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 100 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 51 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 25 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 100 | -- | 1 |
| n-Butylbenzene | 68 | | ug/kg | 51 | -- | 1 |
| sec-Butylbenzene | ND | | ug/kg | 51 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 100 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 100 | -- | 1 |
| o-Chlorotoluene | 340 | | ug/kg | 100 | -- | 1 |
| p-Chlorotoluene | 240 | | ug/kg | 100 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | -- | 1 |
| Hexachlorobutadiene | 210 | | ug/kg | 200 | -- | 1 |
| Isopropylbenzene | ND | | ug/kg | 51 | -- | 1 |
| p-Isopropyltoluene | ND | | ug/kg | 51 | -- | 1 |
| Naphthalene | 750 | | ug/kg | 200 | -- | 1 |
| n-Propylbenzene | ND | | ug/kg | 51 | -- | 1 |

**Project Name:** ERM OSWEGO **Lab Number:** L2361346

**Project Number:** Not Specified **Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-03 Date Collected: 10/15/23 15:20

Client ID: AAP CTRL 14 DAY Date Received: 10/17/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 100 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | -- | 1 |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 100 | -- | 1 |
| 1,2,4-Trimethylbenzene | 270 | | ug/kg | 100 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 100 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 100 | -- | 1 |
| Tert-Butyl Alcohol | ND | | ug/kg | 1000 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 100 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 100 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 4000 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 92 | | 70-130 |
| Toluene-d8 | 98 | | 70-130 |
| 4-Bromofluorobenzene | 98 | | 70-130 |
| Dibromofluoromethane | 92 | | 70-130 |

**Project Name:** ERM OSWEGO
**Lab Number:** L2361346
**Project Number:** Not Specified
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-03 D
Client ID: AAP CTRL 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:20
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 10/25/23 17:50
Analyst: JIC
Percent Solids: 77%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 76000 | | ug/kg | 510 | -- | 20 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 98 | | 70-130 |
| Toluene-d8 | 96 | | 70-130 |
| 4-Bromofluorobenzene | 95 | | 70-130 |
| Dibromofluoromethane | 101 | | 70-130 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/24/23 09:06
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 02-03 Batch: WG1844040-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | -- |
| 1,1-Dichloroethane | ND | | ug/kg | 50 | -- |
| Chloroform | ND | | ug/kg | 75 | -- |
| Carbon tetrachloride | ND | | ug/kg | 50 | -- |
| 1,2-Dichloropropane | ND | | ug/kg | 50 | -- |
| Dibromochloromethane | ND | | ug/kg | 50 | -- |
| 1,1,2-Trichloroethane | ND | | ug/kg | 50 | -- |
| Tetrachloroethene | ND | | ug/kg | 25 | -- |
| Chlorobenzene | ND | | ug/kg | 25 | -- |
| Trichlorofluoromethane | ND | | ug/kg | 200 | -- |
| 1,2-Dichloroethane | ND | | ug/kg | 50 | -- |
| 1,1,1-Trichloroethane | ND | | ug/kg | 25 | -- |
| Bromodichloromethane | ND | | ug/kg | 25 | -- |
| trans-1,3-Dichloropropene | ND | | ug/kg | 50 | -- |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | -- |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 25 | -- |
| 1,1-Dichloropropene | ND | | ug/kg | 25 | -- |
| Bromoform | ND | | ug/kg | 200 | -- |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Benzene | ND | | ug/kg | 25 | -- |
| Toluene | ND | | ug/kg | 50 | -- |
| Ethylbenzene | ND | | ug/kg | 50 | -- |
| Chloromethane | ND | | ug/kg | 200 | -- |
| Bromomethane | ND | | ug/kg | 100 | -- |
| Vinyl chloride | ND | | ug/kg | 50 | -- |
| Chloroethane | ND | | ug/kg | 100 | -- |
| 1,1-Dichloroethene | ND | | ug/kg | 50 | -- |
| trans-1,2-Dichloroethene | ND | | ug/kg | 75 | -- |
| Trichloroethene | ND | | ug/kg | 25 | -- |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/24/23 09:06
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 02-03 Batch: WG1844040-5 | | | | | |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| Methyl tert butyl ether | ND | | ug/kg | 100 | -- |
| p/m-Xylene | ND | | ug/kg | 100 | -- |
| o-Xylene | ND | | ug/kg | 50 | -- |
| Xylenes, Total | ND | | ug/kg | 50 | -- |
| cis-1,2-Dichloroethene | ND | | ug/kg | 50 | -- |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 50 | -- |
| Dibromomethane | ND | | ug/kg | 100 | -- |
| 1,2,3-Trichloropropane | ND | | ug/kg | 100 | -- |
| Styrene | ND | | ug/kg | 50 | -- |
| Dichlorodifluoromethane | ND | | ug/kg | 500 | -- |
| Acetone | ND | | ug/kg | 500 | -- |
| Carbon disulfide | ND | | ug/kg | 500 | -- |
| 2-Butanone | ND | | ug/kg | 500 | -- |
| 4-Methyl-2-pentanone | ND | | ug/kg | 500 | -- |
| 2-Hexanone | ND | | ug/kg | 500 | -- |
| Bromochloromethane | ND | | ug/kg | 100 | -- |
| Tetrahydrofuran | ND | | ug/kg | 200 | -- |
| 2,2-Dichloropropane | ND | | ug/kg | 100 | -- |
| 1,2-Dibromoethane | ND | | ug/kg | 50 | -- |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Bromobenzene | ND | | ug/kg | 100 | -- |
| n-Butylbenzene | ND | | ug/kg | 50 | -- |
| sec-Butylbenzene | ND | | ug/kg | 50 | -- |
| tert-Butylbenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| o-Chlorotoluene | ND | | ug/kg | 100 | -- |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/24/23 09:06
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 02-03 Batch: WG1844040-5 | | | | | |
| p-Chlorotoluene | ND | | ug/kg | 100 | -- |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | -- |
| Hexachlorobutadiene | ND | | ug/kg | 200 | -- |
| Isopropylbenzene | ND | | ug/kg | 50 | -- |
| p-Isopropyltoluene | ND | | ug/kg | 50 | -- |
| Naphthalene | ND | | ug/kg | 200 | -- |
| n-Propylbenzene | ND | | ug/kg | 50 | -- |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| Ethyl ether | ND | | ug/kg | 100 | -- |
| Isopropyl Ether | ND | | ug/kg | 100 | -- |
| Tert-Butyl Alcohol | ND | | ug/kg | 1000 | -- |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 100 | -- |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 100 | -- |
| 1,4-Dioxane | ND | | ug/kg | 4000 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 102 | | 70-130 |
| Toluene-d8 | 98 | | 70-130 |
| 4-Bromofluorobenzene | 97 | | 70-130 |
| Dibromofluoromethane | 101 | | 70-130 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/25/23 20:21
Analyst: MAG
TCLP/SPLP Extraction Date: 10/24/23 06:33

