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US Army Corps of Engineers
Engineering & Support Center
Huntsville, Alabama

Seneca Army Depot Activity
Romulus, New York

ACCIDENT PREVENTION PLAN AND GENERIC SITE-WIDE HEALTH AND SAFETY PLAN FOR SENECA ARMY DEPOT ACTIVITY

CONTRACT NO. DACA87-02-D-0005
CONTRACT NO. DACA87-95-D-0031

PARSONS

March 2005

Description **Page**

This Accident Prevention Plan (APP) was prepared in support of work being conducted by Parsons Engineering Science, Inc. (Parsons) at the Seneca Army Depot Activity in Romulus New York under Contracts DACA87-95-D-0031 and DACA87-02-D-0005 with the U.S. Army, Engineering and Support Center, Huntsville, the U.S. Army Base Realignment and Closure Office, and the U. S. Army Corp of Engineers, New York District. This Accident Prevention Plan has been prepared in accordance with requirements identified in, and guidance provided within U.S. Army Engineering Manual EM 385-1-1 "**Safety - Safety and Health Requirements,**" Appendix A "Minimum Basic Outline for Accident Prevention Plan" dated 3 Nov 03. It is supplemented by the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity, which is included as **Appendix A** of this document. Please refer to Appendix A for all site-specific information.

1. SIGNATURE SHEET

- Plan Prepared By:

Name: Jim L. Owen	Title: Safety Manager
Signature:	Phone Number: 210-805-2291

Note: Qualified person such as Corporate Safety Person, QC

- Plan Approved By:

Name: Ross N. Miller, PhD, PE	Title: Vice President
Signature:	Phone Number: 801-572-5999

Note: Company/Corporate Officers authorized to obligate the company (Owner, Company President, Regional Vice President)

- Approval Concurrence By:

Name: Andrew D. Peters	Title: Corporate Vice President, Safety
Signature:	Phone Number: 626-440-4440

Note: Chief of Operations, Corporate Chief of Safety, Corporate Industrial Hygienist, Project Manager or Superintendent, Project Safety Professional, Project QC, or Contractor

2. BACKGROUND INFORMATION

- **Contractor**

Parsons Engineering Science, Inc.
150 Federal Street, 4th Floor
Boston, Massachusetts 02110-1713
(617) 946-9400 telephone
(617) 946-9777 facsimile

- **Contract Numbers**

DACA87-95-D-0031 and DACA87-02-D-0005

- **Program Name**

Seneca Army Depot Activity

- **Brief Program Description, Description of Work to be Performed, and Location**

Architect-Engineer and Facilities Master Planning/Construction Support Services for Environmental Services under the Defense Environmental Restoration Program (DERP), Resource Conservation and Recovery Act (RCRA) (including the Hazardous and Solid Waste Amendments of 1984); Comprehensive Environmental Response, Compensation and Recovery Act (CERCLA) [including the Superfund Amendments and Reauthorization Action (SARA)]; National Environmental Policy Act (NEPA); Clean Water Act; Clean Air Act and Clean Air Act Amendments; Toxic Substances Control Act (TSCA); Safe Drinking Water Act; environmental compliance assessment; and other Federal and State regulations that are applicable to environmental activities at the Seneca Army Depot Activity in Romulus, New York.

Work undertaken under the identified contract vehicles is performed on a task or delivery order basis. Each delivery order has individual requirements and goals. Individual tasks may consist of only office type work (e.g., report or document preparation, preparation and presentation of investigation summaries, etc.), performance of field surveys, investigations or studies (e.g., site investigations, periodic groundwater monitoring, GPS surveys, etc.) or combinations of both office type and field activities. Individual delivery order assignments may also involve work of Parsons personnel from the Boston and other offices, work requiring the collaboration of Parsons personnel and Army designated co-contractors, work requiring Parsons personnel and Parsons retained subcontractors, or any combination of the above. Requirements of this Accident Prevention Plan and Parsons overall Programmatic Health and Safety Program are applicable to employees and subcontractors of Parsons.

Location of Romulus, New York – Map copied from www.mapquest.com

Location of Seneca Army Depot, between Cayuga and Seneca Lakes – Map copied from www.mapqquest.com. A detailed site map is provided in the figures section of Appendix A.

- **Contractor Accident Experience**

As of January 18, 2005 Parsons' EMR is 0.81. Please see the attached corporate safety statistics and trend analysis in **Appendix E** and **Appendix F**.

- **Listing of Phases of Work and Hazardous Activities requiring AHA**

1	Soil Sampling (with drill rig)
2	Soil Sampling (with hand tools)
3	Surface Water Sampling
4	Groundwater Sampling
5	Installing a Monitoring Well
6	Radiation Scanning
7	UXO Avoidance
8	Test Pits
9	Abandoning a Monitoring Well
10	IDWs / Drum Moving / Filling / Emptying
11	Driving in the Ammo Area / "Q"
12	Decontamination Area set-up
13	Building Soil Piles
14	Surveying / GPS
15	Working on Igloo Rooftops
16	Building Decontamination
17	Trenching
18	Soil Excavation
19	Site Walk / Visit
20	Power and Hand Tool Operation
21	Heavy and Motorized Equipment Operation
22	Project Mobilization / Demobilization
23	Personnel Decontamination
24	Tool / Equipment Decontamination

Note: These AHAs are included as an attachment to the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity. New AHAs will be developed as needed and will be provided with the site-specific HSPs.

3. STATEMENT OF SAFETY AND HEALTH POLICY

As an industry-leading engineering, construction and technical services firm, Parsons is firmly committed to maintaining a safe and healthy working environment at all its offices and project facilities. We share the National Safety Council Safety and Health Code of Ethics as the principles guiding our commitment to safety.

- We will hold safety and health as our highest core value.
- Executive management will lead the safety improvement process.
- Safety will be a responsibility shared by everyone in our organization.
- Safety performance will be a key indicator of our organizational excellence and will be incorporated into our business processes.
- We will communicate safety performance openly with employees.
- All employees will be given the knowledge and skills necessary to safely perform their jobs.
- We will extend our safety efforts beyond the workplace to include transportation, homes and communities.
- We will continually strive to improve our safety and health processes.

To meet its health and safety objectives, all Parsons employees are expected to act proactively with regard to health and safety issues. This requires the combined efforts of a concerned management, responsible and knowledgeable supervision, and conscientious, well-trained employees.

Parsons will take all reasonable action to meet or exceed the applicable occupational health safety requirements, domestically and internationally, and will continuously monitor and improve operations, procedures, technologies and programs that are conducive to maintaining a safe and healthy working environment.

James F. McNulty
Chairman and Chief Executive Officer
2004

3.1 Implementation of Parsons Corporate Safety and Health Policy

Parsons' Safety, Health, and Risk Management Program (**SHARP Management**) is one of the most important tools in our corporate commitment to implementing best practices in achieving zero incidents. **SHARP Management** formalizes our corporate Zero Incident management approach. The Zero Incident philosophy originated with a study by the Construction Industry Institute (CII) that identified specific control measures shown to dramatically reduce the probability of incidents. These control measures, known as Zero Incident Techniques, provide the framework for SHARP Management. SHARP Management is Parsons' proactive approach to manage the three interrelated areas of safety, health, and risk management.

To ensure the success of the SHARP Management, Parsons' safety culture must be dynamic and evolving. This begins with training all management personnel in the foundations and philosophy of SHARP Management through Supervisory Training in Accident Reduction Techniques, known as the START program. This training lays the groundwork for SHARP Management by creating accountability and responsibility for the safety and risk process with all employees. All Parsons supervisors must complete START training.

SHARP Management is based on nine Zero Incident Techniques, each essential to the success of our project safety programs. Details of the Zero Incident Techniques are provided in Table 1. These techniques establish the distinct Parsons Safety culture by standardizing our safety, health, and risk program and empowering every employee to take action to eliminate injury and enhance safety.

3.2 The Project Safety Plan or Design/Office Safety Plan

The Project Safety Plan (PSP) or Design/Office Safety Plan (DSOP) is essential to the successful and consistent implementation of Parsons' safety program on all projects. For construction or other high-risk projects, developing a PSP/DOSP, the first work element in the SHARP Management, is one of a Project Manager's highest priorities after receiving notice to proceed. A clear and concise PSP/DOSP helps ensure effective implementation of the overall safety program.

Each project PSP/DOSP must be tailored to the risks of the job. Some of our projects that involve a variety of complex hazards require a substantial PSP/DOSP containing comprehensive guidance. On less complex projects, the PSP/DOSP may be a simple, brief document that covers the basic elements of SHARP Management. In all cases, the PSP/DOSP must have sufficient detail to ensure the safe management and performance of all project work.

Zero Incidents Techniques: A Snapshot of What and Why		
Key Technique		**What and Why**
1	Demonstrated Management Commitment	All levels of management consistently display their commitment to the SHARP Management process. As organization leaders, managers are role models whose actions send a strong message to employees.
2	Staffing for Safety	Each GBU funds a full-time Safety Manager to assist in implementing and administering Parsons' safety program and SHARP Management. The safety manager consults with line organizations, helping to emphasize that safety is the responsibility of each employee on the project, not just the safety department.
3	Safety Planning – Pre-project/Pre-task	Planning safety into design and construction by using activity hazards analyses is key to eliminating accidents and incidents in the workplace. Planning job tasks with safety as a key component raises safety awareness of supervisors and employees. Pre-task planning improves productivity and reduces the negative impact of direct and indirect costs of accidents.
4	Safety Training and Education	Orientations, daily and weekly training sessions are conducted at all levels of an organization. Specialized training is also conducted to provide specific knowledge about hazardous work activities. Ongoing safety orientation and training gives employees the knowledge and skills to complete their job tasks without injury.
5	Worker Involvement and Participation	Empowering employees to identify hazards in the workplace is a valuable tool to increase safety awareness. Conducting labor-management safety committee meetings allows a forum to coordinate and resolve safety issues. When employees identify and have the ability to correct hazards in the workplace, safety motivation and awareness increase and fewer accidents occur.
6	Recognition and Rewards	Employee recognition programs to reward and recognize employees for safe behavior can be based on individual or group accomplishments. Safe behavior is positively reinforced through management involvement, personal contact, communication, and training.
7	Subcontractor Management	Project Managers must ensure subcontractors comply with safety and health rules and regulations in accordance with contractual requirements. Aggressive management of subcontractor safety reduces accidents and incidents on the jobsite and reduces the risk of general liability claims against the company.
8	Accident/Incident Reporting and Investigation	Each project must investigate accidents and incidents immediately and report to the appropriate GBU personnel. The investigation process includes root cause determination and recommendations to prevent future occurrences.
9	Drug and Alcohol Testing	Employees are tested for drugs and alcohol where and when permitted by state law and local collective bargaining agreements during pre-employment, at random, post-accident, and when reasonable suspicion exists. Testing employees for drugs and alcohol reduces the likelihood of serious injuries as a result of workers being impaired while working on a project.

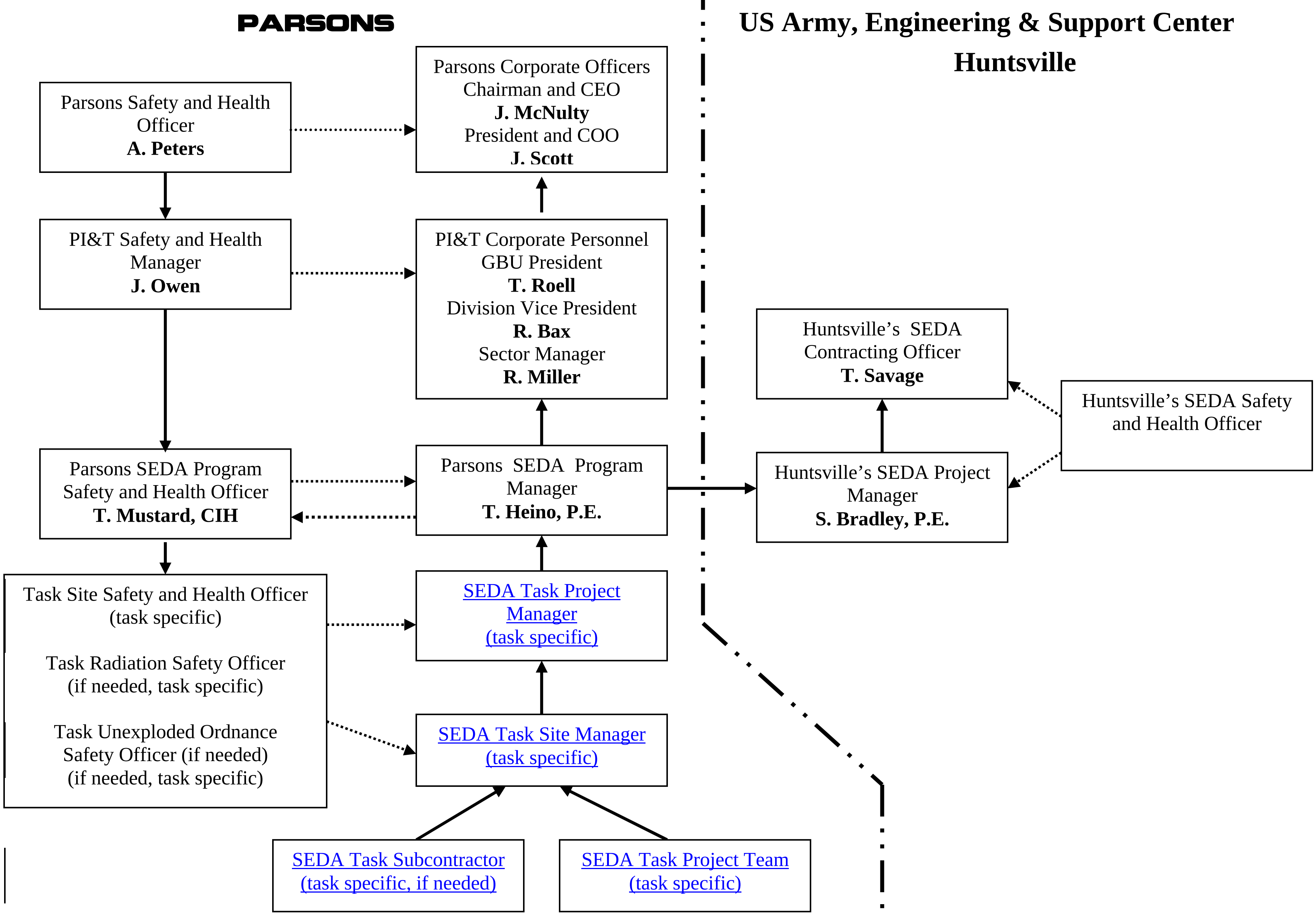
4. RESPONSIBILITIES AND LINES OF AUTHORITY

Work performed by Parsons is run and managed at the Project/Program level, with administrative guidance and assistance provided at both the Global Business Unit (e.g., Parsons Infrastructure & Technology Group) and Parsons Corporate levels. A listing of the personnel responsible for the implementation and maintenance of Parsons' SHARP Management is provided in **Table 2**. A figure identifying the lines of communication and reporting is provided in **Figure 1**. Additional information regarding project responsibilities is provided in Appendix A Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity, Section 4.

Table 2

SENECA ARMY DEPOT ACTIVITY Program/Project Level Authority and Responsibility	
Program Manager/Project Manager ***Mr. Todd M. Heino, P.E./Designated separately for each task***	Reports to upper-level management, has authority to direct response operations, assumes total control over Program/Project site activities.
Program Health and Safety Officer PHSO) ***Mr. Timothy S. Mustar, CIH***	Advises the Program/Project Manager, SHSO, UXOSO, and RSO on all aspects of health and safety.
Site Health and Safety Officer (SHSO) ***Designated separately for each project***	Reports to the PHSO on all aspects of Safety and Health onsite, performs day-to-day H&S tasks, stops work if any operation threatens worker or public health and/or safety.
Unexploded Ordnance Safety Officer ***If needed, designated separately***	Advises the Project Manager on all aspects of health and safety on site, stops work if any operation threatens work or public health or safety.
Radiation Safety Officer ***If needed, designated separately***	Responsible for radiation safety during field activities.
Parsons Project Staff and Subcontractors ***Designated separately for each project***	Act proactively with regard to project-specific and general health.
Corporate Authority and Responsibility	
Parsons CEO/Chairman ***Mr. James F. McNulty***	Provides leadership and company-wide direction on SHARP Management goals and objectives.
Parsons COO/President ***Mr. John A. Scott***	Provides leadership and company-wide direction on SHARP Management goals and objectives.
Corporate Safety ***Mr. Andrew D. Peters***	Provides technical and programmatic content to the CEO/President and company-wide direction and leadership on SHARP Management processes.
Global Business Unit Authority and Responsibility	
PI&T President ***Mr. Thomas L. Roell***	Defines GBU expectations and accountability consistent with corporate SHARP Management goals and objectives.
PI&T Business Development Manager ***Mr. Martin N. Fabrick***	Establishes requirements applicable to each project.
PI&T Safety Manager ***Mr. Edward C. Bishop***	Provides oversight, technical guidance, training, and support to project safety managers; leads safety audit efforts; and champions implementation of safety initiatives.
PI&T Quality Manager ***Mr. Edward C. Bishop***	Audits SHARP Management processes as part of the quality assurance audit of project management plans (PMPs).
PI&T Risk Manager ***Mr. Edward C. Bishop***	Establishes requirements applicable to each project.
Environment and Resource Management Division Manager ***Mr. Robert B. Bax***	Establishes division-level safety initiatives; monitors development and use of PSP (Project Safety Plan)/DOSPs (Design/Office Safety Plan) for all division projects.
Restoration and Design Sector Manager ***Mr. Ross N. Miller***	Works closely with Project Managers to ensure PSP/DOSP implementation.

b. Lines of Authority



5. SUBCONTRACTORS AND SUPPLIERS

Subcontractors and suppliers are identified and selected by Parsons and the Army on a delivery order/project specific basis, and will be identified in the delivery order/project work plan and/or delivery order/project site-specific Health and Safety Plan (HASPs). Selected subcontractors or suppliers may include drillers, riggers, contract analytical laboratory services, excavation contractors or equipment providers, other architect-engineering firms, specialty UXO avoidance personnel, geophysicists, surveyors, etc.

It is Parsons' policy to strictly comply with all applicable requirements of the Federal Acquisition Regulations (FARs) and other Federal, state or local laws and regulations in the procurement of services (subcontracts) or goods (purchase orders) under federally funded contracts. The FARs establish and define uniform policies and procedures of acquisition by all federal executive agencies. The FARs are the primary document governing acquisitions by the federal government. The FARs are supplemented by individual agency regulations which prescribe additional policies and procedures as necessary to satisfy the specific needs of the agency. The FARs address all phases of procurement by the US government including acquisition planning, contracting methods and types, socioeconomic programs, general and special contracting requirements, contract management, solicitation provisions, and contract clauses and forms. All federal contracts embody the policies and procedures mandated by the FARs, as reflected in the contract terms and conditions.

Program Managers/Project Managers, in conjunction with Subcontract Administrators and Purchasing Agents, are responsible for defining the FAR requirements of a particular contract and describing the flow down and other applicable and necessary provisions that must be incorporated in Parsons subcontracts and purchase orders. Contract flow down provisions are to be appropriately tailored and incorporated into the "Special Provisions" section of the subcontract and purchase order forms.

Parsons' procurement process under our contract vehicles with the Army includes defining technical and FARs task order subcontractor or supplier requirements, identifying potential sources, solicitation and evaluation/selection of the supplier or subcontractor, award of the purchase order (PO) or subcontract (SC), PO/SC administration, and PO/SC close-out.

Parsons Health and Safety Program requires each subcontractor to submit with its proposal a completed Subcontractor Safety Data Questionnaire form. Health and Safety also provides the following criteria to evaluate supplier responses. Projects should consider eliminating from consideration suppliers that fail to complete or return partially completed questionnaires. Acceptable supplier responses for each of the following areas are:

- Workers Compensation Insurance
    - Current Workers Compensation Insurance Experience Modification Rate (EMR) less than or equal to 1.00.

- ◦ Current EMR is greater than 1.00, but the trend for the past 3 years is downward and no single EMR during that period was above 1.20. (For example, a firm whose EMR's for the last 3 years have been 1992-1.19; 1993-1.13; and 1994-1.05 is acceptable).
- ◦ Some subcontractors may not provide a true EMR because they have been in business less than 1 year, they have less than 5 full-time employees, or they are self-insured. In such cases consider a firm with an OSHA Recordable Incident Rate less than or equal to 15 injuries and illnesses per 200,000 manhours is acceptable.

- OSHA Recordable Incidents
  - Many firms are not required to maintain an OSHA 300 log because they have fewer than 10 employees at any time during the calendar year or are exempted by virtue of the services they perform (SIC categories 52-89 [excluding 52-54, 70, 75, 76, 79, and 80]). These firms should be evaluated on the basis of their safety program and EMRs.
  - Firms not exempt from OSHA record keeping requirements that fail to complete Part B of the questionnaire should be eliminated from consideration.
  - An acceptable OSHA Recordable Incident Rate is less than or equal to 15 injuries and illnesses per 200,000 manhours and no fatalities. The rate is calculated as follows:

$$\text{OSHA recordable Incident rate} = \frac{\text{(total number of recordable injuries and illnesses)}}{\text{(total hours worked last year from Question B-2)}}$$

Prior to the mobilization of personnel to the site, each subcontractor to Parsons must submit a written subcontractor safety plan (SSP) for review and approval. The Program Manager/Project Manager reviews the SSP for compliance with contract safety specifications, quality, and applicability to risks of the work. At a minimum, the SSP shall comply with the contract and shall contain information to detail specific issues relating to the following topics (as applicable).

- Accountability/Responsibility/Key Line Personnel
- Statement of Subcontractor’s Safety and Health Policy
- Identification of Competent/Qualified Persons
- Scope of Work Evaluation
- Hazard/Risk/Exposure Assessment
- Control Measures/Activity Hazard Analysis
- Subcontractor Periodic Safety Audits/Inspections
- Subcontractor’s Weekly Safety Planning – Weekly Look Ahead Plan
- Compliance Requirements and Policy
- Written Progressive Disciplinary Program
- Hazard Correction System
- Training and Instruction
- Project Site Orientation
- Communication System

- Recordkeeping
- Accident/Exposure Investigation
- Emergency Action Plan
- Site-Specific Medical Emergency Plan
- Written Hazard Communication Program
- Written Trenching and Shoring Plan (if applicable)
- Written 100% Fall Protection Plan (if applicable)
- Other written programs as specified by regulatory agency or contract Requirements
- List of Attachments

If necessary, the Program Manager/Project Manager may present workshops on how to develop a safety program to help subcontractors comply with the contract.

6. TRAINING

Training is the foundation upon which all of Parsons' other protective measures depend. All Parsons employees, including managers and supervisors, must be trained by qualified personnel on general and job-specific safety and health practices. The content and extent of health and safety training depends on the nature of the work and the responsibilities of the personnel performing the work. All Parsons health and safety training programs will cover:

- Parsons health and safety policy
- Hazards of the work
- General office safety
- Safe work practices
- Protective clothing, equipment, or engineering controls (where appropriate)
- Emergency procedures
- Employee rights and responsibilities

Specific instruction in hazards unique to a program/project assignment or location must supplement this training, as necessary. For example, all Parsons personnel who work in the following areas must receive training before beginning work.

- Laboratories
- Hazardous wastes field investigations
- Industrial field investigations
- Asbestos management
- Construction site activities
- Treatment plants
- Stack sampling

Introductory safety training will be provided by the corporate health and safety staff, qualified designees, or outside training providers. Training on specific office or plant safety procedures is the responsibility of the Project Facility Health and Safety Representative. Project-specific training will be conducted by the Project Health and Safety Officer or other qualified persons.

Health and safety staff who have specific responsibilities for health and safety guidance on site, such as Project Health and Safety Officers, must have the same training provided to site workers and advanced training in health and safety issues, policies, and techniques.

The Project Health and Safety Officer is responsible for verifying that Parsons subcontractors are in compliance with federal and state safety training requirements relevant to their field operations. (Safety training covering the work performed by a subcontractor is the responsibility of the subcontractor. It is not the responsibility of Parsons to provide that training unless specific training arrangements have been agreed upon in writing between Parsons and the subcontractor.)

All employees working on site as general site workers (such as equipment operators, general laborers and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained experienced supervisor. Such training shall include review of:

- Health and Safety Plan overview
- Project rules and disciplinary policies
- Reporting incidents and unsafe conditions
- Location-specific hazards
- Site personnel roles and responsibilities
- Site description
- Site characterization
- Chemical and physical hazards communication
- Heat stress and cold stress
- Site layout, site control measures, and work zones
- Personal Protective Equipment
- Air and personnel monitoring
- Safe work practices and engineering controls
- Emergency response plan
- Evacuation procedures
- Emergency and personnel protective equipment
- Emergency telephone numbers
- Directions to the hospital
- Medical surveillance requirements
- Health and safety training

Employees working on site only occasionally for a specific limited task (such as, but not limited to, ground water monitoring, land surveying, or geophysical surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

Employees working regularly on site in areas which have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

Employees with 24 hours of training who subsequently become general site workers or who are required to wear respirators, shall have the additional 16 hours and two days of field experience under the direct experience of a trained experienced supervisor.

On-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations shall receive 40 hours initial training, and three days of supervised field experience and at least eight additional hours of specialized training at the time of job assignment on such topics as, but not limited to, the employer's safety and health program and the associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques. This training may be reduced to 24 hours and one day of supervised field experience if the only area of their responsibility is employees who require 24 hour training.

Additional training in the following areas will be provided to employees as necessary for individual delivery orders or assignments:

- Emergency Response
- Radiological Hazard
- UXO Hazard
- Current CPR and First Aid certifications

Two site personnel certified in First Aid/CPR will be on site to provide immediate response to an accident situation until medical assistance arrives on the site. These selected employees are trained in CPR and first aid for emergency use only. Indoctrination to the bloodborne pathogens standard (29 CFR §1910.1030) will be provided to all employees either during their first aid training, and/or during the initial site health and safety meeting.

Note: these requirements may require emergency response training, check each one for details:

- *Procedures and tests (01.E.01)*
- *Spill plans (01.E.01, 06.A.02)*
- *Firefighting plan (01.E.01, 19.A.04)*
- *Posting of emergency telephone numbers (01.E.05)*
- *Wild land fire prevention plan (09.K.01)*
- *Man overboard/abandon ship (19.A.04)*

These sections (where applicable) are addressed below in Section 12.

Site Orientation

The Project Manager is responsible for implementing a site orientation program, to ensure that safety and health policies and procedures are clearly communicated and understood. Either the Project/Construction Manager, Field Engineer, Safety Manger or Human Resources Representative may conduct the orientation. The orientation will include an overview of the key elements in the HASP, such as personal protective equipment requirements, disciplinary policies, communication plans, emergency plans, employee rights and responsibilities, and reporting of hazards and injuries.

Subcontractors are typically contractually required to provide orientation to all their employees and visitors consistent with Parsons requirements. In some cases, contractual arrangements may allow one group to provide orientation for all workers and visitors to the site (regardless of their company).

Copies of the orientation presentation materials will be maintained on site, and employees will sign a statement acknowledging their understanding of the material covered. The length of the orientation depends on the expected hazards at the project jobsite; the orientation can be a 5 minute presentation or a complex multi-day training program with demonstrations of personal protective equipment and other emergency procedures.

Supervisory Safety Meetings:

Parsons requires that a safety committee be established when 5 full-time Parsons employees or 25 subcontractor employees are assigned to a field project. The Project Manager is responsible and accountable for establishing the safety committee, developing its charter, and carefully considering committee recommendations. All Parsons corporate offices have a safety committee, and project staff may utilize the local office safety committee safety programs.

The committee membership is decided on a case-by-case basis, but will reflect a balance between management and workers, and participation is voluntary. The committee will meet as needed, typically once per month for field projects, and once per quarter for office work. The safety committee makes recommendations to the Project Manager or senior management representative, who has the authority to act on, modify, or reject the recommendations. Meeting minutes will be kept, and posted on the bulletin board.

7. SAFETY AND HEALTH INSPECTIONS

a. Who will conduct safety inspections, proof of inspector's training/qualifications, when inspections will be conducted, how the inspections will be recorded, deficiency tracking system, follow-up procedures, etc. 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.

Mr. Timothy Mustard, CIH is the Seneca Army Depot Activity Program Health and Safety Officer. His qualifications are attached. Also attached (see **Appendix B**) are the names and qualifications of other qualified individuals who will assist Mr. Mustard in the performance of his Program duties.

Mr. Mustard CIH, or his designee, will be responsible for scheduling and conducting all safety inspections, the Project Manager is responsible for the safety inspection program. The safety inspection program will be developed as the Project Safety Plan (PSP) is written, or when a review of technical specifications indicates unique hazards not included in the standard protocol (Seneca Generic RI/FS Workplan). Parsons' policy requires that at least one corporate audit is conducted during each year of the contract by the GBU Safety Manager, the Quality Control Manager, or representatives of the Corporate Safety Staff. Additional audits may be scheduled by the Program/Project Managers or the Program Health and Safety Officer during periods of more labor intensive on-site activities, upon the receipt of an employee complaint of unsafe conditions, in the event of an occupational injury or illness, or upon the introduction of new substances, processes, procedures or equipment that presents potential new hazards in the workplace.

Safety inspections begin during the project mobilization phase, and continue through the life of the project, with the content and protocol changing based on the phase of work. Findings from the inspection are documented on an inspection form, and all corrective actions will be tracked to completion by either the Project Manger, Project Quality Manager, or Safety Manger. The goal of the safety inspection process is to identify potential process failures and improvement opportunities.

All programs/projects must establish record keeping procedures consistent with the records retention policy on Parsons PWeb (number 47 under Corporate Policies). At a minimum, each project must maintain the following records to document their safety program (these records will be audited):

1. Records of hazard assessment inspections, including the name of the person conducting the inspection, unsafe conditions and work practices identified, and action taken to correct unsafe conditions and work practices. This data is recorded on a hazard assessment and correction form.
2. Documentation of safety and health training for each employee, including name or other identifier, training dates, type of training, and name of instructors are recorded on a worker training and instruction form. Inspection records and training documentation are maintained in the project office.

3. Parsons monthly safety report and all detailed incident reports.
4. OSHA 300 log (Report of Injuries and Illnesses).
5. Other records as required by Parsons or local, state, or federal regulation.

All work performed under the Seneca Army Depot Activity Program is conducted under the supervision of a Professional Engineer (PE). In addition, all radiation work will be supervised by a Radiation Safety Officer (RSO), and any UXO work will be supervised by a UXO / OE Safety Officer.

8. SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

As is stated in our Corporate Statement of Policy, Parsons shares the National Safety Council's Safety and Health Code of Ethics as the principles guiding our Corporate-commitment to safety. These principles include:

- We will hold safety and health as our highest core value.
- Executive management will lead the safety improvement process.
- Safety will be a responsibility shared by everyone in our organization.
- Safety performance will be a key indicator of our organizational excellence and will be incorporated into our business processes.
- We will communicate safety performance openly with employees.
- All employees will be given the knowledge and skills necessary to safely perform their jobs.
- We will extend our safety efforts beyond the workplace to include transportation, homes and communities.
- We will continually strive to improve our safety and health processes.

To meet our health and safety objectives, all Parsons employees are expected to act proactively with regard to health and safety issues. This requires the combined efforts of a concerned management, responsible and knowledgeable supervision, and conscientious, well-trained employees.

Parsons will take all reasonable action to meet or exceed the applicable occupational health safety requirements, domestically and internationally, and will continuously monitor and improve operations, procedures, technologies and programs that are conducive to maintaining a safe and healthy working environment. It is Parsons' goal to continue to reduce the EMR to the lowest achievable number, with zero incidents and zero lost-work hours.

Each Program/Project Manager is responsible for developing and implementing a safety program that ensures the safety of all project employees, contractors, visitors, and others involved in a program/project. One potential aspect of the safety program is development of an incentive/rewards program to recognize safety achievements. Parsons has recognized that a necessary tie-in to a meaningful safety program is a program that rewards exemplary conduct. Such rewards may include the presentation of a plaque for demonstrated dedication to creating a safe and healthy environment; assignment of a dedicated prime parking space for the use of the individual who has recognized a hazard and has eliminated it or devised a method of managing it; or to let an individual's or group's peers know, in some way, that individual or group has taken an extra step where safety is involved, are all types of award best appreciated by the professional.

