



**US Army Corps
of Engineers®**
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**Final
Site Safety and Health Plan Addendum
for
Occidental Chemical Corporation Property and Wastewater
Treatment Plant Data Gap Investigations
at the Former Lake Ontario Ordnance Works (LOOW)
Niagara County, New York**

**Addendum to the
Phase IV Remedial Investigation of the
Wastewater Treatment Plant (EU7)
Site Safety and Health Plan**

August 2011

Prepared for

**U.S. Army Corps of Engineers
Baltimore District**

**Contract W912DR-06-D-0002
Delivery Order 0009 Modification 03**

Prepared by

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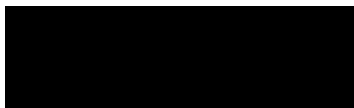
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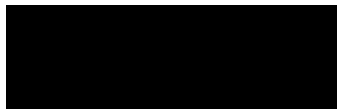
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22 August 2011

Michael Dorman
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Date



18 August 2011

Peter Li, PhD
Program Manager

Date

COMPLETION OF SENIOR TECHNICAL REVIEW

This document has been produced within the framework of the Earth Resources Technology, Inc. (ERT) and EA Engineering, Science, and Technology, Inc. (EA) quality management systems. As such, a senior technical review, as defined in the Quality Control Plan for this project, has been conducted. This included review of the overall design addressed within the document, proposed or utilized technologies and alternatives and their applications with respect to project objectives and framework of United States Army Corps of Engineers (USACE) regulatory constraints under the current Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP-FUDS) No. C02NY0025 project, within which this work has been completed.



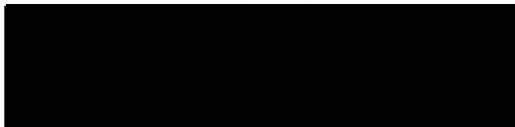
21 August 2011

Sandy Staigerwald (EA)
Senior Technical Reviewer

Date

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

This document has been produced within the framework of ERT's total quality management system. As such, an independent technical review, appropriate to the level of risk and complexity inherent in the project as defined in the Quality Control Plan (QCP) for this project, has been conducted. This included review of assumptions (methods, procedures, and material used in analyses), alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the project objectives. Comments and concerns resulting from review of the document have been addressed and corrected as necessary.



19 August 2011

Thomas Bachovchin
Independent Technical Reviewer (ERT)

Date

CERTIFICATION

This Site-Specific Safety and Health Plan (SSHP) has been prepared under the supervision of, and has been reviewed by, a Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene (ABIH).

A black rectangular box redacting the signature of the Certified Industrial Hygienist.

18 August 2011

Dewey Cubit

Date

Certified Industrial Hygienist (ABIH No. CP1254)

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LIST OF ACRONYMS

ABIH	American Board of Industrial Hygiene
AHA	Activity Hazard Analysis
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CNS	Central Nervous System
COPC	Chemicals of Potential Concern
CPR	Cardiopulmonary Resuscitation
CWM	Waste Management Chemical Services LLC
DERP-FUDS	Defense Environmental Restoration Program - Formerly Used Defense Sites
DOD	Department of Defense
EA	EA Engineering, Science, and Technology, Inc.
EM	Engineering Manual
ERT	Earth Resources Technology, Inc.
ES&H	Employee Safety and Health
EU	Exposure Unit
EU 7	Wastewater Treatment Plant
EU 8	Occidental Chemical Corporation Property
FS	Feasibility Study
FSP	Field Sampling Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IDLH	Immediately Dangerous to Life and Health
LOOW	Lake Ontario Ordnance Works
MEC	Munitions and Explosives of Concern
mg/m ³	milligrams per cubic meter
mRem	Milliroentgen equivalent in man
MSDS	Material Safety Data Sheets
N/A	Not Applicable
OCCP	Occidental Chemical Corporation Property
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbons
PEL	Permissible Exposure Limit
PM	Project Manager
PPE	Personal Protective Equipment
ppm	parts per million
QAPP	Quality Assurance Project Plan
QCP	Quality Control Plan
RI	Remedial Investigation
RSP	Radiation Safety Plan
SSHO	Site Safety and Health Officer
SSHP	Site-specific Safety and Health Plan
STEL	Short-Term Exposure Limit
TLV	Threshold Limit Value
TNT	Trinitrotoluene
USACE	US Army Corps of Engineers
VOC	Volatile Organic Compound

WWTP Wastewater Treatment Plant

1.0 INTRODUCTION

Earth Resources Technology, Inc. (ERT) has been contracted by the U.S. Army Corps of Engineers (USACE), Baltimore District to develop a Site-specific Safety and Health Plan (SSHP) Addendum for activities related to the Occidental Chemical Corporation Property (OCCP) and Wastewater Treatment Plant (WWTP) Data Gap Investigations at the Former Lake Ontario Ordnance Works (LOOW). This SSHP Addendum establishes procedures to protect employees of ERT, subcontractors, USACE, and site visitors from potential safety and health hazards resulting from activities conducted during this project. This SSHP is an addendum to the previously accepted *Final Site Safety and Health Plan for Phase IV Remedial Investigation/Feasibility Studies at the Former Lake Ontario Ordnance Works, Niagara County, New York* (USACE/ERT, 2009a) and *Final Site Safety and Health Plan Addendum for OCCP Data Gap and Lewiston-Porter Central School District Investigations at the Former LOOW, Niagara County, New York* (USACE/ERT, 2010), although enough site-specific information has been included herein to refer only to this document during day to day field activities. This SSHP has been developed in accordance with requirements set forth in:

- 29 Code of Federal Regulations (CFR) 1910.120 - the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard;
- 29 CFR 1926 - the OSHA Safety and Health Regulations for Construction;
- ERT's Corporate Health and Safety Program; and
- USACE Safety and Health Requirements Engineering Manual (EM) 385-1-1 (USACE, 2008).

This SSHP Addendum has been prepared in order to provide safe procedures and practices for personnel performing site work. This SSHP Addendum was developed using contract information provided by USACE, Baltimore District and will refer to the requirements discussed in OSHA regulations, USACE EM 385-1-1, ERT's Corporate Health and Safety Program, and the previously accepted Final Health and Safety Plan (USACE/ERT, 2009a). A crosswalk checklist of EM 385-1-1 requirements and their location within this plan is provided in Appendix A. All of the above mentioned documents will be kept onsite (or will be readily available), and are incorporated into the SSHP Addendum by reference. The SSHP Addendum will also be transmitted to all site workers and subcontractors.

Elevated radioactivity is not expected to be encountered during the activities; however, a Radiation Safety Plan (RSP) (USACE/ERT, 2009b) has been developed to outline procedures for providing radiological screening. This RSP has been produced under separate cover, but is also included as part of this SSHP, incorporated by reference, and will be maintained on site with the SSHP Addendum.

1.1 Site History

In 1942, the War Department obtained a 7,500-acre parcel in northwestern Niagara County for the construction of a trinitrotoluene (TNT) production facility designated as the LOOW. TNT production, product support and storage occupied 2,500 acres of the eastern parcels. The remaining 5,000 acres were left undeveloped, acting as a buffer zone and allowing for the

possible expansion of production. Expansion never occurred and in 1943, after nine (9) months of operation, LOOW was decommissioned due to excess TNT production at other facilities. The eastern 2,500 acres, the production area, was subsequently used by various other agencies of the Department of Defense (DOD), including the Air Force and Navy, which later constructed manufacturing plants, Air Force Plant 68 (AFP-68) and the Navy Interim Pilot Production Plant (IPPP) respectively, for high efficiency borane fuels. The Army subsequently used the acreage for the construction of a Nike missile base.

In the mid 1940s, 1,500 acres of the southern portion of the former LOOW were transferred to the USACE, Manhattan Engineer District. The Manhattan Engineer District later became the U.S. Atomic Energy Commission (AEC), then the Energy Research and Development Administration (ERDA) and finally the U.S. Department of Energy (DOE). During operation, radioactive materials were stored on portions of the 1,500 acres. However, between the 1950s and 1980s, radioactive materials formerly housed on the acreage were consolidated and removed to the current 191-acre Niagara Falls Storage Site (NFSS) area. The NFSS is currently being addressed under the Formerly Utilized Sites Remedial Action Program (FUSRAP). Portions of the 1,500 acre area overlap operational areas previously described (e.g., AFP-68, Nike Base).

In subsequent years, the Town of Lewiston acquired portions of the former LOOW, including two parcels which comprised the former LOOW WWTP. An ongoing Remedial Investigation (RI) is assessing the nature and extent of contamination associated with the former LOOW operations and subsequent DOD operations fully eligible for investigation within the approved and ongoing Defense Environmental Restoration Program-Formerly Used Defense Sites (DERP-FUDS) Hazardous, Toxic and Radioactive Waste (HTRW) project. The WWTP has been included in previous phases of the ongoing RI, but completion of the investigation was postponed, pending decisions on the eligibility of the site for additional evaluation under the ongoing HTRW and/or other FUDS projects. Investigation of the WWTP represents Phase IV of the ongoing RI.

1.2 Project Description

The overall project objectives for the OCCP (EU 8) and WWTP (EU 7) Data Gap Investigations include the following:

- **OCCP** - Evaluate surface and subsurface soil constituents at Locations 3, 4 and 7 at the OCCP, potentially associated with previous DOD activities. This will be addressed by collecting surface and subsurface soil samples, and submitting the environmental samples for laboratory analysis; evaluating whether constituents associated with former DOD activities potentially impacted the areas.
- **OCCP** - Evaluate sediment and surface water constituents at Location 2 (pond) at the OCCP, potentially associated with previous DOD activities. This will be addressed by collecting surface water and sediment samples, and submitting the environmental samples for laboratory analysis; evaluating whether constituents associated with former DOD activities potentially impacted the area.
- **WWTP** - Confirm or deny previously detected polycyclic aromatic hydrocarbon (PAH) concentrations detected in groundwater samples collected from the former WWTP during field activities associated with the Phase IV RI.

Data collected and evaluated from the OCCP and WWTP Data Gap Investigations will supplement previous investigation data. Data collected from the OCCP Data Gap Investigation will be used to complete a RI for the OCCP. Data collected from the WWTP will be used to finalize the evaluation of potential groundwater impacts associated with previous DOD activities and complete the Phase IV RI.

Field work will be performed in accordance with the guidelines contained in the Field Sampling Plan (FSP), presented under separate cover. Analytical data will be evaluated against applicable standards as discussed in the Quality Assurance Project Plan (QAPP), also presented under separate cover.

Various activities to be performed require communication of the potential risks, safe operational procedures and adherence to required Activity Hazard Analyses (AHAs). The following activities require an AHA:

- Site reconnaissance
- Site preparation/mobilization
- Manual and mechanical brush removal
- Decontamination of field equipment
- Environmental sampling
- Investigative Derived Waste (IDW) management

1.3 ERT Corporate Safety and Health Policy

ERT's Safety and Health Program specifies that all ERT personnel are responsible for their safety and the safety of those working with them. However, it is also stated that the ultimate employee safety and health (ES&H) responsibility begins with the President of ERT and this responsibility radiates outward to all management, administrative, operations, and field personnel. To achieve this philosophy, ERT empowers all personnel with stop work authority regarding known or potential ES&H issues. Additionally, all ERT personnel are held accountable for performing their assigned tasks in a manner that promotes continuous, active hazard evaluation and safe task performance.

1.4 Project Safety and Health Program

ERT has established a safety and health training program for those staff, within the Environmental Services business unit, that conduct field activities at sites that could involve hazardous substances, HTRW, or munitions. This training program establishes minimum training requirements for field workers, field supervisors, site safety and health officers, and project managers. The program includes the following components: basic training for hazardous waste operations and annual refreshers; medical monitoring; first aid training; and a personal protective equipment program. As part of ERT's overall safety and health program, there is also a policy for disciplinary actions for staff who do not follow safe work practices and this program.

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2.0 ORGANIZATION OF PERSONNEL

<u>Role</u>	<u>Person</u>	<u>Contact Information</u>
ERT Program Manager	[REDACTED]	[REDACTED]
ERT Project Manager (PM)	[REDACTED]	[REDACTED]
ERT Certified Industrial Hygienist (CIH)	[REDACTED]	[REDACTED]
ERT Site Manager	[REDACTED]	[REDACTED]
ERT Site Safety and Health Officer (SSHO)	[REDACTED]	[REDACTED]
ERT Radiation Safety Officer	Pending	Pending
USACE Project Manager	[REDACTED]	[REDACTED]
USACE Technical Manager	[REDACTED]	[REDACTED]

Training certifications/qualifications for key staff are included in Appendix C

2.1 Program Manager

The Program Manager is responsible for contracting, oversees contract specifications to be included in the execution of the project task, and has ultimate responsibility for client satisfaction.

2.2 Project Manager

The Project Manager (PM) will be responsible for the overall direction, implementation, and enforcement of health and safety requirements. Other responsibilities include:

- Ensure that the project is being performed in a manner consistent with the ERT's Corporate Health and Safety Program;
- Ensure that a SSHP is prepared and approved;
- Provide the SSHO with project information related to health and safety matters and the development of the SSHP;
- Monitor compliance with the SSHP by ERT and subcontractor personnel;
- Ensure adequate resources are provided to the health and safety staff, so that they may carry out their duties;
- Ensure that all ERT and subcontractor personnel designated to work at the project sites are qualified according to ERT's medical surveillance and training requirements; and
- Maintain communication with the USACE PM.

2.3 Project Certified Industrial Hygienist

The Project CIH or his/her designee's responsibilities are listed below.

- Provides for the development and approval of the SSHP and works with the project team to ensure implementation of the SSHP;
- Ensures that all health and safety activities identified in the SSHP are conducted and/or implemented;
- Serves as the primary contact to review health and safety matters that may arise;
- Approves revised or new safety protocols for field operations;
- Coordinates revisions of this SSHP with field personnel;

- Oversees the investigation of major accidents/incidents;
- Conducts periodic inspections for compliance with the SSHP;
- Monitors compliance with this SSHP; and
- Maintains Accident/Incident Report Forms.

2.4 Site Manager

The Site Manager will be responsible for daily completion of site activities in accordance with the approved project planning documents. The Site Manager will be required to have OSHA 8-hour HAZWOPER Site Supervisor training in addition to current OSHA 40-hour HAZWOPER training. The responsibilities of the Site Manager include:

- Reviewing health and safety documentation to ensure compliance with this SSHP; and
- Work with SSHO to identify, evaluate, and control hazards.

During an emergency, the Site Manager will be responsible for initiating and coordinating responses. The Site Manager will be responsible for the following:

- Initiating the evacuation of the work site when needed, communicating with offsite emergency responders, and coordinating activities of onsite and offsite emergency responders; and
- Determine if hazardous conditions are adequately alleviated prior to allowing resumption of work operations after an emergency.

2.5 Site Safety and Health Officer

The SSHO will be onsite throughout the project and will be responsible for daily compliance with site safety and health requirements. The SSHO or their designee will be required to have OSHA 30-hour Construction Safety training in addition to current OSHA 40-hour HAZWOPER training.

The SSHO will have the following responsibilities:

- Monitor compliance with this SSHP;
- Ensure all site activities are performed in a manner consistent with ERT's Corporate Health and Safety Program and the SSHP;
- Interface with the CIH about onsite implementation of the SSHP;
- Direct daily health and safety activities onsite;
- In conjunction with the PM, ensure that all ERT's personnel and subcontractors designated to work at the project sites are qualified according to ERT's medical surveillance and training requirements;
- Report all incidents, accidents, and near misses to the PM, Site Manager and to the USACE PM or Authorized Site Representative and completes or oversees completion of Accident/Incident Report forms;
- Maintain health and safety equipment onsite;
- Inspect ongoing activities, and report any health and safety deficiencies to the Site Manager and Project Manager;

- Accompany or maintain communication with each work crew;
- Perform site monitoring to ensure that site personnel are adequately protected; and
- Conduct initial site-specific safety training and regular safety briefings for site personnel.

The SSHO will have the authority to take the following actions:

- Stop site activities if an "imminently dangerous" situation exists. The emergency situation will be immediately reviewed with the PM, and CIH and the USACE PM or Authorized Site Representative;
- Direct personnel to change a work practice if it is determined to be hazardous to the health and safety of site personnel; and
- Temporarily suspend an individual from site activities for infractions of the SSHP, pending discussion with the CIH.

Both the Site Manager and SSHO will be CPR/First Aid trained.

2.6 Environmental Field Technician

Environmental field technicians will be responsible for collecting environmental samples, including soil samples, and groundwater samples. Field Geophysicists may serve as Environmental Field Technicians. All Field Technicians will have OSHA 40-hour training. Field Technicians will perform the following tasks:

- Receive and establish accountability for project equipment;
- Organize support facilities and test communication equipment;
- Operate pumps for groundwater sampling;
- Operate Robotic Total Station (RTS) unit or other appropriate surveying equipment;
- Collect samples (including but not limited to soil, groundwater, and sediment); and
- Fill out Chain of Custody forms and ship environmental samples to laboratory.

2.7 Field Personnel

ERT field personnel, including the Environmental Field Technician, will be identified as this project proceeds. All field personnel, at a minimum will maintain current OSHA HAWOPER certifications. Copies of all pertaining certifications will be maintained onsite for inspection. Their responsibilities are listed below:

- Comply with rules, regulations, and procedures as set forth in this SSHP and any revisions;
- Maintain up-to-date knowledge of the information, instructions, and emergency response actions maintained in the SSHP;
- Report any unsafe or potentially hazardous conditions to the SSHO or PM;
- Prevent admittance to work sites by unauthorized personnel; and
- Inspect all tools and equipment utilized by ERT for safe operation and condition, including personal protective equipment (PPE), daily prior to use.

2.8 Subcontractors

Various subcontractors will be utilized as the project proceeds. Anticipated subcontractors to be utilized are listed below.

- Test America, Inc (Contract Laboratory support)
- Parratt Wolff (Direct Push Geoprobe® support)

Subcontractor supervisors and staff will follow, at a minimum, the procedures and reporting requirements specified in this plan. If at any time, the Site Manager or SSHO feels the subcontractor is disregarding safe work practices, the subcontractor supervisor will be notified immediately to implement corrective actions. If unsafe work practices continue by the subcontractor, they will be requested to stop work and leave the site by the Site Manager. ERT's contract manager will also terminate their subcontract agreement if the subcontractor cannot resolve the issues to the satisfaction of the ERT PM.

2.9 Visitors

Visitors will not be allowed within work exclusion zones without appropriate OSHA training and medical surveillance, and the permission of the Site Manager and/or SSHO. Authorized site visitors, defined as anyone who is not a regular project worker, such as a contracting agency and other Federal or local agency personnel, may visit the site per the project-specification, but will be responsible for the following items:

- Signing the Site Entry and Exit Log upon entering and exiting the site (Appendix B);
- Receiving the site hazard and safety instructions from the SSHO;
- Reviewing and complying with the essential elements of the SSHP;
- Entering only those areas of the site deemed permissible by the SSHO and Site Manager;
- Entering work exclusion zones only after presenting appropriate documentation and after having been granted permission from the SSHO and Site Manager, and donning appropriate PPE to enter regulated work areas when such controls are required for entry; and
- Reporting any observed unsafe act and/or condition at, or affecting, the work site to the PM

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3.0 REQUIRED TRAINING AND MEDICAL SURVEILLANCE

3.1 General Safety and Health Training

ERT requires all field personnel to participate in a minimum of 40 hours of OSHA HAZWOPER safety training as outlined in 29 CFR 1910.120. The subjects addressed include: regulatory concepts, toxicology, first aid, material safety data sheets (MSDS), field monitoring, personal protection, site-entry procedures, sampling and decontamination, hazard communication, documentation, and emergency response. An annual 8-hour refresher course is also required for all field personnel prior to performing field work. In addition, three days of field experience under the supervision of an experienced supervisor is required prior to allowing field personnel to lead field tasks.

3.2 Site-Specific Training

In addition, the following training requirements will also be satisfied:

- Prior to site entry, employees must be provided site-specific safety and health indoctrination and training to enable them to perform their work in a safe manner;
- This training will be documented as required by EM 385-1-1 Section 01.B.02;
- Field personnel assigned to the project will be informed of, and trained on, the content and application of the SSHP;
- Field personnel will review the SSHP and sign a SSHP Compliance Agreement upon completing this training (see Appendix C);
- Field personnel will undergo training for ordnance and explosives (OE) hazard identification operating procedures, and emergency response procedures, as detailed in the MEC Operations Plan (USACE/ERT, 2009c);
- Field personnel will undergo training for monitoring and recognition of radiological hazards, as detailed in the RSP (USACE/ERT, 2009a); and

Attendance sheets will be used to document completion of each orientation session.

3.3 Medical Surveillance

ERT personnel who will be performing activities at the former LOOW site will have undergone an extensive medical examination by a board certified occupational physician. The purpose of this evaluation program is listed below.

- Assess the health status of personnel prior to employment, including ability to use respiratory protection.
- Evaluate and provide medical care for personnel in the event of a work-related accident, illness, or over exposure.
- Identify any adverse health effects resulting from hazardous work, and to determine employee fitness for future work assignments through routine (annual or biannual) examinations.

Based on the examination, the physician identifies any medical restrictions that would affect an employee's ability to safely perform their job. If no restrictions are imposed, the physician certifies the employee as capable of full participation in the work program. The ERT medical surveillance program requires an annual surveillance examination to ensure the continued fitness

of field personnel for future work activities. Furthermore, supplemental testing will be administered on an as-needed basis.

3.4 First Aid/CPR

At least two onsite workers will be currently certified in both Standard First Aid and Adult Cardiopulmonary Resuscitation (CPR) by the American Red Cross or equivalent organization and will include blood borne pathogen training. Although subject to change, the tentatively scheduled field team members currently certified are [REDACTED] and [REDACTED].

Certifications will be maintained onsite during all field activities. First-aid training will be updated every 3 years. CPR training will be updated annually.