Extraction Date: 10/24/23 06:33

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab for sample(s): 01-03 Batch: WG1844415-5 | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- |
| Tetrachloroethene | ND | | ug/l | 5.0 | -- |
| Chlorobenzene | ND | | ug/l | 5.0 | -- |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- |
| Benzene | ND | | ug/l | 5.0 | -- |
| Vinyl chloride | ND | | ug/l | 10 | -- |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- |
| Trichloroethene | ND | | ug/l | 5.0 | -- |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- |
| 2-Butanone | ND | | ug/l | 50 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | | 70-130 |
| Toluene-d8 | 96 | | 70-130 |
| 4-Bromofluorobenzene | 107 | | 70-130 |
| dibromofluoromethane | 86 | | 70-130 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/25/23 12:24
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 03 Batch: WG1844453-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | -- |
| 1,1-Dichloroethane | ND | | ug/kg | 50 | -- |
| Chloroform | ND | | ug/kg | 75 | -- |
| Carbon tetrachloride | ND | | ug/kg | 50 | -- |
| 1,2-Dichloropropane | ND | | ug/kg | 50 | -- |
| Dibromochloromethane | ND | | ug/kg | 50 | -- |
| 1,1,2-Trichloroethane | ND | | ug/kg | 50 | -- |
| Tetrachloroethene | ND | | ug/kg | 25 | -- |
| Chlorobenzene | ND | | ug/kg | 25 | -- |
| Trichlorofluoromethane | ND | | ug/kg | 200 | -- |
| 1,2-Dichloroethane | ND | | ug/kg | 50 | -- |
| 1,1,1-Trichloroethane | ND | | ug/kg | 25 | -- |
| Bromodichloromethane | ND | | ug/kg | 25 | -- |
| trans-1,3-Dichloropropene | ND | | ug/kg | 50 | -- |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | -- |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 25 | -- |
| 1,1-Dichloropropene | ND | | ug/kg | 25 | -- |
| Bromoform | ND | | ug/kg | 200 | -- |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Benzene | ND | | ug/kg | 25 | -- |
| Toluene | ND | | ug/kg | 50 | -- |
| Ethylbenzene | ND | | ug/kg | 50 | -- |
| Chloromethane | ND | | ug/kg | 200 | -- |
| Bromomethane | ND | | ug/kg | 100 | -- |
| Vinyl chloride | ND | | ug/kg | 50 | -- |
| Chloroethane | ND | | ug/kg | 100 | -- |
| 1,1-Dichloroethene | ND | | ug/kg | 50 | -- |
| trans-1,2-Dichloroethene | ND | | ug/kg | 75 | -- |
| Trichloroethene | ND | | ug/kg | 25 | -- |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/25/23 12:24
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 03 Batch: WG1844453-5 | | | | | |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| Methyl tert butyl ether | ND | | ug/kg | 100 | -- |
| p/m-Xylene | ND | | ug/kg | 100 | -- |
| o-Xylene | ND | | ug/kg | 50 | -- |
| Xylenes, Total | ND | | ug/kg | 50 | -- |
| cis-1,2-Dichloroethene | ND | | ug/kg | 50 | -- |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 50 | -- |
| Dibromomethane | ND | | ug/kg | 100 | -- |
| 1,2,3-Trichloropropane | ND | | ug/kg | 100 | -- |
| Styrene | ND | | ug/kg | 50 | -- |
| Dichlorodifluoromethane | ND | | ug/kg | 500 | -- |
| Acetone | ND | | ug/kg | 500 | -- |
| Carbon disulfide | ND | | ug/kg | 500 | -- |
| 2-Butanone | ND | | ug/kg | 500 | -- |
| 4-Methyl-2-pentanone | ND | | ug/kg | 500 | -- |
| 2-Hexanone | ND | | ug/kg | 500 | -- |
| Bromochloromethane | ND | | ug/kg | 100 | -- |
| Tetrahydrofuran | ND | | ug/kg | 200 | -- |
| 2,2-Dichloropropane | ND | | ug/kg | 100 | -- |
| 1,2-Dibromoethane | ND | | ug/kg | 50 | -- |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Bromobenzene | ND | | ug/kg | 100 | -- |
| n-Butylbenzene | ND | | ug/kg | 50 | -- |
| sec-Butylbenzene | ND | | ug/kg | 50 | -- |
| tert-Butylbenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| o-Chlorotoluene | ND | | ug/kg | 100 | -- |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/25/23 12:24
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 03 Batch: WG1844453-5 | | | | | |
| p-Chlorotoluene | ND | | ug/kg | 100 | -- |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | -- |
| Hexachlorobutadiene | ND | | ug/kg | 200 | -- |
| Isopropylbenzene | ND | | ug/kg | 50 | -- |
| p-Isopropyltoluene | ND | | ug/kg | 50 | -- |
| Naphthalene | ND | | ug/kg | 200 | -- |
| n-Propylbenzene | ND | | ug/kg | 50 | -- |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| Ethyl ether | ND | | ug/kg | 100 | -- |
| Isopropyl Ether | ND | | ug/kg | 100 | -- |
| Tert-Butyl Alcohol | ND | | ug/kg | 1000 | -- |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 100 | -- |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 100 | -- |
| 1,4-Dioxane | ND | | ug/kg | 4000 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 104 | | 70-130 |
| Toluene-d8 | 99 | | 70-130 |
| 4-Bromofluorobenzene | 99 | | 70-130 |
| Dibromofluoromethane | 102 | | 70-130 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/26/23 13:11
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01 Batch: WG1844721-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 5.0 | -- |
| 1,1-Dichloroethane | ND | | ug/kg | 1.0 | -- |
| Chloroform | ND | | ug/kg | 1.5 | -- |
| Carbon tetrachloride | ND | | ug/kg | 1.0 | -- |
| 1,2-Dichloropropane | ND | | ug/kg | 1.0 | -- |
| Dibromochloromethane | ND | | ug/kg | 1.0 | -- |
| 1,1,2-Trichloroethane | ND | | ug/kg | 1.0 | -- |
| Tetrachloroethene | ND | | ug/kg | 0.50 | -- |
| Chlorobenzene | ND | | ug/kg | 0.50 | -- |
| Trichlorofluoromethane | ND | | ug/kg | 4.0 | -- |
| 1,2-Dichloroethane | ND | | ug/kg | 1.0 | -- |
| 1,1,1-Trichloroethane | ND | | ug/kg | 0.50 | -- |
| Bromodichloromethane | ND | | ug/kg | 0.50 | -- |
| trans-1,3-Dichloropropene | ND | | ug/kg | 1.0 | -- |
| cis-1,3-Dichloropropene | ND | | ug/kg | 0.50 | -- |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 0.50 | -- |
| 1,1-Dichloropropene | ND | | ug/kg | 0.50 | -- |
| Bromoform | ND | | ug/kg | 4.0 | -- |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 0.50 | -- |
| Benzene | ND | | ug/kg | 0.50 | -- |
| Toluene | ND | | ug/kg | 1.0 | -- |
| Ethylbenzene | ND | | ug/kg | 1.0 | -- |
| Chloromethane | ND | | ug/kg | 4.0 | -- |
| Bromomethane | ND | | ug/kg | 2.0 | -- |
| Vinyl chloride | ND | | ug/kg | 1.0 | -- |
| Chloroethane | ND | | ug/kg | 2.0 | -- |
| 1,1-Dichloroethene | ND | | ug/kg | 1.0 | -- |
| trans-1,2-Dichloroethene | ND | | ug/kg | 1.5 | -- |
| Trichloroethene | ND | | ug/kg | 0.50 | -- |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/26/23 13:11
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01 Batch: WG1844721-5 | | | | | |
| 1,2-Dichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,3-Dichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,4-Dichlorobenzene | ND | | ug/kg | 2.0 | -- |
| Methyl tert butyl ether | ND | | ug/kg | 2.0 | -- |
| p/m-Xylene | ND | | ug/kg | 2.0 | -- |
| o-Xylene | ND | | ug/kg | 1.0 | -- |
| Xylenes, Total | ND | | ug/kg | 1.0 | -- |
| cis-1,2-Dichloroethene | ND | | ug/kg | 1.0 | -- |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 1.0 | -- |
| Dibromomethane | ND | | ug/kg | 2.0 | -- |
| 1,2,3-Trichloropropane | ND | | ug/kg | 2.0 | -- |
| Styrene | ND | | ug/kg | 1.0 | -- |
| Dichlorodifluoromethane | ND | | ug/kg | 10 | -- |
| Acetone | ND | | ug/kg | 25 | -- |
| Carbon disulfide | ND | | ug/kg | 10 | -- |
| 2-Butanone | ND | | ug/kg | 10 | -- |
| 4-Methyl-2-pentanone | ND | | ug/kg | 10 | -- |
| 2-Hexanone | ND | | ug/kg | 10 | -- |
| Bromochloromethane | ND | | ug/kg | 2.0 | -- |
| Tetrahydrofuran | ND | | ug/kg | 4.0 | -- |
| 2,2-Dichloropropane | ND | | ug/kg | 2.0 | -- |
| 1,2-Dibromoethane | ND | | ug/kg | 1.0 | -- |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 0.50 | -- |
| Bromobenzene | ND | | ug/kg | 2.0 | -- |
| n-Butylbenzene | ND | | ug/kg | 1.0 | -- |
| sec-Butylbenzene | ND | | ug/kg | 1.0 | -- |
| tert-Butylbenzene | ND | | ug/kg | 2.0 | -- |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 2.0 | -- |
| o-Chlorotoluene | ND | | ug/kg | 2.0 | -- |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 10/26/23 13:11
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01 Batch: WG1844721-5 | | | | | |
| p-Chlorotoluene | ND | | ug/kg | 2.0 | -- |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 3.0 | -- |
| Hexachlorobutadiene | ND | | ug/kg | 4.0 | -- |
| Isopropylbenzene | ND | | ug/kg | 1.0 | -- |
| p-Isopropyltoluene | ND | | ug/kg | 1.0 | -- |
| Naphthalene | ND | | ug/kg | 4.0 | -- |
| n-Propylbenzene | ND | | ug/kg | 1.0 | -- |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 2.0 | -- |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 2.0 | -- |
| Ethyl ether | ND | | ug/kg | 2.0 | -- |
| Isopropyl Ether | ND | | ug/kg | 2.0 | -- |
| Tert-Butyl Alcohol | ND | | ug/kg | 20 | -- |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 2.0 | -- |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 2.0 | -- |
| 1,4-Dioxane | ND | | ug/kg | 80 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 91 | | 70-130 |
| Toluene-d8 | 104 | | 70-130 |
| 4-Bromofluorobenzene | 114 | | 70-130 |
| Dibromofluoromethane | 82 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-03 Batch: WG1844040-3 WG1844040-4 | | | | | | | | |
| Methylene chloride | 82 | | 84 | | 70-130 | 2 | | 30 |
| 1,1-Dichloroethane | 87 | | 88 | | 70-130 | 1 | | 30 |
| Chloroform | 88 | | 90 | | 70-130 | 2 | | 30 |
| Carbon tetrachloride | 93 | | 96 | | 70-130 | 3 | | 30 |
| 1,2-Dichloropropane | 87 | | 90 | | 70-130 | 3 | | 30 |
| Dibromochloromethane | 87 | | 89 | | 70-130 | 2 | | 30 |
| 1,1,2-Trichloroethane | 86 | | 88 | | 70-130 | 2 | | 30 |
| Tetrachloroethene | 98 | | 100 | | 70-130 | 2 | | 30 |
| Chlorobenzene | 90 | | 91 | | 70-130 | 1 | | 30 |
| Trichlorofluoromethane | 87 | | 89 | | 70-139 | 2 | | 30 |
| 1,2-Dichloroethane | 85 | | 87 | | 70-130 | 2 | | 30 |
| 1,1,1-Trichloroethane | 96 | | 98 | | 70-130 | 2 | | 30 |
| Bromodichloromethane | 88 | | 91 | | 70-130 | 3 | | 30 |
| trans-1,3-Dichloropropene | 80 | | 82 | | 70-130 | 2 | | 30 |
| cis-1,3-Dichloropropene | 92 | | 95 | | 70-130 | 3 | | 30 |
| 1,1-Dichloropropene | 96 | | 99 | | 70-130 | 3 | | 30 |
| Bromoform | 84 | | 86 | | 70-130 | 2 | | 30 |
| 1,1,2,2-Tetrachloroethane | 83 | | 84 | | 70-130 | 1 | | 30 |
| Benzene | 88 | | 91 | | 70-130 | 3 | | 30 |
| Toluene | 88 | | 90 | | 70-130 | 2 | | 30 |
| Ethylbenzene | 91 | | 93 | | 70-130 | 2 | | 30 |
| Chloromethane | 83 | | 86 | | 52-130 | 4 | | 30 |
| Bromomethane | 97 | | 96 | | 57-147 | 1 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-03 Batch: WG1844040-3 WG1844040-4 | | | | | | | | |
| Vinyl chloride | 86 | | 87 | | 67-130 | 1 | | 30 |
| Chloroethane | 83 | | 87 | | 50-151 | 5 | | 30 |
| 1,1-Dichloroethene | 88 | | 94 | | 65-135 | 7 | | 30 |
| trans-1,2-Dichloroethene | 92 | | 95 | | 70-130 | 3 | | 30 |
| Trichloroethene | 91 | | 94 | | 70-130 | 3 | | 30 |
| 1,2-Dichlorobenzene | 89 | | 90 | | 70-130 | 1 | | 30 |
| 1,3-Dichlorobenzene | 89 | | 90 | | 70-130 | 1 | | 30 |
| 1,4-Dichlorobenzene | 88 | | 88 | | 70-130 | 0 | | 30 |
| Methyl tert butyl ether | 88 | | 92 | | 66-130 | 4 | | 30 |
| p/m-Xylene | 95 | | 96 | | 70-130 | 1 | | 30 |
| o-Xylene | 94 | | 95 | | 70-130 | 1 | | 30 |
| cis-1,2-Dichloroethene | 89 | | 91 | | 70-130 | 2 | | 30 |
| Dibromomethane | 85 | | 88 | | 70-130 | 3 | | 30 |
| 1,2,3-Trichloropropane | 83 | | 82 | | 68-130 | 1 | | 30 |
| Styrene | 83 | | 84 | | 70-130 | 1 | | 30 |
| Dichlorodifluoromethane | 88 | | 89 | | 30-146 | 1 | | 30 |
| Acetone | 91 | | 90 | | 54-140 | 1 | | 30 |
| Carbon disulfide | 87 | | 89 | | 59-130 | 2 | | 30 |
| 2-Butanone | 80 | | 80 | | 70-130 | 0 | | 30 |
| 4-Methyl-2-pentanone | 90 | | 90 | | 70-130 | 0 | | 30 |
| 2-Hexanone | 86 | | 84 | | 70-130 | 2 | | 30 |
| Bromochloromethane | 89 | | 91 | | 70-130 | 2 | | 30 |
| Tetrahydrofuran | 86 | | 83 | | 66-130 | 4 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-03 Batch: WG1844040-3 WG1844040-4 | | | | | | | | |
| 2,2-Dichloropropane | 95 | | 98 | | 70-130 | 3 | | 30 |
| 1,2-Dibromoethane | 94 | | 95 | | 70-130 | 1 | | 30 |
| 1,1,1,2-Tetrachloroethane | 93 | | 96 | | 70-130 | 3 | | 30 |
| Bromobenzene | 89 | | 90 | | 70-130 | 1 | | 30 |
| n-Butylbenzene | 93 | | 92 | | 70-130 | 1 | | 30 |
| sec-Butylbenzene | 92 | | 93 | | 70-130 | 1 | | 30 |
| tert-Butylbenzene | 93 | | 93 | | 70-130 | 0 | | 30 |
| 1,3,5-Trichlorobenzene | 95 | | 94 | | 70-139 | 1 | | 30 |
| o-Chlorotoluene | 87 | | 89 | | 70-130 | 2 | | 30 |
| p-Chlorotoluene | 89 | | 90 | | 70-130 | 1 | | 30 |
| 1,2-Dibromo-3-chloropropane | 85 | | 87 | | 68-130 | 2 | | 30 |
| Hexachlorobutadiene | 95 | | 96 | | 67-130 | 1 | | 30 |
| Isopropylbenzene | 92 | | 93 | | 70-130 | 1 | | 30 |
| p-Isopropyltoluene | 94 | | 95 | | 70-130 | 1 | | 30 |
| Naphthalene | 90 | | 92 | | 70-130 | 2 | | 30 |
| n-Propylbenzene | 90 | | 91 | | 70-130 | 1 | | 30 |
| 1,2,3-Trichlorobenzene | 92 | | 93 | | 70-130 | 1 | | 30 |
| 1,2,4-Trichlorobenzene | 94 | | 92 | | 70-130 | 2 | | 30 |
| 1,3,5-Trimethylbenzene | 92 | | 92 | | 70-130 | 0 | | 30 |
| 1,2,4-Trimethylbenzene | 92 | | 93 | | 70-130 | 1 | | 30 |
| Ethyl ether | 83 | | 85 | | 67-130 | 2 | | 30 |
| Isopropyl Ether | 86 | | 88 | | 66-130 | 2 | | 30 |
| Tert-Butyl Alcohol | 94 | | 93 | | 70-130 | 1 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-03 Batch: WG1844040-3 WG1844040-4 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 90 | | 91 | | 70-130 | 1 | | 30 |
| Tertiary-Amyl Methyl Ether | 91 | | 92 | | 70-130 | 1 | | 30 |
| 1,4-Dioxane | 97 | | 108 | | 65-136 | 11 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 94 | | 94 | | 70-130 |
| Toluene-d8 | 99 | | 99 | | 70-130 |
| 4-Bromofluorobenzene | 98 | | 98 | | 70-130 |
| Dibromofluoromethane | 97 | | 99 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab Associated sample(s): 01-03 Batch: WG1844415-3 WG1844415-4 | | | | | | | | |
| Chloroform | 97 | | 91 | | 70-130 | 6 | | 20 |
| Carbon tetrachloride | 95 | | 88 | | 63-132 | 8 | | 20 |
| Tetrachloroethene | 120 | | 110 | | 70-130 | 9 | | 20 |
| Chlorobenzene | 110 | | 110 | | 75-130 | 0 | | 25 |
| 1,2-Dichloroethane | 100 | | 100 | | 70-130 | 0 | | 20 |
| Benzene | 96 | | 88 | | 70-130 | 9 | | 25 |
| Vinyl chloride | 68 | | 64 | | 55-140 | 6 | | 20 |
| 1,1-Dichloroethene | 88 | | 82 | | 61-145 | 7 | | 25 |
| Trichloroethene | 86 | | 81 | | 70-130 | 6 | | 25 |
| 1,4-Dichlorobenzene | 110 | | 110 | | 70-130 | 0 | | 20 |
| 2-Butanone | 92 | | 82 | | 63-138 | 11 | | 20 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 99 | | 97 | | 70-130 |
| Toluene-d8 | 101 | | 98 | | 70-130 |
| 4-Bromofluorobenzene | 93 | | 94 | | 70-130 |
| dibromofluoromethane | 85 | | 84 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 03 Batch: WG1844453-3 WG1844453-4 | | | | | | | | |
| Methylene chloride | 91 | | 86 | | 70-130 | 6 | | 30 |
| 1,1-Dichloroethane | 96 | | 86 | | 70-130 | 11 | | 30 |
| Chloroform | 97 | | 90 | | 70-130 | 7 | | 30 |
| Carbon tetrachloride | 103 | | 93 | | 70-130 | 10 | | 30 |
| 1,2-Dichloropropane | 96 | | 89 | | 70-130 | 8 | | 30 |
| Dibromochloromethane | 91 | | 90 | | 70-130 | 1 | | 30 |
| 1,1,2-Trichloroethane | 90 | | 89 | | 70-130 | 1 | | 30 |
| Tetrachloroethene | 108 | | 94 | | 70-130 | 14 | | 30 |
| Chlorobenzene | 98 | | 90 | | 70-130 | 9 | | 30 |
| Trichlorofluoromethane | 94 | | 82 | | 70-139 | 14 | | 30 |
| 1,2-Dichloroethane | 89 | | 88 | | 70-130 | 1 | | 30 |
| 1,1,1-Trichloroethane | 104 | | 93 | | 70-130 | 11 | | 30 |
| Bromodichloromethane | 94 | | 90 | | 70-130 | 4 | | 30 |
| trans-1,3-Dichloropropene | 86 | | 82 | | 70-130 | 5 | | 30 |
| cis-1,3-Dichloropropene | 100 | | 96 | | 70-130 | 4 | | 30 |
| 1,1-Dichloropropene | 109 | | 94 | | 70-130 | 15 | | 30 |
| Bromoform | 84 | | 87 | | 70-130 | 4 | | 30 |
| 1,1,2,2-Tetrachloroethane | 82 | | 84 | | 70-130 | 2 | | 30 |
| Benzene | 99 | | 89 | | 70-130 | 11 | | 30 |
| Toluene | 98 | | 87 | | 70-130 | 12 | | 30 |
| Ethylbenzene | 100 | | 90 | | 70-130 | 11 | | 30 |
| Chloromethane | 100 | | 86 | | 52-130 | 15 | | 30 |
| Bromomethane | 107 | | 94 | | 57-147 | 13 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 03 Batch: WG1844453-3 WG1844453-4 | | | | | | | | |
| Vinyl chloride | 97 | | 82 | | 67-130 | 17 | | 30 |
| Chloroethane | 94 | | 83 | | 50-151 | 12 | | 30 |
| 1,1-Dichloroethene | 102 | | 88 | | 65-135 | 15 | | 30 |
| trans-1,2-Dichloroethene | 102 | | 91 | | 70-130 | 11 | | 30 |
| Trichloroethene | 101 | | 92 | | 70-130 | 9 | | 30 |
| 1,2-Dichlorobenzene | 96 | | 90 | | 70-130 | 6 | | 30 |
| 1,3-Dichlorobenzene | 98 | | 89 | | 70-130 | 10 | | 30 |
| 1,4-Dichlorobenzene | 97 | | 89 | | 70-130 | 9 | | 30 |
| Methyl tert butyl ether | 92 | | 94 | | 66-130 | 2 | | 30 |
| p/m-Xylene | 103 | | 93 | | 70-130 | 10 | | 30 |
| o-Xylene | 102 | | 93 | | 70-130 | 9 | | 30 |
| cis-1,2-Dichloroethene | 98 | | 92 | | 70-130 | 6 | | 30 |
| Dibromomethane | 87 | | 89 | | 70-130 | 2 | | 30 |
| 1,2,3-Trichloropropane | 80 | | 83 | | 68-130 | 4 | | 30 |
| Styrene | 89 | | 84 | | 70-130 | 6 | | 30 |
| Dichlorodifluoromethane | 102 | | 85 | | 30-146 | 18 | | 30 |
| Acetone | 80 | | 95 | | 54-140 | 17 | | 30 |
| Carbon disulfide | 98 | | 85 | | 59-130 | 14 | | 30 |
| 2-Butanone | 73 | | 85 | | 70-130 | 15 | | 30 |
| 4-Methyl-2-pentanone | 81 | | 91 | | 70-130 | 12 | | 30 |
| 2-Hexanone | 76 | | 88 | | 70-130 | 15 | | 30 |
| Bromochloromethane | 93 | | 91 | | 70-130 | 2 | | 30 |
| Tetrahydrofuran | 77 | | 84 | | 66-130 | 9 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 03 Batch: WG1844453-3 WG1844453-4 | | | | | | | | |
| 2,2-Dichloropropane | 107 | | 95 | | 70-130 | 12 | | 30 |
| 1,2-Dibromoethane | 95 | | 96 | | 70-130 | 1 | | 30 |
| 1,1,1,2-Tetrachloroethane | 103 | | 94 | | 70-130 | 9 | | 30 |
| Bromobenzene | 96 | | 89 | | 70-130 | 8 | | 30 |
| n-Butylbenzene | 106 | | 90 | | 70-130 | 16 | | 30 |
| sec-Butylbenzene | 104 | | 90 | | 70-130 | 14 | | 30 |
| tert-Butylbenzene | 103 | | 90 | | 70-130 | 13 | | 30 |
| 1,3,5-Trichlorobenzene | 104 | | 94 | | 70-139 | 10 | | 30 |
| o-Chlorotoluene | 95 | | 88 | | 70-130 | 8 | | 30 |
| p-Chlorotoluene | 99 | | 88 | | 70-130 | 12 | | 30 |
| 1,2-Dibromo-3-chloropropane | 74 | | 86 | | 68-130 | 15 | | 30 |
| Hexachlorobutadiene | 107 | | 92 | | 67-130 | 15 | | 30 |
| Isopropylbenzene | 103 | | 90 | | 70-130 | 13 | | 30 |
| p-Isopropyltoluene | 106 | | 92 | | 70-130 | 14 | | 30 |
| Naphthalene | 88 | | 93 | | 70-130 | 6 | | 30 |
| n-Propylbenzene | 102 | | 88 | | 70-130 | 15 | | 30 |
| 1,2,3-Trichlorobenzene | 98 | | 94 | | 70-130 | 4 | | 30 |
| 1,2,4-Trichlorobenzene | 101 | | 94 | | 70-130 | 7 | | 30 |
| 1,3,5-Trimethylbenzene | 102 | | 90 | | 70-130 | 13 | | 30 |
| 1,2,4-Trimethylbenzene | 102 | | 91 | | 70-130 | 11 | | 30 |
| Ethyl ether | 81 | | 86 | | 67-130 | 6 | | 30 |
| Isopropyl Ether | 96 | | 89 | | 66-130 | 8 | | 30 |
| Tert-Butyl Alcohol | 76 | | 96 | | 70-130 | 23 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 03 Batch: WG1844453-3 WG1844453-4 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 97 | | 93 | | 70-130 | 4 | | 30 |
| Tertiary-Amyl Methyl Ether | 94 | | 94 | | 70-130 | 0 | | 30 |
| 1,4-Dioxane | 85 | | 97 | | 65-136 | 13 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 91 | | 97 | | 70-130 |
| Toluene-d8 | 100 | | 98 | | 70-130 |
| 4-Bromofluorobenzene | 97 | | 96 | | 70-130 |
| Dibromofluoromethane | 95 | | 97 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1844721-3 WG1844721-4 | | | | | | | | |
| Methylene chloride | 77 | | 75 | | 70-130 | 3 | | 30 |
| 1,1-Dichloroethane | 93 | | 90 | | 70-130 | 3 | | 30 |
| Chloroform | 81 | | 78 | | 70-130 | 4 | | 30 |
| Carbon tetrachloride | 86 | | 84 | | 70-130 | 2 | | 30 |
| 1,2-Dichloropropane | 94 | | 92 | | 70-130 | 2 | | 30 |
| Dibromochloromethane | 98 | | 94 | | 70-130 | 4 | | 30 |
| 1,1,2-Trichloroethane | 92 | | 88 | | 70-130 | 4 | | 30 |
| Tetrachloroethene | 96 | | 91 | | 70-130 | 5 | | 30 |
| Chlorobenzene | 99 | | 97 | | 70-130 | 2 | | 30 |
| Trichlorofluoromethane | 76 | | 75 | | 70-139 | 1 | | 30 |
| 1,2-Dichloroethane | 91 | | 88 | | 70-130 | 3 | | 30 |
| 1,1,1-Trichloroethane | 85 | | 83 | | 70-130 | 2 | | 30 |
| Bromodichloromethane | 82 | | 80 | | 70-130 | 2 | | 30 |
| trans-1,3-Dichloropropene | 102 | | 98 | | 70-130 | 4 | | 30 |
| cis-1,3-Dichloropropene | 86 | | 85 | | 70-130 | 1 | | 30 |
| 1,1-Dichloropropene | 90 | | 87 | | 70-130 | 3 | | 30 |
| Bromoform | 93 | | 91 | | 70-130 | 2 | | 30 |
| 1,1,2,2-Tetrachloroethane | 97 | | 97 | | 70-130 | 0 | | 30 |
| Benzene | 86 | | 83 | | 70-130 | 4 | | 30 |
| Toluene | 98 | | 94 | | 70-130 | 4 | | 30 |
| Ethylbenzene | 101 | | 98 | | 70-130 | 3 | | 30 |
| Chloromethane | 100 | | 94 | | 52-130 | 6 | | 30 |
| Bromomethane | 66 | | 65 | | 57-147 | 2 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1844721-3 WG1844721-4 | | | | | | | | |
| Vinyl chloride | 85 | | 77 | | 67-130 | 10 | | 30 |
| Chloroethane | 80 | | 77 | | 50-151 | 4 | | 30 |
| 1,1-Dichloroethene | 79 | | 76 | | 65-135 | 4 | | 30 |
| trans-1,2-Dichloroethene | 81 | | 77 | | 70-130 | 5 | | 30 |
| Trichloroethene | 89 | | 83 | | 70-130 | 7 | | 30 |
| 1,2-Dichlorobenzene | 104 | | 101 | | 70-130 | 3 | | 30 |
| 1,3-Dichlorobenzene | 105 | | 101 | | 70-130 | 4 | | 30 |
| 1,4-Dichlorobenzene | 104 | | 101 | | 70-130 | 3 | | 30 |
| Methyl tert butyl ether | 81 | | 78 | | 66-130 | 4 | | 30 |
| p/m-Xylene | 101 | | 98 | | 70-130 | 3 | | 30 |
| o-Xylene | 99 | | 96 | | 70-130 | 3 | | 30 |
| cis-1,2-Dichloroethene | 81 | | 78 | | 70-130 | 4 | | 30 |
| Dibromomethane | 77 | | 74 | | 70-130 | 4 | | 30 |
| 1,2,3-Trichloropropane | 104 | | 102 | | 68-130 | 2 | | 30 |
| Styrene | 97 | | 94 | | 70-130 | 3 | | 30 |
| Dichlorodifluoromethane | 68 | | 65 | | 30-146 | 5 | | 30 |
| Acetone | 88 | | 82 | | 54-140 | 7 | | 30 |
| Carbon disulfide | 79 | | 77 | | 59-130 | 3 | | 30 |
| 2-Butanone | 94 | | 92 | | 70-130 | 2 | | 30 |
| 4-Methyl-2-pentanone | 111 | | 102 | | 70-130 | 8 | | 30 |
| 2-Hexanone | 109 | | 104 | | 70-130 | 5 | | 30 |
| Bromochloromethane | 80 | | 78 | | 70-130 | 3 | | 30 |
| Tetrahydrofuran | 88 | | 83 | | 66-130 | 6 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1844721-3 WG1844721-4 | | | | | | | | |
| 2,2-Dichloropropane | 86 | | 83 | | 70-130 | 4 | | 30 |
| 1,2-Dibromoethane | 100 | | 96 | | 70-130 | 4 | | 30 |
| 1,1,1,2-Tetrachloroethane | 100 | | 97 | | 70-130 | 3 | | 30 |
| Bromobenzene | 99 | | 100 | | 70-130 | 1 | | 30 |
| n-Butylbenzene | 114 | | 111 | | 70-130 | 3 | | 30 |
| sec-Butylbenzene | 113 | | 110 | | 70-130 | 3 | | 30 |
| tert-Butylbenzene | 113 | | 110 | | 70-130 | 3 | | 30 |
| 1,3,5-Trichlorobenzene | 98 | | 96 | | 70-139 | 2 | | 30 |
| o-Chlorotoluene | 111 | | 123 | | 70-130 | 10 | | 30 |
| p-Chlorotoluene | 112 | | 110 | | 70-130 | 2 | | 30 |
| 1,2-Dibromo-3-chloropropane | 94 | | 94 | | 68-130 | 0 | | 30 |
| Hexachlorobutadiene | 92 | | 91 | | 67-130 | 1 | | 30 |
| Isopropylbenzene | 114 | | 110 | | 70-130 | 4 | | 30 |
| p-Isopropyltoluene | 114 | | 111 | | 70-130 | 3 | | 30 |
| Naphthalene | 105 | | 104 | | 70-130 | 1 | | 30 |
| n-Propylbenzene | 112 | | 110 | | 70-130 | 2 | | 30 |
| 1,2,3-Trichlorobenzene | 95 | | 95 | | 70-130 | 0 | | 30 |
| 1,2,4-Trichlorobenzene | 100 | | 98 | | 70-130 | 2 | | 30 |
| 1,3,5-Trimethylbenzene | 112 | | 110 | | 70-130 | 2 | | 30 |
| 1,2,4-Trimethylbenzene | 112 | | 110 | | 70-130 | 2 | | 30 |
| Ethyl ether | 76 | | 76 | | 67-130 | 0 | | 30 |
| Isopropyl Ether | 103 | | 101 | | 66-130 | 2 | | 30 |
| Tert-Butyl Alcohol | 88 | | 83 | | 70-130 | 6 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1844721-3 WG1844721-4 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 97 | | 95 | | 70-130 | 2 | | 30 |
| Tertiary-Amyl Methyl Ether | 81 | | 80 | | 70-130 | 1 | | 30 |
| 1,4-Dioxane | 86 | | 84 | | 65-136 | 2 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 90 | | 92 | | 70-130 |
| Toluene-d8 | 104 | | 102 | | 70-130 |
| 4-Bromofluorobenzene | 114 | | 115 | | 70-130 |
| Dibromofluoromethane | 83 | | 84 | | 70-130 |

# PCBS

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-01
Client ID: ZVI 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:00
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 10/20/23 16:21
Analyst: MEO
Percent Solids: 79%

Extraction Method: EPA 3546
Extraction Date: 10/19/23 19:34
Cleanup Method: EPA 3665A
Cleanup Date: 10/20/23
Cleanup Method: EPA 3660B
Cleanup Date: 10/20/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1221 | ND | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1232 | ND | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1242 | ND | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1248 | ND | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1254 | 469 | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1260 | ND | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1262 | ND | | ug/kg | 61.0 | -- | 1 | A |
| Aroclor 1268 | ND | | ug/kg | 61.0 | -- | 1 | B |
| PCBs, Total | 469 | | ug/kg | 61.0 | -- | 1 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 61 | | 30-150 | A |
| Decachlorobiphenyl | 66 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 52 | | 30-150 | B |
| Decachlorobiphenyl | 50 | | 30-150 | B |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-02
Client ID: AAP 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:10
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 10/20/23 16:30
Analyst: MEO
Percent Solids: 72%

Extraction Method: EPA 3546
Extraction Date: 10/19/23 19:34
Cleanup Method: EPA 3665A
Cleanup Date: 10/20/23
Cleanup Method: EPA 3660B
Cleanup Date: 10/20/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 67.2 | -- | 1 | A |
| Aroclor 1221 | ND | | ug/kg | 67.2 | -- | 1 | A |
| Aroclor 1232 | ND | | ug/kg | 67.2 | -- | 1 | A |
| Aroclor 1242 | ND | | ug/kg | 67.2 | -- | 1 | A |
| Aroclor 1248 | ND | | ug/kg | 67.2 | -- | 1 | A |
| Aroclor 1254 | 354 | | ug/kg | 67.2 | -- | 1 | B |
| Aroclor 1260 | ND | | ug/kg | 67.2 | -- | 1 | A |
| Aroclor 1262 | ND | | ug/kg | 67.2 | -- | 1 | A |
| Aroclor 1268 | ND | | ug/kg | 67.2 | -- | 1 | B |
| PCBs, Total | 354 | | ug/kg | 67.2 | -- | 1 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 44 | | 30-150 | A |
| Decachlorobiphenyl | 41 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 68 | | 30-150 | B |
| Decachlorobiphenyl | 56 | | 30-150 | B |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-03
Client ID: AAP CTRL 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:20
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 10/20/23 16:40
Analyst: MEO
Percent Solids: 77%

Extraction Method: EPA 3546
Extraction Date: 10/19/23 19:34
Cleanup Method: EPA 3665A
Cleanup Date: 10/20/23
Cleanup Method: EPA 3660B
Cleanup Date: 10/20/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1221 | ND | | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1232 | ND | | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1242 | ND | | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1248 | ND | | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1254 | 270 | P | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1260 | ND | | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1262 | ND | | ug/kg | 61.4 | -- | 1 | B |
| Aroclor 1268 | ND | | ug/kg | 61.4 | -- | 1 | B |
| PCBs, Total | 270 | | ug/kg | 61.4 | -- | 1 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | **19** | Q | 30-150 | A |
| Decachlorobiphenyl | **21** | Q | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 38 | | 30-150 | B |
| Decachlorobiphenyl | 38 | | 30-150 | B |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8082A
Analytical Date: 10/19/23 10:20
Analyst: MEO

Extraction Method: EPA 3546
Extraction Date: 10/18/23 21:52
Cleanup Method: EPA 3665A
Cleanup Date: 10/19/23
Cleanup Method: EPA 3660B
Cleanup Date: 10/19/23

| Parameter | Result | Qualifier | Units | RL | MDL | Column |
|---|---|---|---|---|---|---|
| Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01-03 Batch: WG1841523-1 | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1221 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1232 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1242 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1248 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1254 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1260 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1262 | ND | | ug/kg | 49.0 | -- | A |
| Aroclor 1268 | ND | | ug/kg | 49.0 | -- | A |
| PCBs, Total | ND | | ug/kg | 49.0 | -- | A |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 85 | | 30-150 | A |
| Decachlorobiphenyl | 73 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 89 | | 30-150 | B |
| Decachlorobiphenyl | 74 | | 30-150 | B |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits | Column |
|---|---|---|---|---|---|---|---|---|---|
| Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01-03 Batch: WG1841523-2 WG1841523-3 | | | | | | | | | |
| Aroclor 1016 | 71 | | 72 | | 40-140 | 1 | | 50 | A |
| Aroclor 1260 | 60 | | 60 | | 40-140 | 0 | | 50 | A |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria | Column |
|---|---|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 81 | | 82 | | 30-150 | A |
| Decachlorobiphenyl | 72 | | 72 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 89 | | 88 | | 30-150 | B |
| Decachlorobiphenyl | 73 | | 71 | | 30-150 | B |

# METALS

**Project Name:** ERM OSWEGO
**Lab Number:** L2361346
**Project Number:** Not Specified
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-01
Client ID: ZVI 14 DAY
Sample Location: Not Specified
Date Collected: 10/15/23 15:00
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Percent Solids: 79%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Prep Method | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Metals - Mansfield Lab** | | | | | | | | | | | |
| Iron, Total | 55800 | | mg/kg | 24.4 | -- | 10 | 10/20/23 10:00 | 10/23/23 12:43 | EPA 3050B | 1,6010D | TAA |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified
**Lab Number:** L2361346
**Report Date:** 10/26/23

# Method Blank Analysis
# Batch Quality Control

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab for sample(s): 01 Batch: WG1841388-1 | | | | | | | | | | |
| Iron, Total | ND | | mg/kg | 2.00 | -- | 1 | 10/20/23 10:00 | 10/20/23 21:43 | 1,6010D | JMF |

**Prep Information**

Digestion Method: EPA 3050B

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** ERM OSWEGO

**Project Number:** Not Specified

**Lab Number:** L2361346

**Report Date:** 10/26/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab Associated sample(s): 01 Batch: WG1841388-2 SRM Lot Number: D119-540 | | | | | | | | |
| Iron, Total | 93 | | - | | 60-140 | - | | |