Just as Parsons recognizes the importance of a program that rewards exemplary conduct, it also recognizes the need for disciplinary actions that are assessed when unsafe procedures or practices occur. Again, Program/Project Managers are responsible for the establishment and application of a fair and consistent project policy for the disciplinary process related to health and safety violations. Parsons Corporate policies include a progressive discipline system for corrective action for performance or behavior that does not meet expectations. The corrective action used, the sequence, and the duration may vary depending on the issue and related circumstances. Progressive steps typically include counseling, written warning, unpaid suspension, and termination. In general, employees or subcontractors that create or contribute to situations that are immediately dangerous to life and health may be subject to immediate termination. However, the Project Manager must ensure that the handling of discipline matters is consistent with applicable contracts or local and national collective bargaining agreements.

Parsons' Program/Project Managers are held fully responsible and accountable for the following safety related issues:

- Ensuring that a formal hazards analysis is based on final contractual documents and is performed shortly after award. Typically leads the review.
- Ensuring the Project Safety Plan is in place and functioning from the beginning of the project; participates in PSP development.
- Scheduling and conducting the stakeholder PSP meeting prior to commencement of site work"
- Ensuring that awareness materials are posted in a highly visible location or distributed to project employees.
- Working with project human resources and safety representatives to ensure that new and transferred employees promptly receive safety orientation.
- Ensuring that project employees receive appropriate general and project-specific safety training"
- Establishing the safety committee and its charter for the Program/Project and for carefully considering committee recommendations.
- Ensuring that all incidents are reported and investigated in a timely manner and that appropriate corrective actions are identified and implemented; may participate in or lead investigations"
- Submitting incident reports and monthly reports of hours. Provides reports of selected metrics to the project team.
- Ensuring that routine internal safety inspections are performed at least one a month; tracks corrective actions to completion; performs monthly inspections.
- Ensuring that preconstruction safety planning and review are complete before RFPs are issued.
- Developing the orientation program to ensure that safety and health policies and procedures are clearly communicated and understood.
- Scheduling and conducting the meetings (between unions, OSHA and other Agencies).
- Ensuring a process is in place to review all subcontractor safety programs before construction begins.
- Ensuring that a premobilization meeting takes place with every major subcontractor.
- Participating in progress meetings and reviews mitigation plans (which include the following: upcoming scope of work risks and hazards, control measures, activity hazard analyses required, subcontractor mobilization or demobilization, scheduled audits or inspections, competent person

changes or additions, planned orientations and training, recommendations, comments, concerns, and lessons learned.

- Ensuring that Activity Hazard Analyses are included in the project schedule and are conducted as planned.
- Ensuring that all workers participate in daily and weekly training; participates in weekly toolbox meeting as a trainer or participant.
- Ensuring that they or their staff conduct routine site walkarounds at least weekly.
- Ensuring that a comprehensive final safety report is developed and issued for projects where a final safety report is required.
- Appointing a records custodian and implements a comprehensive records storage and retention plan.

9. ACCIDENT REPORTING

Exposure Data

All Parsons labor hours expended on programs and projects within Parsons are reported weekly within Parsons' Webtime Management System. When needed, features within the Parsons Webtime application allow field labor hours expended on projects to be reported and tallied separate from no-field time labor hours within Parsons' Financial Reporting System. Parsons' Managers, Program Managers, Project Managers and other employees can specify and access ad hoc labor hour reports directly from their computers. Such reports can be tailored to individual employee reports or Program/Project/Work Breakdown Structure reports on a weekly or multi-weekly basis. As part of our Monthly Progress Reports and Billing process, Parsons provides the Army with information pertinent to the labor hours expended on all projects performed.

In addition, Parsons requires programs/projects that meet or exceed one or more of the following criteria to submit internal Parsons monthly manhour reports to Global Business Unit management personnel:

- Parsons has 5 or more full-time equivalent (FTE) employees working in the field
- Subcontractors (all tiers) have 25 or more FTE employees working in the field
- Parsons is contractually responsible for construction on the project
- Parsons is contractually responsible for safety on the project

Programs/projects not surpassing these baseline levels do not need to provide internal reports to Global Business Unit management. Instructions and details on Parsons online manhour reporting are provided in **Appendix C**.

Accident and Incident Notification

Program/Project Managers measure and report accidents and incidents, injuries, near misses, and property damage as part of the ongoing process of enhancing project safety performance. Parsons' policy is that all incidents must be reported through the local supervisor and Project Manager to the GBU Safety Manager within four hours of the initial incident. See **Appendix C** for instructions how to use the Parsons Online Safety Reporting System. If internet access is not available, the Incident/Accident Report Form in Appendix C may be used. The GBU Safety Manager is responsible for notifying the Corporate Workers Compensation Analyst.

If an incident results in a lost workday case (LWDC) or worse, the Project Manager and immediate supervisor must call the GBU President within four hours. Any fatality, injury of a private citizen, property loss or damage in excess of $50,000, or catastrophes require immediate notification of the GBU or Corporate Safety Manager. Parsons will also notify the Army of any lost workday or worse incident.

Army guidance and requirements regarding accident reporting, and the ENG Form 3394 are included as **Appendix D**.

The Occupational Safety and Health Administration (OSHA) requires reporting any work site fatality or accidents involving the hospitalization of three or more employees to the nearest OSHA office within eight hours. Reporting to OSHA is coordinated through the Global Business Unit or Corporate Safety Manager

In addition to the required reporting of incidents, Project Managers establish key safety metrics appropriate to the work. These metrics, which include both leading and lagging indicators, are typically measured each month and reported to all project staff as a quality improvement measure. Common performance metrics are shown in following table.

Category	Metrics
Accident Rates	Recordable Incident Frequency Rate Days Away from Work Incident Frequency Rate Severity Rate (numbers of days away from work)
Accident Costs	Total incurred workers compensation costs Loss ratios (W/C losses/premium)
Near Misses	Number of near misses reported and investigated
Training	START training participation Zero Incident Techniques training participation Parsons University monthly/quarterly participation Project-specific training participation
Inspections	Number and results (scored) of management inspections Audit results
Meetings	Participation in daily huddles or weekly toolbox meetings

Accident Investigations, Reports and Logs

Incident investigations are an important element of Parsons' safety program because they provide useful information to prevent similar incidents. Incident investigations identify root causes, system failures, unsafe acts and conditions, and noncompliance with or inadequacy of the PSP. All significant near miss, injury, illness, or major equipment or property damage incidents (including process interruptions) require an investigation.

The Project Manager and Safety Manager must conduct the on-site investigation immediately and prepare an incident investigation report. Additional participants may include the Project Controls Manager and the Project Human Resources Manager. The GBU Safety Manager or a designee completes the on-line safety reporting system incident investigation tab while Corporate Safety disseminates the results of the completed investigation throughout the Corporation as appropriate to implement lessons learned.

The purpose of an investigation is to identify all possible contributing root causes to prevent future incidents of a similar type. The investigation also determines factors that may affect Parsons' legal liability. Simple incidents may require only a brief investigation by the Project Manager or Safety Manager while more complex or significant incidents require a formal team investigation as described below. The investigation team must perform its job diligently and professionally.

The incident report must contain only facts, avoiding personal opinions, speculation, or conclusions. A paper copy of the report is maintained at the project site; electronic copies are submitted to the on-line safety reporting system as attachments to the investigation page.

10. MEDICAL SUPPORT

At least two members of each field team will be trained in first aid and CPR. They, along with (or including) the Site Health and Safety Officer will be available to provide treatment as necessary.

The names of on-site personnel that are trained in first aid and CPR will vary from project to project. These names will be listed in each project-specific health and safety plan.

Phone numbers for emergency personnel are posted at the jobsite. The nearest hospital is Geneva Hospital; driving directions are included in Appendix A Generic Site-Wide Health and Safety Plan for Seneca Army Depot, Figure A-4.

11. PERSONAL PROTECTIVE EQUIPMENT

The Project Manger leads the Activity Hazard Analysis effort, and will be supported by the contracts department (to identify all contractual obligations), construction/other technical department (to identify the potential hazards of the project work), and the Safety Manager (to identify all regulatory requirements). The process of identifying all potential hazards begins following the issuance of final contract documents.

The selection and use of PPE will be specified in the HSP, and will be project-specific. Due to the unknown nature of hazardous waste site work and the possibility of changing conditions during the conduct of the work may require changes in the personal protective equipment. When changes in personal protective equipment become necessary, these changes shall be made in accordance with the action levels and criteria set for the in this plan. Routine site work will be performed in Level D protection, augmented with steel toe boots, inner surgical gloves, and chemical-resistant outer gloves. In the event that PPE is ripped or torn, work shall stop and PPE shall be removed and replaces as soon as possible.

Additional PPE requirements are discussed in Section 6 of the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity (included as Appendix A of this document), and project-specific PPE information is included in the HSP for each site (project).

12. PLANS (PROGRAMS, PROCEDURES) REQUIRED BY THE SAFETY MANUAL (AS APPLICABLE)

See Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity for information.

13. CONTRACTOR INFORMATION

See applicable sections of the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity.
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14. SITE-SPECIFIC HAZARDS AND CONTROLS

See applicable sections of the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity.

REFERENCES

EM-385-1-1, Revised 3 Nov 03

Seneca Generic RI/FS Workplan, September 2003

SHARP Management Manual, August 2004, Version 1.0

APPENDIX A SENECA SITE-WIDE HEALTH AND SAFETY PLAN

GENERIC SITE-WIDE HEALTH AND SAFETY PLAN
FOR
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

APPROVED BY: ______________________
Program Manager

APPROVED BY: Timothy S. Mustard, CIH
Program Health and Safety Officer

March, 2005

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EXECUTIVE SUMMARY

As a result of the issuance of an updated version of EM 385-1-1 on November 3, 2003, Parsons has developed an Accident Prevention Plan, which includes this Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity as Appendix A.

The Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity was written for work being conducted by Parsons Engineering Science, Inc. (Parsons) at the Seneca Army Depot Activity in Romulus New York under the DACA87-95-D-0031 and DACA87-02-D-0005 contracts with the U.S. Army, Engineering and Support Center, Huntsville, the U.S. Army Base Realignment and Closure Office, and the U. S. Army Corp of Engineers, New York District.

The Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity has been revised to ensure compliance with the following documents:

- EM-385-1-1, 3 Nov 03 (Army)
- OSHA 1910.120, March 7 1996 and Nov. 7 2002 (Occupational Safety and Health Administration)
- SHARP Management Manual, version 1.0, August 2004 (Parsons)

This document meets or exceeds all applicable requirements for a health and safety plan. The original document structure/organization has been maintained to facilitate review. The Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity was most recently revised in August 2003, and was attached as Appendix B of the Seneca Generic RI/FS Workplan.

Table 1 lists the requirements for a Health and Safety Plan according to EM 385-1-1 Section 28.A.02, OSHA 1910.120, and SHARP Management Manual; and where the information is located within this document.

Several sections that were specified in Appendix A of EM 385-1-1 Minimum Basic Outline for Accident Prevention Plan, were included in this Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity instead of the Accident Prevention Plan. The location of these new sections is discussed below.

Other changes to this document:

In addition to certifying compliance with all applicable regulations and updating all sections (as necessary), the following sections have been added to this document:

Text

- Sections 11.18 – 11.22 standard operating procedures and safe work practices for constructing haul roads, abrasive blasting, building demolition (with lead and asbestos abatement), excavation and trenching, and compressed air work.

Tables

- Table A-9 First Aid Kit Requirements includes a list of first aid kit requirements, as specified in EM 385-1-1 Section 03.B.
- Table A-12 Minimum Illumination Intensities summarizes how many foot-candles of light are required by Parsons Health and Safety Manual (comparable to Table 7-1 in EM 385-1-1) for various work areas or situations

Figures

- Figure A-5 Parsons Cell Phone Policy was issued on 7/6/04

Attachments

- Attachment A-4 was expanded from Table B-3 Activity Hazard Analysis Summary Table. It includes individual activity hazard analyses (AHAs) for each expected field activity. A list of these activities is included as Table A-3
- Attachment A-5 Confined Space Work discusses Parsons policies and requirements for all projects that involve a confined space task
- Attachment A-6 Power and Hand Tool Operation discusses Parsons policies and requirements regarding safe power and hand tool operation, also see the AHA for power and hand tool operation in Attachment A-4 for additional information
- Attachment A-7 Motor Vehicle and Heavy Equipment Safety discusses Parsons policies and requirements regarding safe motor vehicle and heavy equipment use, also see the AHA for motor vehicle and heavy equipment use in Attachment A-4 for additional information
- Attachment A-8 Lock Out / Tag Out discusses Parsons policies and requirements for all projects that involve hazardous energy work
- Attachment A-9 Fall Protection discusses Parsons policies and requirements for all projects that involve fall protection
- Attachment A-10 Haul Road Construction discusses Parsons safety recommendations for all projects that involve haul road construction
- Attachment A-11 Abrasive Blasting discusses Parsons policies and requirements for all projects that involve a abrasive blasting
- Attachment A-12 Building Demolition (and Dismantling) discusses Parsons' policies and requirements for all projects that involve building demolition. Also included in this section is the Corporate Asbestos Project Health and Safety Program (to be considered as it applies to building demolition).
- Attachment A-13 Excavation and Trenching discusses Parsons' policies and requirements regarding safe excavation and trenching activities, also see the AHA for soil excavation in Attachment A-4 for additional information
- Attachment A-14 Compressed Gas Safety discusses Parsons policies and requirements for all projects that involve compressed gas work

TABLE 1

Required by the Army EM-385-1-1 Section 28.A.02	Required by OSHA 1910.120	Required by SHARP Management Manual (Parsons)	Included in the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity (revised February 2005)
Description/Background			
Site description	* location and size of site * description of activity/job to be performed * site topography - accessibility by air and roads		Site description/location/size - see **Section 2.1** Description of activity/job - see **Table A-1** Site topography/accessibility by air and roads - **TBD** - project specific, to be discussed in the HSP. See **Figure A-1** for a site-wide map. Site security and control - see **Section 12.3**
	duration of activity	Project schedules	Duration of activity - see **Section 2.2** Project schedules - **TBD** - project-specific, to be discussed in the HSP.
		* Project owner and project name * Scope of work * Scope of contract * Project safety budget * List of key project stakeholders	Project (Program) owner & name / scope of work & contract - see **Section 2.2** Safety budget - **TBD** - project specific, to be discussed in the HSP**.** Stakeholders - Not Applicable.
Contamination characterization w/ exposure potential	Site characterization and Analysis * safety & health hazards expected at the site / hazardous substances/health hazards involved or expected - and their chemical and physical properties * exposures exceeding the PELs and published exposure levels * IDLH Concentrations * potential skin absorption and irritation sources * potential eye irritation sources * explosion sensitivity and flammability ranges * oxygen deficiency	Risk analysis / Other risks (identified and documented)	Contamination characterization - see **Section 2.3**, Section 11.1, **Table A-2**, **Table A-4** Exposure potential, health hazards involved or expected (and their chemical and physical properties), IDLH concentrations - **TBD** - project-specific, to be discussed in the HSP Risk analysis / other risks (including potential skin absorption/irratation, eye irratation, explosion sensitivity/flammability, oxygen deficiency - see **Table A-3** for a list of AHAs, and **Attachment A-4** for AHAs (project-specific AHAs that are not included here will be provided in the HSP as needed)
Hazard Risk Analysis/AHA comprehensive AHA for treatment technologies used at the site	Hazard identification safety & health risk or hazard analysis for each task and operation	Initial Activity Hazards Analysis	Physical / Biological / Safety / Ionizing Radiation Hazards are discussed in **Section 3**. Also see **Table A-5**, **Table A-10**, **Figure A-2**, **Attachment A-1**, **Attachment A-2**. Chemical Hazards - **TBD** - project-specific, to be discussed in the HSP. AHAs - see **Table A-3** for a list, and **Attachment A-4** for the individual AHAs.
	comprehensive workplan * defines work tasks and objectives - identifies methods for completing * establishes personnel requirements * implements training and medical monitoring * confined space entry procedures * spill containment program		Work task definitions, objectives, methods, and personnel requirements - **TBD** - project specific, to be discussed in the HSP. Training- see **Section 5** Medical monitoring - see **Section 7** Confined spaces - see **Section 11.5** and **Attachment A-5** Spill containment program - see **Section 15.2**
Staff Organization - qualifications, responsibilities	organizational structure - including chain of command and specific responsibilities	PSP management structure	See **Section 4** and **Table A-6**, also **TBD** - project-specific, to be discussed in the HSP
	general supervisor		**TBD** - project-specific, to be discussed in the HSP
Safety & Health Manager		Name of Project Safety Manager	Program Safety Manager is Tim Mustard. Each project will also have a SHSO (see below).
Site Safety & Health Officer	site safety & health supervisor		**TBD** - project-specific, to be discussed in the HSP

TABLE 1

Required by the Army EM-385-1-1 Section 28.A.02	Required by OSHA 1910.120	Required by SHARP Management Manual (Parsons)	Included in the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity (revised February 2005)
Programs			
Training (General = 40-hr, 8-hr, 3 days supervised field experience Supervisory = general + 8-hr Sup Project Specific training prior to onsite work)	employee training program		Training - see **Section 5**
PPE	PPE		PPE - see **Section 6** and **Table A-7**
Medical Surveillance	medical surveillance program		Medical surveillance - see **Section 7**
Exposure monitoring/Air sampling program	frequency & types of air monitoring, personnel monitoring and environmental sampling techniques (instruments used, methods, maintenance, calibration)		Frequency and type of monitoring, sampling techniques - **TBD** - project specific, to be discussed in the HSP. Exposure monitoring / air sampling program - see **Section 9** Radiation dosimetry - see Section 8
material handling procedures	handling drums & containers/material handling program		Material handling - see **Section 11.10**
drum/container/tank handling	handling drums & containers/material handling program		Drum/container handling - see **Section 11.11**
Personal hygiene + decon	decontamination procedures/program		Personal hygiene + decon - see **Section 13, Table A-13, and Table A-14**
Equipment decon	decontamination procedures/program		Equipment decon - see **Section 14, Table A-13, and Table A-14**. Also see **Attachment A-2** for radiation decon.
	confined space entry		Confined space entry - see **Section 11.5** and **Attachment A-5**
	spill containment program		Spill containment - see **Section 15.2**
	workplace illumination		Illumination - see Section **11.17** and **Table A-12**
	sanitation		Sanitation - see **Section 11.2**
	safety and health program		Safety and health inspections - see **Section 17.1**
	hazard communication program		Hazard communication - see **Section 11.8, Section 11.9**
	new technology program		**TBD** - project-specific, to be discussed in the HSP
		Safety incentive program	see Section 8 of the Accident Prevention Plan
		Workers compensation program	Workers compensation program - see **Section 5.1**, and **Attachment A-15**.
Emergency Response			
Emergency Equipment/First Aid			Emergency equipment/first aid - see **Section 15.1** and **Table A-9**
Emergency Response and Contingency Procedures	emergency response plan/program		Emergency response/contingency procedures/emergency response program - see **Section 16**
pre-emergency planning			Pre-emergency planning - see **Section 16.1**
personnel and lines of authority			Personnel and lines of authority - see **Section 16.4**, also **TBD** - project-specific, to be discussed in the HSP
criteria and procedures for emergency recognition and evacuation			Emergency recognition - see **Section 16.10** Evacuation - see **Sections 16.5** and **16.15**, and **Tables A-8** and **A-16**
decontamination and medical treatment of injured personnel			Decontamination and medical treatment - see **Section 16.6** for general guidelines, **TBD** - project-specific, to be discussed in the HSP
route map to medical facilities/phone number	Identification of nearest medical assistance		Map, directions to hospital - see **Figure A-4** Phone numbers - see **Table A-15**
criteria for alerting local community responders	status/capabilities of EMS teams pathways for hazardous substance dispersion		Criteria for alerting, status/capabilities - see **Section 16.14** Pathways for dispersion, site topography & layout, weather conditions - **TBD** - project-specific, to be discussed in the HSP. See **Figure A-1** for a site-wide map.

TABLE 1

Required by the Army EM-385-1-1 Section 28.A.02	Required by OSHA 1910.120	Required by SHARP Management Manual (Parsons)	Included in the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity (revised February 2005)
Other Required Information			
Heat and Cold Stress			Heat & cold stress - see **Section 10, Section 3.3.1, Section 3.3.2, Table A-11**
Standard operating safety procedures, engineering controls, and work practices	standard operating procedures for safety and health		Standard operating procedures, engineering controls, work practices - see **Section 11.**
site rules/prohibitions			Site rules/prohibitions - see **Section 11.1** See **Figure A-5** for Parsons' cell phone policy
work permit requirements			Work permit requirements - see **Section 11.4**
Site control measures (exclusion zone, support zone, contamination reduction zone)	site control measures (including site map, site work zones, use of buddy system, site communicatoins)		Site security and control - see **Section 16.12**, **Section 12.3** Site map - see **Figure A-1, A-3**, also **TBD** - see HSPs for project-specific maps Work zones, utility clearance, site communications, UXO clearance - see **Section 12** Use of the buddy system - see **Section 11.1**
	HASP should be an interface btw general program and site-specific activities		**HASP includes general work practices, procedures, and policies, HSPs are project-specific, include all details**
		Subcontractor safety plan submittals	Subcontractor safety plan submittals - **TBD** - project-specific, to be discussed in the HSP
Additional Information Included in the HASP			
			Fall protection - see **Section 11.14** and **Attachment A-9**
			Fire control, prevention & protection - see **Section 11.3**
			Accident investigation and reporting procedures - see **Section 16.9, Attachment A-15**, and Section 9 of the APP. Critique of response and follow-up - see **Section 16.13**
			Safe distances & safety zones - see **Section 16.15**
			Recordkeeping requirements (including logs, safety logs, training logs, equipment maintenance logs, reports (manhour and accident)) - see **Section 18**
			UXO work (including regulations, responsibilities, standard operating procedure, general ordnance safety) - see **Section 19** and **Attachment A-16**
			Physical Hazards: UV Radiation - see **Section 3.3.3** Noise - see **Section 3.3.4**
			Lock out/tag out - see **Section 11.12** and **Attachment A-8**
			Process safety management - see **Section 11.16**
			Haul Road Construction - see **Section 11.18** and **Attachment A-10**
			Abrasive Blasting - see **Section 11.19** and **Attachment A-11**
			Building Demolition - see **Section 11.20** and **Attachment A-12**
			Excavation and Trenching - see **Section 11.21** and **Attachment A-13**
			Compressed Gas Safety - see **Section 11.22** and **Attachment A-14**
			Respiratory Protection Program - see **Attachment A-3**
			Power and Hand Tool Operation - see **Attachment A-6**
			Motor Vehicle and Heavy Equipment Operation - see **Attachment A-7**

1 INTRODUCTION

The purpose of this Seneca Site-Wide Health and Safety Plan (SHSP) is to establish personnel protection standards and mandatory safety practices and procedures for field investigation efforts conducted at Seneca Army Depot, Romulus, New York. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise during RI/FS investigations and other field work at solid waste management units (SWMUs) at Seneca Army Depot, Romulus, New York. Unless otherwise specified in the individual site-specific Health and Safety Plan (HSP), the standard operating procedures and safety practices presented in this plan shall be followed by all personnel conducting work at Seneca Army Depot. Safety practices and operating procedures deviating from or in addition to this SHSP or other site-specific requirement will be presented in individual site-specific HSPs to accommodate changes in specific work plans and task specific and location specific hazards for the various SWMU investigation activities. Each project will have an individual HSP that will have project-specific information (i.e. project manager's name, phone number, etc.), as well as details on any new site activities. The HSP will reference this document as much as possible, to prevent duplication of efforts.

The provisions of this plan, if applicable to individual SWMU, are mandatory for all Parsons personnel engaged in on-site hazardous waste operations. Subcontractors working for Parsons must conform to this Health and Safety Plan unless they prepare and administer a plan with equivalent requirements. All Parsons and Parsons contract personnel who engage in project activities must be familiar with this plan and comply with its requirements. These personnel must sign-off on the Health and Safety Plan Signature Form, which is attached to each individual HSP as well as to this Generic Site-Wide Health and Safety Plan. The signed original forms will be kept on site for the duration of the project and becomes part of the permanent project files (to be kept in the Parsons Boston office following completion of project work). Copies of these forms will be submitted to the Program Health and Safety Officer (PHSO).

2 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

2.1 SITE HISTORY AND DESCRIPTION

The Seneca Army Depot, a 10,587-acre facility in Seneca County, Romulus, New York, has been owned by the United States Government and operated by the Department of the Army since 1941 (**Figure A-1**). Since its inception in 1941, SEDA's primary mission has been the receipt, storage, maintenance, and supply of military items, including munitions and equipment. The Depot's mission changed in 1995 when the Department of Defense (DOD) recommended closure of the SEDA under its Base Realignment and Closure (BRAC) process.

During active military use, the land use was divided into three categories at the depot. The Main Post accounted for 9,832 acres and consists of an exclusion area containing partially buried, reinforced concrete igloos, general storage magazines, and warehouses. The cantonment areas of the facility consist of the North and South Posts. The North Post, at the north end of the Main Post, included troop housing, troop support, and community services. The South Post is located in the southeast portion of the facility near Route 96 and was a developed area containing warehouses, administration buildings, quarters, and community service.

When the Army arrived in Seneca, New York in 1941, the nearly 10,000 acres in Central New York State were abundant farmland. In June 1941, the War Department approved the munitions project, and in July 1941, construction for the Seneca Ordnance Depot (Depot) began. Construction workers completed nearly 500 storage igloos and six aboveground magazines by the end of the year (Johnson 1984). With the construction of the administrative area, ammunition facilities, warehouses, utility structures and a few housing quarters completed in 1943, the Depot began its primary mission of receipt, storage, maintenance and supply of ammunition. As a filler Depot, it also issued and reconditioned ammunition for the First and Second Service Commands and for the Boston Port of Embarkation. This included all classes of ammunition and explosives except chemical ammunition other than smoke. In 1946, the Army assigned the Depot to the First Army, which included the Mid-Atlantic States of New York, New Jersey and Delaware (Seneca Ordnance Depot 1946).

2.2 PLANNED SITE ACTIVITIES

Depending on specific conditions at individual sites at SEDA, field activities may include, but may not be limited to the following tasks: sampling-related geophysical surveys (e.g., EM-31, GPR); excavation, test pitting, soil boring, monitoring well installation, and sample collection. UXO detection and clearance will be performed at sites where UXO is a concern. In addition, some sites have potential radiological hazards.

Table A-1 presents a list of Solid Waste Management Units (SWMUs) planned for RI/FS or other investigations at Seneca Depot.

This work is being performed under the Parsons Infrastructure and Technology Restoration and Design sector, contract nos. DACA87-95-D-0031 and DACA87-02-D-0005, and is the responsibility of Todd Heino, Program Manager. The scope of work includes: Architect-Engineer and Facilities Master Planning/Construction Support Services for Environmental Services. The scope of work for each project is TBD – to be defined in task or delivery orders. Each task or delivery order has individual requirements and goals. The project safety budget and project schedules are TBD – to be defined in the individual project-specific HSPs.

2.3 SITE CONTAMINATION CHARACTERIZATION

A large number of compounds have been detected in the previous investigations at the Seneca site. The contaminants detected at the site include metals (e.g., antimony, arsenic, cadmium, chromium, copper, lead, mercury, zinc), volatiles (e.g., benzene, toluene, xylene, trichloroethene, cis-1,2-DCE, vinyl chloride), semi-volatiles (e.g., PAHs). In addition, explosives (HMX, RDX, 2,4,6-TNT, 2,6-DNT, 2,4-DNT, and tetryl) have been detected at sites with potential UXO/OE hazards and elevated radiation levels have been detected at sites with potential radiation hazards (as listed in Table A-1). **Table A-2** lists selected contaminants at SEDA and the ranges of the maximum concentrations observed at selected sites. Contaminant characterization and exposure potential for individual sites will be presented in the site-specific HSPs.

3 HAZARD/RISK ANALYSIS

The chemical and physical hazards that may be encountered at the SEDA sites are described below. **Table A-3** presents a summary of Activity Hazard Analysis (AHA) for tasks that may be conducted at the Seneca Depot, including drilling, excavation/test pitting, sampling, monitoring well installation, and general site activities. The AHAs listed in Table A-3 are included in **Attachment A-4**.

For the individual HSPs, Activity Hazard Analysis will be conducted based on site-specific conditions and tasks involved at the site and a site-specific AHA table will be presented (Note: New AHAs will only be provided in a HSP if they are not already included in Attachment A-4 of this document).

3.1 EXPOSURE POTENTIAL

The primary sources of exposure at the SWMUs will be the surface and subsurface soils, groundwater, surface water, and sediment. Depending on specific conditions at individual sites, these media may be contaminated with heavy metals, VOCs, SVOCs, explosive compounds, or low level radioactive waste. The exposure potential for the planned site activities is presented in the individual HSPs.

3.2 CHEMICAL HAZARDS

Health hazards and the exposure limits associated with chemicals of concern are presented in **Table A-4**. Health hazards and the exposure limits for site-specific chemicals of concern will be presented in the individual HSPs.

3.3 PHYSICAL HAZARDS

3.3.1 Heat Stress

Heat stress is one of the most common (and potentially serious) illnesses that affect field personnel. When site personnel are engaged in operations involving hot environments, a number of physiological responses can occur which may seriously affect the health and safety of the workers. Heat stress can result in health effects ranging from transient heat fatigue to serious illness or death.

Sweating does not cool the body unless moisture is removed from the body. The use of personal protective equipment (PPE) reduces the body's ability to eliminate large quantities of heat because the evaporation of sweat is decreased. The body's effort to maintain an acceptable temperature may become impaired and this may cause heat stress. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.

Heat stress can be eliminated or controlled through the use of a comprehensive heat stress prevention and monitoring program (see Section 10).

3.3.2 Cold-Related Illness

Cold-related illness, like heat stress, is very common and can seriously affect field personnel if the appropriate controls are not established. Exposure to low temperatures presents a risk to employee safety and health, in the form of hypothermia and frostbite. Both can be controlled or eliminated by implementing employee training, periodic physiological screening, establishment of administrative controls, selecting proper work clothing, and wind-chill monitoring all contribute to the prevention of hypothermia and frostbite.

Cold related illness, hypothermia and frost bite are discussed in detail in Section 10 of this document.

3.3.3 Ultraviolet Radiation

The sun emits ultraviolet radiation (UV) as heat and light. The skin's natural defense mechanisms attempt to reject the UV by distributing melanin pigmentation where needed. However, overexposure to direct sunlight can cause inflammation or blistering of the skin (sunburn). The use of sunscreen, long sleeve shirts, and wide brim hats can help prevent sunburn. Chronic exposure to UV radiation is known to cause skin cancer. In case of sunburn, do not apply burn ointment, cold cream, or butter to relieve pain. Use a dry dressing and get medical attention for severe, extensive sunburns.

3.3.4 Noise

Operating heavy equipment can be a potential noise source. Hearing protection will be worn by personnel operating heavy equipment. If noise hazards are of concern for a particular project, appropriate hearing protection will be discussed in the HSP.

3.4 SAFETY HAZARDS

3.4.1 Slip, Trip, and Fall Hazards

The site may contain slip, trip, and fall hazards for site workers, such as:

. • Holes, pits, or ditches.

. • Slippery surfaces.
. • Steep grades.
. • Uneven grades.
. • Sharp objects, such as nails, metal shards, and broken glass.

Site personnel will be instructed to look for potential safety hazards and immediately contact the SHSO if hazards are discovered. The SHSO will inform team members of the locations of slip, trip, and fall hazards during daily site safety briefings.

3.4.2 Thunderstorm Hazards

During the course of field operations, severe weather may be encountered, including thunderstorms, lightning, rainstorms, and other unsafe weather conditions (i.e., high winds and tornadoes). Criteria indicating that severe weather conditions may exist include:

- High winds (greater than 40 miles per hour – depending on the tree cover and other site specific conditions);
- Tornado watch or warning in place for the area including the site;
- Visible lightning;
- Extreme temperatures (e.g., greater than 100 degrees F); or
- Heavy rainfall that makes footing treacherous and visibility difficult.

3.4.3 Ordnance Hazards

Ordnance and ordnance-related items may be encountered at the site. Personnel should be alert for Ordnance and explosives contamination (OE) and OE-related scrap. Safe practices to prevent the hazards are presented in Section 19. Additional OE and Unexploded Ordnance (UXO) information is included in **Attachment A-16**.