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4.0 GENERAL SAFETY REQUIREMENTS

4.1 SSHP Acknowledgment

All ERT and other project personnel participating in onsite activities at Former LOOW must read this SSHP and sign the Safety Plan Acceptance form contained in Appendix B. Photocopies of the signed SSHP Safety Plan Acceptance forms shall be provided to the ERT SSHO by all ERT personnel working on site. The SSHO shall maintain a project file for this documentation.

4.2 Onsite Coordination

Safety meetings shall be conducted at the beginning of field work and on an ad hoc basis thereafter as warranted by site conditions. The purpose of these meetings will be to exchange/update information on the activities planned for the day, anticipated PPE level for each activity, special safety requirements, site conditions, and newly identified hazards including temperature, wind velocity and direction, humidity, and precipitation. Records of the daily site meetings will be maintained including attendance and time of the meeting.

4.3 General Safety Rules

The general safety rules listed below apply to ERT and subcontractor personnel present at the former LOOW.

- Under no circumstance will field activities be conducted unless a competent person is present and aware of the activity;
- Eating, drinking, and smoking are prohibited on site, except in designated areas;
- All municipal wastes will be collected in dedicated trash canisters and removed from the site at the end of each work day and disposed of at an appropriate facility;
- All onsite personnel must wear protective clothing appropriate for designated level of protection (e.g., work boots) and personnel shall wash hands before eating and at the completion of work activities;
- Adequate lavatory facilities and wash stations will be provided to site personnel, in accordance with applicable OSHA regulation;
- An adequately stocked first-aid kit will be maintained; and
- All accidents, injuries, or possible exposures will be reported to the SSHO immediately and an accident report form will be completed. A copy of the incident report form is included in Appendix D.

4.3.1 Buddy System

Most activities at the site will be conducted with a buddy who is able to:

- Provide his or her partner with assistance;
- Observe his or her partner for signs of chemical or heat/cold exposure;
- Periodically check the integrity of his or her partner's PPE; and
- Notify the PM or others if emergency help is needed.

A minimum number of personnel for efficiency and safety will be present in the exclusion zone (EZ).

4.3.2 Disciplinary Procedure

Strict adherence to the SSHP will be required for all employees and subcontractors working under ERT's SSHP. Disciplinary action will be enforced for those employees and subcontractors not complying with the project's safety requirements. It is the responsibility of all ERT employees and subcontractor personnel to follow prescribed work practices, and to be aware of the work habits of those around him/her. Any employee whom is observed performing unsafe work practices will be verbally reminded of proper procedures. Should the activity continue, the SSHO will be notified. It is the duty of the SSHO to have an informal discussion with the employee reiterating proper work practices, and the potential risks associated with the activity of the offending employee. A record of the unsafe activity will be documented in the daily log. If any further unsafe activity is observed, the offending employee will be removed from the project, and a report summarizing the events leading up to his/her removal will be prepared by the Site Safety Officer.

4.3.3 Alcohol and Drug Abuse Prevention

ERT prohibits the use, sale dispersal, possession, or manufacture of illegal drugs, narcotics or alcoholic beverages in its field locations. This prohibition also covers all legal or prescription drugs that impair an employee's ability to perform his/her job safely or properly.

4.4 Site Sanitation

Temporary toilet(s) will be available within a five minute drive from the site and potable water will be available at the site to allow field personnel to perform personal hygiene functions. Municipal trash will be kept in contractor grade garbage bags and removed from the site at the end of each work day. During the Pre-Entry Meetings (presented in Section 7.1), the SSHO will provide the field team with the locations and directions to the nearest restroom facilities, and ensure that all members of the field team have transportation available to access those restroom facilities.

5.0 ACTIVITY HAZARD ANALYSIS

The potential hazards associated with the project site include radiological, chemical, physical, and biological hazards. The potential for encountering chemical hazards will depend on the types and quantities of chemicals present and the type of work being performed. All personnel hours will be documented in the daily log book to track the number of man-hours and potential exposure. The potential for encountering physical and biological hazards will depend on the location and type of work being performed. The hazard assessment in this section is intended to communicate to site personnel the radiological, chemical, physical, and biological hazards and risks associated with site work. Activity Hazard Analyses are provided in Appendix E.

5.1 Radiological Hazards

Due to the area's proximity to sites with radiological impacts, field screening for radiological impacts will be conducted prior to any vegetation clearance and while conducting certain sampling activities associated with the OCCP and WWTP Data Gap Investigations. The RSP (USACE/ERT, 2009a) details procedures and techniques that will be utilized to ensure the health and safety of field personnel during RI activities and includes the AHA with respect to radiological hazards.

A radiation survey meter will be used initially upon site entry and during brush clearance activities. Readings will be taken from vegetation to be cleared. After background levels have been established, readings above two times the background level will prompt work to halt immediately and contact the USACE PM or representative. At which point, USACE will determine if additional activities are warranted (e.g. collection of representative sample for radiological analysis). Work will not be performed if the dose rate is greater than 1 milliroentgen equivalent in man (mRem) per hour. Employees will evacuate the area and the SSHO will immediately contact the PM and the USACE PM or Authorized Site Representative. Work will not recommence until the site has been assessed by a health physicist.

5.2 Asbestos Containing Material Hazards

This section of the original Phase IV SSHP Addendum (USACE, 2009a) is hereby removed in its entirety.

5.3 Chemical Hazards

The general contaminants of concern (COCs) at the WWTP are:

- Semi-volatile organic compounds (SVOCs)

The main routes of exposure for field personnel include:

- Inhalation of contaminant vapors;
- Ingestion of contaminated material; or
- Dermal absorption of contaminated material.

Due to the nature of the contaminants, local features, and type of site activities planned:

- There is a moderate to high potential for inhalation of contaminant vapor,
- There is a low to moderate potential for ingestion of contaminated material; and

- There is a moderate potential for dermal contact with contaminated material.

Site personnel can reduce their exposure potential by:

- Using the proper PPE;
- Avoid standing downwind of dust and fumes;
- Practicing contamination avoidance;
- Following proper decontamination procedures; and
- Observing good personal hygiene.

For investigation activities associated with the OCCP anomalies and unnamed water body, a complete list of potential chemicals of concern which may have been utilized during previous DOD activities at the former LOOW, not specific to the WWTP, is provided in Table 5-1. The most likely chemical exposure concerns related to the WWTP are SVOCs.

5.3.1 Volatile Organic Compounds

VOCs present the greatest exposure potential to field personnel. Due to the high vapor pressure of many of these compounds, inhalation is the primary route of exposure. Skin absorption is also a possible route of exposure, leading to the same symptoms as inhalation overexposure. These compounds may cause central nervous system (CNS), lung, and blood vessel damage.

5.3.2 Trinitrotoluene

TNT is classified as an explosive and presents a moderate exposure hazard to field personnel. Explosive characteristics present a physical hazard to potential field personnel, although concentrations are unexpected to result in a physical hazard. Due to potential reaction under strong shock, heat (240°C) or in the presence of reducing agents, inhalation is the primary route of exposure. As TNT reacts it emits highly toxic nitrogen oxide fumes. This compound may cause extreme respiratory damage.

If crystalline TNT is encountered, it will be visibly marked in the field and the USACE PM will be notified. ERT personnel will not engage in the removal or destruction of TNT, therefore exposure to toxic fumes emitted during the reaction of TNT is not anticipated. A detailed description of specific munitions and explosives of concern (MEC) safety procedures and techniques that will be followed during RI activities is available in the Ordnance and Explosives Support Plan Addendum (USACE/ERT, 2009c).

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.				
Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Volatile Organic Compounds (VOC)				
Acetone	500 parts per million (ppm)/750 ppm	2,500 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, nose, throat; head-ache, dizziness, CNS depressant, dermatitis.
Bromoform	0.5 ppm	850 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, respiratory system; CNS depressant; liver, kidney damage.
Bromomethane (Methyl bromide)	1 ppm	Ca 250 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, respiratory system; muscular weakness, incoherence, visual disturbance, vertigo; nausea, vomiting, headache; malaise; hand tremor; convulsions; dyspnea; skin vesiculation. Liquid: frostbite; carcinogen.
2-Butanone (MEK)	200 ppm/300 ppm	3,000 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin, nose; headache, dizziness; vomiting; dermatitis.
Carbon disulfide	10 ppm	500 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Dizziness, headache, poor sleep, fatigue, nervousness, anorexia, low-weight; psychosis; polyneuritis; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects.
Carbon tetrachloride	0.1 ppm/0.3 ppm C 25 ppm	Ca 200 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin; CNS depressant; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoherence; carcinogen.
Chlorobenzene	10 ppm	1,000 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin, nose; drowsiness, incoherence, CNS depressant.
Chloroethane (Ethyl chloride)	100 ppm	3,800 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Incoherence, inebriation; abdominal cramps; cardiac arrhythmia, cardiac arrest; liver, kidney damage.
Chloroform	10 ppm C 50 ppm	500 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin; dizziness, mental dullness, nausea, confusion; headache, fatigue, anis; enlarged liver; carcinogen.
Chloromethane (Methyl chloride)	50 ppm/100 ppm	Ca 2,000 ppm	Inhalation, Skin/Eye Contact	Dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; Liquid: frostbite; reproductive, teratogenic effects; carcinogen.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
1,1-Dichloroethane (1,1-DCA)	100 ppm	3,000 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated skin; CNS depressant; liver, kidney, lung damage.
1,1-Dichloroethylene (1,1-DCE)	5 ppm/20 ppm	Ca	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, throat; dizziness, headache, nausea; liver and kidney dysfunction.
1,2-Dichloroethylene	200 ppm	1,000 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, respiratory system; CNS depressant.
1,3-Dichloropropene (<i>cis- & trans-</i>)	1 ppm	N.D.	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin, upper respiratory system; eye, skin burns; lassitude, loss of appetite, diarrhea, vomiting, slowing of pulse; CNS depressant.
Ethylene dichloride (1,2-Dichloroethane)	10 ppm	50 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, corneal opacity; CNS depressant; nausea, vomiting; dermatitis; liver, kidney, CNS damage; carcinogen.
2-Hexanone (MBK)	5 ppm/10 ppm	500 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose; peritoneal neuritis; weakness, paresthesia; dermatitis; headache; drowsiness.
Hydrogen sulfide (H ₂ S)	10 ppm/15 ppm C 20 ppm	100 ppm	Inhalation, Skin/Eye Contact	Irritated eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimitis, photo, corneal vesiculation; dizziness, headache, fatigue, irritability, insomnia; GI disturbance.
Methane	Simple asphyxiant	N.D.	Inhalation	Simple asphyxiant; at 1.5% creates oxygen depletion.
4-Methyl-2-pentanone (MIBK)	50 ppm/75 ppm	500 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin, mucous membranes; headache, narcosis, coma; dermatitis.
Methylene chloride	50 ppm C 1,000 ppm	Ca 2,300 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin; fatigue, weakness, sleepiness, light-headedness, nausea.
Styrene	20 ppm/40 ppm C 200 ppm	700 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose; respiratory system; headache, fatigue, dizziness, confusion, malaise, drowsiness, weakness, unsteady gait; narcosis; defatting dermatitis; possible liver injury, reproductive effects.
1,1,2,2-Tetrachloroethane (1,1,2,2-TECA)	1 ppm	100 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Nausea, vomiting, abdominal pain; tremor fingers; jaundice, hepatitis, liver tend; dermatitis, monocyt; kidney damage; carcinogen.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Tetrachloroethylene (PCE)	25 ppm/100 ppm C 200 ppm	Ca 150 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose, throat; nausea, flush face, dizziness, headache, liver damage.
1,1,1-Trichloroethane (TCA)	350 ppm/450 ppm	700 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin; headache, lassitude, CNS depressant, poor equilibrium; dermatitis; cardiac arrhythmia; liver damage.
1,1,2-Trichloroethane (1,1,2-TCA)	10 ppm	Ca 100 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose; CNS depressant; liver, kidney damage, dermatitis; carcinogen.
Trichloroethylene (TCE)	50 ppm/100 ppm	Ca 1,000 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin; headache, dizziness, vertigo, visual distortion, fatigue, giddiness, vomiting, dermatitis, nausea.
Vinyl chloride	1 ppm C 5 ppm	Ca N.D.	Inhalation, Skin/Eye Contact (with liquid)	Weakness, abdominal pain, GI bleeding, enlarged liver.
Volatile Organic Compounds (BTEX)				
Benzene	1 ppm/5 ppm	Ca 500 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose, skin, resp. system, nausea, headache, fatigue, dermatitis
Ethylbenzene	100 ppm/125 ppm	800 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, mucous membranes; headache, dermatitis, narcosis, coma
Toluene	50 ppm	500 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, insomnia, nervousness, muscle fatigue, dermatitis
Xylenes, total	100 ppm/150 ppm	900 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Dizziness, excitement, drowsiness, irritated eyes, nose and throat, nausea, vomiting, abdominal pain, and dermatitis
Semivolatile Organic Compounds (SVOC)				
Benzidine	Lowest feasible limit	Ca	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Hematosiis, secondary anemia from hemolysis, acute cystitis, acute liver disorders, dermatitis; painful, irregular urination.
Di-n-butyl-phthalate	5 milligrams per cubic meter (mg/m ³)	4,000 mg/m ³	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, upper respiratory system, and stomach.
1,2-Dichlorobenzene (o-DCB)	25 ppm/50 ppm	200 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose; liver and kidney damage, skin blisters.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
1,4-Dichlorobenzene (p-DCB)	10 ppm	Ca 150 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Headache, eye irritation, profuse rhinitis, weight loss, nausea, vomiting.
3-3' Dichlorobenzidine	N.D. ^(d)	Ca	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Skin sensitivity, dermatitis; headache, dizziness; caustic burns; frequent urination; dysuria; hematosi; GI upset; upper respiratory infection; carcinogen.
Diethyl phthalate	5 mg/m ³	None	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin, nose, throat; headache, dizziness, nausea; lacrimitis; possible polyneuritis, vestibular dysfunction; pain, numbness, weakness, spasms in arms and legs.
Dimethyl phthalate	5 mg/m ³	2,000 mg/m ³	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, upper respiratory system; stomach pain.
Hexachlorobenzene	0.002 mg/m ³	N.D.	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Liver; metabolic disorders; skin and nervous system effects
Hexachlorobutadiene	0.02 ppm	Ca N.D.	Inhalation, Ingestion, Absorption, Skin/Eye Contact	In animals: irritated eyes, skin, respiratory system; kidney damage; carcinogen.
Hexachlorocyclopentadiene	0.01 ppm	N.D.	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, respiratory system; eye, skin burns; lacrimitis; sneezing, coughing, dyspnea, salivating, pulmonary edema; nausea, vomiting, diarrhea.
Hexachloroethane	1 ppm	Ca 300 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, mucous membranes; carcinogen.
Isophorone	C 5 ppm	200 ppm	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, nose, throat; head-ache, nausea, dizziness, fatigue dermatitis, narcosis.
2-Methyl phenol (o-Cresol)	5 ppm	250 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, mucous membranes; CNS effects: confusion, depression, respiratory failure; dyspnea, irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
4-Methyl phenol (p-Cresol)	5 ppm	250 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, mucous membranes; CNS effects: confusion, depression, respiratory failure; dyspnea, irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage.
4-Nitroaniline	3 mg/m ³	300 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated nose, throat; cyanosis, ataxia; tacer, tachypnea; dyspnea; irritability; vomiting, diarrhea; convulsions; respiratory arrest; anemia; methemo.; jaundice.
N-Nitrosodimethylamine	N.D. ^(d)	Ca N.D.	Inhalation, Ingestion, Absorption, Skin/Eye Contact	nausea, vomiting, diarrhea, abdominal cramps; headache; fever; enlarged liver, jaundice; decreased liver, kidney, pulmonary function; carcinogen.
Pentachlorophenol (PCP)	0.5 mg/m ³	2.5 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose, throat; sneezing, coughing; weakness, anorexia, low-weight; sweating; headache, dizziness; nausea, vomiting; dyspnea; chest pain; high fever; dermatitis.
Phenol	5 ppm/C 15.6 ppm	250 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, nose, throat; weight loss, dark urine, liver and kidney damage, muscle ache, skin burns, dermatitis, tremors, convulsions.
1,2,4-Trichlorobenzene	C 5 ppm	N.D.	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, mucous membrane; liver/kidney damage, possible teratogenic effects.
Semivolatile Organic Compounds (PAH)				
Benzo[a]anthracene	0.2 mg/m ³ ^[a]	Ca 80 mg/m ³ ^[a]	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Suspected human carcinogen.
Benzo[a]pyrene	0.2 mg/m ³ ^[a]	Ca 80 mg/m ³ ^[a]	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Suspected human carcinogen.
Benzo[b]fluoranthene	0.2 mg/m ³ ^[a]	Ca 80 mg/m ³ ^[a]	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Suspected human carcinogen.
Chrysene	0.2 mg/m ³ ^[a]	Ca 80 mg/m ³ ^[a]	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Suspected human carcinogen.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.				
Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Naphthalene	10 ppm/15 ppm	250 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Eye irritation, headache, confusion, vomiting, profuse sweating, abdominal pain.
Explosive Compounds				
Cyclonite (RDX)	0.5 mg/m ³	N.D.	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin; headache, irritability, fatigue, weakness, tremors, nausea, dizziness, vomiting, insomnia, convulsions.
1,3-Dinitrobenzene	1 mg/m ³	50 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin; headache, cyanosis, liver damage, acidosis, anemia, liver and kidney damage, methemoglobin formation.
2-Nitrotoluene	2 ppm	200 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Respiratory tract irritation, aspiration, pneumonia, digestive tract irritation, skin and eye irritation.
2,4-Amino-4,6-dinitrotoluene	2 ppm	200 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Respiratory tract irritation and swelling, aspiration hazard, pneumonia, digestive tract irritation, skin and eye irritation.
2,4-Dinitrotoluene (DNT)	0.2 mg/m ³	Ca 50 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Anoxia, cyanosis; anemia, jaundice; reproductive effects; carcinogen.
2,6-Dinitrotoluene	2 ppm	200 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Respiratory tract irritation and swelling, aspiration, pneumonia, digestive tract irritation, skin and eye irritation.
2,4,6-Trinitrotoluene (TNT)	0.1 mg/m ³	500 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Mechanical damage possible from explosion. Orange staining on exposed skin. Irritated skin, mucous membrane; liver damage, jaundice; cyanosis; sneezing; cough, sore throat; peritoneal neuritis, muscular pain; kidney damage; cataract; sensitized dermatitis; leukocytosis; anemia, cardiac irregularity.
4-Amino-2,6-dinitrotoluene	2 ppm	200 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Respiratory tract irritation, aspiration hazard, pneumonia, digestive tract irritation, skin and eye irritation.
Polychlorinated Biphenyls (PCB)				
Chlorodiphenyl-42% chlorine (Aroclor 1242)	1 mg/m ³	Ca 5 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin; chloracne, dermatitis, liver damage, reproductive effects.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.				
Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Chlorodiphenyl-54% chlorine (Aroclor 1254)	0.5 mg/m ³	Ca 5 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes; chloracne, liver damage, reproductive effects.
Organochlorine Compounds (Pesticides)				
Aldrin	0.25 mg/m ³	Ca 25 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Headache, dizziness, nausea, vomiting, myoclonic jerks of limbs, cloni/tonic convulsions.
Chlordane	0.5 mg/m ³	Ca 100 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Blurred vision, confusion, ataxia, delirium, coughing, abdominal pain, nausea, vomiting, diarrhea, tremors, convulsions, anuria.
Dieldrin	0.25 mg/m ³	Ca 50 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Headache, dizziness, nausea, vomiting, sweating, myoclonic limb jerks, clonic/tonic convulsions, coma.
Dichlorodiphenyltrichloroethane (4,4'-DDT)	1.0 mg/m ³	Ca 500 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin; paresis of tongue, lips, face and hands; tremor, dizziness, confusion, headache, fatigue, convulsions, vomiting.
Endosulfan	0.1 mg/m ³	N.D.	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated skin; nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, headache.
Endrin	0.1 mg/m ³	2 mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Epileptic convulsions; stupor, headache, dizziness; abdominal discomfort, nausea, vomiting; insomnia; aggressiveness, confusion, lethargy, weakness; anorexia.
Heptachlor	0.05 mg/m ³	Ca 35mg/m ³	Inhalation, Ingestion, Absorption, Skin/Eye Contact	In animals: tremor, convulsions; liver damage; carcinogen.
Methoxychlor	10 mg/m ³	Ca 5,000 mg/m ³	Inhalation, Ingestion	In animals: fasc., trembling, convulsions; kidney, liver damage; carcinogen.
Metals				
Antimony (Sb)	0.5 mg/m ³	50 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Irritated eyes, skin, nose, throat, mouth; coughing, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps, insomnia, loss of smell.
Arsenic (As)	0.01 mg/m ³	Ca 5 mg/m ³ (as As)	Inhalation and Ingestion via particulates, Skin/Eye Contact	Ulceration of nasal septum, dermatitis, gastrointestinal bleeding.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Barium (Ba)	0.5 mg/m ³	50 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Upper resp. irritation, muscle spasm, slow pulse, irritated eyes, skin.
Beryllium (Be)	0.002 mg/m ³ C 0.005 mg/m ³	Ca 4 mg/m ³	Inhalation via particulates, Skin/Eye Contact	Berylliosis (chronic exposure): anorexia, low-weight; weakness, chest pain; cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritated eyes; dermatitis; carcinogen.
Boron oxide	10 mg/m ³	2000 mg/m ³	Inhalation and Ingestion via particulates	Eye, skin, and upper respiratory irritant; cough.
Cadmium (Cd)	0.005 mg/m ³	Ca 9 mg/m ³	Inhalation and Ingestion via particulates	Pulmonary edema, dyspnea, cough, chest tight, subs pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anos., emphysema, prot., mild anemia; carcinogen.
Chromium (Cr), total	0.5 mg/m ³	250 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Histological fibrosis of lungs; irritated eyes and skin.
Cobalt (Co)	0.02 mg/m ³	20 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Irritation of nasal membranes, pharynx, nasal perforation, eye irritation.
Copper (Cu)	1 mg/m ³	100 mg/m ³	Inhalation via particulates, Skin/Eye Contact	Irritated eyes, upper respiratory system; metal fume fever: chills, muscular ache, nausea, fever, dry throat, cough, weakness, lassitude; metallic or sweet taste; discoloration of skin, hair.
Hexavalent Chromium (Cr ⁺⁶)	0.1 mg/m ³	15 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Coughing, headacnes, dyspnea, substernal pain, weight loss weakness, irritated eyes and upper respiratory system.
Lead (Pb)	0.050 mg/m ³	100 mg/m ³ (as Pb)	Inhalation and Ingestion via particulates, Skin/Eye Contact	Lassitude, insomnia, pallor, anoxia, weight loss, constipation, abdominal pain, colic, anemia, wrist paralysis.
Lithium (Li)	-	-	Inhalation and Ingestion via particulates	Corrosive to skin, eyes, and respiratory tract; lung edema.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Manganese (Mn)	0.2 mg/m ³ C 5 mg/m ³	500 mg/m ³	Inhalation and Ingestion via particulates	Parkinson's; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea, rales, flu-like fever; low-back pain; vomiting; malaise; fatigue; kidney damage.
Mercury (Hg)	0.01/0.03 mg/m ³	2 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Dizziness, nausea, vomiting, diarrhea, constipation, skin burns, emotional distance.
Nickel (Ni) (insoluble/soluble)	0.1 mg/m ³	Ca 10 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Sensitive skin, asthma, nasal cavity irritation, pneumonitis, carcinogen.
Selenium (Se)	0.2 mg/m ³	1 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Irritation eyes, skin, nose, and throat; headache, chills, dyspnea, bronchitis, metallic taste, garlic breath, liver/spleen damage.
Silver (Ag)	0.01 mg/m ³	10 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Blue-gray eyes, nasal septum, throat, skin; irritability, ulceration of skin; GI disturbance.
Thallium (Tl)	0.1 mg/m ³	15 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact, Absorption	Nausea, diarrhea, abdominal pain, vomiting, tremor, chest pain, pulmonary edema.
Vanadium (V)	C 0.05 mg/m ³	35 mg/m ³	Inhalation and Ingestion via particulates, Skin/Eye Contact	Irritated eyes, skin, throat; green tongue, metallic taste, eczema, cough, wheezing, bronchitis.
Radioactivity				