# Matrix Spike Analysis
## Batch Quality Control

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | Native Sample | MS Added | MS Found | MS %Recovery | Qual | MSD Found | MSD %Recovery | Qual | Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1841388-3 WG1841388-4 QC Sample: L2361412-10 Client ID: MS Sample | | | | | | | | | | | | |
| Iron, Total | 7550 | 100 | 8540 | **988** | Q | 8500 | **978** | Q | 75-125 | 0 | | 20 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

# Lab Serial Dilution Analysis
**Batch Quality Control**

**Lab Number:** L2361346
**Report Date:** 10/26/23

| Parameter | Native Sample | Serial Dilution | Units | % D | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1841388-6 QC Sample: L2361412-10 Client ID: DUP Sample | | | | | | |
| Iron, Total | 7550 | 7810 | mg/kg | 3 | | 20 |

# INORGANICS
# &
# MISCELLANEOUS

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-01
Client ID: ZVI 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:00
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 78.5 | | % | 0.100 | NA | 1 | - | 10/18/23 01:59 | 121,2540G | WJM |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-02
Client ID: AAP 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:10
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 72.4 | | % | 0.100 | NA | 1 | - | 10/18/23 01:59 | 121,2540G | WJM |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

## SAMPLE RESULTS

Lab ID: L2361346-03
Client ID: AAP CTRL 14 DAY
Sample Location: Not Specified

Date Collected: 10/15/23 15:20
Date Received: 10/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 76.7 | | % | 0.100 | NA | 1 | - | 10/18/23 01:59 | 121,2540G | WJM |

# Lab Duplicate Analysis
## *Batch Quality Control*

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

***Lab Number:*** L2361346
***Report Date:*** 10/26/23

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG1840995-1 QC Sample: L2361346-01 Client ID: ZVI 14 DAY | | | | | | |
| Solids, Total | 78.5 | 78.9 | % | 1 | | 20 |

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

### Cooler Information

| Cooler | Custody Seal |
|---|---|
| A | Absent |

### Container Information

| Container ID | Container Type | Cooler | Initial pH | Final pH | Temp deg C | Pres | Seal | Frozen Date/Time | Analysis(*) |
|---|---|---|---|---|---|---|---|---|---|
| L2361346-01A | Vial MeOH preserved | A | NA | | 3.6 | Y | Absent | | 8260HLW-NH(14) |
| L2361346-01B | Vial water preserved | A | NA | | 3.6 | Y | Absent | **17-OCT-23 23:18** | 8260HLW-NH(14) |
| L2361346-01C | Vial water preserved | A | NA | | 3.6 | Y | Absent | **17-OCT-23 23:18** | 8260HLW-NH(14) |
| L2361346-01D | Plastic 2oz unpreserved for TS | A | NA | | 3.6 | Y | Absent | | TS(7) |
| L2361346-01E | Glass 60mL/2oz unpreserved | A | NA | | 3.6 | Y | Absent | | PCB-8082(365) |
| L2361346-01F | Glass 120ml/4oz unpreserved | A | NA | | 3.6 | Y | Absent | | FE-TI(180) |
| L2361346-01G | Vial Large Septa unpreserved (4oz) | A | NA | | 3.6 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2361346-01T | Vial unpreserved Extracts | A | NA | | 3.6 | Y | Absent | | TCLP-VOA(14) |
| L2361346-01U | Vial unpreserved Extracts | A | NA | | 3.6 | Y | Absent | | TCLP-VOA(14) |
| L2361346-02A | Vial MeOH preserved | A | NA | | 3.6 | Y | Absent | | 8260HLW-NH(14) |
| L2361346-02B | Vial water preserved | A | NA | | 3.6 | Y | Absent | **17-OCT-23 23:18** | 8260HLW-NH(14) |
| L2361346-02C | Vial water preserved | A | NA | | 3.6 | Y | Absent | **17-OCT-23 23:18** | 8260HLW-NH(14) |
| L2361346-02D | Plastic 2oz unpreserved for TS | A | NA | | 3.6 | Y | Absent | | TS(7) |
| L2361346-02E | Glass 60mL/2oz unpreserved | A | NA | | 3.6 | Y | Absent | | PCB-8082(365) |
| L2361346-02F | Vial Large Septa unpreserved (4oz) | A | NA | | 3.6 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2361346-02T | Vial unpreserved Extracts | A | NA | | 3.6 | Y | Absent | | TCLP-VOA(14) |
| L2361346-02U | Vial unpreserved Extracts | A | NA | | 3.6 | Y | Absent | | TCLP-VOA(14) |
| L2361346-03A | Vial MeOH preserved | A | NA | | 3.6 | Y | Absent | | 8260HLW-NH(14) |
| L2361346-03B | Vial water preserved | A | NA | | 3.6 | Y | Absent | **17-OCT-23 23:18** | 8260HLW-NH(14) |
| L2361346-03C | Vial water preserved | A | NA | | 3.6 | Y | Absent | **17-OCT-23 23:18** | 8260HLW-NH(14) |
| L2361346-03D | Plastic 2oz unpreserved for TS | A | NA | | 3.6 | Y | Absent | | TS(7) |
| L2361346-03E | Glass 60mL/2oz unpreserved | A | NA | | 3.6 | Y | Absent | | PCB-8082(365) |
| L2361346-03F | Vial Large Septa unpreserved (4oz) | A | NA | | 3.6 | Y | Absent | | TCLP-EXT-ZHE(14) |



*Values in parentheses indicate holding time in days

**Project Name:** ERM OSWEGO
**Project Number:** Not Specified

**Lab Number:** L2361346
**Report Date:** 10/26/23

***Container Information***

| Container ID | Container Type | Cooler | Initial pH | Final pH | Temp deg C | Pres | Seal | Frozen Date/Time | Analysis(*) |
|---|---|---|---|---|---|---|---|---|---|
| L2361346-03T | Vial unpreserved Extracts | A | NA | | 3.6 | Y | Absent | | TCLP-VOA(14) |
| L2361346-03U | Vial unpreserved Extracts | A | NA | | 3.6 | Y | Absent | | TCLP-VOA(14) |



*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | ERM OSWEGO | **Lab Number:** | L2361346 |
| **Project Number:** | Not Specified | **Report Date:** | 10/26/23 |

## GLOSSARY

***Acronyms***

| | |
|---|---|
| DL | - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| EDL | - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME). |
| EMPC | - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration. |
| EPA | - Environmental Protection Agency. |
| LCS | - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LCSD | - Laboratory Control Sample Duplicate: Refer to LCS. |
| LFB | - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LOD | - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| LOQ | - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)<br><br>Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| MDL | - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| MS | - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values. |
| MSD | - Matrix Spike Sample Duplicate: Refer to MS. |
| NA | - Not Applicable. |
| NC | - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit. |
| NDPA/DPA | - N-Nitrosodiphenylamine/Diphenylamine. |
| NI | - Not Ignitable. |
| NP | - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil. |
| NR | - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests. |
| RL | - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| RPD | - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report. |
| SRM | - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples. |
| STLP | - Semi-dynamic Tank Leaching Procedure per EPA Method 1315. |
| TEF | - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD. |
| TEQ | - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values. |
| TIC | - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. |

*Report Format: Data Usability Report*

| | | | |
|---|---|---|---|
| **Project Name:** | ERM OSWEGO | **Lab Number:** | L2361346 |
| **Project Number:** | Not Specified | **Report Date:** | 10/26/23 |

***Footnotes***

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

***Terms***

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

***Data Qualifiers***

**A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

*Report Format: Data Usability Report*

| | | | |
|---|---|---|---|
| **Project Name:** | ERM OSWEGO | **Lab Number:** | L2361346 |
| **Project Number:** | Not Specified | **Report Date:** | 10/26/23 |

***Data Qualifiers***

**ND** - Not detected at the reporting limit (RL) for the sample.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**V** - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

**Z** - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

*Report Format: Data Usability Report*

| | | | |
|---|---|---|---|
| **Project Name:** | ERM OSWEGO | **Lab Number:** | L2361346 |
| **Project Number:** | Not Specified | **Report Date:** | 10/26/23 |

## REFERENCES


1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.


## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 624.1:** m/p-xylene, o-xylene, Naphthalene
**EPA 625.1:** alpha-Terpineol
**EPA 8260D:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270E:** NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
**SM4500**: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

**Mansfield Facility**
**SM 2540D:** TSS.
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
**Biological Tissue Matrix:** EPA 3050B

**The following analytes are included in our Massachusetts DEP Scope of Accreditation**

**Westborough Facility:**

***Drinking Water***
**EPA 300.0**: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
**EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

***Non-Potable Water***
**SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH:** Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
**EPA 624.1**: Volatile Halocarbons & Aromatics,
**EPA 608.3**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625.1**: SVOC (Acid/Base/Neutral Extractables).
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

**Mansfield Facility:**

***Drinking Water***
**EPA 200.7:** Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
**EPA 522, EPA 537.1.**

***Non-Potable Water***
**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
**EPA 200.8:** Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
**EPA 245.1** Hg.
**SM2340B**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

# CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 10-17-2023

ALPHA Job #: L2361346

ALPHA ANALYTICAL
8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

**Client Information**

Client: Loureiro

Address: 112 Corporate Drive #2
Portsmouth, NH 03801

Phone: 603-778-1100

Email: Lcrawford@Loureiro.com

**Project Information**

Project Name: ERM Osweco

Project Location:

Project #:

Project Manager: Laurel Crawford

ALPHA Quote #:

**Turn-Around Time**

☒ Standard ☐ RUSH (only confirmed if pre-approved)

Date Due:

**Report Information - Data Deliverables**

☐ ADEx ☐ EMAIL

**Billing Information**

☐ Same as Client info PO #: 1073

**Regulatory Requirements & Project Information Requirements**

☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:
Billing to corporate office in Plainville, CT
accountspayable@Loureiro.com

ANALYSIS

VOC: ☒ 8260 ☐ 624 ☐ 524.2
SVOC: ☐ ABN ☐ PAH
METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15
METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13
EPH: ☐ Ranges & Targets ☐ Ranges Only
VPH: ☐ Ranges & Targets ☐ Ranges Only
☒ PCB ☐ PEST
TPH: ☐ Quant Only ☐ Fingerprint
TCL VOCs
Iron

SAMPLE INFO
Filtration
☐ Field
☐ Lab to do
Preservation
☐ Lab to do

| ALPHA Lab ID (Lab Use Only) | Sample ID | Collection Date | Collection Time | Sample Matrix | Sampler Initials | VOC | | | | | | | | | | | | | | | | Sample Comments | TOTAL # BOTTLES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 61346 -01 | ZVI 14 day | 10/15/23 | 1500 | soil | GG | 4 | | | | | | | 1 | | 1 | 1 | | | | | | | 7 |
| -02 | AAP 14-day | ↓ | 1510 | ↓ | ↓ | 4 | | | | | | | 1 | | 1 | | | | | | | | 6 |
| -03 | AAP ctrl 14 day | ↓ | 1520 | ↓ | ↓ | 4 | | | | | | | 1 | | 1 | | | | | | | | 6 |

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Container Type | V | | | | | | | | | | | | A | | A | A | | | | | | | |
| Preservative | B/F/A | | | | | | | | | | | | A | | A | A | | | | | | | |

**Container Type**
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

**Preservative**
A= None
B= HCl
C= $HNO_3$
D= $H_2SO_4$
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = $NH_4Cl$
K= Zn Acetate
O= Other

| Relinquished By: | Date/Time | Received By: | Date/Time |
|---|---|---|---|
| | 10/17/23 9:24 | AAL | 10/17/23 0924 |
| AAL | 10/17/23 1320 | | 10/17/23 1320 |
| | 10/17/23 | | 10/17/23 |

All samples submitted are subject to Alpha's Terms and Conditions.
See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L2364654 |
| Client: | Loureiro Engineering Associates, Inc.<br>100 Northwest Drive<br>Plainville, CT 06062 |
| ATTN: | Laurel Crawford |
| Phone: | (860) 410-3040 |
| Project Name: | ERM GROUP |
| Project Number: | Not Specified |
| Report Date: | 11/09/23 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0826), IL (200077), IN (C-MA-03), KY (KY98045), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), OH (CL108), OR (MA-1316), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #525-23-122-91930).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L2364654-01 | ZVI 30 DAY | SOIL | Not Specified | 10/31/23 10:00 | 10/31/23 |
| L2364654-02 | ZVI CTRL 30 DAY | SOIL | Not Specified | 10/31/23 12:00 | 10/31/23 |
| L2364654-03 | AAP 30 DAY | SOIL | Not Specified | 10/31/23 12:10 | 10/31/23 |
| L2364654-04 | AAP CTRL 30 DAY | SOIL | Not Specified | 10/31/23 12:30 | 10/31/23 |
| L2364654-05 | AAP CTRL DUP 30 DAY | SOIL | Not Specified | 10/31/23 14:00 | 10/31/23 |

| | | | |
|---|---|---|---|
| **Project Name:** | ERM GROUP | **Lab Number:** | L2364654 |
| **Project Number:** | Not Specified | **Report Date:** | 11/09/23 |

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

**Case Narrative (continued)**

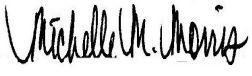
Volatile Organics

L2364654-01: The sample was analyzed as a High Level Methanol in order to quantitate results within the calibration range. The result should be considered estimated, and is qualified with an E flag, for any compound that exceeded the calibration on the initial Low Level analysis. The results of both analyses are reported. Differences were noted between the results of the analyses which have been attributed to vial discrepancies.

PCBs

L2364654-04D: The internal standard (IS) response for 1-bromo-2-nitrobenzene (216%) was above the acceptance criteria on column A; however, the sample was not re-analyzed due to obvious interferences. Since the IS response was above method criteria, all associated compounds reported from this column are considered to have a potentially low bias.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Michelle M. Morris

Title: Technical Director/Representative Date: 11/09/23

# ORGANICS

# VOLATILES

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/07/23 22:25
Analyst: MCM
Percent Solids: 78%
TCLP/SPLP Ext. Date: 11/06/23 08:03

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 120 | | 70-130 |
| Toluene-d8 | 98 | | 70-130 |
| 4-Bromofluorobenzene | 90 | | 70-130 |
| dibromofluoromethane | 114 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/08/23 17:12
Analyst: LAC
Percent Solids: 78%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 Low - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 3.4 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 0.69 | -- | 1 |
| Chloroform | ND | | ug/kg | 1.0 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 0.69 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 0.69 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 0.69 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 0.69 | -- | 1 |
| Tetrachloroethene | ND | | ug/kg | 0.34 | -- | 1 |
| Chlorobenzene | 0.60 | | ug/kg | 0.34 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 2.8 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 0.69 | -- | 1 |
| 1,1,1-Trichloroethane | ND | | ug/kg | 0.34 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 0.34 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 0.69 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 0.34 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 0.34 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 0.34 | -- | 1 |
| Bromoform | ND | | ug/kg | 2.8 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 0.34 | -- | 1 |
| Benzene | 0.82 | | ug/kg | 0.34 | -- | 1 |
| Toluene | 24 | | ug/kg | 0.69 | -- | 1 |
| Ethylbenzene | 12 | | ug/kg | 0.69 | -- | 1 |
| Chloromethane | ND | | ug/kg | 2.8 | -- | 1 |
| Bromomethane | ND | | ug/kg | 1.4 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 0.69 | -- | 1 |
| Chloroethane | ND | | ug/kg | 1.4 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 0.69 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 1.0 | -- | 1 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 Low - Westborough Lab** | | | | | | |
| Trichloroethene | 6.2 | | ug/kg | 0.34 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 1.4 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 1.4 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 1.4 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 1.4 | -- | 1 |
| p/m-Xylene | 61 | | ug/kg | 1.4 | -- | 1 |
| o-Xylene | 17 | | ug/kg | 0.69 | -- | 1 |
| Xylenes, Total | 78 | | ug/kg | 0.69 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 0.69 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 0.69 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 1.4 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 1.4 | -- | 1 |
| Styrene | ND | | ug/kg | 0.69 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 6.9 | -- | 1 |
| Acetone | 230 | E | ug/kg | 17 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 6.9 | -- | 1 |
| 2-Butanone | 32 | | ug/kg | 6.9 | -- | 1 |
| 4-Methyl-2-pentanone | 8.2 | | ug/kg | 6.9 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 6.9 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 1.4 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 2.8 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 1.4 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 0.69 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 0.34 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 1.4 | -- | 1 |
| n-Butylbenzene | 3.7 | | ug/kg | 0.69 | -- | 1 |
| sec-Butylbenzene | 1.3 | | ug/kg | 0.69 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 1.4 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 1.4 | -- | 1 |
| o-Chlorotoluene | 20 | | ug/kg | 1.4 | -- | 1 |
| p-Chlorotoluene | 13 | | ug/kg | 1.4 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 2.1 | -- | 1 |
| Hexachlorobutadiene | ND | | ug/kg | 2.8 | -- | 1 |
| Isopropylbenzene | 1.8 | | ug/kg | 0.69 | -- | 1 |
| p-Isopropyltoluene | 2.1 | | ug/kg | 0.69 | -- | 1 |
| Naphthalene | 58 | | ug/kg | 2.8 | -- | 1 |
| n-Propylbenzene | 2.9 | | ug/kg | 0.69 | -- | 1 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 Low - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 1.4 | -- | 1 |
| 1,2,4-Trichlorobenzene | 1.4 | | ug/kg | 1.4 | -- | 1 |
| 1,3,5-Trimethylbenzene | 6.0 | | ug/kg | 1.4 | -- | 1 |
| 1,2,4-Trimethylbenzene | 18 | | ug/kg | 1.4 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 1.4 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 1.4 | -- | 1 |
| Tert-Butyl Alcohol | 62 | | ug/kg | 14 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 1.4 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 1.4 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 55 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 95 | | 70-130 |
| Toluene-d8 | 102 | | 70-130 |
| 4-Bromofluorobenzene | 108 | | 70-130 |
| Dibromofluoromethane | 94 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/09/23 05:59
Analyst: JIC
Percent Solids: 78%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 240 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 48 | -- | 1 |
| Chloroform | ND | | ug/kg | 72 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 48 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 48 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 48 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 48 | -- | 1 |
| Tetrachloroethene | ND | | ug/kg | 24 | -- | 1 |
| Chlorobenzene | ND | | ug/kg | 24 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 190 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 48 | -- | 1 |
| 1,1,1-Trichloroethane | ND | | ug/kg | 24 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 24 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 48 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 24 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 24 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 24 | -- | 1 |
| Bromoform | ND | | ug/kg | 190 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 24 | -- | 1 |
| Benzene | ND | | ug/kg | 24 | -- | 1 |
| Toluene | 88 | | ug/kg | 48 | -- | 1 |
| Ethylbenzene | ND | | ug/kg | 48 | -- | 1 |
| Chloromethane | ND | | ug/kg | 190 | -- | 1 |
| Bromomethane | ND | | ug/kg | 97 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 48 | -- | 1 |
| Chloroethane | ND | | ug/kg | 97 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 48 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 72 | -- | 1 |

**Project Name:** ERM GROUP **Lab Number:** L2364654

**Project Number:** Not Specified **Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01 Date Collected: 10/31/23 10:00

Client ID: ZVI 30 DAY Date Received: 10/31/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 230 | | ug/kg | 24 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 97 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 97 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 97 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 97 | -- | 1 |
| p/m-Xylene | 200 | | ug/kg | 97 | -- | 1 |
| o-Xylene | 66 | | ug/kg | 48 | -- | 1 |
| Xylenes, Total | 270 | | ug/kg | 48 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 48 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 48 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 97 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 97 | -- | 1 |
| Styrene | ND | | ug/kg | 48 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 480 | -- | 1 |
| Acetone | ND | | ug/kg | 480 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 480 | -- | 1 |
| 2-Butanone | ND | | ug/kg | 480 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 480 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 480 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 97 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 190 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 97 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 48 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 24 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 97 | -- | 1 |
| n-Butylbenzene | ND | | ug/kg | 48 | -- | 1 |
| sec-Butylbenzene | ND | | ug/kg | 48 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 97 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 97 | -- | 1 |
| o-Chlorotoluene | 100 | | ug/kg | 97 | -- | 1 |
| p-Chlorotoluene | ND | | ug/kg | 97 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 140 | -- | 1 |
| Hexachlorobutadiene | ND | | ug/kg | 190 | -- | 1 |
| Isopropylbenzene | ND | | ug/kg | 48 | -- | 1 |
| p-Isopropyltoluene | ND | | ug/kg | 48 | -- | 1 |
| Naphthalene | 470 | | ug/kg | 190 | -- | 1 |
| n-Propylbenzene | ND | | ug/kg | 48 | -- | 1 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 97 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 97 | -- | 1 |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 97 | -- | 1 |
| 1,2,4-Trimethylbenzene | 100 | | ug/kg | 97 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 97 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 97 | -- | 1 |
| Tert-Butyl Alcohol | ND | | ug/kg | 970 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 97 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 97 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 3900 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | | 70-130 |
| Toluene-d8 | 100 | | 70-130 |
| 4-Bromofluorobenzene | 99 | | 70-130 |
| Dibromofluoromethane | 96 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02
Client ID: ZVI CTRL 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/07/23 22:48
Analyst: MCM
Percent Solids: 80%
TCLP/SPLP Ext. Date: 11/06/23 08:03

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | 190 | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | 1800 | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 119 | | 70-130 |
| Toluene-d8 | 100 | | 70-130 |
| 4-Bromofluorobenzene | 91 | | 70-130 |
| dibromofluoromethane | 112 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02
Client ID: ZVI CTRL 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/08/23 17:59
Analyst: LAC
Percent Solids: 80%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 220 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 43 | -- | 1 |
| Chloroform | ND | | ug/kg | 65 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 43 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 43 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 43 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 43 | -- | 1 |
| Tetrachloroethene | 7700 | | ug/kg | 22 | -- | 1 |
| Chlorobenzene | ND | | ug/kg | 22 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 170 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 43 | -- | 1 |
| 1,1,1-Trichloroethane | 1500 | | ug/kg | 22 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 22 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 43 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 22 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 22 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 22 | -- | 1 |
| Bromoform | ND | | ug/kg | 170 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 22 | -- | 1 |
| Benzene | ND | | ug/kg | 22 | -- | 1 |
| Toluene | 1200 | | ug/kg | 43 | -- | 1 |
| Ethylbenzene | 280 | | ug/kg | 43 | -- | 1 |
| Chloromethane | ND | | ug/kg | 170 | -- | 1 |
| Bromomethane | ND | | ug/kg | 87 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 43 | -- | 1 |
| Chloroethane | ND | | ug/kg | 87 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 43 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 65 | -- | 1 |

**Project Name:** ERM GROUP **Lab Number:** L2364654

**Project Number:** Not Specified **Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02 Date Collected: 10/31/23 12:00

