Robintech / Compudyne, Inc. Site

Sanmina Corporation Facility, Owego, New York

Investigation Work Plan

NYSDEC Site Number 7-5-4007

April 2021

Project No.: 0578737

The business of sustainability

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Certification

I, Rob Sents, certify that I am currently a NYS Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Rob Sents, P.G.
ERM Consulting & Engineering, Inc.
20 April 2021

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1. INTRODUCTION

On behalf of Sanmina Corporation (Sanmina), ERM Consulting and Engineering, Inc. (ERM) has prepared this investigation work as requested by the New York State Department of Environmental Conservation (NYSDEC) in a letter dated 24 August 2020 and as discussed on conference calls with the NYSDEC on 16 September and 5 November 2020.

1.1 PURPOSE AND OBJECTIVES

Sanmina has prepared this work plan to outline the proposed activities to further investigation the Robintech / Compudyne site located at 1200 Taylor Road in the Town of Owego, Tioga County, New York (the "Site"; Site No. 754007) and the abutting Broadway Complex remedial site (BCS; Site No. V00290) managed by International Business Machines (IBM). This work plan 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 work plan was developed to meet the following goals:

- further characterize impacts in known source areas;
- define the nature and extent of contamination;
- produce data of sufficient quantity and quality to support the evaluation of the NYSDEC-approved remedy for the Site and develop a holistic Site management strategy to achieve remedial objectives of being protective of public health and the environment.

1.2 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

Sanmina Earl Kimble, P.E.- (607) 239-9431

Regulatory Agency

NYSDEC Gary Priscott, P.G.- (607) 775-2545 ext. 116

NYSDOH Julia Kenney, P.G.- (518) 402-7860

Environmental Consultant

ERM Robert Sents, P.G.- (315) 233-3038

1.3 DESCRIPTION AND HISTORY

The Site is an inactive hazardous waste disposal site which entered into a Consent Order (Index #A701518809) on 8 February 1989. The site was first developed for industrial use in 1956. The site was owned and operated by various organization 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.

The Site is bordered to west and north primarily by undeveloped land, with an 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. A wetland is located south of the site, and the Susquehanna River is located approximately one-half mile south of the site (Figure 1).

A Record of Decision was issued by NYSDEC for the Site in March 1995; the potential source area for hazardous waste in the subsurface is a former Robintech chemical storage area now located under the existing "clean room" of the Main Building. Figure 2 presents a layout of the Site. 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 (volatile organic compounds [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 a NYSDEC-approved Performance Monitoring Program (PMP).

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 chemical storage area. In addition, polychlorinated biphenyls were identified in soil in the chemical storage area during the source area remedy evaluation completed in 2017.

A groundwater pump and treat system was installed and has been in operation since 1993, which is effectively achieving its goal of removing VOC mass. Further work will be completed in 2021 as outlined in this work plan to evaluate the effectiveness of this system to hydraulically control dissolved phase plume.

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 has been 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.

1.4 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, and during the installation of recovery wells RW-4, RW-5, and RW-6 as well as monitoring wells MW-34, MW-35, MW-36, MW-37, and MW-38 in 1995.

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 feet bgs near the southern property boundary.

1.5 HYDROGEOLOGY

The principal water transmitting zones at the Site are divided into three aquifers or hydrogeologic units (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 during semi-annual PMP monitoring events and the potentiometric surfaces are contoured to illustrate the inferred horizontal groundwater flow direction of each HGU. These maps are attached as Figures 3A thru 3C. The general flow direction of all three HGUs is south-southwest, toward the Susquehanna River, located approximately 0.75-mile south of the Site.

1.6 STANDARDS, CRITERIA, AND GUIDANCE

The following standards and criteria may apply to this project:

- 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

The following guidance may apply to this project:

- 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

1.7 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative criteria required to support the decision making process. DQOs define the uncertainty in an analytical data set and are expressed in terms of precision, accuracy, representatives, completeness, and comparability (PARCC).

- Precision is 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.

- Accuracy is the degree of agreement of a measurement (or an average of measurements) with an accepted reference of “true value”. Accuracy is an estimate of potential numerical bias (i.e., low or high) in analytical data.
- 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 is a measure of the amount of valid data obtained 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 measurement. Comparability is assessed by reviewing results or procedures for analytical data that do not agree with expected results.

The field team will collect representative samples. The chemist at the laboratory will analyze samples using accepted protocols resulting in data that meet PARCC standards and in accordance with the Quality Assurance Project Plan (QAPP) in Appendix A.

2. SCOPE OF INVESTIGATION

2.1 SUBSURFACE CLEARANCE AND UTILITY EVALUATION

Dig Safely 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 clear proposed locations prior to the commencement of subsurface intrusive activities. A minimum 10-foot-diameter around each planned location will be scanned and cleared of subsurface utilities by the utility location subcontractor prior to the initiation of drilling. Additionally, the former subsurface sanitary sewer pipe that runs through the Former Chemical Lab Storage Area to the BCS Site former IBM septic tank will be located and evaluated.

Proposed sampling locations will be adjusted in the field as necessary based on the results of the subsurface clearance effort to facilitate the health and safety of personnel, prevent property damage, and/or to avoid or minimize interference with property operations. NYSDEC will be consulted and approve relocation of any sampling location if the adjustment results in an off-set position that is greater than 10 feet away from the originally proposed location.

2.2 SURFACE AND NEAR SURFACE SOIL SAMPLING

Surface and near-surface soil samples will be collected at the locations shown in Figure 4B and as described in Table 1B. Surface soil samples will be collected using a stainless steel hand auger or equivalent at a depth of 0 to 2 inches below the surficial vegetative cover, but will include the root mass. Near-surface soil samples will be collected using the same approach at a depth of 2 to 12 inches below the surficial vegetative cover. Soil will be screened by an ERM geologist using a calibrated photoionization detected (PID) equipped with an 11.7 eV lamp. Soil samples will also be visually examined for physical properties including color, texture, composition, moisture content, odor, and visual evidence of staining, discoloration, or product/sheen. Soil descriptions and other field data/observations will be documented in soil boring logs.

Soil samples will be collected into laboratory-provided sampling containers, which will be labeled and stored in a clean pre-chilled cooler. All samples will be managed under chain-of-custody procedures and submitted to the project laboratory for analysis pursuant to DER-10 paragraph 2.1(a)1 and NYSDEC's guidance for sampling, analysis and assessment of per- and polyfluoroalkyl substances (PFAS). These parameters are summarized in Table 1B.

Special precautions will be used to avoid or minimize the use of sampling equipment and materials that may contain PFAS.

2.3 SUBSURFACE SOIL SAMPLING

Subsurface soil will be examined and screened continuously from the ground surface to each soil boring's completion depth. Selected depth intervals will be sampled for laboratory analysis to evaluate concentrations of contaminates of potential concern (COPC).

Subsurface soil samples will be collected at the soil boring locations shown in Figure 4A. Soil borings will be advanced to either top of bedrock or drilling refusal using direct-push or hollow-stem auger drilling methods. Alternate drilling methods (e.g. Sonic, etc.) may be considered if geologic conditions prevent reaching anticipated depths due to equipment limitations or subsurface conditions. If drilling refusal is encountered at a depth estimated to be near to an approved completion depth (or conditions), the NYSDEC will be consulted for approval on the completion of the boring.

Each borehole will be sampled continuously using dedicated sample liners and dual tube or equivalent discrete interval sampling methods. Reusable sampling equipment will be cleaned between each borehole location by washing in an Alconox® and potable water solution followed by rinsing. Decontamination procedures are presented in Section 2.6.

Soil will be screened by an ERM geologist using a calibrated photoionization detected equipped with an 11.7 electron-volt (eV) lamp. Soil samples will also be visually examined for physical properties including color, texture, composition, moisture content, odor, and visual evidence of staining, discoloration, or product/sheen. Soil descriptions and other field data/observations will be documented in soil boring logs. Air monitoring will be performed within the work area.

Soil Sampling

Up to three soil samples may be submitted for laboratory analysis per boring location (Table 1A). The total number of samples and the sample intervals will be biased toward the 2-foot interval of highest suspected contamination based on the results of field screening, and visual examination or to confirm the absence of COPC.

Soil samples will be placed into laboratory-provided sampling containers, which will be labeled and stored in a clean pre-chilled cooler. All samples will be managed under chain-of-custody procedures and submitted to the project laboratory for analysis of parameters indicated Table 1A.

2.4 OVERBURDEN MONITORING WELLS

A soil boring will be installed at each new well location to allow inspection of overburden materials and select monitoring well screen intervals. Overburden monitoring wells will be installed using direct-push drilling techniques or alternate drilling methodology, if deemed appropriate based on geologic conditions. All well installations, drilling, construction, development, testing, and sampling will be directed by a geologist.

Following the completion of each soil boring as shown on Figure 4A, a determination of the need to install monitoring well(s) at each location will be made based on field screening and observations during the soil boring installation. If there are indications of COPC in soil, the borehole will be cement grouted to target depth and a shallow overburden groundwater monitoring well will be installed. If it is determined a monitoring well or wells will not be required at a given location to further develop the site conceptual model, the bore hole will be sealed with a cement bentonite-grout mixture. Prior to making a determination on whether to remove a proposed monitoring well from the proposed investigation, the NYSDEC will be consulted and the decisions regarding construction of a well will be documented in writing.

Each new well will be 1.5-inch PVC. Wells will be constructed using 5-foot or 10-foot long 0.010-inch pre-slotted screens based on field observations. Sand filter packs will be prepacked with an outer 304 stainless steel 65 mesh surrounding 20/40 sand. A minimum 2-foot-thick bentonite seal will be installed and hydrated above the filter pack using approved potable water. Cement-bentonite grout will be installed to backfill the remainder of the borehole to approximately one-foot below ground surface. A flush-mounted steel protective casing will be cemented in place over each well.

If elevated concentrations of COPCs are identified through field screening and visual examination in the shallow overburden, double cased wells may be installed to evaluate the deep overburden HGU.

Well Development

Each new monitoring well will be developed through pumping, surging, or bailing to facilitate collection of representative groundwater samples. Water levels and field parameters will be measured and recorded during well development activities using a calibrated multi-parameter meter with a flow cell and a water level indicator. Parameters for measurement include temperature, specific conductance (SpC), dissolved oxygen (DO), pH, turbidity, and Oxidation-Reduction Potential (ORP).

Groundwater Sampling

Groundwater samples will be collected from all newly installed monitoring wells and from select existing wells presented in Figure 4C and 4D and Table 2A to further our conceptual site model. Groundwater sampling will be performed using low-flow well purging/sample collection techniques. The low-flow groundwater purging/sampling technique requires the measurement and recording of water levels and field parameters, which will be measured and recorded during well development activities using a calibrated multi-parameter meter with a flow cell and a water level indicator.

Well construction details and sampling records from previous sampling events will be reviewed prior to this sampling event. The condition of each well, including the well's protective cover and casing, will be evaluated in the field prior to sampling. Groundwater levels and the total depth of the well will be measured from the top of each well casing. Observations will be assessed in the field to determine the usability of each well for groundwater sampling.

Select in situ geochemical parameters including temperature, SpC, pH, ORP, and DO will be monitored and recorded to provide geochemical data and evaluate groundwater stabilization prior to sample collection. Stabilization will be considered achieved when three consecutive readings are within the following limits; however, samples may be collected if stabilization has not been achieved within 90 minutes of purging:

- DO less than or equal to (≤) 10 percent;
- Turbidity less than 50 Nephelometric Turbidity Units (NTUs);
- Specific Conductance ≤ 3 percent;
- Temperature ≤ 3 percent;
- pH ± 0.1 unit; and
- ORP ± 10 millivolts.

Samples will be collected directly into laboratory-supplied sampling containers, which will be pre-labeled and stored in a clean, pre-chilled cooler. Samples will be transported under chain-of-custody to a NYSDOH-approved environmental laboratory for analysis. Samples will be analyzed for parameters identified in Table 2A.

Deep Grab Groundwater Sampling

Upon completion of each soil boring as shown on Figure 4D, a determination of the need to collect a deep groundwater grab sample at each location will be evaluated based on field screening and observations during the soil boring installation. If there are indications of COPCs in deep overburden, a grab sample will be collected utilizing SP-22 tooling and analyzed for EPA Method 8260 TCL VOCs and 1,4 Dioxane in select locations (Table 2B).

Groundwater grab samples will be placed into laboratory-provided sampling containers, which will be labeled and stored in a clean pre-chilled cooler. All samples will be managed under chain-of-custody procedures and submitted to the project laboratory for analysis.

2.5 HYDROGEOLOGICAL EVALUATION

Water level monitoring and aquifer testing will be performed to evaluate hydrogeological conditions in overburden.

The goals of the hydrogeological evaluation task are to:

- Measure water levels and calculate groundwater elevations for each well location;
- Calculate horizontal hydraulic gradients in the upper and lower HGUs;
- Calculate vertical hydraulic gradients between the upper and lower HGUs at each well cluster;
- Obtain a range of hydraulic conductivity values for the upper and lower HGUs;
- Estimate a range of transmissivity values for the unconsolidated upper and lower HGUs; and
- Estimate a range of groundwater flow rates for the unconsolidated upper and lower HGUs.

Initial hydrogeological evaluation methods include both water level gauging events and single well aquifer slug tests.

The slug test is designed to measure the response of an aquifer to an instantaneous displacement of a known volume of water within a well. Recovery of the water levels to the pre-test condition (static) are measured and stored at frequent time intervals using an electronic programmable pressure-sensitive water level transducer. A falling head slug test is initiated when a slug is deployed below the static water level in the well. Recovery is monitored until the initial displacement of the water level has returned at least 95 percent of the way to the static level. At this time the slug is removed and a rising head slug test is initiated, where water levels are recorded until 95 percent of the initial displacement has been recovered. The data set can be analyzed to estimate a hydraulic conductivity and transmissivity value for each tested well. A range of hydraulic conductivity values can be obtained for an HGU by performing slug tests in multiple wells across the site screened in the same HGU. Differences between HGUs can be quantified by performing slug tests in wells screened in different HGUs.

Wells screened across the water table will be tested as described above using a physical solid slug method of water displacement with a physical slug. Wells screened below the water table will be tested using pneumatic equipment assemblies. Pneumatic slug testing methodology uses air rather than a solid slug deployed within the water column to create the initial displacement necessary to initiate a slug test. Pneumatic slug tests are beneficial in that solid slugs, string, decontamination of solid slugs, and additional manual measurements are not required. Instead, an airtight pneumatic assembly is attached to the well head and equilibrium is established and recorded. A valve in the pneumatic assembly is closed and the air column above the water surface within the well is pressurized using a hand pump or compressed air, and water level is monitored until a new equilibrium is established with the added air pressure. The valve is then opened allowing an instantaneous release of the applied pressure resulting in an instantaneous initiation of a rising head slug test without perturbations observed during solid slug tests. Pneumatic slug tests can only be performed in wells where:

1. The well screen is fully saturated.
2. The well screen will not become exposed (unsaturated) during pressurization.
3. The well casing above the water level is competent with no cracks or open joints.
4. The hydraulic conductivity of the well is high (fast) enough that equilibration is reached before introduced pressure is lost.

In the event that a well with a fully saturated well screen does not satisfy these criteria, a solid slug test will be completed.

The water level gauging and slug tests will be performed after the additional overburden wells are installed so the new wells may be incorporated into the gauging and slug testing activities.

Details of specific tasks will include:

- Two sets of groundwater level measurements will be collected using electronic water level meters: one set before and one set following completion of the slug testing program.
- Compressed air by hand pump or portable air compressor will be used for the pneumatic slug testing method.
- For wells screened across the water table (or wells with low hydraulic conductivity), solid slugs of known initial displacement will be used and cleaned using decontamination procedures described in Section 2.6.

The data collected from the slug tests will be reduced and analyzed using: 1) the aquifer test analysis software program Aqtesolv®, and 2) analytical methods set forth by Bouwer and Rice (1976, 1989), Cooper et al (1967), and the KGS Model described by Hyder et al (1994),

2.6 DECONTAMINATION

Temporary decontamination pads will be constructed with two layers of polyethylene sheeting that will be bermed at the sides. Re-usable drilling and sampling equipment and tools will be bucket washed with Alconox® and potable water solution followed by a water rinse between uses. Decontamination water from the pad will be placed into 5-gallon buckets and/ or transferred into pre-labeled waste containers.