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Radionuclides	100 milliREM/year ^(b) [Total effective dose equivalent for public or workers assumed not to be radiation workers.]	N/A ^(c)	In addition to external penetrating gamma radiation, possible exposures may be associated with inhalation and incidental ingestion. Beta particles are usually energetic enough to result in radiation exposure to the skin. Alpha particles are not energetic enough to expose the skin, as the skin's layer of dead cells is thick enough to stop particles from penetrating. For alpha particles, the routes of exposures of concern are inhalation and ingestion.	Acute symptoms will not be caused by the expected levels of radioactivity. Skin redness, dermatitis, hair loss, eye inflammation, genetic damage, cancer, tissue, and organ damage are caused by acute high level doses of 200 rad or higher. Technical overexposures at or just above regulatory limits are not accompanied with any of the traditional radiation sickness symptoms or cancer, as limits incorporate a large safety factor. For these effects to occur, the exposures need to be prolonged (occurring over an occupational lifetime and exposures well above regulatory limits) or acute (where large doses, such as hundreds of rads, are delivered over a brief time period, e.g., in minutes or hours).
Other Constituents				
Boron trifluoride	C 1 ppm	25 ppm	Inhalation and Skin/Eye Contact	Irritated eyes, skin, nose, respiratory system; epistaxis (nosebleed); eye, skin burns. In animals: pneumonia, kidney damage.
Hydrazine	0.01 ppm	Ca 50 ppm	Inhalation, Ingestion, Absorption, Skin/Eye Contact	Irritated eyes, skin, nose, throat; temporary blindness; dizziness, nausea; dermatitis; eye, skin burns. In animals: bronchitis, pulmonary edema; liver, kidney damage; convulsions; carcinogen.
Lithium hydride	0.025 mg/m ³	0.5 mg/m ³	Inhalation, Ingestion, Skin/Eye Contact	Irritated eyes, skin; eye, skin burns; mouth, esophagus burns (if ingested); nausea; muscular twitches; mental confusion; blurred vision.
Asbestos	0.1 fibers/cc	Ca N.D.	Inhalation, Ingestion, and Skin/Eye Contact	Asbestosis (chronic exposure); breathing difficulties; interstitial fibrosis; restricted pulmonary function; finger clubbing; irritated eyes. Carcinogen.

Table 5-1. Summary of Known and Potential Chemicals of Concern at the Former Lake Ontario Ordnance Works (LOOW), Niagara County, New York.

Compound	PEL or TLV/STEL	IDLH	Route of Exposure	Symptoms
Phosgene	0.1 ppm	2 ppm	Inhalation and Skin/Eye Contact	Irritated eyes; dry burning throat; vomiting; cough, foamy sputum, dyspnea, chest pain, cyanosis.

IDLH - Immediately Dangerous to Life and Health
PEL - Permissible Exposure Limit
TLV - Threshold Limit Value
STEL - Short Term Exposure Limit (15 min)
C - Ceiling Limit
Ca - Carcinogen
CNS - Central Nervous System
GI - Gastrointestinal
N.D. - Not determined
Skin – Skin absorption can contribute to overall body dose
^[a] - The PEL and IDLH are representative of coal tar pitch volatiles.
^[b] - Exposures to radiation and radioactivity are controlled by the NY State Dept. of Labor, under Code Rule 38, Ionizing Radiation Protection, as NY is an NRC-Agreement State. NY State is responsible for regulatory oversight otherwise assumed by the NRC. Code Rule 38 is also cited as 12 NYCRR Part 38.
^[c] - Not applicable for levels of radiation and radioactivity reported at LOOW. Immediate effects are not manifested unless radiation exposures or doses are on the order of several hundred rads.
^[d] - Exposures of workers are to be controlled through the required use of engineering controls, work practices, and personal protective equipment, including respirators.

(Source: USACE/EA, 2005)

5.4 Physical and Biological Hazards

Physical hazards, to be discussed in depth in the following sections, will potentially be present at the site during field activities. These physical hazards may include, but are not limited to the following:

- General physical hazards;
- Fire/explosion hazards;
- Noise hazards;
- Electrical hazards;
- Utility hazards;
- Weather hazards;
- Cold stress/heat stress;
- Material handling/moving/lifting; and
- Confined space hazards

The site will be visually inspected for the presence of general safety hazards (e.g., trip/slip hazards, unstable surfaces or steep grades, sharp objects) prior to beginning work. If hazards are present, these hazards will be recorded and precautionary measures will be taken to prevent injury.

5.4.1 General Physical Hazards

The work site may include many basic physical safety hazards, such as:

- Open manholes and pits – the presence of these open fall hazards have been confirmed
- Steep grades and/or uneven terrain, posing slip, trip, and fall hazards
- Holes, ditches, etc., posing fall, cave-in, and other hazards
- Precariously positioned objects, which may cause crushing or other injuries
- Sharp objects (e.g., nails, metal shards, glass), which may cause cuts, injection, or other injuries
- Slippery surfaces, posing slip and fall hazards
- Unstable surfaces (e.g., walls that may cave-in, unstable underground structures) which may pose fall, crushing, or other injuries

Hazards associated with site activities are varied and include contact with potentially contaminated soil gas/vapor, potentially contaminated ditch water and sediment, materials handling, slips and falls, cuts and punctures. ERT personnel will observe and abide by access restrictions, zones, and the safety requirements of this SSHP.

There are several additional site-specific conditions and potential hazards that should be noted by anyone working on the site. These are discussed briefly below.

5.4.2 Fire/Explosion Hazards

Explosion and fire hazards may be present at the work site due to the unexpected ignition of chemicals or fuels, the sudden release of materials under pressure, or careless unauthorized smoking in work areas. Site operations will be conducted in accordance with local fire codes and regulations. The potential for fire and/or explosion emergencies is higher at properties that may contain underground storage tanks or septic tanks due to the potential for accumulated gases.

Field vehicles will be equipped with fire extinguishers. Employees will be trained in the proper use of fire suppression equipment. Large fires, not controllable with a fire extinguisher, will be handled by local fire department professionals. In the event of a fire, employees will contact the fire department, the property owner, and the SSHO, and will report to the pre-determined rally point unless this location has become dangerous due to the existing emergency. Employees shall always be on the alert for unexpected events, and be prepared to act in these emergencies.

5.4.3 Noise Hazards

Work around heavy equipment often creates excessive noise. Noise can startle, annoy, or distract workers; it can cause physical ear damage, ear pain, and temporary and/or permanent hearing loss; and it can interfere with communication. If workers are subjected to noise exceeding an 8-hour time-weighted average (TWA) sound level of 85 decibels on the A-weighted scale (dBA), hearing protection will be provided with an appropriate noise reduction rating (NRR) to comply with 29 CFR 1910.95 and to reduce noise levels to or below 85 dBA. In

the absence of a noise meter, noise approaching 85 dBA can be estimated by assessing whether individuals standing 3 ft away from one another must raise their voices to be heard clearly.

5.4.4 Electrical Hazards

Overhead power lines, electrical wiring, electrical equipment, and buried cables pose risks to workers including electric shock, burns, muscle twitches, heart fibrillation, and other physical injuries, as well as fire and explosion hazards.

In accordance with OSHA's standard for Electrical Safety Related Work Practices (29 CFR 1910.331-.335), protective measures will be taken when working near live electrical parts, including but not limited to:

- Insulation and guarding of live parts
- Grounding
- De-energizing live parts followed by lockout/tagout to prevent inadvertent re-activation of the parts
- Electric protective devices (e.g., insulated tools)
- Safe work practices, including:
 - ◆ Inspection of work area to identify potential spark sources
 - ◆ Maintenance of a safe distance from live electrical parts as per USACE requirements:

Table 5-2. Minimum Clearance From Energized Overhead Electric Lines	
Nominal System Voltage	Minimum Rated Clearance
0-50 kilovolt (kV)	10 ft (3 meter [m])
51-200 kV	15 ft (4.6 m)
201-350 kV	20 ft (6 m)
351-500 kV	25 ft (7.6 m)
501-650 kV	30 ft (9.1 m)
651-800 kV	35 ft (10.7 m)
801-950 kV	40 ft (12.2 m)
951-1100 kV	45 ft (13.7 m)

(Source: USACE, 2008)

- ◆ Proper illumination of work areas
- ◆ No "blind reaching" around live electrical equipment
- ◆ Provision of barriers, shields, or insulation to prevent inadvertent contact with live parts
- ◆ Use of nonconductive, intrinsically safe equipment near live parts

Field personnel will not be permitted to work on electric parts of equipment that have not been de-energized, locked out, and tagged by personnel trained to work with electrical equipment. Field personnel will not work near energized exposed live parts without the use of protective measures, nor will the need for this be expected during the scheduled field activities for this project.

Lightning may be an electrical hazard during outdoor operations, particularly for workers in open areas and workers who are handling metal equipment. Weather conditions will be monitored and work suspended during electrical storms at the discretion of the SSHO and Site Manager.

5.4.5 Utilities

There were no known active utilities within the study area as of 2010. However, prior to intrusive field investigation, a utility clearance will be performed and the property owner will be contacted to verify the current state of utilities on the parcel.

5.4.6 Weather Hazards

Weather conditions will be taken into consideration during site activities. Heavy rains, snowfall, freezing conditions, electrical storms, high winds, and extreme temperatures may create dangerous situations for employees. Inclement weather may also impair equipment performance. When unfavorable conditions arise, the Site Manager and SSHO will evaluate both the safety hazards and the ability of the employees to effectively perform given tasks under such conditions. Activities will be halted at the discretion of the SSHO and Site Manager. Site activities will cease when lightning has been sighted in an approaching storm.

Wind direction will be considered when positioning for sampling. If exposure to contaminated emissions is anticipated, workers will relocate upwind. Wind direction often changes abruptly and without warning, so personnel will be prepared to reposition as necessary.

5.4.7 Cold Stress

Cold stress hazards are most likely to occur at low temperatures or at low wind chill factors, with wet, windy conditions contributing to the risk. Site workers will respect the OSHA Cold Stress Equation while working in cold conditions.

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURIES & ILLNESS

Table 5-3 below will be used to determine the degree of cold stress hazard and minimum break schedule for a four hour work shift.

Table 5-3. TLVS Work/Warm-Up Schedule for Outside Workers Based on a Four-Hour Shift*

Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx)	°F (approx)	Max. work Period	No. of Breaks**	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to - 28°	-15° to - 19°	(Norm breaks) 1		(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4
-29°to - 31°	-20°to - 24°	(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to - 34°	-25°to - 29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-35° to - 37°	-30° to - 34°	55 min.	3	40 min.	4	30 min.	5	Non- emergency work should cease			
-38° to - 39°	-35° to - 39°	40 min.	4	30 min.	5	Non- emergency work should cease					
-40° to - 42°	-40°to - 44°	30 min.	5	Non- emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									
*2008 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH), 2008 - page 213											

Workers will be familiar with the signs and symptoms of cold stress, which include:

Hypothermia - Cold-induced decreasing of the core body temperature that produces shivering, numbness, drowsiness, and muscular weakness. If severe enough, it can lead to unconsciousness and death.

Frostbite - Constriction of blood vessels in the extremities, decreasing the supply of warming blood and may result in formation of ice crystals in the tissues, causing tissue damage. Conditions may range from frostnip, which is a numbing of extremities, to deep-freezing tissue beneath the skin. Symptoms include white or grayish skin, blisters, numbness, mental confusion, failing eyesight, fainting, shock, and cessation of breathing. Death may occur from heart failure.

Pain in the extremities may be the first warning of cold stress, and precautions will be taken to reduce exposure. Severe shivering will be taken as a sign of immediate danger to the worker, and exposure to cold will be immediately terminated. Personnel exhibiting signs and symptoms

of cold stress will be removed from the site, decontaminated, and given appropriate first aid. Emergency medical services will be contacted if symptoms are severe (e.g., more than numbness of the extremities or shivering). When air temperatures are less than 36°F (including wind chill), workers who become immersed in water or whose clothing becomes wet will be immediately provided a change of clothing and be treated for hypothermia.

As a precautionary measure, employees will wear layers of loose-fitting clothing including insulated coveralls, head cover (perhaps a wool cap beneath a hard hat), and boots when temperatures fall below 40°F, including the wind chill. Head covering for use beneath a hard hat must be specifically designed for that purpose so that the function of the hard hat is not impaired. Protection of the hands, feet, and head is particularly important because these are likely to be injured first by cold. However, actual injury to hands, feet, and head is not likely to occur without prior development of early signs of hypothermia such as numbing and shivering. Bare skin contact with cold surfaces (below 32°F) will be avoided. Personnel will wear wind-resistant outer shell to decrease wind chill effects. Less than one minute of exposure to cold is permitted when the air speed and temperature results in an equivalent chill temperature of -26°F to -72°F.

A temperature-dependent work regimen that limits lengthy periods of outdoor activity may be necessary. Workers entering heated shelters will remove the outer layer of clothing and loosen remaining clothing to permit the evaporation of perspiration. Workers will avoid dehydration by drinking water or other decaffeinated beverages, including warm drinks and soups.

5.4.8 Heat Stress

Heat stress hazards can occur even in temperatures not commonly considered "hot" due to the level of physical activity, the level of PPE the worker is wearing, or the physical condition of the worker. Illness resulting from exposure to extreme heat is possible during field operations. Factors affecting heat stress include high temperatures and humidity, direct sun or heat, limited air movement, physical exertion and poor physical condition. Personnel, especially those in impermeable clothing (e.g., chemical suits), will be familiar with the signs and symptoms of heat stress, including:

- **Heat Cramps** - Muscle spasms in the abdomen or limbs. Frequent rest periods and fluid intake are appropriate measures to prevent or reduce heat cramps.
- **Heat exhaustion** - Severe dehydration; pale, clammy skin; profuse sweating; dizziness, light-headedness; slurred speech; rapid pulse; confusion; fainting; fatigue; cool skin; nausea. Affected personnel will be escorted from the site, decontaminated promptly, set in a cool shaded area, and given fluids slowly.
- **Heat stroke** - Life-threatening condition occurring when the body's temperature-regulating system improperly functions. Hot dry skin; rapid, deep breathing; lack of perspiration; delirium; high fever (often 106°F or more), nausea; unconsciousness. Brain damage and/or death may occur, if body temperature is not reduced. Provide fluids, use cooling devices (hose-down or shower), and call emergency medical services or transport to hospital immediately.

Some preventive measures to avoid heat stress include:

- Frequent resting in cool or shaded areas

- Prevent heat stress by resting frequently in a shaded area and consuming large quantities of fresh potable water (more than amount needed to simply "quench thirst"). Drink at least 8 ounce (oz) of water or diluted Gatorade every 2 hours when temperatures exceed 75°F. Do not consume alcoholic beverages to combat dehydration or heat stress.

Heat stress monitoring will be conducted in a manner that anticipates and prevents the onset of heat stress symptoms [i.e., wet-bulb globe temperature (WBGT) monitoring coupled with OSHA work-rest regimens]. If the WBGT Index is used and semi-impermeable or impermeable clothing is worn, the WBGT Index will be lowered as appropriate.

Non-acclimated workers and workers wearing full-body impermeable chemical protective clothing shall be monitored when the work area temperature is greater than 70°F. The worker's heart rate (HR) will be measured at the start of a rest break, and the work period will be decreased so that after 1 minute of rest, a worker's HR does not exceed 110 beats per minute.

For non-acclimated workers, a suggested work-rest regimen is:

<u>Ambient Temperature</u>	<u>Work</u>	<u>Rest</u>
70°F	3 hours	15 min
75°F	2-1/2 hours	15 min
80°F	2 hours	15 min
85°F	1-1/2 hours	15 min
90°F	1 hour	15 min
95°F	½ hour	15 min

If a worker's HR is greater than 110 beats per minute, the next work period will be shortened by 33 percent, while the length of the rest period stays the same. If the HR is 110 beats per minute at the beginning of the next rest period, the following work cycle will be shortened by 33 percent. When ambient temperatures are expected to exceed 75°F, the resting HR of each worker will be measured prior to the start of onsite activities.

Other factors, such as a worker's acclimation level, physical fitness level and age, may increase or decrease their susceptibility to heat stress. Before assigning a task to an individual worker, these factors will be taken into account to ensure that the task will not endanger the worker's health.

If a heat-related illness is suspected or observed, the affected person will be moved to a cool or shaded area and given plenty of liquids to consume. If symptoms of a heat stroke are observed, the victim will be cooled and 911 will be called immediately.

5.4.9 Material Handling/Moving/Lifting

Materials handling at the subject site could vary from heavy equipment handling to manually moving/lifting items. Hazards associated with materials handling include physical injury, detonation, fire, explosion, and vapor generation, among others. During the sampling activities, it is anticipated that personnel will move sample equipment (e.g., pumps) and coolers.

Injuries to back and abdominal muscles from improper lifting of loads are the most common occupational injuries reported. Such injuries can range from relatively mild strains to major, permanently disabling injuries. Before lifting a load, personnel will consider the overall weight, distribution of weight, awkwardness of the load, distance to be carried, obstacles to be negotiated, site conditions, and visibility.

When using equipment to move materials, proper work practices will be followed. Equipment used will be designed for the task to be performed. Equipment will be inspected regularly by the SSHO and the Site Manager, and damaged or defective equipment will be removed for service. Planning is critical when handling materials. The Site Manager, in conjunction with the PM, will plan where the materials are to be moved, taking into consideration the current location of such materials and hazards associated with moving them. Routes for moving materials will be clearly communicated, with paths cleaned of obstructions so materials may be transported.

Loads will be lifted using the power of the leg muscles rather than the back, stomach, or arm muscles. The item will be approached to balance the load evenly. Backs will be kept straight and the arms nearly parallel with the body. The knees will be bent to grasp the load. Lifting will be done by straightening the legs without bending the body, holding the load as close to the body as possible and the back remaining as straight as possible. When possible, a lifting arm or automatic lift gate will be used to move drums into and out of trucks.

Bulky, heavy loads will be handled by at least two people, ensuring that the load is level and evenly distributed between the personnel helping to carry it. Carriers will know the destination and path for the load.

5.4.10 Brush Clearance

In order to perform activities associated with the data gap investigations in a safe manner, brush clearance will be conducted at sampling locations as necessary. Brush and other obstacles will be addressed if they pose a hazard to site workers. All personnel working with tools, mechanical or otherwise, will be trained in the proper and safe operation of the equipment. Proper and safe operation will be defined as operation in accordance with the manufacturer's recommendation and in accordance with USACE EM 385-1-1. Appropriate Level D PPE will be required at all times during brush clearance.

In the event power saws are required, they will be operated in accordance with the manufacturer's recommendations. The engine of the saw will not be started until all co-workers are clear of the saw and are aware of the pending action. The saw will be turned off promptly once cutting is complete. The saw will be turned off when not in use or when transporting the saw. Idle speed is not considered off.

All chopping tools will be used in accordance with the manufacturer's recommendations. Chopping tools will be inspected regularly for defects such as loose or cracked heads and shafts. When operating a chopping tool, it should always be swung away from the feet, legs, and body.