Client ID: ZVI CTRL 30 DAY Date Received: 10/31/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 60000 | E | ug/kg | 22 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 87 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 87 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 87 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 87 | -- | 1 |
| p/m-Xylene | 1400 | | ug/kg | 87 | -- | 1 |
| o-Xylene | 350 | | ug/kg | 43 | -- | 1 |
| Xylenes, Total | 1800 | | ug/kg | 43 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 43 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 43 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 87 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 87 | -- | 1 |
| Styrene | ND | | ug/kg | 43 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 430 | -- | 1 |
| Acetone | ND | | ug/kg | 430 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 430 | -- | 1 |
| 2-Butanone | ND | | ug/kg | 430 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 430 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 430 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 87 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 170 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 87 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 43 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 22 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 87 | -- | 1 |
| n-Butylbenzene | 68 | | ug/kg | 43 | -- | 1 |
| sec-Butylbenzene | ND | | ug/kg | 43 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 87 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 87 | -- | 1 |
| o-Chlorotoluene | 320 | | ug/kg | 87 | -- | 1 |
| p-Chlorotoluene | 240 | | ug/kg | 87 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 130 | -- | 1 |
| Hexachlorobutadiene | 260 | | ug/kg | 170 | -- | 1 |
| Isopropylbenzene | ND | | ug/kg | 43 | -- | 1 |
| p-Isopropyltoluene | ND | | ug/kg | 43 | -- | 1 |
| Naphthalene | 820 | | ug/kg | 170 | -- | 1 |
| n-Propylbenzene | 46 | | ug/kg | 43 | -- | 1 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02
Client ID: ZVI CTRL 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 87 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 87 | -- | 1 |
| 1,3,5-Trimethylbenzene | 97 | | ug/kg | 87 | -- | 1 |
| 1,2,4-Trimethylbenzene | 280 | | ug/kg | 87 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 87 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 87 | -- | 1 |
| Tert-Butyl Alcohol | ND | | ug/kg | 870 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 87 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 87 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 3500 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 94 | | 70-130 |
| Toluene-d8 | 100 | | 70-130 |
| 4-Bromofluorobenzene | 102 | | 70-130 |
| Dibromofluoromethane | 92 | | 70-130 |

**Project Name:** ERM GROUP
**Lab Number:** L2364654
**Project Number:** Not Specified
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02 D
Client ID: ZVI CTRL 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 12:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/08/23 18:22
Analyst: JIC
Percent Solids: 80%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 55000 | | ug/kg | 220 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 98 | | 70-130 |
| Toluene-d8 | 100 | | 70-130 |
| 4-Bromofluorobenzene | 101 | | 70-130 |
| Dibromofluoromethane | 98 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-03
Client ID: AAP 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:10
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/07/23 23:11
Analyst: MCM
Percent Solids: 72%
TCLP/SPLP Ext. Date: 11/06/23 08:03

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | 66 | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | 21 | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 118 | | 70-130 |
| Toluene-d8 | 98 | | 70-130 |
| 4-Bromofluorobenzene | 95 | | 70-130 |
| dibromofluoromethane | 111 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-03
Client ID: AAP 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:10
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/08/23 17:35
Analyst: LAC
Percent Solids: 72%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 280 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 56 | -- | 1 |
| Chloroform | ND | | ug/kg | 85 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 56 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 56 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 56 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 56 | -- | 1 |
| Tetrachloroethene | 3000 | | ug/kg | 28 | -- | 1 |
| Chlorobenzene | ND | | ug/kg | 28 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 230 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 56 | -- | 1 |
| 1,1,1-Trichloroethane | 320 | | ug/kg | 28 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 28 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 56 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 28 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 28 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 28 | -- | 1 |
| Bromoform | ND | | ug/kg | 230 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 28 | -- | 1 |
| Benzene | ND | | ug/kg | 28 | -- | 1 |
| Toluene | ND | | ug/kg | 56 | -- | 1 |
| Ethylbenzene | ND | | ug/kg | 56 | -- | 1 |
| Chloromethane | ND | | ug/kg | 230 | -- | 1 |
| Bromomethane | ND | | ug/kg | 110 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 56 | -- | 1 |
| Chloroethane | ND | | ug/kg | 110 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 56 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 85 | -- | 1 |

**Project Name:** ERM GROUP **Lab Number:** L2364654

**Project Number:** Not Specified **Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-03 Date Collected: 10/31/23 12:10

Client ID: AAP 30 DAY Date Received: 10/31/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 600 | | ug/kg | 28 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 110 | -- | 1 |
| p/m-Xylene | ND | | ug/kg | 110 | -- | 1 |
| o-Xylene | ND | | ug/kg | 56 | -- | 1 |
| Xylenes, Total | ND | | ug/kg | 56 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 56 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 56 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 110 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 110 | -- | 1 |
| Styrene | ND | | ug/kg | 56 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 560 | -- | 1 |
| Acetone | ND | | ug/kg | 560 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 560 | -- | 1 |
| 2-Butanone | ND | | ug/kg | 560 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 560 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 560 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 110 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 230 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 110 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 56 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 28 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 110 | -- | 1 |
| n-Butylbenzene | ND | | ug/kg | 56 | -- | 1 |
| sec-Butylbenzene | ND | | ug/kg | 56 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| o-Chlorotoluene | ND | | ug/kg | 110 | -- | 1 |
| p-Chlorotoluene | ND | | ug/kg | 110 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 170 | -- | 1 |
| Hexachlorobutadiene | ND | | ug/kg | 230 | -- | 1 |
| Isopropylbenzene | ND | | ug/kg | 56 | -- | 1 |
| p-Isopropyltoluene | ND | | ug/kg | 56 | -- | 1 |
| Naphthalene | ND | | ug/kg | 230 | -- | 1 |
| n-Propylbenzene | ND | | ug/kg | 56 | -- | 1 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-03
Client ID: AAP 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:10
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 110 | -- | 1 |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 110 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 110 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 110 | -- | 1 |
| Tert-Butyl Alcohol | ND | | ug/kg | 1100 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 110 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 110 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 4500 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 101 | | 70-130 |
| Toluene-d8 | 100 | | 70-130 |
| 4-Bromofluorobenzene | 101 | | 70-130 |
| Dibromofluoromethane | 98 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-04
Client ID: AAP CTRL 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:30
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/07/23 23:34
Analyst: MCM
Percent Solids: 76%
TCLP/SPLP Ext. Date: 11/06/23 08:03

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | 120 | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | 1200 | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 120 | | 70-130 |
| Toluene-d8 | 99 | | 70-130 |
| 4-Bromofluorobenzene | 93 | | 70-130 |
| dibromofluoromethane | 118 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-04
Client ID: AAP CTRL 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:30
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/08/23 18:46
Analyst: JIC
Percent Solids: 76%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 310 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 62 | -- | 1 |
| Chloroform | ND | | ug/kg | 93 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 62 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 62 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 62 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 62 | -- | 1 |
| Tetrachloroethene | 9400 | | ug/kg | 31 | -- | 1 |
| Chlorobenzene | ND | | ug/kg | 31 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 250 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 62 | -- | 1 |
| 1,1,1-Trichloroethane | 2700 | | ug/kg | 31 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 31 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 62 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 31 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 31 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 31 | -- | 1 |
| Bromoform | ND | | ug/kg | 250 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 31 | -- | 1 |
| Benzene | ND | | ug/kg | 31 | -- | 1 |
| Toluene | 1900 | | ug/kg | 62 | -- | 1 |
| Ethylbenzene | 380 | | ug/kg | 62 | -- | 1 |
| Chloromethane | ND | | ug/kg | 250 | -- | 1 |
| Bromomethane | ND | | ug/kg | 120 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 62 | -- | 1 |
| Chloroethane | ND | | ug/kg | 120 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 62 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 93 | -- | 1 |

**Project Name:** ERM GROUP **Lab Number:** L2364654

**Project Number:** Not Specified **Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-04 Date Collected: 10/31/23 12:30

Client ID: AAP CTRL 30 DAY Date Received: 10/31/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 100000 | E | ug/kg | 31 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 120 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 120 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 120 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 120 | -- | 1 |
| p/m-Xylene | 1900 | | ug/kg | 120 | -- | 1 |
| o-Xylene | 470 | | ug/kg | 62 | -- | 1 |
| Xylenes, Total | 2400 | | ug/kg | 62 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 62 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 62 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 120 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 120 | -- | 1 |
| Styrene | ND | | ug/kg | 62 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 620 | -- | 1 |
| Acetone | ND | | ug/kg | 620 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 620 | -- | 1 |
| 2-Butanone | ND | | ug/kg | 620 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 620 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 620 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 120 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 250 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 120 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 62 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 31 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 120 | -- | 1 |
| n-Butylbenzene | ND | | ug/kg | 62 | -- | 1 |
| sec-Butylbenzene | ND | | ug/kg | 62 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 120 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 120 | -- | 1 |
| o-Chlorotoluene | 400 | | ug/kg | 120 | -- | 1 |
| p-Chlorotoluene | 280 | | ug/kg | 120 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 180 | -- | 1 |
| Hexachlorobutadiene | ND | | ug/kg | 250 | -- | 1 |
| Isopropylbenzene | ND | | ug/kg | 62 | -- | 1 |
| p-Isopropyltoluene | ND | | ug/kg | 62 | -- | 1 |
| Naphthalene | 840 | | ug/kg | 250 | -- | 1 |
| n-Propylbenzene | ND | | ug/kg | 62 | -- | 1 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-04
Client ID: AAP CTRL 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:30
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 120 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 120 | -- | 1 |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 120 | -- | 1 |
| 1,2,4-Trimethylbenzene | 300 | | ug/kg | 120 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 120 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 120 | -- | 1 |
| Tert-Butyl Alcohol | ND | | ug/kg | 1200 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 120 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 120 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 5000 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 95 | | 70-130 |
| Toluene-d8 | 101 | | 70-130 |
| 4-Bromofluorobenzene | 100 | | 70-130 |
| Dibromofluoromethane | 95 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-04 D
Client ID: AAP CTRL 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 12:30
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/09/23 09:39
Analyst: AJK
Percent Solids: 76%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 91000 | | ug/kg | 620 | -- | 20 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 103 | | 70-130 |
| Toluene-d8 | 98 | | 70-130 |
| 4-Bromofluorobenzene | 96 | | 70-130 |
| Dibromofluoromethane | 105 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-05
Client ID: AAP CTRL DUP 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 14:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/07/23 23:57
Analyst: MCM
Percent Solids: 80%
TCLP/SPLP Ext. Date: 11/06/23 08:03

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **TCLP Volatiles by EPA 1311 - Westborough Lab** | | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- | 10 |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- | 10 |
| Tetrachloroethene | 100 | | ug/l | 5.0 | -- | 10 |
| Chlorobenzene | ND | | ug/l | 5.0 | -- | 10 |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- | 10 |
| Benzene | ND | | ug/l | 5.0 | -- | 10 |
| Vinyl chloride | ND | | ug/l | 10 | -- | 10 |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- | 10 |
| Trichloroethene | 900 | | ug/l | 5.0 | -- | 10 |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- | 10 |
| 2-Butanone | ND | | ug/l | 50 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 120 | | 70-130 |
| Toluene-d8 | 100 | | 70-130 |
| 4-Bromofluorobenzene | 95 | | 70-130 |
| dibromofluoromethane | 112 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-05
Client ID: AAP CTRL DUP 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 14:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/08/23 19:33
Analyst: JIC
Percent Solids: 80%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Methylene chloride | ND | | ug/kg | 240 | -- | 1 |
| 1,1-Dichloroethane | ND | | ug/kg | 47 | -- | 1 |
| Chloroform | ND | | ug/kg | 71 | -- | 1 |
| Carbon tetrachloride | ND | | ug/kg | 47 | -- | 1 |
| 1,2-Dichloropropane | ND | | ug/kg | 47 | -- | 1 |
| Dibromochloromethane | ND | | ug/kg | 47 | -- | 1 |
| 1,1,2-Trichloroethane | ND | | ug/kg | 47 | -- | 1 |
| Tetrachloroethene | 5000 | | ug/kg | 24 | -- | 1 |
| Chlorobenzene | ND | | ug/kg | 24 | -- | 1 |
| Trichlorofluoromethane | ND | | ug/kg | 190 | -- | 1 |
| 1,2-Dichloroethane | ND | | ug/kg | 47 | -- | 1 |
| 1,1,1-Trichloroethane | 1100 | | ug/kg | 24 | -- | 1 |
| Bromodichloromethane | ND | | ug/kg | 24 | -- | 1 |
| trans-1,3-Dichloropropene | ND | | ug/kg | 47 | -- | 1 |
| cis-1,3-Dichloropropene | ND | | ug/kg | 24 | -- | 1 |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 24 | -- | 1 |
| 1,1-Dichloropropene | ND | | ug/kg | 24 | -- | 1 |
| Bromoform | ND | | ug/kg | 190 | -- | 1 |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 24 | -- | 1 |
| Benzene | ND | | ug/kg | 24 | -- | 1 |
| Toluene | 900 | | ug/kg | 47 | -- | 1 |
| Ethylbenzene | 210 | | ug/kg | 47 | -- | 1 |
| Chloromethane | ND | | ug/kg | 190 | -- | 1 |
| Bromomethane | ND | | ug/kg | 94 | -- | 1 |
| Vinyl chloride | ND | | ug/kg | 47 | -- | 1 |
| Chloroethane | ND | | ug/kg | 94 | -- | 1 |
| 1,1-Dichloroethene | ND | | ug/kg | 47 | -- | 1 |
| trans-1,2-Dichloroethene | ND | | ug/kg | 71 | -- | 1 |

**Project Name:** ERM GROUP **Lab Number:** L2364654

**Project Number:** Not Specified **Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-05 Date Collected: 10/31/23 14:00

Client ID: AAP CTRL DUP 30 DAY Date Received: 10/31/23

Sample Location: Not Specified Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 44000 | E | ug/kg | 24 | -- | 1 |
| 1,2-Dichlorobenzene | ND | | ug/kg | 94 | -- | 1 |
| 1,3-Dichlorobenzene | ND | | ug/kg | 94 | -- | 1 |
| 1,4-Dichlorobenzene | ND | | ug/kg | 94 | -- | 1 |
| Methyl tert butyl ether | ND | | ug/kg | 94 | -- | 1 |
| p/m-Xylene | 1100 | | ug/kg | 94 | -- | 1 |
| o-Xylene | 280 | | ug/kg | 47 | -- | 1 |
| Xylenes, Total | 1400 | | ug/kg | 47 | -- | 1 |
| cis-1,2-Dichloroethene | ND | | ug/kg | 47 | -- | 1 |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 47 | -- | 1 |
| Dibromomethane | ND | | ug/kg | 94 | -- | 1 |
| 1,2,3-Trichloropropane | ND | | ug/kg | 94 | -- | 1 |
| Styrene | ND | | ug/kg | 47 | -- | 1 |
| Dichlorodifluoromethane | ND | | ug/kg | 470 | -- | 1 |
| Acetone | ND | | ug/kg | 470 | -- | 1 |
| Carbon disulfide | ND | | ug/kg | 470 | -- | 1 |
| 2-Butanone | ND | | ug/kg | 470 | -- | 1 |
| 4-Methyl-2-pentanone | ND | | ug/kg | 470 | -- | 1 |
| 2-Hexanone | ND | | ug/kg | 470 | -- | 1 |
| Bromochloromethane | ND | | ug/kg | 94 | -- | 1 |
| Tetrahydrofuran | ND | | ug/kg | 190 | -- | 1 |
| 2,2-Dichloropropane | ND | | ug/kg | 94 | -- | 1 |
| 1,2-Dibromoethane | ND | | ug/kg | 47 | -- | 1 |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 24 | -- | 1 |
| Bromobenzene | ND | | ug/kg | 94 | -- | 1 |
| n-Butylbenzene | 59 | | ug/kg | 47 | -- | 1 |
| sec-Butylbenzene | ND | | ug/kg | 47 | -- | 1 |
| tert-Butylbenzene | ND | | ug/kg | 94 | -- | 1 |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 94 | -- | 1 |
| o-Chlorotoluene | 270 | | ug/kg | 94 | -- | 1 |
| p-Chlorotoluene | 190 | | ug/kg | 94 | -- | 1 |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 140 | -- | 1 |
| Hexachlorobutadiene | 230 | | ug/kg | 190 | -- | 1 |
| Isopropylbenzene | ND | | ug/kg | 47 | -- | 1 |
| p-Isopropyltoluene | ND | | ug/kg | 47 | -- | 1 |
| Naphthalene | 690 | | ug/kg | 190 | -- | 1 |
| n-Propylbenzene | ND | | ug/kg | 47 | -- | 1 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-05
Client ID: AAP CTRL DUP 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 14:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 94 | -- | 1 |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 94 | -- | 1 |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 94 | -- | 1 |
| 1,2,4-Trimethylbenzene | 220 | | ug/kg | 94 | -- | 1 |
| Ethyl ether | ND | | ug/kg | 94 | -- | 1 |
| Isopropyl Ether | ND | | ug/kg | 94 | -- | 1 |
| Tert-Butyl Alcohol | ND | | ug/kg | 940 | -- | 1 |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 94 | -- | 1 |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 94 | -- | 1 |
| 1,4-Dioxane | ND | | ug/kg | 3800 | -- | 1 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 97 | | 70-130 |
| Toluene-d8 | 100 | | 70-130 |
| 4-Bromofluorobenzene | 104 | | 70-130 |
| Dibromofluoromethane | 94 | | 70-130 |

**Project Name:** ERM GROUP
**Lab Number:** L2364654
**Project Number:** Not Specified
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-05 D
Client ID: AAP CTRL DUP 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 14:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8260D
Analytical Date: 11/08/23 19:56
Analyst: JIC
Percent Solids: 80%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Volatile Organics by EPA 5035 High - Westborough Lab** | | | | | | |
| Trichloroethene | 37000 | | ug/kg | 240 | -- | 10 |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 98 | | 70-130 |
| Toluene-d8 | 101 | | 70-130 |
| 4-Bromofluorobenzene | 102 | | 70-130 |
| Dibromofluoromethane | 100 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/07/23 16:42
Analyst: MAG
TCLP/SPLP Extraction Date: 11/06/23 08:03