2.7 SAMPLE ANALYSIS

Proposed sample locations for soil and groundwater are presented in Figure 4A, 4B, 4C and 4D. The laboratory analysis of soil and groundwater samples collected will be performed by NYSDOH-approved environmental laboratories using analytical methods consistent with the methods outlined in Table 1A, 1B, 2A, 2B and in the QAPP (Appendix A). Laboratory analytical reports will contain Analytical Service Protocol (ASP) Category B or equivalent deliverables to facilitate data validation or usability evaluation and review (see Section 2.8). Electronic data deliverables will also be submitted.

2.8 DATA USABILITY

Data usability will be evaluated following procedures for the preparation of a Data Usability Summary Report for all samples collected. The usability evaluation will be performed consistent with the NYSDEC guidance contained in DER-10 Appendix 2B. The results of the data usability evaluation will be presented in an Electronic Data Summary consistent with the requirements of DER-10 Section 3.13.

2.9 INVESTIGATION-DERIVED WASTE

Investigation-derived waste (IDW) is anticipated to consist of the following:

- Water - decontamination fluids, monitoring well development water, and groundwater from monitoring well sampling;
- Disposables - personal protective equipment (PPE), high density poly ethylene tubing used for groundwater sampling, paper towels; and
- Solids - soil cuttings.

IDW generated from the field sampling efforts will be placed in Department of Transportation-approved 55-gallon steel drums or other appropriate containers and staged for as-required waste characterization sampling in advance of disposal. All containers of IDW will be labeled with generator name, address, contents, container number, waste determination status, and accumulation start date. IDW will be transported and disposed of at permitted disposal facility in accordance with applicable state and federal regulations.

2.10 SURVEY

Sampling locations will be measured in the field using GPS equipment. Select locations will be surveyed by a New York-licensed surveyor.

2.11 REPORTING

An Investigation Report will be prepared at the completion of the scope of work. It will present a summary of all results to satisfy the requirements of DER-10 Section 3.14. The report will summarize areas of concern, identify potential exposure pathways, and recommend additional work, if necessary.

2.12 SCHEDULE

A general schedule of anticipated investigation-related activities is presented below. Subsequent to receipt of NYSDEC's approval, ERM's drilling subcontractor will mobilize to the Site. NYSDEC will be notified a minimum of 5 days in advance of investigation activities at the Site.

- Submittal of Revised Investigation Work Plan- 20 April 2021
- Mobilization for subsurface clearance and evaluation of sanitary sewer- 17 May 2021
- Initiate Direct-Push Soil Sampling- 17 May 2021
- Initiate Well Installation- 31 May 2021
- Monitoring Well Development- 21 June 2021
- Initiate Groundwater Sampling and Hydrogeologic Evaluation – 12 July 2021
- Submit Draft Report- 23 September 2021

All dates are subject to change based on review periods; subcontractor availability and drilling methodology required to collect quality data based on geologic conditions and restrictions within the building; weather; and COVID-19 restrictions. ERM will provide regular updates on any changes to the schedule.

3. ASSOCIATED DOCUMENTS

3.1 QUALITY ASSURANCE PROJECT PLAN

The QAPP is presented in Appendix A. The QAPP is consistent with the requirements of DER-10 Section 2.4. The QAPP describes sampling and analysis procedures for implementation of the investigation along with quality assurance/quality control criteria. The QAPP will facilitate generation of data with acceptable precision, accuracy, representatives, completeness, and comparability.

3.2 COMMUNITY AIR MONITORING PLAN

The Community Air Monitoring Plan (CAMP) for the Site is presented in Appendix B. The CAMP is consistent with the requirements of DER-10 Appendix 1A (NYSDEC, 2010). The CAMP describes monitoring requirements and response action levels associated with monitoring of VOCs and particulates (i.e., dust) downwind of outdoor intrusive activities. The action levels specified in the CAMP require increased monitoring, corrective actions to abate emissions, and/or work stoppage if necessary. The CAMP provides a measure of protection for the down-wind community from potential airborne contaminant releases as a result of outdoor Site work activities.

3.3 HEALTH AND SAFETY PLAN

The Health and Safety Plan (HASP) is presented in Appendix C. The procedures set forth in the HASP are designed to minimize the risk of exposure to chemical and physical hazards that may be present at the properties. These procedures generally conform to applicable federal, state and local regulations, including Occupational Safety and Health Administration requirements governing activities at hazardous waste sites and the requirements in 29 CFR 1910.120 (Hazardous Waste Operations). Specific practices and procedures, including the level of PPE, are based on a review of currently-available information for the properties.

Every potential safety hazard associated with this investigation may not be predicted. The HASP does not attempt to establish rules to cover every contingency that may arise, but it does provide a basic framework for the safe completion of field activities and plans for reasonable contingencies.

4. REFERENCES

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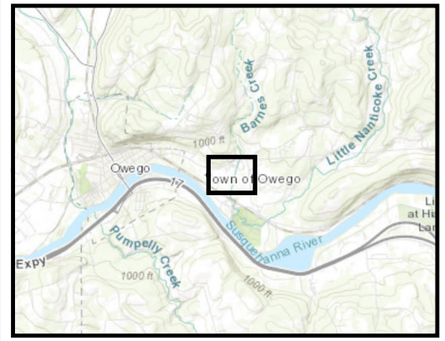
Bouwer, H. and R.C. Rice, 1976. A Slug Test Method for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. Water Resources Research. Vol. 12, no. 3, pp 423-428.

Cooper, H.H., J.D. Bredehoeft, and S.S. Papadopulos, 1967. Response of a Finite-Diameter Well to an Instantaneous Charge of Water. Water Resources Research. Vol. 3, no. 1, pp 263-269.

Hyder, Z., J.J. Butler Jr., C.D. McElwee, and W. Liu, 1994. Slug Tests in Partially Penetrating Wells. Water Resources Research. Vol. 30, no. 11, pp 2945-2957.

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

0 140 280 420 560

Feet

Figure 1: Site Location
Sanmina
Owego, NY

ERM

Legend

- Creek
- Former Sanitary Sewer
- Building Outline

Former Structure

- Former Chemical Storage Area
- Former IBM Septic Tank
- Approximate location of Former Septic Tank and Leach Area
- Broadway Complex Site Boundary
- Robintech Compudyne Site Boundary

NOTES:

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

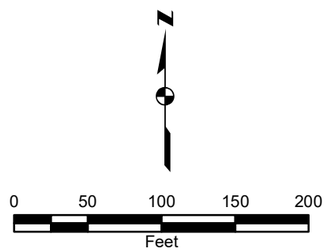


Figure 2: Site Layout
Sanmina
Owego, NY

ERM

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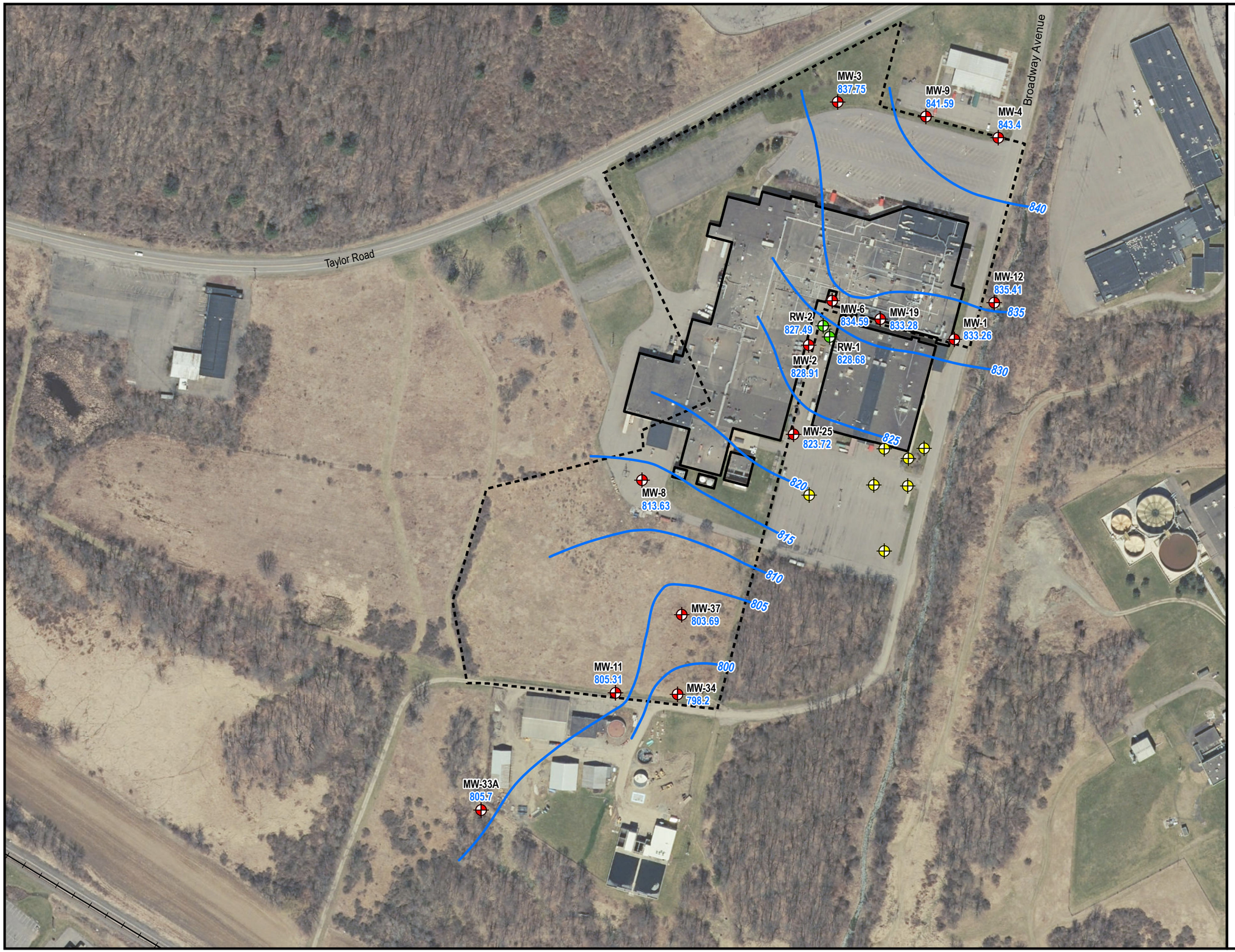
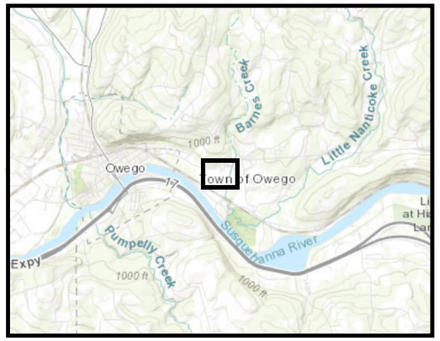




Legend

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

NOTES:

- Groundwater elevations recorded 6 October 2020
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

N

0 100 200 300 400

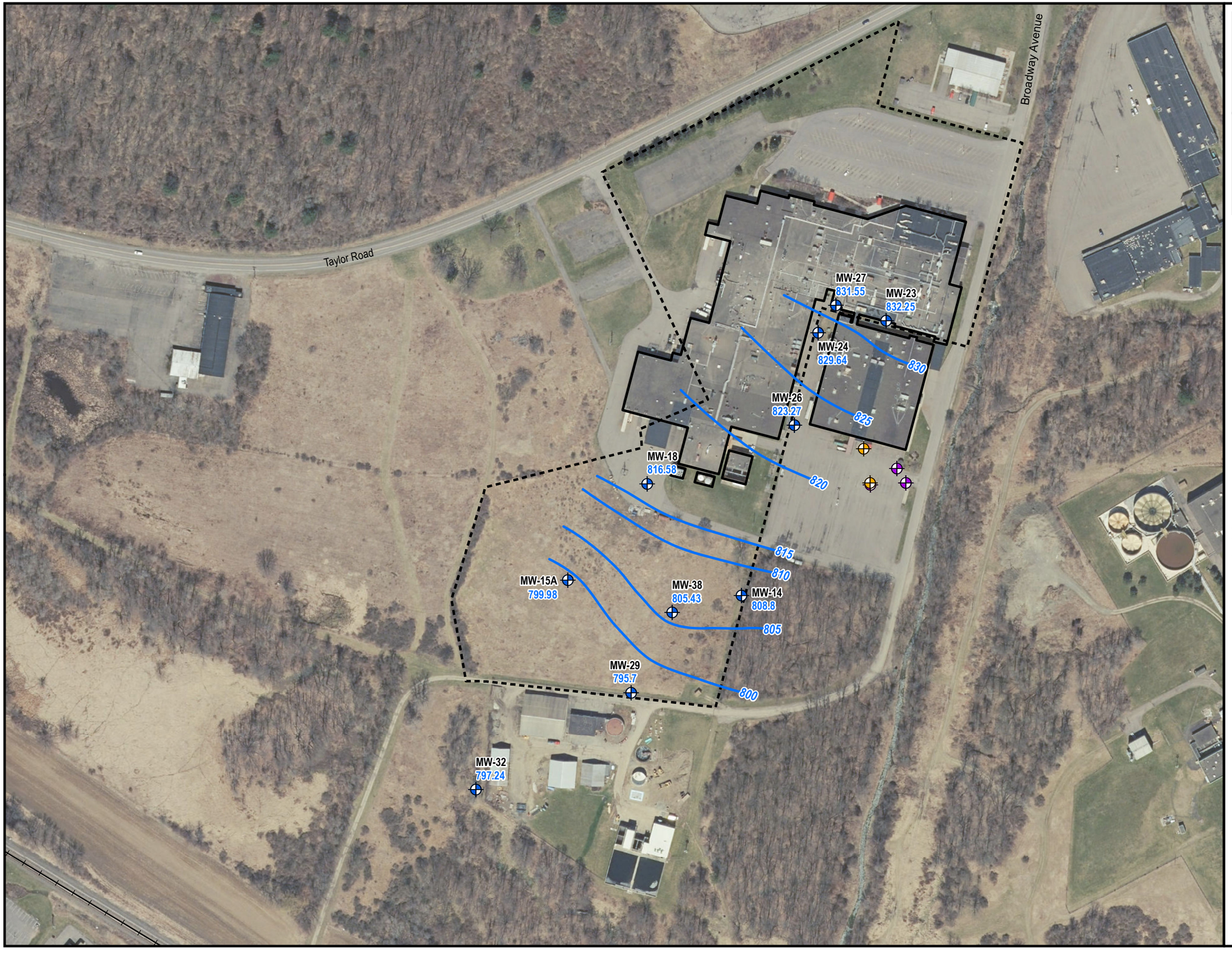
Feet

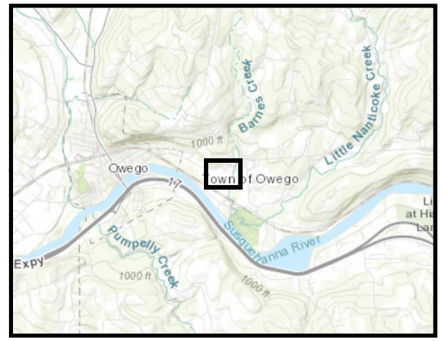
Figure 3A: Hydrogeology - Shallow Overburden

Sanmina

Owego, NY

ERM





Legend

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

NOTES:

- Groundwater elevations recorded 6 October 2020
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