5.4.11 Slips, Trips, Falls

Working in and around the site will pose slip, trip and fall hazards due to potentially slippery conditions. Slips, trips and falls, are serious safety concerns which are preventable with general precautions and safety measures. All areas should be kept clean, sanitary, and free of obstacles (29 CFR 1910.22). All areas should be kept well lit and proper footwear (safety boots) should be worn at all times. Floor surfaces should be kept dry at all times. All personnel should be aware of their surroundings and maintain focus on the task at hand. Many slip, trip and fall accidents occur because attention has been diverted away from a specific task. All personnel should communicate potential hazards to the team, especially the SSHO. The SSHO will take appropriate actions as necessary to mitigate the potential hazard.

5.5 Biological Hazards

There may be a possible hazard arising from poisonous plants, such as poison ivy, and from some animals, such as snakes, rats, and insects such as ticks and mosquitoes. Mosquitoes are extremely dense in some areas of the site. ERT personnel should avoid all contact with animals.

All ERT personnel will be trained to identify poison ivy during the preliminary site safety meetings.

Insects, including bees, wasps, hornets and spiders, may be present at the site, presenting the possibility of a bite. Some individuals may have a severe allergic reaction to an insect bite or sting that can result in a life-threatening condition. Personnel that have been bitten or stung by an insect at the site should notify the ERT SSHO immediately. The following is a list of preventive measures:

- Apply insect repellent prior to fieldwork and as often as necessary during the shift.
- Wear proper protective clothing (work boots, socks and light colored pants).
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush to the greatest possible extent.
- Field personnel who may have insect allergies (e.g., bee sting) should provide this information to the ERT SSHO or his designee prior to commencing work, and shall have allergy medication available on site.

The ERT SSHO will instruct the project personnel in the recognition and procedures for encountering potentially hazardous insects at the site.

5.5.1 Poisonous Plants

Poisonous plants, such as poison ivy, poison oak, or poison sumac may be present at various work sites. Personnel are expected to know how to recognize these plants and how to avoid them. If these plants need to be removed to obtain a hazard-free work area, gloves will be worn to protect against poisonous plant oils, and the plant will be placed in a trash bag and disposed of in a proper receptacle. Never burn a poisonous plant; smoke and vapors are also poisonous when inhaled. If dermal contact occurs, the affected areas will be washed with soap and water immediately.

5.5.2 Insect Bites/Stings

Protective outer clothing such as gloves, hard hats, and coveralls can reduce the potential for insect bites and stings. Avoid disturbing insect nests encountered on the job site if possible, as an insect swarm may develop. If an insect nest (e.g., a bee hive) is encountered in an area that is likely to be disturbed during site activities, the nest will be eradicated prior to site activities to ensure employee safety.

Insect bite symptoms may include redness, rash, swelling, chills, fever, diarrhea, and vomiting. A worker who has been bitten or stung and shows symptoms of a severe reaction will seek medical assistance immediately. Workers with allergies to insects (e.g., bees) should advise the SSHO prior to field activities and should carry an antidote kit if necessary.

To prevent contact with fleas or disease-carrying ticks (deer ticks), workers may wear long-sleeved shirts, long pants, and boots that extend above the ankle with pants cuffs taped to boots, especially when working in wooded, overgrown, or high grass areas. Workers will thoroughly check clothing, skin, and hair for the presence of ticks at the end of each workday. If a tick attaches to the body, it will be removed by gently tugging with tweezers where the mouth-parts enter the skin. The tick should not be killed prior to removal. Ticks can carry a variety of diseases, such as Lyme, Rocky Mountain spotted fever, ehrlichiosis, and babesiosis. If a worker suspects he has been bitten by a tick, the area shall be monitored for several days/weeks by the individual for the development of a noticeable bulls-eye shaped skin rash at the affected area. If this develops, seek immediate medical attention for a possible infection of Lyme disease. Insect repellent containing DEET® is an effective means of tick control.

Lyme disease is caused by infection from a deer tick that carries a spirochete. During the painless tick bite, the spirochete may be transmitted into the bloodstream, which could lead to the worker contracting Lyme disease. This flu-like illness commonly happens between May and October when ticks are more active. Symptoms can include a stiff neck, chills, fever, sore throat, headache, fatigue and joint pain. Early signs may include an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve or heart problems as well as a disabling type of arthritis. If personnel feel sick or have signs similar to those above, they should notify the SSHO immediately.

It is recommended that personnel check themselves in areas that could harbor deer ticks, wear light-colored clothing and visually check themselves and their buddy when leaving wooded or vegetation-covered areas. If a tick is found biting an individual, the SSHO should be contacted immediately. The tick can be removed by pulling gently at the head with tweezers. The affected area should then be disinfected with an antiseptic wipe.

Mosquitoes infected with the West Nile Virus have been identified in the Western New York area. Field personnel will acquaint themselves with the symptoms associated with West Nile Virus and will contact a physician, as well as the ERT SSHO, if the disease is suspected.

5.5.3 Animal Bites

Rodents, snakes, stray dogs, stray cats, raccoons or other animals may be encountered on the job site. The only effective measure to preclude animal bites is avoidance. Contact with wild

animals will be avoided. Do not reach into an object such as a pipe that may contain a rodent or other animal, and do not attempt to remove the animal. If possible, delay activity in this area until the animal leaves or has been removed by an animal control unit. If it is necessary to use or move an object where an animal is hiding, the SSHO may have to notify the local animal control agency to subdue an animal that may cause a risk to workers (e.g., a raccoon). Do not approach an animal, as this may provoke aggression from the animal. Persons bitten by an animal will seek medical assistance immediately, especially if they suspect that the animal may be rabid. Aggressive or disoriented behavior, as well as foaming at the mouth, can be signs of rabid animals. Until medical assistance can be reached, persons will watch for symptoms of severe swelling, nausea, and shock. The local animal control agency will be contacted if a stray dog is observed on the property, especially if its presence will interfere with work activity or the animal's safety. Do not attempt to leash a stray dog (no matter how harmless it may appear); doing so would greatly increase the risk of an animal bite.

5.5.4 Bacteria

Adherence to personal protective equipment requirements, personnel decontamination procedures, personal hygiene measures and work zone rules will minimize exposure. Bacteria are not expected to be a hazard based on the location of field activities. However, syringes, medical or biohazard waste encountered in an uncontrolled setting will be reported immediately to the SSHO.

5.5.5 Humans

The site is an open area and it is possible that non-study-team personnel may be encountered in the vicinity of the work site. While unauthorized intruders are not expected to purposely or maliciously pose a threat to personnel working at the site, precautions will be taken to prohibit the presence of unauthorized personnel in the work zone. Onlookers will be asked (repeatedly, if necessary) to maintain an appropriate distance from the work zone and will be asked to leave the area when such encounters threaten non-compliance with this SSHP. Obstinate or malicious behavior in this regard will be dealt with by calling the police (911). In addition, the USACE PM and ERT PM will be notified.

5.6 Hazard Communication

An AHA will be reviewed with applicable site workers prior to each task.

The MSDs for common contaminants will be supplied and kept onsite by the SSHO. Copies of these MSDSs are presented in Appendix E of this Plan. Additional MSDSs for materials used during the sampling investigation such asalconox and hydrochloric acid are also presented in Appendix E. Employees and subcontractors will be informed of the location of MSDSs. Chemicals brought onsite will be properly labeled in accordance with OSHA's Hazard Communication requirements (29 CFR 1926.59), and a MSDS will be provided to the SSHO for each hazardous substance brought onsite.

5.7 CWM Emergency Response Procedures

In order to access the WWTP, personnel may need to traverse WM property and while on WM property will obey all WM safety and emergency response procedures. Although not included in this document, WM implements a site-wide emergency response plan for their facility. Prior to

work startup on WM property, personnel will be briefed by a WM facility representative and will be familiar with WM's emergency response plan. WM requires that emergencies be reported to the WM Emergency Representative at extension 200 from a WM phone or (716) 754-0200 from an outside line.

In addition to the emergency response plan, personnel will be familiar with WM's emergency alert system. A siren blast lasting 2 minutes indicates the property is on alert status. If the siren cycles again, personnel will evacuate and check in at the checkpoint in front of the emergency response garage, at the parking lot of the administration building, or at the main gate. Personnel will be aware that the siren is tested every Wednesday at 12:00p.m.

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6.0 SITE ACCESS

Site access will be coordinated with the USACE Technical Manager or Authorized Site Representative who will notify the Occidental Chemical Corporation, Town of Lewiston, NY, and the New York State Department of Environmental Conservation of the proposed work schedule.

6.1 Site Control

During the field investigation, the following activities will be performed:

- Site reconnaissance;
- Surveying and vegetation clearing;
- Direct push and surface soil sampling;
- Field analytical screening;
- Groundwater sampling;
- Surface water and sediment sampling; and
- Equipment decontamination.

6.1.1 Activities Not Requiring Work Zones

Activities not requiring specific work zones include:

- Site reconnaissance.

6.1.2 Activities Requiring Work Zones

Vegetation clearance, direct push and surface soil sampling, field analytical screening, groundwater sampling, surface water and sediment sampling, and equipment decontamination will require the establishment of work zones.

The three separate work zones that will be established for each of these activities include:

- The exclusion zone (EZ) ;
- The contamination reduction zone (CRZ); and
- The support zone (SZ).

The EZ for sampling will consist of a 10-foot (ft) radius from sampling locations. The EZ for non-essential personnel during brush clearance will consist of a 15-ft radius. Exclusion zones will also be verbally explained and maintained to site visitors or onlookers. Proper PPE will be worn when working in the EZ (see Section 2.9). The radius of the EZ may be expanded or decreased based on environmental monitoring results and as deemed appropriate by the SSHO.

The CRZ shall be immediately adjacent to the EZ and shall have equipment for appropriate decontamination and receptacles for used disposable supplies. Based on previous investigations, the expected concentrations of contaminants suggest that personnel decontamination will consist of simply removing and disposing of PPE or removal and bagging of soiled outer garments (e.g., coveralls), if worn. Potable water and an eye wash solution will be available in the CRZ.

If elevated levels of contaminants are encountered, as discussed in Section 5 work will stop and the site will be evaluated. If protection is to be upgraded, the EZs and CRZs shall become more stringent and visually demarcated. The EZ will be located within 25 ft of field-investigation activities where respiratory protection is required. The CRZ will be expanded to include a non-phosphate detergent scrub station and potable water rinse station prior to removing and disposing of chemically protective coveralls, boot covers, and outer gloves.

The SZ shall consist of the site vehicle and will also contain emergency response equipment including phone and first aid supplies. Activities will be largely dispersed throughout the investigation areas and field teams will carry minimal first-aid components. There will be no temporary construction buildings for this project; therefore the following items will not be required:

- Facilities;
- Fencing;
- Anchoring systems for temporary structure;
- Access routes to the temporary structure;
- Spacing requirements of 09.A.19;
- Temporary power; and
- Temporary ramp, trestle, scaffold and platform approval.

The SZ and site access roads will be located as depicted in Figure 6-1.

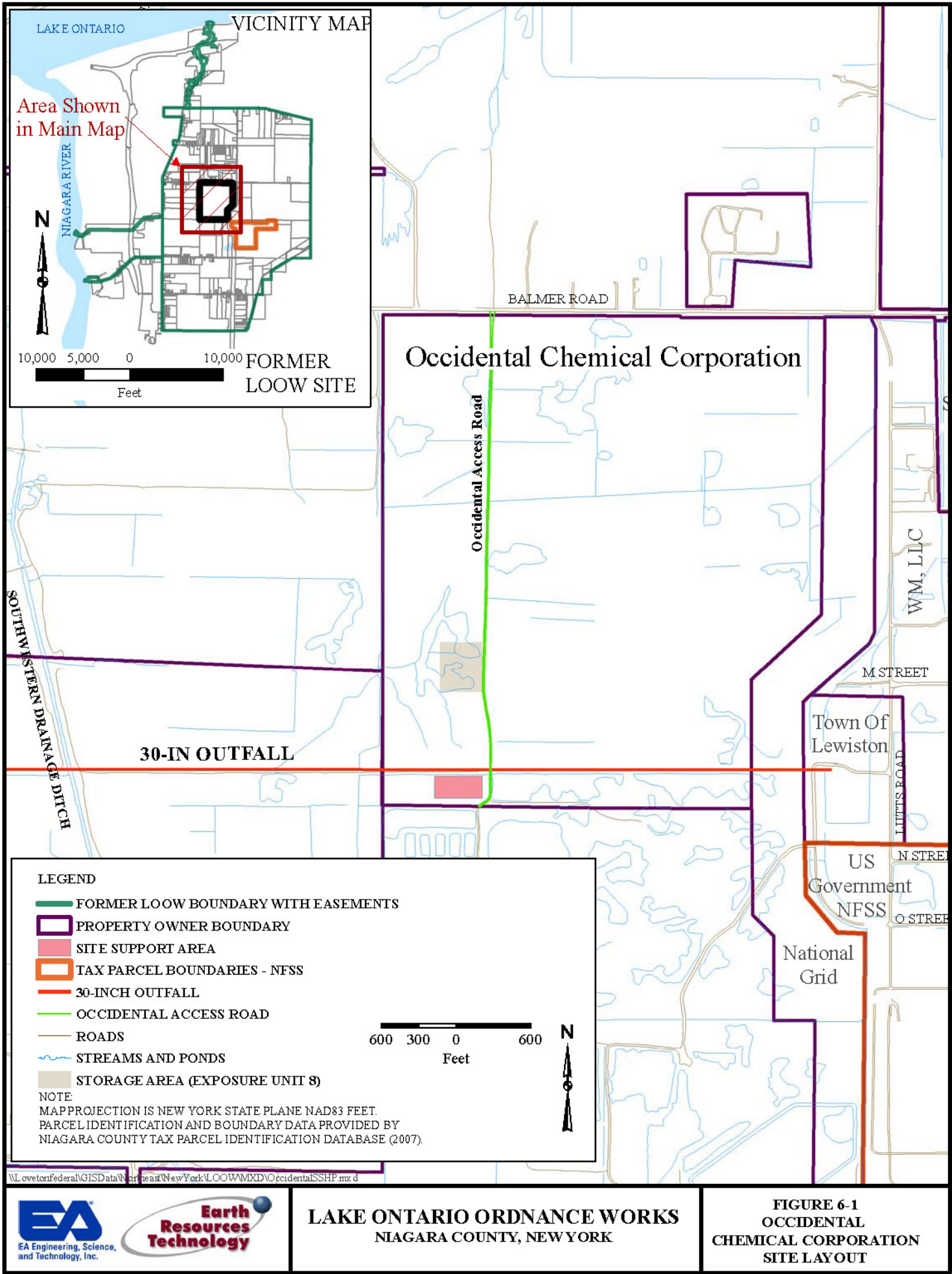


Figure 6-1. Occidental Chemical Corporation Site Layout

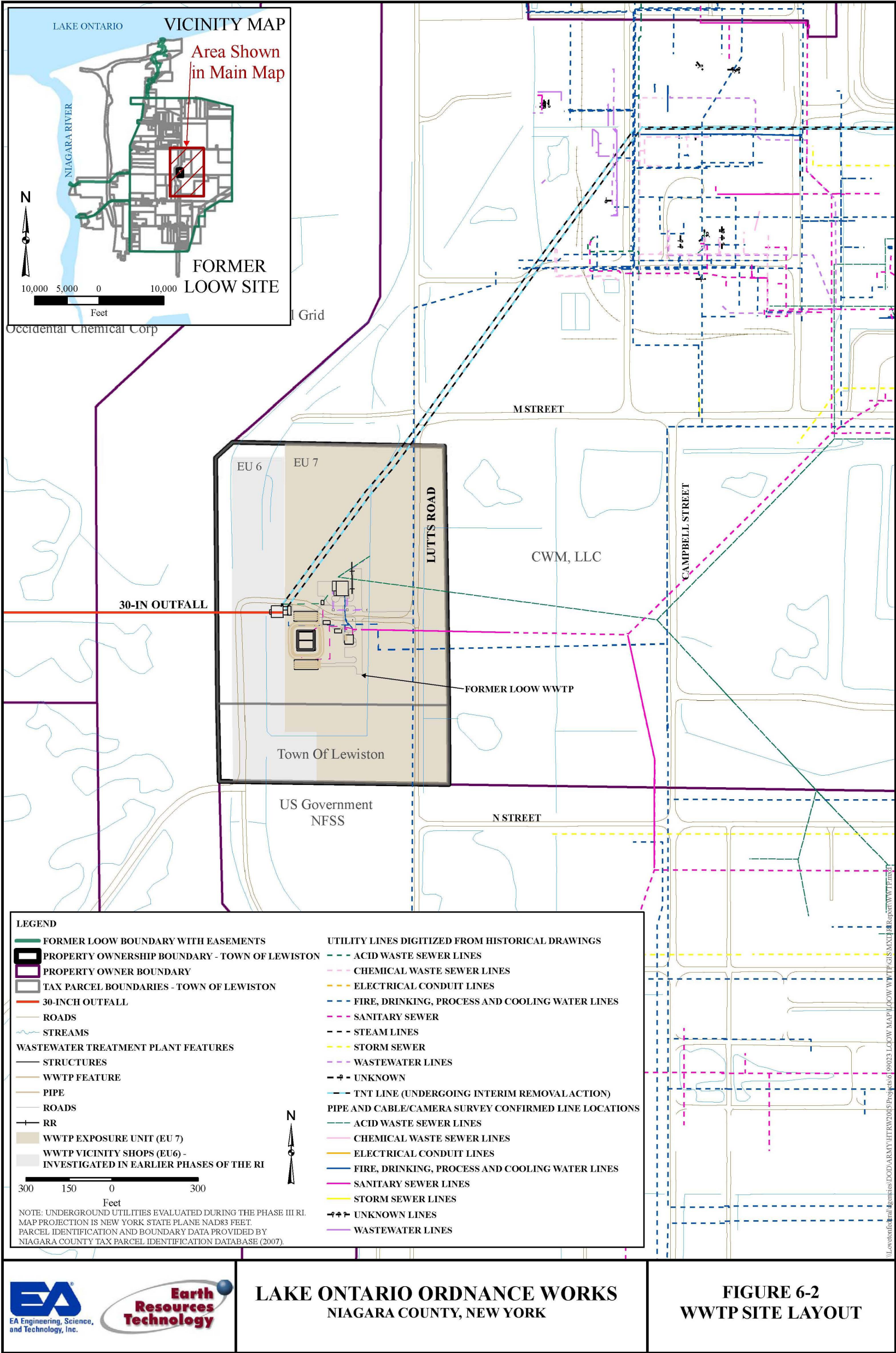


Figure 6-2. WWTP Site Layout

7.0 SAFETY MEETINGS

Employees, subcontractors, and site visitors will read this SSHP and will indicate their understanding of the requirements by signing the SSHP Compliance/Review Record which is contained in Appendix C. The SSHO will brief employees, subcontractors and site visitors on the potential hazards at the site and protective measures to be implemented, both prior to entry and daily during the work. An evacuation rally point will be used in the event of an emergency and will be communicated to personnel. This location will be an upwind point from site activities, in an area not expected to be affected by an onsite emergency situation and will be determined in the field by the SSHO. The SSHO will brief visitors of the rally areas prior to initial entry.

7.1 Pre-Entry Briefing / Daily Safety Meeting

The Site Manager and SSHO will provide site-specific training on the contents of this SSHP, including: site monitoring equipment; emergency procedures; areas of restricted access; methods of decontamination; responsibilities for safety of personnel, residents, and property; physical, chemical and biological hazards; PPE; and the MSDS locations. Pre-entry briefings will be held prior to all personnel (employees and subcontractors) working on site. Following review of this document and receipt of the pre-entry briefing, personnel shall indicate their understanding of the site specific hazards and appropriate emergency response by signing the plan Compliance/Review Record (Appendix C).

7.2 Daily Safety Meeting

Daily safety meetings will be held prior to personnel working on site. Following review of this document and receipt of the pre-entry briefing, personnel shall indicate their understanding of the site-specific hazards and appropriate emergency response by signing the plan Compliance/Review Record (Appendix C). Employees and subcontractors are required to adhere to all sections of the SSHP and face disciplinary action as discussed in Section 4.3, if found not in compliance.

The SSHO is responsible for conducting safety meetings, daily during field activities, to discuss status of site health and safety. These meetings shall also address employees' concerns regarding onsite safety and hazard control practices and procedures.

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8.0 PERSONAL PROTECTIVE EQUIPMENT AND ENVIRONMENTAL MONITORING PROGRAM

The PPE specified herein represents the hazard analysis and PPE selection required by 29 CFR 1910.132. For the purposes of PPE selection, the ERT SSHO is considered qualified to make these decisions. The signatures on the front of the SSHP constitute certification of the hazard assessment.

It is anticipated that only Level D PPE will be required at the Site. Level D protection is applicable when no respiratory protection and minimal skin protection is required. Level D can be used in the following circumstances:

- The atmosphere contains no known hazard
- Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.
- The PPE requirements for Level D are presented in Section 8.2.

8.1 General PPE Requirements

Personnel will be equipped with proper PPE for the tasks they are asked to perform. The SSHO will distribute PPE and will also train employees in proper PPE use and disposal.

8.2 Initial Requirements / Upgrade or Downgrade of PPE Levels

Based on evaluation of the potential safety and health hazards, the required initial PPE level is Level D. The following field activities will require Level D PPE:

- Site reconnaissance;
- Brush clearance;
- Soil sampling;
- Field analytical screening;
- Groundwater sampling;
- Surface water and sediment sampling; and
- Equipment decontamination.

Level D protection will be the minimum protection used for field operations. The following are the minimum requirements for Level D:

- Steel-toe, steel-shank safety shoes/boots;
- Hard hat that meets American National Standards Institute (ANSI) Standard Z89.1-1986 (for use during sampling activities if overhead hazards exist);
- Chemical-resistant gloves when conducting groundwater sampling;
- Leather work gloves (as appropriate);
- Safety glasses;
- Hearing protectors (when noise hazards are present or as required by SSHO);
- Face shield (when operating steam cleaner or decontaminating equipment using nitric acid);

- Coveralls (as appropriate); and
- Poly-coated coveralls (when splash hazards are present or contact with heavily contaminated water is expected).