Extraction Date: 11/06/23 08:03

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab for sample(s): 01-05 Batch: WG1849660-5 | | | | | |
| Chloroform | ND | | ug/l | 7.5 | -- |
| Carbon tetrachloride | ND | | ug/l | 5.0 | -- |
| Tetrachloroethene | ND | | ug/l | 5.0 | -- |
| Chlorobenzene | ND | | ug/l | 5.0 | -- |
| 1,2-Dichloroethane | ND | | ug/l | 5.0 | -- |
| Benzene | ND | | ug/l | 5.0 | -- |
| Vinyl chloride | ND | | ug/l | 10 | -- |
| 1,1-Dichloroethene | ND | | ug/l | 5.0 | -- |
| Trichloroethene | ND | | ug/l | 5.0 | -- |
| 1,4-Dichlorobenzene | ND | | ug/l | 25 | -- |
| 2-Butanone | ND | | ug/l | 50 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 115 | | 70-130 |
| Toluene-d8 | 101 | | 70-130 |
| 4-Bromofluorobenzene | 94 | | 70-130 |
| dibromofluoromethane | 108 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 12:53
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01 Batch: WG1850254-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 5.0 | -- |
| 1,1-Dichloroethane | ND | | ug/kg | 1.0 | -- |
| Chloroform | ND | | ug/kg | 1.5 | -- |
| Carbon tetrachloride | ND | | ug/kg | 1.0 | -- |
| 1,2-Dichloropropane | ND | | ug/kg | 1.0 | -- |
| Dibromochloromethane | ND | | ug/kg | 1.0 | -- |
| 1,1,2-Trichloroethane | ND | | ug/kg | 1.0 | -- |
| Tetrachloroethene | ND | | ug/kg | 0.50 | -- |
| Chlorobenzene | ND | | ug/kg | 0.50 | -- |
| Trichlorofluoromethane | ND | | ug/kg | 4.0 | -- |
| 1,2-Dichloroethane | ND | | ug/kg | 1.0 | -- |
| 1,1,1-Trichloroethane | ND | | ug/kg | 0.50 | -- |
| Bromodichloromethane | ND | | ug/kg | 0.50 | -- |
| trans-1,3-Dichloropropene | ND | | ug/kg | 1.0 | -- |
| cis-1,3-Dichloropropene | ND | | ug/kg | 0.50 | -- |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 0.50 | -- |
| 1,1-Dichloropropene | ND | | ug/kg | 0.50 | -- |
| Bromoform | ND | | ug/kg | 4.0 | -- |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 0.50 | -- |
| Benzene | ND | | ug/kg | 0.50 | -- |
| Toluene | ND | | ug/kg | 1.0 | -- |
| Ethylbenzene | ND | | ug/kg | 1.0 | -- |
| Chloromethane | ND | | ug/kg | 4.0 | -- |
| Bromomethane | ND | | ug/kg | 2.0 | -- |
| Vinyl chloride | ND | | ug/kg | 1.0 | -- |
| Chloroethane | ND | | ug/kg | 2.0 | -- |
| 1,1-Dichloroethene | ND | | ug/kg | 1.0 | -- |
| trans-1,2-Dichloroethene | ND | | ug/kg | 1.5 | -- |
| Trichloroethene | ND | | ug/kg | 0.50 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 12:53
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01 Batch: WG1850254-5 | | | | | |
| 1,2-Dichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,3-Dichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,4-Dichlorobenzene | ND | | ug/kg | 2.0 | -- |
| Methyl tert butyl ether | ND | | ug/kg | 2.0 | -- |
| p/m-Xylene | ND | | ug/kg | 2.0 | -- |
| o-Xylene | ND | | ug/kg | 1.0 | -- |
| Xylenes, Total | ND | | ug/kg | 1.0 | -- |
| cis-1,2-Dichloroethene | ND | | ug/kg | 1.0 | -- |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 1.0 | -- |
| Dibromomethane | ND | | ug/kg | 2.0 | -- |
| 1,2,3-Trichloropropane | ND | | ug/kg | 2.0 | -- |
| Styrene | ND | | ug/kg | 1.0 | -- |
| Dichlorodifluoromethane | ND | | ug/kg | 10 | -- |
| Acetone | ND | | ug/kg | 25 | -- |
| Carbon disulfide | ND | | ug/kg | 10 | -- |
| 2-Butanone | ND | | ug/kg | 10 | -- |
| 4-Methyl-2-pentanone | ND | | ug/kg | 10 | -- |
| 2-Hexanone | ND | | ug/kg | 10 | -- |
| Bromochloromethane | ND | | ug/kg | 2.0 | -- |
| Tetrahydrofuran | ND | | ug/kg | 4.0 | -- |
| 2,2-Dichloropropane | ND | | ug/kg | 2.0 | -- |
| 1,2-Dibromoethane | ND | | ug/kg | 1.0 | -- |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 0.50 | -- |
| Bromobenzene | ND | | ug/kg | 2.0 | -- |
| n-Butylbenzene | ND | | ug/kg | 1.0 | -- |
| sec-Butylbenzene | ND | | ug/kg | 1.0 | -- |
| tert-Butylbenzene | ND | | ug/kg | 2.0 | -- |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 2.0 | -- |
| o-Chlorotoluene | ND | | ug/kg | 2.0 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 12:53
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01 Batch: WG1850254-5 | | | | | |
| p-Chlorotoluene | ND | | ug/kg | 2.0 | -- |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 3.0 | -- |
| Hexachlorobutadiene | ND | | ug/kg | 4.0 | -- |
| Isopropylbenzene | ND | | ug/kg | 1.0 | -- |
| p-Isopropyltoluene | ND | | ug/kg | 1.0 | -- |
| Naphthalene | ND | | ug/kg | 4.0 | -- |
| n-Propylbenzene | ND | | ug/kg | 1.0 | -- |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 2.0 | -- |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 2.0 | -- |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 2.0 | -- |
| Ethyl ether | ND | | ug/kg | 2.0 | -- |
| Isopropyl Ether | ND | | ug/kg | 2.0 | -- |
| Tert-Butyl Alcohol | ND | | ug/kg | 20 | -- |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 2.0 | -- |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 2.0 | -- |
| 1,4-Dioxane | ND | | ug/kg | 80 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | | 70-130 |
| Toluene-d8 | 99 | | 70-130 |
| 4-Bromofluorobenzene | 98 | | 70-130 |
| Dibromofluoromethane | 107 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 12:53
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 02-05 Batch: WG1850256-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | -- |
| 1,1-Dichloroethane | ND | | ug/kg | 50 | -- |
| Chloroform | ND | | ug/kg | 75 | -- |
| Carbon tetrachloride | ND | | ug/kg | 50 | -- |
| 1,2-Dichloropropane | ND | | ug/kg | 50 | -- |
| Dibromochloromethane | ND | | ug/kg | 50 | -- |
| 1,1,2-Trichloroethane | ND | | ug/kg | 50 | -- |
| Tetrachloroethene | ND | | ug/kg | 25 | -- |
| Chlorobenzene | ND | | ug/kg | 25 | -- |
| Trichlorofluoromethane | ND | | ug/kg | 200 | -- |
| 1,2-Dichloroethane | ND | | ug/kg | 50 | -- |
| 1,1,1-Trichloroethane | ND | | ug/kg | 25 | -- |
| Bromodichloromethane | ND | | ug/kg | 25 | -- |
| trans-1,3-Dichloropropene | ND | | ug/kg | 50 | -- |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | -- |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 25 | -- |
| 1,1-Dichloropropene | ND | | ug/kg | 25 | -- |
| Bromoform | ND | | ug/kg | 200 | -- |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Benzene | ND | | ug/kg | 25 | -- |
| Toluene | ND | | ug/kg | 50 | -- |
| Ethylbenzene | ND | | ug/kg | 50 | -- |
| Chloromethane | ND | | ug/kg | 200 | -- |
| Bromomethane | ND | | ug/kg | 100 | -- |
| Vinyl chloride | ND | | ug/kg | 50 | -- |
| Chloroethane | ND | | ug/kg | 100 | -- |
| 1,1-Dichloroethene | ND | | ug/kg | 50 | -- |
| trans-1,2-Dichloroethene | ND | | ug/kg | 75 | -- |
| Trichloroethene | ND | | ug/kg | 25 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 12:53
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 02-05 Batch: WG1850256-5 | | | | | |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| Methyl tert butyl ether | ND | | ug/kg | 100 | -- |
| p/m-Xylene | ND | | ug/kg | 100 | -- |
| o-Xylene | ND | | ug/kg | 50 | -- |
| Xylenes, Total | ND | | ug/kg | 50 | -- |
| cis-1,2-Dichloroethene | ND | | ug/kg | 50 | -- |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 50 | -- |
| Dibromomethane | ND | | ug/kg | 100 | -- |
| 1,2,3-Trichloropropane | ND | | ug/kg | 100 | -- |
| Styrene | ND | | ug/kg | 50 | -- |
| Dichlorodifluoromethane | ND | | ug/kg | 500 | -- |
| Acetone | ND | | ug/kg | 500 | -- |
| Carbon disulfide | ND | | ug/kg | 500 | -- |
| 2-Butanone | ND | | ug/kg | 500 | -- |
| 4-Methyl-2-pentanone | ND | | ug/kg | 500 | -- |
| 2-Hexanone | ND | | ug/kg | 500 | -- |
| Bromochloromethane | ND | | ug/kg | 100 | -- |
| Tetrahydrofuran | ND | | ug/kg | 200 | -- |
| 2,2-Dichloropropane | ND | | ug/kg | 100 | -- |
| 1,2-Dibromoethane | ND | | ug/kg | 50 | -- |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Bromobenzene | ND | | ug/kg | 100 | -- |
| n-Butylbenzene | ND | | ug/kg | 50 | -- |
| sec-Butylbenzene | ND | | ug/kg | 50 | -- |
| tert-Butylbenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| o-Chlorotoluene | ND | | ug/kg | 100 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 12:53
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 02-05 Batch: WG1850256-5 | | | | | |
| p-Chlorotoluene | ND | | ug/kg | 100 | -- |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | -- |
| Hexachlorobutadiene | ND | | ug/kg | 200 | -- |
| Isopropylbenzene | ND | | ug/kg | 50 | -- |
| p-Isopropyltoluene | ND | | ug/kg | 50 | -- |
| Naphthalene | ND | | ug/kg | 200 | -- |
| n-Propylbenzene | ND | | ug/kg | 50 | -- |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| Ethyl ether | ND | | ug/kg | 100 | -- |
| Isopropyl Ether | ND | | ug/kg | 100 | -- |
| Tert-Butyl Alcohol | ND | | ug/kg | 1000 | -- |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 100 | -- |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 100 | -- |
| 1,4-Dioxane | ND | | ug/kg | 4000 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | | 70-130 |
| Toluene-d8 | 99 | | 70-130 |
| 4-Bromofluorobenzene | 98 | | 70-130 |
| Dibromofluoromethane | 107 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 22:02
Analyst: JIC

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 01 Batch: WG1850344-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | -- |
| 1,1-Dichloroethane | ND | | ug/kg | 50 | -- |
| Chloroform | ND | | ug/kg | 75 | -- |
| Carbon tetrachloride | ND | | ug/kg | 50 | -- |
| 1,2-Dichloropropane | ND | | ug/kg | 50 | -- |
| Dibromochloromethane | ND | | ug/kg | 50 | -- |
| 1,1,2-Trichloroethane | ND | | ug/kg | 50 | -- |
| Tetrachloroethene | ND | | ug/kg | 25 | -- |
| Chlorobenzene | ND | | ug/kg | 25 | -- |
| Trichlorofluoromethane | ND | | ug/kg | 200 | -- |
| 1,2-Dichloroethane | ND | | ug/kg | 50 | -- |
| 1,1,1-Trichloroethane | ND | | ug/kg | 25 | -- |
| Bromodichloromethane | ND | | ug/kg | 25 | -- |
| trans-1,3-Dichloropropene | ND | | ug/kg | 50 | -- |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | -- |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 25 | -- |
| 1,1-Dichloropropene | ND | | ug/kg | 25 | -- |
| Bromoform | ND | | ug/kg | 200 | -- |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Benzene | ND | | ug/kg | 25 | -- |
| Toluene | ND | | ug/kg | 50 | -- |
| Ethylbenzene | ND | | ug/kg | 50 | -- |
| Chloromethane | ND | | ug/kg | 200 | -- |
| Bromomethane | ND | | ug/kg | 100 | -- |
| Vinyl chloride | ND | | ug/kg | 50 | -- |
| Chloroethane | ND | | ug/kg | 100 | -- |
| 1,1-Dichloroethene | ND | | ug/kg | 50 | -- |
| trans-1,2-Dichloroethene | ND | | ug/kg | 75 | -- |
| Trichloroethene | ND | | ug/kg | 25 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 22:02
Analyst: JIC

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 01 Batch: WG1850344-5 | | | | | |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| Methyl tert butyl ether | ND | | ug/kg | 100 | -- |
| p/m-Xylene | ND | | ug/kg | 100 | -- |
| o-Xylene | ND | | ug/kg | 50 | -- |
| Xylenes, Total | ND | | ug/kg | 50 | -- |
| cis-1,2-Dichloroethene | ND | | ug/kg | 50 | -- |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 50 | -- |
| Dibromomethane | ND | | ug/kg | 100 | -- |
| 1,2,3-Trichloropropane | ND | | ug/kg | 100 | -- |
| Styrene | ND | | ug/kg | 50 | -- |
| Dichlorodifluoromethane | ND | | ug/kg | 500 | -- |
| Acetone | ND | | ug/kg | 500 | -- |
| Carbon disulfide | ND | | ug/kg | 500 | -- |
| 2-Butanone | ND | | ug/kg | 500 | -- |
| 4-Methyl-2-pentanone | ND | | ug/kg | 500 | -- |
| 2-Hexanone | ND | | ug/kg | 500 | -- |
| Bromochloromethane | ND | | ug/kg | 100 | -- |
| Tetrahydrofuran | ND | | ug/kg | 200 | -- |
| 2,2-Dichloropropane | ND | | ug/kg | 100 | -- |
| 1,2-Dibromoethane | ND | | ug/kg | 50 | -- |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Bromobenzene | ND | | ug/kg | 100 | -- |
| n-Butylbenzene | ND | | ug/kg | 50 | -- |
| sec-Butylbenzene | ND | | ug/kg | 50 | -- |
| tert-Butylbenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| o-Chlorotoluene | ND | | ug/kg | 100 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/08/23 22:02
Analyst: JIC

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 01 Batch: WG1850344-5 | | | | | |
| p-Chlorotoluene | ND | | ug/kg | 100 | -- |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | -- |
| Hexachlorobutadiene | ND | | ug/kg | 200 | -- |
| Isopropylbenzene | ND | | ug/kg | 50 | -- |
| p-Isopropyltoluene | ND | | ug/kg | 50 | -- |
| Naphthalene | ND | | ug/kg | 200 | -- |
| n-Propylbenzene | ND | | ug/kg | 50 | -- |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| Ethyl ether | ND | | ug/kg | 100 | -- |
| Isopropyl Ether | ND | | ug/kg | 100 | -- |
| Tert-Butyl Alcohol | ND | | ug/kg | 1000 | -- |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 100 | -- |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 100 | -- |
| 1,4-Dioxane | ND | | ug/kg | 4000 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 95 | | 70-130 |
| Toluene-d8 | 103 | | 70-130 |
| 4-Bromofluorobenzene | 99 | | 70-130 |
| Dibromofluoromethane | 94 | | 70-130 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/09/23 09:14
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 04 Batch: WG1850383-5 | | | | | |
| Methylene chloride | ND | | ug/kg | 250 | -- |
| 1,1-Dichloroethane | ND | | ug/kg | 50 | -- |
| Chloroform | ND | | ug/kg | 75 | -- |
| Carbon tetrachloride | ND | | ug/kg | 50 | -- |
| 1,2-Dichloropropane | ND | | ug/kg | 50 | -- |
| Dibromochloromethane | ND | | ug/kg | 50 | -- |
| 1,1,2-Trichloroethane | ND | | ug/kg | 50 | -- |
| Tetrachloroethene | ND | | ug/kg | 25 | -- |
| Chlorobenzene | ND | | ug/kg | 25 | -- |
| Trichlorofluoromethane | ND | | ug/kg | 200 | -- |
| 1,2-Dichloroethane | ND | | ug/kg | 50 | -- |
| 1,1,1-Trichloroethane | ND | | ug/kg | 25 | -- |
| Bromodichloromethane | ND | | ug/kg | 25 | -- |
| trans-1,3-Dichloropropene | ND | | ug/kg | 50 | -- |
| cis-1,3-Dichloropropene | ND | | ug/kg | 25 | -- |
| 1,3-Dichloropropene, Total | ND | | ug/kg | 25 | -- |
| 1,1-Dichloropropene | ND | | ug/kg | 25 | -- |
| Bromoform | ND | | ug/kg | 200 | -- |
| 1,1,2,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Benzene | ND | | ug/kg | 25 | -- |
| Toluene | ND | | ug/kg | 50 | -- |
| Ethylbenzene | ND | | ug/kg | 50 | -- |
| Chloromethane | ND | | ug/kg | 200 | -- |
| Bromomethane | ND | | ug/kg | 100 | -- |
| Vinyl chloride | ND | | ug/kg | 50 | -- |
| Chloroethane | ND | | ug/kg | 100 | -- |
| 1,1-Dichloroethene | ND | | ug/kg | 50 | -- |
| trans-1,2-Dichloroethene | ND | | ug/kg | 75 | -- |
| Trichloroethene | ND | | ug/kg | 25 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/09/23 09:14
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 04 Batch: WG1850383-5 | | | | | |
| 1,2-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,4-Dichlorobenzene | ND | | ug/kg | 100 | -- |
| Methyl tert butyl ether | ND | | ug/kg | 100 | -- |
| p/m-Xylene | ND | | ug/kg | 100 | -- |
| o-Xylene | ND | | ug/kg | 50 | -- |
| Xylenes, Total | ND | | ug/kg | 50 | -- |
| cis-1,2-Dichloroethene | ND | | ug/kg | 50 | -- |
| 1,2-Dichloroethene, Total | ND | | ug/kg | 50 | -- |
| Dibromomethane | ND | | ug/kg | 100 | -- |
| 1,2,3-Trichloropropane | ND | | ug/kg | 100 | -- |
| Styrene | ND | | ug/kg | 50 | -- |
| Dichlorodifluoromethane | ND | | ug/kg | 500 | -- |
| Acetone | ND | | ug/kg | 500 | -- |
| Carbon disulfide | ND | | ug/kg | 500 | -- |
| 2-Butanone | ND | | ug/kg | 500 | -- |
| 4-Methyl-2-pentanone | ND | | ug/kg | 500 | -- |
| 2-Hexanone | ND | | ug/kg | 500 | -- |
| Bromochloromethane | ND | | ug/kg | 100 | -- |
| Tetrahydrofuran | ND | | ug/kg | 200 | -- |
| 2,2-Dichloropropane | ND | | ug/kg | 100 | -- |
| 1,2-Dibromoethane | ND | | ug/kg | 50 | -- |
| 1,1,1,2-Tetrachloroethane | ND | | ug/kg | 25 | -- |
| Bromobenzene | ND | | ug/kg | 100 | -- |
| n-Butylbenzene | ND | | ug/kg | 50 | -- |
| sec-Butylbenzene | ND | | ug/kg | 50 | -- |
| tert-Butylbenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| o-Chlorotoluene | ND | | ug/kg | 100 | -- |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8260D
Analytical Date: 11/09/23 09:14
Analyst: AJK