3.4.4 Fire Hazards

Although fires and explosions may arise spontaneously, they are more commonly the result of carelessness during the conduct of site activities, such as moving drums, mixing/bulking of site chemicals and during refueling of heavy or hand held equipment. Some potential causes of explosions and fires include:

- Mixing of incompatible chemicals, which cause reactions that spontaneously ignite due to the production of both flammable vapors and heat;
- Ignition of explosive or flammable chemical gases or vapors by external ignition sources;
- Ignition of materials due to oxygen enrichment;
- Agitation of shock or friction-sensitive compounds;
- Sudden release of materials under pressure.

Fire prevention and control are discussed in Section 11.

3.5 BIOLOGICAL HAZARDS

Biological hazards can result from encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Mammals can bite or scratch when cornered or surprised. The bite or scratch can result in local infection or infection with systemic pathogens or parasites. Insect and spider bites can result in severe allergic reactions in sensitive individuals. Exposure to poison ivy, poison oak or poison sumac results in skin rash. Ticks are vectors for a number of serious diseases. Dead animals, organic wastes, and contaminated soil and water can harbor parasites and pathogens. Pictures of poison ivy, snakes, spiders, and ticks are provided in **Attachment A-1**.

3.5.1 Poison Ivy

Poison ivy is common throughout SEDA. The majority of skin reactions following contact with offending plants are allergic in nature and are characterized by:

- General symptoms of headache and fever;
- Itching;
- Redness; and
- A rash.

Some of the most common and severe allergic reactions result from contact with poison ivy, poison oak, and poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim also may develop a high fever and may be very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each (see figure in Attachment A-1). In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters. Poison sumac is a tall shrub or small tree with 6-12 leaflets arranged in pairs with a single leaflet at the end. This plant grows in wooded, swampy areas.

Avoidance of plant/sap contact is the only effective means of preventing the poisoning. Site personnel should know how to recognize the poison ivy plant (see figures in Attachment A-1) and avoid walking through, or placing equipment and tools in areas of heavy growth. If you must walk through areas of poison ivy, keep extremities covered and avoid contact of bare skin with poison ivy leaves and stems. When digging in areas of poison ivy growth, avoid contact with the roots; these too can produce a reaction.

A person experiencing symptoms of poisoning should remove contaminated clothing; wash all exposed areas thoroughly with soap and water. Oils from the poison ivy plant can adhere to clothes. Wash clothes exposed to poison ivy before wearing again. Apply calamine or other poison ivy/oak lotion if the rash is mild. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity. A more thorough washing of skin and clothing can be used after site work at the end of the day, or after potential exposure to reduce severity of irritation.

3.5.2 Ticks and Lyme Disease

3.5.2.1 Introduction

Ticks may be common during the spring and summer at SEDA. Two types of ticks may be encountered: the dog tick and the deer tick. The dog tick is the larger, more common tick. After biting, the dog tick will remain attached to the victim until engorged with blood. Dog ticks may transmit rocky mountain spotted fever and other diseases. The deer tick is much smaller, ranging from poppy seed to grape seed size, and does not remain attached to the skin for very long after biting. Deer ticks can transmit Lyme disease, which can have serious, long-term health effects if left untreated. Lyme disease is characterized by a bulls-eye type rash; light in the center with an outer red area. Flu-like symptoms may also occur. These signs may occur at different times and the rash may not appear.

If you discover any bites on the skin, wash the affected area and seek medical attention if a rash or flu-like symptoms appear.

Lyme Disease is caused by a bacterium that may be transmitted by the bite of a tick. Ticks carrying Lyme Disease may be found throughout the U. S. living in grassy and wooded areas, and feeding on mammals such as mice, shrews, birds, raccoons, opossums, deer, and humans. Not all ticks are infected with the bacterium. When an infected tick bites, the bacterium is passed into the bloodstream of the host, where it multiplies. If detected early, Lyme Disease can be treated with antibiotics.

The illness typically occurs in the summer months and is characterized by a slowly expanding red rash that develops a few days to a few weeks after the bite of an infected tick. The illness can be accompanied by flu-like symptoms, headache, stiff neck, fever, muscle aches, and/or general malaise. At this stage, treatment by a physician is usually effective; but if left alone, these early symptoms may disappear and more serious problems may follow. The most common late symptom of the untreated disease is arthritis; other problems include meningitis, neurological, and cardiac abnormalities.

NOTE: some people do not get the characteristic rash but progress directly to the later manifestations. Treatment of follow-on symptoms is more difficult than early symptoms and is not always successful.

Rocky Mountain Spotted Fever is another tickborne disease. Nearly all cases of infection occur in the spring and summer, generally several days after exposure to infected ticks. The onset of illness is abrupt and often accompanied by high fever, headache, chills, and severe weakness. After the fourth day of fever, victims develop a spotted pink rash that usually starts on the hands and feet and gradually extends to most of the body. Early detection and treatment significantly reduces the severity of illness. The disease responds to antibiotic therapy with tetracycline or chloramphenicol.

3.5.2.2 Prevention

The following steps should be taken to limit the likelihood of getting tick bites:

- Wear long pants and long sleeved shirts that fit tightly at the ankles and wrists; tape cuffs if necessary. Tuck pants legs into socks.
- Wear hat and closed shoes.
- Wear light colored clothing so ticks can be easily spotted.
- Tick repellents such as DEET (vapor-active repellant) and Permethrin may be useful. Apply DEET to any exposed skin surface (except eyes and lips) or clothes and permethrin to field clothing (allow to dry prior to wearing).
- Inspect clothing frequently while in tick habitat.
- Inspect head and body thoroughly when you return from the field.
- Shower immediately after work and wash work clothes daily.

3.5.2.3 First Aid

If found crawling on a person, ticks should be removed and burned or smashed between two rocks. Remove any ticks by tugging with tweezers. Do not squeeze or crush the tick. If a tick is found to be holding onto the skin, the tick should be covered with Vaseline until it can no longer breathe and backs out of the skin. At that time, all parts of the tick should be removed with tweezers. Do not squeeze the tick's body. Grasp it where the mouth parts enter the skin and tug gently, but firmly, until it releases its hold on the skin. Save the tick in a jar labeled with the date, body location of the bite, and the place where it may have been acquired. Be sure to remove all parts of the tick’s body, and wash and disinfect the bite site with alcohol or an antiseptic. Hot showers are to be taken as soon as possible after departure from the depot to wash away all ticks that have not adhered to the skin.

For several days to several weeks after removal of the tick, look for the signs of the onset of

Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center. Also look for the signs of the onset of Rocky Mountain Spotted Fever (RMSF), such as an inflammation that is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

3.5.3 Snakes

3.5.3.1 Introduction

Poison snakes are not common to the area of SEDA, though central New York is within the range of rattlesnakes and copperheads. Descriptions of these snakes are presented below.

Copperhead: These snakes are commonly found near water sources in wooded areas. Copperheads are generally less than four feet in length and are not particularly aggressive. Coloration ranges from golden brown to tan. These snakes have a banded pattern.

Timber Rattlesnake: These are large, not particularly aggressive snakes with yellow through or gray to black, with dark back and side blotches on front of body and blotches fused to form crossbands on rear of body. Head is unmarked and the tail is black. They can be found in many habitats including rocky hillsides, swampy areas, and canebrake thickets.

Eastern Diamondback Rattlesnake: These snakes are commonly found in dry habitats throughout the coastal plain including pine and oak hills, pine flatwoods, and abandoned farmland. They are the largest rattlers ranging from 3 to 8 feet in length. These thick-bodied snakes have highly destructive venom and are considered the most dangerous snakes in North America. The back of the snake is distinctively patterned with dark diamonds with light centers and bordered by cream to yellow-colored scales.

3.5.3.2 Prevention

The best snakebite treatment is to avoid getting bitten. The following suggestions will help in this process:

- Learn to identify poisonous snakes – this shall be reviewed during site-specific safety training. The features identified in **Table A-5** will assist in properly identifying a snake as poisonous or non-poisonous.
- Watch where you sit and place your hands and feet. Do not put hands and feet where you have not looked.
- Avoid rock piles, stacks of old boards, and weeds and brush in wooded areas. If movement is necessary, use a remote means to initially relocate the material. Prior to entering a heavily wooded or brush area, look and listen carefully.
- Never handle "dead" snakes; they may not be completely dead. Do not attempt to capture

or kill ***ANY*** snakes. Caution should be used if any snake is encountered.

- Step heavily. Snakes can feel footfalls through the ground and will avoid you if they can.
- Wear heavy leather boots and loose fitting pants.

3.5.3.3 First Aid

A snakebite is usually characterized by extreme pain and swelling at the site of the bite; the presence of one or more puncture wounds created by the fangs; and a general skin discoloration. The manifestations of the bite include general weakness, rapid pulse, nausea and vomiting, shortness of breath, dimness of vision, tingling or numbness of the tongue, mouth or scalp, and shock.

Physical reactions are aggravated by acute fear, anxiety, the amount of venom injected and the speed of absorption of venom into the victim's circulation, the size of the victim, protection provided by clothing (including shoes and gloves), quick anti-venom therapy, and location of the bite.

The rules to follow if someone is bitten by a snake are:

1. DO NOT cut "Xs" over the bite area as this will intensify the effect of the venom.
2. DO NOT apply suction to the wound since this has a minimal effective in removing venom.
3. DO NOT apply a tourniquet since this will concentrate the venom and increase the amount of tissue damage in the immediate area.
4. If possible, try to get a good look at the snake so it can be identified for proper selection of antivenom.
5. DO NOT allow the victim to run for help since running increases the heart rate and will increase the spread of the venom throughout the body.
6. Calm, reassure and keep the victim calm and immobile. Do not delay evacuation.
7. Have the victim hold the affected extremity lower than the body while waiting for medical assistance.
8. Transport the victim to medical attention immediately.

An incision through the fang marks is not advisable; this procedure is too hazardous to underlying structures and at best removes only 20% of the venom. Do not use cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, or other methods of cold therapy. The caregiver must consider several other factors. A person bitten by a snake should try to lie still and be quiet. If the bite is in the arm or leg, keep the bite lower than the heart. Staying still and holding the bite lower than the heart will help to slow any poison spreading through the body. Get medical care as soon as possible, even if the snake was known to be non-poisonous. The use of snake bite kits is prohibited.

3.5.4 Spiders

The two poisonous spiders that may be encountered on the former Seneca Army Depot project are the Brown Recluse and the Black Widow. The Brown Recluse is up to one inch long with a violin or “fiddle” shaped mark on the top of the head. The Black Widow is a smaller, bulbous black spider with a red hourglass-shaped mark on the underside.

Reactions to a Brown Recluse spider bite include mild to severe pain within two to eight hours and a star shaped area around the bite within three to four days. Significant tissue death and loss accompanies a Brown Recluse spider bite. Reactions to a Black Widow spider include intense pain at the site of the bite after approximately 15 to 60 minutes, followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils, and generalized swelling of face and extremities.

Persons that have been bitten by a Brown Recluse or Black Widow spider should be immediately transported to a hospital. The spider should be collected (if possible) for confirmation of the species.

3.5.4.1 First Aid:

- If possible, catch the spider to confirm its identity. Even if the body is crushed, save it for identification.
- Clean the bitten area with soap and water or rubbing alcohol.
- To relieve pain, place an ice pack over the bite.
- Keep the victim quiet and monitor breathing.
- Seek immediate medical attention.

3.5.5 Mosquitoes

West Nile virus is spread by the bite of an infected mosquito, and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. Mild flu-like symptoms include fever, headache, body aches, and possibly a rash.

On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older.

There is evidence to suggest that West Nile virus can be spread from person to person through blood transfusions and organ transplants.

Human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low.

You can further reduce your chances of becoming ill by protecting yourself from mosquito bites. To avoid mosquito bites:

- Apply insect repellent containing DEET (N,N-diethyl-meta-toluamide) when you're outdoors.
- When possible, wear long-sleeved clothes and long pants treated with repellents containing permethrin or DEET since mosquitoes may bite through thin clothing. Do not apply repellents containing permethrin directly to exposed skin. If you spray your clothing, there is no need to spray repellent containing DEET on the skin under your clothing.
- Consider staying indoors at dawn, dusk, and in the early evening, which are peak mosquito biting times.

3.5.6 Bees, Wasps, Hornets, and Other Insects

Symptoms of an insect bite are normally a sharp, immediate pain in the body part bitten. Poisonous insects and insect-like creatures that may be encountered at former Seneca Army Depot sites include the following:

- Bees (honeybees, bumble bees, wasps, and hornets);
- Scorpions;
- Caterpillars; and
- Beetles/Bugs.

Site personnel will comply with the following work practices:

- Personnel with a known hypersensitivity to bee, wasp, or hornet stings will inform the PM or SHSO of this condition prior to performing site activities.
- Personnel with a known hypersensitivity condition will keep emergency medication in their possession.
- All personnel will remain vigilant for the presence of these stinging insects. Discovered nests will be flagged and their location reported to other site personnel.
- If stung, immediately inform the SHSO to receive treatment, per **Figure A-2**.

3.5.7 Bloodborne Pathogens

Bloodborne pathogens enter the human body and blood circulation system through punctures, cuts or abrasions of the skin or mucous membranes. They are not transmitted through ingestion (swallowing), through the lungs (breathing), or by contact with whole, healthy skin. However, under the principle of universal precautions (see below) all blood should be considered infectious, and all skin and mucous membranes should be considered to have possible points of entry for pathogens.

There are a number of infections that are transmitted by insects and arthropods where the infection cycle includes the human blood system. Examples include malaria and lyme disease, which are transmitted by mosquitoes and ticks, respectively. These diseases are serious, and the possibility for infection should be considered in planning field operations in areas where these disease vectors are present. However, these diseases cannot be transmitted through personal contact with human blood, and are not covered by the OSHA *Bloodborne Pathogen Standard*.

Potential bloodborne pathogen exposures include:

- Contact with contaminated medical equipment, medical waste, sharps and other potential infectious material
- Medical emergency response operations such as administering first aid or CPR
- Contact with human wastes such as domestic sewage
- All body fluids in situations where it is difficult or impossible to differentiate between body fluid types

An indoctrination to the bloodborne pathogens standard (29 CFR §1910.1030) will be provided to all employees either during their first aid training, and/or during the initial site health and safety meeting. It is important to recognize the concept of universal precautions. Universal precautions require one to assume that all blood and bodily fluids contain pathogens and require the use of protective barriers to prevent exposure. Latex gloves and CPR barriers will be available in the first aid supplies stored at each site and should be used prior to attending to a victim’s needs. Additionally, washing any body part or surface that has been contaminated with blood is an important part of the universal precautions. The SHSO should be notified of any potential contact with blood or bodily fluids resulting from first aid or CPR administered on the job.

3.6 IONIZING RADIATION HAZARDS

Radioactive materials were stored at Seneca Army Depot in the form of pitch blend, a tar-like uranium oxide ore derived from coal. The pitch blend has been removed from the depot; however, the possibility exists that small amounts of this radioactive material were disposed on-site. Monitoring for radioactivity will be conducted at selected SWMUs to minimize the small chance of exposure.

The hazards associated with radioactive materials result from the particles emitted from the material. Three types of radioactive particles are of concern with regard to environmental radioactivity are:

. • Alpha particles,
. • Beta particles, and
. • Gamma or x- rays.

The hazards associated with each of these types of radiation are presented in the Corporate Radiation Protection Manual, which is attached in **Attachment A-2**.

The following is a summary of the possible long-term toxic effects of the radionuclides of concern that may exist at Seneca.

Radium – Radium (primarily found in nature as Ra-226 and Ra-228) can emit alpha and beta particles and gamma rays. Radium, via oral exposure, is known to cause lung, bone, brain, and nasal passage tumors in humans. Specifically, the primary biological endpoints associated with the ingestion of radium are bone sarcomas and carcinomas of the paranasal sinuses and mastoids. The decay progeny of radium, including radon, polonium, bismuth, and lead, are believed to be in part responsible for the occurrence of tumors after radium exposure.

Thorium – The toxicity of thorium is generally associated with the radioactivity of Th-232 and its decay progeny. Th-232 is primarily an alpha-emitter, but several of its progeny are beta and gamma emitters as well. There is strong evidence of liver cancer resulting from the injection of certain thorium compounds. It is believed that most thorium compounds are retained in the body more or less indefinitely, but due to the chemistry of thorium and the lack of epidemiological studies, there is considerable uncertainty about its long-term health effects.

Uranium – The major pathway for the primary uranium isotopes (U-234, U-235, and U-238) is through ingestion. The uranium isotopes primarily are alpha-emitters, but several of their progeny are beta and gamma emitters as well. The biological endpoints of uranium in the body are the skeletal system, lungs, liver, and kidneys. The radiotoxicity of uranium (the result of the emission of alpha particles and gamma rays) can result in tumors of these organs; in addition, the chemical toxicity of uranium can result in kidney damage. There is also a suggestion of risk from the chronic inhalation of uranium dust. For natural uranium, there may also be health risk associated with its decay progeny, including radium, radon, polonium, bismuth, and lead.

Promethium – The toxicity of promethium (Pm-147) comes from its emission of beta particles. In addition, its decay progeny, samarium-147, is an alpha-emitter. There is little specific information available about the long-term health effects of promethium exposure.

Plutonium – The toxicity of plutonium (Pu-239) primarily comes from its emission of alpha particles. It is thought that inhalation and skin penetration are the two more important exposure pathways, with ingestion being less of a concern because of the poor absorption of plutonium by the gastrointestinal tract. Although few epidemiological studies with plutonium have been performed, it is believed that inhalation of plutonium compounds can result in lung cancer, pulmonary fibrosis, and radiation pneumonitis. After inhalation or skin penetration, plutonium absorbed into the blood stream is deposited principally in the liver and skeleton, with a small amount deposited in the gonads. Plutonium can be retained by the body for several decades.

Tritium – Tritium (H-3) can be present in the environment as a gas, as water or water vapor, or as part of a more complex molecule, and its toxicity varies depending on its form. Tritium as water or water vapor is several times more toxic than tritium as a gas. Tritium is not retained by the human body for a long period of time. Studies have shown that unborn fetuses may develop birth defects if the mother ingests tritium in the form of water.

Ionizing radiation hazard training, radiological monitoring, personnel decontamination, and equipment decontamination are presented in Sections 5.6, 9.3, 13 and 14, respectively. In addition, radiological survey procedure for decontamination of equipment, materials, and tools is presented in Attachment A-2.

4 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

All Parsons site personnel and Parsons subcontractors performing duties or working in areas where there is potential for exposure to hazardous material will meet the training requirements of OSHA 29 CFR §1910.120 before working on-site. Site personnel and their duties are outlined below:

1. Parsons Project Manager, responsible for all Parsons personnel and Parsons' subcontractors on-site and designates duties to the on-site personnel. The name and contact information for the Project Manager or, if the Project Manager is absent, the name of the acting Project Manager, shall be provided in the HSP and posted on the bulletin board in the field office.
2. The Program Health and Safety Officer (PHSO) is responsible for oversight and direction to ensure full compliance with all health and safety issues at the project site. The PHSO will oversee all aspects of site safety, including: the preparation of the Safety and Health Plan, performance of the initial site-specific training, and the periodic auditing of site operations to verify OSHA, COE, and SSHP compliance.
3. The Site Health and Safety Officer (SHSO) is responsible for carrying out the provisions of the HSP with regard to site work, and will ensure that all personnel entering the site understand and adhere to the provisions of the HSP and that personnel meet the training and medical monitoring requirements of 29 CFR §1910.120. Any changes in the provisions of the HSP shall be made in writing by the SHSO and shall be approved by the Program Health and Safety Officer (PHSO) or Corporate Health and Safety Officer. Any personal protective equipment upgrades or downgrades shall be documented in writing by the SHSO. The SHSO shall have the authority to stop an operation or site work if, in the opinion of the SHSO, the site conditions or the manner in which the work is being conducted, presents a hazard to site personnel, surrounding populations, or the environment. The name and contact information for the SHSO or, if the SHSO is absent, the name of the Acting SHSO, shall be provided in the HSP and posted on the bulletin board in the field office. The SHSO is responsible for all air monitoring. Air monitoring requirements for Seneca are set forth in Section 9.0 of this document. Additional site-specific information will be provided in the HSP.
4. For sites with potential radiological hazards, Radiation Safety Officer (RSO) is responsible for radiation safety during field activities. The RSO is responsible for compliance with radiation protection standards, determination of radiation-monitoring procedures, preparation of radiation training program, and selection of appropriate Personal Protection Equipment (PPE) for ionizing radiation hazard. For sites with potential radiological hazards, field personnel will be responsible for field monitoring and decontamination.
5. Field personnel will be involved in sampling, inspections, field monitoring, and decontamination, as specified in the Work Plan for each individual site. Site personnel will only perform tasks for which they have received appropriate training.
6. For sites where UXO is involved, field personnel will be responsible for locating and identifying unexploded ordnance on the site and for clearing access pathways to sampling and work locations. UXO personnel shall not move or dispose of any UXO found. Disposal and demolition of UXO

will be performed by trained UXO technicians. The UXO/OE Safety Officer (UXOSO) will be responsible for all UXO safety on site. He or she will stops work if any operation threatens work or public health or safety.

Site visitors will not be allowed into active work areas (also referred to as exclusion zones (EZs)) without making arrangements with the resident Army client and Parsons well in advance of the planned visit. In addition, Parsons will deny visitors access to any active EZ unless they present written documentation of the following items:

- Appropriate, up-to-date hazardous waste operations training;
- Current participation in a medical surveillance program per requirements of 29 CFR § 1910.120; and
- Evidence of the ability to use a respirator in accordance with 29 CFR §1910.134.

Furthermore, if the EZ is a radiological site meeting specification defined in EM 385-1-1 Section 06.E (c), approved visitors must be willing to participate in appropriate dosimetry use that is coordinated with the RSO.

Visitors will not be allowed into EZs associated with UXO operations unless they provide written evidence that they are UXO-qualifed personnel or they are accompanied by UXO-qualified personnel. Also, all UXO operations will be suspended when non-qualified personnel are within an UXO EZ.

While Parsons may be able to provide a limited amount of PPE, site visitors will be responsible for coordinating PPE needs and available supplies with Parsons prior to their arrival at the site. Site visitors will be required to wear appropriate PPE, as dictated by Parsons and the HSP during the visit. In addition, it is Parsons general policy to suspend active site operations during site visitations by outside observers. If visits to view active operations are required and necessary, Parsons will expect advance notice of the planned site visit so necessary arrangements and coordination can be discussed and reviewed.

Once visitors have provided Parsons with sufficient information and documentation to document their acceptability to visit a site, they will be briefed by a qualified person on the hazards expected on the site and the health controls required. They will be escorted by the site manager, or his/her designee, and will sign the visitor sign-in/out log. All visitors will be required to follow all advice and instructions provided by the Parsons’ Site manager and SHSO. Failure to follow instructions or guidance may endanger the health and safety of the site visitor and other site personnel. Visitors not complying with provided site guidance and instructions will be escorted from the site.

Visitors to the site not satisfying the above conditions will be denied access to active sites under Parsons control.

Table A-6 describes the responsibilities of all on-site personnel.

5 HEALTH AND SAFETY TRAINING

All site personnel involved in hazardous work should meet the training requirements set forth in 29 CFR §1910.120(e). All employees engaged in hazardous waste site work should have received 40 hours of training in hazardous waste site operations and safety procedures. In addition, all field personnel will have had at least three days of field experience under the supervision of a trained supervisor. On-site personnel must be up to date on their annual 8-hour refresher training.

Supervisors, SHSO, and site managers should have received an additional 8 hours of specialized training on the safe management of site operations. All site personnel should receive annual updated training. Additional training should be provided to those personnel designated to respond to site emergencies. Additional training should be provided to those employees who may be exposed to unique or special hazards (e.g., radiological hazards, UXO hazards) at the site. At least two people on-site will be currently certified in First Aid and CPR.

On-site safety training will consist of a detailed safety meeting and training session prior to the beginning of any field work. This meeting will cover all site activities, the corresponding AHAs, and will also review the site-specific HSP. All site personnel are required to attend this meeting. Other topics to be discussed will include donning and doffing of personnel protective equipment as well as a brief toxicological review of site-specific known and suspected contaminants. Employees who have not worked previously at this site will also review the Generic Site-Wide Health and Safety Plan for Seneca Army Depot Activity and the Accident Prevention Plan (APP). Sign-off sheets are included in **Attachment A-15**.

Daily safety meetings will also be conducted prior to each day's activities. These meetings will cover the safety measures to be employed during that day's activities and the emergency response and evacuation procedures for each work site and work crew.

A template site orientation documentation form is contained in Attachment A-15, On-Site Documentation Forms. Certificates of training (40-hr, 8-hr refresher, etc) will be maintained in the project file by the SHSO.

5.1 INITIAL SITE TRAINING

The PHSO or SHSO is responsible for developing a site-specific occupational hazard training program. The PHSO or SHSO is responsible for providing training to all Parsons personnel and Parsons subcontractors under Parsons H&S supervision that are to work at SEDA. This initial site training shall consist of a review of the site specific Health and Safety Plan and shall cover the following topics:

- Site Personnel and Duties;

- Site Description;
- Site Characterization;
- Chemical and Physical Hazards;
- Heat Stress and Cold Stress;
- Biological Hazards (poison ivy, snakes, spiders, and bloodborne pathogens);
- Site Layout, Site Control Measures, and Work Zones;
- Personal Protective Equipment;
- Air and personnel monitoring
- Safe Work Practices and Engineering Controls;
- Emergency Response Plan;
- Evacuation Procedures;
- Emergency and Personal Protective Equipment;
- Emergency Telephone Numbers;
- Directions to Hospital;
- Medical Surveillance Requirements; and
- Health and Safety Training
- Workers Compensation
- Accident Investigation and Reporting

All proposed project personnel will be required to complete this training prior to being allowed to work on site. Each worker's attendance and completion of this training will be documented by the SHSO. After the training, each field team member will sign the form in Attachment A-15 attesting to their understanding and acceptance of the SHSP and copies of these forms will be kept on file.

All field inspectors will be provided training in the use of instruments or equipment prior to their assignment to operate these instruments or equipment.

Personnel will also be instructed in the use of the buddy system, which is a method of organizing work groups so that there is someone that is always available to:

- Provide his or her partner with assistance in an emergency.
- Observe his or her partner for signs of chemical or physical exposure.
- Periodically check the integrity of his or her partner's PPE.
- Notify the emergency response personnel when an emergency occurs.

The buddy system will be used at all times when employees are within an exclusion zone (EZ).

5.2 SAFETY BRIEFINGS

Safety briefings shall be conducted each morning while working at the site and at the beginning of new operations, changes in site conditions, and changes in operating procedures due to weather, new equipment, or additional site information. Topics will include a review of safety procedures for that day's activities. Records of attendance and topics discussed will be maintained by the SHSO.

The topics covered in the safety briefings will include, as appropriate:

- Evacuation routes and emergency procedures;
- Use of additional protective equipment;
- Terrain hazards;
- Weather hazards;
- New chemical or toxicological information;
- Periodic review of portions of the site-specific SSHP; and
- Review of site incidents, follow-up, and corrective measures.

5.3 CPR/FIRST AID TRAINING

Two site personnel certified in First Aid/CPR will be on site to provide immediate response to an accident situation until medical assistance arrives on the site. These selected employees are trained in CPR and first aid for emergency use only. Indoctrination to the bloodborne pathogens standard (29 CFR §1910.1030) will be provided to all employees either during their first aid training, and/or during the initial site health and safety meeting.

5.4 EMERGENCY RESPONSE TRAINING

All site personnel will be made aware of the project emergency assistance network, the most probable route of evacuation from the site in the event of an emergency, and other emergency procedures included in Section 16.

5.5 HAZARD COMMUNICATION TRAINING

In accordance with the OSHA Hazard Communication Standard (29 CFR §1920.1200 and CFR §1926.59), copies of all material safety data sheets (MSDS) for hazardous chemical materials that are used during site operations or that are present on-site will be available from the SHSO. The SHSO will conduct hazard communication training in accordance with 29 CFR §1920.1200 and CFR §1926.59 and the Hazard Communication Program (See Section 11). Training will include, but not limited to, all hazards or potential hazards associated with site activities and any hazardous chemical materials brought to or found on site.

5.6 RADIOLOGICAL TRAINING

All field inspectors will be provided training in the use of hand-held radiation meters, by a person who is knowledgeable in their use, prior to their assignment as lead representative on a survey crew. This training will focus on the proper use of radiation detection instruments (Geiger-Mueller detectors and other detectors if considered appropriate) to assure that all radiation health and safety monitoring equipment is properly used during the field operations. Radiation survey meters must only be used by persons who have been trained in the proper interpretation of their readings. The meters require frequent calibration and checking to ensure that the readings are accurate.

Additionally, as part of the planned Health and Safety kick-off meeting, all other project personnel will be informed of the possible implications of contact with or exposure to radiological materials. This briefing will focus on:

- Identifying materials that are suspected of being present on site;
- Tentatively identifying areas where exposure to radiological material is believed to be possible based on surface radiation surveys;
- Defining levels that will be used as thresholds for triggering personal safety response actions;
- Explaining how the selected exposure levels are set and why these levels are consistent with established guidance and protection of site worker health, safety and welfare; and,
- Explaining and practicing decontamination procedures that will be implemented if radiological materials are found to be present.

All proposed project personnel will be required to complete this training prior to being allowed to work on site. Each worker's attendance and completion of this training will be documented by the SHSO.

5.7 UXO TRAINING

The UXO technician will have graduated from a school recognized by USACOE Huntsville and will have a UXO roster database number. The various UXO labor technician categories will meet the requirements of the current USACOE document requirements.

The UXO technician will provide site-specific basic UXO Recognition and Avoidance Training. The following areas will be included:

1. Basic UXO and UXO component recognition training;
2. UXO avoidance and reporting procedures;
3. Specific hazards related to UXO;
4. UXO emergency procedures; and

5. Emergency medical care related to UXO.

5.8 VISITOR TRAINING

Visitors to the support zone will receive training in the following areas:

- Emergency signals and procedures.
- Work areas and locations.
- Names of field team leader and site health and safety officer.
- Location and description of potential hazards and risks.
- A short briefing about chemical and physical hazards found on-site.
- Areas of the site that are closed to visitors.
- The site excavation plan and emergency procedures.
- Other topics as deemed appropriate.

Site visitors wishing to enter the EZ during site operations will be subject to the same site specific and hazard information training as specified for site personnel. See Section 4 for additional visitor responsibilities and restrictions.

5.9 TRAINING DOCUMENTATION

Documentation of training requirements is the responsibility of each employee/visitor. Written documentation verifying compliance with 29 CFR §1910.120 (e)(3), (e)(4) (as applicable) and (e)(8) must be submitted to the SHSO prior to entering the EZ. Documentation of worker's current training credentials and site-specific training will be kept in the project file.

6 PERSONAL PROTECTIVE EQUIPMENT

The selection and use of personal protective equipment (PPE) at individual sites will be specified in the site-specific HSPs. The unknown nature of hazardous waste site work and the possibility of changing conditions during the conduct of the work may require changes in the personal protective equipment. When changes in personal protective equipment become necessary, these changes shall be made in accordance with the action levels and criteria set forth in this plan. As a rule, levels of PPE will need to be reassessed if any of the following occur:

- Appearance of previously unidentified or anticipated chemical conditions or task hazards.
- Ambient weather conditions change which impact the use of assigned PPE.
- A new task is introduced or a previously assigned and evaluated task is expanded in scope.

If work tasks are added to the SOW after approval of the site-specific HSP, the Corporate HSO or PHSO shall identify and assess the task hazards, complete and sign an Activity Hazard Analysis (AHA) form and designate the level and type of PPE to be used during conduct of the task. The new AHA, along with any other additions, changes or modifications to the approved site-specific HSP shall be approved by the Corporate HSO and PM.

Routine site work at the Seneca site will be performed in Level D protection, including safety glasses, steel toe boots, inner surgical gloves, chemical-resistant outer gloves, and long pants or jeans. Level C respiratory protection with organic vapor/P-100 will be carried by all work crews to be donned when air monitoring indicates the need for respiratory protection. Required equipment for Levels B, C, and D are detailed in **Table A-7**, Description of Personal Protective Equipment and Levels of Protection.

The organic vapor monitor will be the primary instrument for determining contaminant concentrations that may trigger a change in respiratory protection. Level C protection will be worn in situations where inhalation of fugitive dust containing metals or explosives is determined to be present in high levels. Action levels for changes in personal protection equipment are shown in **Table A-8**. It should be noted that the action levels for specific sites may vary depending on the site-specific information. The action levels for individual sites will be specified in the individual HSPs.