If an upgrade in PPE is required, Level C protection is the anticipated upgrade level of protection. The following are the requirements for Level C:

- Full-face or half-mask, air purifying respirators with organic cartridges [National Institute for Occupational Safety and Health (NIOSH) approved];
- Hooded chemical-resistant clothing (coveralls; two-piece chemical-splash suit; disposable chemical-resistant coveralls);
- Safety glasses;
- Coveralls (optional as applicable);
- Gloves, outer, chemical-resistant;
- Gloves, inner, chemical-resistant;
- Boots (outer), chemical-resistant steel toe and shank;
- Boot-covers, outer, chemical resistant (disposable) (optional as applicable);
- Hard hat that meets ANSI Standard Z89.1-1986 (for use during sampling activities if overhead hazards exist);
- Escape mask (optional as applicable); and
- Face shield (when operating steam cleaner or decontaminating equipment using nitric acid).
- Work will stop if action level(s) are exceeded prior to upgrading to Level C, and the USACE PM and ERT's PM will be notified of the situation.

8.3 Real-Time Monitoring

Organic Vapor Meter (OVM): Real-time monitoring for VOCs will be conducted using an OVM equipped with a photoionization detector (PID). The OVM will be used to monitor employee breathing zones during all invasive activities, including (but not limited to) soil, sediment, and groundwater sampling

Monitoring the employee's breathing zone will be conducted at least every 15 minutes until the SSHO determines a more applicable schedule. The OVM will also be used to monitor local and background area VOC readings during invasive work activities, and prior to entry and periodically during work within a trench/confined space. VOCs will be monitored using a Thermo-Environmental Instruments, Inc. Model 580S OVM, or its equivalent, with an 11.2 eV lamp. The 580S OVM has a detection limit of 0.1 parts per million (ppm) as isobutylene.

Combustible Gas Indicator (CGI)/Oxygen Level Meter: It is currently not anticipated, but if warranted by conditions, real-time monitoring for combustible gases and oxygen levels will be conducted using a CGI. The CGI will test for the presence of combustible gases by monitoring the lower explosive limit (LEL) of organic vapors.

Real-time monitoring will be conducted prior to, and during, the following types of work activities:

- Subsurface soil sampling; and
- Sampling of monitoring wells (at the wellhead)

Sound Level Meter (SLM): Hearing protection will be required for employees exposed to 85 dBA. Rather than monitor for potential harmful noise levels, it is currently intended for members of the field team operating heavy equipment or power tools, or within the vicinity of the operation of heavy equipment and power tools will be required to wear hearing protection in the form of ear plugs with a minimum noise reduction rating of 22 dBA. However, at the discretion of the SSHO, a SLM may be used to monitor noise levels in the vicinity of site personnel during heavy equipment and power tool operation, and during other potentially noisy site activities. If required, a Metrosonics dB-307 SLM, or its equivalent, will be used on the A-scale/slow response, to monitor for noise levels.

Calibration of Real-Time Monitoring Equipment: Monitoring and calibration protocols will be performed in accordance with the manufacturer's guidelines. Calibration will be performed, at a minimum, prior to each day's use. A copy of each instrument's manual will be kept in the SZ. The following calibration methods will be used:

- The OVM will be calibrated using either a 100 ppm or a 250 ppm isobutylene span gas concentration.
- The CGI/Oxygen Level Meter will be calibrated using a gas mixture which represents 50 percent (50%) LEL and 15 percent (15%) oxygen.
- The SLM will be calibrated using an acoustical calibrator with a known decibel level output.

Radiation Monitoring: Radiation monitoring will be performed prior to vegetation clearing and during intrusive sampling, including but not limited to soil, sediment, and groundwater sampling, to evaluate whether radiation levels exceed background. In addition, radiation monitoring will be performed in areas selected for decontamination to ensure the area is within the expected background. The radiation monitoring is detailed in the RSP (USACE/ERT, 2009a).

8.4 Action Levels

Tables 8-1 through 8-3 list the action levels and action requirements for the OVM, CGI, and the SLM. Action levels for elevated radiological readings are included in the RSP (USACE/ERT, 2009a). Upgrading respiratory protection is based on maintaining the upper limit of the action level for approximately 1 to 5 minutes (i.e., a non-transient reading), or at the discretion of the SSHO.

Table 8-1. OVM Action Levels	
Meter Response	Action
OVM response < 5 ppm sustained above background in the breathing zone (BZ)	No respiratory protection required (i.e., Level D)
OVM response > 5 ppm and < 25 ppm above background sustained in the BZ.	Expand exclusion zone. Inform Project CIH and USACE PM. Perform engineering controls such as venting or repositioning work station to an upwind location, or perform air sampling/monitoring to determine specific contaminant concentrations. If engineering controls are ineffective and contaminant specific air monitoring results indicate exceedance of PELs, upgrade to Level C PPE.
OVM response > 25 ppm above background	Retreat from work area*

Table 8-2. CGI/Oxygen Action Levels	
Meter Response	Action
CGI response <10% LEL	Continue normal operations.
CGI response >10% and <20% LEL	Eliminate all sources of ignition from work area; implement continuous monitoring.
CGI response >20% LEL	Discontinue operations; allow venting. Inform CIH, PM, and USACE PM and Authorized Site Representative.
Oxygen Level Meter response < 19.5 % or > 23.5 %	Retreat from work area*
<i>Note: If a retreat becomes necessary, the Project CIH, PM, and USACE PM and Authorized Site Representative will be consulted in regard to upgrading to Level B respiratory protection, adding mechanical ventilation, or possible changes in work practices. An amendment to the SSHP will be prepared.</i>	

Table 8-3. SLM Action Levels	
Meter Response	Action
SLM response <85 dBA	Proceed with periodic monitoring.
SLM response >85 dBA	Hearing protection is required.
<i>dBA – decibels in the A Scale</i>	

During field operations, the SSHO will evaluate environmental monitoring results and potential for exposure to hazards. The SSHO can authorize an upgrade or downgrade of the PPE level worn onsite. Changes in PPE level, including the rationale for the changes, shall be documented by the SSHO. If PPE is upgraded to Level C, respirator cartridges will be changed at least daily, in accordance with a contaminant specific cartridge exchange rate, or more frequently if damaged, soiled, or if breathing resistance increases.

8.5 Inspection and Maintenance of Protective Equipment

Effective use of protective equipment requires that the equipment be properly used, maintained, and inspected prior to use and periodically during the day. The SSHO will conduct periodic inspections of protective equipment to ensure that equipment is maintained and used properly. Site-specific issues and standard procedures will be reiterated during pre-entry training.

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9.0 SPILL CONTAINMENT

Loose-sorbent material and/or absorbent booms or pads will be available during each site activity. Small incidental spills which do not cause injury to personnel or threaten the environment will be addressed immediately. Any residual waste will be disposed of properly and labeled accordingly.

Large spills that may harm personnel or threaten the environment will be dealt with at once. First aid to personnel will be of primary importance. Spill containment procedures will follow, and emergency contacts will be notified. The Site Manager or SSHO will notify the ERT PM as soon as personnel safety has been established and spill containment has been achieved.

Many hazardous chemicals are listed by the EPA as having Reportable Quantities (RQ). Any spill involving any of these chemicals in amounts of the RQ or greater will require reporting to the appropriate federal, state, and local agencies. It is the U.S. Army's responsibility to report to other government agencies. Emergency telephone numbers are provided in Table 11-1.

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10.0 DECONTAMINATION

All personnel are required to maintain the appropriate level of PPE (Level D currently anticipated) at all times while onsite. Appropriate PPE will minimize potential exposure to site chemicals. Decontamination procedures shall be consistent with those described in 29 CFR 1910.120.

Equipment decontamination will be conducted to prevent cross-contamination during each sampling event and also to minimize personal exposure to chemical hazards. Because of strict analytical quality control requirements, sampling equipment will be properly cleaned according to the decontamination procedures described in the QAPP.

Dedicated disposable equipment will be properly disposed of after use into a dedicated receptacle and will not be reused under any circumstance. Dedicated disposable PPE, such as nitrile-gloves, will be used only once and properly be disposed of in a dedicated receptacle. Dedicated disposable PPE will not be reused under any circumstance.

Most chemical hazards associated with the proposed RI activities can be mitigated by the appropriate use of PPE and proper hygiene (regular bathing for at least 15-minutes for non-localized exposures). Prior to engaging in break activities such as drinking and eating, and upon completion of each work day, personnel should remove and discard all dedicated disposable PPE and properly wash all exposed areas, including hands and face, with warm potable water and mild soap. Reusable PPE (e.g., respirators) should be decontaminated as per the applicable manufactures requirements. Clothes should be laundered and/or machine washed prior to reuse.

In the event that minor cuts occur, affected areas should be cleaned with warm water and soap. Dry the area; apply disinfectant and proper first aid dressings. It may be necessary to use swabs in order to effectively clean impacts to the affected area.

In the event of heavy localized chemical exposure occurs contact the appropriate emergency personnel immediately (Appendix G). Consult the provided MSDS for other pertinent information related to the chemical of concern and potential exposure remedies (Appendix F).

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11.0 EMERGENCY RESPONSE PLAN

Prior to work start-up, personnel will be familiar with this Emergency Response Plan. The Site Manager will make this plan available for inspection and copying by subcontractors and will review the location of evacuation areas and exit routes.

Emergency telephone numbers will be carried by the field personnel at all times. See Table 11-1 for a listing of emergency telephone numbers. Figure 11-1 provides the route and directions to the nearest emergency care facility.

Before commencing onsite operations, the ERT SSHO or his designee will advise personnel of the appropriate response to potential emergencies. Factors to be discussed will include the following.

- Communication networks and warning signals used on site;
- First aid equipment;
- Notification of fire, police and emergency facilities; and
- Evacuation plans.
- Names of employees who have CPR/First Aid certification: Currently assumed to be [REDACTED] and [REDACTED].

11.1 Emergency Response Equipment

Emergency response equipment to be maintained on site includes, but is not limited to, the following:

- Fire extinguisher(s)
- Eye wash station(s)
- Cell phones and/or two way radios
- Minimum spill response kit (sorbent pads and absorbent material)
- Transportation (support vehicle)
- First aid kit

11.2 Communication

The ERT team sampling members shall be equipped with a cellular telephone. If an emergency occurs, and the team members are not in close proximity to each other, communication will occur via telephone.

11.3 Pre-Planning

Pre-planning in case of an emergency helps minimize the potential hazards of an unpredictable event, such as physical injury. An emergency condition is considered to be present in the following instances.

- A member of the crew is involved in an accident or is experiencing adverse effects; and
- *When a condition is discovered that suggests that a situation is more hazardous than first thought or anticipated.*

Table 11-1. Emergency Contact/Notification System		
Organization	Agency	Telephone
Ambulance		911
Police		911
Fire		911
Hospital 1	Mount St Mary's Hospital	(716) 297-4800
Poison Control Center	New York Poison Control	(800) 222-1222
Regional NYSDEC	Region 9 Office	(716) 851-7220

Prior to conducting any activity, the ERT SSHO or his designee will implement the following general emergency procedures:

- Cellular telephones will be fully operational and turned on;
- Appropriate key personnel and emergency numbers will be carried by each field staff individual;
- Any accidents will be reported immediately to the ERT PM and/or ERT SSHO so that appropriate actions can be taken;
- Personnel not familiar with certain operations will practice the operation prior to doing the actual work in the field; and
- The address of the nearest local hospital will be noted (see Appendix G, Section 9.6 for a map of the hospital route and directions).

11.4 Emergency Incident Procedures

In the event of an emergency, the information available at that time will be properly evaluated and the appropriate steps will be taken to implement the emergency response plan. The Site Manager will assume command of the situation. He/She will call the appropriate emergency services, evacuate personnel to the designated evacuation location as needed, and take other steps necessary to gain control over the emergency.

11.5 Emergency Notification Procedures

Emergency telephone numbers and directions to the nearest hospital are provided in Table 10-1 and in Appendix G, along with maps showing the routes to the nearest hospitals. The field personnel will immediately stop work and report to the Site Manager under the following potential emergency situations:

- Medical emergency;
- Discovery of unanticipated hazards [e.g., drums, heavily contaminated materials, etc.];
- Overexposure of personnel to onsite contaminants;
- Cold/heat-related injury or heat stress;

Onsite emergencies may ultimately be handled by offsite emergency support personnel. Initial response and first-aid treatment, however, will be available through onsite personnel. In case of a hazardous materials emergency, the Site Manager will assume control and direction of the emergency response until arrival of off-site emergency personnel. The Site Manager will work

with the SSHO to identify and evaluate hazards. Emergency responders and communications will be coordinated and controlled through the Site Manager.

In the event of an emergency, the information available at that time will be properly evaluated and the appropriate steps will be taken to implement the emergency response procedures. The Site Manager (or SSHO if the Site Manager is part of the emergency) will assume command of the situation. He/she will call the appropriate emergency services, evacuate personnel to the pre-designated evacuation location as needed, and take other steps necessary to gain control over the emergency.

Provide the following information when reporting an emergency:

1. Name and location of person reporting;
2. Location of accident/incident;
3. Name and affiliation of injured party;
4. Description of injuries, fire, spill, or explosion;
5. Status of medical aid and/or other emergency control efforts;
6. Details of chemicals involved;
7. Summary of accident, including suspected cause and time it occurred; and
8. Temporary control measures taken to minimize further risk.

This information will not be released to parties other than those listed in this section and emergency response team members. After emergency response agencies have been notified and supplied appropriate response information, the ERT PM will be notified. The ERT PM will immediately notify the USACE PM of all incidents, no matter how severe, as soon as possible, but no later than four hours.

11.6 Personnel Injury/Medical Emergency

Personnel will always be alert for signs and symptoms of illnesses related to chemical, physical, and disease factors onsite. Severe injuries resulting from accidents will be recognized as emergencies and treated as such.

In a medical emergency, the Site Manager will cease work, and personnel will move to the decontamination area. Personnel currently trained in Standard First Aid/Adult CPR will evaluate the nature of the injury, decontaminate the victim if the victim can be moved safely, and initiate first aid assistance immediately. First aid will be administered as appropriate. The local Emergency Medical Services will be notified immediately if needed, contact numbers are provided in Section 10 and Appendix F. Victims who are heavily contaminated with toxic or dangerous materials will be decontaminated before being transported from the site. A fellow worker will accompany injured workers to the hospital to inform the admitting clerk that the injury is work-related and to assist in completing the insurance forms.

The SSHO or Site Manager will complete an Incident Report (Appendix **D**) which will be submitted to the PM and Project CIH within 24 hours of the following types of incidents:

- Job-related injuries and illnesses;

- Accidents resulting in significant property damage;
- Accidents involving vehicles and/or vessels; and
- Accidents in which there may have been no injury or property damage, but which have a high probability of recurring with at least a moderate risk to personnel or property.

An accident, which results in a fatality or the hospitalization of 3 or more employees, will be reported within 8 hours to the U.S. Department of Labor by the PM. USACE Form 3394 (Appendix H) will be submitted to the USACE PM within 48 hours of any such accident. An Incident Reporting Form (Appendix D) will be completed when a near miss occurs that could have potentially resulted in serious physical harm.

11.7 Fire/Explosion Emergencies

A fire or explosion will be immediately recognized as an emergency. The Site Manager will announce the emergency and personnel will be evacuated to the pre-designated evacuation location and the local emergency services notified. Contact numbers are provided in Table 10-1 and Appendix F. Decontamination will take place once personnel have been safely evacuated to the pre-designated evacuation location. Personnel properly trained in fire suppression, spill control, and other emergency response procedures will attempt to deal with these situations. Other than small fires or spills, local emergency response services will be notified to handle the emergency. The Site Manager will take measures to reduce injury and illness, primarily by evacuating personnel as quickly as possible and accounting for personnel. A Site Entry and Exit Log (Appendix B) will be kept on a daily basis and utilized in the event of an emergency to ensure that all personnel have retreated from the area of incident safely and no one has been left in an unsafe location. He/She will then notify the PM. Cleanup after such events may require specialized services. Work will not resume until the Site Manager and SSHO declares the incident closed.



Figure 11-1. Hospital Route and Directions

12.0 REFERENCES

USACE, 2008. *Safety and Health Requirements*, Engineering Manual 385-1-1. September.

USACE/Prepared by EA, 2005. *Addendum II to the Health and Safety Plan for Phase I Remedial Investigation at the Former Lake Ontario Ordnance Works, Niagara County, New York, for Phase III Remedial Investigation – Underground Lines*.

USACE/Prepared by Earth Resources Technology, Inc (ERT), 2010. *Final Site Safety and Health Plan Addendum for Occidental Chemical Corporation Data Gap and Lewiston-Porter Central School District Investigations at the Former LOOW, Niagara County, New York*. August.

USACE/Prepared by ERT, 2009a. *Final Site Safety and Health Plan for Phase IV Remedial Investigation/Feasibility Studies at the Former Lake Ontario Ordnance Works, Niagara County, New York*. June.

USACE/ ERT, 2009b. *Radiation Safety Plan Addendum for Phase IV Remedial Investigation/Feasibility Studies at the Former Lake Ontario Ordnance Works, Niagara County, New York*. January.

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APPENDIX A
Checklist of EM 385-1-1 Requirements

Appendix A
Accident Prevention Plan/ Site Safety and Health Plan
(APP/SSHP) Checklist
(EM 385-1-1, Appendix A & Section 28, 15 September 2008)

CONTRACTOR ACCIDENT PREVENTION PLAN (APP) CHECKLIST (EM 385-1-1, Appendix - A, dated: 15 Sept. 08)**Minimum Basic Outline for Accident Prevention Plan**

The APP is the Contractor Safety and Health Program Document. The following Site Specific Areas will be addressed:

NOTE: 1. Contractor will complete Checklist and Submit with their APP.

NOTE: 2. Contractor APP WILL be submitted in format below.

NOTE: 3. Safety Office will review Contractor APP and return to PM / COR.

NOTE: 4. Contractor APP's ARE NOT APPROVED by the USACE, only found as Acceptable or Non-Acceptable.

Safety Office Review Status: ACCEPTED BY/DATE: _____ NOT ACCEPTED BY/DATE: _____

Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
ALL CHECKLIST ITEMS WILL BE COMPLETED!				
1. SIGNATURE SHEET. Title, signature, and phone number of the following:				See Below
a. <i>Plan Preparer</i> (qualified person, Competent Person such as corporate safety staff person, QC).	X			Title Section, Pg 1
b. <i>Plan Approval</i> by company/corporate officers authorized to obligate the company (e.g. owner company president, regional vice president etc.)	X			Title Section, Pg 1
c. <i>Plan Concurrence</i> (e.g. Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, project manager or superintendent, project safety professional, project QC). Provide concurrence of other applicable corporate and project personnel (Contractor).	X			Title Section, Pg 1-3
2. BACKGROUND INFORMATION. List the following:				See Below
a. Contractor;	X			Title Section, Pg 1
b. Contract number;	X			Title Section, Pg 1
c. Project name;	X			Title Section, Pg 1
d. Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).	X			Section 1.1 – 1.2
3. STATEMENT OF SAFETY AND HEALTH POLICY. Provide a copy of your current corporate/company Safety & Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor's written safety program goals, objectives, and accident experience goals for this contract should be provided.	X			Section 1.3
4. RESPONSIBILITIES AND LINES OF AUTHORITIES. Provide the following:				See Below
a. A statement of the employer's ultimate responsibility for the implementation of his SOH program;	X			Section 1.3 and Section 2.0

CONTRACTOR ACCIDENT PREVENTION PLAN (APP) CHECKLIST (EM 385-1-1, Appendix - A, dated: 15 Sept. 08)**Minimum Basic Outline for Accident Prevention Plan**

The APP is the Contractor Safety and Health Program Document. The following Site Specific Areas will be addressed:

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Safety Office Review Status: ACCEPTED BY/DATE: _____ NOT ACCEPTED BY/DATE: _____

Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
b. Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes. Qualifications shall include the OSHA 30-hour course or equivalent course areas as listed here:	X			Section 1.3 and Section 2.0
(1) OSH Act/General Duty Clause;	X			Section 1.0
(2) 29 CFR 1904, Recordkeeping;	X			Section 3.0, Section 4.1 and Section 7.0
(3) Subpart C: General Safety and Health Provisions, Competent Person	X			Section 3.0
(4) Subpart D: Occupational Health and Environmental Controls, Citations and Safety Programs;	X			Section 1.3 and Section 1.4
(5) Subpart E: PPE, types and requirements for use;	X			Section 8.0
(6) Subpart F: understanding fire protection in the workplace;	X			Section 5.4.2 and Section 11.7
(7) Subpart K: Electrical;			X	
(8) Subpart M: Fall Protection;			X	
(9) Rigging, welding and cutting, scaffolding, excavations, concrete and masonry, demolition; health hazards in construction, materials handling, storage and disposal, hand and power tools, motor vehicles, mechanized equipment, marine operations, steel erection, stairways and ladders, confined spaces or any others that are applicable to the work being performed.			X	
c. The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached. The District SOHO will review the qualifications for acceptance;	X			Section 2.0
d. Requirements that no work shall be performed unless a designated competent person is present on the job site;	X			Section 3.0 – 3.2, and Section 4.0-4.3
e. Requirements for pre-task safety and health analysis;	X			Section 3.3, Section 4.1 and Section 11.3

CONTRACTOR ACCIDENT PREVENTION PLAN (APP) CHECKLIST (EM 385-1-1, Appendix - A, dated: 15 Sept. 08)**Minimum Basic Outline for Accident Prevention Plan**

The APP is the Contractor Safety and Health Program Document. The following Site Specific Areas will be addressed:

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Safety Office Review Status: ACCEPTED BY/DATE: _____ NOT ACCEPTED BY/DATE: _____

Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
f. Lines of authority;	X			Section 2.0
g. Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;	X			Section 4.3.2
h. Provide written company procedures for holding managers and supervisors accountable for safety.	X			Section 4.3.2
5. SUBCONTRACTORS AND SUPPLIERS. If applicable, provide procedures for coordinating SOH activities with other employers on the job site:	X			See Below
a. Identification of subcontractors and suppliers (if known);	X			Section 2.8
b. Safety responsibilities of subcontractors and suppliers.	X			Section 2.8, 4.0 and 7.0
6. TRAINING.				See Below
a. Requirements for new hire SOH orientation training at the time of initial hire of each new employee.	X			Section 3.0
b. Requirements for mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, confined space entry, crane operator, diver, vehicle operator, HAZWOPER training and certification, PPE) and any requirements for periodic retraining/recertification.	X			Section 3.0
c. Procedures for periodic safety and health training for supervisors and employees.	X			Section 3.2, 3.3 and 3.4
d. Requirements for emergency response training. > See 9.b. below for a list of requirements that may require emergency response training.	X			Section 11.0
7. SAFETY AND HEALTH INSPECTIONS.				See Below
a. Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., SSHO, PM, safety professional, QC, supervisors, employees – depends on level of technical proficiency needed to perform said inspections), proof of inspector's training/qualifications, when inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures;	X			Section 2.5
b. Any external inspections/certifications that may be required (e.g., USCG).			X	
8. ACCIDENT REPORTING. The Contractor shall identify person(s) responsible to provide the following:				See Below

CONTRACTOR ACCIDENT PREVENTION PLAN (APP) CHECKLIST (EM 385-1-1, Appendix - A, dated; 15 Sept. 08)**Minimum Basic Outline for Accident Prevention Plan**

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Safety Office Review Status: ACCEPTED BY/DATE: _____ NOT ACCEPTED BY/DATE: _____

Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
a. Exposure data (man-hours worked);	X			Section 11.5 – 11.6
b. Accident investigations, reports, and logs: Report all accidents as soon as possible but not more than 24 hours afterwards to the Contracting Officer/Representative (CO/COR). The contractor shall thoroughly investigate the accident and submit the findings of the investigation along with appropriate corrective actions to the CO/COR in the prescribed format as soon as possible but no later than five (5) working days following the accident. Implement corrective actions as soon as reasonably possible;	X			Section 11.5 – 11.6
c. The following require immediate accident notification:				See Below
(1) A fatal injury;	X			Section 11.5 – 11.6
(2) A permanent total disability;	X			Section 11.5 – 11.6
(3) A permanent partial disability;	X			Section 11.5 – 11.6
(4) The hospitalization of three or more people resulting from a single occurrence;	X			Section 11.5 – 11.6
(5) Property damage of \$200,000 or more.	X			Section 11.5 – 11.6
9. PLANS (PROGRAMS, PROCEDURES) REQUIRED BY THE SAFETY MANUAL. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational risks and compliance plans. Using the EM 385-1-1 as a guide, plans may include but not be limited to:				See Below
a. Layout plans (04.A.01);	X			Section 6.1.2
b. Emergency response plans:	X			See Below
(1) Procedures and tests (01.E.01);	X			Section 5.7 and Section 11.0-11.7
(2) Spill plans (01.E.01, 06.A.02);	X			Section 9.0
(3) Firefighting plan (01.E.01, Section 19);	X			Section 11.7
(4) Posting of emergency telephone numbers (01.E.05);	X			Section

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Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
				11.0 – 11.3
(5) Man overboard/abandon ship (Section 19.A.04);			X	
(6) Medical Support. Outline on-site medical support and offsite medical arrangements including rescue and medical duties for those employees who are to perform them, and the name(s) of on-site Contractor personnel trained in first aid and CPR. A minimum of two employees shall be certified in CPR and first aid per shift/site (Section 03.A.02; 03.D);	X			Section 11.0
c. Plan for prevention of alcohol and drug abuse (01.C.02);	X			Section 4.3.3
d. Site sanitation plan (Section 02);	X			Section 4.4
e. Access and haul road plan (4.B);	X			Section 5.7 and Section 6.0
f. Respiratory protection plan (05.G);	X			Section 8.0 – 8.5
g. Health hazard control program (06.A);	X			Section 5.0 – 5.6
h. Hazard communication program (06.B.01);	X			Section 5.6
i. Process Safety Management Plan (06.B.04);			X	
j. Lead abatement plan (06.B.05 & specifications);			X	
k. Asbestos abatement plan (06.B.05 & specifications);			X	
l. Radiation Safety Program (06.E.03.a);	X			Section 8.0 – 8.5
m. Abrasive blasting (06.H.01);			X	
n. Heat/Cold Stress Monitoring Plan (06.I.02)	X			Section 5.4
o. Crystalline Silica Monitoring Plan (Assessment) (06.M) ;			X	
p. Night operations lighting plan (07.A.08);			X	
q. Fire Prevention Plan (09.A);	X			Section 5.4
r. Wild Land Fire Management Plan (09.K);	X			Section 5.4
s. Hazardous energy control plan (12.A.01);			X	
t. Critical lift Plan (16.H);			X	
u. Contingency plan for Floating Plants for severe weather (19.A.03);			X	
v. Float Plan (19.F.04);			X	

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Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
w. Site-Specific Fall Protection & Prevention Plan (21.C);			X	
x. Demolition plan (to include engineering survey) (23.A.01);			X	
y. Excavation/trenching plan (25.A.01);			X	
z. Emergency rescue (tunneling) (26.A.);			X	
aa. Underground construction fire prevention and protection plan (26.D.01);			X	
bb. Compressed air plan (26.I.01);			X	
cc. Formwork and shoring erection and removal plans (27.C);			X	
dd. PreCast Concrete Plan (27.D);			X	
ee. Lift slab plans (27.E);			X	
ff. Steel erection plan (27.F.01);			X	
gg. Site Safety and Health Plan for HTRW work (28.B);	X			Section 1.0 through Section 12.0
hh. Blasting Safety Plan (29.A.01);			X	
ii. Diving plan (30.A.13);			X	
jj. Confined space Program (34.A).			X	
10. RISK MANAGEMENT PROCESSES. Detailed project-specific hazards and controls shall be provided by an Activity Hazard Analysis (01.A.13) for each major phase/activity of work.	X			Appendix E
11. ABBREVIATED APP for LIMITED-SCOPE SERVICE, SUPPLY AND R&D CONTRACTS. If service, supply and R&D contracts with limited scopes are awarded, the contractor may submit an abbreviated Accident Prevention Plan. This APP shall address the following areas at a minimum. If other areas of the EM 385-1-1 are pertinent to the contract, the contractor must assure these areas are addressed as well.			X	
a. Title, signature, and phone number of the plan preparer.			X	
b. Background Information to include: Contractor; Contract number; Project name; Brief project description, description of work to be performed, and location (map); The project description shall provide a means to evaluate the work being done (see AHA requirements in 01.A.13) and associated hazards involved. Contractor's APP shall address the identified hazards involved and the control measures to be taken.			X	
c. Statement of Safety and Health Policy detailing their commitment to providing a safe and healthful workplace for all employees.			X	

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Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
d. Responsibilities and Lines of Authorities – to include a statement of the employer's ultimate responsibility for the implementation of his SOH program; Identification and accountability of personnel responsible for safety at all levels to include designated site safety and health officer (SSHO) and associated qualifications. The District SOHO will review the qualifications for acceptance.			X	
e. Training - new hire SOH orientation training at the time of initial hire of each new employee and any periodic retraining/recertification requirements.			X	
f. Procedures for job site inspections - assignment of responsibilities and frequency.			X	
g. Procedures for reporting man-hours worked and reporting and investigating any accidents as soon as possible but not more than 24 hours afterwards to the Contracting Officer/Representative (CO/COR). An accident that results in a fatal injury, permanent partial or permanent total disability shall be immediately reported to the Contracting Officer.			X	
h. Emergency Planning. Employees working alone shall be provided an effective means of emergency communication. This may be cellular phone, two-way radio or other acceptable means. The selected means of communication must be readily available and must be in working condition.			X	
i. Drinking Water provisions, toilet and washing facilities.			X	
j. First Aid and CPR training (at least two employees on each shift shall be qualified/certified to administer first aid and CPR) and provision of first aid kit (types/size).			X	
k. Personal Protective Equipment.			X	
(1) WORK CLOTHING - Minimum Requirements. Employees shall wear clothing suitable for the weather however minimum requirements for work shall be short-sleeve shirt, long pants (excessively long or baggy pants are prohibited) and leather work shoes. If analysis determines that safety-toed (or other protective) footwear is necessary (i.e., mowing, weed eating, chain saw use, etc), they shall be worn.			X	
(2) Eye and Face Protection. Eye and face protection shall be worn as determined by an analysis of the operations being performed HOWEVER, all involved in chain saw use, chipping, stump grinding, pruning operations, grass mowing, weed eating and blowing operations shall be provided safety eyewear (Z87.1) as a minimum.			X	
(3) Hearing Protection. Hearing protection must be worn by all those exposed to high noise activities (to include grass mowing and trimming, chainsaw operations, tree chipping, stump grinding and pruning).			X	
(4) Head Protection. Hard hats shall comply with ANSI Z89.1 and shall be worn by all workers when a head hazard exists. At a minimum, hard hats shall be worn when performing activities identified in (2) above.			X	
(5) High Visibility Apparel shall comply with ANSI/ISEA 107, Class 2 requirements at a minimum and shall be worn by all workers exposed to vehicular or equipment traffic.			X	
(6) Protective Leg chaps shall be worn by all chainsaw operators.			X	
(7) Gloves of the proper type shall be worn by persons involved in activities that expose the hands to cuts, abrasions, punctures, burns and chemical irritants.			X	
(8) If work is being performed around water and drowning is a hazard, PFDs must be provided and worn as appropriate.			X	

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Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
l. Machine Guards and safety devices. Lawn maintenance equipment must have appropriate guards and safety devices in place and operational.			X	
m. Hazardous Substances. When any hazardous substances are procured, used, stored or disposed, a hazard communication program must be in effect and MSDSs shall be available at the worksite. Employees shall have received training in hazardous substances being used. When the eyes or body of any person may be exposed to corrosives, irritants or toxic chemicals, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within 10 seconds of the worksite.			X	
n. Traffic control shall be accomplished in accordance with DOT's MUTCD.			X	
o. Control of Hazardous Energy (Lockout/Tagout). Before an employee performs any servicing or maintenance on any equipment where the unexpected energizing or startup of the equipment could occur, procedures must be in place to ensure adequate control of this energy.			X	
p. Driving, working on (i.e., working with equipment/mowers) while on slopes, working from/in boats/skiffs, etc shall also be considered and dealt with accordingly.			X	
			X	
HTRW Projects Additional Requirements (EM 385-1-1, Section 28 HAZWOPER): SSHP (Site Safety and Health Plan) shall be attached to the APP as an Appendix. The SSHP shall cover the following in project-specific detail. General information adequately covered in the APP need not be duplicated.				
a. Site description and contamination characterization	X			Section 1.1 – 1.2
b. Hazard/Risk Analysis - AHA for each task	X			Section 5.0
c. Staff Organization; Qualifications; Responsibilities	X			Section 2.0
d. Training - General, Supervisor and Project Specific	X			Section 3.0
e. PPE Personal Protective Equipment	X			Section 8.0
f. Medical Surveillance	X			Section 3.3
g. Exposure Monitoring/ Air Sampling Program	X			Section 3.0 and Section 8.2 – 8.3
h. Heat and Cold Stress - Procedures and Practices	X			Section 5.4.7 – 5.4.8
i. SOPs Standard Operating Procedures; Engineering Controls; Work Practices:	X			
(1) Site rules/prohibitions (buddy system, eating/drinking/smoking restrictions, etc.)	X			Section 4.3
(2) Work permit requirements (rad work, excavation, hot work, confined space etc.)			X	

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Safety Office Review Status: ACCEPTED BY/DATE: _____ NOT ACCEPTED BY/DATE: _____

Contractor Name:

Contract No:

Project Title & Location:	Included ?			Location:
	Yes	No	N/A	Page(s)
(3) Material handling procedures (soil, liquid, rad materials, spill contingency)	X			Section 5.4.9
(4) Drum/container/tank handling (opening, sampling, draining, removal, etc.)	X			Section 5.0
(5) Comprehensive AHA of treatment technologies employed at site			X	
j. Site Control Measures: Clearly Defined EZ, SZ, CRZ	X			Section 6.0 – 6.2
k. Personal Hygiene and Decontamination	X			Section 5.3 and Section 10.0
l. Equipment Decontamination	X			Section 10.0
m. Emergency Equipment and First Aid	X			Section 3.4, Section 11.1 and Section 11.5-11.6
n. Emergency Response and Contingency Procedures:	X			Section 9.0 and Section 11.0-11.7
(1) Pre-emergency planning	X			Section 11.3
(2) Personnel and lines of authority for emergency situations	X			Sections 11.3 and 11.4
(3) Criteria and procedures for emergency recognition and site evacuation (alarms, etc.)	X			Section 11.5
(4) Decontamination and medical treatment of injured personnel				Section 11.6
(5) A route map to emergency medical facilities and phone numbers for emergency responders				Section 11.0 and Appendix G
(6) Criteria for alerting the local community responders				Section 11.5

APPENDIX B
Site Entry and Exit Log

APPENDIX B

SITE ENTRY AND EXIT LOG

Project: Phase IV RI/FS Activities

Site: Lake Ontario Ordnance Works (LOOW), Niagara County, New York

ERT Project No.: 3047

[illegible]

APPENDIX C
SSHP Compliance, Review Record, and Training Records

APPENDIX C

SITE SAFETY AND HEALTH PLAN REVIEW RECORD

Project: Occidental Chemical Corporation Property Data Gap Investigation and Lewiston-Porter Central School

District Investigation

Site: Lake Ontario Ordnance Works (LOOW), Niagara County, New York

ERT Project No.: 3047

I have read the Site-Specific Health and Safety Plan for this site and have been briefed on the nature, level, and degree of exposure likely as a result of participation in this project. I meet and agree to conform to all the requirements of this Plan.

[illegible]

APPENDIX D
Incident Reporting Form



INCIDENT/INJURY/ILLNESS REPORTING FORM

Date: _____ **Project No:** _____

Time: _____ **Project Name:** _____

Employee's Name: _____ **Employee No.:** _____

Employee Office: _____ **Employee Phone:** _____

Incident/Injury/Illness Location: _____

Incident/Injury/Illness Description:

Extent of Injury or Damage:



INCIDENT/INJURY/ILLNESS REPORTING FORM (page 2)

Actions Taken:

List of all personnel involved and their home phone numbers:

Describe any measures taken to prevent reoccurrence:

Other Notes:

Employee's Signature/Date:

Site Supervisor's Signature/Date:

APPENDIX E
Activity Hazard Analyses

HAZARD ANALYSIS TABLE

Activity ATV Use Analyzed by/Date [REDACTED] Reviewed by/Date _____

Principal Steps	Potential Hazards	Recommended Controls
ATV Use	Chemical	This task involves handling petroleum products (gasoline and oil), the appropriate Level D PPE protection should be implemented for these tasks.
	Radiological	This task involves handling potentially contaminated materials, the appropriate Level D PPE protection should be implemented for these tasks. The work area should be surveyed for contamination to ensure the levels of protection are correct.
	OE	This task involves potentially handling OE, specifically TNT. If suspected OE is encounter, the SUXOS will be notified immediately.
	Heat/cold stress	Take appropriate weather protection measures. Temporary shelters will be provided in case of inclement weather.
	Wildlife, venomous snakes, insects, biological hazards	Be alert. Watch for snakes, make noise, and do not handle wildlife. Check yourself at end of the day for ticks. Wear light color clothing with cuffs and openings closed.
	Slips, trips, falls	Be alert. Watch for trip hazards and look where you walk.
	Moving mechanical parts from heavy equipment operations.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts. Appropriate Level D PPE will be used.
	Noise during the operation of heavy equipment.	High noise areas will be identified. Hearing protection will be provided as appropriate.
	Electric Hazards	Extension cords will be properly rated for intended use.
	Fire	Flammable liquids will be stored in safety containers. Propane cylinders will be stored outside in secured areas. Properly rated fire extinguishers will be placed near fuel storage areas, within site vehicles, and the site trailer.
	Overhead	Awareness for overhead hazards and applicable Level D PPE is required (including hardhat, safety glasses and shoes, long sleeve form fit clothing.

ACTIVITY HAZARD ANALYSIS

Activity Brush Clearance Prepared by/Date _____ Reviewed by/Date _____

Principal Steps	Potential Hazards	Recommended Controls
Brush Clearance	Radiological	Areas to be cleared will be pre-screened for radiation. Any levels above threshold will be avoided. Modified Level D will be the minimum PPE requirement. Adhere to the approved radiation safety plan.
	Wildlife, venomous snakes, insects, biological hazards	Be alert. Watch for snakes, make noise, and do not handle wildlife. Check yourself at end of the day for ticks. Wear light color clothing with cuffs and openings closed.
	Slips, trips, falls	Be alert. Watch for trip hazards and look where you walk.
	OE	This task involves potentially handling OE, specifically TNT. If suspected OE is encounter, the SUXOS will be notified immediately. Adhere to the approved OE support plan.
	Traffic	Work areas will be clearly demarcated. Site traffic will be rerouted as necessary. Operators of machinery/vehicles will be properly licensed and expected to inspect vehicles/machinery on a daily basis. A log will be kept of all inspections.
	Moving mechanical parts from heavy equipment operations.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts. Appropriate Level D PPE will be used.
	Heat stress	Take appropriate weather protection measures. Temporary shelters will be provided in case of inclement weather.
	Noise during the operation of heavy equipment.	High noise areas will be identified. Hearing protection will be provided as appropriate.
	Electric Hazards	Extension cords will be properly rated for intended use. Receptacles and plugs should be tested for correct operation of the equipment-grounding conductor. Equipment will be tested prior to use.
	Fire	Flammable liquids will be stored in safety containers. Propane cylinders will be stored outside in secured areas. Properly rated fire extinguishers will be placed near fuel storage areas, within site vehicles, and the site trailer.
	Sanitation	Drinking water, toilets and adequate washing facilities will be supplied to all personnel. Proper disposal of waste and adequate vermin control will be established.

ACTIVITY HAZARD ANALYSIS

Activity Brush Clearance Prepared by/Date _____ Reviewed by/Date _____

Equipment To Be Used	Inspection Requirements	Training Requirements
Brush Hog (or similar)	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts.
Brush Chipper (or similar)	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts.
Hand tools	Tools should be inspected prior to use. Damaged tools will be discarded and replaced..	Tools will be used properly and for their intended purpose. Proper lifting techniques will be used such as keeping straight back, lifting with legs; personnel will avoid twisting back, will use mechanical equipment, or get help from others.
Electrical hand tools	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. A safe distance will be maintained from moving mechanical parts.
		Extension cords will be properly rated for intended use. Prior to any intrusive activity, authorities will be contacted for permits. Elevated parts of machinery, ladders, and antennas will be kept at least 10 ft from overhead electric lines.
Electrical Generators	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be aware of all manufacturers' operational requirements. Generators will be grounded unless self-grounded.

ACTIVITY HAZARD ANALYSIS

Activity Decontamination of Equipment

Prepared by/Date _____

Reviewed by/Date _____

Principal Steps	Potential Hazards	Recommended Controls
Decontamination of Equipment	Chemical	This task involves handling potentially contaminated materials, the appropriate Level D PPE protection should be implemented for these tasks. Face protection will be necessary during any spraying operations.
	Heat/cold stress	Take appropriate weather protection measures. Temporary shelters will be provided in case of inclement weather.
	Wildlife, venomous snakes, insects, biological hazards	Be alert. Watch for snakes, make noise, and do not handle wildlife. Check yourself at end of the day for ticks. Wear light color clothing with cuffs and openings closed.
	Slips, trips, falls	Be alert. Watch for trip hazards and look where you walk.
	Moving mechanical parts from heavy equipment operations.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts. Appropriate Level D PPE will be used.
	Noise during the operation of heavy equipment.	High noise areas will be identified. Hearing protection will be provided as appropriate.
	Electric Hazards	Extension cords will be properly rated for intended use.
	Fire	Flammable liquids will be stored in safety containers. Properly rated fire extinguishers will be placed near any fuel storage areas, within site vehicles, and the site shed.
Equipment To Be Used	Inspection Requirements	Training Requirements
Hand tools	Tools should be inspected prior to use. Damaged tools will be discarded and replaced.	Tools will be used properly and for their intended purpose. Proper lifting techniques will be used such as keeping straight back, lifting with legs; personnel will avoid twisting back, will use mechanical equipment, or get help from others.
Electrical hand tools	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts.
		Extension cords will be properly rated for intended use. Prior to any intrusive activity, authorities will be contacted for permits. Elevated parts of machinery, ladders, and antennas will be kept at least 10 ft from overhead electric lines.
Electrical Generators	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be aware of all manufacturers' operational requirements. Generators will be grounded unless self-grounded.