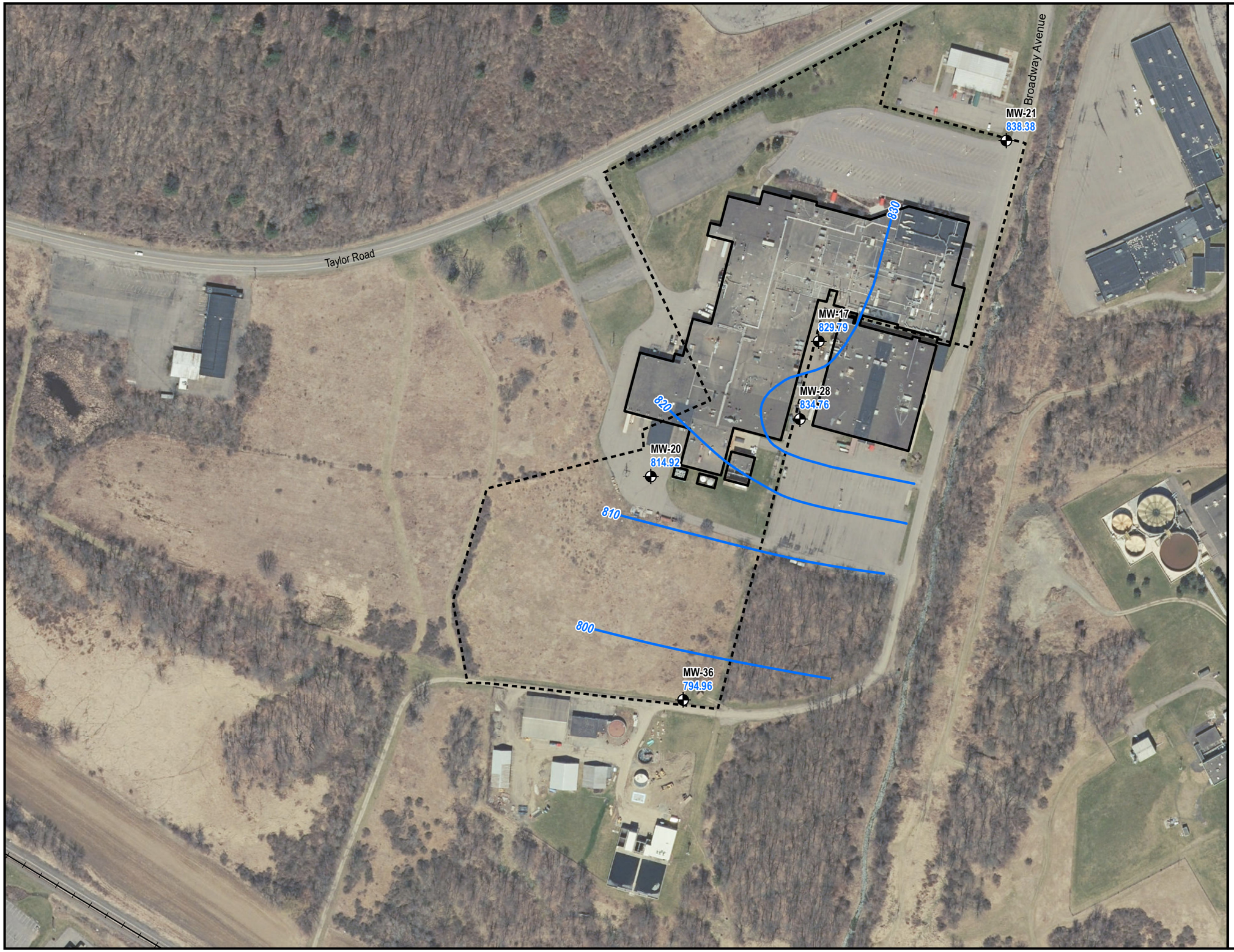
N

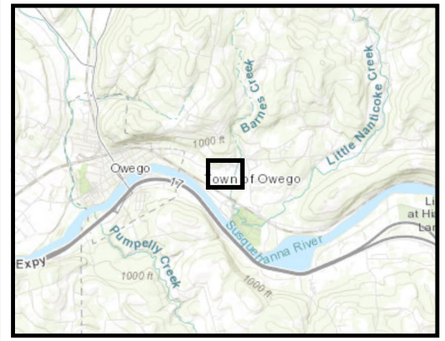
0 100 200 300 400

Feet

Figure 3B: Hydrogeology - Deep Overburden
Sanmina
Owego, NY

ERM





Legend

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

NOTES:

- Groundwater elevations recorded 6 October 2020
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

N

0 100 200 300 400

Feet

Figure 3C: Hydrogeology - Bedrock
Sanmina
Owego, NY

ERM

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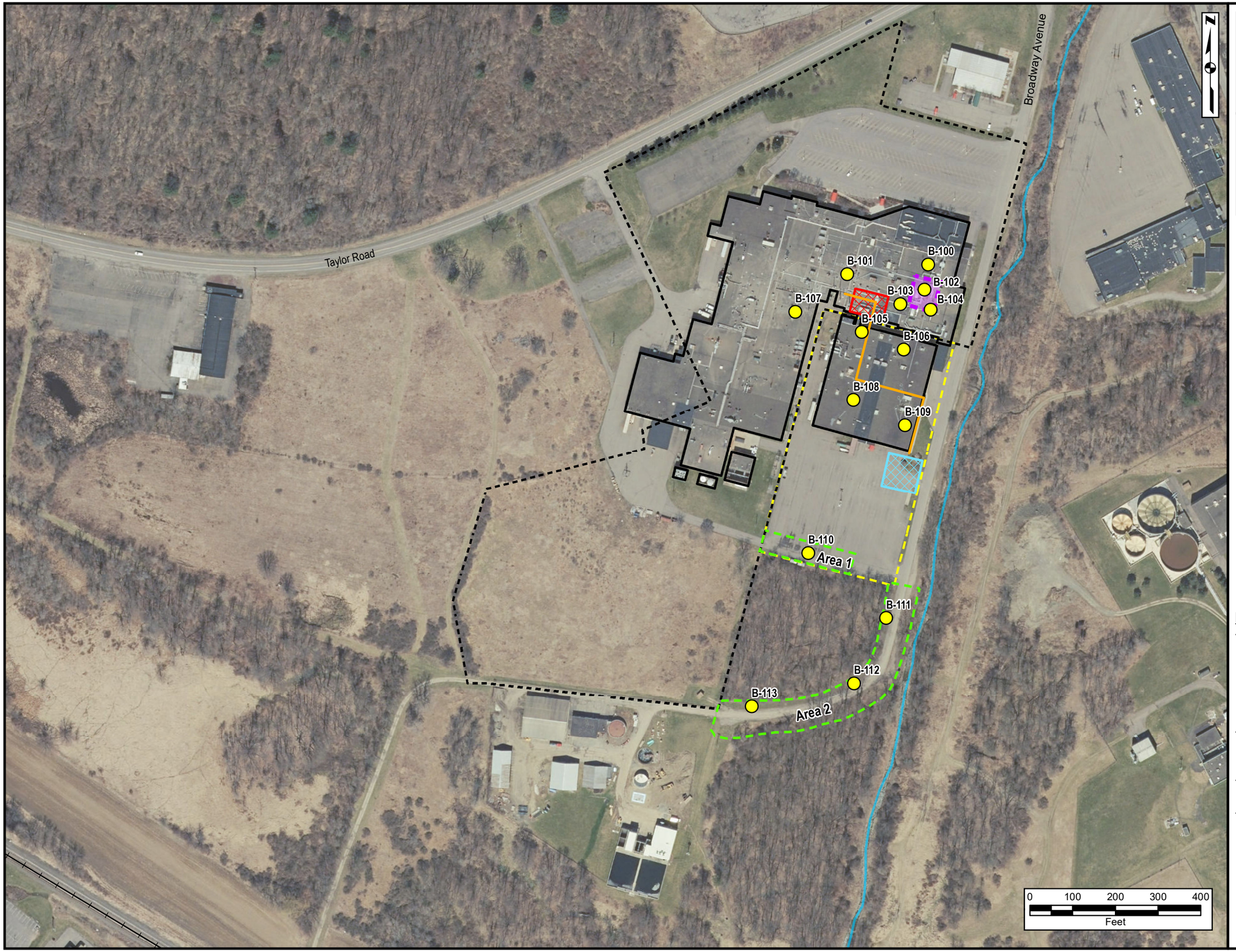
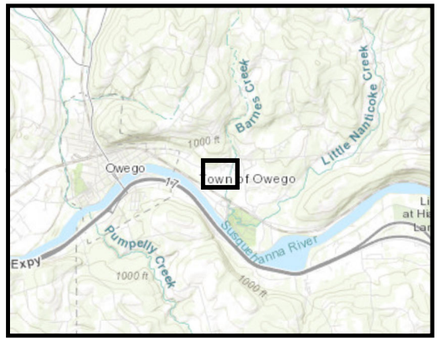




Legend

- Proposed Soil Boring Locations and Potential Overburden Monitoring Well Locations
- Creek
- Former Sanitary Sewer
- Railroad
- Building Outline

Former Structure

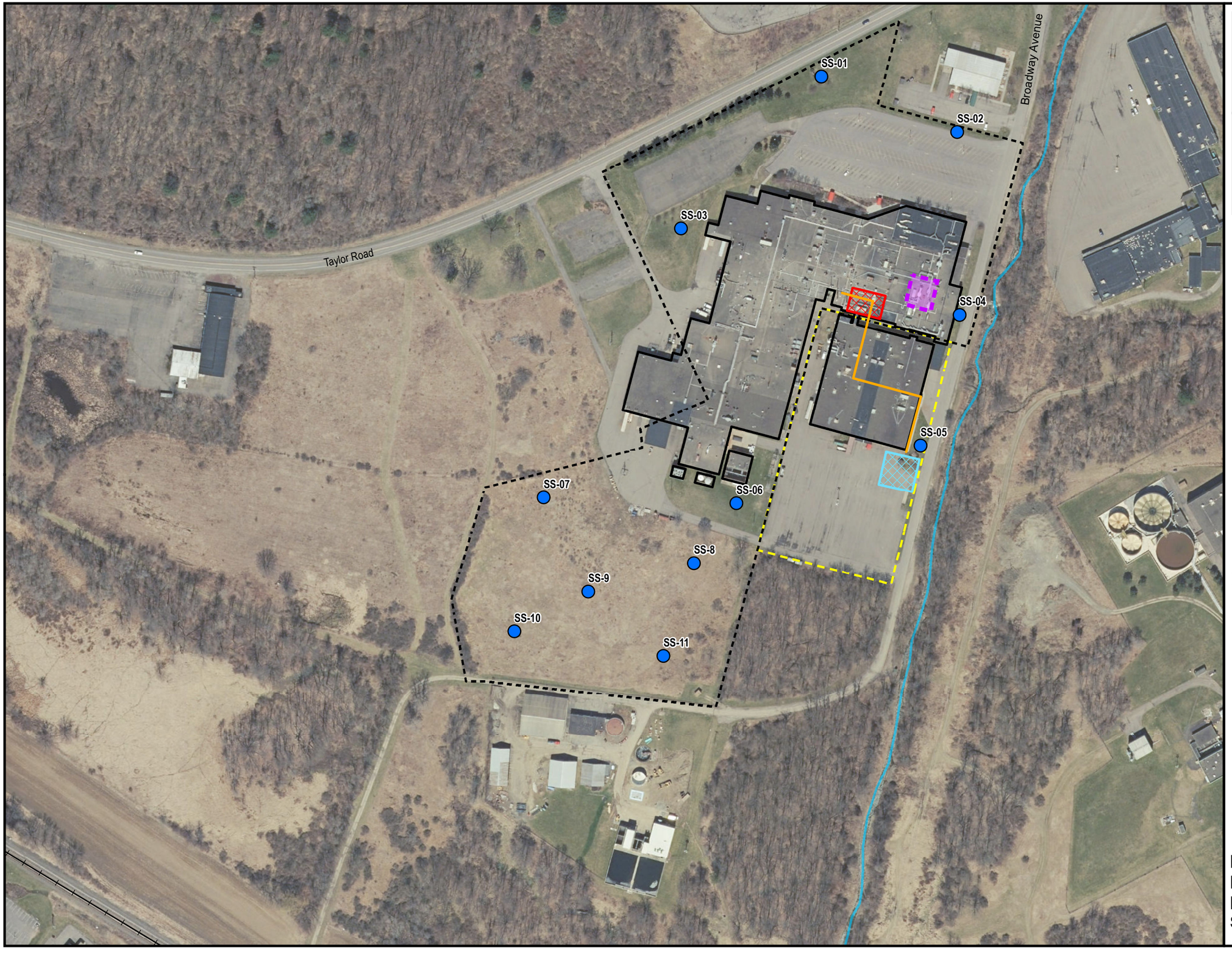
- Former Chemical Storage Area
- Former IBM Septic Tank
- Approximate Location of Former Septic Tank and Leach Area
- Additional Investigation Area
- Broadway Complex Site Boundary
- Robintech Compudyne Site Boundary

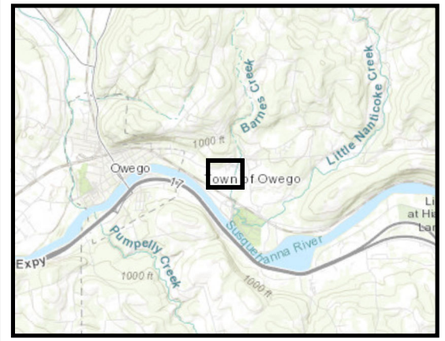
NOTES:

- Shallow overburden monitoring wells or couplets of shallow and deep overburden monitoring wells may be installed at each of the proposed soil boring locations. The number of wells and screen intervals will be based on field screenings and observations.
- Proposed locations are subject to change based on physical features within building and utility clearance.
- B-110 through B-113 will only be completed if access agreements or perimts can be obtained.
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

Figure 4A: Proposed Soil Boring Locations
Sanmina
Owego, NY

ERM





Legend

- Proposed Shallow Soil Sample Location
- Creek
- Railroad
- Former Sanitary Sewer
- Building Outline

Former Structure

- Former Chemical Storage Area
- Former IBM Septic Tank
- Approximate Location of Former Septic Tank and Leach Area
- Broadway Complex Site Boundary
- Robintech Compudyne Site Boundary

NOTES:

- Proposed locations are subject to change based on physical features within building and utility clearance.
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

N

0 100 200 300 400
Feet

Figure 4B: Proposed Surface and Near Surface Soil Sampling Locations
Sanmina Owego, NY

ERM

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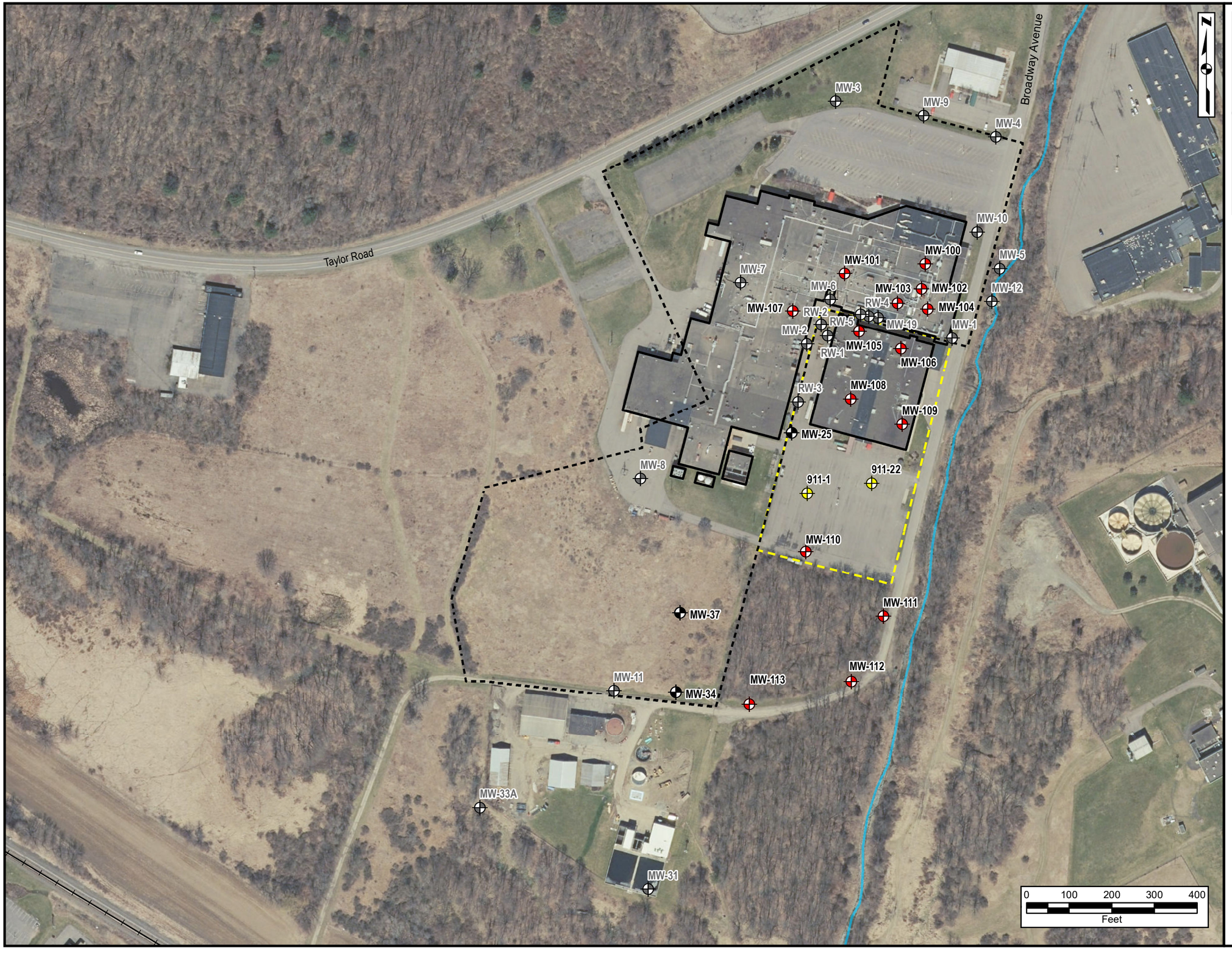
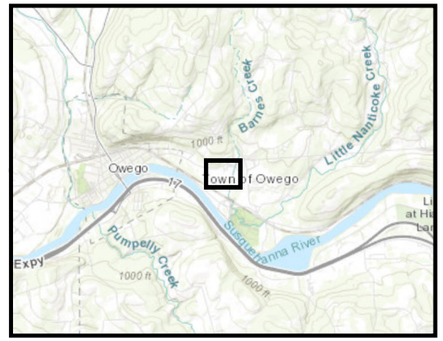