In the event that personal protective equipment is ripped or torn, work shall stop and PPE shall be removed and replaced as soon as possible.

6.1 PPE SELECTION

Appropriate PPE shall be identified by SHSO based on site-specific conditions and shall be presented in site-specific HSPs. In general, the following considerations shall be observed in the selection of PPE:

- Hard hats will be required when working around heavy equipment or when an overhead hazard exists;
- Steel toe/shank boots are required when working around heavy equipment;
- Safety glasses shall be selected which protect site personnel from potential hazards. Goggles may be necessary to protect from splash hazards during sampling;
- Hearing protection should be used when working around heavy equipment or using power tools;
- Leather gloves should be used when drilling is conducted;
- The SHSO shall continually evaluate site tasks to identify hazards and shall provide any PPE necessary to ensure the safety and health of site personnel, regardless of the activity they perform; and
- Other task-specific PPE based on site-specific conditions.

6.2 RESPIRATORY PROTECTION

Respiratory protection is required whenever it is determined necessary by the SHSO. The selection and use of a full respiratory protection must comply with the OSHA respirator standards and U.S. Army EM 385-1-1. All respirators must be NIOSH approved and properly fit tested. Fit test forms are located in Attachment A-15. Respirator use and maintenance must be documented. The respiratory protection program is presented in **Attachment A-3**.

When usage of a respirator is deemed necessary, the following will be completed:

- All project personnel that will be required to wear a respirator will be fit tested;
- Used cartridges for Level C operation will be disposed at the end of the day and new cartridges will be used for the next working day; and
- Respirators will be cleaned daily by project personnel.

6.3 EQUIPMENT

First aid kits for the treatment of minor injuries and burns shall be maintained onsite. The first aid kits shall be inspected by the SHSO at least weekly to ensure adequate supplies are available and in proper working order. The contents and number of first aid kits shall be determined by EM-385-1-1, Section 03.B and approved by the SHSO prior to the start of site activities. **Table A-9** lists what EM 385-1-1 requires.

At a minimum, the following general emergency equipment will be available at the site at all times:

Equipment	Location
Fire Extinguishers	Two (10ABC) in the vehicle transporting explosives, one in each transport vehicle and piece of heavy equipment
Emergency Eyewash	Each vehicle on-site
First Aid Kit	Each vehicle on-site
Stretchers	One in the vehicle

7 MEDICAL SURVEILLANCE

All personnel conducting work in the exclusion and contamination reduction zones will be participating in a medical surveillance program which meets the criteria set forth in OSHA 29 CFR Part 1910.120. This rule requires that employees engaged in hazardous waste site work receive a medical examination at least annually, and they be certified by the examining physician to wear a respirator without restrictions. All subcontractors performing hazardous waste work must be enrolled in a medical surveillance program. Written certification of completion of medical exams will be maintained in the project by the SHSO. The medical surveillance program requires all field personnel receive medical examinations:

- Prior to site activities;
- Annually;
- Upon termination;
- Following exposure or injury; and
- Additionally as needed on a case-specific basis.

Employees of Seneca Army Depot (SEDA) who will be performing activities in active work areas at SEDA will be required to participate in SEDA's medical surveillance program.

7.1 PHYSICAL EXAMINATIONS

OSHA (29 CFR Part 1910.120 [f]) requires the enrollment of personnel engaged in operations involving hazardous materials in a medical surveillance program. The content of the examination must be sufficiently detailed to determine an individual’s fitness for duty, including ability to work while wearing protective equipment (e.g., respirator, impermeable clothing, etc.). The results of these examinations will be kept on file at least 30 years after employment has been terminated.

All personnel who will be engaged in hazardous waste operations on this project will present to the PHSO or SHSO a physician’s certification of completion of a comprehensive medical monitoring examination within the 12 months prior to the beginning of activities. Additionally, the SHSO will ensure that workers remain current in their medical monitoring throughout the duration of the project as well as meet the medical surveillance inclusion criteria for their specific job assignments. The certification shall attest to the individual’s fitness for duty, including his or her ability to work while wearing PPE (e.g., respirator, impermeable clothing, etc.). Copies of employees’ Health Status Reports will be provided to the SHSO prior to the commencement of field operations.

7.2 RADIOLOGICAL MONITORING

For sites with potential radiological hazards, dosimetry will be used to monitor exposure to ionizing radiation resources. Section 8 provides guidance on the use of radiation dosimetry.

8 RADIATION DOSIMETRY

All site personnel involved in radiological surveys or investigations shall wear personal radiation dosimeters during their work. These badges will be used to determine each individual's exposure to radiation as a result of their involvement in the site activities. The exposure data will also be used to verify compliance with OSHA and NRC's regulatory limits.

Each crew member will be assigned an individual, pre-numbered thermoluminescent dosimeter (TLD) badge. Whenever the employee is in the area, he/she will be required to wear their TLD in a prominent location, specifically in a region on the front of the body between the waist and the neck. At the end of each work shift or whenever the employee leaves the site, this badge will be returned to the field office for storage in a secure location. This badge will not be assigned or used by any other individual and is intended to provide data on the site worker's cumulative exposure while on site. At the end of each month, all assigned badges will be recovered and sent to a laboratory for analysis. Project personnel will also be assigned a new badge for the next period of work on site.

Reports prepared by the RSO that document worker exposure to ionizing radiation will be furnished to each individual working within a radiologically restricted area annually, upon project completion, upon termination, and within 30 days of any personal request. These reports of exposure to ionizing radiation will be maintained in the project files and by the Facility Health and Safety Representative.

9 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

An environmental and personal monitoring program will be developed based on site-specific information for individual HSPs. This section will present general information on wind direction monitoring, volatile organic compound (VOC) monitoring, and radiation monitoring.

9.1 WIND DIRECTION MONITORING

A wind direction indicator (such as survey flagging tied to a stake) will be erected at every active work site. This will enable the SSHO and on-site personnel to determine upwind locations necessary for proper health and safety procedure implementation, (work areas relative to the excavation) and, if necessary, evacuation procedures.

9.2 VOLATILE ORGANICS MONITORING

Field work at sites with VOC contamination shall use photoionization detector (OVM-580B/580S or equivalent) equipped with a 10.6e V lamp or other monitoring instrument deemed appropriate by PHSO to monitor VOC concentrations in the working area. Readings detected by the PID or other instrument will be used to determine the appropriate levels of protection. Action levels for VOCs and particulates are presented in Table A-8. Action levels for individual sites, if different from the levels in Table A-8, will be presented in the site-specific HSPs.

9.3 RADIATION MONITORING

Radiation monitoring will be conducted at sites with potential radiological hazards (see Table A-1). The monitoring includes site pre-screening, personal radiological exposure monitoring, real-time site radiation monitoring, and personnel and PPE exit monitoring as discussed in the following subsections.

9.3.1 Site Pre-Screening

Site pre-screening will be conducted prior to investigations in the areas with potential radiological hazards. As part of this operation, background levels of radiation will be defined. Background levels will be established by collecting field data from areas on- or off-site where there is no historic information to indicate that radiological materials have been used or handled and which are believed to be representative of other site conditions present at SEDA.

As part of the site clearance process for intrusive investigations, an area of roughly 900 square feet around the stake (i.e., 30 x 30 foot square) will be surveyed to determine radiation levels that are present. If radiation levels of greater than two times the background level are found, intrusive work at the proposed location will be postponed pending further clarification of the source of the radiation. If excessive radiation is not found, this information will be documented for the site and the site will be considered ready for initiation of intrusive operations.

In the event that elevated levels of radiation are found at areas that are not currently known to have such levels, efforts will be made to:

- Investigate the cause or source of the elevated readings;
- Review and modify, as necessary, the proposed intrusive investigation methodology and sample collection methodology;
- Review and modify, as necessary, the handling and placement of Investigation Derived Waste (IDW) and/or of excavated materials.

9.3.2 Real-Time Site Radiation Monitoring

Real-time site radiation monitoring shall be conducted in addition to the site pre-screening. Field inspectors assigned to site crews will be responsible for monitoring the real-time radiation level at the work site. This monitoring will be performed periodically during the workday and continuously when intrusive activities are in progress.

At the beginning of each day, the assigned field inspector (the RSO or his/her designee) will measure and record the background radiation level present in the designated work zone. Radiation monitoring will be conducted using a Geiger-Mueller pancake-type detector, a phoswich, or other appropriate detector identified by the RSO. Monitoring for the gross alpha, beta, and gamma radiation will be conducted in the work zone and on all samples, if deemed necessary by the RSO. The measurement will be obtained using a meter that is in proper working condition and that has been calibrated within the preceding six months. Additional background measurements will be made and recorded during the workday.

If the measured site radiation level is less than two times the background reading for the work site, work will be allowed to continue. If background radiation levels are found to be greater than two times the historic background level, work will be suspended and the RSO will be notified.

If work is allowed to continue, the field inspector will continuously monitor for an increase in radiation level. During intrusive operations such as drilling, this operation will be completed by screening soils as they are raised to the surface. In addition, soil and groundwater samples collected will also be screened as they are raised to the surface. Radiation measurements obtained from soils and groundwater will be recorded periodically on the field sheets (e.g., boring logs or SSHO's daily logs).

Measurement of radiation levels at or above two times background at areas that are not currently known to have such levels will cause an immediate cessation of all work area activity. This condition will be immediately reported to the site RSO.

Once informed of an increase in radiation level, the RSO will be responsible for assessing and evaluating the radiological conditions. The RSO will independently confirm the validity of the reading to determine if the reading represents a real or false-positive measurement. If the reading is verified, the RSO will suspend intrusive work at the proposed location pending further evaluation. After this assessment is performed, the RSO may permit intrusive operations without restriction, may permit intrusive operations with additional radiological controls in place, or may recommend that the intrusive method be modified or a different method selected to minimize the potential hazard. The RSO will also prescribe or define appropriate short-term measures to control or limit the spread of radioactive materials from the immediate work location.

In the event that the recorded reading is determined to be a false positive reading by the RSO, the reasons for this determination will be documented. All pertinent facts leading to this conclusion will be recorded in the RSO's field log.

9.3.3 Personnel and PPE Exit Monitoring

If working in a potentially radiation contaminated area, all personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking or drinking, Personnel shall use the following procedure for a self-frisk:

a. Verify frisker is on the x1 scale,
b. Survey hands before picking up probe,
c. Hold probe approximately 1/2 inch from the surface being surveyed and move the probe slowly over the surface (2 inches per second maximum). Take care not to touch the surface being monitored with the probe,
d. Monitor face (pause at mouth and nose),
e. Monitor neck and shoulders,
f. Monitor arms (pause at each elbow),
g. Monitor chest and abdomen,
h. Monitor back, hips and seat of pants,
i. Monitor legs (pause at each knee), and
j. Monitor shoe tops and bottoms (pause at soles and heels).

The absence of gamma readings above background should not be interpreted as the complete absence of radioactivity. Radioactive materials emitting low-energy gamma, alpha, or beta radiation may be present, but for a number of reasons may not cause a response on the instrument. Unless airborne, these radioactive materials should present minimal hazard. More thorough surveys should be conducted as site operations continue to document the absence of radioactive materials.

Radiation survey meters must only be used by persons who have been trained in the proper interpretation of their readings. The meters require daily calibration and checking to ensure that the readings are accurate.

10 HEAT/COLD STRESS MONITORING

10.1 INTRODUCTION

Heat/cold stress is one of the most common (and potentially serious) illnesses that affect site personnel. When site personnel are engaged in operations involving hot or cold environments, a number of physiological responses can occur which may seriously affect the health and safety of the workers. These affects can be eliminated or controlled through the use of a comprehensive heat/cold stress prevention and monitoring program.

10.2 HEAT STRESS DISORDERS

This section outlines the major heat related illness that may result from exposure to high heat environments, which include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. For the purpose of this program, reference to “liquids” will indicate the use of water or an electrolyte replacement solution, and not tea or coffee (unless it is decaffeinated) or carbonated soft drinks.

10.2.1 Early Symptoms of Heat Related Problems

Early symptoms of heat related problems include:

1. Decline in task performance
2. Lack of coordination
3. Decline in alertness
4. Unsteady walk
5. Excessive fatigue
6. Muscle cramps
7. Dizziness

10.2.2 Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by wet chafing clothing. This condition can decrease a worker’s ability to tolerate hot environments.

Symptoms: Mild red rash, especially in areas of the body that sweat heavily.

Treatment: Decrease amount of time in protective gear and provide powder such as cornstarch or baby powder to help absorb moisture and decrease chafing. Maintain good personal hygiene standards and change into dry clothes if needed.

10.2.3 Heat Cramps

Heat cramps are caused by a profuse rate of perspiration that is not balanced by adequate fluid and electrolyte intake. The occurrence of heat related cramps are often an indication that excessive water and electrolyte loss has occurred, which can further develop into heat exhaustion or heat stroke.

Symptoms: Acute, painful spasms of voluntary muscles such as the back, abdomen and extremities.

Treatment: Remove victim to a cool area and loosen restrictive clothing. Stretch and massage affected muscles to increase blood flow to the area. Have patient drink one to two cups (16 oz.) of liquids immediately, and every twenty minutes thereafter. Consult with physician if condition does not improve. If available, an electrolyte replacement solution should be taken along with liquids.

10.2.4 Heat Exhaustion

Heat exhaustion occurs due to the large fluid and salt loss from profuse sweating. It is a state of very definite weakness or exhaustion caused by increased stress on various organs to meet increased demands to cool the body due to excessive loss of fluids from the body. This condition leads to inadequate blood supply and cardiac insufficiency. Heat exhaustion is less dangerous than heat stroke, but nonetheless must be treated. If allowed to go untreated, heat exhaustion can quickly develop into heat stroke.

Symptoms: Pale or flushed, clammy, moist skin, profuse perspiration, and extreme weakness. Body temperature is basically normal or slightly elevated, the pulse is weak and rapid, and breathing is shallow. The individual may have a headache, be dizzy or nauseated.

Treatment: Remove the individual to a cool, air-conditioned place, loosen clothing, elevate feet and allow individual to rest. Consult physician, especially in severe cases. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Total liquid consumption should be about one to two gallons per day. If the signs and symptoms of heat exhaustion do not subside, or become more severe, immediate medical attention will be required.

10.2.5 Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by failure of the heat regulating mechanisms of the body. The failure of the individual's temperature control system causes the perspiration system to stop working correctly. When this occurs, the body core temperature rises very rapidly to a point (105+ °F) where brain damage and death will result if the person is not cooled quickly.

Symptoms: The victim's skin is hot, and may or may not be red, dry and spotted, due to the fact that the individual may still be wet from sweat that occurred while wearing protective clothing earlier; nausea; dizziness; confusion; extremely high body temperature; rapid respiratory and pulse rate; delirium;

convulsions; unconsciousness or coma.

Treatment: Cool the victim immediately. If the body temperature is not brought down quickly, permanent brain damage or death may result. The victim should be moved to a shady area; he should lie down and keep head elevated. Cool the victim by either sponging or immersing the victim in very cool water to reduce the core temperature to a safe level (<102 °F). If conscious, give the victim cool liquids to drink. Observe the victim and obtain immediate medical help. Do not give the victim caffeinated or alcoholic beverages. Heat stroke is considered a medical emergency. Medical help should be summoned immediately. EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.

10.2.6 Preventive Measures

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat exhaustion, that person may become predisposed to additional heat injuries. In order to avoid heat related illnesses, proper preventive measures will be implemented whenever environmental conditions dictate the need, normally whenever the temperature reaches at least 75 °F. These preventive measures represent the minimal steps to be taken and will include the following procedures:

1. The SHSO will examine each site worker prior to the start of daily operations, and periodically throughout the day, to determine individuals that may be susceptible to heat induced stress. Evidence of extreme dehydration, illness or drug or alcohol use may require the SHSO to restrict the worker’s activities until such time as the worker is fit for duty.
2. Personnel identified as being at high risk for heat stress who are allowed to participate in site operations will be monitored frequently by the SHSO.
3. Site workers will be trained to recognize and treat heat-related illnesses. This training will include the signs, symptoms and treatment of heat stress disorders as outlined in this document.
4. In order to maintain workers’ body fluids at normal levels, workers will be encouraged to drink, as a minimum, approximately sixteen ounces of liquids prior to start of work in the morning, after lunch and prior to leaving the site at the conclusion of the day’s activities. Disposable four (4) to twelve (12) ounce cups and liquids will be provided on site. Liquids to be provided will include water and an electrolyte replacement solution, with the intake of each being equally divided. Liquids containing caffeine are to be avoided.
5. When ambient conditions and site workload requirements dictate, as determined by the SHSO, workers will be required to drink a minimum of 16 to 32 ounces of liquids during each rest cycle. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drank to replace lost sweat. When heavy sweating occurs, workers shall be encouraged to drink even though they may not be thirsty.

6. A shelter or shaded area will be provided where workers may be protected from direct sunlight during rest periods.

7. Monitoring of ambient or physiological heat stress indices will be conducted by SHSO to allow prevention and/or early detection of heat induced stress. Monitoring will be conducted in accordance with applicable paragraphs of this SSHP.

8. Site workers will be given time to acclimatize to site work conditions, temperature, protective equipment, and workload. Acclimatization is the adaptive process that results in a decrease of the physiological response produced by the application of a constant environmental stress. On initial exposure to a hot environment, there is an impaired ability to work and evidence of physiological strain. If the exposure is repeated on several successive days, there is a gradual return of the ability to work and a decrease in physiological strain. Acclimatization usually takes two to six days of continued work in hot environments, and allows the worker's body to become adjusted to this level and type of work. This process involves a gradual increase in the workload over the required period, the length of which depends upon the nature of the work performed, the ambient temperatures, and the individual's susceptibility to heat stress. The results of acclimatization include: subjective discomfort practically disappears; body temperature and heart rate are lower; there is a more stable blood pressure; and the sweat is more profuse and dilute.

9. Work schedules will be adjusted by SHSO as follows:
    - Modify work/rest schedules according to monitoring requirements.
    - Mandate work slowdowns as needed.
    - Rotate personnel: alternate job functions to minimize over-stress or overexertion at one task.
    - Add additional personnel to work teams.
    - Perform work during cooler hours of the day if possible.

10. Workers will be encouraged to achieve and maintain an optimum level of physical fitness. Increased physical fitness will allow workers to better tolerate and respond to hot environments and heavy workloads. In comparison to an unfit person, a fit person will have: less physiological strain; a lower heart rate and body temperature; and a more efficient sweating mechanism.

11. Alcohol should not be consumed in a hot environment because the loss of body fluids increases the risk of heat stress.

The amount and type of PPE worn directly influence reduced work tolerance and the increased risk of excessive heat stress. PPE adds weight and bulk, severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Therefore, when selecting PPE, each item's benefit should be carefully evaluated in relation to its potential for increasing the risk of heat stress. Once PPE is selected, the safe duration of work/rest periods should be determined based on the following factors:

1. Anticipated work rate.
2. Ambient temperature and other environmental factors.
3. Type of protective ensemble.
4. Individual worker characteristics and fitness.

Sweating does not cool the body unless moisture is removed from the body. The use of personal protective equipment reduces the body's ability to eliminate large quantities of heat because the evaporation of sweat is decreased. The body's effort to maintain an acceptable temperature may become impaired and this may cause heat stress. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks. At most SWMUs at Seneca, Level D PPE will be utilized, thus providing minimal increase in the potential for heat stress. Level D PPE is defined as standard work clothes with long pants, hard hats (when overhead hazard is present), safety boots and glasses. The selection of PPE is discussed in Section 6.

10.3 HEAT STRESS MONITORING

Because the incidence of heat stress depends on a variety of factors, all workers shall be monitored by SHSO. Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The length of the work cycle will be governed by the frequency of the required physiological monitoring.

Monitoring of personnel wearing PPE should begin when the ambient temperature is 75°F or above. **Table A-10** presents the suggested frequency for such monitoring. Monitoring frequency should increase as the ambient temperature increases or as slow recovery rates are observed. A person with a current first aid certification who is trained to recognize heat stress symptoms should perform heat stress monitoring. Other methods for determining heat stress monitoring, such as the wet bulb globe temperature (WBGT) index from American Conference of Governmental Industrial Hygienist (ACGIH) Threshold Limit Values (TLV) booklet can be used.

For workers wearing permeable clothing (i.e., standard cotton work clothes), one should follow recommendations for monitoring requirements and suggested work/rest schedules in the current ACGIH Threshold Limit Values for Heat Stress (**Table A-11**). For workers in tyvek suits, work/rest schedules will be adjusted in accordance with physiological monitoring requirements.

To monitor the worker, the SHSO should measure:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
  - If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
  - If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
    - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.
    - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
    - Do not permit a worker to wear a semipermeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

10.3.1 Wet Bulb, Globe Temperature (WBGT) Monitoring

For site conditions where personnel are working in Level D PPE, and the ambient temperature is greater than 75°F, the SHSO may conduct WBGT monitoring to assist in controlling the potential for site workers experiencing heat related adverse health affects. The SHSO will take readings on a WBGT monitor throughout the day to determine the work/rest schedule to be implemented. This guidance is designed such that nearly all acclimatized, fully clothed workers with adequate water and electrolyte replacement liquids intake will be able to function without the body temperature exceeding 100.4°F.

10.4 HEAT STRESS DOCUMENTATION

The SHSO will be responsible for recording all heat stress related information. This will include training sessions and monitoring data. Training sessions will be documented on the Documentation of Training Form (Attachment A-15), and WBGT data and other information will be recorded in the Safety Log. All documentation will be maintained in the project files.

10.5 COLD-RELATED ILLNESS

Exposure to low temperatures presents a risk to employee safety and health both through the direct effect of the low temperature on the body and collateral effects such as slipping on ice, decreased dexterity, and reduced dependability of equipment. Work conducted in the winter months can become a hazard for field personnel due to cold exposure. All personnel must exercise increased care when working in cold environments to prevent accidents that may result from the cold. The symptoms of cold exposure include frostbite and hypothermia. Wind increases the impact of cold on a person's body. Work will cease under

unusually hazardous conditions (e.g., windchill less than 10°F, or wind chill less than 20°F with precipitation). Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite. Recognition of the symptoms of cold-related illness will be discussed during the health and safety briefing conducted prior to the onset of site activities.

10.5.1 Hypothermia

Hypothermia is defined as a decrease in a person's core temperature below 96.8°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of "cold" ambient temperatures. The first symptom of systemic hypothermia is shivering. Maximum shivering starts when the core body temperature drops below 95°F. The next set of symptoms as the body's cooling progresses is apathy, listlessness, and sleepiness. The person remains conscious and responsive with normal blood pressure and a core temperature of 93.2°F. The person must be removed immediately to a facility with heat. As hypothermia advances beyond this point, the person has a glassy stare, slow pulse, slow respiratory rate, and may lose consciousness. Severe hypothermia starts when the core body temperature reaches 91.4°F. Finally, the extremities start to freeze hard and death could result.

Progressive Clinical Symptoms of Hypothermia

Core Temperature °F	Clinical Signs
95°	Maximum shivering
87° - 89°	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated
84° - 86°	Progressive loss of consciousness; muscular rigidity; respiratory rate decreases
79°	Victim rarely conscious
70° - 72°	Maximum risk of ventricular fibrillation

10.5.2 Frostbite

Frostbite is both a general and medical term given to areas of local cold injury. Frostbite has progressive degrees and this progression may continue until systemic hypothermia occurs. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Frostbite symptoms are a sudden blanching or whitening of the skin; a waxy or white appearance of the skin and it is firm to the touch; tissues are cold, pale, and solid. Superficial frostbite occurs when the skin is white but the underlying tissue is firm. The skin will return to shape when depressed. Deep frostbite causes the underlying tissue to freeze. The skin will either not depress when pressed by the finger or it will depress but not return to the original contour. DEEP FROSTBITE IS A SERIOUS INJURY.

10.5.3 Preventative Measures

In preventing cold stress, the SHSO must consider factors relating both to the worker and the environment. Training, medical screening, establishment of administrative controls, selecting proper work clothing, and wind-chill monitoring all contribute to the prevention of hypothermia and frostbite.

1. Training - Recognizing the early signs and symptoms of cold stress can help prevent serious injury. Thus, workers will be trained to recognize the symptoms of hypothermia and frostbite and have appropriate first-aid instruction. When the air temperature is below 50°F, the SHSO will inform workers of the proper clothing requirements and any work practices that are in effect to reduce cold exposure.

2. Administrative Controls - The SHSO will establish a work/rest schedule based upon worker monitoring. At the first sign of uncontrollable shivering the worker will be rested in a heated shelter. Work will stop when the air temperature reaches 0°F.

3. Clothing - Workers will be encouraged to layer clothing when air temperature is below 50°F. Clothing that has a high insulation value will be worn under protective garments. Insulated gloves will be worn when the wind chill index is below 32°F.

11 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND SAFE WORK PRACTICES

Safe work practices and engineering controls shall be implemented to comply with OSHA 29 CFR §1910.120 to limit employee exposure to hazardous substances or conditions. The use of personal protective equipment has limitations and presents hazards of its own, such as physical stress and interference with peripheral vision, calling for the consideration and implementation of work practices and engineering controls prior to beginning site tasks and before the use of personal protective equipment is instituted.

The safe work practices and engineering controls discussed below apply to general site procedures.

11.1 SAFE WORK PRACTICES

The following work practices are intended for use when site activities involve potential exposure to hazardous substances or conditions.

1. Certain SWMUs are known to contain various types of unexploded ordnance (UXO), explosives, or radiological hazards.
   All movement on the site shall be along cleared roads and pathways.
   ON-SITE WORKERS SHALL NOT STRAY FROM THE CLEARED PATHWAYS AND ROAD! ON-SITE WORKERS SHALL NOT TOUCH, KICK, OR OTHERWISE DISTURB ANY MATERIALS ON-SITE WHICH MAY BE UXO.
2. The buddy system will be utilized at all times within the exclusion zone.
3. Entry into and exit from zones within the site must be made via the established access control points.
4. Prescribed personal protective equipment must be worn as directed by the SHSO and Site Manager.
5. Assumptions will not be made concerning the nature of materials found on the site. Should any unusual situations occur (not covered by the Site Standard Operating Procedures or the HSP), operations will cease and the SHSO and the Site Manager will be contacted for further guidance.
6. Communication hand signals must be understood and reviewed regularly.
7. Consultation with the Project Manager shall be made to avoid any uncertainties regarding all aspects of project work.
8. Ground fault circuit interrupters shall be used on all field electrical equipment. Improperly grounded/guarded tools shall be tagged out-of- service and the Site Manager shall be notified immediately.
9. If a piece of equipment fails or is found to be in need of repair, it will be immediately tagged out-of-service and the Site Manager shall be notified. This equipment will not be returned to service until repairs have been completed and the equipment tested by a competent individual.
10. Unsafe conditions shall be reported immediately.
11. Unusual odors, emissions, or signs of chemical reaction shall be reported immediately.

12. Workers will minimize contact with hazardous materials by:
    a. Avoiding areas of obvious contamination
    b. Using poly sheeting to help contain contaminants
    c. Avoiding contact with toxic or hazardous materials
13. Only essential personnel will be permitted in the work zones.
14. Whenever possible, personnel will be located upwind during material handling.
15. At the first sign of odors detected inside the facepiece of a respirator, or if the employee begins experiencing any signs or symptoms of exposure to site toxic material (this information will be discussed during the daily meeting and can be found on the appropriate Chemical Hazard Evaluation Sheets), the employee will leave the area immediately and report the incident to the SHSO and Site Manager. The work site shall be evacuated whenever evidence of a situation that could result in possible hazardous condition is identified.
16. Smoking will be allowed only in designated areas of the support zone.
17. Talking on cellular phones while driving is prohibited (see Parsons cell phone policy **Figure A-5**).

11.2 SANITATION

11.2.1 Drinking Water

Only approved potable water systems shall be used for the distribution of drinking water. Tap water located in several administrative buildings (i.e., Buildings 123 and 125) at Seneca, which is treated by drinking water treatment plant at the Town of Waterloo, can be used as drinking water. The source of this water is Lake Seneca. Drinking water supplied from other sources approved by Federal, State, or local health authorities can also be used. A drinking water cooler will be provided in Building 125.

Portable containers used to dispense drinking water shall be tightly closed, and equipped with a tap. Containers will be clearly marked as their contents and shall not be used for other purposes. Water shall not be dipped from containers. Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

Outlets dispensing nonpotable water will be conspicuously posted "**CAUTION – WATER UNFIT FOR DRINKING, WASHING, OR COOKING.**"

11.2.2 Toilets

When sanitary sewers are not available, one of the following facilities, unless prohibited by local codes, shall be provided: chemical toilets; recirculating toilets; combustion toilets, or other toilet systems as approved by state/local governments.

Unless mobile crews have transportation readily available to nearby toilet facilities, toilets shall be provided for the job sites according to the following:

Number of employees	Minimum facilities (per sex)
20 or less	One
21 to 199	one toilet seat and one urinal for every 40 workers
200 or more	one toilet seat and one urinal for every 50 workers

Where toilet rooms may be occupied by no more than one person at a time, can be locked from the inside, and contain at least one toilet seat, separate toilet rooms for each sex need not be provided.

Under temporary field conditions, provisions shall be made to assure that at least one toilet facility is available.

Permanent toilet facilities are available in Building 125.

11.2.3 Washing Facilities

Washing facilities will be provided at the decontamination facilities. The main decontamination facilities at the SEDA SWMU areas will be located adjacent to the support zone. These facilities will be used for vehicle, heavy equipment, and personnel decontamination. Each washing facility will be maintained in a sanitary condition and provided with water (either hot and cold running water or tepid running water), soap, brush, and individual means of drying.

11.2.4 Personal Hygiene Practices

The following personal hygiene practices will apply to field work conducted at the SEDA SWMU areas:

1. No smoking or chewing of tobacco or gum shall be allowed within the exclusion or decontamination zones.
2. No eating or drinking shall be allowed in the exclusion or decontamination zones.
3. On-site personnel shall remove protective clothing and wash face and hands prior to leaving the decontamination zones.
4. Disposable outerwear will be placed in clearly labeled drums located in the personnel decontamination area. Drums will be staged on-site at a central location for later disposal.

11.3 FIRE CONTROL

11.3.1 Fire Prevention

Explosions and fires not only pose the obvious hazards of intense heat, open flames, smoke inhalation, and flying objects, but may also cause the release of toxic chemicals into the environment. Such releases can threaten both personnel on-site and members of the general public living or working nearby. Site personnel involved with potentially flammable material or operations will follow the guidelines listed below and EM 385-1-1, Section 9, to prevent fires and explosions:

- Potentially explosive/flammable atmospheres involving gases or vapors will be monitored using a combustible gas indicator;
- Prior to initiation of site activities involving explosive/flammable materials, all potential ignition sources will be removed or extinguished;
- Non-sparking and explosion-proof equipment will be used whenever the potential for ignition of flammable/explosive gases/vapors/liquids exists;
- Dilution or induced ventilation may be used to decrease the airborne concentration of explosive/flammable atmospheres;
- Smoking is prohibited at UXO work sites, or in the vicinity of, operations which may present a fire hazard, and the area will be conspicuously posted with signs stating “No Smoking or Open Flame Within 50 Feet”;
- Flammable and/or combustible liquids must be handled only in approved, properly labeled metal safety cans equipped with flash arrestors and self-closing lids;
- Transfer of flammable liquids from one metal container to another will be done only when the containers are electrically interconnected (electrically bonded);
- The motors of all equipment being fueled will be shut off during the fueling operations;
- Metal drums used for storing flammable/combustible liquids will be equipped with self-closing safety faucets, vent bung fittings, grounding cables and drip pans, and will be stored outside buildings in an area approved by the SHSO.

11.3.2 Protection

The following safe work practices will be used to protect against fires:

- Flammable/combustible liquid storage areas will have at least one 4A: 20:B: C: fire extinguisher located within 25-75 feet, marked with the appropriate fire symbol and no smoking signs;
- The field office will be equipped with a fire extinguisher of not less than 10:ABC;
- At least one portable fire extinguisher having a rating of not less than 20:ABC will be located at each work site.
- At least one portable fire extinguisher having a rating of not less than 20:ABC will be located at flammable storage areas and in vehicles used for site work.

11.4 WORK PERMIT REQUIREMENTS

No work permits are expected to be required for the RI/FS work or other field investigations at SEDA. Should this change, work permit requirements will be specified in the site-specific HSPs. Permit Required Confined Space (PRCS) operations and hot work are not anticipated for the RI/FS at the SEDA. Should this change for any particular site, 29 CFR 1910.146 will be reviewed and a PRCS AHA will be developed and included in the site-specific HSPs and implemented. Hot work is not anticipated for the RI/FS at the SEDA. Should this change, work permit requirements will be specified in the site-specific HSPs.