ACTIVITY HAZARD ANALYSIS

Activity Field Sampling Prepared by/Date _____ Reviewed by/Date _____

Principal Steps	Potential Hazards	Recommended Controls
Drilling and Direct Push Sampling	Equipment and Drilling	Overhead and underground utilities will be identified. Daily equipment inspections are to occur and be documented. Proper Level D PPE should be worn at all times (including hardhat, safety glasses, protective boots, long pants, tight fit clothing and hearing protection).
	Chemical	This task involves handling potentially contaminated materials and chemical preservatives, the appropriate Level D PPE protection should be implemented for these tasks. The Level D PPE for equipment decontamination will be consistent with the level of protection at the borehole, and based on VOC air monitoring. Adhere to the approved site safety and health plan.
	Radiological	This task involves handling potentially contaminated materials, the appropriate Level D PPE protection should be implemented for these tasks. The work area should be surveyed for contamination to prior to any intrusive activities to ensure the levels of protection are correct. Adhere to the approved radiation safety plan.
	OE	This task involves potentially handling OE, specifically TNT. If suspected OE is encountered, the SUXOS will be notified immediately. Adhere to the approved OE support plan.
	Heat/cold stress	Take appropriate weather protection measures. Temporary shelters will be provided in case of inclement weather.
	Wildlife, venomous snakes, insects, biological hazards	Be alert. Watch for snakes, make noise, and do not handle wildlife. Check yourself at end of the day for ticks. Wear light color clothing with cuffs and openings closed.
	Electrical	Generators are to be properly grounded and power cables rated for intended use. Extension cords will be inspected and properly rated for intended use. All applicable permits will be acquired prior to commencing work.
	Slips, trips, falls	Be alert. Watch for trip hazards and look where you walk.
	Moving mechanical parts from heavy equipment operations.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts. Appropriate Level D PPE will be used.
	Noise during the operation of heavy equipment.	High noise areas will be identified. Hearing protection will be provided as appropriate.
	Fire	Flammable liquids will be stored in safety containers. Properly rated fire extinguishers will be placed near any fuel storage areas, within site vehicles, and the site shed.
	Noise	Hearing protection will be required in high noise areas.

ACTIVITY HAZARD ANALYSIS

Activity Field Sampling Prepared by/Date _____ Reviewed by/Date _____

Principal Steps	Potential Hazards	Recommended Controls
	Traffic	Work areas will be clearly demarcated. Site traffic will be rerouted as necessary. Operators of machinery/vehicles will be properly licensed and expected to inspect vehicles/machinery on a daily basis. A log will be kept of all inspections.
	Sanitation	Drinking water, toilets and adequate washing facilities will be supplied to all personnel. Proper disposal of waste and adequate vermin control will be established.
Equipment To Be Used	Inspection Requirements	Training Requirements
Drill Rig (CME-55, Geoprobe®, or similar)	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be aware of all manufacturers' operational requirements. Brief field personnel on OE, ACM and radiation hazards. All operators should be properly licensed.
Electrical generators	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be aware of all manufacturers' operational requirements. Generators will be grounded unless self-grounded.

ACTIVITY HAZARD ANALYSIS

Activity IDW Management Prepared by/Date _____ Reviewed by/Date _____

Principal Steps	Potential Hazards	Recommended Controls
IDW Management	Chemical	This task involves handling potentially contaminated materials, the appropriate Level D PPE protection should be implemented for these tasks. Adhere to the approved site safety and health plan.
	Radiological	This task involves handling potentially contaminated materials, the appropriate Level D PPE protection should be implemented for these tasks. The work area should be surveyed for contamination prior to sampling, to ensure the levels of protection are correct. Adhere to the approved radiation safety plan.
	OE	This task involves potentially handling OE, specifically TNT. If suspected OE is encounter, the SUXOS will be notified immediately. Adhere to the approved OE support plan.
	Heat/cold stress	Take appropriate weather protection measures. Temporary shelters will be provided in case of inclement weather.
	Wildlife, venomous snakes, insects, biological hazards	Be alert. Watch for snakes, make noise, and do not handle wildlife. Check yourself at end of the day for ticks. Wear light color clothing with cuffs and openings closed.
	Slips, trips, falls	Be alert. Watch for trip hazards and look where you walk.
	Moving mechanical parts from heavy equipment operations.	Personnel should be made aware of the hazard and will coordinate carefully during handling equipment operations.. Appropriate Level D PPE will be used.
	Fire	Flammable liquids will be stored in safety containers. Propane cylinders will be stored outside in secured areas. Properly rated fire extinguishers will be placed near fuel storage areas, within site vehicles, and the site trailer.
	Traffic	Work areas will be clearly demarcated. Site traffic will be rerouted as necessary. Operators of machinery/vehicles will be properly licensed and expected to inspect vehicles/machinery on a daily basis. A log will be kept of all inspections.
	Sanitation	Drinking water, toilets and adequate washing facilities will be supplied to all personnel. Proper disposal of waste and adequate vermin control will be established.
Equipment To Be Used	Inspection Requirements	Training Requirements
Hand tools	Tools should be inspected prior to use. Damaged tools will be discarded and replaced.	Tools will be used properly and for their intended purpose. Proper lifting techniques will be used such as keeping straight back, lifting with legs; personnel will avoid twisting back, will use mechanical equipment, or get help from others.
Utility Truck	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	Personnel should be aware of all manufacturers' operational requirements. Brief field personnel on potential site hazards. All operators should be properly licensed.

ACTIVITY HAZARD ANALYSIS

Activity Site Preparation Prepared by/Date _____ Reviewed by/Date _____

Principal Steps	Potential Hazards	Recommended Controls
Site Preparation: Site reconnaissance, mobilization of the field office, radiation survey and establishing a grid system	Radiological	This task involves handling potentially contaminated materials, the appropriate Level D PPE protection should be implemented for these tasks. The work area should be surveyed for contamination to ensure the levels of protection are correct. Adhere to the approved radiation safety plan.
	OE	This task involves potentially handling OE, specifically TNT. If suspected OE is encountered, the SUXOS will be notified immediately. Adhere to the approved OE support plan.
	Heat/cold stress	Take appropriate weather protection measures.
	Wildlife, venomous snakes, insects, biological hazards	Be alert. Watch for snakes, make noise, and do not handle wildlife. Check yourself at end of the day for ticks. Wear light color clothing with cuffs and openings closed.
	Electrical	Generators are to be properly grounded and power cables rated for intended use. Extension cords will be inspected and properly rated for intended use. All applicable permits will be acquired prior to commencing work. All electrical hook-ups will be conducted by a professional electrician.
	Traffic	Work areas will be clearly demarcated. Site traffic will be rerouted as necessary. Operators of machinery/vehicles will be properly licensed and expected to inspect vehicles/machinery on a daily basis. A log will be kept of all inspections.
	Noise during the operation of heavy equipment.	High noise areas will be identified. Hearing protection will be provided as appropriate.
	Overhead	Awareness for overhead hazards and applicable Level D PPE is required (including hardhat, safety glasses and shoes, long sleeve form fit clothing).
	Fire	Flammable liquids will be stored in safety containers. Properly rated fire extinguishers will be placed near any fuel storage areas (for portable generators), within site vehicles, and the site shed.
	Slips, trips, falls	Be alert. Watch for trip hazards and look where you walk.
	Sanitation	Drinking water, toilets and adequate washing facilities will be supplied to all personnel. Proper disposal of waste and adequate vermin control will be established.

ACTIVITY HAZARD ANALYSIS

Activity Site Preparation Prepared by/Date _____ Reviewed by/Date _____

Equipment To Be Used	Inspection Requirements	Training Requirements
Hand Tools (specifically hand saws and machetes)	Inspect sharp edges routinely before, during and after use. If dull, either sharpen or replace tool.	Brief field personnel on site specific hazards.
Magnetometers (if required for utility)	In accordance with manufacturers' manuals	In accordance with manufacturers' manuals. Brief field personnel on site specific hazards.
Radiation Monitoring Equipment and Meters	In accordance with manufacturers' manuals. Daily inspection logs will be maintained onsite.	In accordance with manufacturers' manuals. Brief field personnel on site specific hazards.

APPENDIX F
MSDS Information



MATERIAL SAFETY DATA SHEET (HYDROCHLORIC ACID)

I. PRODUCT IDENTIFICATION

Chemical Name : Hydrochloric Acid
Trade Name : Technical Grade Muriatic Acid
Synonyms : Muriatic Acid, Spirit of Salts

II. COMPOSITION /INGREDIENTS

Hydrochloric Acid, % : 32 – 34 % by weight
Chemical Formula : HCl
Molecular Weight : 36.46 g/mole
CAS Registry No. : 7647-01-0

III. HAZARDS IDENTIFICATION

THIS PRODUCT MAY BE : corrosive, toxic and a major potential hazard upon contact to skin, eyes and respiratory tract.

TOXICITY ROUTES OF EXPOSURE :

Ingestion can cause severe burns of the mucous membranes of the mouth, esophagus and stomach; pain, nausea and vomiting may also occur.

Inhalation causes irritation of the upper respiratory tract resulting in cough, burning of the throat and choking sensation.

In contact to a high concentration of the HCl gas or liquid may cause burns; repeated or prolonged exposures to dilute solutions may cause dermatitis.

Eyes to high concentration of the acid can cause eye irritation to severe destruction like prolonged or permanent visual impairment, including blindness. These effects occur rapidly affecting all parts of the eye. Mist can also cause irritation to destructive burns.

OVEREXPOSURE :

Can cause serious damage to all body tissues contacted.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Fumes may aggravate eye, skin or respiratory conditions.

Effects are usually limited to inflammation and occasionally ulceration of the nose, throat and larynx, if inhaled deeply, pulmonary edema may occur.

IV. FIRST AID MEASURES

SKIN : Remove contaminated clothing and immediately wash skin for a minimum of 15 minutes. Call or see a physician.

EYES : Immediately flush eyes with large amount of water. Occasionally lifting the upper and lower eyelids and rotating the eyeballs. Continue flushing for a minimum of 15 minutes. Call a physician.

INHALATION : Remove to fresh air. If breathing stops, administer artificial respiration. Call a physician.

INGESTION : DO NOT induce vomiting. Rinse or wash mouth with water. If person is conscious, give 2 or more glasses of water. If unconscious, never give anything by mouth.

V. FIRE FIGHTING MEASURES

Autoignition Point : Not Applicable

Flash Point : Not Applicable

Flammability/Explosive limits : Not Applicable

Fire/Explosion Hazards: Emits toxic and choking fumes of hydrogen chloride. Hydrochloric acid is not flammable but flammable and explosive hydrogen gas may be formed on contact with metals.

Fire Prevention/ Extinguishing Media : Not Applicable

VI. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR RELEASE :

Move people from the area. Move upwind. Avoid contact with acid. Stop leaks if safe to do so. Reposition container if this will reduce or stop leakage. If leak continues, remove leaking container from vehicle or move other materials from vehicle away from container. Absorb spill with sand or earth. If available, cover the spill with excess soda ash, lime or sodium bicarbonate, otherwise, wash away with large amounts of water. Scoop slurry to plastic drums. If leak cannot be safely stopped or if contents cannot be safely transferred to a sound container, contact fire brigade.

VII. HANDLING AND STORAGE

Storage Requirements: Keep container tightly closed.

FOR SMALL VOLUMES : Maybe stored in plastic jugs, carboys, and plastic drums.

FOR LARGE VOLUMES : Store in rubber-lined or epoxy lined steel storage tanks or fiber glass reinforced polyester (FRP) tanks.

Incompatible Materials: Store away from heat

Use Instructions: Wear suitable protective clothing, gloves and eye/face protection. In case of insufficient ventilation, wear suitable respiratory equipment.



MATERIAL SAFETY DATA SHEET (HYDROCHLORIC ACID)

VIII. EXPOSURE CONTROLS AND PROTECTION

Ventilation: Use only in well-ventilated areas.

Protective Equipment for the eyes and skin :

Splash proof and face shield goggles, disposable latex/ rubber apron, PVC rain suit, rubber boots with pant legs over boots.

Respiratory Protection Requirements: NIOSH/MSHA approved respirator should be used.

Precautionary Hygiene/control measures :

Avoid contact with skin, eyes, and clothing. Do not breathe mist or vapor. Wash thoroughly after handling. Safety showers and eye wash fountains should be available in storage and handling area. Any protective clothing contaminated with hydrochloric acid should be removed immediately and thoroughly laundered before wearing again.

IX. PHYSICAL AND CHEMICAL PROPERTIES

STATE : fuming liquid
APPEARANCE : colorless to slightly yellow
ODOR : Irritating
pH : Strong acid <1
BOILING POINT : 85° C
FLASH POINT : Not determined
SPECIFIC GRAVITY : 1.150 -1.164
VAPOR PRESSURE : 20 hPa @ 20° C
SOLUBILITY IN : WATER: miscible, BASE : miscible

X. STABILITY AND REACTIVITY

Stability : Stable under normal handling conditions.

Hazardous polymerization will not occur.

Hazardous decomposition product: HCl gas will not decompose.

Materials and conditions to avoid (incompatibility) are:

Avoid high temperatures. Containers may burst. Corrosive to most metals, concrete, some plastics, some rubber and coatings. Fumes forms droplets which settle and promote corrosion of metals and unprotected equipment. Mixing with strong acids can cause evolution of hydrogen chloride gas. Oxidizing agents will cause the release of toxic chlorine gas. Contact of liquid acid or gas with alkali or active metal may develop enough heat to cause fire in adjacent combustible material.

XI. TOXICOLOGICAL INFORMATION

Reproductive Effects: No data available

MUTAGENICITY : Not applicable

CANCER INFORMATION : Not applicable

XII. ECOLOGICAL INFORMATION

ECOTOXICITY DATA: High acidity may pose potential hazard to plant and marine life.

WATER-POLLUTION RISK CLASSIFICATION: Slightly water-polluting substance.

XIII. DISPOSAL CONSIDERATIONS

Dispose of in accordance with all Government and Local regulations.

XIV. TRANSPORT INFORMATION

Transportation of Dangerous Goods

TDG Classification: Do not ship by air.

DOT Hazard Classification: Class 8 : Corrosive: Group II

DOT Shipping Name : Hydrochloric acid ID: UN 1789

XV. REGULATORY INFORMATION

No data available

XVI. OTHER INFORMATION

This MSDS contains information under the sixteen (16) section headings required by ISO 11014 "Safety Data Sheet for Chemical Products".

THE INFORMATION CONTAINED HEREIN IS PRESENTED IN GOOD FAITH AND BELIEVED TO CORRECT AS OF THE DATE OF ISSUE. HOWEVER, NO WARRANTY, EXPRESS OR IMPLIED IS GIVEN BY MABUHAY VINYL CORPORATION REGARDING THE USE OF THIS MATERIAL SAFETY DATA SHEET (MSDS).



Material Safety Data Sheet

From: Vinquiry, Inc.
7795 Bell Road
Windsor, CA 95492

VINQUIRY

All Non-Hazardous Chemicals

24 hour Emergency Telephone:
Chemtec: 1-800-424-9300

Outside U.S. and Canada Chemtec: 202-483-7616

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

Sulfuric Acid 1+3

SULFURIC ACID, 10 - 51%

MSDS Number: SA264 --- Effective Date: 01/01/01

1. Product Identification

Synonyms: Oil of vitriol; Babcock acid; sulphuric acid

CAS No.: 7664-93-9

Molecular Weight: 98.07

Chemical Formula: H₂SO₄ in H₂O

Vinquiry Inc. Product Codes: 10-264-0000, 10-264-0118, 10-264-0237, 10-264-0473, 10-264-0946

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfuric Acid	7664-93-9	10 - 51%	Yes
Water	7732-18-5	49 - 90%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

VINQUIRY INC. SAFETY DATA Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Water Reactive)

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:

Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.

Ingestion:

Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow ingestion or skin contact. Circulatory shock is often the immediate cause of death.

Skin Contact:

Corrosive. Symptoms of redness, pain, and severe burn can occur. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow skin contact or ingestion. Circulatory shock is often the immediate cause of death.

Eye Contact:

Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Can cause blindness.

Chronic Exposure:

Long-term exposure to mist or vapors may cause damage to teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

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

Ingestion:

DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Excess acid on skin can be neutralized with a 2% solution of bicarbonate of soda. Call a physician immediately.

Eye Contact:

Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

5. Fire Fighting Measures

Fire:

Concentrated material is a strong dehydrating agent. Reacts with organic materials and may cause ignition of finely divided materials on contact.

Explosion:

Contact with most metals causes formation of flammable and explosive hydrogen gas.

Fire Extinguishing Media:

Dry chemical, foam or carbon dioxide. Do not use water on material. However, water spray may be used to keep fire exposed containers cool.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

Structural firefighter's protective clothing is ineffective for fires involving this material. Stay away from sealed containers.

6. Accidental Release Measures

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

NEUTRASORB(R) or TEAM(R) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For Sulfuric Acid:

- OSHA Permissible Exposure Limit (PEL) -

1 mg/m³ (TWA)

- ACGIH Threshold Limit Value (TLV) -

1 mg/m³(TWA), 3 mg/m³ (STEL), A2 - suspected human carcinogen for sulfuric acid contained in strong inorganic acid mists.

Ventilation System:

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

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge and particulate filter (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full- facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

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

9. Physical and Chemical Properties

Appearance:

Clear oily liquid.

Odor:

Odorless.

Solubility:

Miscible with water, liberates much heat.

Specific Gravity:

1.40 (50%), 1.07 (10%)

pH:

1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

ca. 290C (ca. 554F) (decomposes at 340C)

Melting Point:

3C (100%), -32C (93%), -38C (78%), -64C (65%).

Vapor Density (Air=1):

3.4

Vapor Pressure (mm Hg):
1 @ 145.8C (295F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:

Concentrated solutions react violently with water, spattering and liberating heat.

Hazardous Decomposition Products:

Toxic fumes of oxides of sulfur when heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Water, potassium chlorate, potassium perchlorate, potassium permanganate, sodium, lithium, bases, organic material, halogens, metal acetylides, oxides and hydrides, metals (yields hydrogen gas), strong oxidizing and reducing agents and many other reactive substances.

Conditions to Avoid:

Heat, moisture, incompatibles.

11. Toxicological Information

Toxicological Data:

Oral rat LD50: 2140 mg/kg; inhalation rat LC50: 510 mg/m³/2H; standard Draize, eye rabbit, 250 ug (severe); investigated as a tumorigen, mutagen, reproductive effector.

Carcinogenicity:

Cancer Status: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen, (IARC category 1). This classification applies only to mists containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Sulfuric Acid (7664-93-9)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material may leach into groundwater. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.

Environmental Toxicity:

LC50 Flounder 100 to 330 mg/l/48 hr aerated water/Conditions of bioassay not specified; LC50 Shrimp

80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified; LC50 Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified.
This material may be toxic to aquatic life.

13. Disposal Considerations

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

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFURIC ACID (WITH NOT MORE THAN 51% ACID)

Hazard Class: 8

UN/NA: UN2796

Packing Group: II

Information reported for product/size: 200L

International (Water, I.M.O.)

Proper Shipping Name: SULPHURIC ACID (WITH NOT MORE THAN 51% ACID)

Hazard Class: 8

UN/NA: UN2796

Packing Group: II

Information reported for product/size: 200L

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Sulfuric Acid (7664-93-9)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	--Canada--		
		DSL	NDSL	Phil.
Sulfuric Acid (7664-93-9)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.

Sulfuric Acid (7664-93-9)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sulfuric Acid (7664-93-9)	1000	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: 2P

Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 2 Other: **Water reactive**

Label Hazard Warning:

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe mist.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Do not contact with water.

Label First Aid:

In all cases call a physician immediately. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use. Excess acid on skin can be neutralized with a 2% bicarbonate of soda solution. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Product Use:

Laboratory Reagent.

Revision Information:

Disclaimer

Vinquiry Inc. provides this information in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to laboratory use of this material by a properly trained person. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose. Vinquiry Inc. will not be responsible for damages resulting from use or reliance upon this information.

MSDS Number: **N3660** * * * * * Effective Date: **02/15/08** * * * * * Supersedes: **05/06/05****MSDS****Material Safety Data Sheet**

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



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 800-850-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-696-6666

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

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

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

NITRIC ACID, 50-70%

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 69-70%

CAS No.: 7697-37-2

Molecular Weight: 63.01

Chemical Formula: HNO₃

Product Codes:

J.T. Baker: 5371, 5796, 5801, 5826, 5856, 5876, 5896, 9597, 9598, 9600, 9601, 9602, 9603, 9604, 9606, 9607, 9608, 9610, 9616, 9617, 9670

Mallinckrodt: 1409, 2704, 2705, 2716, 6623, H862, H988, H993, H998, V077, V650

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent
Hazardous		
Nitric Acid	7697-37-2	50 - 70%
Water	7732-18-5	30 - 50%

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Oxidizer)

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:

Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:

Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:

Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:

Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.

Inhalation:

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

Ingestion:

DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:

Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

Water spray may be used to keep fire exposed containers cool. Do not get water inside container.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

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

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

2 ppm (TWA), 4 ppm (STEL)

-ACGIH Threshold Limit Value (TLV):

2 ppm (TWA); 4 ppm (STEL)

Ventilation System:

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

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

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

9. Physical and Chemical Properties

Appearance:

Colorless to yellowish liquid.

Odor:

Suffocating, acrid.

Solubility:

Infinitely soluble.

Specific Gravity:

1.41

pH:

1.0 (0.1M solution)

% Volatiles by volume @ 21C (70F):

100 (as water and acid)

Boiling Point:

122C (252F)

Melting Point:

-42C (-44F)

Vapor Density (Air=1):

2-3

Vapor Pressure (mm Hg):

48 @ 20C (68F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:

When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

Conditions to Avoid:

Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO₂)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

15. Regulatory Information

```

-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA   EC    Japan  Australia
-----
Nitric Acid (7697-37-2)                       Yes   Yes   Yes
Yes
Water (7732-18-5)                             Yes   Yes   Yes
Yes
  
```

```

-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  DSL   NDSL   Phil.
-----
Nitric Acid (7697-37-2)                       Yes   Yes   No     Yes
Water (7732-18-5)                             Yes   Yes   No     Yes
  
```

```

-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-   -SARA 313-
RQ   TPQ   List   Chemical Catg.
-----
Nitric Acid (7697-37-2)                       1000  1000   Yes     No
Water (7732-18-5)                             No    No    No      No
  
```

```

-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     CERCLA   -RCRA-   -TSCA-
261.33   8(d)
-----
Nitric Acid (7697-37-2)                       1000    No      No
Water (7732-18-5)                             No      No
No
  
```

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

Australian Hazchem Code: 2PE

Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 Flammability: 0 Reactivity: 0 Other: Oxidizer

Label Hazard Warning:

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe vapor or mist.