Legend

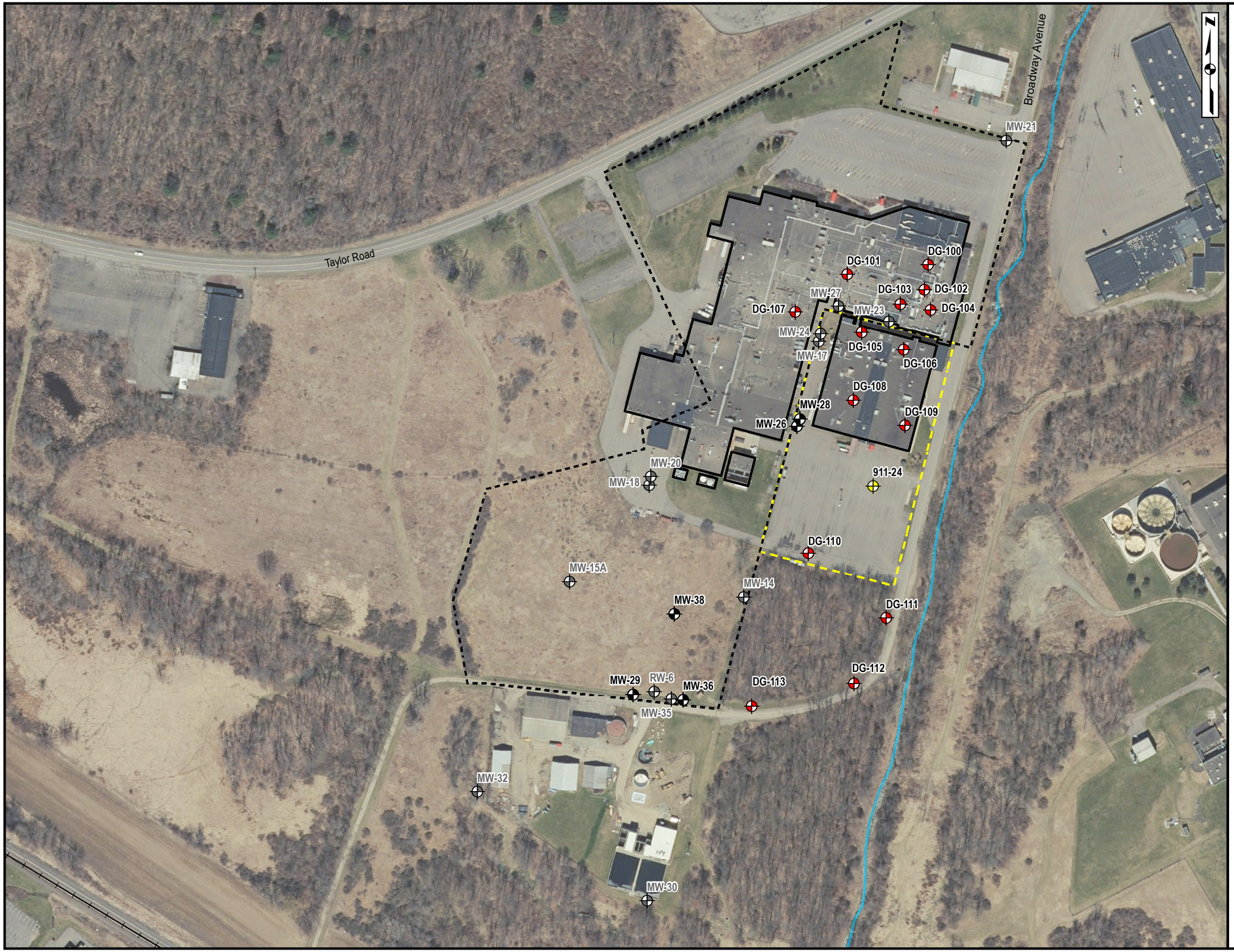
- Proposed Soil Boring Locations and Potential Overburden Monitoring Well Locations
- Existing Shallow Monitoring Well
- IBM Shallow Overburden Monitoring Well
- Gauge Only
- Creek
- Railroad
- Building Outline
- Broadway Complex Site Boundary
- Robintech Compudyne Site

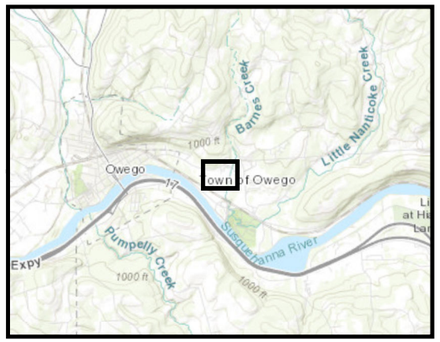
NOTES:

- Proposed locations are subject to change based on physical features within building and utility clearance.
- Monitoring wells may not be installed in each of the proposed locations. A final determination will be made in the field based on observations, screening of soil with a calibrated PID, and in consultation with NYSDEC.
- Proposed shallow monitoring well locations will have co-located deep groundwater grab samples.
- Co-located deep groundwater grab samples will be determined in the field and after consultation with NYSDEC.
- MW-110 through MW-113 will only be completed if access agreements or perimts can be obtained.
- IBM monitoring well locations have been provided by IBM.
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

Figure 4C: Proposed Shallow Monitoring Well Sample Locations
Sanmina
Owego, NY

ERM





Legend

- Proposed Soil Boring Locations and Potential Overburden Monitoring Well Locations
- Existing Deep Overburden/ Bedrock Monitoring Well
- IBM Deep Overburden Monitoring Well
- Gauge Only
- Creek
- Railroad
- Building Outline
- Broadway Complex Site Boundary
- Robintech Compudyne Site Boundary

NOTES:

- Proposed locations are subject to change based on physical features within building, utility clearance, and/ or obtaining legal access agreements or permits for off site locations.
- Deep groundwater samples may not be collected from each of the proposed locations. A determination will be made in the field based on observations, screening of soil with a calibrated PID, and in consultation with NYSDEC.
- IBM monitoring well locations have been provided by IBM.
- Aerial Imagery: ESRI World Imagery, Reproduced under lisence with ArcGIS 10

0 100 200 300 400

Feet

Figure 4D: Proposed Deep Groundwater Sampling Locations

Sanmina
Owego, NY

ERM

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Tables

Table 1A- Summary of Proposed Soil Sampling Locations and Analytical Data Collection- Soil Boring Program
Robintech/Compudyne, Inc. Site,
1200 Taylor Road, Owego, New York
Site No.: 7-54-007

Parameter	Boring Identification Number													
	B-100	B-101	B-102	B-103	B-104	B-105	B-106	B-107	B-108	B-109	B-110	B-111	B-112	B-113
TCL PCBs - EPA 8082A	2	2	2	2	2	2	2	2	2	2	2	2	2	2
TCL VOCs - EPA 8260C	3	3	3	3	3	3	3	3	3	3	3	3	3	3
1,4-Dioxane - EPA 8270D (SIM)	3	3	3	3	3	3	3	3	3	3	3	3	3	3
TAL Metals - 6010	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Total Cyanide - EPA 9010C/9012B	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Notes:
The number of soil samples collected will be dependent on conditions observed during installation. A minimum of 1 sample will be submitted from each soil boring for each analyte.
Soil borings B-110 through B-113 will only be completed if written legal access agreements are obtainable from the current property owner or a permits is obtained to work within the right of way from the village, town and/or county.
QA/QC samples will be collected at a rate of one set of QA/QC data per 20 samples collected as outlined in the site QAPP

Table 1B- Summary of Proposed Soil Sampling Locations and Analytical Data Collection- Surficial Soil Sampling

Parameter	Boring Identification Number											
	SS-100	B-101	B-102	B-103	B-104	B-105	B-106	B-107	B-108	B-109	B-110	B-111
TCL PCBs - EPA 8082A	2	2	2	2	2	2	2	2	2	2	2	2
TCL VOCs+ 10 TICs - EPA 8260D	2	2	2	2	2	2	2	2	2	2	2	2
TCL SVOCs+ 20 TICs - EPA 8270C	2	2	2	2	2	2	2	2	2	2	2	2
1,4-Dioxane - EPA 8270D (SIM)	2	2	2	2	2	2	2	2	2	2	2	2
TAL Metals - EPA 6010, 7471	2	2	2	2	2	2	2	2	2	2	2	2
Total Cyanide - EPA 9010C/9012B	2	2	2	2	2	2	2	2	2	2	2	2
TCL Pesticides/ Herbicides	2	2	2	2	2	2	2	2	2	2	2	2
PFAS- EPA 537 (modified)	2	2	2	2	2	2	2	2	2	2	2	2
Total Organic Carbon- USEPA Method SW-846 SM 5310C/ Lloyd Kahn	2	2	2	2	2	2	2	2	2	2	2	2
pH- EPA Method SW-846 SM 4500-H+B-2000, 9045D	2	2	2	2	2	2	2	2	2	2	2	2

Notes:
Soil samples will be collected from 0-0.2 foot below grade surface (ft bgs) and 0.2 to 1 ft bgs at each proposed location.
QA/QC samples will be collected at a rate of one set of QA/QC data per 20 samples collected as outlined in the site QAPP

Table 2A- Summary of Proposed Groundwater Sampling and Analytical Data Collection- Monitoring Wells
Robintech/Compudyne, Inc. Site,
1200 Taylor Road, Owego, New York
Site No.: 7-54-007

Parameter	New Well Identification Number														Existing Sanmina Well Identification Number								Former IBM Wells		
	MW-100	MW-101	MW-102	MW-103	MW-104	MW-105	MW-106	MW-107	MW-108	MW-109	MW-110	MW-111	MW-112	MW-113	MW-25	MW-37	MW-34	MW-26	MW-38	MW-29	MW-28	MW-36	911-1	911-22	911-24
	Shallow														Shallow			Deep OB			BR		Shallow		Deep
1,4 Dioxane via EPA 8270D-SIM	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dissolved Gases- RSK 175	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nitrite Nitrogen - EPA 353.2	1	1		1	1	1		1	1	1	1		1		1	1	1	1	1	1	1	1	1	1	1
Nitrate Nitrogen - EPA 353.2	1	1		1	1	1		1	1	1	1		1		1	1	1	1	1	1	1	1	1	1	1
TCL PCBs - EPA 8082A (LVI)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1
TCL Volatiles - EPA 8260C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sulfate - EPA 9038	1	1		1	1	1		1	1	1	1		1		1	1	1	1	1	1	1	1	1	1	1
Sulfide - EPA 9030	1	1		1	1	1		1	1	1	1		1		1	1	1	1	1	1	1	1	1	1	1
Total Target Analyte List Metals -	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
EPA 6020/Hg EPA 7471	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Cyanide - EPA 9010C/9012B	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Organic Carbon - EPA 5310C/ Lloyd Kahn	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Notes:
The number of new, shallow, overburden wells installed will be dependent on conditions observed during the soil boring program (e.g. olfactory, staining of soil, sheen, soil screening results with PID, etc.). If ERM does not feel a new monitoring well in a location is necessary to advance the conceptual site model (e.g., no indication of contamination in the field, sentential monitoring well already in close proximity, etc.) the NYSDEC will be consulted to make a final determination on removing the proposed well from the investigation.
QA/QC samples will only be collected from the contaminates of potential concern at a rate of one set of QA/QC data per 20 samples collected as outlined in the site QAPP
Monitoring wells MW-110 through MW-113 will only be installed if written legal access agreements are obtainable from the current property owner or a permits is obtained to work within the right of way from the village, town and/or county.

Table 2B- Summary of Proposed Groundwater Sampling Locations and Analytical Data Collection- Deep Grab Samples

Parameter	Deep Grabs													
	DG-100	DG-101	DG-102	DG-103	DG-104	DG-105	DG-106	DG-107	DG-108	DG-109	DG-110	DG-111	DG-112	DG-113
1,4 Dioxane via EPA 8270D-SIM	1			1				1	1		1		1	
TCL Volatiles - EPA 8260C	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Notes:
The number of deep, overburden grab groundwater samples collected with SP-22 direct push method, will be dependent on conditions observed during the soil boring program (e.g. olfactory, staining of soil, sheen, soil screening results with PID, etc.). If ERM does not feel a deep grab sample in a location is necessary to advance the conceptual site model (e.g., no indication of contamination in the field, etc.) the NYSDEC will be consulted to make a final determination on removing the proposed grab sample from the investigation.
Up to Six 1,4 Dioxane samples may be collected from deep overburden grab sample locations; however, these samples will only be collected if there are indication of VOC concentration within the soil boring and the sampling method can produce adequate sample volume.
QA/QC samples will only be collected from the contaminates of potential concern at a rate of one set of QA/QC data per 20 samples collected as outlined in the site QAPP
Deep grab groundwater samples DG-110 through GD-113 will only be collected if written legal access agreements are obtainable from the current property owner or a permits is obtained to work within the right of way from the village, town and/or county.

Appendix A
Quality Assurance Project Plan

Appendix A
Quality Assurance Project Plan

Robintech / Compudyne, Inc. Site

Sanmina Corporation Facility, Owego, New York

NYSDEC Site Number 754007

Project No.: 0570500

ERM Consulting and Engineering, Inc.

TABLE OF CONTENTS

1. INTRODUCTION

On behalf of Sanmina Corporation (Sanmina), ERM Consulting and Engineering, Inc. (ERM) has prepared this Quality Assurance Project Plan (QAPP) for additional site investigation as requested by the New York State Department of Environmental Conservation (NYSDEC) in a letter dated 24 August 2020 and as discussed on conference calls with the NYSDEC on 16 September and 5 November 2020.

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 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 the Robintech/ Compudyne Site located at 1200 Taylor Road in the Town of Owego, Tioga County, New York (the “Site”; Site No. 754007) 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; 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 contaminates 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.

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 work, 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

Soil and groundwater samples will be analyzed for parameters found in Tables 1A, 1B, 2A, and 2B of the Work Plan.

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.

Appendix B
Community Air Monitoring Program

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, 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

This Level 2 health and safety plan (HASP) is intended to provide health and safety guidelines for project work meeting one or more of the following criteria:

- Some likelihood of physical and/or chemical hazard exposure (e.g., sampling, use of equipment and tools);
- Number of job tasks is five or greater;
- Use of subcontractors;
- Work meets the definition of being "high hazard", which includes, but is not limited to:
  - Activities that could have an adverse effect on the environment (e.g., use of bulk liquid storage tanks, generators, etc.);
  - Air or boat transport via charter or non-commercial carrier/vendor;
  - Confined space entry;
  - Construction;
  - Demolition, Decontamination and Demolition (DDD) operations;
  - Diving;
  - Excavations, trenching, drilling, or other ground disturbance activities (i.e., activities requiring subsurface clearance [SSC] operations);
  - Hazardous energy control operations;
  - Hot work (e.g., welding, flame cutting, or other spark-producing activities);
  - Injection well operations;
  - Off-shore or over water work (including oil platform visits);
  - Rigging and lifting operations; and
  - Work at heights in excess of four feet.