11.5 CONFINED SPACE ENTRY PROCEDURES

Confined space is not expected during the RI/FS work or other field investigations at SEDA. If confined space entry becomes necessary during the implementation of the work, a confined space entry AHA will be included in the site-specific HSP and will be instituted prior to allowing any confined space entry. Parsons confined space work policies procedures are included as **Attachment A-5**.

11.6 SITE INSPECTIONS

Site inspections will be conducted daily by the SHSO to ensure that site work is accomplished in accordance with the approved safety plan, contract requirements and federal regulations. Daily inspections will be documented.

11.7 SAFE WORK PRACTICES FOR EXCAVATION AND TRENCHING, DRILLING, TEST PITTING, POWER TOOL OPERATION, HAND TOOL OPERATION, MATERIAL LIFTING, HEAVY EQUIPMENT OPERATION, AND MOTORIZED EQUIPMENT OPERATION

Safe practices for all anticipated work activities at Seneca Army Depot are included as AHAs in Attachment A-4 of this document. Additional information regarding Parsons' standard operating procedures and policies is provided as follows:

Subject:	**Source of Additional Information:**
Excavation and Trenching	**Attachment A-13**
Power and Hand Tool Operation	**Attachment A-6**
Motor Vehicle and Heavy Equipment Operation	**Attachment A-7**

11.8 HAZARD COMMUNICATION PROGRAM

The OSHA Hazard Communications Standard (29 CFR§ 1910.1200) was promulgated to ensure that all chemicals would be evaluated and information regarding the hazards associated with these chemicals would be communicated to employers and employees. The goal of the standard is to reduce the number of chemically related occupational illnesses and injuries.

In order to comply with the OSHA Hazard Communication Standard, this written program has been established by Parsons for work at SEDA, Romulus, New York. All Parsons and subcontractor personnel working at SEDA are included in this program. Copies of this written program will be available for review by any employee at the field office, by contacting the Site Safety and Health Officer, or from the Program Health and Safety Officer:

Timothy Mustard, CIH
Parsons
1700 Broadway, Suite 900
Denver, CO 80290
(303) 764-8810

11.8.1 Hazardous Chemical Inventory List

The Site Manager or his/her designee must compile a list of hazardous chemical substances that Parsons employees and subcontractors bring to the site. The list shall be maintained in the Boston office and on-site. As new substances are purchased or old ones are discontinued, the inventory shall be updated to reflect these changes.

11.8.2 Material Safety Data Sheets (MSDS)

MSDSs are prepared by manufacturers or producers to provide specific information on the safety precautions and health effects of a particular chemical or mixture. The MSDS contains at a minimum the following information:

- Chemical and common names
- Physical and chemical characteristics
- Physical hazards
- Health hazards
- Primary routes of entry
- Exposure limits
- Carcinogenic potential
- Handling and protective precautions
- Control measures
- Emergency and first aid procedures
- Date of MSDS preparation
- Name and address of manufacturer

If chemicals are ordered, the Site Manager or his designee will specify on the purchase order that chemicals are not to be shipped without corresponding MSDSs. When chemicals and MSDS arrive, the SSHO or his designee will review them for completeness. Should any MSDS be incomplete, a letter or fax will be sent immediately to the manufacturer requesting the additional information, Parsons or its subcontractors will not accept any shipped chemical materials without an MSDS.

A complete file of MSDSs for all hazardous chemicals to which an employee of Parsons may be exposed will be kept in labeled files in the main office and on-site. In the event that a MSDS is missing the employee should immediately contact the SHSO or PHSO.

11.9 LABELS AND SIGNS

The Hazard Communication Standard requires that hazardous chemicals be labeled by manufacturers. The label must contain the following:

- Chemical identity
- Appropriate warnings
- Name and address of manufacturer, importer, or other responsible party.

If the labels are incomplete or missing, Parsons personnel will refuse the shipment.

When chemicals are transferred from the manufacturer's container to secondary containers, the Site Manager or SHSO will ensure that the containers are labeled with the identity of the chemicals and appropriate hazard warnings. Labels for secondary containers can be obtained from the SHSO.

Signs, tags, and labels shall be provided at the site to give adequate warning and caution of hazards and instruction and directions to on-site personnel and the public. Section 8 of EM 385-1-1 (USACOE, 3-Nov 2003) shall be observed.

11.10 MATERIAL HANDLING PROCEDURES

11.10.1 Material Lifting

Many types of objects are handled in normal day-to-day operations. Care should be taken in lifting and handling heavy or bulky items because they are the cause of many joint and back injuries. The following fundamentals address the proper lifting of materials to avoid joint and back injuries:

- The size, shape and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably;
- A firm grip on the object is essential, therefore the hands and object shall be free of oil, grease and water, which might prevent a firm grip;
- The hands, and especially the fingers shall be kept away from any points that cause them to be pinched or crushed, especially when setting the object down;
- The item will be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces and pinch points, and gloves shall be used, if necessary, to protect the hands;
- The feet will be placed far enough apart for good balance and stability;
- Personnel will ensure that solid footing is available prior to lifting the object;
- When lifting, get as close to the load as possible, bend the legs at the knees, and keep the back as straight as possible;
- To lift the object, the legs are straightened from their bending position;
- Never carry a load that you cannot see over or around;

- When placing an object down, the stance and position are identical to that for lifting: with the back kept straight and the legs bent at the knees, the object is lowered;

- If needed, back support devices will be provided to aid in preventing back injury during lifting activities; and

- Materials will not be moved over or suspended above personnel unless positive precautions have been taken to protect.

When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. One person will be designated as “leader”. The leader will direct the pick up, transfer, set down and release of the load, to ensure coordination. When carrying the object, each person, if possible, shall face the direction in which the object is being carried.

11.10.2 Material Handling

On-site personnel shall avoid contact with potential UXO/OE, radiological material, unidentified metal objects, or contaminated substances. All wastes generated during activities on-site should be disposed of as specified in the site-specific HSP.

11.11 DRUM/CONTAINER HANDLING PROCEDURES AND PRECAUTIONS

The handling of HTRW drums and containers shall be kept to the minimum. Drum/container handling procedures and precautions presented in Section 28.H of the Safety and Health Requirements Manual (USACOE, 1996) shall be observed. Note: This section of the Safety and Health Requirements Manual is not included in the Nov. 3, 2003 version of EM 385-1-1. An AHA for drum handling is included in Attachment A-4.

11.12 LOCKOUT/TAGOUT

Hazardous energy (lockout/tagout) is not expected at the site. Should this change for individual SWMUs, an AHA will be developed as part of the site-specific HSP. **Attachment A-8** contains Parsons’ lockout/tagout energy control procedures.

11.13 GUARDING OF MACHINERY AND EQUIPMENT

All machinery and equipment that is designed to have a guard will be equipped with a functional guard, and will be operated according to manufacturer’s instructions. All reciprocating, rotating, and moving parts of equipment shall be guarded if exposed to contact by employees or otherwise create a hazard as required by EM 385-1-1 (USACOE, 3-Nov 2003).

11.14 FALL PROTECTION

Work at heights is not anticipated at SEDA. If work at heights occurs, safety practices presented in Section 21 of the Safety and Health Requirements Manual (USACOE, 3-Nov 2003) and Parsons Fall Protection Program (**Attachment A-9**) shall be observed.

11.15 ENGINEERING CONTROLS

As part of the Activity Hazard Analysis that is performed prior to any field activity, the PHSO will examine each task and recommend engineering controls for each action, as applicable. These controls will be followed by all site personnel to ensure tasks are completed in the safest possible manner.

11.16 PROCESS SAFETY MANAGEMENT

Process safety management is not expected at the site. Should this change for individual SWMUs, the process safety management will be specified in the site-specific HSPs.

11.17 ILLUMINATION

Illumination requirements presented in Section 7 of the Safety and Health Requirements Manual (EM-385-1-1, 3 Nov 2003) shall be observed. Construction areas, stairs, ramps and storage areas where work is in progress must be lighted with either natural or artificial illumination. Minimum illumination intensities for several activities are listed in **Table A-12**.

11.18 HAUL ROADS

To date, Parsons has not been involved in haul road construction at Seneca Army Depot. If tasked with project work involving haul road construction, an Activity Hazard Analysis (AHA) will be performed to identify the steps involved, the associated hazards or risks, and the recommended controls. This AHA will be prepared in accordance with EM-385-1-1 guidance, included as **Attachment A-10**; and will be reviewed and signed by the PSHO prior to inclusion with the site-specific HSP.

11.19 ABRASIVE BLASTING

To date, Parsons has not been involved in abrasive blasting operations at Seneca Army Depot. If tasked with project work involving abrasive blasting operations, an Activity Hazard Analysis (AHA) will be performed to identify the steps involved, the associated hazards or risks, and the recommended controls.

This AHA will be prepared in accordance with the Parsons Abrasive Blasting safety recommendations included as **Attachment A-11** and EM-385-1-1 Section 06.H; and will be reviewed and signed by the PSHO prior to inclusion with the site-specific HSP.

11.20 BUIDLING DEMOLITION

To date, Parsons has not been involved in building demolition at Seneca Army Depot. If tasked with project work involving building demolition, an Activity Hazard Analysis (AHA) will be performed to identify the steps involved, the associated hazards or risks, and the recommended controls. This AHA will be prepared in accordance with the Parsons Dismantling and Demolition Policies included as **Attachment A-12** and EM-385-1-1 Section 23; and will be reviewed and signed by the PSHO prior to inclusion with the site-specific HSP.

11.20.1 Lead Abatement

Lead hazards are often encountered while dismantling or demolishing old buildings; engineering and best work practice controls will be established and discussed in the site-specific HSP. If it is determined that there is a potential lead hazard, a lead abatement plan will be developed in accordance with the requirements of EM 385-1-1 Section 06.B.05.

11.20.2 Asbestos Abatement

Asbestos hazards are often encountered while dismantling or demolishing old buildings; engineering and best work practice controls will be established and discussed in the site-specific HSP. Attachment A-12 includes the corporate Asbestos Project Health and Safety Program, as it applies to building demolition.

11.21 EXCAVATION AND TRENCHING

11.21.1 Inspections

Daily inspections of excavations and trenches must be made by a designated competent person. If evidence of potential cave-ins, slides, or water accumulation is found, all work in the excavation or trench must cease until the necessary precautions have been taken to safeguard on-site personnel. All excavations and trenches must be inspected by a designated competent person after every rainstorm or other hazard-increasing occurrence, and safeguards against slides and cave-ins must be increased, if warranted. Relevant OSHA regulations (i.e., 29 CFR §1926.650-652) shall be used as a reference guide for angling of repose and shoring techniques used in excavations and trenches. Added measures must be taken if conditions warrant.

Any mobile equipment, including earth-moving machinery, shall be operated in strict compliance with the manufacturer's instructions, specifications, and limitations, as well as any applicable regulations. The operator is responsible for inspecting the equipment daily to assure that it is functioning properly and safely. This inspection will include all parts subject to faster than normal wear and all lubrication points.

All field personnel shall recognize and avoid hazards associated with motorized equipment; an AHA for working with motor vehicles and heavy equipment is included in Attachment A-4. Personnel that observe an equipment condition believed to be unsafe shall advise the equipment operator of the unsafe condition.

11.21.2 Utility Line Identification

The SHSO or site manager shall determine overhead and buried utility lines before excavation, drilling, or test pitting begins. The locations of any underground installations such as sewer lines and electric lines are determined before excavation. Utility companies must be notified of the proposed work to establish the locations of utility installations before the start of work. All such installations must be appropriately identified for the safety of persons working nearby. If any overhead or buried utility lines exist, the SHSO or site manager shall implement an appropriate safety plan (including an AHA) to protect utility lines from damage or displacement and to protect site personnel from any danger associated with the utility line. The area must be swept with a metal detector before excavation. Should any underground obstructions be encountered, the site manager or SHSO must immediately notify the USACE Project Manager and other appropriate personnel for their assistance in identification of the obstruction and its possible removal or re-routing. A pre-drilling/subsurface checklist for intrusive field work is attached in Attachment A-15.

11.21.3 Personal Protective Equipment

All site personnel must have PPE identified by the HSP. Head protection must be worn at all times near heavy equipment. Hearing protective devices must be provided and used to protect on-site personnel from noise exposure if it is not feasible to reduce noise levels or noise exposure duration.

11.21.4 Protection Systems (Controls)

Excavations 5 ft or more deep must be shored or sloped in an approved manner unless they are made entirely in stable rock. Sides of trenches above the 5-ft level may be sloped in lieu of shoring, but the slope may not be steeper than 1-1/2 H:1 V.

All protective systems for excavation sites must be designed by a registered professional engineer when it is not feasible to attain required slope configurations in accordance with 29CFR §1926.652(b)(1), (2) and (3). Sloping or benches greater than 20 ft deep must be approved by a registered engineer.

The registered professional engineer's recommended protective systems must be documented in sufficient detail to establish compliance with OSHA excavation requirements. The recommendations must be signed by the registered professional engineer, and the report must be maintained at the jobsite.

When manufactured support systems are used, the manufacturer's written specifications, recommendations, and limitations must be maintained at the jobsite.

A designated competent person must monitor the construction and maintenance of the recommended protective systems and their use in excavations.

11.21.5 General Requirements

For each trench where workers are working 3 ft deep or more, there must be ladders to provide a safe exit. There must be no more than 25 ft of lateral travel distance to the nearest ladder. Excavated or other material will not be stored closer than 2 ft from the edge of any excavation. Surface encumbrances that create a hazard must be moved or supported, as necessary.

No personnel are permitted under loads handled by lifting or digging equipment. When mobile equipment operates adjacent to or approaches the edge of an excavation, a warning system such as barricades, hand or mechanical signals, or stop logs must be used. The use of water control and removal equipment must be monitored by a competent person. Sloping or benching excavations greater than 20 ft deep must be designed by a registered professional engineer.

If the possibility exists in an excavation of an oxygen deficient atmosphere (less than 19.5% oxygen) or an atmosphere in excess of 20% of the lower flammable limit (or lower explosive limit) of a gas, atmospheric testing must be conducted before personnel enter the excavation. Proper respiratory equipment and ventilation must be established for each excavation before personnel enter the excavation.

Walkways and bridges over excavations must be provided with standard guardrails. Adequate barriers must be provided at all excavations. All excavations must be barricaded or covered prior to leaving the job site each day, and upon completion of exploration or similar operations, all excavations must be backfilled unless other arrangements have been made.

Attachment A-13 discusses Parsons' policies and requirements regarding safe excavation and trenching activities, also see the AHA for soil excavation in Attachment A-4 for additional information.

11.22 Compressed Gas Safety

To date, Parsons has not been involved in tasks using compressed gas at Seneca Army Depot. If tasked with project work involving compressed gas, an Activity Hazard Analysis (AHA) will be performed to identify the steps involved, the associated hazards or risks, and the recommended controls. This AHA will be prepared in accordance with the Parsons Compressed Gas Safety requirements included as **Attachment A-14** and EM-385-1-1; and will be reviewed and signed by the PSHO prior to inclusion with the site-specific HSP.

12 SITE LAYOUT AND CONTROL MEASURES

12.1 WORK ZONES

The support zone and command post for the field work at the SWMU areas will consist of the office space in Building 125, with all equipment stored either in the office or in the con-ex. The location of the support and exclusion zones for each project will be determined prior to the commencement of field work. UXO exclusion zones will include all on-site areas beyond the areas flagged by contracted UXO personnel as cleared of UXO. These exclusion zones will be set up at individual work locations when necessary.

If surface contamination is created or suspected as a result of the operations, an exclusion zone will be defined around the suspected surface contamination until the problem has been mitigated. Mobile operations, such as sediment sampling and geophysical surveying, will not have defined exclusion zones.

12.2 UTILITIES CLEARANCE

Facility maps will be obtained and consulted prior to commencing any intrusive work. Borehole sites will be positioned accordingly, marked with wooden stakes, and then cleared with SEDA. Drilling is to be done at the marked, cleared locations only. Refer to Section 11.7.2 for additional guidance. A pre-drilling/subsurface checklist for intrusive field work is attached in Attachment A-15.

12.3 SITE CONTROL

SEDA is responsible for overall site-wide security. The Seneca Army Depot is entirely surrounded by fence; the main security gate is locked at night and on the weekends. The ammo area is surrounded by additional fencing with barbed wire, and is kept locked at all times. The Q is contained within the ammo area, is surrounded by two fences with barbed wire, and is kept locked at all times.

Parsons personnel will sign keys in and out from the BRAC Environmental Coordinator onsite. All locked gates are to be kept locked at all times.

All Parsons personnel, subcontractors and visitors will meet at Building 125 at the beginning of each day or upon arrival.

12.4 SITE COMMUNICATIONS

Project schedule and personnel will be verbally communicated to the BRAC Environmental Coordinator prior to commencement of work; verbal updates on project status and activities will be communicated daily. There is a phone in the Parsons on-site field office located in Building 125 in the Administrative Area. On-site communications will be achieved orally with a contingency for hand signals, air horn signals, FM two-way radio or cellular phones (in the absence of suspected ordnance). Routine site communications will be maintained between all work crews and the support zone with two-way radios.

On-site emergency communications will be maintained by the use of hand signals, air horns, on-site two-way radios or cell phones. Details of the emergency communications are contained in the Emergency Response Plan in Section 16 of this SHSP.

12.5 UNEXPLODED ORDNANCE CLEARANCE

Certain SWMUs (as listed in Table A-1) are known to contain various types of unexploded ordnance (UXO) or explosives. Only trained UXO technicians will be in the area when the initial clearing is in progress. All movement on these sites shall be along cleared roads and pathways and UXO-trained personnel will be on hand at all times to ensure that untrained personnel follow all procedures relative to UXO. Cleared roads and pathways shall be marked. **ON-SITE WORKERS SHALL NOT STRAY FROM THE CLEARED PATHWAYS AND ROAD!** UXO found on the site may have been subjected to stresses which render them very unstable and the UXO may detonate with even very slight disturbance. **ON-SITE WORKERS SHALL NOT TOUCH, KICK, OR OTHERWISE DISTURB ANY MATERIALS ON-SITE WHICH MAY BE UXO.**

Additional information on UXO clearance is included in Section 19 of this document.

13 PERSONAL HYGIENE AND DECONTAMINATION

Decontamination is the physical removal of contaminants from clothing and equipment or the chemical change of such contaminants to innocuous substances. Decontamination procedures will take place in the contamination reduction zone. Disposal is an available option in lieu of decontamination when decontamination is impractical.

The following decontamination procedures are intended to meet the requirements of 29 CFR §1910.120(k). No personnel or equipment shall enter the contaminated zone of the site until workers have acknowledged the decontamination procedures and operating procedures intended to minimize contamination. These procedures shall be monitored by the Site Manager (or the RSO in an area where radiation is a concern), to determine their effectiveness. Ineffective procedures will be corrected.

13.1 DECONTAMINATION FACILITIES

The main decontamination facilities at the SEDA SWMU areas will be located adjacent to the support zone. These decontamination facilities will be used for vehicle and heavy equipment decontamination and for personnel decontamination. Personnel decontamination must take place prior to leaving the decontamination area and prior to entering any personnel hygiene facilities or before eating, drinking, or smoking. Information regarding the exact location of decontamination areas will be included in the site-specific HSPs.

13.2 PERSONNEL DECONTAMINATION

Personnel decontamination will consist primarily of a segregated equipment drop, removal and disposal of any non-reusable protective equipment, and washing of hands and face. No heavy contamination of clothing is expected and disposable protective clothing will be disposed of as non-hazardous waste. However, if contamination is detected (i.e., elevated PID readings, visual evidence, or known contact with potentially contaminated liquids), personal protective equipment and cartridges from respirators will be bagged separately from daily garbage. Facilities for personnel and sampling equipment decontamination will be set up between the equipment decontamination pad and the site trailer. Personnel will not enter the office trailer without first going through decontamination, and hands and face must be thoroughly washed before eating, drinking, etc.

Upon entering the contamination reduction zone from areas with potential radiological hazards, gloves and hands, and then the rest of the body will be scanned with the Pancake G-M meter to detect any residual radiation that may be present. When completing the body scan, careful attention must be paid to the hands, the bottom of the feet, and to any areas that have touched surfaces inside the exclusion zone. The disposable gloves, and any other PPE that is being worn, will be disposed of in a bag that is exclusively for the disposal of potentially radiologically elevated PPE. At this same point, all other equipment exiting the exclusion zone will also be scanned with the pancake G-M for the detection of residual contamination.

Level C Decontamination - The activities to be carried out at each station are described in **Table A-13**, Measures for Level C Decontamination.

Level B Decontamination - The activities to be carried out at each station are described in **Table A-14**, Measures for Level B Decontamination.

It should be noted that depending site-specific conditions, Level C or Level B PPE may not necessarily be warranted.

13.3 PREVENTION OF CONTAMINATION

In an effort to minimize contact with waste and decrease the potential for contamination, the points outlined below will be adhered to during all phases of field investigation and sampling.

1. Personnel will make every effort not to walk through puddles, mud, any discolored surface, and/or any area of obvious contamination.
2. Personnel will not kneel or sit on the ground in the exclusion zone and/or in the Contamination Reduction Zone (CRZ).
3. Personnel will not place equipment on drums, containers, vehicles, or on the unprotected ground.
4. Where appropriate, personnel will wear disposable outer garments and use disposable equipment.

14 EQUIPMENT DECONTAMINATION

As discussed in the previous section, the main decontamination facilities at the SEDA SWMU areas will be located adjacent to the support zone. Equipment and vehicle decontamination will consist of pressure washing followed by steam cleaning. Solvent and soap and water washes will be performed when required for sampling or for heavy contamination. Gross contamination, such as caked mud and dirt on augers and split spoons, will be removed at the work site and placed back in the borehole or drummed with other drilling spoils if contaminant indicators (e.g., PID readings) warrant drumming of the soils.

Refer to Attachment A-2 for the radiological decontamination of equipment, materials, and tools.

15 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

15.1 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

The support zone will have the following emergency equipment:

Self-Contained Breathing Apparatus (SCBA);
First Aid Kit;
Fire Extinguisher (A, B, C Type);
l5-Minute Emergency Eyewash Station;
Air Horn;
Bolt Cutters (to cut exit gate chains);
Latex Gloves;
A CPR Mask; and
A copy of the Health and Safety Plan, which includes the emergency exits and hospital locations.

Each work crew will have at the work site the following emergency equipment:

First Aid Kit;
Fire Extinguisher (A, B, C Type);
Hand-Held Eyewash;
Air Horn;
Bolt Cutters (to cut exit gate chains);
Latex Gloves;
A CPR Mask; and
A copy of the Health and Safety Plan, which includes the emergency exits and hospital locations.

At least one vehicle at a work site will be a designated emergency escape vehicle. It will be parked at an easily accessible location, **KEYS IN THE IGNITION**, and pointed in the direction of escape. All vehicles on site will have the keys with the car so they can be located easily (on top of the vehicle for example).

15.2 SPILL CONTROL MATERIALS AND EQUIPMENT

Chemical spills are not expected to be a problem at the former Seneca Army Depot site. The only chemicals being brought into the site would be fuels and oils for equipment that would be used on the site. This will be brought onto the site in small quantity containers in the amounts needed for that day's operations. If a spill should occur while performing fueling on equipment, the spill would be a small quantity (under a gallon) and it would be cleaned up immediately. Small spill response kits (e.g., paper towel, diaper, etc.) will be on-hand to assist in the clean up. The spill and contaminated soil would be containerized and labeled, properly manifested, and shipped to an approved hazardous waste facility.

If a project involves bringing large quantities of a chemical onsite, a map showing chemical storage locations and a MSDS for each chemical will be included with the HSP.

16 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

The purpose of the Emergency Response and Contingency Procedures (ERCP) is to define procedures to protect human health and the environment both on and off site in the event of an accident or emergency during the RI/FS activities at Seneca Army Depot. The ERCP complies with 29 CFR §1910.120(l) and the guidelines given in *Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties, Appendix B, Contingency Plan* (EPA, 1990). In addition, the ERCP meets the US Army Corps of Engineers requirements for the emergency response plan as presented in the Health and Safety Requirements Manual (USACE, 1996) and the Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities (USACE, 2000). The following elements are presented in this section.

- Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposures, personal injuries, fires/explosions, environmental spills and releases, discovery of radioactive materials.
- On-site emergencies
- Off-site emergencies
- Personnel roles and lines of authority
- Emergency communications
- Evacuation routes from SWMUs to the nearest gate
- Specific procedures for decontamination and medical treatment of injured personnel
- List of emergency contacts
- Route maps to nearest pre-notified medical facility
- Accident investigation and reporting
- Emergency recognition and prevention
- Site topography, layout, and prevailing weather conditions
- Site security and control
- Critique of emergency responses and follow-up
- Emergency alerting and response procedures
- Safe distances and staging areas

Emergency equipment and first aid requirements are presented in Section 15.

This Emergency Response Plan applies to site work at Seneca Army Depot. Copies of this plan are to be kept at the field office and work areas. The list of emergency telephone numbers and directions to the nearest exit gate and nearest hospital will be prominently posted on the bulletin board in the field office. Copies of the directions to the nearest hospital will be kept in all site vehicles.

16.1 PRE-EMERGENCY PLANNING

If an emergency develops on site, the procedures delineated herein are immediately followed. Emergency conditions exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure;
- A condition occurs that is more hazardous than anticipated; and/or
- Fires, explosions, structural collapses/failures, and/or unusual weather conditions (thunderstorms, lightning, high winds, etc.) occur.

If an emergency occurs, direct voice communication is used to sound the alarm. If personnel are out of range of direct voice communication, an air horn meeting the requirements of 29 CFR §1910.165 is sounded. General emergency procedures and specific procedures for personal injury are described within this section. **Table A-15** is a list of emergency contacts. Additional project-specific phone numbers will be provided in the HSP. The shortest route from each SWMU to the nearest gate is included as **Figure A-3**. Directions to the nearest medical facilities (Geneva General Hospital) are included as **Figure A-4**.

<u>In case of emergency, SHSO will implement the site emergency procedures. The following procedures will be followed:</u>

- Notify the contact listed in Table A-15 when an emergency occurs. This list is posted prominently at the site.
- Use the "buddy" system (pairs).
- Maintain visual contact between "pairs." Each team member remains close to the other to assist in case of emergencies.
- If any member of the field crew experiences any adverse effects or symptoms of exposure, the entire field crew will immediately halt work and act according to the instructions provided by the Site Manager.
- Any condition that suggests a situation more hazardous than anticipated will result in evacuating the field team and re-evaluating the hazard and the level of protection required.
- If an accident occurs, the Site Manager or SHSO is to complete an accident investigation and submit the required paperwork. Refer to Section 16.9 for additional accident reporting guidelines. Follow-up action will be taken to correct the situation that caused the accident.

<u>The SHSO is specifically responsible for the following:</u>

- Implementing the site ERCP, including ordering site evacuations, coordinating fire-fighting efforts, and directing spill control and cleanup.
- Supervising site evacuation.
- Contacting emergency services such as the fire department, ambulance and security services, as may be required.
- Assisting in providing first aid services and medical support or evacuation for injured or exposed personnel.

- Determining the cause of the incident and ways to prevent future occurrences.
- Preparing a written incident or near-miss report for submission to the Parsons and USAESCH Project Managers.

On-site personnel are responsible for reporting emergencies or conditions immediately to their supervisors, alerting other employees; helping injured personnel, and assisting as directed to mitigate the incident.

16.2 ON-SITE EMERGENCIES

On site emergencies can range from minor cuts and scrapes to explosions, fires, and the release of toxic gases. Apparently minor incidents at hazardous waste sites can have serious consequences or may indicate the presence of a previously unknown health and safety hazard. Explosions, fires, and the release of toxic gases will not only involve site workers, but may affect the neighboring populations and the environment.

All incidents will be reported as soon as possible to the Site Manager and the SHSO who will determine the appropriate steps to be taken.

When the incident is minor, the work may continue. When an incident is considered serious, work will be discontinued until the emergency situation has been brought under control, the incident has been evaluated, and any conditions which may have contributed to the emergency have been mitigated.

All site incidents, including near misses, will be investigated and documented, using the Incident Report Form and Incident Follow-Up Report Form in Attachment A-15.

16.3 OFF-SITE EMERGENCIES

In the unlikely event of a vapor release off-site, the contamination source will be secured, if possible.

Emergency response contacts will be notified in the following order:

1. SEDA Security and Environmental Office
2. Safety Officer
3. Project Manager

The phone numbers of these contacts are provided in Table A-15 and will be posted in the field office.

16.4 SITE PERSONNEL AND LINES OF AUTHORITY

A clear chain-of-command in emergency situations ensures clear and consistent communication between site personnel and, therefore, results in more effective response to the emergency situation. The duties of site personnel in emergency situations are outlined below:

The **Site Manager** will direct all emergency response operations, designate duties to other site personnel, and serve as liaison with government officials and emergency response teams.

The **Site Health and Safety Officer** will make initial contact with off-site emergency response teams (first aid, fire, police, etc.), make recommendations on work stoppage, and provide for on-site first aid and rescue.

The **Field Office Supervisor** will be designated when no one is performing this function during normal site work. This person will maintain contact with off-site response teams and notify additional agencies or offices that need to be contacted.

Decontamination personnel will stand by to perform emergency decontamination. Decontamination personnel will also assist the safety officer in rescue operations when necessary.

Field personnel will assist in rescue operations or take over for decontamination personnel when they are required for other duties.

16.5 EMERGENCY SITE COMMUNICATIONS

The emergency communications codes are given in **Table A-16**, On-Site Emergency Communications.

<u>Some areas to be investigated may contain various types of unexploded ordnance (UXO). All movement on the site, **EVEN UNDER EMERGENCY CONDITIONS**, shall be along cleared roads and pathways. Cleared roads and pathways shall be marked. **ON-SITE WORKERS SHALL NOT STRAY FROM THE CLEARED PATHWAYS AND ROAD**</u>**!**

Evacuation from work sites shall be along the access paths cleared to the various worksites. Equipment shall be placed so as not to impede emergency escape and evacuation along the cleared pathways. Evacuation routes from work areas shall be discussed daily for each work crew as a part of the daily safety meeting.
Figure A-3 shows best routes from the SWMUs to SEAD exits.

16.6 EMERGENCY DECONTAMINATION AND FIRST AID

Decontamination procedures used in emergency situations will vary greatly with the severity and particulars of the situation. The SHSO will provide advice on the medical and decontamination procedures to be used in each emergency situation. General guidelines for first aid and decontamination procedures are given below.

16.6.1 Inhalation Exposure

Remove the victim from the exposure area to an area with fresh air. Attempt rescue only if proper protective gear (Level B or C) is available for the rescue team. Remove protective clothing and respiratory protective gear as soon as possible to determine if the administration of CPR is necessary. If so, complete decontamination while CPR is being administered. Continue CPR until emergency medical unit arrives. If CPR is not required, complete decontamination and transport to hospital; administer other first-aid as indicated.

16.6.2 Contact Exposure

Remove victim from area and flush affected area with water only. Be careful not to spread the contamination to other parts of the body. Remove protective clothing and flush area with water only. Consult references or MSDS (if applicable) to determine if soap and water wash is indicated. Do not remove respirator until removal of contaminant from body is reasonably assured and the victim is well into a clean zone.

16.6.3 Physical Injury

If a physical injury occurs or worker collapses in a clean zone, first aid will be administered as indicated.

If a physical injury occurs in a contaminated zone, care must be taken to prevent contact of any contaminant with open wounds. The wound can provide easy access to the body for toxic chemicals that are not normally a skin absorption problem. Protective clothing will be removed carefully to avoid additional injury and avoid any exposure of the wound to contaminants on the clothing.

If a worker collapses or loses consciousness in a contaminated zone, remove protective clothing and respiratory protective gear as soon as possible to determine if the administration of CPR is necessary. If so, complete decontamination while CPR is being administered. Continue CPR until emergency medical units arrive. If CPR is not required, complete decontamination and transport to hospital; administer other first-aid as indicated. The field site will have at least two persons certified in CPR and first-aid per shift.

16.7 EMERGENCY TELEPHONE NUMBERS

Emergency telephone numbers for medical and chemical emergencies are given in Table A-15, Emergency Telephone Numbers. These numbers will be displayed prominently near each site phone.