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab for sample(s): 04 Batch: WG1850383-5 | | | | | |
| p-Chlorotoluene | ND | | ug/kg | 100 | -- |
| 1,2-Dibromo-3-chloropropane | ND | | ug/kg | 150 | -- |
| Hexachlorobutadiene | ND | | ug/kg | 200 | -- |
| Isopropylbenzene | ND | | ug/kg | 50 | -- |
| p-Isopropyltoluene | ND | | ug/kg | 50 | -- |
| Naphthalene | ND | | ug/kg | 200 | -- |
| n-Propylbenzene | ND | | ug/kg | 50 | -- |
| 1,2,3-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trichlorobenzene | ND | | ug/kg | 100 | -- |
| 1,3,5-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| 1,2,4-Trimethylbenzene | ND | | ug/kg | 100 | -- |
| Ethyl ether | ND | | ug/kg | 100 | -- |
| Isopropyl Ether | ND | | ug/kg | 100 | -- |
| Tert-Butyl Alcohol | ND | | ug/kg | 1000 | -- |
| Ethyl-Tert-Butyl-Ether | ND | | ug/kg | 100 | -- |
| Tertiary-Amyl Methyl Ether | ND | | ug/kg | 100 | -- |
| 1,4-Dioxane | ND | | ug/kg | 4000 | -- |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,2-Dichloroethane-d4 | 103 | | 70-130 |
| Toluene-d8 | 98 | | 70-130 |
| 4-Bromofluorobenzene | 95 | | 70-130 |
| Dibromofluoromethane | 103 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| TCLP Volatiles by EPA 1311 - Westborough Lab Associated sample(s): 01-05 Batch: WG1849660-3 WG1849660-4 | | | | | | | | |
| Chloroform | 100 | | 97 | | 70-130 | 3 | | 20 |
| Carbon tetrachloride | 100 | | 93 | | 63-132 | 7 | | 20 |
| Tetrachloroethene | 110 | | 95 | | 70-130 | 15 | | 20 |
| Chlorobenzene | 100 | | 100 | | 75-130 | 0 | | 25 |
| 1,2-Dichloroethane | 110 | | 100 | | 70-130 | 10 | | 20 |
| Benzene | 91 | | 90 | | 70-130 | 1 | | 25 |
| Vinyl chloride | 76 | | 77 | | 55-140 | 1 | | 20 |
| 1,1-Dichloroethene | 85 | | 77 | | 61-145 | 10 | | 25 |
| Trichloroethene | 95 | | 90 | | 70-130 | 5 | | 25 |
| 1,4-Dichlorobenzene | 100 | | 95 | | 70-130 | 5 | | 20 |
| 2-Butanone | 85 | | 90 | | 63-138 | 6 | | 20 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 117 | | 114 | | 70-130 |
| Toluene-d8 | 106 | | 107 | | 70-130 |
| 4-Bromofluorobenzene | 89 | | 90 | | 70-130 |
| dibromofluoromethane | 102 | | 104 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1850254-3 WG1850254-4 | | | | | | | | |
| Methylene chloride | 94 | | 94 | | 70-130 | 0 | | 30 |
| 1,1-Dichloroethane | 98 | | 96 | | 70-130 | 2 | | 30 |
| Chloroform | 97 | | 97 | | 70-130 | 0 | | 30 |
| Carbon tetrachloride | 98 | | 100 | | 70-130 | 2 | | 30 |
| 1,2-Dichloropropane | 96 | | 97 | | 70-130 | 1 | | 30 |
| Dibromochloromethane | 84 | | 88 | | 70-130 | 5 | | 30 |
| 1,1,2-Trichloroethane | 98 | | 99 | | 70-130 | 1 | | 30 |
| Tetrachloroethene | 102 | | 99 | | 70-130 | 3 | | 30 |
| Chlorobenzene | 100 | | 98 | | 70-130 | 2 | | 30 |
| Trichlorofluoromethane | 101 | | 100 | | 70-139 | 1 | | 30 |
| 1,2-Dichloroethane | 90 | | 94 | | 70-130 | 4 | | 30 |
| 1,1,1-Trichloroethane | 98 | | 98 | | 70-130 | 0 | | 30 |
| Bromodichloromethane | 94 | | 98 | | 70-130 | 4 | | 30 |
| trans-1,3-Dichloropropene | 90 | | 91 | | 70-130 | 1 | | 30 |
| cis-1,3-Dichloropropene | 89 | | 92 | | 70-130 | 3 | | 30 |
| 1,1-Dichloropropene | 100 | | 99 | | 70-130 | 1 | | 30 |
| Bromoform | 89 | | 95 | | 70-130 | 7 | | 30 |
| 1,1,2,2-Tetrachloroethane | 89 | | 96 | | 70-130 | 8 | | 30 |
| Benzene | 101 | | 100 | | 70-130 | 1 | | 30 |
| Toluene | 102 | | 97 | | 70-130 | 5 | | 30 |
| Ethylbenzene | 104 | | 100 | | 70-130 | 4 | | 30 |
| Chloromethane | 105 | | 96 | | 52-130 | 9 | | 30 |
| Bromomethane | 108 | | 103 | | 57-147 | 5 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1850254-3 WG1850254-4 | | | | | | | | |
| Vinyl chloride | 103 | | 100 | | 67-130 | 3 | | 30 |
| Chloroethane | 100 | | 99 | | 50-151 | 1 | | 30 |
| 1,1-Dichloroethene | 103 | | 99 | | 65-135 | 4 | | 30 |
| trans-1,2-Dichloroethene | 101 | | 98 | | 70-130 | 3 | | 30 |
| Trichloroethene | 95 | | 95 | | 70-130 | 0 | | 30 |
| 1,2-Dichlorobenzene | 98 | | 97 | | 70-130 | 1 | | 30 |
| 1,3-Dichlorobenzene | 101 | | 99 | | 70-130 | 2 | | 30 |
| 1,4-Dichlorobenzene | 100 | | 98 | | 70-130 | 2 | | 30 |
| Methyl tert butyl ether | 90 | | 99 | | 66-130 | 10 | | 30 |
| p/m-Xylene | 107 | | 104 | | 70-130 | 3 | | 30 |
| o-Xylene | 93 | | 91 | | 70-130 | 2 | | 30 |
| cis-1,2-Dichloroethene | 95 | | 96 | | 70-130 | 1 | | 30 |
| Dibromomethane | 86 | | 95 | | 70-130 | 10 | | 30 |
| 1,2,3-Trichloropropane | 90 | | 93 | | 68-130 | 3 | | 30 |
| Styrene | 91 | | 90 | | 70-130 | 1 | | 30 |
| Dichlorodifluoromethane | 104 | | 100 | | 30-146 | 4 | | 30 |
| Acetone | 73 | | 88 | | 54-140 | 19 | | 30 |
| Carbon disulfide | 102 | | 100 | | 59-130 | 2 | | 30 |
| 2-Butanone | 84 | | 97 | | 70-130 | 14 | | 30 |
| 4-Methyl-2-pentanone | 85 | | 94 | | 70-130 | 10 | | 30 |
| 2-Hexanone | 83 | | 96 | | 70-130 | 15 | | 30 |
| Bromochloromethane | 90 | | 95 | | 70-130 | 5 | | 30 |
| Tetrahydrofuran | 85 | | 93 | | 66-130 | 9 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1850254-3 WG1850254-4 | | | | | | | | |
| 2,2-Dichloropropane | 102 | | 100 | | 70-130 | 2 | | 30 |
| 1,2-Dibromoethane | 88 | | 92 | | 70-130 | 4 | | 30 |
| 1,1,1,2-Tetrachloroethane | 90 | | 90 | | 70-130 | 0 | | 30 |
| Bromobenzene | 97 | | 96 | | 70-130 | 1 | | 30 |
| n-Butylbenzene | 116 | | 110 | | 70-130 | 5 | | 30 |
| sec-Butylbenzene | 109 | | 105 | | 70-130 | 4 | | 30 |
| tert-Butylbenzene | 106 | | 102 | | 70-130 | 4 | | 30 |
| 1,3,5-Trichlorobenzene | 108 | | 106 | | 70-139 | 2 | | 30 |
| o-Chlorotoluene | 100 | | 100 | | 70-130 | 0 | | 30 |
| p-Chlorotoluene | 105 | | 101 | | 70-130 | 4 | | 30 |
| 1,2-Dibromo-3-chloropropane | 80 | | 95 | | 68-130 | 17 | | 30 |
| Hexachlorobutadiene | 111 | | 109 | | 67-130 | 2 | | 30 |
| Isopropylbenzene | 107 | | 103 | | 70-130 | 4 | | 30 |
| p-Isopropyltoluene | 111 | | 107 | | 70-130 | 4 | | 30 |
| Naphthalene | 92 | | 101 | | 70-130 | 9 | | 30 |
| n-Propylbenzene | 108 | | 103 | | 70-130 | 5 | | 30 |
| 1,2,3-Trichlorobenzene | 100 | | 103 | | 70-130 | 3 | | 30 |
| 1,2,4-Trichlorobenzene | 105 | | 105 | | 70-130 | 0 | | 30 |
| 1,3,5-Trimethylbenzene | 106 | | 102 | | 70-130 | 4 | | 30 |
| 1,2,4-Trimethylbenzene | 105 | | 102 | | 70-130 | 3 | | 30 |
| Ethyl ether | 88 | | 91 | | 67-130 | 3 | | 30 |
| Isopropyl Ether | 100 | | 99 | | 66-130 | 1 | | 30 |
| Tert-Butyl Alcohol | 70 | | 89 | | 70-130 | 24 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01 Batch: WG1850254-3 WG1850254-4 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 98 | | 100 | | 70-130 | 2 | | 30 |
| Tertiary-Amyl Methyl Ether | 94 | | 100 | | 70-130 | 6 | | 30 |
| 1,4-Dioxane | 74 | | 88 | | 65-136 | 17 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 93 | | 96 | | 70-130 |
| Toluene-d8 | 103 | | 100 | | 70-130 |
| 4-Bromofluorobenzene | 100 | | 101 | | 70-130 |
| Dibromofluoromethane | 94 | | 99 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-05 Batch: WG1850256-3 WG1850256-4 | | | | | | | | |
| Methylene chloride | 94 | | 94 | | 70-130 | 0 | | 30 |
| 1,1-Dichloroethane | 98 | | 96 | | 70-130 | 2 | | 30 |
| Chloroform | 97 | | 97 | | 70-130 | 0 | | 30 |
| Carbon tetrachloride | 98 | | 100 | | 70-130 | 2 | | 30 |
| 1,2-Dichloropropane | 96 | | 97 | | 70-130 | 1 | | 30 |
| Dibromochloromethane | 84 | | 88 | | 70-130 | 5 | | 30 |
| 1,1,2-Trichloroethane | 98 | | 99 | | 70-130 | 1 | | 30 |
| Tetrachloroethene | 102 | | 99 | | 70-130 | 3 | | 30 |
| Chlorobenzene | 100 | | 98 | | 70-130 | 2 | | 30 |
| Trichlorofluoromethane | 101 | | 100 | | 70-139 | 1 | | 30 |
| 1,2-Dichloroethane | 90 | | 94 | | 70-130 | 4 | | 30 |
| 1,1,1-Trichloroethane | 98 | | 98 | | 70-130 | 0 | | 30 |
| Bromodichloromethane | 94 | | 98 | | 70-130 | 4 | | 30 |
| trans-1,3-Dichloropropene | 90 | | 91 | | 70-130 | 1 | | 30 |
| cis-1,3-Dichloropropene | 89 | | 92 | | 70-130 | 3 | | 30 |
| 1,1-Dichloropropene | 100 | | 99 | | 70-130 | 1 | | 30 |
| Bromoform | 89 | | 95 | | 70-130 | 7 | | 30 |
| 1,1,2,2-Tetrachloroethane | 89 | | 96 | | 70-130 | 8 | | 30 |
| Benzene | 101 | | 100 | | 70-130 | 1 | | 30 |
| Toluene | 102 | | 97 | | 70-130 | 5 | | 30 |
| Ethylbenzene | 104 | | 100 | | 70-130 | 4 | | 30 |
| Chloromethane | 105 | | 96 | | 52-130 | 9 | | 30 |
| Bromomethane | 108 | | 103 | | 57-147 | 5 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-05 Batch: WG1850256-3 WG1850256-4 | | | | | | | | |
| Vinyl chloride | 103 | | 100 | | 67-130 | 3 | | 30 |
| Chloroethane | 100 | | 99 | | 50-151 | 1 | | 30 |
| 1,1-Dichloroethene | 103 | | 99 | | 65-135 | 4 | | 30 |
| trans-1,2-Dichloroethene | 101 | | 98 | | 70-130 | 3 | | 30 |
| Trichloroethene | 95 | | 95 | | 70-130 | 0 | | 30 |
| 1,2-Dichlorobenzene | 98 | | 97 | | 70-130 | 1 | | 30 |
| 1,3-Dichlorobenzene | 101 | | 99 | | 70-130 | 2 | | 30 |
| 1,4-Dichlorobenzene | 100 | | 98 | | 70-130 | 2 | | 30 |
| Methyl tert butyl ether | 90 | | 99 | | 66-130 | 10 | | 30 |
| p/m-Xylene | 107 | | 104 | | 70-130 | 3 | | 30 |
| o-Xylene | 93 | | 91 | | 70-130 | 2 | | 30 |
| cis-1,2-Dichloroethene | 95 | | 96 | | 70-130 | 1 | | 30 |
| Dibromomethane | 86 | | 95 | | 70-130 | 10 | | 30 |
| 1,2,3-Trichloropropane | 90 | | 93 | | 68-130 | 3 | | 30 |
| Styrene | 91 | | 90 | | 70-130 | 1 | | 30 |
| Dichlorodifluoromethane | 104 | | 100 | | 30-146 | 4 | | 30 |
| Acetone | 73 | | 88 | | 54-140 | 19 | | 30 |
| Carbon disulfide | 102 | | 100 | | 59-130 | 2 | | 30 |
| 2-Butanone | 84 | | 97 | | 70-130 | 14 | | 30 |
| 4-Methyl-2-pentanone | 85 | | 94 | | 70-130 | 10 | | 30 |
| 2-Hexanone | 83 | | 96 | | 70-130 | 15 | | 30 |
| Bromochloromethane | 90 | | 95 | | 70-130 | 5 | | 30 |
| Tetrahydrofuran | 85 | | 93 | | 66-130 | 9 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-05 Batch: WG1850256-3 WG1850256-4 | | | | | | | | |
| 2,2-Dichloropropane | 102 | | 100 | | 70-130 | 2 | | 30 |
| 1,2-Dibromoethane | 88 | | 92 | | 70-130 | 4 | | 30 |
| 1,1,1,2-Tetrachloroethane | 90 | | 90 | | 70-130 | 0 | | 30 |
| Bromobenzene | 97 | | 96 | | 70-130 | 1 | | 30 |
| n-Butylbenzene | 116 | | 110 | | 70-130 | 5 | | 30 |
| sec-Butylbenzene | 109 | | 105 | | 70-130 | 4 | | 30 |
| tert-Butylbenzene | 106 | | 102 | | 70-130 | 4 | | 30 |
| 1,3,5-Trichlorobenzene | 108 | | 106 | | 70-139 | 2 | | 30 |
| o-Chlorotoluene | 100 | | 100 | | 70-130 | 0 | | 30 |
| p-Chlorotoluene | 105 | | 101 | | 70-130 | 4 | | 30 |
| 1,2-Dibromo-3-chloropropane | 80 | | 95 | | 68-130 | 17 | | 30 |
| Hexachlorobutadiene | 111 | | 109 | | 67-130 | 2 | | 30 |
| Isopropylbenzene | 107 | | 103 | | 70-130 | 4 | | 30 |
| p-Isopropyltoluene | 111 | | 107 | | 70-130 | 4 | | 30 |
| Naphthalene | 92 | | 101 | | 70-130 | 9 | | 30 |
| n-Propylbenzene | 108 | | 103 | | 70-130 | 5 | | 30 |
| 1,2,3-Trichlorobenzene | 100 | | 103 | | 70-130 | 3 | | 30 |
| 1,2,4-Trichlorobenzene | 105 | | 105 | | 70-130 | 0 | | 30 |
| 1,3,5-Trimethylbenzene | 106 | | 102 | | 70-130 | 4 | | 30 |
| 1,2,4-Trimethylbenzene | 105 | | 102 | | 70-130 | 3 | | 30 |
| Ethyl ether | 88 | | 91 | | 67-130 | 3 | | 30 |
| Isopropyl Ether | 100 | | 99 | | 66-130 | 1 | | 30 |
| Tert-Butyl Alcohol | 70 | | 89 | | 70-130 | 24 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 02-05 Batch: WG1850256-3 WG1850256-4 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 98 | | 100 | | 70-130 | 2 | | 30 |
| Tertiary-Amyl Methyl Ether | 94 | | 100 | | 70-130 | 6 | | 30 |
| 1,4-Dioxane | 74 | | 88 | | 65-136 | 17 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 93 | | 96 | | 70-130 |
| Toluene-d8 | 102 | | 100 | | 70-130 |
| 4-Bromofluorobenzene | 100 | | 101 | | 70-130 |
| Dibromofluoromethane | 94 | | 99 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 01 Batch: WG1850344-3 WG1850344-4 | | | | | | | | |
| Methylene chloride | 93 | | 92 | | 70-130 | 1 | | 30 |
| 1,1-Dichloroethane | 96 | | 96 | | 70-130 | 0 | | 30 |
| Chloroform | 97 | | 96 | | 70-130 | 1 | | 30 |
| Carbon tetrachloride | 97 | | 97 | | 70-130 | 0 | | 30 |
| 1,2-Dichloropropane | 98 | | 97 | | 70-130 | 1 | | 30 |
| Dibromochloromethane | 107 | | 105 | | 70-130 | 2 | | 30 |
| 1,1,2-Trichloroethane | 116 | | 115 | | 70-130 | 1 | | 30 |
| Tetrachloroethene | 122 | | 123 | | 70-130 | 1 | | 30 |
| Chlorobenzene | 114 | | 116 | | 70-130 | 2 | | 30 |
| Trichlorofluoromethane | 97 | | 95 | | 70-139 | 2 | | 30 |
| 1,2-Dichloroethane | 96 | | 94 | | 70-130 | 2 | | 30 |
| 1,1,1-Trichloroethane | 102 | | 100 | | 70-130 | 2 | | 30 |
| Bromodichloromethane | 99 | | 98 | | 70-130 | 1 | | 30 |
| trans-1,3-Dichloropropene | 102 | | 101 | | 70-130 | 1 | | 30 |
| cis-1,3-Dichloropropene | 95 | | 95 | | 70-130 | 0 | | 30 |
| 1,1-Dichloropropene | 106 | | 105 | | 70-130 | 1 | | 30 |
| Bromoform | 117 | | 115 | | 70-130 | 2 | | 30 |
| 1,1,2,2-Tetrachloroethane | 117 | | 117 | | 70-130 | 0 | | 30 |
| Benzene | 101 | | 101 | | 70-130 | 0 | | 30 |
| Toluene | 110 | | 110 | | 70-130 | 0 | | 30 |
| Ethylbenzene | 112 | | 112 | | 70-130 | 0 | | 30 |
| Chloromethane | 98 | | 99 | | 52-130 | 1 | | 30 |
| Bromomethane | 102 | | 102 | | 57-147 | 0 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 01 Batch: WG1850344-3 WG1850344-4 | | | | | | | | |
| Vinyl chloride | 104 | | 104 | | 67-130 | 0 | | 30 |
| Chloroethane | 111 | | 112 | | 50-151 | 1 | | 30 |
| 1,1-Dichloroethene | 95 | | 94 | | 65-135 | 1 | | 30 |
| trans-1,2-Dichloroethene | 99 | | 99 | | 70-130 | 0 | | 30 |
| Trichloroethene | 103 | | 103 | | 70-130 | 0 | | 30 |
| 1,2-Dichlorobenzene | 117 | | 118 | | 70-130 | 1 | | 30 |
| 1,3-Dichlorobenzene | 118 | | 121 | | 70-130 | 3 | | 30 |
| 1,4-Dichlorobenzene | 115 | | 117 | | 70-130 | 2 | | 30 |
| Methyl tert butyl ether | 94 | | 92 | | 66-130 | 2 | | 30 |
| p/m-Xylene | 115 | | 117 | | 70-130 | 2 | | 30 |
| o-Xylene | 122 | | 122 | | 70-130 | 0 | | 30 |
| cis-1,2-Dichloroethene | 98 | | 98 | | 70-130 | 0 | | 30 |
| Dibromomethane | 100 | | 97 | | 70-130 | 3 | | 30 |
| 1,2,3-Trichloropropane | 116 | | 114 | | 68-130 | 2 | | 30 |
| Styrene | 105 | | 106 | | 70-130 | 1 | | 30 |
| Dichlorodifluoromethane | 98 | | 98 | | 30-146 | 0 | | 30 |
| Acetone | 91 | | 85 | | 54-140 | 7 | | 30 |
| Carbon disulfide | 87 | | 86 | | 59-130 | 1 | | 30 |
| 2-Butanone | 94 | | 89 | | 70-130 | 5 | | 30 |
| 4-Methyl-2-pentanone | 99 | | 95 | | 70-130 | 4 | | 30 |
| 2-Hexanone | 100 | | 96 | | 70-130 | 4 | | 30 |
| Bromochloromethane | 101 | | 100 | | 70-130 | 1 | | 30 |
| Tetrahydrofuran | 88 | | 85 | | 66-130 | 3 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 01 Batch: WG1850344-3 WG1850344-4 | | | | | | | | |
| 2,2-Dichloropropane | 104 | | 102 | | 70-130 | 2 | | 30 |
| 1,2-Dibromoethane | 104 | | 102 | | 70-130 | 2 | | 30 |
| 1,1,1,2-Tetrachloroethane | 121 | | 120 | | 70-130 | 1 | | 30 |
| Bromobenzene | 120 | | 120 | | 70-130 | 0 | | 30 |
| n-Butylbenzene | 120 | | 125 | | 70-130 | 4 | | 30 |
| sec-Butylbenzene | 120 | | 121 | | 70-130 | 1 | | 30 |
| tert-Butylbenzene | 122 | | 124 | | 70-130 | 2 | | 30 |
| 1,3,5-Trichlorobenzene | 122 | | 126 | | 70-139 | 3 | | 30 |
| o-Chlorotoluene | 118 | | 120 | | 70-130 | 2 | | 30 |
| p-Chlorotoluene | 120 | | 121 | | 70-130 | 1 | | 30 |
| 1,2-Dibromo-3-chloropropane | 102 | | 104 | | 68-130 | 2 | | 30 |
| Hexachlorobutadiene | 118 | | 123 | | 67-130 | 4 | | 30 |
| Isopropylbenzene | 123 | | 124 | | 70-130 | 1 | | 30 |
| p-Isopropyltoluene | 123 | | 126 | | 70-130 | 2 | | 30 |
| Naphthalene | 120 | | 120 | | 70-130 | 0 | | 30 |
| n-Propylbenzene | 120 | | 122 | | 70-130 | 2 | | 30 |
| 1,2,3-Trichlorobenzene | 120 | | 124 | | 70-130 | 3 | | 30 |
| 1,2,4-Trichlorobenzene | 123 | | 129 | | 70-130 | 5 | | 30 |
| 1,3,5-Trimethylbenzene | 120 | | 123 | | 70-130 | 2 | | 30 |
| 1,2,4-Trimethylbenzene | 122 | | 124 | | 70-130 | 2 | | 30 |
| Ethyl ether | 99 | | 96 | | 67-130 | 3 | | 30 |
| Isopropyl Ether | 102 | | 101 | | 66-130 | 1 | | 30 |
| Tert-Butyl Alcohol | 109 | | 102 | | 70-130 | 7 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 01 Batch: WG1850344-3 WG1850344-4 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 106 | | 104 | | 70-130 | 2 | | 30 |
| Tertiary-Amyl Methyl Ether | 104 | | 101 | | 70-130 | 3 | | 30 |
| 1,4-Dioxane | 93 | | 87 | | 65-136 | 7 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 93 | | 91 | | 70-130 |
| Toluene-d8 | 105 | | 105 | | 70-130 |
| 4-Bromofluorobenzene | 101 | | 102 | | 70-130 |
| Dibromofluoromethane | 88 | | 89 | | 70-130 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 04 Batch: WG1850383-3 WG1850383-4 | | | | | | | | |
| Methylene chloride | 89 | | 84 | | 70-130 | 6 | | 30 |
| 1,1-Dichloroethane | 94 | | 88 | | 70-130 | 7 | | 30 |
| Chloroform | 94 | | 89 | | 70-130 | 5 | | 30 |
| Carbon tetrachloride | 96 | | 90 | | 70-130 | 6 | | 30 |
| 1,2-Dichloropropane | 98 | | 92 | | 70-130 | 6 | | 30 |
| Dibromochloromethane | 92 | | 87 | | 70-130 | 6 | | 30 |
| 1,1,2-Trichloroethane | 97 | | 92 | | 70-130 | 5 | | 30 |
| Tetrachloroethene | 92 | | 86 | | 70-130 | 7 | | 30 |
| Chlorobenzene | 96 | | 91 | | 70-130 | 5 | | 30 |
| Trichlorofluoromethane | 96 | | 90 | | 70-139 | 6 | | 30 |
| 1,2-Dichloroethane | 97 | | 92 | | 70-130 | 5 | | 30 |
| 1,1,1-Trichloroethane | 99 | | 92 | | 70-130 | 7 | | 30 |
| Bromodichloromethane | 101 | | 96 | | 70-130 | 5 | | 30 |
| trans-1,3-Dichloropropene | 104 | | 97 | | 70-130 | 7 | | 30 |
| cis-1,3-Dichloropropene | 94 | | 89 | | 70-130 | 5 | | 30 |
| 1,1-Dichloropropene | 93 | | 87 | | 70-130 | 7 | | 30 |
| Bromoform | 92 | | 87 | | 70-130 | 6 | | 30 |
| 1,1,2,2-Tetrachloroethane | 94 | | 88 | | 70-130 | 7 | | 30 |
| Benzene | 96 | | 90 | | 70-130 | 6 | | 30 |
| Toluene | 92 | | 87 | | 70-130 | 6 | | 30 |
| Ethylbenzene | 93 | | 87 | | 70-130 | 7 | | 30 |
| Chloromethane | 89 | | 83 | | 52-130 | 7 | | 30 |
| Bromomethane | 93 | | 88 | | 57-147 | 6 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 04 Batch: WG1850383-3 WG1850383-4 | | | | | | | | |
| Vinyl chloride | 91 | | 84 | | 67-130 | 8 | | 30 |
| Chloroethane | 92 | | 86 | | 50-151 | 7 | | 30 |
| 1,1-Dichloroethene | 94 | | 88 | | 65-135 | 7 | | 30 |
| trans-1,2-Dichloroethene | 95 | | 89 | | 70-130 | 7 | | 30 |
| Trichloroethene | 100 | | 95 | | 70-130 | 5 | | 30 |
| 1,2-Dichlorobenzene | 95 | | 91 | | 70-130 | 4 | | 30 |
| 1,3-Dichlorobenzene | 95 | | 91 | | 70-130 | 4 | | 30 |
| 1,4-Dichlorobenzene | 94 | | 89 | | 70-130 | 5 | | 30 |
| Methyl tert butyl ether | 101 | | 94 | | 66-130 | 7 | | 30 |
| p/m-Xylene | 99 | | 93 | | 70-130 | 6 | | 30 |
| o-Xylene | 96 | | 91 | | 70-130 | 5 | | 30 |
| cis-1,2-Dichloroethene | 94 | | 88 | | 70-130 | 7 | | 30 |
| Dibromomethane | 100 | | 94 | | 70-130 | 6 | | 30 |
| 1,2,3-Trichloropropane | 91 | | 86 | | 68-130 | 6 | | 30 |
| Styrene | 100 | | 95 | | 70-130 | 5 | | 30 |
| Dichlorodifluoromethane | 91 | | 83 | | 30-146 | 9 | | 30 |
| Acetone | 99 | | 80 | | 54-140 | 21 | | 30 |
| Carbon disulfide | 89 | | 83 | | 59-130 | 7 | | 30 |
| 2-Butanone | 94 | | 87 | | 70-130 | 8 | | 30 |
| 4-Methyl-2-pentanone | 96 | | 86 | | 70-130 | 11 | | 30 |
| 2-Hexanone | 93 | | 81 | | 70-130 | 14 | | 30 |
| Bromochloromethane | 99 | | 95 | | 70-130 | 4 | | 30 |
| Tetrahydrofuran | 111 | | 100 | | 66-130 | 10 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 04 Batch: WG1850383-3 WG1850383-4 | | | | | | | | |
| 2,2-Dichloropropane | 96 | | 89 | | 70-130 | 8 | | 30 |
| 1,2-Dibromoethane | 95 | | 88 | | 70-130 | 8 | | 30 |
| 1,1,1,2-Tetrachloroethane | 101 | | 96 | | 70-130 | 5 | | 30 |
| Bromobenzene | 95 | | 91 | | 70-130 | 4 | | 30 |
| n-Butylbenzene | 94 | | 88 | | 70-130 | 7 | | 30 |
| sec-Butylbenzene | 92 | | 86 | | 70-130 | 7 | | 30 |
| tert-Butylbenzene | 93 | | 87 | | 70-130 | 7 | | 30 |
| 1,3,5-Trichlorobenzene | 100 | | 94 | | 70-139 | 6 | | 30 |
| o-Chlorotoluene | 92 | | 87 | | 70-130 | 6 | | 30 |
| p-Chlorotoluene | 93 | | 88 | | 70-130 | 6 | | 30 |
| 1,2-Dibromo-3-chloropropane | 85 | | 78 | | 68-130 | 9 | | 30 |
| Hexachlorobutadiene | 96 | | 90 | | 67-130 | 6 | | 30 |
| Isopropylbenzene | 93 | | 87 | | 70-130 | 7 | | 30 |
| p-Isopropyltoluene | 94 | | 89 | | 70-130 | 5 | | 30 |
| Naphthalene | 98 | | 92 | | 70-130 | 6 | | 30 |
| n-Propylbenzene | 92 | | 88 | | 70-130 | 4 | | 30 |
| 1,2,3-Trichlorobenzene | 101 | | 96 | | 70-130 | 5 | | 30 |
| 1,2,4-Trichlorobenzene | 103 | | 99 | | 70-130 | 4 | | 30 |
| 1,3,5-Trimethylbenzene | 92 | | 87 | | 70-130 | 6 | | 30 |
| 1,2,4-Trimethylbenzene | 92 | | 86 | | 70-130 | 7 | | 30 |
| Ethyl ether | 100 | | 94 | | 67-130 | 6 | | 30 |
| Isopropyl Ether | 102 | | 96 | | 66-130 | 6 | | 30 |
| Tert-Butyl Alcohol | 95 | | 87 | | 70-130 | 9 | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics by EPA 5035 High - Westborough Lab Associated sample(s): 04 Batch: WG1850383-3 WG1850383-4 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 103 | | 98 | | 70-130 | 5 | | 30 |
| Tertiary-Amyl Methyl Ether | 102 | | 96 | | 70-130 | 6 | | 30 |
| 1,4-Dioxane | 90 | | 85 | | 65-136 | 6 | | 30 |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| 1,2-Dichloroethane-d4 | 101 | | 99 | | 70-130 |
| Toluene-d8 | 99 | | 100 | | 70-130 |
| 4-Bromofluorobenzene | 99 | | 100 | | 70-130 |
| Dibromofluoromethane | 103 | | 102 | | 70-130 |

# PCBS

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 11/03/23 09:47
Analyst: RMP
Percent Solids: 78%