The HASP should be developed with input from the project team and reviewed with all ERM project personnel, including subcontractors. A signed copy of the HASP must be maintained at the project site during work and must be archived in the project files.

H&S Team review is required for the Level 2 HASP. You can e-mail completed plans requiring review to the ERM North America HASP Review Team (ERMNASafetyLeads@erm.com). This HASP must be reviewed by the Project Manager and reviewed/approved by the Partner in Charge (PIC) and updated as warranted to address changes in scope, hazards present, project personnel, etc. At a minimum, HASPs must be reviewed annually or if the scope of work changes. Updated HASPs should also be sent to the H&S Team for review and PIC for approval.

Administrative Information

This document has been developed for the sole use of ERM staff. Subcontractors and other project participants must develop their own HASP.

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

Project Name: Robintech/Compudyne Inc. Site Investigation	Site Name & Location: Sanmina Corporation, Owego, NY
Client Contact and Phone: Earl Kimble	GMS Project #: 0578737
Health & Safety Plan Date: 02/16/2021	Revision Number and Date: 2 on 2/16/21
Field Work Start Date: 5/11/2021	Anticipated Field Work End Date: 8/15/2021
Project Manager: Rob Sents	Partner In Charge: Ernie Rossano
Field Safety Officer: Jason Reynolds	Additional ERM Personnel on site: Katherine Popyack, Olivia Botting, Kevin Warner, Emily Payne, Jason Reynolds, Jonathan Mills

H&S Team Review

Reviewer Name: Ernie Sweet Review Date: 2/19/2021	Signature File: Ernest F Sweet

Site Description and Scope of Work

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.

Include a description of work to be completed during the project. From this, develop a list of tasks to be completed by ERM personnel, as well as a list of tasks to be completed by subcontractor personnel.

Site Description: 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 is currently in the process of closing oporations at this location. The facility is located on relatively flat land in an industrial area. The Site has onsite security with surveillance; all personal must sign in use badges to move through the facility. 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 in accessible 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 degradion daughter products).

Project Background and Scope of Work

Include list of tasks to be completed by ERM personnel during this project, and a separate list of tasks to be completed by any contractors at the site. A site-specific Job Hazard Analysis (JHA; ERM Form S1-ERM-002-FM4) must be completed for each task to be performed. Contractors must provide their own HASP and a JHA for each task they will perform for ERM review.

A JHA template and reference/example JHAs for more common tasks can be found at: Americas H&S Page - JHAs.

ERM Scope of Work: ERM will be collecting the data required to further investigate the Robintech/Compudyne site and the abutting Broadway Complex remedial site. Task 1: Utility Screening - Prior to any intrusive site work, underground facility (e.g., natural gas, electric, fiber optics, etc.) mark outs will be performed by the Underground Facilities Protection Organization (UFPO) to identify where subsurface facilities enter the property. UFPO member companies are only required to mark-out utilities they own, located in public right of ways and/or easements, and are not required to mark-out facilities located on private property. ERM personnel will arrange the UFPO mark-outs through our drilling subcontractor prior to our site work. In addition to the UFPO mark-outs, and in coordination with site representatives, ERM will subcontract a private professional utility location company to locate and mark out subsurface utilities within the in the vicinity of a proposed soil borings and in the area where we are evaluating/proposing to complete remedial work. Following ERM's Subsurface Clearance Policy, prior to boring advancement, all boring locations will be hand cleared by ERM's drilling subcontractor to a depth of 5-ft bgs to minimize potential damage to any shallow utilities. If no utilities are encountered during the soft dig clearance, the remainder of the soil boring will be completed with direct-push equipment (i.e. Geoprobe). Task 2: Soil Sampling Program - ERM's subcontracted drilling will complete thirteen (13) soil borings and eleven (11) surficial soil sampling locations to further evaluate COCs. For boring within the building, the concrete floor will be cored using dust suppression (i.e. water) and each soil boring will be advanced to 5 ft. bgs using soft dig techniques to minimize potential damage to subsurface utilities. ERM will monitor indoor air within a calibrated 5-gas meter and photo-ionization detector (PID) for all interior work. All soil borings will be sampled continuously from the existing ground surface to the completion depth of the soil boring. A hand auger will be used for collecting soil during the soft dig clearance (i.e. surface to 5 ft. bgs) and a Macrocore® sampling device equipped with a disposable acetate liner or equivalent will be used to evaluate the remainder of the soil boring. An ERM geologist will visually inspect each sample to describe the soil conditions and will screen the soil with a calibrated PID. Soil samples will be taken by ERM personnel at selected depths to further evaluate concentrations of contaminates of potential concern. Similarly, four (4) exterior soil borings will be completed, each location will be physically cleared, evaluated in the field and samples will be collected for submission to a laboratory. Shallow soil samples will be collected with had hand auger. The project CAMP will be followed for all exterior work. Task 3: Monitoring well installation and grab groundwater samples: - the driller will install an overburden monitoring well upon the completion of soil borings that indicate presence of COPC in soil. Once completed, each new monitoring well will be developed by ERM through pumping, surging or bailing to facilitate the collection of representative groundwater samples. In addition, a deep grab groundwater samples maybe collected with a SP-22 direct push methodology during the completion of each soil boring. Task 4: Monitoring Well Groundwater Sampling - ERM will complete a groundwater sampling event to collect in situ data and analytical data from the newly installed wells and from select existing wells. ERM proposes to purge and sample each of the wells in general conformance with the EPA's Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (January 19, 2010). Once the groundwater parameters stabilize groundwater samples will be collected and submitted to the project laboratory. Task 5: Hydrogeological Evaluation - ERM will conduct water level monitoring and aquifer testing to evaluate hydrogeological conditions in the overburden. Task 6: ERM will complete semi-annual groundwater sampling events. The

well network at the site will be gauged using a water level indicator prior to the event, PDB inplace within the monitoring wells will be samples and new PDB will be set in wells for the following sampling event.	
ERM Task 1: Drive to Site	☒ JHA Attached?
ERM Task 2: Utility Clearance Oversight	☒ JHA Attached?
ERM Task 3: Soil Boring/Soil Sampling	☒ JHA Attached?
ERM Task 4: Well Development	☒ JHA Attached?
ERM Task 5: Groundwater Sampling	☒ JHA Attached?
ERM Task 6: Hydrogeological Evaluation	☒ JHA Attached?
ERM Task 7: Click here to enter text.	☐ JHA Attached?
Contractor Scope of Work: NYLD will be conducting utility clearance, Parratt-Wolff will complete soil borings.	
Contractor Task 1: Utility Clearance	☒ JHA Reviewed?
Contractor Task 2: Soil Boring Completion	☒ JHA Reviewed?
Contractor Task 3: Click here to enter text.	☐ JHA Reviewed?
Contractor Task 4: Click here to enter text.	☐ JHA Reviewed?
Contractor Task 5: Click here to enter text.	☐ JHA Reviewed?
Contractor Task 6: Click here to enter text.	☐ JHA Reviewed?
Contractor Task 7: Click here to enter text.	☐ JHA Reviewed?

Contractor(s) to be used:	Approved under Contractor Management Program?
1. New York Leak Detection	☒ Yes ☐ No
2. Parratt-Wolff	☒ Yes ☐ No
3. Test America/ Eurofins	☒ Yes ☐ No
4. Click here to enter text.	☐ Yes ☐ No
5. Click here to enter text.	☐ Yes ☐ No

Site/Project General Information

Site Type (check all applicable boxes)

- ☒ Industrial
- ☐ Residential
- ☐ Unsecured
- ☐ Coastal/offshore (on or near water)
- ☐ Hazardous waste release (Hazwoper)
- ☐ Remote or Inactive Facility*
- ☐ Other (specify): Click here to enter text.
- ☐ Other (specify): Click here to enter text.

*ERM Form S3-NAM-029-FM6 (*Undeveloped, Remote, or Inactive Sites*) must be completed and attached to this document.

Main Project Hazards (check all applicable boxes)

- ☐ Aerial Lift Use (e.g., Scissor Lifts, Cherry Pickers)[1]
- ☐ All-Terrain Vehicle Use[1]
- ☐ ASTs/USTs
- ☐ Biological Hazards
- ☒ Chemical Exposure Potential (including asbestos)
- ☐ Chemical Mixing/Injection
- ☐ Compressed Gas
- ☐ Confined Space Entry[2]
- ☐ Construction[1]
- ☐ Control of Hazardous Energy (i.e., Lockout/Tagout)[2]
- ☐ DDD Operations[1]
- ☐ Diving[1]
- ☐ Ergonomics/Material Handling
- ☒ Excavation/Trenching/Drilling[2]
- ☐ Extended or Nonstandard Work Shifts (>14 hours)
- ☐ Extreme Weather
- ☐ Explosives Use[1]
- ☐ Falls from height (>4 feet)[1]
- ☐ Forklift/Industrial Truck Use[1]
- ☒ Hand/Power Tool Use
- ☒ Heavy Equipment Use
- ☐ Helicopter/Fixed Wing Aircraft Transportation[3]
- ☒ High Noise (>85 dBA)
- ☐ Hot Work (Welding, Cutting, Brazing)[2]
- ☐ International Travel[4]
- ☐ Long Distance/Duration Driving[5]
- ☐ Mining (Surface/Underground)
- ☒ Natural Hazards (Plants, Animals, Insects)
- ☐ Off-Shore Platform Work[6]
- ☐ Overhead Power Lines
- ☐ Portable/Fixed Ladders
- ☐ Radiation (Ionizing/Non-ionizing)
- ☐ Rigging/Lifting[2]
- ☐ Scaffold Use
- ☐ Shift Work (e.g., night work)
- ☐ Short Service Employees
- ☐ Slips/Trips
- ☒ Subsurface Clearance (Buried Utilities)[2]
- ☐ Working on/over Water (including transport)[1]
- ☐ Unexploded Ordnance/Munitions and Explosives of Concern (UXO/MEC)[1]
- ☐ Other (specify): Click here to enter text.

1 High hazard work requiring H&S team coordination. Additional control measures may be required beyond JHA.

2 Permit-required high hazard work requiring H&S Team coordination and ERM or equivalent client-required permit to be completed.

3 If traveling using a helicopter or fixed wing aircraft, ERM employees are required to follow the provisions of ERM Standard S1-ERM-009-ST (*Fixed Wing Aircraft and Helicopter Safety*).

4 A Travel Risk Assessment (TRA) is required for all international travel (with the sole exception of travel to a Low Risk country where ERM has a permanent office). Consult ERM Standard S1-ERM-005-ST.

5 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 (see ERM Standard S1-ERM-008-PR) is required and should be appended to this HASP.

6 If traveling to/from and working on an off shore platform, ERM employees are required to follow the provisions of ERM Standard S1-ERM-006-ST (*Offshore Platform Safety*).

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: 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 eyewash unit, whether stationary or portable, must be large enough to provide at least 15 minutes of eye flushing.

Regulated Chemicals of Concern

Check any chemicals known or suspected to be present on the site to which the ERM team may be exposed. These chemicals include OSHA-regulated potential carcinogens (29 CFR 1910.1003 through 1016) as well as those chemicals for which OSHA has established specific respiratory protection requirements (29 CFR 1910.134). If any of these chemicals are present on site, contact your H&S team member for guidance and describe any additional protective measures to be taken, as necessary.

☐ Friable asbestos	☐ Hexavalent chromium
☐ 3,3'-Dichlorobenzidine	☐ Coke oven emissions
☐ Benzidine	☐ Ethylene oxide
☐ Beta-Propiolactone	☐ 1,2-Butadiene
☐ N-Nitrosomethylamine	☐ Methyl chromoethyl ether
☐ Lead	☐ Beta-Naphthylamine
☐ Benzene	☐ Ethyleneimine
☐ Acrylonitrile	☐ 4-Dimethylaminoazobenzene
☐ Methylenedianiline	☐ Inorganic arsenic
☐ 4-Nitrobiphenyl	☐ Cadmium
☐ alpha-Naphthylamine	☐ 1,2-Dibromo-3-chloropropane
☐ bis-Chloromethyl ether	☐ Formaldehyde
☐ 4-Aminodiphenyl	☐ Methylene chloride
☐ 2-Acetyaminoflourene	☐ **No ERM exposure to these compounds**
☒ Vinyl chloride	

Known or Suspected Chemicals of Concern

The following section must be filled out for all confirmed or suspected chemicals present on the site to which the ERM team may reasonably be exposed. Information on each chemical must be provided to all team members.

Material name: Trichloroethene		Highest reported concentration*: 150 ppm (groundwater)	
Primary hazards: Combustible Liquid, but burns with difficulty; strong caustics & alkalis; chemically-active metals; and potential occupational carcinogen.		Exposure symptoms: irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias	
OSHA Exposure Limits**	NIOSH Exposure Limits**	ACGIH Exposure Limits**	IDLH Level**:
PEL: 100	REL: None	TLV: 50	25
STEL: 100	STEL: None	STEL: 100	Ionization Potential (in eV):
Other: Click here to enter text.	Other: TWA 25	Other: Click here to enter text.	9.45

Material name: Vinyl Chloride		Highest reported concentration*: Click here to enter text.	
Primary hazards: Cancer		Exposure symptoms: Weakness, dizziness, drowsiness; headache, weight loss; abdominal pain, GI bleeding; liver enlargement, fibrosis, cirrhosis; spleen enlargement; pallor or cyanosis of extremities; eye redness, pain; frostbite (on contact with liquid); (carcinogenic)	
OSHA Exposure Limits**	NIOSH Exposure Limits**	ACGIH Exposure Limits**	IDLH Level**:
PEL: 1	REL: low as feasible	TLV: 5	Click here to enter text.
STEL: none	STEL: none	STEL: none	Ionization Potential (in eV):
Other: Click here to enter text.	Other: Click here to enter text.	Other: Click here to enter text.	10.0

Material name: Click here to enter text.		Highest reported concentration*: Click here to enter text.	
Primary hazards: Click here to enter text.		Exposure symptoms: Click here to enter text.	
OSHA Exposure Limits**	NIOSH Exposure Limits**	ACGIH Exposure Limits**	IDLH Level**:
PEL: Click here to enter text.	REL: Click here to enter text.	TLV: Click here to enter text.	Click here to enter text.
STEL: Click here to enter text.	STEL: Click here to enter text.	STEL: Click here to enter text.	Ionization Potential (in eV):
Other: Click here to enter text.	Other: Click here to enter text.	Other: Click here to enter text.	Click here to enter text.

Material name: Click here to enter text.		Highest reported concentration*: Click here to enter text.	
Primary hazards: Click here to enter text.		Exposure symptoms: Click here to enter text.	
OSHA Exposure Limits**	NIOSH Exposure Limits**	ACGIH Exposure Limits**	IDLH Level**:
PEL: Click here to enter text.	REL: Click here to enter text.	TLV: Click here to enter text.	Click here to enter text.

STEL: Click here to enter text.	STEL: Click here to enter text.	STEL: Click here to enter text.	Ionization Potential (in eV): Click here to enter text.
Other: Click here to enter text.	Other: Click here to enter text.	Other: Click here to enter text.	

For additional chemicals, refer to S3-NAM-029-FM9 (Additional Known or Suspected Chemicals of Concern).
*Specify units and sample medium; **Specify units
OSHA Permissible Exposure Limits (PEL) and Short Term Exposure Limits (STEL); https://www.osha.gov/dsg/annotated-pels/
NIOSH Recommended Exposure Limits (REL), STELs, and Immediately Dangerous to Life and Health (IDLH); http://www.cdc.gov/niosh/npg/
ACGIH Threshold Limit Values (TLV) and STELs; contact your Division H&S Leader for additional information on these values.

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
Steel-toed Boots	☒	☐	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	☒	☐	If either half or full-face respirator checked: • Define cartridge type: Click here to enter text. • 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 Division H&S Leader 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. Refer to S3-NAM-026-PR (*Respiratory Protection*) for additional information.

Training, Medical Surveillance, and Safety Supplies

Req = Required; requirements are based on the specific tasks performed in the field and the type of environments, chemicals, or hazards encountered. NA = Not applicable to this project.