16.8 DIRECTIONS TO HOSPITAL

Directions to the nearest hospital are shown and described in Figure A-4, Route to Geneva General Hospital. The map will be displayed in the command post and kept in every site vehicle.

16.9 ACCIDENT INVESTIGATION AND REPORTING

In case of an accident on-site, the SHSO or Site Manager shall be notified immediately. The SHSO is responsible for initiating first aid and contacting off-site emergency-medical services, if necessary. The SHSO will initiate the site Emergency Response Contingency Plan if necessary.

Initial notification of an accident may be verbal, in person, by hand signals, or by an alarm device such as an air horn. In high-hazard areas where radio or other communications are hampered or impractical, air horns and the buddy system shall be used, as will emergency escape or self-rescue provisions for workers. Specific on-site procedures will be given at the site-specific initial site training.

Accident reporting requirements are presented in Section 18.5.2.

Incident investigations are an important element of Parsons' safety program because they provide useful information to prevent similar incidents. Incident investigations identify root causes, system failures, unsafe acts and conditions, and noncompliance with or inadequacy of the PSP. All significant near miss, injury, illness, or major equipment or property damage incidents (including process interruptions) require an investigation.

The SHSO will be responsible for conducting an investigation of all on-site accidents involving personal injury, illness, death, property damage or incidents that are regarded as "near misses". **A near miss is defined by OSHA as an incident where no property was damaged and no personal injury sustained, but where, given a slight shift in time or position, damage and or injury easily could have occurred** (www.OSHA.gov). The investigation will consist of conducting interviews with witnesses and/or persons involved in the accidents; inspecting the accident site and equipment involved in the accident; reviewing the operating procedures, existing site or weather conditions; and qualifications, training, and experience of the workers involved and examination of generally accepted safety procedures and regulations.

The objective of the investigation is to clarify the actual events of the accident, to establish the probable cause or causes, and to determine appropriate preventative or protective measures. The SHSO will prepare a written report of his findings including recommendations for preventing future incidents. The report will be discussed in detail with Parsons and USAESCH.

The conclusions reached regarding the accident and preventative measures will be included in the next tailgate safety meeting.

16.10 EMERGENCY RECOGNITION AND PREVENTION

16.10.1 Training

All field personnel receive site-specific health and safety training before starting any site activities. The SHSO is responsible for implementing and enforcing the accident prevention program. An accident prevention program identifies actual and potential site hazards so that no contractor, subcontractor, laborer, operator, mechanic, or other employee is required to work in surroundings or under conditions that are dangerous to their health and safety.
This program must include frequent and regular inspection of the job site to ensure successful implementation. On a day-to-day basis, individual personnel should watch for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. The general elements of an accident prevention program are discussed in this

section. Emergencies can be averted by rapid recognition of dangerous situations. At the start of each workday, before assigning tasks, tailgate safety meetings will be held. Discussion should include:

- Tasks to be performed.
- Time constraints (e.g., rest breaks).
- Hazards that may be encountered, including the effects, how to recognize or monitor symptoms, and danger signals.
- Emergency procedures.
- Radio communication.

Hard hats and safety boots must be worn as a minimum within 50 feet of heavy equipment. The Site Manager or SHSO supervises the field team to ensure they are meeting health and safety requirements. If deficiencies are noted, work is stopped and corrective action is taken (e.g., retain/purchase additional safety equipment). A report of health and safety deficiencies and the corrective action taken is forwarded to the Project Manager and PHSO.

All site workers, including subcontractors, will be trained to their level of responsibility before beginning work. In addition to the hazardous waste health and safety training required by 29 CFR §1910.120(e), workers will receive training in the operational and health and safety aspects of site work. This may include use of fire extinguishers, first aid, CPR, drum handling, heavy equipment, electrical hazards, hearing protection, and excavation. In addition, all site workers will be briefed on the hazards associated with UXO/OE or radiation, if any.

16.10.2 Fire or Explosion

Fire or explosion hazards are presented in Section 3. Fire Prevention and Protection is presented in Section 11.

16.10.3 Spill Remediation

In the event of a spill, the SHSO will be notified immediately. The important factors are that no personnel are overexposed to vapors, gases, or mists and that the liquid does not ignite. Waste spillage must not be allowed to contaminate any local water source. Small dikes will be erected to contain spills, if necessary, until proper disposal can be completed. Subsequent to cleanup activities, the site safety officer will survey the area to ensure that no toxic or explosive vapors remain.

16.10.4 Traffic Control

Parsons shall utilize traffic control measures to minimize inconvenience to the site and the risk of traffic accidents and pedestrian injuries. These measures will include the use of flagmen, signs, barricades, and markings, as necessary, for the safe movement of traffic during the remediation activities. Refer to Attachment A-4 for an Activity Hazard Analysis for driving in the ammo area and “Q”.

16.10.5 Site Housekeeping

During the course of the project, scrap materials, tools, construction materials, extension cords, containers, and debris could create tripping hazards and shall be kept cleared from work areas, and in and around buildings or other on-site structures or equipment. Site access and egress routes for pedestrian and vehicular traffic will be kept clear. Materials will not be stored under or piled against buildings or in front of doors and exits. Work areas will be cleared and cleaned at least once per shift. However, garbage and debris shall be removed more frequently.

Metal drums used for storing flammable/combustible liquids shall be equipped with self-closing safety faucets, vent bung fittings, grounding cables and drip pans, and shall be stored outside buildings in an area approved by the SHSO.

Outdoor flammable/combustible materials storage areas will be: lined and surrounded by a dike of 12 inches in height, and of sufficient volume to contain 110% of the stored materials; located fifty feet from buildings; and kept free of weeds, debris, and other combustible materials.

Any test pits, borings, excavations, or miscellaneous holes will be either covered, backfilled, or adequately flagged at the end of the work day. Seneca Army Depot personnel will be verbally notified of any holes that will remain open at the end of the project.

16.10.6 Motor Vehicle Accident Report

All vehicular accidents both on and off-site will be reported immediately and investigated. The objective of the investigation is to clarify events of the accident, establish the probable cause or causes, and to determine appropriate preventative or protective measures. The SHSO will prepare a written report of his/her findings, including the recommendations to prevent future accidents. The report will be discussed with the Parsons PM. Vehicular accidents that are recordable, as defined by AR 385-40 and USACE supplement 1 to that regulation, are also to be reported to Parsons and USAESCH PMs via Form ENG 3394 (See Attachment A-15). The conclusions reached regarding the accident and preventative measures will be included in the next tailgate safety meeting.

16.11 SITE TOPOGRAPHY, LAYOUT, AND PREVAILING WEATHER CONDITIONS

Site topography, layout, and prevailing weather conditions will be presented in the individual HSPs. A site-wide map is included as Figure A-1.

16.12 SITE SECURITY AND CONTROL

The purpose of site access control is to protect the public and workers from the site's hazards and prevent vandalism of the site operations. As discussed in Section 12, SEDA is responsible for overall site security.

For individual sites, site access control will be implemented by the SHSO and will be accomplished through a program that limits movement and activities of people and equipment at the project site. Site control requires the establishment of site work zones, a communications network, an evacuation protocol, and site security. Site access control will be based on site-specific characteristics including:

1. Potential chemical, biological, physical or explosive hazards;
2. Terrain;
3. Expected weather conditions;
4. Planned site activities; and
5. Site proximity to populated areas.

Site access control will include the following unless otherwise specified in the individual site-specific HSPs:

1. Worker/visitor registration;
2. Escort of visitors;
3. PPE requirements; and
4. Posting of site/work area boundaries.

As discussed in Section 12, an exclusion zone (i.e., work zone) will be defined around the suspected surface contamination. UXO exclusion zones will include all on-site areas beyond the areas flagged by contracted UXO personnel as cleared of UXO. These exclusion zones will be set up at individual work locations when necessary.

16.13 CRITIQUE OF RESPONSE AND FOLLOW-UP

Emergency response plans are based on site-specific needs and experience. It is important to consider previous emergency incidents in preparing an ERP. To date, there have been 0 emergency incidents under these contracts. The ERP will be reviewed by Program Health and Safety Officer and project manager annually and revised accordingly. In addition, the ERP will be reviewed and revised if any emergency accidents or incidents occur at SEDA. The Corporate Health and Safety Officer will review company-wide emergency accidents or incidents and provide critique of emergency responses. Information on Parsons' corporate trends and statistics is included as Appendix E and Appendix F of the Accident Prevention Plan. Time spent by emergency response employees reviewing incidents will be tracked by the SHSO and credited toward their refresher training requirements.

16.14 EMERGENCY ALERTING AND RESPONSE PROCEDURES

This section of the ERP addresses how employees will be informed that an emergency exists and how they should respond. The alarm systems must inform "all affected employees" that an emergency exists and what their immediate response should be. Depending on the size and the magnitude of the emergency "all affected employees" may include all site personnel, or just personnel from a limited area.

The following list outlines the information necessary to inform the employees of what their immediate response should be. All of these criteria may not be applicable to all site personnel, depending on the size and nature of the place of work and the preplanning efforts:

- Notification. The SHSO or Site Manager will initiate emergency notification and make the existence of the emergency situation known. The notification can be conducted using hand signals, horn, cell phone, two-way radio, and the phone in the Parsons on-site field office located in Building 125.
- Level & Type of the required Response. Based on the extent and type of emergency, SHSO and Site Manager will determine the level and type of the required response and notify the associated personnel (local EMS).
- Nature of the Response. The SHSO or Site Manager will notify relevant personnel the emergency condition (e.g., explosion, chemical spill, medical).
- Location. The SHSO or Site Manager will notify relevant personnel the location of the emergency. This is critically important in large facilities such as Seneca.
- Ambient environmental factors and conditions that influence evacuation or response procedures (wind speed and direction).

16.15 Safe Distances and Staging Areas (Safety Zones)

Figure A-3 presents emergency exit routes and the buildings at Seneca. Specific on-site staging areas and procedures will be given at the site-specific safety meeting. In general, in case of an emergency, the site personnel should:

- Escape the emergency situation.
- Meet at the designated safe staging area, or when the designated staging area is in emergency situation
- Meet at the Parsons on-site field office located in Building 125 or when the whole Seneca area is in emergency
- Exit the Seneca Site

The SHSO will conduct a head count to ensure all personnel have evacuated safely.

17 ACCIDENT PREVENTION

This section includes the following subsections: safety and health inspections, safety & health expectations, incentive programs, and compliance.

Accident/incident reporting is covered under Section 18. Emergency prevention is presented in Section 16.

17.1 SAFETY AND HEALTH INSPECTIONS

Each day, the SHSO shall conduct a site inspection to ensure that operations are being performed in accordance with this document, the HSP, USAESCH requirements (EM 385-1-1), and OSHA regulations. Results of the inspections will be documented daily in the SHSO's safety logbook. Any health and safety deficiencies or potential problems discovered during the daily site inspection will be discussed at the next tailgate safety meeting. Inspections will be focused on the following areas (as applicable):

- General Site Safety
  - Housekeeping
  - Sanitation
  - Communication equipment
  - Safety/warning signs/labels
  - Security
  - Illumination
  - Excavation
  - Fire hazards

- Emergency Equipment
  - Alarm systems operability/access
  - Fire extinguisher access
  - Safety shower/eyewash access/operability
  - First-aid kit access
  - Spill containment and control supplies access

- Hazardous Materials
  - Warning sign/labels
  - Proper hazard class segregation
  - Gas cylinder storage/use
  - Leakage/spillage protection
  - Unsafe condition/ignition source

- Equipment and Tools
  - Vehicle
  - Mechanical equipment
  - Power tools
  - Hand tools
  - Ropes, chains, and slings
  - Safety harnesses

Any problems in implementation of the HSP shall be reported immediately to the SHSO, and work shall not proceed until all deficiencies have been corrected. Violations of the HSP by workers (including subcontractors) require corrective action. As appropriate, this may include additional training, closer supervision, or disciplinary action.

17.2 SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

Please see Section 8 of the Accident Prevention Plan for information on Parsons' safety and health expectations, incentive programs, and compliance.

18 LOGS, REPORTS, AND RECORD KEEPING

18.1 LOGS

The SHSO will keep a log recording the following aspects related to safety at the site:

- Training (initial site specific training, daily tailgate safety briefings, etc).
- Daily inspections
- Site visitors.
- Issues or problems encountered.
- Accidents.
- Emergencies.

18.2 SAFETY LOG

The SHSO will maintain a daily safety log of all safety related activities. The following information will be maintained in the Safety Log:

- Date and recorder of log;
- Safety briefings (time conducted, material discussed, etc.);
- Weather conditions;
- Significant site events relating to safety;
- Heat stress monitoring data
- Accidents;
- Stop work events related to safety;
- Safety audits; and
- Signature of the Site Manager indicating concurrence.

18.3 TRAINING LOG

The SHSO will maintain a training log documenting the following information:

- Date and recorder of log;
- Nature of training (personnel will complete the appropriate documentation of training form);
- Three days of supervised work (for new employees);
- Visitor training; and
- Signature of both the PM and SHSO indicating concurrence.

18.4 EQUIPMENT MAINTENANCE LOG

The SHSO will document all information related to safety equipment maintenance, calibration, and standardization in the logbook.

18.5 REPORTS

18.5.1 Man-Hours and Lost Workday Reporting

Man-hours and lost workday (LWD) cases will be submitted to the Contracting Officer monthly with copy furnished the U.S. Army Engineering and Support Center, Huntsville (USAESCH), ATTN: CEHNC-ED-SY-S. The data will be submitted to arrive at the USAESCH not later than 10 calendar days after the end of each month. The information cut-off date will be the last day of each month. The monthly submission shall include the title of the report, contract number, task order number, project site, month and year for which the report is made, a point of contact listing both email address and telephone number, and number of lost workday accidents to include total days lost. If no hours are worked on the project/task, a report showing "zero (0)" is required.

18.5.2 Accident Reporting

Once the initial accident report has been received by the SHSO and necessary emergency procedures are initiated, verbal reports will be given to the Parsons PM, Parsons GBU Safety Manager, and the Contracting Officer or authorized representative e.g., Huntsville Center Project Manager within 4 hours. The GBU Safety Manager is responsible for notifying the workers compensation analyst and the nearest OSHA office (if applicable).

A written accident or near miss report will be submitted using Parsons online reporting system. If internet access is not available, the attached accident report form may be filled out and faxed. In addition, ENG Form 3394 will be filled out for lost work day cases, accidents where 3 or more persons are admitted to a hospital, a fatality, or property damage $2000 or greater and submitted to USAESCH within 5 working days. The ENG Form 3394 is prepared by the PHSO/SHSO, with original signatures shown in blocks 15c and 16 (copies/faxes are not acceptable). The remaining signature blocks, blocks 17 -19, will be completed by the Huntsville Engineering Center.

Accident/near miss report forms, instructions and guidelines are included as Attachment A-15. Personal injury reports will be completed, filed, and recorded on an OSHA 300 Log of injuries and illnesses.

Accidents and near misses will be investigated by the SHSO and the site manager. The investigation team shall make recommendations for preventing a recurrence of the accident or incident and submit the accident report to the project health and safety officer and the office health and safety representative. The accident report shall be retained on file at the site, in the project files and in office health and safety files. All accidents or incidents that are recordable will be entered on the OSHA 200 log maintained in the Parsons office.

The office health and safety officer and the project health and safety officer shall review the accident report and approve or make additional recommendations for prevention of the future occurrence of the incident. The project health and safety officer shall ensure that remedial recommendations are carried out by the filed staff.

18.6 RECORD KEEPING

The SHSO will establish and maintain a filing system on-site for Health and Safety records, reports, and information concerning individual training, medical surveillance, etc. Sections in this filing system will include:

- Training Records -- Certificates for training required by 29 CFR§1910.120 (40-hour initial HAZWOPER, 8-hr refresher, and supervisory training) will be maintained at the site. Additionally, documentation of three days work under supervision, CPR, First Aid, and DoD ordnance training will be available at the site.
- Medical Monitoring -- Documentation of current enrollment (within last 12 months) in a medical monitoring program will be available for each employee working at the site. Documentation will consist of the employee's Health Status Report that is written and signed by the examining physician.
- Accident Reports -- Copies of any accident/incident reports and follow-up reports.
- Plan Acceptance Forms -- Copies of the Plan Acceptance Forms documenting that employees have read and understand the HSP will be maintained at the site.

Documentation of personnel credentials, site activities, and environmental monitoring will be maintained on-site. The SHSO will maintain and update these records. Documentation, at a minimum, shall include:

- Certificates for the following:
  - Initial 40-hour Hazardous Waste Operations and Emergency Response Training.
  - Applicable annual 8-hour refresher health and safety training.
  - Applicable 8-hour supervisory Hazardous Waste Operations and Emergency Response Training.

  - On-the-job training, 3-day.
- First Aid and CPR.
- DoD Explosive Training.
- OSHA Job Safety and Health Protection Poster: A copy of this poster shall be hung in the field office or in an area where employees routinely congregate.
- The OSHA 300 log: This log contains the required information for recording on-site injuries and illnesses, and must be generated by each company safety contact. A copy shall be maintained on-site and posted during the month of February.
- Site sign-in sheet: This record shall contain the date, name of each individual on-site, the employer, and the time entering and leaving the site. All personnel will sign this form.
- Accident/incident/near miss reports: All accidents, safety/health incidents, and near misses shall be investigated, and investigation reports shall be maintained at the site.
- A Site Health and Safety Plan Acknowledgment form containing the date, names of the individuals, the employer, and the individuals' signature.
- The initial site-specific health and safety training record containing the date, the individuals' names and signatures, and the company they are representing.
- The Safety Meeting Record containing the date, topic discussed, individuals' names and signatures, and the company they are representing.
- Safety problem/observations: These records: 1) document unsafe behavior and initiate disciplinary action, and 2) document exemplary safety behavior.
- The health and safety inspection log completed daily to verify that site conditions and activities are in compliance with the HSP. Deficiencies will be noted and changes made immediately.
- The safety and health program plan required under 29 CFR §1910.120(b).

All records related to the project will be kept in the project files onsite for the duration of field activities. Upon completion of all field tasks, all records will be maintained in the Parsons Boston office.

19 SOP FOR SITES CONTAMINATED WITH MUNITIONS AND EXPLOSIVE OF CONCERN, IN WHICH SOIL SAMPLES ARE TO BE TAKEN OR MONITORING WELLS INSTALLED

Some SEDA SWMU areas (as listed in Table A-1) may be contaminated with UXO components and UXO. Basic considerations for unexploded explosive ordnance operations are provided in Attachment A-16. This section presents standard operating procedures for the sites with potential UXO hazards.

19.1 PURPOSE

The purpose of this SOP is to delineate the procedures necessary in order to ensure that any Parsons entity and their subcontractors conduct soil sampling and monitoring well installation, in an area known or suspected of being contaminated with munitions and explosives of concern (MEC), in a safe manner.

19.2 SCOPE

This SOP is applicable to all Parsons personnel and any Parsons subcontractors involved in the taking of soil samples or installation of monitoring wells in an MEC contaminated area. This SOP is to be used in conjunction with the approved Work Plan, Site-Specific Safety and Health Plan (HSP) and Accident Prevention Plan (APP).

19.3 REFERENCES

The following documents were researched in preparing this SOP. This SOP is not intended to contain all of the requirements needed to ensure compliance, and should be used in conjunction with and supplements project plans, in particular the approved Work Plan, and applicable Federal, state and local regulations. Applicable sections and paragraphs from the documents listed below will be used as references.

- Parsons Corporate Safety and Health Program;
- OSHA General Industry Standards, 29 CFR 1910;
- USACE EP385-1-95a, Safety Concepts and Basic Considerations for Unexploded Ordnance;
- USACE EM 385-1-1, Safety and Health Requirements;
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Manual;
- AR 385-64, Ammunition and Explosives Safety;
- AR 385-10, Army Safety Program;
- DA PAM 385-64, Ammunition and Explosives Standards; and
- EP 1110-1-18, Ordnance and Explosives Response.

19.4 DEFINITIONS

The following definitions are included for clarity and representative of all of the possible definitions, which could be included. UXO is a subset of MEC and in an effort to reduce confusion hereafter the term UXO will be used to describe any item containing explosives.

- **Cultural Debris** – Debris found on operational ranges or munitions response sites, which may be removed to facilitate a range clearance or munitions response, that is not related to munitions or range operations. Such debris includes, but is not limited to: rebar, household items (refrigerators, washing machines, etc), automobile parts and automobiles that were not associated with range targets, fence posts, fence wire, and magnetic rocks.

- **Discarded Military Munitions (DMM)** – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations.

- **Munitions and Explosives of Concern (MEC)** – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded ordnance (UXO), as defined in 10 U.S.C. 101(e)(5)(A) through (C); (B) Discarded military munitions (DMM), as defined in 10 U.S.C. 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

- **Material Potentially Presenting an Explosive Hazard (MPPEH)** – Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal); or material potentially containing a high enough concentration of explosives such that the material presents an explosives hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

- **Munitions Constituents (MC)** – Any materials originating from UXO, DMM, or other munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

- **Munitions Debris** – Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

- **UXO Avoidance** – Techniques employed on property known or suspected to contain UXO or other munitions that have experienced abnormal environments, to avoid contact with potential explosives or CA hazards, to allow entry to the area for the performance of required operations.

- **Unexploded Ordnance (UXO)** – Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and (C) remain unexploded either by malfunction, design, or any other cause.

19.5 RESPONSIBILITIES

19.5.1 Project Manager

The project manager (PM) will be responsible for ensuring the availability of the resources needed to implement this SOP. The PM will also ensure that this SOP is incorporated in plans, procedures and training for Seneca.

19.5.2 Site Manager

The Site Manager will be responsible for the implementation of this SOP and the periodic review of the procedures outlined in this SOP to ensure compliance with regulatory requirements and to evaluate the process for improvements.

19.5.3 UXO Technicians

The UXO technicians conducting the surface clearance, subsurface clearance, and down-hole clearance while practicing subsurface anomaly avoidance techniques, are responsible for safely removing debris and accurately identifying and sorting items into munitions debris or cultural debris. They are responsible for positively identifying any MPPEH and UXO, and treating it in accordance with this SOP and the WP. They are also responsible for conducting a UXO Recognition Class for all site personnel.

19.6 GENERAL PROCEDURES

19.6.1 UXO Recognition Training

Prior to field activities commencing Parsons will present a UXO Recognition Training class, which will be mandatory, for all site personnel. The class is designed to ensure that all site personnel recognize possible ordnance items and are trained to react in accordance with accepted safety standards. Only UXO technicians can handle UXO. If an item is encountered it will be reported immediately to the BRAC Environmental Coordinator and all operations in the immediate area will cease.

19.6.2 UXO Inspection of the Access Routes and Sampling Sites

Parsons will provide the UXO technicians and equipment required to inspect the access routes and sampling sites for UXO. The UXO technicians will preview the desired footprint on a map with the equipment operator and the site manager prior to conducting a clearance. The UXO technicians will then visually inspect the surface area to ensure it is free of UXO.

19.6.3 Marking Access Routes and Sampling Site Boundaries

Dependant upon the equipment size and quantity being brought into a sampling site, the width of the ingress/egress route will be a minimum of twice the width of the largest piece of equipment. The size of the sampling area will vary but will be a minimum of twice the length of the largest piece of equipment. The desired size of the area being cleared is to make it big enough to permit the piece of equipment to safely maneuver within the cleared area.
The boundaries of the access route and sampling area will be marked at 25' intervals, or closer, with brightly colored survey flags, wooden stakes, or some other means of clearly marking the cleared area. In each case the point at which the marker will be inserted into the ground the point will be cleared using a magnetometer to ensure it is free of any subsurface anomaly.

19.7 CLEARANCE TECHNIQUES

19.7.1 Access Routes/Sampling Sites.

The two UXO technicians (technician level will be listed with the UXO Roster Database Number), one UXO Tech III and one UXO Tech II, will proceed at the start of the ingress/egress route on either the extreme right or left marker, and standing approximately five-feet apart using a magnetometer, such as the Schonstedt GA 52CX proceed down the inside of the marked route. Upon reaching the sampling area the two man team will turn around and move to the right or left and return down the inside of the marked route to the start of the access route. Each UXO technician will clear a five-foot lane during their progression, for a total cleared width of 10 feet per pass. This procedure will be used until the entire width has been cleared. The sampling area will be cleared in a similar manner. This area will normally be a large circle at the end of the access route and the UXO technicians must take precautions to ensure that they clear the entire circle using whatever approach they deem to be the most efficient i.e., straight lines or circular.

19.7.2 Down Hole.

The point selected to take a subsurface soil sample or install a monitoring well will be cleared at the surface to a depth of two feet. Once the two-foot depth is reached the auger, or drill will be extracted and a down hole magnetometer used to clear the next two foot section. This procedure will be used until the desired depth is reached. In the event an anomaly is encountered by the magnetometer that location will be abandoned and a new borehole started a minimum of two feet from the contaminated one. The contaminated bore hole will be filled back in to prevent any confusion and to eliminate a possible safety hazard.

19.7.3 Clearance Depths

The clearance depth of the ingress/egress routes and sampling area is dependent on the size and type of equipment being used, the type of soil and its condition, and whether it is wet or dry, but should be a minimum of two feet. This is to ensure that the equipment does not cause an unintentional detonation by running over or miring down and impacting any subsurface UXO. Clearance depth of the sampling hole will be as stated in the WP.

19.7.4 Marking and Handling of UXO

When UXO is encountered it will be positively identified to determine if it is acceptable to move. If it is acceptable to move it will be relocated out of the access route/sampling area and placed in a UXO holding area. The holding area will be clearly marked and protected on three sides with sandbags, earthen berms etc with the open end facing in a direction away from the sampling area or structures. The holding area will be marked with a red survey flag at each of the four corners. All UXO that can not be moved will be marked with two red survey flags in order to distinguish it from anything else. Red should only be used to mark UXO. The BRAC Environmental Coordinator will be contacted and arrangements made for SEDA to respond and destroy the item.

19.8 GENERAL ORDNANCE SAFETY

General ordnance safety procedures are discussed in detail in “Basic Safety Concepts and Considerations for Ordnance and Explosives Operations” (USACOE, EP 385-1-95a) Attachment A-16 of this document.

TABLE A-1
SWMUs Planned for RI/FS and Other Investigations at SEDA

SWMU Number	SWMU NAME	Potential Rad or UXO Hazard?	SWMU NUMBER	SWMU NAME	Potential Rad or UXO Hazard?
Seneca Army Depot Activity	Building 307 – Hazardous Waste Container Storage Facility	None	SEAD-52	Buildings 608 and 612 - Ammunition Breakdown Area	None
Romulus, New York	Incinerator Cooling Water Pond	None	SEAD-53	Munitions Storage Igloos	None
SEAD-2	Building 301 – PCB Transformer Storage Facility	None	SEAD-54	Asbestos Storage	None
SEAD-4	Munitions Washout Facility Leach Field	None	SEAD-55	Building 357 – Tannin Storage	None
SEAD-5	Sewage Sludge Waste Piles	None	SEAD-56	Building 606 - Herbicide and Pesticide Storage	None
SEAD-6	Abandoned Ash Landfill	None	SEAD-57	Explosive Ordnance Disposal Area	UXO
SEAD-7	Shale Pit	None	SEAD-58	Debris Area Near Booster Station 2131	None
SEAD-8	Non-Combustible Fill Area		SEAD-59	Fill Area West of Building 135	None
SEAD-9	Old Scrap Wood Site	None	SEAD-60	Oil Discharge Adjacent to Building 609	None
SEAD-10	Present Scrap Wood Site	None	SEAD-61	Building 718 - Underground Waste Oil Tank	None
SEAD-11	Old Construction Debris Landfill	None	SEAD-62	Nicotine Sulfate Disposal Area Near Buildings 606 or 612	None
SEAD-12	Radioactive Waste Burial Sites	Rad	SEAD-63	Miscellaneous Components Burial Site	Rad
SEAD-13	IRFNA Disposal Site	None	SEAD-64A, B, C, D	Debris Landfill South of Storage Pad	None
SEAD-14	Refuse Burning Pits (2 Units)	None	SEAD-65	Acid Storage Areas	None
SEAD-15	Building 2207 - Abandoned Solid Waste Incinerator	None	SEAD-66	Pesticide Storage Near Building 5 and 6	None
SEAD-16	Building S-311 – Abandoned Deactivation Furnace	UXO	SEAD-67	Dump Site East of Sewage Treatment Plant No. 4	None
SEAD-17	Building 367 – Existing Deactivation Furnace	UXO	SEAD-68	Building S-335 – Old Pest Control Shop	None
SEAD-18	Building 709 - Classified Document Incinerator	None	SEAD-69	Building 606 - Disposal Area	None
SEAD-19	Building 801 – Classified Document Incinerator	None	SEAD-70	Building 2110 - Fill Area	None
SEAD-20	Sewage Treatment Plant No. 4	None	SEAD-71	Alleged Paint Disposal Area	None
SEAD-21	Sewage Treatment Plant No. 715	None	SEAD-72	Building 803 - Mixed Waste Storage Facility	None
SEAD-22	Sewage Treatment Plant No. 314	None	SEAD-119A	Building 2409 Sewage Spill	None
SEAD-23	Open Burning Ground	UXO	SEAD-120A	50 Area Dumpling Areas	None
SEAD-24	Abandoned Powder Burning Pit	None	SEAD-120B	Ovid Road Small Arms Range	UXO
SEAD-25	Fire Training and Demonstration Pad	None	SEAD-120C	Building 813-817 Paints and Solvents Disposal Areas	None
SEAD-26	Fire Training Pit and Area	None	SEAD-120D	MP Refueling Island in the Q	None
SEAD-27	Building 360 – Steam Cleaning Waste Tanks	None	SEAD-120E	Near Building 2131, Possible DDT Disposal	None
SEAD-28	Building 360 – Underground Waste Oil Tanks	None	SEAD-120F	Munitions Burial Sites, South End of the Main Depot	None
SEAD-29	Building 732 - Underground Waste Oil Tanks (2 units)	None	SEAD-120G	Mounds at the Duck Pond	None

TABLE A-1
SWMUs Planned for RI/FS and Other Investigations at SEDA

SWMU Number	SWMU NAME	Potential Rad or UXO Hazard?	SWMU NUMBER	SWMU NAME	Potential Rad or UXO Hazard?
SEAD-30	Building 118 – Underground Waste Oil Tank	None	SEAD-120H	Building 810	None
SEAD-31	Building 117 – Underground Waste Oil Tank	None	SEAD-120I	Building 819, A0101, and A0102	None
SEAD-32	Building 718 – Underground Waste Oil Tanks	None	SEAD-120J	Farmer's Dump	None
SEAD-33	Building 121 – Underground Waste Oil Tanks	None	SEAD-121A	USCG Halon Discharge	None
SEAD-34	Building 319 – Underground Waste Oil Tank	None	SEAD-121B	Building 325 PCB Oil Spill	None
SEAD-35	Building 718 - Waste Oil-Burning Boilers (3 units)	None	SEAD-121C	DRMO Yard	None
SEAD-36	Building 121 – Waste Oil‐Burning Boilers (2 units)	None	SEAD-121D	Building 306 and 308 Hazardous Materials Release	None
SEAD-37	Building 319 – Waste Oil‐Burning Boilers (2 units)	None	SEAD-121E	Building 127 UST Petroleum Release	None
SEAD-38	Building 2079 - Boiler Plant Blowdown Leach Pit	None	SEAD-121F	Building 135 Stained Oil	None
SEAD-39	Building 121 – Boiler Plant Blowdown Leach Pit	None	SEAD-121G	Rumored Coal Ash Disposal Area	None
SEAD-40	Building 319 – Boiler Plant Blowdown Leach Pit	None	SEAD-121H	Rumored Coal Disposal Area	None
SEAD-41	Building 718 - Boiler Plant Blowdown Leach Pit	None	SEAD-121I	Rumored Cosmoline Oil Disposal Area	None
SEAD-42	Building 106 – Preventative Medicine Laboratory	None	SEAD-122A	Skeet/Trap Range	UXO
SEAD-43	Building 606 - Old Missile Propellant Test Laboratory (Related to SEAD-56)	None	SEAD-122B	Building 2302 Small Arms Range	UXO
SEAD-44A	Quality Assurance Test Laboratory - West of Building 616	UXO	SEAD-122C	Near Building 2311 Conex with Unknown Contents	None
SEAD-44B	Quality Assurance Test Laboratory - Brady Road	None	SEAD-122D	Hot Pad Spill	None
SEAD-45	Demolition Area	UXO	SEAD-122E	Deicing Planes	None
SEAD-46	Small Arms Range	UXO	SEAD-123A	Building 744 Indoor Firing Range	None
SEAD-47	Building 321 and 806 – Radiation Calibration Source Storage	None	SEAD-123B	Building 716 and 717 Petroleum Releases	None
SEAD-48	Pitchblend Storage Igloos	Rad	SEAD-123C	Building 747 HM Spills	None
SEAD-49	Building 356 – Columbite Ore Storage	None	SEAD-123D	Area West of Building 715	None
SEAD-50	Tank Farm	None	SEAD-123E	Rumored DDT Burial at Ice Rink	None
SEAD-51	Herbicide Usage Area – Perimeter of High Security Area	None	SEAD-123F	Mound North of Post 3	None

SWMU list obtained from SWMU Classification Report (Parsons, 1994) and Investigation of Environmental Baseline Survey Non-Evaluated Sites (Parsons, 1999).