Extraction Method: EPA 3546
Extraction Date: 11/02/23 14:17
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 59.4 | -- | 1 | A |
| Aroclor 1221 | ND | | ug/kg | 59.4 | -- | 1 | A |
| Aroclor 1232 | ND | | ug/kg | 59.4 | -- | 1 | A |
| Aroclor 1242 | ND | | ug/kg | 59.4 | -- | 1 | A |
| Aroclor 1248 | ND | | ug/kg | 59.4 | -- | 1 | A |
| Aroclor 1254 | 545 | | ug/kg | 59.4 | -- | 1 | B |
| Aroclor 1260 | ND | | ug/kg | 59.4 | -- | 1 | A |
| Aroclor 1262 | ND | | ug/kg | 59.4 | -- | 1 | A |
| Aroclor 1268 | ND | | ug/kg | 59.4 | -- | 1 | A |
| PCBs, Total | 545 | | ug/kg | 59.4 | -- | 1 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 54 | | 30-150 | A |
| Decachlorobiphenyl | 60 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 63 | | 30-150 | B |
| Decachlorobiphenyl | 69 | | 30-150 | B |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02 D
Client ID: ZVI CTRL 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 12:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 11/03/23 20:55
Analyst: ER
Percent Solids: 80%

Extraction Method: EPA 3546
Extraction Date: 11/02/23 14:17
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 302 | -- | 5 | A |
| Aroclor 1221 | ND | | ug/kg | 302 | -- | 5 | A |
| Aroclor 1232 | ND | | ug/kg | 302 | -- | 5 | A |
| Aroclor 1242 | ND | | ug/kg | 302 | -- | 5 | A |
| Aroclor 1248 | ND | | ug/kg | 302 | -- | 5 | A |
| Aroclor 1254 | 453 | | ug/kg | 302 | -- | 5 | B |
| Aroclor 1260 | ND | | ug/kg | 302 | -- | 5 | A |
| Aroclor 1262 | ND | | ug/kg | 302 | -- | 5 | A |
| Aroclor 1268 | ND | | ug/kg | 302 | -- | 5 | A |
| PCBs, Total | 453 | | ug/kg | 302 | -- | 5 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 34 | | 30-150 | A |
| Decachlorobiphenyl | 35 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 55 | | 30-150 | B |
| Decachlorobiphenyl | 51 | | 30-150 | B |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-03
Client ID: AAP 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 12:10
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 11/03/23 10:03
Analyst: RMP
Percent Solids: 72%

Extraction Method: EPA 3546
Extraction Date: 11/02/23 14:17
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 64.6 | -- | 1 | A |
| Aroclor 1221 | ND | | ug/kg | 64.6 | -- | 1 | A |
| Aroclor 1232 | ND | | ug/kg | 64.6 | -- | 1 | A |
| Aroclor 1242 | ND | | ug/kg | 64.6 | -- | 1 | A |
| Aroclor 1248 | ND | | ug/kg | 64.6 | -- | 1 | A |
| Aroclor 1254 | 436 | P | ug/kg | 64.6 | -- | 1 | B |
| Aroclor 1260 | ND | | ug/kg | 64.6 | -- | 1 | A |
| Aroclor 1262 | ND | | ug/kg | 64.6 | -- | 1 | A |
| Aroclor 1268 | ND | | ug/kg | 64.6 | -- | 1 | A |
| PCBs, Total | 436 | | ug/kg | 64.6 | -- | 1 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 36 | | 30-150 | A |
| Decachlorobiphenyl | 39 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 66 | | 30-150 | B |
| Decachlorobiphenyl | 74 | | 30-150 | B |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-04 D
Client ID: AAP CTRL 30 DAY
Sample Location: Not Specified

Sample Depth:
Matrix: Soil
Analytical Method: 1,8082A
Analytical Date: 11/03/23 21:03
Analyst: ER
Percent Solids: 76%

Date Collected: 10/31/23 12:30
Date Received: 10/31/23
Field Prep: Not Specified

Extraction Method: EPA 3546
Extraction Date: 11/02/23 14:17
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Column |
|---|---|---|---|---|---|---|---|
| **Polychlorinated Biphenyls by GC - Westborough Lab** | | | | | | | |
| Aroclor 1016 | ND | | ug/kg | 318 | -- | 5 | B |
| Aroclor 1221 | ND | | ug/kg | 318 | -- | 5 | B |
| Aroclor 1232 | ND | | ug/kg | 318 | -- | 5 | B |
| Aroclor 1242 | ND | | ug/kg | 318 | -- | 5 | B |
| Aroclor 1248 | ND | | ug/kg | 318 | -- | 5 | B |
| Aroclor 1254 | 547 | P | ug/kg | 318 | -- | 5 | B |
| Aroclor 1260 | ND | | ug/kg | 318 | -- | 5 | B |
| Aroclor 1262 | ND | | ug/kg | 318 | -- | 5 | B |
| Aroclor 1268 | ND | | ug/kg | 318 | -- | 5 | B |
| PCBs, Total | 547 | | ug/kg | 318 | -- | 5 | B |

| Surrogate | % Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 31 | | 30-150 | A |
| Decachlorobiphenyl | 34 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 58 | | 30-150 | B |
| Decachlorobiphenyl | 53 | | 30-150 | B |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 1,8082A
Analytical Date: 11/03/23 09:23
Analyst: RMP

Extraction Method: EPA 3546
Extraction Date: 11/02/23 14:17
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23
Cleanup Method: EPA 3665A
Cleanup Date: 11/03/23

| Parameter | Result | Qualifier | Units | RL | MDL | Column |
|---|---|---|---|---|---|---|
| Polychlorinated Biphenyls by GC - Westborough Lab for sample(s): 01-04 Batch: WG1847600-1 | | | | | | |
| Aroclor 1221 | ND | | ug/kg | 47.4 | -- | A |
| Aroclor 1232 | ND | | ug/kg | 47.4 | -- | A |
| Aroclor 1242 | ND | | ug/kg | 47.4 | -- | A |
| Aroclor 1248 | ND | | ug/kg | 47.4 | -- | A |
| Aroclor 1254 | ND | | ug/kg | 47.4 | -- | A |
| Aroclor 1262 | ND | | ug/kg | 47.4 | -- | A |
| Aroclor 1268 | ND | | ug/kg | 47.4 | -- | A |
| Aroclor 1016 | ND | | ug/kg | 47.4 | -- | B |
| Aroclor 1260 | ND | | ug/kg | 47.4 | -- | B |
| PCBs, Total | ND | | ug/kg | 47.4 | -- | B |

| Surrogate | %Recovery | Qualifier | Acceptance Criteria | Column |
|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 75 | | 30-150 | A |
| Decachlorobiphenyl | 73 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 77 | | 30-150 | B |
| Decachlorobiphenyl | 79 | | 30-150 | B |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** ERM GROUP

**Project Number:** Not Specified

**Lab Number:** L2364654

**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits | Column |
|---|---|---|---|---|---|---|---|---|---|
| Polychlorinated Biphenyls by GC - Westborough Lab Associated sample(s): 01-04 Batch: WG1847600-2 WG1847600-3 | | | | | | | | | |
| Aroclor 1016 | 80 | | 82 | | 40-140 | 2 | | 50 | A |
| Aroclor 1260 | 78 | | 81 | | 40-140 | 4 | | 50 | A |

| Surrogate | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria | Column |
|---|---|---|---|---|---|---|
| 2,4,5,6-Tetrachloro-m-xylene | 75 | | 78 | | 30-150 | A |
| Decachlorobiphenyl | 78 | | 82 | | 30-150 | A |
| 2,4,5,6-Tetrachloro-m-xylene | 75 | | 77 | | 30-150 | B |
| Decachlorobiphenyl | 77 | | 81 | | 30-150 | B |

# METALS

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified
Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil
Percent Solids: 78%

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Prep Method | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Metals - Mansfield Lab** | | | | | | | | | | | |
| Iron, Total | 51000 | | mg/kg | 25.0 | -- | 10 | 11/09/23 09:15 | 11/09/23 13:21 | EPA 3050B | 1,6010D | DMB |

**Project Name:** ERM GROUP
**Project Number:** Not Specified
**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02
Client ID: ZVI CTRL 30 DAY
Sample Location: Not Specified
Sample Depth:
Matrix: Soil
Percent Solids: 80%
Date Collected: 10/31/23 12:00
Date Received: 10/31/23
Field Prep: Not Specified

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Prep Method | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Metals - Mansfield Lab** | | | | | | | | | | | |
| Iron, Total | 29500 | | mg/kg | 23.5 | -- | 10 | 11/09/23 09:15 | 11/09/23 13:25 | EPA 3050B | 1,6010D | DMB |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

# Method Blank Analysis
# Batch Quality Control

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab for sample(s): 01-02 Batch: WG1850190-1 | | | | | | | | | | |
| Iron, Total | ND | | mg/kg | 2.00 | -- | 1 | 11/09/23 09:15 | 11/09/23 11:13 | 1,6010D | DMB |

**Prep Information**

Digestion Method: EPA 3050B

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** ERM GROUP

**Project Number:** Not Specified

**Lab Number:** L2364654

**Report Date:** 11/09/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab Associated sample(s): 01-02 Batch: WG1850190-2 SRM Lot Number: D119-540 | | | | | | | | |
| Iron, Total | 114 | | - | | 60-140 | - | | |

# Matrix Spike Analysis
## Batch Quality Control

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

| Parameter | Native Sample | MS Added | MS Found | MS %Recovery | Qual | MSD Found | MSD %Recovery | Qual | Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1850190-3 QC Sample: L2364175-01 Client ID: MS Sample | | | | | | | | | | | | |
| Iron, Total | 15800 | 92.2 | 14400 | **0** | Q | - | - | | 75-125 | - | | 20 |

# Lab Duplicate Analysis

***Batch Quality Control***

**Project Name:** ERM GROUP

**Project Number:** Not Specified

***Lab Number:*** L2364654

***Report Date:*** 11/09/23

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Total Metals - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG1850190-4 QC Sample: L2364175-01 Client ID: DUP Sample | | | | | | |
| Iron, Total | 15800 | 16800 | mg/kg | 6 | | 20 |

# INORGANICS
# &
# MISCELLANEOUS

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-01
Client ID: ZVI 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 10:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 78.4 | | % | 0.100 | NA | 1 | - | 11/01/23 00:46 | 121,2540G | WJM |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-02
Client ID: ZVI CTRL 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 12:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 80.1 | | % | 0.100 | NA | 1 | - | 11/01/23 00:46 | 121,2540G | WJM |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-03
Client ID: AAP 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 12:10
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 72.0 | | % | 0.100 | NA | 1 | - | 11/01/23 00:46 | 121,2540G | WJM |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-04
Client ID: AAP CTRL 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 12:30
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 75.8 | | % | 0.100 | NA | 1 | - | 11/01/23 00:46 | 121,2540G | WJM |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## SAMPLE RESULTS

Lab ID: L2364654-05
Client ID: AAP CTRL DUP 30 DAY
Sample Location: Not Specified

Date Collected: 10/31/23 14:00
Date Received: 10/31/23
Field Prep: Not Specified

Sample Depth:
Matrix: Soil

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor | Date Prepared | Date Analyzed | Analytical Method | Analyst |
|---|---|---|---|---|---|---|---|---|---|---|
| **General Chemistry - Westborough Lab** | | | | | | | | | | |
| Solids, Total | 79.7 | | % | 0.100 | NA | 1 | - | 11/01/23 00:46 | 121,2540G | WJM |

# Lab Duplicate Analysis
*Batch Quality Control*

**Project Name:** ERM GROUP
**Project Number:** Not Specified

***Lab Number:*** L2364654
***Report Date:*** 11/09/23

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| General Chemistry - Westborough Lab Associated sample(s): 01-05 QC Batch ID: WG1846717-1 QC Sample: L2364627-01 Client ID: DUP Sample | | | | | | |
| Solids, Total | 90.8 | 90.5 | % | 0 | | 20 |

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

### Cooler Information

| Cooler | Custody Seal |
|---|---|
| A | Absent |

### Container Information

| Container ID | Container Type | Cooler | Initial pH | Final pH | Temp deg C | Pres | Seal | Frozen Date/Time | Analysis(*) |
|---|---|---|---|---|---|---|---|---|---|
| L2364654-01A | Vial MeOH preserved | A | NA | | 3.3 | Y | Absent | | 8260H-NH(14),8260HLW-NH(14) |
| L2364654-01B | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260H-NH(14),8260HLW-NH(14) |
| L2364654-01C | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260H-NH(14),8260HLW-NH(14) |
| L2364654-01D | Plastic 2oz unpreserved for TS | A | NA | | 3.3 | Y | Absent | | TS(7) |
| L2364654-01E | Glass 60mL/2oz unpreserved | A | NA | | 3.3 | Y | Absent | | PCB-8082(365) |
| L2364654-01F | Vial Large Septa unpreserved (4oz) | A | NA | | 3.3 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2364654-01G | Glass 120ml/4oz unpreserved | A | NA | | 3.3 | Y | Absent | | FE-TI(180) |
| L2364654-01T | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-01U | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-02A | Vial MeOH preserved | A | NA | | 3.3 | Y | Absent | | 8260HLW-NH(14) |
| L2364654-02B | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-02C | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-02D | Plastic 2oz unpreserved for TS | A | NA | | 3.3 | Y | Absent | | TS(7) |
| L2364654-02E | Glass 60mL/2oz unpreserved | A | NA | | 3.3 | Y | Absent | | PCB-8082(365) |
| L2364654-02F | Vial Large Septa unpreserved (4oz) | A | NA | | 3.3 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2364654-02G | Glass 120ml/4oz unpreserved | A | NA | | 3.3 | Y | Absent | | FE-TI(180) |
| L2364654-02T | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-02U | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-03A | Vial MeOH preserved | A | NA | | 3.3 | Y | Absent | | 8260HLW-NH(14) |
| L2364654-03B | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-03C | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-03D | Plastic 2oz unpreserved for TS | A | NA | | 3.3 | Y | Absent | | TS(7) |
| L2364654-03E | Glass 60mL/2oz unpreserved | A | NA | | 3.3 | Y | Absent | | PCB-8082(365) |



*Values in parentheses indicate holding time in days

**Project Name:** ERM GROUP
**Project Number:** Not Specified

**Lab Number:** L2364654
**Report Date:** 11/09/23

## Container Information

| Container ID | Container Type | Cooler | Initial pH | Final pH | Temp deg C | Pres | Seal | Frozen Date/Time | Analysis(*) |
|---|---|---|---|---|---|---|---|---|---|
| L2364654-03F | Vial Large Septa unpreserved (4oz) | A | NA | | 3.3 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2364654-03T | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-03U | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-04A | Vial MeOH preserved | A | NA | | 3.3 | Y | Absent | | 8260HLW-NH(14) |
| L2364654-04B | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-04C | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-04D | Plastic 2oz unpreserved for TS | A | NA | | 3.3 | Y | Absent | | TS(7) |
| L2364654-04E | Glass 60mL/2oz unpreserved | A | NA | | 3.3 | Y | Absent | | PCB-8082(365) |
| L2364654-04F | Vial Large Septa unpreserved (4oz) | A | NA | | 3.3 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2364654-04T | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-04U | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-05A | Vial MeOH preserved | A | NA | | 3.3 | Y | Absent | | 8260HLW-NH(14) |
| L2364654-05B | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-05C | Vial water preserved | A | NA | | 3.3 | Y | Absent | 31-OCT-23 22:33 | 8260HLW-NH(14) |
| L2364654-05D | Plastic 2oz unpreserved for TS | A | NA | | 3.3 | Y | Absent | | TS(7) |
| L2364654-05E | Vial Large Septa unpreserved (4oz) | A | NA | | 3.3 | Y | Absent | | TCLP-EXT-ZHE(14) |
| L2364654-05T | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |
| L2364654-05U | Vial unpreserved Extracts | A | NA | | 3.3 | Y | Absent | | TCLP-VOA(14) |



*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | ERM GROUP | **Lab Number:** | L2364654 |
| **Project Number:** | Not Specified | **Report Date:** | 11/09/23 |

## GLOSSARY

***Acronyms***

| | |
|---|---|
| DL | - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| EDL | - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME). |
| EMPC | - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration. |
| EPA | - Environmental Protection Agency. |
| LCS | - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LCSD | - Laboratory Control Sample Duplicate: Refer to LCS. |
| LFB | - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LOD | - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| LOQ | - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)<br><br>Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) |
| MDL | - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| MS | - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values. |
| MSD | - Matrix Spike Sample Duplicate: Refer to MS. |
| NA | - Not Applicable. |
| NC | - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit. |
| NDPA/DPA | - N-Nitrosodiphenylamine/Diphenylamine. |
| NI | - Not Ignitable. |
| NP | - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil. |
| NR | - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests. |
| RL | - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| RPD | - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report. |
| SRM | - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples. |
| STLP | - Semi-dynamic Tank Leaching Procedure per EPA Method 1315. |
| TEF | - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD. |
| TEQ | - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values. |
| TIC | - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. |

*Report Format: Data Usability Report*

| | | | |
|---|---|---|---|
| **Project Name:** | ERM GROUP | **Lab Number:** | L2364654 |
| **Project Number:** | Not Specified | **Report Date:** | 11/09/23 |

***Footnotes***

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

***Terms***

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

***Data Qualifiers***

**A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

*Report Format: Data Usability Report*

| | | | |
|---|---|---|---|
| **Project Name:** | ERM GROUP | **Lab Number:** | L2364654 |
| **Project Number:** | Not Specified | **Report Date:** | 11/09/23 |

***Data Qualifiers***

**ND** - Not detected at the reporting limit (RL) for the sample.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**V** - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

**Z** - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

*Report Format: Data Usability Report*

| | | | |
|---|---|---|---|
| **Project Name:** | ERM GROUP | **Lab Number:** | L2364654 |
| **Project Number:** | Not Specified | **Report Date:** | 11/09/23 |

## REFERENCES


1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - VI, 2018.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.


## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 624.1:** m/p-xylene, o-xylene, Naphthalene
**EPA 625.1:** alpha-Terpineol
**EPA 8260D:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270E:** NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
**SM4500**: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

**Mansfield Facility**
**SM 2540D:** TSS.
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
**Biological Tissue Matrix:** EPA 3050B

**The following analytes are included in our Massachusetts DEP Scope of Accreditation**

**Westborough Facility:**

***Drinking Water***
**EPA 300.0**: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
**EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

***Non-Potable Water***
**SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH:** Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
**EPA 624.1**: Volatile Halocarbons & Aromatics,
**EPA 608.3**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625.1**: SVOC (Acid/Base/Neutral Extractables).
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

**Mansfield Facility:**

***Drinking Water***
**EPA 200.7:** Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
**EPA 522, EPA 537.1.**

***Non-Potable Water***
**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
**EPA 200.8:** Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
**EPA 245.1** Hg.
**SM2340B**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

# CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 10-31-2023

ALPHA Job #: L2364654

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

**Project Information**
Project Name: ERM Oswego
Project Location:
Project #:
Project Manager: Laurel Crawford
ALPHA Quote #:

**Report Information - Data Deliverables**
☐ ADEx ☒ EMAIL

**Billing Information**
☐ Same as Client info PO #: 1073

**Client Information**
Client: Loureiro
Address: 112 Corporate Drive #2
Portsmouth, NH 03801
Phone: 603-778-1100
Email: LCrawford@loureiro.com

**Turn-Around Time**
☒ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due:

**Regulatory Requirements & Project Information Requirements**
☐ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:
Billing to accountspayable@loureira.com

| ALPHA Lab ID (Lab Use Only) | Sample ID | Collection Date | Collection Time | Sample Matrix | Sampler Initials | ANALYSIS: VOC: ☒ 8260 ☐ 624 ☐ 524.2 | SVOC: ☐ ABN ☐ PAH | METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15 | METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13 | EPH: ☐ Ranges & Targets ☐ Ranges Only | VPH: ☐ Ranges & Targets ☐ Ranges Only | ☒ PCB ☐ PEST | TPH: ☐ Quant Only ☐ Fingerprint | TCLP VOCs | TCLP VOCs | SAMPLE INFO: Filtration ☐ Field ☐ Lab to do; Preservation ☐ Lab to do | Sample Comments | TOTAL # BOTTLES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64654-01 | ZVI 30 day | 10/31/23 | 1000 | Soil | LC | 4 | | | | | 1 | | 1 | 1 | | | | 7 |
| -02 | ZVI Ctrl 30 day | | 1200 | | | 4 | | | | | 1 | | 1 | 1 | | | | 7 |
| -03 | AAP 30 day | | 1210 | | | 4 | | | | | 1 | | 1 | | | | | 6 |
| -04 | AAP ctrl 30 day | | 1230 | | | 4 | | | | | 1 | | 1 | | | | | 6 |
| -05 | AAP ctrl dup 30 day | | 1400 | | | 4 | | | | | | | 1 | | | | | 5 |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| Container Type | | | | | | P/C | | | | | A | | A | A | | | | |
| Preservative | | | | | | O/F | | | | | A | | A | A | | | | |

**Container Type**
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

**Preservative**
A= None
B= HCl
C= $HNO_3$
D= $H_2SO_4$
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = $NH_4Cl$
K= Zn Acetate
O= Other

| Relinquished By: | Date/Time | Received By: | Date/Time |
|---|---|---|---|
| | 10/31/23 1600 | | 10/31/23 1600 |
| | 10/31/23 | | 10/31/23 1010 |
| | 10/31/23 2010 | | 10/31/23 2010 |

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

# APPENDIX E SOIL AND WASTE MANAGEMENT PLAN



# Soil and Waste Management Plan

Robintech / Compudyne, Inc. Site

Owego, New York

NYSDEC Site Number 7-5-4007

March 2024

*The business of sustainability*

ERM

| Document details | The details entered below are automatically shown on the cover and the main page footer.<br>PLEASE NOTE: This table must NOT be removed from this document. |
|---|---|
| Document title | Soil and Waste Management Plan |
| Document subtitle | Sanmina Corporation |
| Project No. | 0589878 |
| Date | March 2024 |
| Version | 2.0 |
| Author | ERM |
| Client Name | Sanmina |

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## Acronyms and Abbreviations

| Name | Description |
|---|---|
| bgs | Below ground surface |
| cDCE | cis-1,2-dichloroethene |
| COC | Constituent of concern |
| CVOC | Chlorinated volatile organic compound |
| IRM | Interim Remedial Measure |
| µg/kg | Micrograms per kilogram |
| PCB | Polychlorinated biphenyl |
| PCE | tetrachloroethene |
| PCS | Potentially contaminated soil |
| PE | Polyethylene |
| ppm | Parts per million |
| RCRA | Resource Conservation and Recovery Act |
| TAGM 3028 | Technical and Guidance Memorandum 3028 Contained-In Policy |
| TCA | 1,1,1-Trichloroethane |
| TCE | trichloroethene |
| TCLP | toxicity characteristic leaching procedure |
| VOC | Volatile organic compound |

# 1. INTRODUCTION

The Interim Remedial Measure (IRM) is anticipated to generate non-hazardous and potentially hazardous waste. The goals of this Soil Management Plan is to properly manage potentially contaminated soils (PCS) and potentially contaminated groundwater during excavation activities associated with this project. Objectives to achieve this goal are the following: 1) Site personnel will conduct construction activities in a way to properly manage PCS; 2) reduce levels of contamination and potential future exposures to onsite receptors through monitoring and proper segregation of PCS; and 3) further protect the public health, safety and welfare, and the environment with proper Site restrictions, established exclusion zones, construction fencing, and erosion control measures.