Training	Req	NA	Medical Surveillance**	Req	NA
40-Hour Hazwoper	☒	☐	Medical Clearance	☒	☐
Current 8-hour Hazwoper Refresher	☒	☐	Respirator Clearance and Fit Test	☐	☒
8-Hour Hazwoper Supervisor*	☐	☒	Blood Lead and ZPP	☐	☒
Current First Aid/CPR	☒	☐	Other (specify): Click here to enter text.	☐	☐
40-Hour MSHA New Miner	☐	☒	Other (specify): Click here to enter text.	☐	☐
Current 8-hour MSHA Refresher	☐	☒	**Safety Supplies**	**Req**	**NA**
ERM Field Safety Officer (FSO)	☒	☐	First Aid Kit	☒	☐
DDD Practice FSO/DM	☐	☒	Eyewash Solution (15 minute flush)	☐	☒
Subsurface Clearance (SSC)	☒	☐	Air Horn	☐	☒
EPA Hazardous Waste	☐	☒	Decontamination Supplies	☐	☒
Hazmat/Dangerous Goods Shipping	☐	☒	Fire Extinguisher	☒	☐
International Traveler	☐	☒	Potable Water	☒	☐
Other (specify): Click here to enter text.	☐	☐	Toilets	☒	☐
Other (specify): Click here to enter text.	☐	☐	Other (specify): Click here to enter text.	☐	☐

*Provides specialized training to serve as an on-site manager supervising employees engaged in work covered by 29 CFR 1910.120.

**Physical examination requirements should be discussed with Workcare well in advance of project to allow adequate time to schedule exams.

Monitoring Equipment

All monitoring equipment on site must be calibrated per manufacturer specifications (including daily bump tests) and results recorded. Under stable conditions, measurements must be made in the breathing zone at least once every 30 minutes.

Combustible Gas Indicator	Reading	Action Guideline	Comments
Check if required: ☐	0 to 10% LEL	Monitor. Evacuate if confined space.	We will be using a 5-gas meter to monitor indoor; but there is no reason to believe there will be combustible gas associated with the investigation.
Model: Click here to enter text.	10 to 25% LEL	Potential fire or explosion hazard.	
Task number(s): Click here to enter text.	>25% LEL	Fire/explosion hazard. Evacuate.	

Oxygen Meter	Reading	Action Guideline	Comments
Check if required: ☐	>23.5%	Fire hazard. Evacuate.	Click here to enter text.
Model: Click here to enter text.	23.5 to 19.5%	Normal oxygen levels.	
Task number(s): Click here to enter text.	<19.5%	Oxygen deficient conditions. Evacuate.	

Radiation Survey Meter	Reading	Action Guideline	Comments
Check if required: ☐	Normal background	Proceed with normal operations.	Annual exposure not to exceed 1250 mrem per quarter. Background reading must be taken in an area known to be free of radiation sources.
Model: Click here to enter text.	3x background	Notify Radiation Safety Officer.	
Task number(s): Click here to enter text.	>3x background	Radiological hazard. Evacuate.	

Photoionization Detector	Reading	Action Guideline	Comments
Check if required: ☒	Any response below 5 ppm, sustained for 1 minute	Level "D" PPE is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	The action level for upgrading the level of protection is typically ½ the lowest published exposure limit for the potential COCs at the site. For COCs with extremely low exposure limits (e.g., <5 ppm), contact your Division H&S Leader for guidance on action levels.
Model: MiniRAE 3000	Click here to enter text. ppm to Click here to enter text. ppm, sustained for 1 minute	Level "C" is acceptable as appropriate.	

Task number(s): Click here to enter text.	Greater than Click here to enter text. ppm above background, sustained for 1 minute	Stop work. Tasks requiring Level B or Level A PPE are not anticipated during this project. If Level B or Level A PPE is needed, as determined by the FSO and/or the PM, the Division H&S Leader will be notified and the HASP will be revised.	See end of this section for additional information on respirator selection.

Flame Ionization Detector	Reading	Action Guideline	Comments
Check if required: ☐	Any response below Click here to enter text. ppm, sustained for 1 minute	Level "D" PPE is acceptable up to the action level. For response above established background level(s), appropriate level PPE requirements must be met.	The action level for upgrading the level of protection is typically ½ the lowest published exposure limit for the potential COCs at the site. For COCs with extremely low exposure limits (e.g., <5 ppm), contact your Division H&S Leader for guidance on action levels. See end of this section for additional information on respirator selection.
Model: Click here to enter text.	Click here to enter text. ppm to Click here to enter text. ppm, sustained for 1 minute	Level "C" is acceptable as appropriate.	
Task number(s): Click here to enter text.	Greater than Click here to enter text. ppm above background, sustained for 1 minute	Stop work. Tasks requiring Level B or Level A PPE are not anticipated during this project. If Level B or Level A PPE is needed, as determined by the FSO and/or the PM, the Division H&S Leader will be notified and the HASP will be revised.	
Colorimetric Detector Tubes	**Reading**	**Action Guideline**	**Comments**
Check if required: ☐ Model: Click here to enter text. Task number(s): Click here to enter text.	Specify: Click here to enter text.	Specify: Click here to enter text.	Click here to enter text.
Other (specify): Click here to enter text.	**Reading**	**Action Guideline**	**Comments**
Check if required: ☐ Model: Click here to enter text. Task number(s): Click here to enter text.	Specify: Click here to enter text.	Specify: Click here to enter text.	Click here to enter text.

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.

Exclusion Zone: Traffic cones will be used around each of the soil boring areas during drilling activites.

Contamination Reduction Zone: The field vehicle or geologist work station will be at the permiter of the work area and will serve as the CRZ.

Support Zone: Same as above.

Site Access/Control

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

Access Control Procedures: The building has security and requires security badges to move through different area of the building. All work on the exterior will be mobile and CRZ/ work zone will serve as the control points

Decontamination Procedures

Describe procedures for the decontamination of personnel and equipment.

Personnel: Remove gloves and change of clothing as necessary. All contact with soil should be well controlled in Macrocore Liners and will only be handled while wearing PPE. If there is reason for additional decon procedures based on site conditions this can be modified.

Equipment: Potable, Alconox solution, brushes contained in 5 gallon buckets on polyethylene sheeting.

Spill Prevention and Response ***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-hired contractors possess containerized chemicals on the project site? ☒ Yes ☐ No
Will container size be greater than or equal to one gallon? ☐ Yes ☒ No
If the answer to both of these questions is Yes, follow the requirements outlined in ERM Procedure S3-NAM-042-PR (*Spill Prevention and Response*)?
Waste Management Planning
Will ERM's project activities generate waste materials? ☒ Yes ☐ No
Will ERM undertake some level of contractual responsibility for handling waste for the client? ☐ Yes ☒ No
If the answer to either of these questions is Yes, follow the requirements outlined in ERM Procedure S3-NAM-038-PR (*Waste Management Planning*).
Describe any waste reduction/minimization techniques to be used on the site: All waste will be placed in labeled drummed and moved to the interior loading docks and/ or waste water treatment building for storage/ security purposes. Waste will be managed directly by the client/ generator.
Client-Specific Emergency Response ***In the event of an emergency, client-specific emergency response procedures may take precedence over ERM established procedures.*** ***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.*** ***Once completed, this summary should be discussed with all visitors, contractors, and others subject to HASP review upon site visit.***
Contributing factor initiating emergency response (process, material, weather): Call security and all response is managed through them.
Lights and/or sounds associated with evacuation: Strobe light and audible alarm
Drill requirements for contractors on-site: none
Initial and alternative muster points: Southeast corner of south employee parking
Specific evacuation procedures: None

Method for accounting for site visitors: All staff and subcontractors are required to sign in and out and must use badges while on site. ERM will have a sign in/out sheet. In the case of emergency the FSO will be responsible for a head count and to check the sign in/out sheet. We will be working as a group in a relatively small area with a maximum of 5 people including ERM employees and subcontractors onsite at any one time. Anyone leaving the area will discuss there activies with the FSO or sign out if they are leaving the site.

PPE and spill kit requirements (if emergency response is spill related): Client has kits on and around the facility.

Map associated with evacuation attached? ☐Yes ☒ No

Emergency Contacts

All ERM employees 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 promptly entered into the Event Communication System (ECS).

FOR ALL MEDICAL EMERGENCIES, CALL 911 OR 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.*
- *At direction of PM, PIC, or H&S Team, call WorkCare Incident Intervention at (888) 449-7787 (available 24 hours/7 days per week in US only).*
- *Clients may have their own procedures which we may need to follow.*

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

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
Incident Intervention	WorkCare	NA	888-449-7787
Partner-in-Charge	Ernie Rossano	Melville, NY	Work: 631-756-8917 Cell: Click here to enter text.
Project Manager	Rob Sents	Syracuse, NY or on site	Work: 315-233-3038 Cell: 315-256-5350
Field Manager (if not PM)	Jason Reynolds	On site	Work: Cell: 716-725-5369

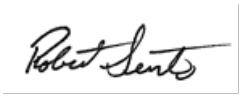
Field Safety Officer (if not PM)	Jason Reynolds	On site	Work: Cell: 716-725-5369
SSC Experienced Person	Jason Reynolds	On site	Work: Cell: 716-725-5369
Division H&S Contact	Matthew Botzler	Philadelphia	Work: 14849130339 Cell: Click here to enter text.
Region H&S Director	Mark Hickey	Denver	Work: 17202007172 Cell: Click here to enter text.
Subcontractor Contact	Sean Pepling	Syracuse, NY	Work: 315-437-1429 Cell: 315-447-2226
Client Contact	Earl Kimble	On Site	Work: Cell: 6072399431
Additional Contact	Jason Reynolds	On Site	Work: Cell: 716-725-5369

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.

ERM has prepared this plan solely for the purpose of protecting the health and safety of ERM employees. Contractors, visitors, and others at the site are required to follow provisions in this document at a minimum, but must refer to the organization's health and safety program for their protection.

Printed Name	Signature	Organization	Date

Approval Signatures ***Signatures in this section indicate the signing employee will comply with and enforce this HASP, as well as procedures and guidelines established in ERM's DCS. Signatures also indicate that any subcontractors performing work under contract to ERM have met the minimum safety standards in S3-NAM-030-PR (Contractor Management).***		**Project Manager**	**Date**
		Typed Name: Robert Sents Signature File: 	2/19/2021
		Partner-in-Charge	**Date**
		Typed Name: Ernie Rossano Signature File: 	2/19/2021

Attachments ***Check all appropriate documents to be attached to this HASP.***	
☒ Site-specific JHAs for all tasks (including contractors)	☒ Map of route to hospital with turn-by-turn instructions
☒ Subsurface Clearance (SSC) Project Plan	☒ Facility site map(s)
☒ Site Safety Meeting Form (S3-NAM-029-FM5)	☒ SNAP Cards
☒ Vehicle Inspection Forms (S1-ERM-008-FM2)	☐ Project/Field Audit Checklist (M1-ERM-016-FM3)
☐ Journey Management Plans (S1-ERM-008-FM1)	☐ Industrial Hygiene Sample Data (S3-NAM-005-FM1)
☒ Safety Data Sheets (SDS) for chemicals brought to site	☒ Ambient Air Monitoring Form (S3-NAM-005-FM2)
☒ Information on chemicals of concern (ICSC cards or like)	☐ Client-specific requirements
☐ PLAN Risk Assessment	☐ Other: Click here to enter text.
Applicable ERM Safety Standards/Procedures ***Check all that procedures/standards that are applicable to this project. Refer to the standards/procedures for guidance and, where applicable, use forms, work instructions, and guideline documents associated with these standards/procedures in the completion of site work. Copies of all standards/procedures must be procured from ERM's Document Control System.***	
Global (Tier I) Standards/Procedures	
☐ Short Service Employees (S1-ERM-003-PR)	☐ Travel Risk Assessment (S1-ERM-005-ST)
☐ Offshore Platform Safety (S1-ERM-006-ST)	☒ Subsurface Clearance Standard (S1-ERM-007-ST)
☒ Driver and Vehicle Safety (S1-ERM-008-PR)	☐ Fixed Wing Aircraft/Helicopter Travel (S1-ERM-009-ST)
Local (Tier III) Standards/Procedures	
☐ Demolition (S3-NAM-004-PR)	☒ Excavation and Trenching (S3-NAM-008-PR)
☐ Fall Protection (S3-NAM-009-PR)	☐ Setting Occ. Exposure Guidelines (S3-NAM-010-PR)
☒ Hazard Communication (S3-NAM-011-PR)	☐ Ladder Safety (S3-NAM-012-PR)
☐ Cold Stress (S3-NAM-013-PR)	☒ Hearing Conservation (S3-NAM-014-PR)
☒ Heat Stress (S3-NAM-015-PR)	☒ Incident Reporting and Investigation (S3-NAM-016-PR)
☒ Medical Services (S3-NAM-019-PR)	☐ Medical Surveillance (S3-NAM-020-PR)
☒ Personal Protective Equipment (S3-NAM-021-PR)	☐ Hot Work (S3-NAM-023-PR)
☒ Regulatory Inspection (S3-NAM-024-PR)	☐ Respiratory Protection (S3-NAM-026-PR)
☒ Contractor Management (S3-NAM-030-PR)	☐ Contractor Management (S3-NAM-030-PR)
☐ High Risk Activity Driving (S3-NAM-031-PR)	☒ Hand Tools/Portable Power Equipment (S3-NAM-033-PR)
☐ Electrical Safety (S3-NAM-035-PR)	☒ Incident/Illness Management (S3-NAM-037-PR)

☒ Waste Management Planning (S3-NAM-038-PR)	☐ Energy Isolation (S3-NAM-039-PR)
☐ Working Over Water (S3-NAM-041-PR)	☒ Spill Prevention and Response (S3-NAM-042-PR)
☐ Fatigue Management (S3-NAM-044-PR)	☒ Cutting Tools and Hand Safety (S3-NAM-047-PR)
☐ Lone Worker (S3-NAM-048-PR)	☐ Compressed Gas Cylinders (S3-NAM-049-PR)

See It; Own It; Share It

It means that:

- **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.**
- **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 lessons from the large and small events that are part of our daily experience.**

Stop Work Authority

It is ERM policy that all ERM and ERM Contractor 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 and safety policies.**
- **Report any unsafe acts or conditions to supervision or, preferably, intervene to safely correct such acts or conditions themselves.**

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

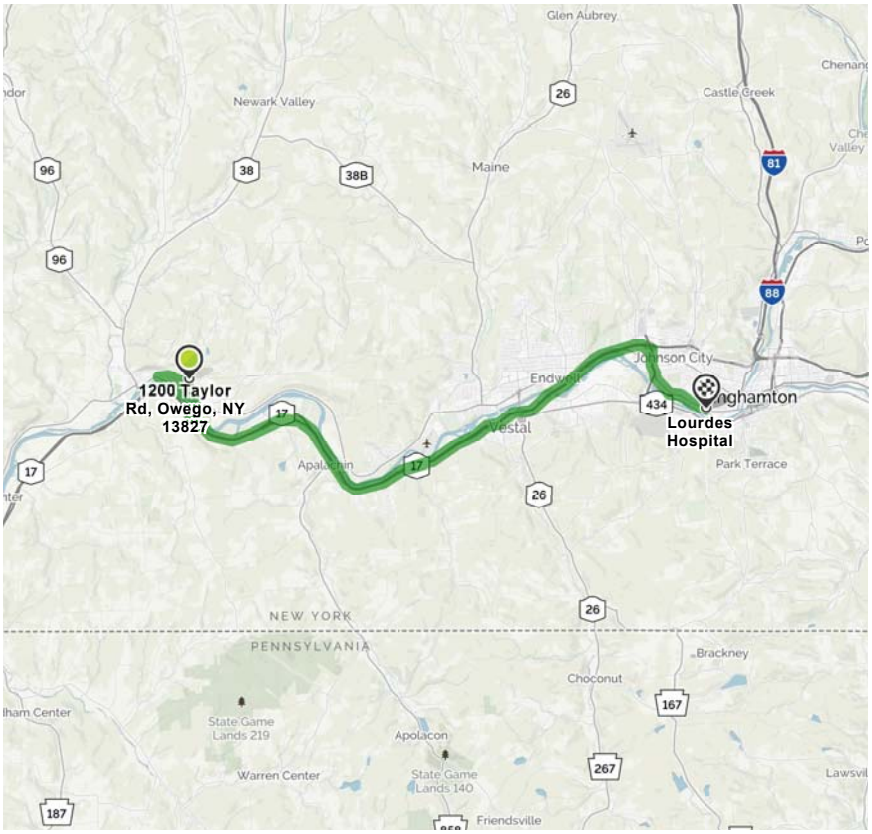
6. Take the **Riverside Dr** exit toward **Floral Ave**.
Then 0.10 miles — 19.82 total miles

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.