TABLE A-2
SEDA Contaminants and Characterization

Contaminants of Concern	Range of Maximum Concentrations[1]	Media	SWMUs Where Maximums Were Observed in the Listed Range
METALS			
Antimony	52 - 285 mg/kg	Soil	SEAD-11, SEAD-17
Arsenic	56 - 151 mg/kg	Soil	SEAD-24, SEAD-50
	12.2 - 17.8 mg/kg	Sediment	SEAD-25, SEAD-26, SEAD-57
Cadmium	12.1 - 24 mg/kg	Soil	SEAD-63 and SEAD-71
	28.6 mg/kg	Sediment	SEAD-57
Chromium	60.7 - 3820 mg/kg	Soil	SEAD-4 and SEAD-50
Copper	35.2 - 2930 mg/kg	Soil	SEAD-4, SEAD-11, SEAD-13, SEAD-16, SEAD-17, SEAD-24, SEAD-26, SEAD-46 SEAD-50, SEAD-57, SEAD-71
	44.4 - 1160 mg/kg	Sediment	SEAD-12, SEAD-26, SEAD-57
Lead	522 - 140,000 mg/kg	Soil	Ash Landfill, SEAD-11, SEAD-17, SEAD-26, SEAD-46, SEAD-57, SEAD-71
Mercury	0.37 - 11.4 mg/kg	Soil	SEAD-16, SEAD-17, SEAD-50, SEAD-59, SEAD-64, SEAD-71
	1.7 mg/kg	Sediment	SEAD-12
Zinc	152 - 14,600 mg/kg	Soil	SEAD-11, SEAD-12, SEAD-16, SEAD-17, SEAD-24, SEAD-50, SEAD-57, SEAD-59, SEAD-71
	487 - 2760 mg/kg	Sediment	SEAD-12 and SEAD-57
VOCs			
Trichloroethene	46 - 42,000 ug/kg	Soil	Ash Landfill, SEAD-11
	599 - 1600 ug/L	Groundwater	Ash Landfill, SEAD-12
cis-1,2-dichloroethene	47 ug/kg	Soil	Ash Landfill
	67 ug/L	Groundwater	Ash Landfill
Vinyl Chloride	28 ug/kg	Soil	Ash Landfill
	81 ug/L	Groundwater	Ash Landfill
BTEX	151,810 ug/kg	Soil	SEAD-25
	6220 ug/L	Groundwater	SEAD-25
SVOCs			
Total Carcinogenic PAHs			
	57,330 - 570,000 ug/kg	Soil	SEAD-11, SEAD-26, SEAD-71
	179 - 90,000 ug/kg	Sediment	SEAD-16, SEAD-17, SEAD-25, SEAD-26, SEAD-50
RADIATION			
Investigations are ongoing at SEAD-12, SEAD-63, and SEAD-48.			

Note:

1. Range of Maximum Concentrations - Range of maximum concentrations observed at the specified Solid Waste Management Units (SWMUs).

   Data values were taken from Table 1 in a report prepared for New York State Electric and Gas (NYSEG) (Parsons, January 2002).

TABLE A-3
List of Activity Hazard Analyses (AHAs)

Number	Title
1	Soil Sampling (with drill rig)
2	Soil Sampling (with hand tools)
3	Surface Water Sampling
4	Groundwater Sampling
5	Installing a Monitoring Well
6	Radiation Scanning
7	UXO Avoidance
8	Test Pits
9	Abandoning a Monitoring Well
10	IDWs / Drum Moving / Filling / Emptying
11	Driving in the Ammo Area / “Q”
12	Decontamination Area set-up
13	Building Soil Piles
14	Surveying / GPS
15	Working on Igloo Rooftops
16	Building Decontamination
17	Trenching
18	Soil Excavation
19	Site Walk / Visit
20	Power and Hand Tool Operation
21	Heavy and Motorized Equipment Operation
22	Project Mobilization / Demobilization
23	Personnel Decontamination
24	Tool / Equipment Decontamination

Note(s):

1. These Activity Hazard Analyses (AHAs) are included in Attachment A-4. They replace Table B-3 from the previous version of this document.
2. This list will be expanded; new AHAs will be developed as tasks are added, and will be provided with the site-specific HSP for each new project.

TABLE A-4
Health Hazard Qualities of Hazardous Substances of Concern
Seneca Army Depot Activity, Romulus, New York

Compound	PEL [a] (ppm)	TLV [b] (ppm)	IDLH [c] (ppm)	Odor Threshold [d] (ppm)	Ionization Potential [e] (eV)	Physical Description/Health Effects/Symptoms
Metals						
Antimony	0.5mg/m3	0.5mg/m3	50mg/m3	NA	NA	Metal :Silver-white, lustrous, hard, brittle. Symptoms: irritation eyes, skin, nose, throat, and mou
Arsenic	0.01mg/m3	0.01mg/m3	5mg/m3	NA	NA	Metal: Silver-gray or tin-white, brittle, odorless solid. Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, and hyperpigmentation of skin. Potential occupational carcinogen
Cadmium	0.005mg/m3	0.002mg/m3	9 mg/m3	NA	NA	Metal: Silver-white, blue-tinged lustrous, odorless solid. Pulmonary edema, dyspnea (breathing difficult cough, chest tightness, substernal (occurring beneath the sternum) pain; headache. Possible carcinogen
Chromium III	0.5mg/m3	0.5mg/m3	25mg/m3	NA	NA	Appearance and odor vary depending upon the specific compound. Irritation eyes; sensitization dermatitis
Lead	0.05mg/m3	0.05mg/m3	100mg/m3	NA	NA	Heavy, ductile, soft, gray metal. Symptoms: weakness, lassitude , and insomı
Mercury (metal)	0.1mg/m3 (ceiling)	0.025mg/m3	10mg/m3	NA	NA	Metal: Silver-white, heavy, odorless liquid. Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, and irritability
Nickle (elemental)	1.0mg/m3	1.5mg/m3	10mg/m3	NA	NA	Metal: Lustrous, silvery, odorless solid.Sensitization dermatitis, allergic asthma, pneumonitis; Potential carcinogen
Selenium (elemental)	0.2mg/m3	0.2mg/m3	10mg/m3	NA	NA	Amorphous or crystalline, red to gray solid. Irritation eyes, skin, nose, throat; visual disturbance; headac chills, fever; dyspnea (breathing difficulty), and bronchitis.
VOCs						
Benzene	1ppm	0.5 ppm	500 ppm	97	9.24	Class IB Flammable Liquid. Symptoms-Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, and lassitude (weakness, exhaustion). Human carcinogen
Petroleum distallates	500 ppm	NA	1,100ppm	NA	ND	Colorless liquid with a gasoline- or kerosene-like odor. Flammable liquid. Symptoms-Irritation eyes, nose, throat; dizziness, drowsiness, headache,and nausea;
Toluene	200ppm	50ppm	500ppm	11	8.82	Colorless liquid with a sweet, pungent odor. Flammable liquid. Symtoms-Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, and headache
Xylene	100ppm	100ppm	900ppm	5.4 (ortho)	8.56	Colorless liquid with an aromatic odor. Class IC Flammable Liquid. Symptoms-Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, and staggering gait
Trichloroethene	100ppm	100ppm	1000ppm	ND	9.45	Colorless liquid with a chloroform-like odor. Symptoms: irritation eyes, skin; headache,and verti
cis-1,2-dichloroethene	200ppm	200ppm	1000ppm	ND	9.65	Colorless liquid with a slightly acrid, chloroform-like odor. Class IB Flammable Liquid. Symptoms:irritation eyes, respiratory system; central nervous system depressant/depression
Vinyl Chloride	1ppm	1ppm	ND	ND	9.99	Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations.Flammable Gas. Symptoms: weakness; abdominal pain, gastrointestinal bleeding, and enlarged liver. Carcinogen
Semi-Volatiles						
PCBs (54% Chlorine)	0.5mg/m3	0.5mg/m3	5mg/m3	ND	ND	Colorless to pale-yellow, viscous liquid or solid.Symptoms-Irritation eyes, chloracne; liver damage; reproductive effects; Potential carcinogen
Coal tar pitch volatiles (PAHs)	0.2mg/m3	0.2mg/m3	80mg/m3	NA	NA	Black or dark-brown amorphous residue. Symptoms: dermatitis and bronchitis. Potential carcino
Ionizing Radiation	1.25 REM[f]	5REM[g]				refer to radiation protection section

a. PEL = Permissible Exposure Limit. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm. Expressed as parts per million (ppm) unless noted otherwise. Some states (such as California) may have more restrictive PELs. Check state regulations.
b. TLV = Threshold Limit Value - Time-Weighted Average. Average air concentration (same definition as PEL, above) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH),*2003 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*
c. IDLH = Immediately Dangerous to Life or Health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise. IDLH values are published in the *NIOSH Pocket Guide to Chemical Hazards* , 2000.
d. Geometric Mean values published in *Patty's Industrial Hygiene Volume 1, 2000* .
e. Ionization Potential, measured in electron volts (eV), used to determine if field air monitoring equipment can detect substance. Values are published in the *NIOSH Pocket Guide to Chemical Hazards* , 2000.
f. 1.25 Rems per calender quarter whole body exposure (refer to 1910.1096)
g. 5 Rems per year whole body exposure
mg/m3 = milligrams per cubic meter. NA = Not available. ND = Not determined.

TABLE A-5
Snake Identification Features

Feature	Poisonous	Non-Poisonous
Eye Pupils	Elliptical, or cat-like	Round
Sensing Pits	Pit between the eyelids and nostrils	No pit between the eyelids and nostrils
Teeth	Two enlarged teeth (fangs) in front of the upper jaw	All teeth are approximately the same size
Scales	Form a single row on the underside and below the tail	Arranged in a double row on the underside of the tail
Head	Head much wider than the neck	Head slightly wider than the neck
Tail	Single anal plate	Divided anal plate

TABLE A-6
Responsibilities of On-Site Personnel

Title	General Description	Responsibility
Program Manager / Project Manager	Reports to upper-level management. Has authority to direct response operations. Assumes total control over site activities.	• Prepares and organizes the background review of the situation, the Work Plan, the Site-Specific Health and Safety Plan, and the field team. • Coordinates activities with appropriate officials. • Ensures that the Work Plan is completed and on schedule. • Briefs field team on their specific assignments. • Uses the SHSO/UXOSO/RXO to ensure that safety and health requirements are met. • Prepares the final report and support files on the response activities.
Program Health and Safety Officer	Advises the Project Manager, SHSO, UXOSO, and RSO on all aspects of health and safety.	• Approves final SHSP. • Confirms each Parsons team member's suitability for work based on physician's recommendation. • Conducts field safety and health audits to ensure Health and Safety Plan conformance and Parsons policy compliance. • Certifies that all workers have proper training as per 29 CFR §1910.120(e). Ensures that Parsons' and all subcontractors' protective clothing and equipment are properly stored and maintained.

TABLE A-6 (continued)

Responsibilities of On-Site Personnel

Title	General Description	Responsibility
Site Health and Safety Officer (SHSO)	Reports to the PHSO on all aspects of Safety and Health on site. Performs day-to-day H&S tasks. Stops work if any operation threatens worker or public health and/or safety.	• Establishes work zones and controls access to these zones with UXOSO and RSO. • Controls entry and exit at the Access Control Points. • Confirms all contractor and field personnel's suitability for work, based upon OSHA and site specific medical and training requirements. • Conducts site-specific safety training prior to initiation of field activities. • Conducts daily safety meetings. • Investigates accidents/incidents and "near misses". • Enforces the "buddy" system. Maintains and calibrates safety monitoring equipment, and document calibration data in the monitoring or safety log. • Restricts site personnel from site activities if they exhibit symptoms of alcohol or drug use or illness. • Ensures personnel are monitored for signs of stress, such as cold exposure, heat stress, fatigue, and chemical exposure. • Implements the SHSP. • Knows emergency procedures, evacuation routes, and telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.

TABLE A-6 (continued)
Responsibilities of On-Site Personnel

Title	General Description	Responsibility
Site Health and Safety Officer (SHSO) [continued]		• Coordinates decontamination procedures/provisions for medical care with U.S. Army Corps of Engineers (USACE) personnel. • Notifies USACE of emergency conditions. • Ensures that all required equipment is available. • Advises medical personnel of potential exposures and consequences. • Notifies emergency response personnel by telephone or radio in the event of an emergency. • Maintains logbook for site workers and visitors. • Acts as spokesperson if OSHA inspector arrives on site. • Conducts on-site training concerning pertinent H&S issues and new concerns. • Reports all accidents or H&S incidents to the PHSO and USACE. • Maintains the site safety and monitoring logs. • Acts as the On-Scene-Incident-Commander (OSIC) in the event of an emergency, notifies and coordinates off-site emergency and medical response agencies. • Coordinates with the local fire department and emergency medical services.

TABLE A-6 (continued)

Responsibilities of On-Site Personnel

Title	General Description	Responsibility
UXOSO	Advises the Project Manager on all aspects of health and safety on site. Stops work if any operation threatens work or public health or safety.	• Implements and enforces the UXO/OE components of the SSHP. • Has STOP WORK authority for safety and health reasons. • Establishes work zones and controls access to these zones with SHSO and RSO.
Radiation Safety Officer (RSO)	Responsible for radiation safety during field activities	• Assures compliance with radiation protection standards • Determine radiation-monitoring procedures, prepares radiation training program, and selects appropriate PPE for ionizing radiation hazard.
Site Manager	Responsible for field team operations and safety	• Manages field operations. • Executes the Work Plan and schedule. • Has STOP WORK authority for safety and health reasons. • Coordinates with the UXOSO/RSO/PHSO in determining PPE level. • Enforces site control. • Serves as liaison with public officials. • Inspects personal protective equipment prior to, during and after each use.
Work Team	The work party must consist of at least two people	• Safely completes the onsite tasks required to fulfill the Work Plan. • Complies with the SHSP. • Notifies UXOSO, RSO, SHSO, or Site Manager of suspected unsafe conditions. • Inspects PPE prior to, during, and after each use.

TABLE A-7
Description of Personal Protective Equipment and Levels of Protection

LEVEL D

- Standard work clothes with long pants;
- Hearing protection (when working around heavy equipment);
- Safety glasses when an eye hazard exists;
- Steel-toed boots when working around heavy equipment;
- Hard hat (when overhead hazard is present);
- Disposable Nitrile Gloves (Sampling operations)
- Leather gloves (drilling operations)

LEVEL C

- full-face air purifying respirator with organic vapor / P-100 cartridges
- Tyvek® coveralls with hood;
- Inner coveralls or other work clothes;
- Inner surgical gloves (Nitrile);
- Outer neoprene-rubber gloves;
- Steel-toed boots;
- PVC boot covers;
- Hard hat (as required when adjacent to heavy equipment);
- Hearing protection (as required when near heavy equipment);and
- Two-way radio

LEVEL B

- 30-minute SCBA with airline attachment
- Tyvek® coveralls with hood;
- Inner coveralls or other work clothes;
- Inner surgical gloves (Nitrile);
- Outer neoprene-rubber gloves;
- Steel-toed boots;
- PVC boot covers;
- Hard hat (as required when adjacent to heavy equipment);
- Hearing protection (as required when near heavy equipment);and
- Two-way radio

*OTHER MATERIALS MAY BE SPECIFIED TO PROVIDE BETTER PROTECTION WHEN WORKING WITH CERTAIN TYPES OF CHEMICALS.

TABLE A-8
Action Levels for Changes in Respiratory Protection and Site Evacuation

INSTRUMENT	LEVEL D	LEVEL C	LEVEL B	PROCEED WITH CAUTION	EVACUATE SITE
HNU (ppm)	< 10	10 – 100	100 – 500		> 500
OVA (ppm)	< 10	10 – 100	100 – 500		> 500
Oxygen (%)	19.5 – 23	19.5 – 23	19.5 – 23		> 23
Lower Explosive Limit (%)	< 10	< 10	< 10	10 < LEL < 25	> 25
Radiation Meter (mR/hr)	< 0.5	< 0.5	< 0.5	0.5 mR < 10	> 5
Aerosol Monitor (mg/m^3)	< 1.0	1.0 – 10	10 – 50		> 50

Volatile concentrations should be monitored at breathing height (5-5.5 ft) and the threshold levels are applicable to stable readings (e.g., readings that last more than 5 minutes).

TABLE A-9
First Aid Kit Requirements

Unit first aid item	Minimum Size or Volume	Item Quantity per unit package	Unit package size
Absorbent Compress	24 in^2	1	1
Adhesive Bandage	1 x 3 in	16	1
Adhesive Tape	5 yd (total)	1 or 2	1 or 2
Antiseptic Swab	0.14 fl. oz.	10	1
Antiseptic Wipe	1 x 1 in	10	1
Antiseptic Towelette	24 in^2	10	1
Bandage Compress (2 in)	2 x 36 in	4	1
Bandage Compress (3 in)	3 x 60 in	2	1
Bandage Compress (4 in)	4 x 72 in	1	1
Burn Treatment	0.14 fl. oz.	6	1
Eye Covering, with means of attachment		1	1
Eye Wash	1 fl. oz. total	1	2
Eye Wash, with covering and means of attachment		1	2
Gloves		2 pair	1
Roller Bandage (4 in)	4 in x 6 yd	1	1
Roller Bandage (2 in)	2 in x 6 yd	2	1
Sterile Pad	3 x 3 in	4	1
Triangular Bandage	40 x 40 x 56 in	1	1
Pocket mouth piece or CPR barrier		1	1

Note(s):

1. Required contents per Table 3-1 EM 385-1-1, Section 03.B.
2. First aid kits will be easily accessible by all workers, protected from the weather, all contents will be maintained sterile, and will be inspected prior to use and at least weekly while work is in progress.

TABLE A-10

Suggested Frequency of Physiological Monitoring for Fit and Acclimated Workers

ADJUSTED TEMPERATURE[b]	NORMAL WORK ENSEMBLE[c]	IMPERMEABLE ENSEMBLE
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-28.1°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

[a] For work levels of 250 kilocalories/hour.

[b] Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100% sunshine = no cloud cover and a sharp, distinct shadow; 0% sunshine = no shadows.)

[c] A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

TABLE A-11
Permissible WBGT Heat Exposure Threshold Limit Values

Work – Rest Regimen	**WORK LOAD**		
	Light*	**Moderate**	**Heavy**
Continuous work	86 (30.0)	80 (26.7)	77 (25.0)
75% Work - 25% Rest, each hour	87 (30.6)	82 (28.0)	78 (25.9)
50% Work - 50% Rest, each hour	89 (31.4)	85 (29.4)	82 (27.9)
25% Work - 75% Rest, each hour	90 (32.2)	88 (31.1)	86 (30.0)

* Consult the ACGIH TLV booklet for definitions of Light, Moderate and Heavy workloads. Values are given in °F and (°C) WBGT, and are intended for workers wearing single layer summer type clothing. Use of semi or totally impermeable clothing require monitoring IAW the OES Heat Stress Prevention Program. As workload increases, the heat stress impact on a nonacclimated worker is exacerbated. For nonacclimated workers performing a moderate level of work, the permissible heat exposure TLV should be reduced by approximately 2.5°C.

TABLE A-12
Minimum Illumination Intensity

Foot-candles	Area of Operation
5	General construction area lighting
3	General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas
5	Indoors: warehouses, corridors, hallways, and exit-ways
5	Tunnels, shafts, and general underground work areas (exception: a minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling; Bureau of Mines approved cap lights are acceptable for use in the tunnel heading)
10	General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active storerooms, barracks or living quarters, locker or dressing rooms, mess halls, and indoor toilets and workrooms)
30	First-aid stations, infirmaries, and offices

Note(s):
1. Taken from Table 13.3 (pg 13-14), Parsons Corporate Health and Safety Manual, Revision 8, June 1999.
2. If comparing foot-candle units in this table to lux units in the Table 7-1 (EM-385-1-1), 1 foot candle = 10.76 lux

TABLE A-13
Measures for Level C Decontamination

Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down station may be set up within this area.
Station 2:	Outer Garment, Boots and Gloves Wash and Rinse	Scrub outer boots, outer gloves and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boots and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask	If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Outer Garment Removal	Remove outer garment. Place on plastic for further cleaning or in barrel for disposal.
Station 6:	Face Piece Removal	Facepiece is removed. Avoid touching face with fingers, Facepiece deposited on plastic sheets.
Station 7:	Inner Boot and Glove Removal	Boots and inner gloves removed an deposited in separate containers lined with plastic.
Station 8:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

TABLE A-14

Measures for Level B Decontamination

Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down station may be set up within this area.
Station 2:	Outer Garment, Boots	Scrub outer boots, outer gloves and splash suit and Gloves Wash and Rinse decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boots and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	If worker leaves exclusive zone to change air tank, this is the last step in the decontamination procedure. Worker's canister air tank is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	SCBA Removal	SCBA backpack and facepiece is removed. Avoid touching face with finger. SCBA deposited on plastic sheets.
Station 6:	Outer Garment Removal	Remove outer garments. Place on plastic for further cleaning or in barrel for disposal.
Station 7:	Inner Boot and Glove Removal	Boots and inner gloves removed and deposited in separate containers lined with plastic.
Station 8:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

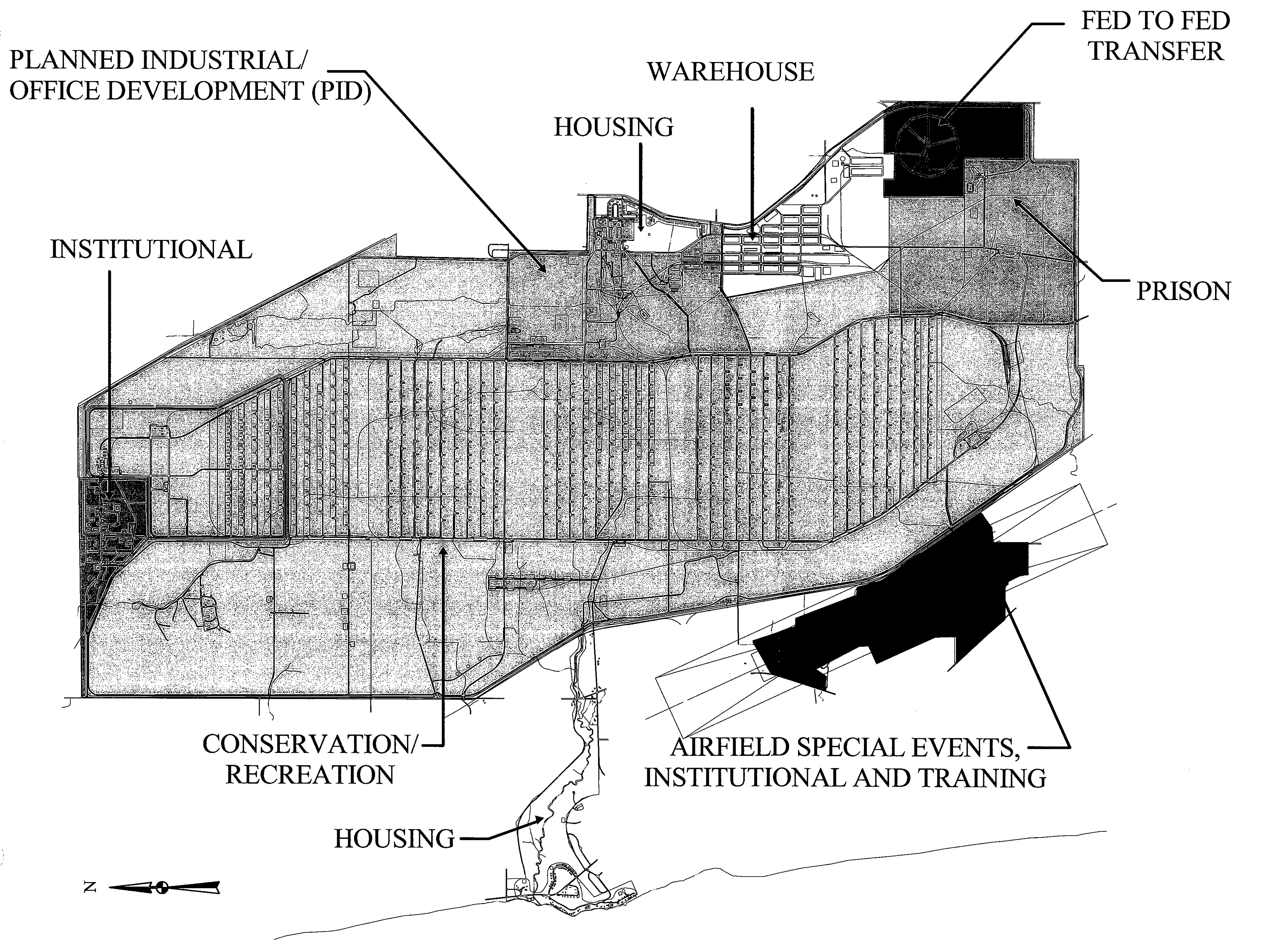
TABLE A-15
Emergency Telephone Numbers

CONTACT	NAME	PHONE
State Police, Fire, Ambulance		911
Program Health and Safety Officer	Tim Mustard	1-303-764-8810
Program Manager	Todd Heino	1-617-449-1405
Site Health & Safety Coordinator	TBD	
Client Contact	Randy Battaglia	1-607-869-1523
State Spill Number		1-585-226-2466
Fire Department	Romulus	1-607-869-9611
Police Department	Interlaken	1-607-532-4466
National Response Center		1-800-424-8802
Poison Control Center		1-800-962-1253
Occupational Physician	Dr. Walker	1-800-874-4676
Regional USEPA Emergency Response		1-732-548-8730
Parsons 24-Hour Emergency #		1-800-883-7300
Parsons Boston H&S Representative	Jessica Smith	1-617-449-1574

TABLE A-16
ON-SITE EMERGENCY COMMUNICATIONS

AIR HORN SIGNAL	ACTION
ONE LONG BLAST	RETURN TO NEAREST SUPPORT ZONE
TWO SHORT HORN/SIREN BLASTS	CONDITION UNDER CONTROL, RETURN TO SITE
THREE SHORT BLASTS	SHUT DOWN EQUIPMENT, STAND BY RADIO
CONTINUOUS LONG BLASTS	EVACUATE SITE BY BEST, FASTEST ROUTE

HAND SIGNALS	MEANING
HAND GRIPPING THROAT	OUT OF AIR, CAN'T BREATHE
GRIP PARTNER'S WRIST	LEAVE AREA IMMEDIATELY; NO DEBATE
HANDS ON TOP OF HEAD	NEED ASSISTANCE
THUMBS UP	OK; I'M ALL RIGHT; I UNDERSTAND
THUMBS DOWN	NO; NEGATIVE
POINTING TO EAR(S)	CAN'T HEAR, DON'T UNDERSTAND
POINTING TO EYES THEN POINTING TO A PERSON/OBJECT	WATCH PERSON/OBJECT CLOSELY



PARSONS

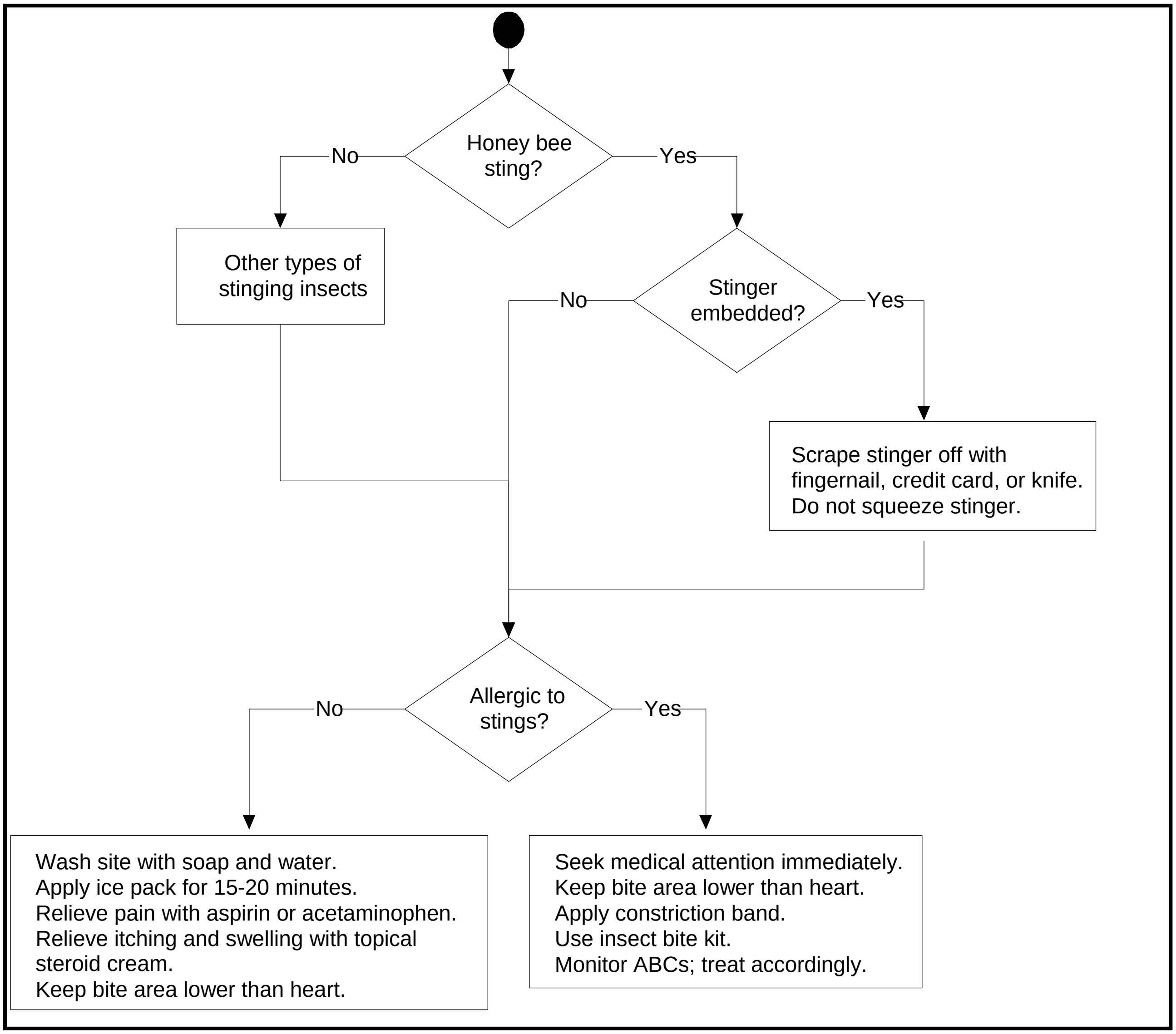
SENECA ARMY DEPOT ACTIVITY

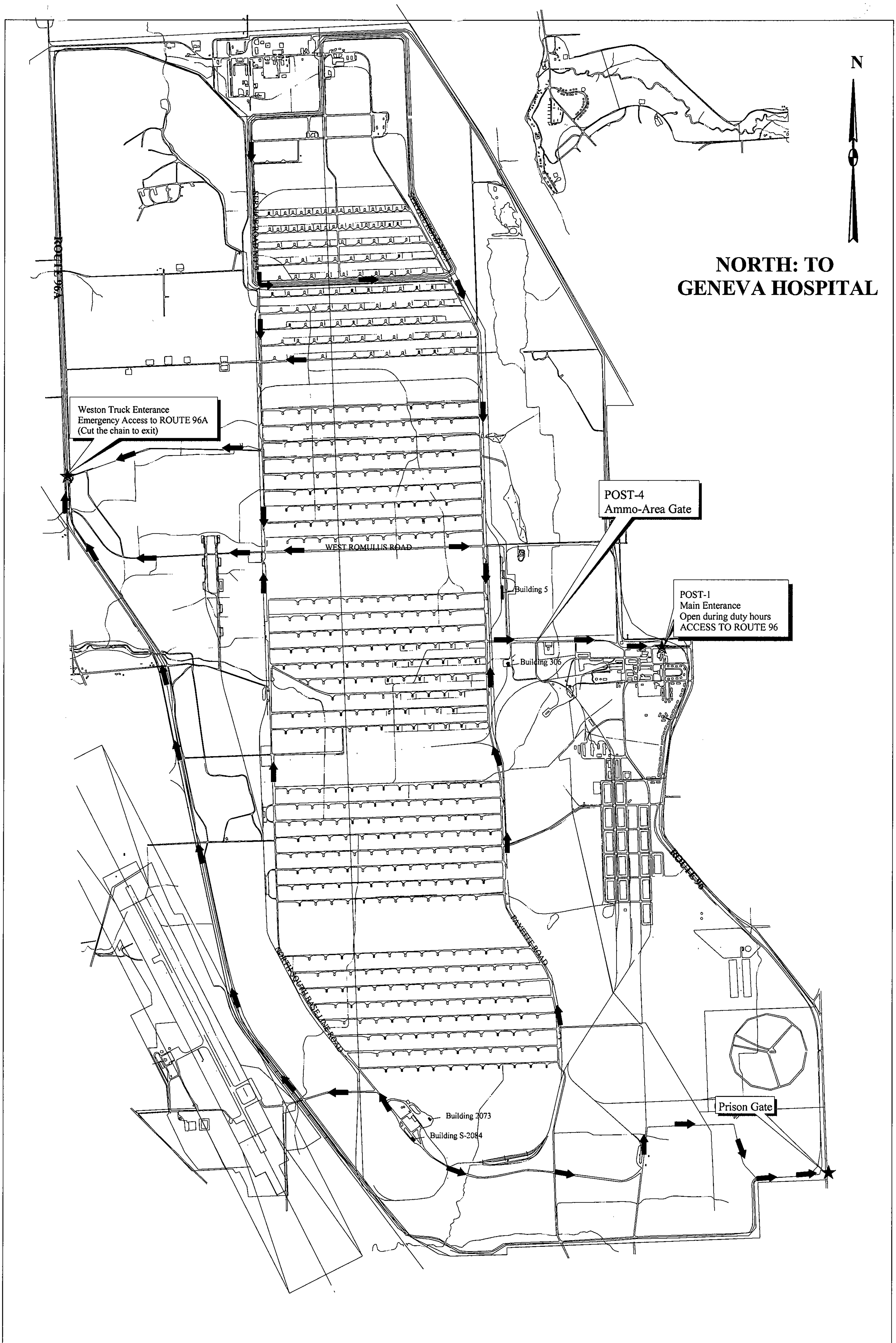
GENERIC SITE WIDE HEALTH & SAFETY PLAN FOR SENECA ARMY DEPOT ACTIVITY

Figure A-1
SENECA ARMY DEPOT MAP

Health and Safety Plan | March 2005

Figure A-2
Decision Diagram for Stings from Insects





LEGEND

← Recommended Path for Emergency Exit from Depot

NOTE:
UNLESS IT IS AN EMERGENCY, EXIT FROM POST-1.
IF EMERGENCY- EXIT FROM THE CLOSEST GATE.
USE WIRE CUTTERS IF NECESSARY.