## 1.1 Constituents of Concern

The primary contaminants identified in soil and groundwater within the Source Area include tetrachloroethene (PCE), trichloroethene (TCE),1,1,1-Trichloroethane (TCA), cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene, 1,1-dichloroethane, acetone, and polychlorinated biphenyls (PCB).

## 1.2 Soil

The available data collected during the investigations of the photo room indicate that TCE and PCE are present at concentrations that may exceed toxicity characteristic leaching procedure (TCLP) D-list maximum contamination levels. In addition, there are several volatile organic compounds (VOCs) present within the soil in the Source Area at concentrations that exceed the action levels set in Technical and Guidance Memorandum 3028 Contained-In Policy (TAGM 3028) that will require soil to be managed as a listed hazardous waste (NYSDEC 1992). There could be up to three types of soil waste generated during the Source Area Removal:

- Non-hazardous waste with TCE concentrations in soil less than 10 milligrams per kilogram (i.e., passes TCLP) and below the TAGM 3028 action levels. If the concentration of constituents of concern (COCs) in soil does not exceed TAGM 3028 action levels, ERM will petition the NYSDEC Division of Materials Management, Bureau of Hazardous Waste and Radiation Management to make a “Contained-In” determination to allow the soil to be managed as non-hazardous waste.
- D-listed (characteristic) hazardous waste that does not exceed the TAGM 3028 action levels, but exceeds the EPA’s TCLP threshold(s).
- F- or U-listed hazardous waste (it is not clear which code we would use given that we have no idea how the TCE waste was generated) because it exceeds the TAGM 3028 action level. Based on the data collected to date, it is unlikely other COCs will exceed the TAGM 3028 action level. If analytical data used to characterize and classify the staged waste indicates the action levels of other COCs has exceeded the TAGM 3028 action levels, the appropriate waste codes will be applied.

Table 1-1 provides a summary of the maximum detected concentration of COCs in soil samples collected proximal to the proposed IRM area at the Site for any compound with an exceedance of the Restricted-Commercial Soil Cleanup Objectives. This table compares the maximum concentration of COCs in soil collected within two intervals (surface to 5 feet below ground surface [bgs] and 5 feet bgs and deeper) with the TAGM 3028 action levels.

## Table 1-1: Summary of Maximum Soil Concentrations

| Compound | Maximum Concentration 0–5 feet bgs (µg/kg) | Maximum Concentration greater than 5 feet bgs (µg/kg) | Restricted-Commercial Soil Cleanup Objectives (µg/kg) | TAGM 3028 Action Levels (µg/kg) |
|---|---|---|---|---|
| TCA | 1.2 | 500,000 | 500,000 | 7,000,000 |
| 1,1-Dichloroethene | ND | 9,000 | 500,000 | 11,000 |
| 2-Butanone | 1.2 | 430 | 500,000 | 47,000,000 |
| Acetone | 86 | 7,400 | 500,000 | 7,800,000 |
| Benzene | 1.2 | 1,100 | 44,000 | 220,000 |
| cDCE | 0.38 | 1,200 | 500,000 | 1,100 |
| Ethylbenzene | 1.4 | 12,000 | 390,000 | 7,800,000 |
| m,p-Xylenes | 5.9 | 55,000 | 1,000,000 | 160,000,000 |
| o-Xylenes | 1.9 | 12,000 | 1,000,000 | 160,000,000 |
| PCE | 2.9 | 140,000 | 150,000 | 120,000 |
| Toluene | 3.8 | 110,000 | 500,000 | 160,000,000 |
| TCE | 50 | 9,900,000 | 200,000 | 58,000 |
| Vinyl Chloride | ND | 37 | 13,000 | 34,000 |
| Total PCB | 492 | 1850 | 1,000 | 1,000 |

*Notes:*
*Soil Cleanup Objectives are derived from 6 NYCRR Part 375-6.8(b).*
*Action Levels from TAGM 3028.*
*Highlighted cells show where the highest soil concentration exceeded the TAGM 3028 action level.*
*µg/kg: micrograms per kilogram*

A full summary of the soil analytical data is included in this report as Table 1-1.

Soil within the proposed IRM area consists primarily of sand, silt, and gravel. The available data from the proposed IRM area indicates that TCE is the primary COC that could drive waste classification; however, any of the COCs highlighted in the Table 1-1 have the potential to require the application of listed waste codes to waste streams.

## 1.3 Groundwater

Contaminated groundwater will likely need to be managed during implementation of the proposed IRM. Table 1-2 summarizes the most recent maximum chlorinated VOC (CVOC) concentrations in groundwater for shallow monitoring wells in the vicinity of the proposed pilot test area. Contact water from within the proposed IRM footprint will be pumped to frac tanks or an equivalent for management, which may include offsite disposal or onsite treatment and discharge with regulatory approvals or under existing industrial discharge permit or New York State Pollutant Discharge Elimination System (SPDES) permit.

**Table 1-2: Summary of Maximum CVOC Concentrations in Shallow Groundwater Collected from within the Proposed IRM Area**

| Compound | Maximum Concentration (µg/L) | TOGS 1.1.1. Ambient Water Quality Standard (µg/L) |
|---|---|---|
| **CVOCs detected in shallow groundwater within the proposed Bioremediation pilot test area** | | |
| PCE | 2.700 | 0.7 |
| TCA | 42,000 | 5 |
| 1,1- Dichloroethane | 6,600 | 5 |
| TCE | 290,000 | 5 |
| cDCE | 6,900 | 5 |
| trans-1,2-dichloroethene | 120 | 5 |
| VC | 0.98 | 2 |

*µg/L: micrograms per liter*
*Groundwater concentrations are from monitoring wells MW-19, MW-23, and IW-4.*
*TOGS 1.1.1: Technical & Operational Guidance Series Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*

# 2. SOIL AND WASTE MANAGEMENT

## 2.1 Estimated Quantities

An estimation of 1650 square feet, to a depth of 5 feet, results in an estimated 306 cubic yards of soil. At a unit density of 1.8 tons per cubic yard, the total weight of soil generated is estimated to be 551 tons.

## 2.2 Erosion and Sediment Control

During construction activities, erosion and sediment controls will be used to minimize the potential for stockpiled soil or storage tanks to impact surrounding media.

## 2.3 Field Screening During Installation

During the proposed IRM, soil will be brought to the surface and equipment—such as a loader or skid-steer loader—will be used to move soil from the excavation area through the unoccupied building to the staging area on the south side of the Broadway Building. Each bucket full of soil will be screened using a calibrated photoionization detector and visually inspected to identify any grossly contaminated soil. Any soils exhibiting elevated photoionization readings and/or visually identified to be grossly contaminated will be segregated as outlined in Section 2.4. Soils deemed to be non-contaminated or that have lower concentrations (i.e., shallower soil) will be staged separately. Each staging area (e.g., constructed staging cells, roll off dumpsters, etc.) will be labeled with a sign.

## 2.4 Soil Stockpiles

The soil stockpile area will be located within an area secured with temporary fencing. Soil may be staged within roll-off containers/dumpsters or constructed staging areas (e.g., bermed area constructed with high-density polyethylene [PE] liner with a geotextile, etc.). Staging areas will be separated into three categories—construction and demolition waste, soil falling under the 10 parts per million (ppm) limit, and soil within 10 to 100 ppm., It is estimated that the under 10 ppm category will come from the upper 5 feet excavated within the proposed IRM treatment area area. Soil with highest concentrations fall within the

zero-valance iron treatment zone (i.e. 5-15 feet bgs; in-situ treatment) and we are not anticipating the need for offsite management of this material.

Stockpiles will be covered with 6 mil PE sheeting at the end of each day, during heavy rains, or if Site activities are curtailed during working hours. The PE sheeting will be weighted down using rope and/ or suitable weights (e.g., sand bags). PE sheeting will extend beyond the perimeter berm so that precipitation falling on the cover does not enter the soil stockpile areas. Water that accumulates within the soil stockpile area will pumped and managed as indicated in Section 2.5.

## 2.5 Water Management

Any water generated will be stored in frac tanks or equivalent storage containers. The disposal or onsite treatment method will be determined in the bidding process and in conciliation with the regulators.

## 2.6 Moisture Conditioning

After stockpiled soils have been given time to gravity dewater, it may be necessary to add a moisture conditioning agent (e.g., ZapZorb®, pebble quicklime, sawdust, etc.) to absorb water entrained in the fine-grained soil. ERM will conduct field tests using Site soils to determine the most cost-efficient moisture conditioning agent and the mix ratio to be utilized. This mix testing will be completed in 5-gallon plastic pails by using soil from the stockpiles and various application ratios of the selected conditioning agents. Each bucket will be allowed to sit overnight and will be visually assessed for free water content.

During construction, mixing of the agent will occur directly in the soil stockpiles and the soil will be mixed using standard construction equipment..

## 2.7 Waste Classification Sampling

Once the excavated soil has been transported to their respective stockpile areas, soil samples will be collected from each stockpile for waste classification analyses—including, at a minimum, TCLP and total VOCs and semi-VOCs, total PCBs, Resource Conservation and Recovery Act (RCRA) metals, Perfluoroalkyl and Polyfluoroalkyl Substances, flashpoint, and any other constituents required by the permitted receiving facility in order to profile and accept the waste stream. Transportation and disposal of the staged soil is included as a task for the prospective bidders for the IRM project. Bidders will provide any additional sampling requirements for profiling and acceptance by prospective permitted receiving facilities.

Samples will be collected from at least 1 foot into the soil stockpile using a shovel, hand auger, or small backhoe. Samples will be collected using a pre-cleaned stainless steel spoon if a hand auger is not utilized, placed in a stainless steel bowl, and composited following NYSDEC guidance. The composited samples will then be placed directly into pre-labeled laboratory glassware, placed directly into a cooler on ice, and will be managed under chain-of-custody procedures.

If soil samples are below the TAGM 3028 action level, ERM will petition the NYSDEC Division of Materials Management, Bureau of Hazardous Waste and Radiation Management to make a “Contained-In” determination to allow the soil to be managed as non-hazardous waste.

In the event that a soil stockpile fails the TAGM 3028 action levels or is a characteristic RCRA hazardous waste based on the TCLP results, the entire soil stockpile will be managed as a hazardous waste to comply with the RCRA 90-day clock and to complete the disposal before the onset of freezing weather.

## 2.8 Soil Load Out and Disposal

Once the waste classification sampling and analysis has been completed, a final determination of waste disposal facility can be made. Potential disposal facilities will be proposed by environmental subcontractors bidding for the IRM work. Each of the IRM bids will be summarized and reviewed with Sanmina, including their proposed disposal facilities. ERM will make a recommendation on a subcontractor and Sanmina will make the final selection based on their review.

Upon final facility acceptance, non-hazardous soils will be loaded out followed by hazardous soils based on facility schedules. Barring a project delay, soil will be transported offsite within four weeks of waste classification and the NYSDEC's "contained-in" determination response.

Properly placarded, registered, and inspected over-the-road dump trucks will be staged adjacent to each stockpile on 6-mil PE sheeting and cleanly loaded with an excavator or front-end loader. Prior to leaving the Site, each vehicle will be inspected and paperwork (e.g., hazardous waste manifest, Bill of Lading, or similar documentation as appropriate for each load) will be checked by ERM. ERM's construction manager will keep and maintain a daily log of all transportation-related activities, referencing truck information, disposal paperwork references, estimated weight, etc.

Personal protective equipment sheeting and other materials that come into contact with the soil and/or expressed water will be disposed of within the soil that is being loaded out.

## 2.9 Site Cleanup and Demobilization

At the conclusion of the construction and restoration activities, demobilization will occur. Temporary improvements installed at the Site as part of construction activities—including, but not limited to, soil stockpile areas and construction barricades—will be removed. All general construction trash and associated containers will be removed and disposed of properly. All construction equipment and materials scheduled for demobilization will be decontaminated. Decontamination will consist of scraping loose any PCS from the equipment and pressure washing. The water used for pressure washing will be collected and pumped into tanks for onsite treatment or offsite disposal. The decontamination materials will be collected and disposed of appropriately.

# APPENDIX F QUALITY ASSURANCE PROJECT PLAN

# Appendix E
# Quality Assurance Project Plan

Robintech / Compudyne, Inc. Site

Owego, New York

NYSDEC Site Number 754007

Project No.: 0589878

ERM Consulting and Engineering, Inc.

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# 1. INTRODUCTION

On behalf of Sanmina Corporation (Sanmina), ERM Consulting and Engineering, Inc. (ERM) has prepared this Quality Assurance Project Plan (QAPP) for an interim remedial measure (IRM) of the source area under the photo room.

## 1.1 Purpose and Objectives

This QAPP identifies the necessary procedures for an orderly, accurate, and efficient data collection and analysis program for the project, and ensures that data meet quality objectives. The objectives for monitoring and ensuring data quality include the following:

- Identify key responsibilities and qualifications of staff responsible for data quality monitoring;
- Ensure that samples are properly managed both in the field and the laboratory;
- Ensure realistic data quality goals that will produce data of known and acceptable quality are established; and
- Ensure that data are accurate, complete, and verifiable.

## 1.2 Site Location

The Robintech / Compudyne, Inc. Site is located at 1200 Taylor Road in the Town of Owego, Tioga County, New York (the Site). The Site is identified as NYSDEC Site Number 754007.

## 1.3 Investigation Objectives

This QAPP has been prepared to outline the proposed activities to further investigate, remediate and monitor the Site and the abutting Broadway Complex remedial site (BCS; Site No. V00290) managed by International Business Machines (IBM). This QAPP addresses required elements established within Section 3.3 of the NYSDEC's Division of Environmental Remediation (DER) guidance manual DER-10 entitled "Technical Guidance for Site Investigation and Remediation" (NYSDEC, 2010).

Consistent with NYSDEC requirements described in DER-10, this QAPP was developed to meet the following goals:

- further characterize contaminants in known source areas;
- define the nature and extent of contamination;
- document conditions during remedial activities; and
- produce data of sufficient quantity and quality to support the evaluation of the NYSDEC-approved remedy for the Site and to develop a holistic Site management strategy to achieve remedial objectives of being protective of public health and the environment.

## 2.0 QUALITY ASSURANCE OBJECTIVES

Quality objectives ensure that data collected are sufficient to meet the intended project goals. Quality objectives are pre-established goals or "benchmarks" that are used to monitor and assess the progress and quality of the work performed. It is essential to define quality objectives prior to initiation of any project work to ensure that activities yield data sufficient to meet project objectives.

Quality objectives are divided into two categories: data quality objectives (DQOs) and quality assurance objectives (QAOs). The DQOs are associated with the overall project objective as it relates to data collection. The QAOs define acceptance limits for project-generated data as they relate to data quality.

### 2.1 Data Quality Objectives

DQOs are qualitative and quantitative criteria required to support the decision making process. DQOs define the uncertainty in a data set and are expressed in terms of precision, accuracy, representatives, completeness, and comparability (PARCC). These parameters are defined as follows:

- **Precision**: a measure of mutual agreement among measurements of the same property usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation. Various measures of precision exist depending upon the “prescribed similar conditions”.
- **Accuracy**: the degree of agreement of a measurement (or an average of measurements) with an accepted reference of “true value”. Accuracy is one estimate of the bias in a system.
- **Representativeness**: expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.
- **Completeness:** a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions.
- **Comparability:** expresses the confidence with which one data set can be compared with another. Comparability is a qualitative, not quantitative measurement, as in the case of accuracy and precision. Comparability is assessed by reviewing results or procedures for data that do not agree with expected results.

It is the responsibility of the field team to collect representative and complete samples. It is the responsibility of the chemist at the laboratory to analyze these samples using accepted protocols resulting in data that meet PARCC standards.

### 2.2 Field Sampling Quality Objectives

The overall quality of sample results depends on proper sample management. Management of samples begins at the time of collection and continues throughout the analytical process. To ensure samples are collected and managed properly and consistently, field procedures for sample collection activities have been developed for this project. The project laboratory also has procedures that ensure a proper and consistent analytical process.

Field procedures include descriptions of equipment and procedures required to perform a specific task. The purpose is to increase reproducibility and to document each of the steps required to perform the task. Approved and correctly implemented field procedures should produce data of acceptable quality that meet project DQOs.

## 2.3 Laboratory Data Quality Objectives

The project laboratory will demonstrate analytical precision and accuracy by the analysis of laboratory duplicates and by adherence to accepted manufacturer and procedural methodologies.

The performance of the project laboratory will be evaluated by the Project Manager and the Project Quality Assurance/Quality Control (QA/QC) Officer during data reduction. The evaluation will include a review of all deliverables for completeness and accuracy.

## 3.0 QUALITY CONTROL PROCEDURES

This section presents a general overview of the QA/QC procedures that will be implemented during the investigation. These quality control procedures are to be implemented in the field and in the laboratory utilized for selected sample analyses.

### 3.1 Field Quality Control Activities

Several types of field QC samples will be collected and submitted for analysis during the project. QC analytical data collection will be limited to the contaminants of potential concern. Each type of QC sample monitors a different aspect of the field effort. Analytical results for QC samples provide information regarding the adequacy of the sample collection and transportation of samples.

The types of field QC samples that will be generated during the project are defined below:

- **Trip Blanks** – Trip blank samples monitor for contamination due to handling, transport, cross contamination from other samples during storage, or laboratory contamination. One trip blank will accompany each shipment of samples to be analyzed for volatile organic compounds (VOCs).
- **Equipment Blanks** – Equipment blank samples monitor for contamination in field sampling equipment. Equipment blanks will be collected at frequency of one duplicate per 20 samples.
- **Field Duplicates** – Field duplicates are used to monitor field and laboratory precision, as well as matrix heterogeneity. Field duplicates will be collected at frequency of one duplicate per 20 samples.
- **Matrix Spike/Matrix Spike Duplicate (MS/MSD)** – MS/MSD samples are used to monitor and assess the effects of the sample matrix on the sample analysis and verify the accuracy and precision of the analysis. MS/MSD samples will be collected at frequency of one MS/MSD sample pair per 20 samples.

QC samples will not be collected when characterizing staged waste or when collecting post-excavation confirmation samples. Might want to add something to the effect of “The NYSDEC required sampling frequency is set such that the sample sets are essentially field duplicates…” But in a better way than I can think of right now.

### 3.2 Laboratory Quality Control Activities

Laboratory QC samples will include the use of method blanks, MS samples, laboratory control samples, laboratory duplicates, and surrogate spikes. The five types of laboratory QC samples are defined below:

- **Method Blanks** – Method blanks are used to monitor and ensure that the analytical system is free of contamination due either to carryover from previous samples or from laboratory procedures.
- **Matrix Spike Samples** – MS samples monitor and assess the effects of the sample matrix on the sample analysis and verify the accuracy and precision of the analysis.
- **Laboratory Control Samples** – Laboratory control samples are used to monitor the accuracy of the analytical procedure without the potential interferences of a matrix.
- **Laboratory Duplicate Samples** – Laboratory duplicate samples are used to monitor and assess laboratory precision, as well as potential matrix heterogeneity.

- **Surrogate Spikes** – Surrogate Spikes are utilized to monitor potential interferences from the sample matrix. Surrogate spikes are required for organic analyses only.

## 4.0 CALIBRATION PROCEDURES

Calibration is an integral part of ensuring that results are quantitated correctly. Instruments that are not calibrated either to manufacturers and/or method specifications are likely to produce unreliable results. Proper procedures must be followed and sufficient documentation maintained to ensure calibrations are performed correctly and that sample quantitations accurately reflect sample concentrations.

During the course of the investigation, remediation, and monitoring activities, instruments that may be used in the field in conjunction with sampling activities include photoionization detector, turbidity meter, handheld multi-parameter instrument (i.e., YSI 556) to collect groundwater geochemical parameters such as temperature, specific conductivity, conductivity, dissolved oxygen, pH, and oxidation-reduction potential. A maintenance, calibration, and operation program will be implemented to ensure that routine calibration and maintenance is performed on all field instruments. Trained team members will perform scheduled calibration, field calibrations, checks, and instrument maintenance prior to use each day in general conformance with the manufacturer's specifications. Additionally, calibration will be checked as necessary to ensure that proper measurements are being taken.

Field personnel will keep records of all field instrument calibrations and field checks in the field logbooks. Calibration information recorded in field logbooks will include date, time, instrument model, a description of calibration or field check procedure, and any instrument deviations.

If on-Site monitoring equipment should fail, replacement equipment will be provided or the malfunction will be repaired in a timely fashion.

# 5.0 ANALYTICAL PROCEDURES AND DATA EVALUATION

Various soil and groundwater samples will be analyzed during investigations, remediation and monitoring activities.

Samples will be analyzed by a National Environmental Laboratory Accreditation Program-approved laboratory. Laboratory data will meet NYSDEC Category B QA/QC deliverables. QC analytical data for shallow groundwater samples will be limited to the contaminates of potential concern. ERM will perform an evaluation of the analytical data that will include review of all deliverables for completeness and accuracy. At a minimum, the following information will be evaluated:

- Chain-of-custody forms;
- Date sampled/date analyzed;
- Sample temperature at check-in;
- Laboratory detection limits;
- Laboratory MS samples;
- Laboratory duplicate analyses;
- Surrogate recoveries (organics); and
- Laboratory control samples (inorganics).

Following completion of the data evaluation, a Data Usability Summary Report will be prepared.

## 5.1 Sample Types and Proposed Analyses

Two types of samples will be collected during this phase of work: confirmation samples and waste characterization samples. Confirmation soil samples will be taken from the excavation side walls and bottom. These samples will be analyzed for volatile organic compounds (VOCs) and polychlorinated biphenyls (PCBs). The side wall samples will be collected at the DER-10 required frequency of one sample per every thirty (30) linear feet. One bottom sample will be collected. Confirmation samples will be validated by a third party reviewer.

Waste characterization sampling of solid waste will be analyzed in accordance with the requirements of the offsite receiving facility. Table 5-1 presents a list of analyses commonly requested by landfill receiving facilities prior to offsite disposal of waste soils. Any wastewater generated will be containerized (e.g., drums, totes, frac tanks, etc.) and sampled in accordance with either the receiving facility in the case on offsite disposal, or in accordance with existing and/or modified permits in the case of onsite treatment and discharge. At this time it is not anticipated that the waste characterization samples will require third party validation.

## Table 5-1: Summary of Laboratory Analyses and Methods

| Analysis | Method |
|---|---|
| TCLP VOCs | 8260C SW1311 |
| TCLP SVOCs | 8270D SW1311 |
| TCLP Metals | 6010 C SW1311 |
| TCLP Pesticides | 8081B SW1311 |
| TCLP Herbicides | 8151A SW1311 |
| TCLP Mercury | 7470A SW1311 |
| Sulfur | 6010C - Sulfur Only |
| Free Liquid | 9095B |
| Flash Point | 1010A |
| pH/Temperature | 9045 |
| PCBs | 8082A |
| Sulfate | 9056A |
| Reactive Sulfide | 7.3.3 |
| Reactive Cyanide | 7.3.4 |
| Halogens | 9023 |
| Dioxins and Furans | 8290 |
| VOCs | 8260C |