ERM

JHA
Job Hazard Analysis

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

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

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:**

Task Steps[1]		Potential Hazards & Consequences[2]		select	Probability	Consequence	RISK	Controls to Eliminate or Reduce Risks[3]	
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. • Refer to ERM COVID-19 Site and FAQs site for guidance. • 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: 1) On a the day prior to the initiation of work*; 2) Prior to beginning work each day*; 3) Each day upon the completion of work activities; and, 4) Upon any perceived change to your fitness for duty. *Determine and report prior to travel to the work site. **Under any of the following circumstances, exercise your Stop Work Authority**: 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. 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. 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. 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. 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. Examples: 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). 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. - Cover your nose and mouth with a flexed elbow or paper tissue when coughing or sneezing and dispose immediately of the tissue. - 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. - If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. - Avoid close contact with people, particularly any who are sick. - Avoid touching your eyes, nose, and mouth. - Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe. - 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. 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. 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. However, please practice the personal hygiene recommendations and try yo avoid travel by public transportation. This includes, but is not limited to: - Buses - Trains - Light Rail - Taxis - Rideshares (e.g., Uber and Lift) - 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. - Fever - Cough - 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. **Utilize physical distancing (referenced commonly as social distancing):** - Maintain a buffer of at least 6 feet (2 m) from other people. - 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: - Do not share or pass around writing implements, clipboards, or other supplies, bring your own pen; - Don disposable gloves (e.g., nitrile) while signing; - Take turns when signing to maintain physical distancing (6ft from others); - Utilize magnets to hold signature pages on vehicles and limit handling; - If possible have one person complete all required documentation; and, - Change gloves before touching personal items. **- 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. 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. - Do not maintain any trash cans inside the trailer. All trash including food waste should be removed. - 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. - 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 - 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).

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:	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:	**Drilling and SSC**

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:**
Dana Hall/Project Scientist			

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

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. 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.
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.

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			

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.
3									

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

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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

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

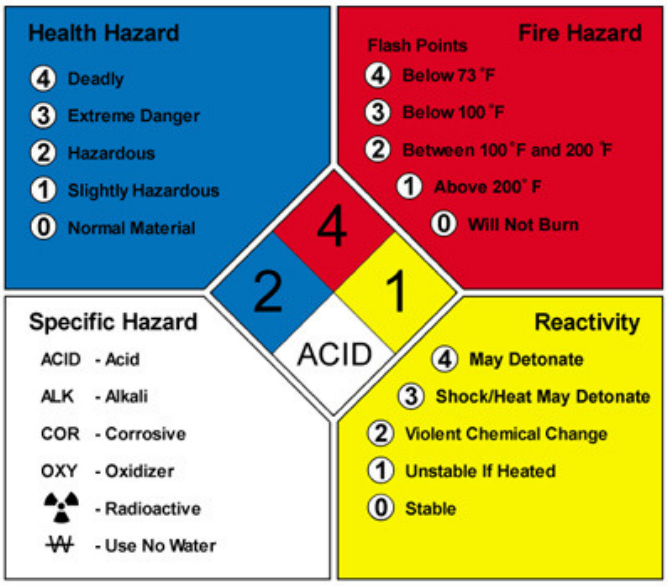
Examples of Common Labeling Systems

GHS Format

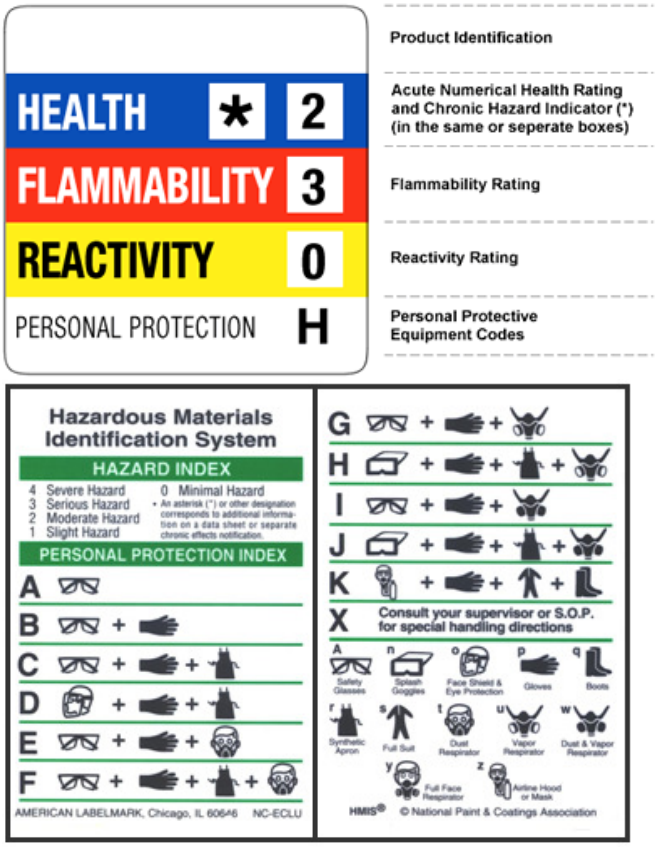
Each container of a classified hazardous chemical is to be labeled, tagged, or marked with the following elements:

- 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) • Someone gets sick (Illness) • 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 • BU Safety Team • BU Managing Partner • Regional Safety Advisor & Global Safety Director • ERM Legal Team
Near Miss Unsafe Act / Unsafe Condition Remarkable Safe Behavior	• Reporting Person • 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"*

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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

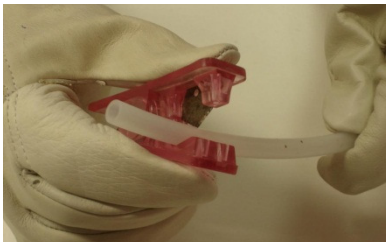
Snips

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

	Applicability:	Form	Document Number:	Version:
ERM	North America		S3-NAM-029-FM7	1
	Title: **Active Facility Risk Management**		**Last Revision Date:**	3/26/15

No.	Issue	Considered?	Additional Actions Necessary Before Beginning Work?
Personnel Management			
1	Does the team have directions on where to park?	☐ Y ☐ N ☐ NA	Click here to enter text.
2	Does the team have instructions on facility access in accordance with client/facility security?	☐ Y ☐ N ☐ NA	Click here to enter text.
3	Has the team reviewed site-specific hazards and acquired personal protective equipment (PPE) necessary for work at the facility?	☐ Y ☐ N ☐ NA	Click here to enter text.
4	Has the team discussed the need for and/or requirements regarding unaccompanied movement within the facility?	☐ Y ☐ N ☐ NA	Click here to enter text.
5	Has the team been briefed on emergency response requirements within the facility?	☐ Y ☐ N ☐ NA	Click here to enter text.
6	Has the team been informed of any chemical, physical, biological, or radiological hazards that may be encountered during the site visit?	☐ Y ☐ N ☐ NA	Click here to enter text.
7	Do any team members have health conditions that could make it unsafe to work in specific areas of the plant (e.g., asthma, skin conditions, allergies, pregnancy, etc.)?	☐ Y ☐ N ☐ NA	Click here to enter text.

Additional Advisory Information		
Hazards	**Control Measures**	**Comments & Follow Up**
Moving vehicles	Visitor parking areas, walkways, designated vehicular gates	Park in designated areas; be alert to truck and other traffic while entering/leaving the facility.
Chemical contact and exposure	Facility engineering controls, facility-designated boundaries and signs, use of required PPE	Know facility requirements on unaccompanied movement; follow posted signs and rules; wear the required PPE.
Walking and working surface hazards	Well-maintained walkways, aisles, stairs, railings, attention to work area	Do not go into potentially unsafe areas; avoid badly cluttered, contaminated, or poorly lit areas.
Plant emergencies from fire, explosion, or other	Facility engineering and operational controls, alarms, response plans and drills	Ensure emergency response to alarms is explained to all team members; follow facility rules on working alone.
High noise levels	Engineering controls, use of hearing protection, limit time in high noise areas	Wear hearing protection in areas designated by facility or if there is the potential for discomfort or distraction from the noise.
Moving facility equipment (e.g., forklifts, aerial lifts)	Alarms, demarcated travel paths	Be observant of all moving facility equipment and back-up alarms; stay on marked travel paths where available.
Work at elevated heights	Railings	Limit work at elevated heights. If required, stay within areas protected by guardrails.
Confined spaces (e.g., pits, vessels, bag houses, sewers)	Signage, secured against inadvertent entry	Do not enter confined spaces on any facility unless you have been formally trained on general confined space entry (CSE), as well as the facility's CSE program; contact your Division H&S Leader for consultation.
Temperature extremes (hot or cold); inclement weather	Pre-planning for anticipated weather conditions, planned breaks from extreme exposures	Conduct facility tours and outside work during the most comfortable part of the day; provide appropriate outerwear based on weather conditions; take breaks from weather extremes as needed or in accordance with developed work/rest schedules.
Working alone/ injured and unattended	Initial decisions on ERM moving alone in the facility and property, determining sign-in and sign-out rules, and letting people know where you are going and anticipated length of time.	If working alone, then heightened awareness of potentially risky situations is essential.
Contact with moving production equipment and live electrical equipment	Machine guards, closed electrical cabinets, warning signs and barriers	Do not touch any plant equipment unless it is properly shut down/locked out and you have asked permission.

	Applicability:	Guideline	Document Number:	Version:
	North America		S3-NAM-029-GU1	1
	Title:	**Project Manager H&S Checklist**	**Last Revision Date:**	3/26/15

Project Name:	Click here to enter text.
Project Manager:	Click here to enter text.
Start/End Date:	Click here to enter text.
Project PIC:	Click here to enter text.
Project Field Safety Officer:	Click here to enter text.

This document can be used by the Project Manager to identify project health and safety requirements for project planning, project site work, and project closeout. It can also serve as guideline to give to project team members to inform the team of health and safety planning undertaken and team efforts required.

Project Planning		
Applicable?	**Description**	**Details**
☐ Y ☐N	Level of health and safety plan (HASP) has been determined (Email, Level 1, Level 2, or Level 3 HASP)	Click here to enter text.
☐ Y ☐N	Risks of travel have been identified (Travel Risk Assessment or Journey Management Plan)?	Click here to enter text.
☐ Y ☐N	H&S team has reviewed Level 2 or Level 3 HASPs	Click here to enter text.
☐ Y ☐N	For all levels of HASP, the project PIC has given written approval	Click here to enter text.
☐ Y ☐N	For projects that must undergo PLAN analysis, risk review is provided to H&S team during HASP review	Click here to enter text.
☐ Y ☐N	Job Hazard Analyses (JHAs) s obtained from contractors and provided to H&S team during HASP review	Click here to enter text.
☐ Y ☐N	Personal protective equipment (PPE) requirements have been determined for each task	Click here to enter text.
☐ Y ☐N	Real-time/industrial hygiene/noise monitoring requirements have been determined based on chemical exposure potential at the site	Click here to enter text.
☐ Y ☐N	Contractors utilized for the project are green-flagged in PICS	Click here to enter text.
☐ Y ☐N	Medical surveillance requirements for ERM and contractor employees have been determined	Click here to enter text.
☐ Y ☐N	Training requirement, including client-specific HS requirements, for ERM and subcontractor employees have been determined	Click here to enter text.
☐ Y ☐N	Applicable permits, notifications, and registrations have been identified	Click here to enter text.
☐ Y ☐N	ERM personnel identified and assigned to the project meet training/medical requirements	Click here to enter text.
☐ Y ☐N	Trained and qualified ERM Field Safety Officer (FSO) has been identified and assigned to the project (as applicable)	Click here to enter text.
☐ Y ☐N	SNAP Cards (M1-ERM-004-FM1) will be used on the project and procedures for using have been explained to ERM and contractors employees	Click here to enter text.

☐ Y ☐N	ERM HASP provided to each contractor firm involved in the project along with minimum health and safety requirements each firm must meet	Click here to enter text.
Project Work		
Applicable?	**Description**	**Details**
☐ Y ☐N	ERM personnel and FSO have not changed since project planning phase, or new personnel meet training and medical surveillance requirements?	Click here to enter text.
☐ Y ☐N	Health and safety included in initial project kickoff meeting or separate health and safety kickoff meeting has been planned	Click here to enter text.
☐ Y ☐N	Site Safety Meeting Form (*S3-NAM-029-FM5*) is at the project site and used to discuss safety each day with ERM and contractor employees onsite	Click here to enter text.
☐ Y ☐N	Everyone on site informed that any change to work scope (weather conditions, personnel, timing, etc.) require short meeting to determine if the change compromises personnel safety	Click here to enter text.
☐ Y ☐N	All PPE and emergency equipment identified in the HASP and JHAs is present at the project site	Click here to enter text.
☐ Y ☐N	Emergency contact information, emergency evacuation/assembly point and route to nearest medical facility are included in HASP and posted at the site	Click here to enter text.
☐ Y ☐N	Guidance on how to handle a regulatory inspection (*S3-NAM-024-PR*) is at the project site	Click here to enter text.
☐ Y ☐N	Training/medical surveillance documents are collected by PM for each contractor employee	Click here to enter text.
☐ Y ☐N	Safety Data Sheets (SDS) are located at the project site for each chemical ERM or contractor brings to the site	Click here to enter text.
☐ Y ☐N	Method to keep site visitors out of ERM work areas has been determined and managed by FSO	Click here to enter text.
☐ Y ☐N	For project work lasting longer than one week, a Field Safety Audit will be conducted, kept with project files, and forwarded to the Division H&S Leader	Click here to enter text.
Project Closeout		
Applicable?	**Description**	**Details**
☐ Y ☐N	Project HASP, JHAs, PM H&S Checklist, subcontractor training/medical documentation, daily Site Safety Meeting Forms, work permits, air and/or noise monitoring and calibration results are placed in project file	Click here to enter text.
☐ Y ☐N	Project team has performed a post-project brainstorming session to close any ECS events and determine any lessons learned	Click here to enter text.

Project Name:	Click here to enter text.
Project Manager:	Click here to enter text.
Partner-in-Charge (PIC):	Click here to enter text.
Start/End Date:	Click here to enter text.

Part I: Project Scope and Team

1. What is the general scope of work for this project?

Click here to enter text.

2. Who are the key ERM members of the envisioned project team?

Role	Assigned
Partner-in-Charge	Click here to enter text.
Project Manager	Click here to enter text.
Field Safety Officer	Click here to enter text.
Construction Manager	Click here to enter text.
Subject Matter Expert	Click here to enter text.
Other: Click here to enter text.	Click here to enter text.
Other: Click here to enter text.	Click here to enter text.

3. Who are ERM's direct contractors for this project? Ensure that all contractors are green-flagged in PICS prior to work start.

Contractor	Task
Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.

Part I Completed: *PM Initials:* Click here to enter text. *Date:* Click here to enter a date.

Part II: Project Security Issues

4. Is full-time security needed/required?

Click here to enter text.

5. Who controls site access?

Click here to enter text.

6. How is site access controlled?

Click here to enter text.

7. What site constituents pose special security risks (e.g., highly toxic chemicals or very valuable materials)?

Click here to enter text.

8. Are there hazardous materials (e.g., drill cuttings or other wastes) that will be shipped from the site?

Click here to enter text.

9. Are there community issues that may impact safety?

Click here to enter text.

10. If work will affect local traffic patterns, are plans in place to contact authorities for specific local requirements?

Click here to enter text.

Part II Completed: *PM Initials:* Click here to enter text. *Date:* Click here to enter a date.

Part III: Project Environmental Issues

11. Where is the site located (provide address)?

Click here to enter text.

12. What regulations will apply to the work (e.g., EPA, State or local regulations, building codes, etc.)?

Click here to enter text.

13. What aspects of the work will require specific professional training, certification, or licenses (e.g., State contractor's license, Professional Engineer seal, etc.)?

Click here to enter text.