Use only with adequate ventilation.

Wash thoroughly after handling.

Keep from contact with clothing and other combustible materials.

Do not store near combustible materials.

Store in a tightly closed container.

Remove and wash contaminated clothing promptly.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)



MATERIAL SAFETY DATA SHEET (CAUSTIC SODA)

I. PRODUCT IDENTIFICATION

Chemical Name : Sodium Hydroxide
Trade Name : Caustic Soda, 50 %
Synonyms : Liquid Caustic Soda, Caustic,
Soda Lye, Lye Solution

II. COMPOSITION /INGREDIENTS

Sodium Hydroxide, % : 48 – 52 % by weight
Chemical Formula : NaOH
Molecular Weight : 40 g/mole
CAS Registry No. : 1310-73-2

III. HAZARDS IDENTIFICATION

THIS PRODUCT MAY BE : corrosive, toxic and a major potential hazard upon contact to skin and eyes.

TOXICITY ROUTES OF EXPOSURE : Ingestion can cause severe burning and pain in lips, mouth, tongue, throat and stomach. Death can result from ingestion.

OVEREXPOSURE : Causes burns and scarring.
Can cause serious damage to all body tissues contacted.

CANCER INFORMATION : Not applicable

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Chronic eye or skin conditions

IV. FIRST AID MEASURES

SKIN : Remove contaminated clothing and immediately wash skin for a minimum of 15 minutes. Call or see a physician.

EYES : Immediately flush eyes with large amount of water, occasionally lifting the upper and lower eyelids and rotating the eyeballs. Continue flushing for a minimum of 15 minutes. See a physician.

INHALATION : Remove to fresh air. If breathing stops, administer artificial respiration. See a physician.

INGESTION : DO NOT induce vomiting. If person is conscious, give 2 or more glasses of water. If unconscious, never give anything by mouth. See a physician immediately.

V. FIRE FIGHTING MEASURES

Autoignition Point : Not Applicable

Flammability/Explosive limits : Not Applicable

Fire/Explosion Hazards: Contact with strong acids may generate enough heat to ignite combustibles.

Fire Prevention : Not Applicable

VI. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR RELEASE : Completely contain spilled material with dikes, sandbags, etc., and prevent run off into the ground or surface waters or sewers. Recover as much caustic material as possible into containers for disposal. Add water and neutralize remaining caustic material with dilute hydrochloric acid, citric acid or another solid acidic material to a pH between 6 and 9. Collect neutralized caustic with a dry sorbent. Flush residual neutralized waste to the drain with excess water.

VII. HANDLING AND STORAGE

Storage Requirements: Keep container tightly closed.
FOR SMALL VOLUMES : Maybe stored in plastic jugs.
FOR LARGE VOLUMES ; Store in steel storage tanks.
INCOMPATIBLE MATERIALS : Store away from acids.
(Refer to Section X)

VIII. EXPOSURE CONTROLS AND PROTECTION

Adequate ventilation needed. TLV C : 2 mg/m³
Protective Equipment for the eyes and skin :
Goggles, respirator, disposable latex/ rubber apron,
PVC rain suit, rubber boots with pant legs over boots.
Precautionary Hygiene/control measures :
Avoid contact with skin, eyes, and clothing.
Do not breathe mist or vapor. Wash thoroughly after handling. Safety showers and eye wash fountains should be available in storage and handling area.

IX. PHYSICAL AND CHEMICAL PROPERTIES

STATE : liquid
APPEARANCE : colorless or slightly turbid
ODOR : Irritating
pH : Strong base >14
BOILING POINT : 145 °C for ~50% NaOH Solution
FLASH POINT : Not determined
SPECIFIC GRAVITY : 1.51-1.54
VAPOR PRESSURE : ~6.3 mm Hg @ 40°C
SOLUBILITY IN : WATER: miscible, ACID : miscible



MATERIAL SAFETY DATA SHEET (CAUSTIC SODA)

X STABILITY AND REACTIVITY

Stable under normal handling conditions. Materials and conditions to avoid (incompatibility) are:

- Chlorinated hydrocarbons, acetaldehyde, acrolein, aluminum, chlorine trifluoride, hydroquinone, maleic anhydride, and phosphorous pentoxide.
- Dilution with water evolves large quantity of heat.

Hazardous decomposition & combustion product = none

Hazardous polymerization will not occur.

XI TOXICOLOGICAL INFORMATION

Effects from skin contact – Contact with skin can cause severe burns with deep ulcerations. Contact with solution or mist can cause multiple burns with temporary loss of hair at burn site.

Effects from eye contact – Liquid in the eye can cause severe destruction and blindness. These effects can occur rapidly affecting all parts of the eye. Mist can cause irritation with high concentration causing destructive burns.

XII ECOLOGICAL INFORMATION

ECOTOXICITY DATA : High basicity may pose potential hazard to plant and marine life.

XIII DISPOSAL CONSIDERATIONS

Dispose of in accordance with all Government and Local regulations.

XIV TRANSPORT INFORMATION

Transportation of Dangerous Goods

TDG Classification: Do not ship by air.

DOT Hazard Classification: Class 8 : Corrosive

DOT Shipping Name : Sodium Hydroxide ID: UN1824

XV REGULATORY INFORMATION

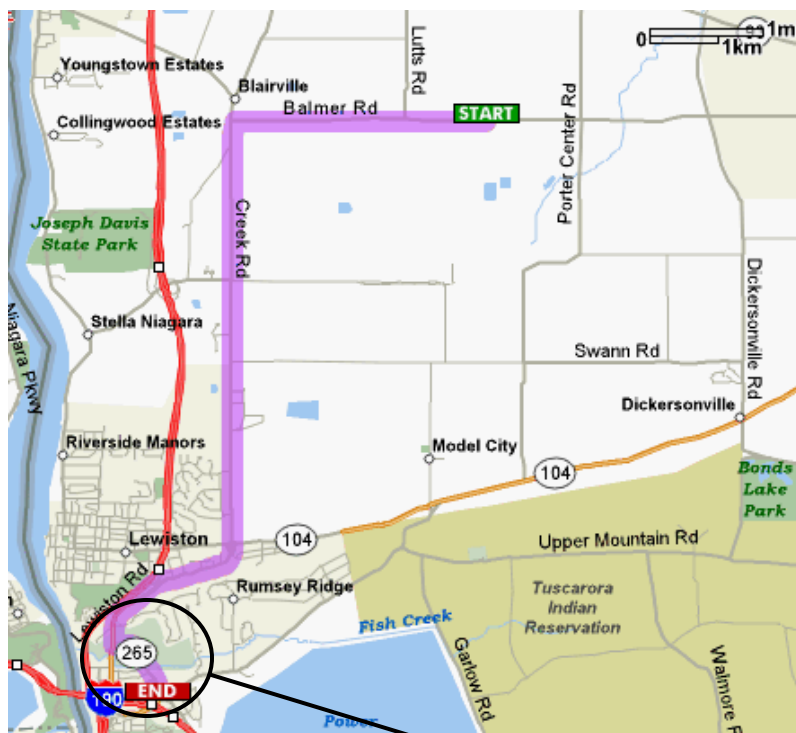
No data available

XVI OTHER INFORMATION

This MSDS contains information under the sixteen (16) section headings written in accordance with the International Standard ISO 11014 "Safety Data Sheet for Chemical Products".

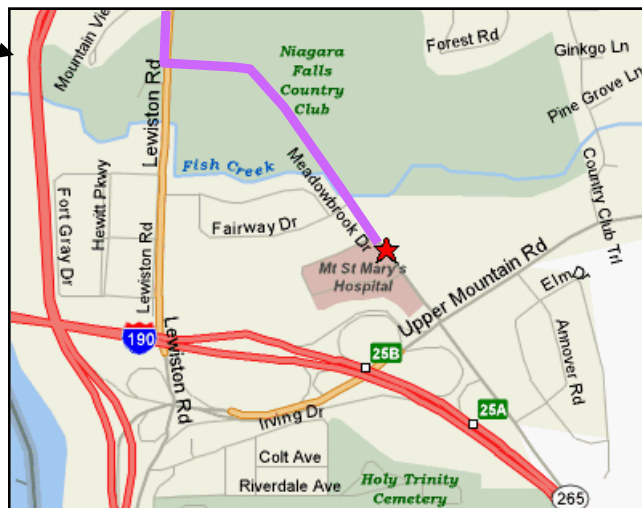
THE INFORMATION CONTAINED HEREIN IS PRESENTED IN GOOD FAITH AND BELIEVED TO BE CORRECT AS OF THE DATE ISSUED. HOWEVER, NO WARRANTY, EXPRESSED OR IMPLIED, IS GIVEN BY MABUHAY VINYL CORPORATION REGARDING THE USE OF THIS MATERIAL SAFETY DATA SHEET (MSDS).

APPENDIX G
Emergency Contacts and Emergency Medical Care Locations



Emergency Numbers:

Police	911
Fire	911
Ambulance	911
Mount St. Mary's Hospital	(716) 297-4800
New York Poison Control	1-800-222-1222



Directions from CWM Main Gate:

Turn left (west) onto Balmer Rd. and proceed for 2 miles to Rt. 18 (Creek Rd.).
 Turn left (south) onto Creek Rd. and proceed for approximately 5 miles.
 Turn right (southwest) onto Rt. 104 (Lewiston Rd.) and proceed approximately 0.5 mile.
 Turn left (southeast) onto Rt. 265 (Military Rd.) and proceed approximately 0.5 miles.
 Mount St. Marys Hospital is on the right.

DIRECTIONS AND ROUTE TO NEAREST HOSPITAL

APPENDIX H
USACE Form 3394

(For Safety Staff only)	REPORT NO.	EROC CODE GO	UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT <i>(For Use of this Form See Attached Instructions and USACE Suppl to AR 385-40)</i>				REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)
1. ACCIDENT CLASSIFICATION							
PERSONNEL CLASSIFICATION		INJURY/ILLNESS/FATAL	PROPERTY DAMAGE		MOTOR VEHICLE INVOLVED	DIV NG	
GOVERNMENT <input type="checkbox"/> CIVILIAN <input type="checkbox"/> MILITARY		<input type="checkbox"/>	<input type="checkbox"/> FIRE INVOLVED <input type="checkbox"/> OTHER		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> CONTRACTOR		<input type="checkbox"/>	<input type="checkbox"/> FIRE INVOLVED <input type="checkbox"/> OTHER		<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> PUBLIC		<input type="checkbox"/> FATAL <input type="checkbox"/> OTHER			<input type="checkbox"/>		
2. PERSONAL DATA							
a. NAME (Last, First, MI)		b. AGE	c. SEX <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE	d. SOCIAL SECURITY NUMBER		e. GRADE	
f. JOB SERIES/TITLE		g. DUTY STATUS <input type="checkbox"/> ON DUTY <input type="checkbox"/> TDY <input type="checkbox"/> OFF DUTY		h. EMPLOYMENT STATUS AT TIME OF ACCIDENT <input type="checkbox"/> ARMY ACTIVE <input type="checkbox"/> ARMY RESERVE <input type="checkbox"/> VOLUNTEER <input type="checkbox"/> PERMANENT <input type="checkbox"/> FOREIGN NATIONAL <input type="checkbox"/> SEASONAL <input type="checkbox"/> TEMPORARY <input type="checkbox"/> STUDENT <input type="checkbox"/> OTHER (Specify)			
3. GENERAL INFORMATION							
a. DATE OF ACCIDENT <i>(month/day/year)</i>	b. TIME OF ACCIDENT <i>(military time)</i> hrs	c. EXACT LOCATION OF ACCIDENT			d. CONTRACTOR'S NAME (1) PRIME:		
e. CONTRACT NUMBER <input type="checkbox"/> CIVIL WORKS <input type="checkbox"/> MILITARY <input type="checkbox"/> OTHER (SPECIFY)		f. TYPE OF CONTRACT <input type="checkbox"/> CONSTRUCTION <input type="checkbox"/> SERVICE <input type="checkbox"/> A/E <input type="checkbox"/> DREDGE <input type="checkbox"/> OTHER (SPECIFY)		g. HAZARDOUS/TOXIC WASTE <input type="checkbox"/> SUPERFUND <input type="checkbox"/> DERP <input type="checkbox"/> IRP <input type="checkbox"/> OTHER (SPECIFY)		d. CONTRACTOR'S NAME (2) SUBCONTRACTOR	
4. CONSTRUCTION ACTIVITIES (Fill in line and corresponding code number in box from list - see instructions)							
a. CONSTRUCTION ACTIVITY (CODE) #		b. TYPE OF CONSTRUCTION EQUIPMENT (CODE) #					
5. INJURY/ILLNESS INFORMATION (Include name on line and corresponding code number in box for items e, f & g - see instructions)							
a. SEVERITY OF ILLNESS/INJURY (CODE) #		b. ESTIMATED DAYS LOST		c. ESTIMATED DAYS HOSPITALIZED	d. ESTIMATED DAYS REST. DUTY		
e. BODY PART AFFECTED PRIMARY (CODE) # (CODE) #		g. TYPE AND SOURCE OF INJURY/ILLNESS TYPE (CODE) # (CODE) #					
f. NATURE OF ILLNESS/INJURY (CODE) #							
6. PUBLIC FATALITY (Fill in line and correspondence code number in box - see instructions)							
a. ACTIVITY AT TIME OF ACCIDENT (CODE) #		b. PERSONAL FLOATATION DEVICE USED? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A					
7. MOTOR VEHICLE ACCIDENT							
a. TYPE OF VEHICLE <input type="checkbox"/> PICKUP/VAN <input type="checkbox"/> AUTOMOBILE <input type="checkbox"/> TRUCK <input type="checkbox"/> OTHER (Specify)		b. TYPE OF COLLISION <input type="checkbox"/> SIDE SWIPE <input type="checkbox"/> HEAD ON <input type="checkbox"/> REAR END <input type="checkbox"/> BROADSIDE <input type="checkbox"/> ROLL OVER <input type="checkbox"/> BACKING <input type="checkbox"/> OTHER (Specify)		c. SEAT BELTS (1) FRONT SEAT (2) REAR SEAT	USED	NOT USED	
						NOT AVAILABLE	
8. PROPERTY/MATERIAL INVOLVED							
a. NAME OF ITEM		b. OWNERSHIP			c. \$ AMOUNT OF DAMAGE		
(1)							
(2)							
(3)							
9. VESSEL/FLOATING PLANT ACCIDENT (Fill in line and correspondence code number in box from list - see instructions)							
a. TYPE OF VESSEL/FLOATING PLANT (CODE) #		b. TYPE OF COLLISION/MISHAP (CODE) #					
10. ACCIDENT DESCRIPTION (Use Additional paper, if necessary)							
See attached page.							

11. CASUAL FACTORS (Read Instructions Before Completing)					
a. (Explain YES answers in item 13 DESIGN: Was design of facility, workplace or equipment a factor?	YES	NO	a. (CONT NUED) CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors, or physical agents such as noise, radiation, etc. contribute to accident?	YES	NO
INSPECTION/MA NTENANCE: Were inspection & maintenance procedures a factor?	<input type="checkbox"/>	<input type="checkbox"/>	OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc. contribute to the accident?	<input type="checkbox"/>	<input type="checkbox"/>
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	<input type="checkbox"/>	<input type="checkbox"/>	SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	<input type="checkbox"/>	<input type="checkbox"/>
OPERATING PROCEDURES: Were operating procedures a factor?	<input type="checkbox"/>	<input type="checkbox"/>	PERSONAL PROTECTIVE EQPT: Did the improper selection, use or maintenance of personal protective eqpt contribute to the accident?	<input type="checkbox"/>	<input type="checkbox"/>
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	<input type="checkbox"/>	<input type="checkbox"/>	DRUGS/ALCOHOL: In your opinion, was deugs or alcohol factor to the accident?	<input type="checkbox"/>	<input type="checkbox"/>
HUIMAN FACTORS: Did any human factors such as size or strength of person, etc., contribute to accident?	<input type="checkbox"/>	<input type="checkbox"/>	b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT? <input type="checkbox"/> YES (If yes, attach a copy) <input type="checkbox"/> NO		
ENV RONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc. contribute to the accident?	<input type="checkbox"/>	<input type="checkbox"/>			

12. TRAINING		
a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? <input type="checkbox"/> YES <input type="checkbox"/> NO	b. TYPE OF TRAIN NG <input type="checkbox"/> CLASSROOM <input type="checkbox"/> ON JOB	c. DATE OF MOST RECENT FORMAL TRAINING Month/Day/Year

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT INCLUDE DIRECT AND INDIRECT CAUSES (See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)

a. DIRECT CAUSE

See attached page.

b. INDIRECT CAUSE(S)

See attached page.

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S)

 DESCRIBE FULLY:

See attached page.

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)
c. SIGNATURE AND TITLE OF SUPERVISOR CORPS CONTRACTOR	d. DATE (Month/Day/Year)
	e. ORGANIZATION IDENTIFIER (Div,Br,Sect)
	f. OFFICE SYMBOL

16. MANAGEMENT REVIEW (1st)

a. <input type="checkbox"/> CONCUR	b. <input type="checkbox"/> NON CONCUR	c. COMMENTS
SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW (2nd - Chief Operations, Construction, Engineering, etc.)

a. <input type="checkbox"/> CONCUR	b. <input type="checkbox"/> NON CONCUR	c. COMMENTS
SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. <input type="checkbox"/> CONCUR	b. <input type="checkbox"/> NON CONCUR	c. ADDITIONAL ACTIONS/COMMENTS
SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

 COMMENTS

COMMANDER SIGNATURE
DATE

10. ACCIDENT DESCRIPTION (Continuation)

13a. DIRECT CAUSE (Continuation)

13b. INDIRECT CAUSES (Continuation)	

14. ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) (Continuation)	

APPENDIX I
ERT OSHA 300A Reporting Data

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases			
Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	1	0	5
(G)	(H)	(I)	(J)

Number of Days	
Total number of days away from work	Total number of days of job transfer or restriction
1	0
(K)	(L)

Injury and Illness Types			
Total number of... (M)			
(1) Injury	3	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	3

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name

Earth Resources Technology, Inc

Street

10810 Guilford Rd, Suite 105

City

Annapolis Junction

State

MD

Zip

20701

Industry description (e.g., Manufacture of motor truck trailers)

IT, Earth Sciences, Geophysics, Environmental, Remote Sensing

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

951 871 874 873 179 495

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information

Annual average number of employees

358

Total hours worked by all employees last year

546211.5

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and correct

Company Executive

Phone

Title

Date

1/29/2010

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses



All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of... (M)			
(1) Injury	1	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave. NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name Earth Resources Technology, Inc.

Street 10810 Guilford Road, Suite 105

City Annapolis Junc ion State MD Zip 20701

Industry description (e.g., Manufacture of motor truck trailers)
IT, Earth Sciences, Geophysics, Environmental, Remote Sensing

Standard Industrial Classifica ion (SIC), if known (e.g., SIC 3715)
899 871 874 737

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
_ _ _ _ _

Employment information

Annual average number of employees 279

Total hours worked by all employees last year 514347

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and hat to the best of my knowledge the entries are true, accurate, and complete.

Company executive President
Title

301-323-1410 Phone 1/31/2009 Date

OSHA's Form 300A

Summary of Work-Related Injuries and Illnesses

Year 2007



U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
(G)	(H)	(I)	(J)

Number of Days

Total number of days of job transfer or restriction	Total number of days away from work
<u>0</u>	<u>0</u>
(K)	(L)

Injury and Illness Types

Total number of... (M)			
(1) Injury	<u>2</u>	(4) Poisoning	<u>0</u>
(2) Skin Disorder	<u>0</u>	(5) All other illnesses	<u>0</u>
(3) Respiratory Condition	<u>0</u>		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave. NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name Earth Resources Technology, Inc.

Street 10810 Guilford Road, Suite 105

City Annapolis Junction State MD Zip 20701

Industry description (e.g., Manufacture of motor truck trailers)
IT, Earth Sciences, Geophysics, Environmental, Remoting Sensing

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
899 871 874 737

Employment information

Annual average number of employees 174

Total hours worked by all employees last year 339023

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true,

[Signature] President
Title

301-361-0658 Phone 1/31/2008 Date

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses



All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases			
Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days	
Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types			
Total number of... (M)			
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name

Earth Resources Technology, Inc.

Street

10810 Guilford Road, Suite 105

City

Annapolis Junction

State

MD

Zip

20701

Industry description (e.g., Manufacture of motor truck trailers)

IT, Earth Science, Geophysics, Environmental, Remote Sensing

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

899871874737

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information

Annual average number of employees

100

Total hours worked by all employees last year

208,000

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Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

President

Title

240-554-0161

Phone

1/24/2007

Date

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses



All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

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Number of Cases			
Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days	
Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types			
Total number of... (M)			
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

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Establishment information

Your establishment name

Earth Resources Technology, Inc.

Street

8106 Stayton Drive

City

Jessup

State

MD

Zip

20794

Industry description (e.g., Manufacture of motor truck trailers)

IT, Earth Science, Geophysics, Environmental, Remote Sensing

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

899871874737

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information

Annual average number of employees

35

Total hours worked by all employees last year

48,000

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Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Principal Title

240-554-0161

Phone

1/24/2006

Date

OSHA's Form 300A

Summary of Work-Related Injuries and Illnesses

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

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Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days of job transfer or restriction	Total number of days away from work
0	0
(K)	(L)

Injury and Illness Types

Total number of... (M)			
(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) All other illnesses	0
(3) Respiratory Condition	0		

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

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Establishment information

Your establishment name Earth Resources Technology, Inc.

Street 8106 Stayton Drive

City Jessup State MD Zip 20794

Industry description (e.g., Manufacture of motor truck trailers)
IT, Geophysics, and Environmental Consulting Services

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
899 874 871 737

Employment information

Annual average number of employees 14

Total hours worked by all employees last year 26550

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Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Principal Title

240-554-0161 Phone 1/26/2004 Date