Part III Completed: *PM Initials:* Click here to enter text. *Date:* Click here to enter a date.

Part IV: Client-Specific Requirements

14. What general, client-specific HSSE requirements (i.e., those above and beyond what would normally be specified in the ERM health and safety plan (HASP) will impact the work? Examples may include site-specific training, use of client-specific incident reporting procedures, loss prevention training, and permit-to-work policies.

Click here to enter text.

Part IV Completed: *PM Initials:* Click here to enter text. *Date:* Click here to enter a date.

PART V: Project Health and Safety Planning/Execution Checklist		
Item	**PM Initials**	**Date Complete**
Draft HASP Preparation		
Applicable HASP documents completed.		
Approximate scope of work and tasks developed.		
Applicable procedures from the Global Safety Management System (SMS) have been identified.		
Site constituents have been identified and appropriate informational sheets on each collected.		
Safety Data Sheets (SDS) have been acquired for chemicals/materials that will be used to help complete the work.		
Personal protective equipment (PPE) and respiratory protection assessment has been performed.		
Medical surveillance requirements have been determined.		
Draft Job Hazard Analyses (JHAs) have been prepared for envisioned work tasks.		
Client approval prior to issuing draft HASP for bid.		
HASP Finalization and Pre-mobilization		
Contractors' means and methods understood.		
Final JHAs prepared with input of contractors.		
HASP reviewed by member of ERM North America HASP review team.		
HASP signed by ERM Project Team.		
Project FSO appointed and made familiar with the HASP.		
Subcontractor personnel training documentation received and verified.		
First Day on Site		
All site personnel read and sign the HASP. Note that subsequently arriving site personnel must also read and sign the HASP prior to initiating site work.		
All site personnel training requirements verified. Note that subsequently arriving site personnel must also provide ERM with appropriate training documentation.		
All "first day" HASP review and training completed at the site.		
Project Close Out		
Ensure that all medical monitoring requirements have been met.		
Ensure that all ECS entries have been finalized.		
Ensure that all action items, if any, from any incident, near miss, unsafe act, or unsafe condition ECS reports have been completed.		
Ensure that all subcontractor safety performance information has been obtained and the performance evaluation has been conducted.		
Transfer site health and safety files to the office.		
Consolidate project health and safety files.		

SUBSURFACE CLEARANCE PROJECT PLAN
Addendum to HASP
GMS Project No: 0351288

This Subsurface Clearance (SSC) Project Plan should be completed for each phase of ground disturbance activities at a project location, and included as an addendum to the Project-Specific Health & Safety Plan (HASP).

Ground disturbance activities that fall under this SSC Project Plan include ALL activities which require penetration of the ground surface deeper than 1 foot (0.3 meter), and/or the coring or removal of engineered surfaces (pavement, concrete, etc.). Examples of ground disturbance activities include, but are not limited to:

- Hand digging / hand augering
- Drilling
- Direct-push or Geoprobe® borings
- Well installation
- Well decommissioning by over-drilling
- Excavation (by hand or with mechanical equipment)
- Trenching
- Grading
- Concrete coring
- Driving of posts, stakes, rods, poles, or sheet pile.

This SSC Project Plan summarizes the types and sources of SSC information obtained, describes the Site Services Model, and documents any waivers to ERM's Global SSC Process. The ERM Partner-in-Charge (PIC), Project Manager (PM), and SSC Experienced Person (EP)[1] must review and approve this SSC Project Plan, and maintain a copy (1) at the project location for the duration of ground disturbance activities and (2) in the project files.
All waivers must be approved by BOTH: (1) the ERM PIC and (2) the Business Unit Managing Partner (BU MP) or the BU MP's designee (cannot be the same person as the PIC).

<table>
<tr><td rowspan="5">Administrative Information</td><td colspan="2">Project Name and Location: Sanmina- Owego, NY</td></tr>
<tr><td colspan="2">Scope of Ground Disturbance Activities: ERM will employ subcontractors to perform private utility location (New York Leak Detection), clearing boring locations, and clearing of surface brush (Parratt-Wolff, Inc.). ERM's surveyor (R. M. Rybinski, L.S.) will be surveying in utility and boring locations. ERM will be advancing soil borings and installing wells in these cleared locations.
<u>Check all that apply:</u>
☒ Point disturbances
☐ Excavation / trenching
☐ Removal of engineered surfaces
☐ Other - Describe:
Use field documentation to document SSC:
• Process Checklist – broadly across the site
• Remote/Greenfield Site Process Checklist – broadly across the site for those projects that meet these criteria and where ONLY hand digging will occur (refer to SSC Process Document Section 1.2)
• Location Disturbance Permit – for each location inside a Critical Zone</td></tr>
<tr><td>SSC Project Plan Date: 4/13/21</td><td>Field Work Start Date:</td></tr>
<tr><td>Project Manager: Rob Sents
Signature:</td><td>Partner In Charge: Ernie Rossano
Signature:</td></tr>
<tr><td>SSC EP: Rob Sents
Signature:</td><td>BU MP (req'd for waivers):
Signature:</td></tr>
</table>

[1] SSC EP not required for project sites determined to be Remote/Greenfield sites (as defined in the ERM Global SSC Process), where ONLY hand digging will occur.

Subsurface Clearance Information Sources Summary	Information Sources	Yes	No	N/A	Comments
	Facility-provided as-built drawings, maps, site plans showing subsurface structures / utilities	☒	☐	☒	Date(s): 1974

	List any SSC General Employees (GEs) working on this project: Dana Burke

Document the information sources that ERM used or will use to locate Subsurface Structures on site.	Other information obtained (e.g., 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	☒	☐	☐	List (including dates): ERM has a full set of drawings of this area. We have horizontal wells in the area, as wells as, boring logs from other consultants both in the same area and just south of the area. All equipment in the main building has been removed in preparation for facility closure.
	Knowledgeable Contact Person	☒	☐	☐	Who: Earl Kimble Time in Job: A long time, unsure on the number of years Time at Site: 9-5
	Utility Markouts	**Yes**	**No**	**N/A**	**Comments**
	Site is Remote/Greenfield site AND only hand digging will occur	☐	☒	☐	*If "YES", utility markouts are not required by ERM process (Note that public markouts may be legally required based on jurisdiction of project site – it is the responsibility of the PIC and PM to determine these requirements and comply)*
	Public Utility Markouts (where they are available)	☒	☐	☐	*Required where available – if not available check "N/A". If available and checked "NO", a Waiver is required (if legally able to do so).* Who: Dig Safely NY
	Private Utility Markouts	☒	☐	☐	*If checked "NO" and site is not a Remote/Greenfield site, a Waiver is required* ERM employee ☐ or Subcontractor ☒ Who: New York Leak Detection Inc List methods / equipment used: GPR, CAT, power and radio sondes

For Remote/Greenfield Sites where ONLY hand digging will occur – the remaining sections of this SSC Project Plan do not apply and can be left blank.

Site Services Model

List the utilities or other below ground services present on site.

Do we know the locations of these services, their conveyance on site (to the site boundary, as appropriate) and the location of isolation switches or valves?

If "Present" and not located or "Unknown", comment on how those gaps will be addressed.

Attach a site plan / drawing (to scale) showing planned ground disturbance location(s), the locations/routes of all identified or suspected subsurface structures and services, and associated critical zones.

Utility / Service	Present	Anticipated Depth (note units)	Located? Yes	Located? No	Absent	Unknown	Status (active/ inactive/ abandoned)	Comment *(how located? Lines of evidence – types and quality. How will gaps be addressed?)*
Electricity	☒		☒	☐	☐	☐	Active overhead	Voltage:
Gas	☒		☒	☐	☐	☐	Active, overhead	
Petroleum Pipeline	☐		☐	☐	☒	☐		
Other Pressurized Lines	☐		☐	☐	☒	☐		Type:
Process Sewer	☐		☐	☐	☒	☐		Not in this area and overhead
Sanitary Sewer	☒		☐	☐	☐	☐		Not in this area
Storm Sewer	☒	3 ft	☒	☐	☐	☐	Active	Will be located with Radiodection and sonde thru clean out in room, only know subsurface utility
Potable Water	☒		☐	☐	☐	☐		Not in this area, overhead
Telephone / Communication	☒		☐	☐	☐	☒		not in this area overhead
Fiber Optic	☒		☐	☐	☐	☒		Not in this area/ Overhead
Plant air / steam	☐		☐	☐	☐	☒		Not in this area
Fuel / oil	☐		☐	☐	☐	☒		Not on maps, will be cleared with GPR
Reclaimed / waste water	☐		☐	☐	☐	☒		Overhead and outside area
Fire suppression	☐		☐	☐	☐	☒		Overhead
Underground tank(s)	☐		☐	☐	☐	☒		Not on maps, will be cleared with GPR
Other:	☐		☐	☐	☐	☐		

Subsurface Clearance Process Waivers **Document any waivers to the process approved by BOTH the PIC and BU MP.** **Legally required steps cannot be waived.**	**Process Component Being Waived:**	**Waived By (PIC)**	**Waived by (BU MP)**	**Date**	**Reason**
	Performance of Public Utility Markouts (where they are available)				
	Performance of Private Utility Markouts				
	No ground disturbance inside a Critical Zone				
	Physical Clearance to required depth(s) and diameters(s) at Point Disturbance Location(s). Indicate specific location(s):				

Subsurface and Overhead Utility Clearance Map	**Attach a site plan / drawing (to scale) showing planned ground disturbance location(s), the locations/routes of all identified or suspected subsurface structures and services, associated critical zones, and location of all isolation devices and/or shutoff valves.**

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,

- 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

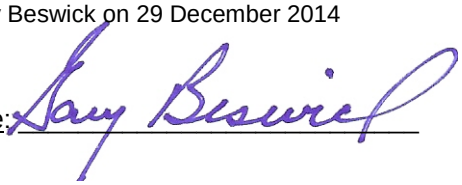
- M1-ERM-012-FM1 – Global Written Operational Controls Register
- M1-ERM-001-FM1 – Health, Safety, and Environment Policy Statement
- M1-ERM-002-PR – Hazard Identification and Risk Assessment Procedure
- M1-ERM-008-PR – Competence, Training and Awareness Procedure
- M1-ERM-011-PR – Document Control and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

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

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

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

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

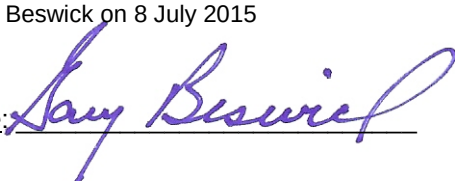
- M1-ERM-011-PR – Document Control and Record Keeping Procedure
- M1-ERM-013-PR2 – Global Crisis Management Plan (Confidential)
- M1-ERM-013-GU1 – Emergency Action Plan Development Guidance Document
- M1-ERM-013-GU2 – Crisis Management Plan Overview
- M1-ERM-015-PR – Event and Non-conformity Management 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

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.

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:

- 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.

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).

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.

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.

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).

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

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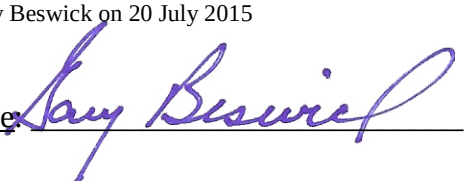
Approval Signature: 

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

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.

- 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.

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.

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

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

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.

- 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:

$$TRIR = \frac{(Number\ of\ ERM\ Recordable\ Injuries\ \&\ Illnesses) * 200{,}000}{Number\ of\ Hours\ Worked\ by\ ERM}$$

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

Document Control Information

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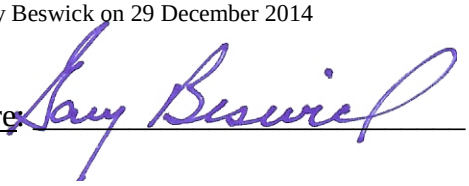
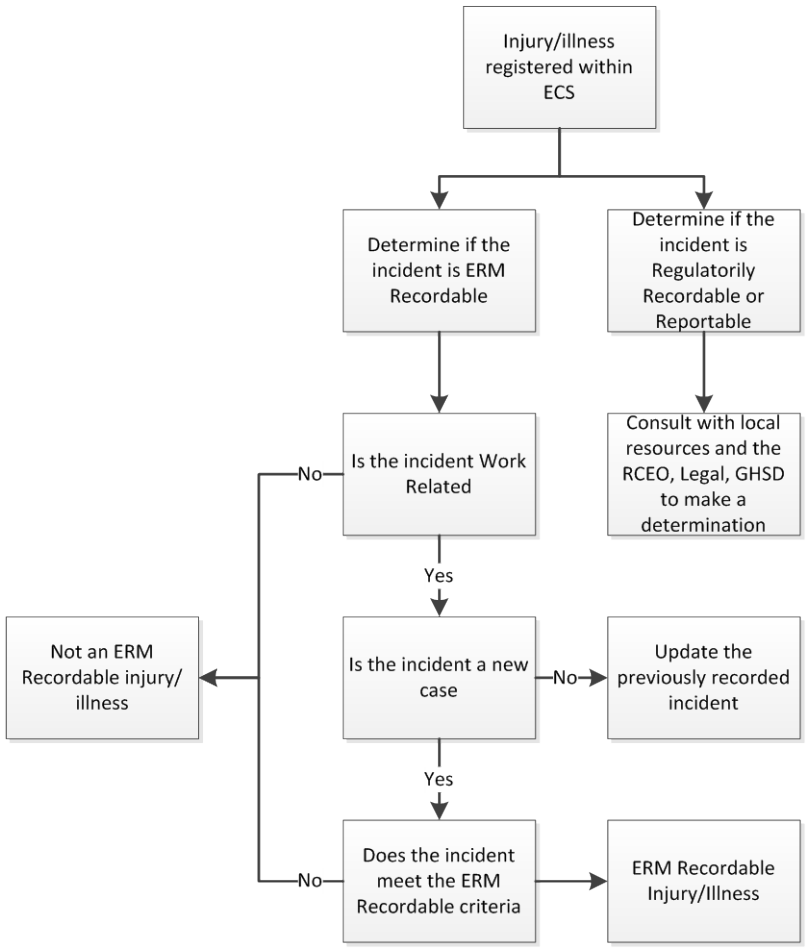
Approval Signature: 

Figure 1 – Recordability Decision Process



Revision History

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

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

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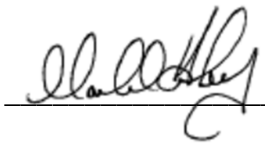
Approval Signature: 

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"*

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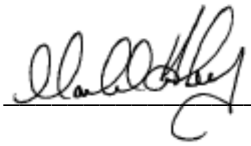
Approval Signature: 

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"*

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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

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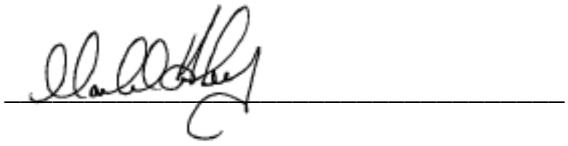
Policy Approval by: Mark Hickey

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)

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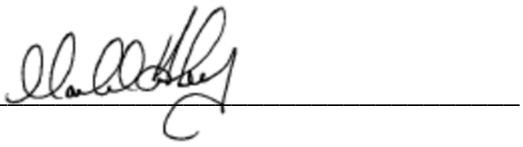
Approval Signature: 

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)

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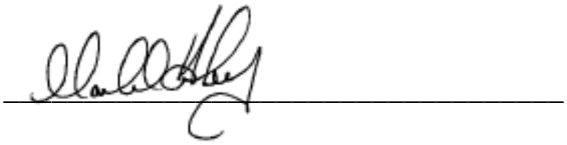
Approval Signature: 

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

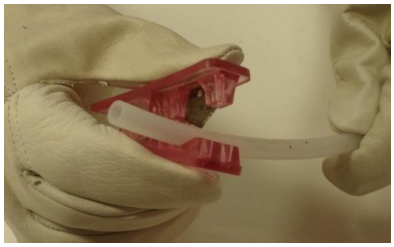
Snips

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)

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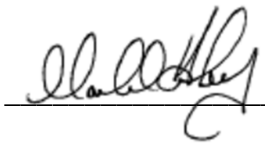
Approval Signature: 

Revision History

Section	Reason for Revision	Date
All	New document.	10/23/13
All	Reformatted document. Minor edits for clarity.	6/1/15