2500 0 2500
(feet)

PARSONS

SENECA ARMY DEPOT ACTIVITY

GENERIC SITE WIDE HEALTH & SAFETY PLAN
FOR SENECA ARMY DEPOT ACTIVITY

FIGURE A-3
LOCATION OF EMERGENCY
EXIT GATES

SCALE	DATE	REV
1:2500	MARCH 2005	SHEET 1 OF 1

O:\Seneca\h&s\plan\workplan.apr

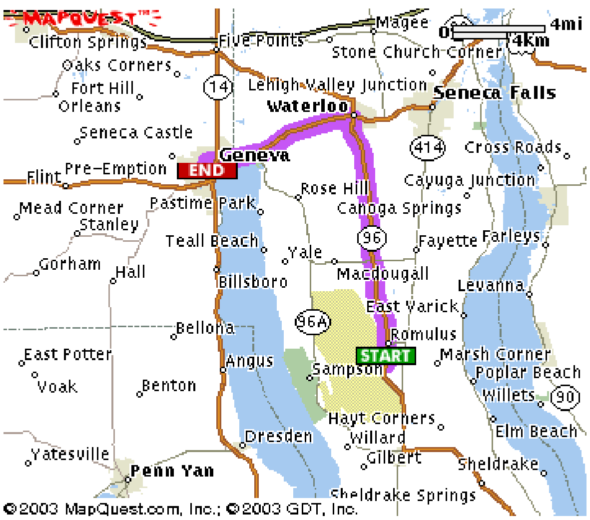
FIGURE A-4
Route to Geneva General Hospital

Hospital Address:	196 North Street Geneva, NY 14456
Telephone Number:	1-315-787-4000
Distance to Hospital:	18.7 miles

Directions to Geneva Hospital (See Attached Map):

Take left onto Route 96 North. Turn left onto NY-5/US-20. Turn right onto CR-110. CR-110 becomes CR-110/E North Street. CR-110/E North Street becomes NY-14.

Map showing route from Seneca Army Depot, Main Gate to Geneva General Hospital - Primary Hospital



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Close Up map of Hospital

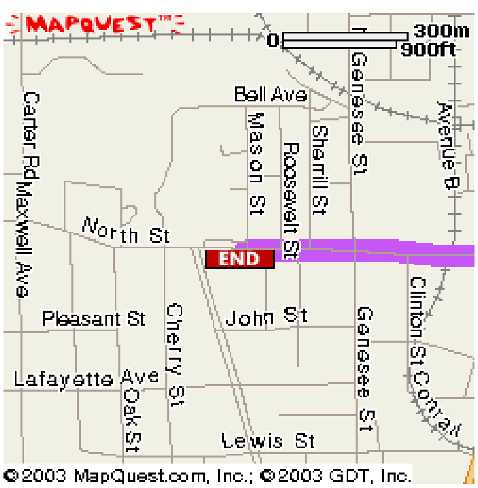

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FIGURE A-5 ***CORPORATE POLICY***
Cellular Phone Usage

POLICY: CELLULAR PHONE/WIRELESS DEVICE USAGE

BACKGROUND:

In line with Parsons' *Zero Accident* goals, the Company has reviewed the available evidence and statistical data regarding the use of cellular telephones, PDA's or other wireless devices (collectively referred to as "wireless devices") while operating motor vehicles. The over-whelming conclusion is that using wireless devices while driving a car significantly increases the risk of a crash.

STATEMENT OF POLICY:

Therefore, it is Company policy that all wireless device use, whether "hand-held" or "hands free***" is prohibited*** while driving a vehicle on public roads as follows:

a. For business use *at any time*; or
b. For *personal use* <u>during business hours</u>; and
c. As defined by law

RESPONSIBILITIES OF EMPLOYEES:

- Refrain from using wireless devices <u>as described above.</u>
- If wireless communications are required, drive to a safe parking area and use the device from that location.
- This policy applies only to drivers, not to passengers in the vehicle.

References:

This policy is maintained on the PWeb for ease of access.

Approved: ***DATE: 7/6/04***

The Company may change, rescind or add to any policies, benefits or practices described on the PWEB, other than employment-at-will policies, from time to time in its sole and absolute discretion with or without prior notice. The Company will advise employees of material changes within a reasonable time.

Attachment A-1

Pictures of Poison Ivy, Snakes, Spiders, and Ticks

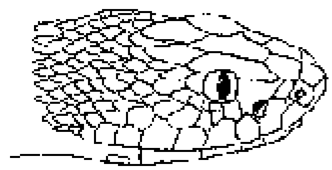
POISON IVY/POISON OAK/POISON SUMAC

Poison Ivy	Poison Oak	Poison Sumac
		

SNAKES

Copperhead

Closeup of head

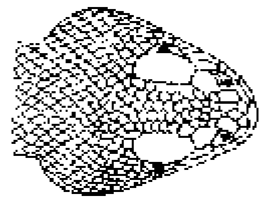


24-36", up to 53"

The copperhead is a venomous snake with a broad triangular head, vertically elliptical pupils and a heat sensitive pit between each eye and nostril. The body is pinkish to grayish brown with brown or reddish-brown crossbands that are narrow on the back and widest on the sides. Small dark spots commonly occur between crossbands on the back. The unpatterned head is dull orange, copper or rusty-red. Body scales are keeled and the belly is pink or light brown with dark blotches along the sides. When young, a copperhead has a yellow-tipped tail.

SNAKES

Timber Rattlesnake



Closeup of head

36-60", up to 74"

Head and body are pinkish-gray to yellowish-brown with a pattern of dark bands on the back and a grayish-white belly. The tail is black with a rattle.

SNAKES

Eastern Diamondback Rattlesnake

33-72", up to 96"

The snake has a large head and a bulky body. It has a row of large dark diamonds with brown centers and cream borders down its back. The ground color of the body ranges from olive, to brown, to almost black. The tail is usually a different shade, brownish or gray, and banded with dark rings. At the end of the tail is a well-developed rattle. The head has a light bordered dark stripe running diagonally through the eye. The pupil is vertical (catlike). There is a large pit between the nostril and eye. The young are similar to the adults in color pattern. The tip of the tail of a newborn diamondback ends in a button, which is the first segment of the future rattle. Male and female rattlesnakes look alike.

SPIDERS

Brown Recluse
0.25-1.0"

Black Widow
0.12-0.75"

TICKS

Larvae

Female Deer Tick with Dime for Size Comparison

Deer Tick Nymph with Dime for Size Comparison

Attachment A-2

Corporate Radiation Protection Manual, Radiological Survey Procedure for Decontamination of Equipment, Materials, and Tools

APPENDIX E
RADIATION PROTECTION

E.1 OBJECTIVE

Radioactive material is typically not present at most work sites. However, radioactive materials may be encountered in drums, lab packs, and buried in landfills found as either solids or liquids. Departments of Energy (DOE) and Defense sites should be particularly suspect of having ionizing radiation hazards. Also sites which have, or once had Atomic Energy Commission (AEC) or Nuclear Regulatory Commission (NRC) licenses may contain sources of ionizing radiation hazards. This appendix provides personnel with an understanding of the types of ionizing radiation and the hazards they pose. Methods for detection of ionizing radiation will be discussed in addition to procedures that should be utilized for protection against a radioactive hazard. This appendix will also provide guidance on the location and content of the applicable regulatory requirements.

Sites regulated by the NRC are typically regulated under 10 CFR part 20 and any applicable license requirements (typically issued by the NRC under 10 CFR part 51 or 10 CFR part 70). However, many states are agreement states and have taken over the regulatory responsibility from the NRC. These states have their own specific regulations, which will be similar to 10 CFR part 20. DOE site regulations may include 10 CFR part 835, 10 CFR part 834 (when issued), the DOE Radiological Control Manual (U.S. DOE, 1992), DOE Order 5480.11, and DOE Order 5400.5. OSHA has adopted the NRC regulatory limits for workers in 29 CFR part 1910.96. NIOSH's "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" (NIOSH, 1985) provides guidance for implementation of radiological controls at hazardous waste sites regulated under 29 CFR part 1910.120. Finally, state regulations establish the requirements for X-ray machines, accelerators, and naturally occurring radioactive material (NORM) (Rogers, 1994). EPA under the Clean Air Act has established limits for release of radioactive material to the air in 40 CFR 61 which currently includes uranium mines, phosphorus plants, NRC facilities, and DOE facilities. The EPA establishes drinking water and surface water radionuclide limits in the Clean Water Act implementation (40 CFR part 141) and the applicable National Pollution Discharge Elimination System (NPDES) permit, if applicable.

E.2 TYPES OF IONIZING RADIATION

When particulate or electromagnetic radiation has an energy greater than about 30 electron volts (eV) it is able to strip an electron from a molecule in the process of ionization. Injury to living matter by ionizing radiation is a result of the transfer of energy to molecules in the region through which the radiation passes. These large energy transfers can easily break strong chemical bonds. For example, the energy associated with a C=C bond commonly found in the body is 4.9 eV. The ability to cause disruption of molecular structure can affect the normal functioning of a cell resulting in cell injury or death.

Radioactive decay results primarily in five different types of ionizing radiation: alpha particle, beta particle, gamma ray, X-ray, and neutron. Alpha, beta, X-ray, and gamma radiation are the most frequently encountered at sites. Types of radiation are distinguished by physical characteristics such as mass, electrical charge, and path length of range. X-ray and gamma radiation are simply photon radiation (i.e., X-ray typically has lower energies) and the only difference is that the X-ray originates in the electron cloud outside the nucleus of the atom and gamma radiation originates within the nucleus. For purposes of radiation protection, X-rays and gamma radiation are the same and only gamma radiation will be addressed throughout the balance of this appendix.

E.2.1 Alpha Particle

The alpha particle is an energetic helium nucleus consisting of two protons and two neutrons. Compared to a beta particle (see below) it is 7,300 times heavier and has double the charge. Alpha particles are commonly emitted in the radioactive decay of heavy nuclei, those that have an atomic number greater than 83. Alpha particles have characteristic specific energies based on the radionuclide emitting the alpha particle. Examples of naturally occurring alpha emitters are uranium, thorium, radium, and polonium. Man-made alpha emitters such as plutonium may be present at some Department of Energy (DOE) and Department of Defense (DOD) sites. Older medical facilities may have used radium-226. Current research facilities and medical facilities may use Ra-226 or Am-241. Many of the radionuclides associated with natural occurring radioactive materials (NORM) are also alpha emitters (e.g., Th-232, U-238, Ra-226, and Th-230).

Alpha particles emitted by these nuclei possess kinetic energy levels ranging from 4 MeV to 9 MeV. Alpha particles are released at velocities much less than the velocity for a beta particle which is released from the nuclei at speeds approaching that of light. Because of their slower speeds, alpha particles spend more time than beta particles residing in the vicinity of the atoms they pass and exert much greater effect on orbital electrons and the charge particles in the nucleus of the atoms. The effect on orbital electrons is increased more because the alpha particle has a +2 charge, twice that of a beta particle. As a result, of these effects the alpha particles impart energy to the medium along their path at a much higher rate than a beta particle.

Alpha particles have had the reputation for being especially dangerous. They are the main source of energy from radium and thorium isotopes which produced bone cancer in persons painting radioluminescent dials, and from radon gas associated with lung cancer in miners. However, alpha particles have a very short range and cannot penetrate through the epidermis layer of the skin and thus do not constitute an external hazard. Damage occurs only when alpha-emitting radionuclides are injected (e.g., enter the body through a cut), ingested, or inhaled and the particles are consequently emitted immediately adjacent to or inside living tissue. They are of more concern within the body since the large mass and charge resulting in deposition of most of their energy in a very localized area.

E.2.2 Beta Particle

Carbon-14, strontium-90, sulfur-35, phosphorus-32, and tritium are a few of the most common beta emitting radioisotopes used in research and medical facilities. For a medical facility the beta emitting radionuclides might also include sodium-22, iodine-131, tin-113, and gold-195. Many of the DOE facilities (e.g., Hanford, Savannah River, Oak Ridge) have a wide assortment of beta emitters with the highest activity normally associated with strontium. There are a significant number of beta emitters associated with NORM radioactivity.

Beta particles are high speed electrons which are emitted by nuclei of atoms as a result of energy released in a radioactive decay process involving the transformation of a neutron to a proton. Beta particles are emitted from the nucleus with a characteristic spectrum of energies. The average energy of the beta particle is about two-third of the maximum kinetic energy that the parent radionuclide could emit. As a result of the transformation, the maximum energies for beta particles range from 0.018 MeV for tritium to 2.24 MeV for strontium-90. The electron emitted as a result of the nuclear decay has a charge of -1 and a range in air from 0.02 to 29 feet. (The beta particles do not penetrate beyond their maximum range.) The ranges of beta particles tell a lot about the hazards of the various radionuclides as external sources of radiation. Tritium is stopped by only 5 mm of air. These particles cannot penetrate the epidermis of the skin. Tritium can produce injury only when it is ingested or inhaled. In contrast, phosphorus-32 emits a highly energetic particle which can penetrate as much as 8 mm into the body. However, the greatest concern is the absorption (typically associated with tritium), injection, ingestion, or inhalation of beta emitters.

E.2.3 Gamma Ray

Gamma radiation is associated with most radioactive decays and may be found anywhere radioactive material may have been present. When radioactive decay results in the emission of a particle from the nucleus the nucleus is left in an excited state. The excited nucleus releases the excess energy as gamma rays (photons or wave packets of electromagnetic radiation) until the ground state of the nucleus is obtained. Sometimes the energy is emitted in a single jump; other times it is emitted in a series of jumps. The number and energy of gamma rays emitted following particle emission is characteristic of a given radionuclide. Gamma rays have energies from a few thousand electron volts to several million electron volts. Unlike beta particles, which slow as they lose energy and finally become attached to atoms, gamma rays of all energies travel at the speed of light and only lose energy through chance encounters that result in the ejection of electrons from atoms or through interactions with the nucleus. There is no range associated with gamma radiation rather there is an exponential decrease in the flux characteristic of the energy of the radiation and the material it passes through. Gamma rays are a major source of indirect ionization. A gamma ray can liberate an electron from an atom which will proceed to ionize in a manner similar to the beta particle. Thus, gamma rays liberate direct ionizing particles deep within the medium, much deeper than the direct ionizing particles could reach from the outside.

E.2.4 Neutrons

Neutrons are simply free neutrons, ejected from a nucleus. Neutrons are characterized by their energy (e.g., thermal neutrons, fast neutrons). Neutron radiation can activate or change the nature of matter when they are absorbed. In some cases the material that absorbs a neutron may become radioactive. Neutrons primarily react with material by transferring energy (typically resulting in the release of electrons and x-rays) by collision with matter. Like alpha particles they may deposit significant amounts of localized energy but unlike alpha particles they easily penetrate the body. Neutron emission is normally associated with the fission (e.g., plutonium, uranium) process although they can be generated in accelerators and certain types of nuclear interactions (e.g., the plutonium beryllium source within an alpha particle interacts with the beryllium nucleus to generate neutrons). Radiological protection and controls associated with neutrons are not addressed further in this discussion since situations where they would be generated are very specialized and such projects must be under the direct supervision of a Health Physicist. Specialized training would be provided to the personnel involved.

E.3 UNITS RELATED TO RADIATION

When addressing radiation specific units are used. These units address the quantity of radiation emitting material (i.e., radioactivity) and the dose or dose rate to an individual from a flux of radiation entering the body. These units are summarized in table E-1. Note, the common and the equivalent standard international (SI) units are both given. (If SI units are listed outside of this table they will be given in parenthesis after the units commonly used in the U.S.)

The units of radiation are commonly used in conjunction with prefixes to indicate the power of ten to which these number should be multiplied. Some common prefixes used with radiological units are summarized in table E-2:

Table E-1
Radiological Units

Value	Common Unit	Equivalent SI Unit	Basic Unit	Description
Radioactivity	Curie (Ci)	3.7×10^{10} Becquerels (Bq)	3.7×10^{10} Disintegrations/sec	The amount of a material that emits 3.7×10^{10} Disintegrations /sec
Dose	rad	0.01 Gray (Gy)	100 ergs/gram of tissue	The radiation flux that deposits 100 ergs of energy in one gram of tissue
Dose Equivalent	rem	0.01 Sievert (Sv)	Dose that does the damage in tissue equivalent to one rad of gamma radiation	Measure of potential damage done to tissue
Body Burden	Annual Limit of Intake (ALI)	ALI	µCi ($\times 3.7 \times 10^4$ Bq)	The amount of radioactivity in the body to produce the annual dose limit specified in **Table E-4**
Allowed Airborne Concentrations	Derived Air Concentration (DAC)	DAC	µCi/ml ($\times 1.3 \times 10^{14}$ Bq/m^3)	The radioactivity concentration in the air that will result in inhalation of one ALI by Standard Man (see ICRP 23)

Table E-2
Common Radiological Units Prefixes

Prefix	Multiplier	Example
m (milli)	X 10-3	mrem or mrad
µ (micro)	X 10-6	µCi, µrad/hr
n (nano)	X 10-9	nCi
p (pico)	X 10-12	pCi

Radiation dose is measured in rads (grays); however, the biological impact of this dose is dependent on the type of radiation. The unit rem (seivert) corrects dose in rads to reflect the biological detriment of the radiation. The relationship between rad and rem is: Dose Equivalent (rem) = W_R * Absorbed Dose (rad) where the value of W_R is shown in table E-3 (see ICRP, 1978 and ICRP, 1987). For purposes of radiation protection roentgen (R) is assumed to be essentially equivalent to rad for gamma and x-rays.

Table E-3
Radiation Weighting Factors

R	Type
1	Gamma and X-ray
1	Beta
20	Alpha
10[a]	Neutrons of Unknown Energy
10[a]	High-energy Neutrons
2[a]	Thermal Neutrons

[a] If the specific energy distribution is known see 10 CFR 20.1004 or 10 CFR 835.2.

E.4 EFFECTS OF RADIATION

The effects of radiation are largely based on the ionization that occurs when the energy of the radiation is absorbed in matter. The different types of radiation show different degrees of absorption which is biologically significant. Alpha particles are heavy, slow moving, and expend their energy over a short distance. Alpha particles therefore show a high linear energy transfer (i.e., a large number of ionization per unit length). Gamma rays have a low specific ionization (i.e., ionization is spread out over a long path required for complete adsorption). Beta particles are intermediate.

Only a fraction of the gamma ray's initial energy will dissipate as it passes through the body. The energy dissipated is the absorbed dose delivered to the body or portion of the body.

Beta emitters may be external or internal hazards. Many beta emitters will penetrate the outer tissue. There is a risk of skin malignancies (carcinogenesis) associated with the external exposure to beta radiation. Exposure to beta particles at levels well above the allowed limit may result in damage to the lens of the eye (e.g., cataracts). The external effects of extremely high doses (i.e., well beyond the doses likely to occur in common Parsons I&T activities) have been radiation burns. Internally, beta particles are also a hazard. Alpha particles, as mentioned earlier, are not an external concern but they are a considerable internal hazard.

Beta or alpha particles that enter the body tend to localize in different organs. For example, strontium and calcium typically deposits in the bones, iron in the red blood cells, and iodine in the thyroid. It is important to recognize that the deposition pattern for a radionuclide is dependent on various other factors such as the pathway of entry, chemical form, and particle size. This means that the radioactive dose is concentrating its effects on a relatively small area. It should also be understood that certain organs of the body are more radiosensitive than others. The lining of the bronchi is the primary site of many lung cancers attributed to inhaling radioactive material. The more rapidly the cells are reproducing the higher the probability of radiation damage to the cell that significantly affects cell behavior (i.e., cell death, mutation, carcinogenesis). In general, a cell in the process of division (mitosis) is highly radiosensitive. Therefore, a person is more sensitive to radiation during the growing years than as an adult. The most radiosensitive period for human is in the fetal stage, particularly the first few weeks of life.

The radiation dose parameter *total effective dose equivalent (TEDE)* (ICRP, 1978 and ICRP, 1987) is the sum of the internal and external doses. The TEDE contains weighting factors (see table E.3) for internal organ doses to reflect the impact of the radiation on the organ and the impact of any damage to the organ of reference man (ICRP, 1975). The TEDE also calculates the doses that will be received by the body for the next 50 years from the radionuclides remaining in the body (i.e., material not removed by the natural exchange of chemicals in the body) and includes this in the value for the TEDE for the year of intake. Thus the TEDE is a measure of the effective (current and future) detriment to the body of radiation received and any intake of radioactive material. The TEDE is specified in the units of sieverts and is assumed to be proportional to risk.

E.4.1 Chronic and Low Dose Exposures

The primary effects of radiation at levels likely to be encountered by Parsons I&T personnel are:

1. The potential of an increase in the probability of the occurrence of certain types of cancers. The National Academy of Sciences estimates that the risk from radiation is less than 0.0000008 (i.e., 2 to 8 X 10^{-7} cancers/mrem) (see BEIR, 1988; BEIR, 1990; United Nations Scientific Committee on the Effects of Atomic Radiation, 1988). This presumes that there are twice as many cancers as cancer fatalities (National Cancer Institute, 1989).

2. The potential for an increase in the genetic mutation rate. The National Academy of Sciences estimates that the increase in the rate of significant genetic disease in the first generation is less than 0.00000004 for males and 0.00000002 for females (i.e., 4 to 2 X 10^{-8} mutations/mrem) (see BEIR, 1988, United Nations Scientific Committee on the Effects of Atomic Radiation, 1988).

In addition to the effects discussed above serious effects occur at dose orders of magnitude above the legal limit. Currently such doses do not appear feasible, even in accident conditions, for activities conducted by Parsons I&T. Such doses would normally be associated with large radiotherapy sources, large X-ray or accelerator devices, DOE facilities handling high level waste, large industrial *X-ray* sources, reactors, or unplanned criticalities (i.e., situations where the neutron production rate exceeds the neutron absorption and loss rate) in a weapons or reactor facility. Doses are typically expressed in rem or mrem (0.001 rem) when addressing impacts.

Dose-equivalent limits for controlling occupational exposure to ionizing radiation have been established by the Nuclear Regulatory Commission (NRC) in 10 CFR part 20 and the Department of Energy (DOE) in 10 CFR part 835 (and eventually in 10 CFR part 834 when issued). OSHA adopted the NRC standards in 29 CFR Part 1910.96.

Both DOE and NRC emphasize that dose-equivalent (ICRP, 1978) in their radiation limits. These limits are upper bounds and every effort must be made to keep exposures below these limits and avoid unnecessary radiation exposure. This principle is strongly emphasized (i.e., mandated) in federal regulations as the As Low As is Reasonably Achievable (ALARA) philosophy.

Exposure standards fall into several categories: occupational exposures, occasional exposures, prenatal exposures, emergency exposures, and nonoccupational exposures. These standards and Parsons I&T control and actions level are summarized in table E-4. The limits specified for radiation worker are only applicable if the minimum training and qualification requirements established in DOE or NRC regulations, orders, notices, and guidance are met by the worker. Hazardous waste site workers or training programs established by Parsons I&T or other organizations that do not meet these criteria do **not** qualify a worker as a radiation worker. Thus, hazardous waste site workers that have not received the DOE, NRC, or equivalent radiation worker training shall not be exposed to radiation levels above the public exposure limit specified in table E.4.

Occupational radiation exposure standards are presented in table E.4. Occupational exposure to ionizing radiation is that resulting from military or civilian activities that directly support the use of radioactive material or equipment capable of producing ionizing radiation. An occupationally exposed individual is one whose work is performed in a radiation or controlled area who might be exposed to more than 5 percent of the limits given in table E.4.

E.4.2 Acute and High Dose Exposures

This discussion will address acute high dose exposures, since the data in the U.S. and western Europe does not include any significant amount of experience in chronic high dose exposures, except in animal experiments. The experience in eastern Europe indicates that chronic high dose rate exposures produce impacts similar to acute exposure impacts on the blood and immune system. Note, all the chronic effects addressed previously are also associated with acute effects and appear linearly proportional to dose. The fetal impacts are similar to those discussed for chronic exposure except the level of impact is much greater. Table E.5 summarizes the potential effects of an acute whole-body exposure in relation to dose, and table E.6 shows the effect of partial body irradiation in selected organs. Note, these values relate to the impact of exposure with no medical intervention and are highly variable based on the radiosensitivity of the individual receiving the exposures and the presence of non-radiological trauma (i.e., nonradiological trauma typically increases the radiosensitivity of an organism). Whole-body irradiations have more impact than partial body exposures. The acute exposure levels in tables E.5 and E.6 should never be reached based on the projected normal and accident conditions associated with current Parsons I&T activities. If Parson's activities do expand to include situations where such exposures could occur this activity and its implications will be discussed in detail in the applicable site/project health and safety plan.

Table E-4
Dose Limits

Organ	Dose Limits [1]		Parsons I&T Administrative Controls [1] where the applicable regulatory authority is:	
	NRC	DOE	NRC	DOE
Radiation Worker				
Whole Body	5 rem/yr –TEDE	5 rem/yr –TEDE	2.5 rem/yr–TEDE	2.5 rem/yr–TEDE
Organ or Tissue (except lens of the eye)	50 rem/yr–DDE+CEDE	50 rem/yr–DDE+CEDE	25 rem/yr–DDE+CEDE	25 rem/yr–DDE+CEDE
Lens of the Eye	15 rem/yr--Annual	15 rem/yr--Annual	7.5 rem/yr--Annual	7.5 rem/yr--Annual
Skin and Extremities	50 rem/yr—SDE	50 rem/yr—SDE	25 rem/yr—SDE	25 rem/yr—SDE

Organ	Dose Limits [1]		Parsons I&T Administrative Controls [1] where the applicable regulatory authority is:	
	NRC	DOE	NRC	DOE
Soluble uranium uptake	10 mg/week	NA	NA	NA
Internal Contributions to TEDE must be determined	2000 DAC hours of potential exposure or 10% of the ALI is credible	NA	2000 DAC hours of potential exposure or 10% of the ALI is credible	2000 DAC hours of potential exposure or 10% of the ALI is credible
External Dosimetry Required	Potential Exposures exceed 10% of the limit or work may occur in High Radiation Areas or Very High Radiation Areas	Potential Exposure • >0.1 rem/yr TEDE, • >5 rem/yr SDE, • > 1.5 rem/yr to the lens of the eye, • 5 rem/yr DDE to any organ, • or a declared pregnant worker >10% of the limit, • for minors or member of the public >50% of the limit, • for individual who enter High or Very High Radiation Areas	Potential Exposure • >0.1 rem/yr TEDE, • >2.5 rem/yr SDE, • > 0.75 rem/yr to the lens of the eye, • 2.5 rem/yr DDE to any organ, • or a declared pregnant worker >5% of the limit, • for minors or member of the public >25% of the limit, • for individual who enter High or Very High Radiation Areas	Potential Exposure • >0.1 rem/yr TEDE, • >2.5 rem/yr SDE, • > 0.75 rem/yr to the lens of the eye, • 2.5 rem/yr DDE to any organ, • or a declared pregnant worker >5% of the limit, • for minors or member of the public >25% of the limit, • for individual who enter High or Very High Radiation Areas
Internal Dosimetry Required	Potential Internal Exposures exceed 10% of the limit for adults or 0.05 rem/yr for minors and declared pregnant women	If the air concentration data does not provide the required accuracy.	Potential Internal Exposures exceed 10% of the limit for adults or 0.05 rem/yr for minors and declared pregnant women	If the air concentration data does not provide the required accuracy.
Non-Uniform Exposure of the skin	See NRC guidance.	Assessment, addition to the SDE, and inclusion in records is **not** required if <2% of the dose limit. Need not be added to the SDE if the area of contamination is less than 10 cm^2. Calculate as described in 10 CFR part 835.205.	Assessment, addition to the SDE, and inclusion in records is **not** required if <2% of the dose limit. Need not be added to the SDE if the area of contamination is less than 10 cm^2. Calculate as described in 10 CFR part 835.205.	Assessment, addition to the SDE, and inclusion in records is **not** required if <2% of the dose limit. Need not be added to the SDE if the area of contamination is less than 10 cm^2. Calculate as described in 10 CFR part 835.205.
Planned Special Exposure Limit[3]	25 rem/career-past exposures in excess of the limits--TEDE	25 rem/career-past exposures in excess of the limits--TEDE	25 rem/career-past exposures in excess of the limits--TEDE	25 rem/career-past exposures in excess of the limits--TEDE
Embryo/Fetus				
Whole Body[4]	0.5 rem/gestation period--DDEM+TEDEF+DFFRM	0.5 rem/gestation	0.25 rem/gestation	0.25 rem/gestation
Non-Radiation Workers At Regulated Facilities or Areas				

Organ	Dose Limits [1]		Parsons I&T Administrative Controls [1] where the applicable regulatory authority is:	
	NRC	DOE	NRC	DOE
Whole Body	See Public Exposure	0.1 rem/yr TEDE	0.05 rem/yr TEDE	0.05 rem/yr TEDE
Public Exposure				
Whole Body[2]	0.1 rem/yr TEDE	0.1 rem/yr TEDE	0.1 rem/yr TEDE	0.1 rem/yr TEDE
Whole Body	0.002 rem/hr	NA	0.001 rem/hr	0.001 rem/hr
Whole Body to an individual member of the public[3]	0.5 rem/yr TEDE	NA	NA	NA
Action Level requiring support of a Health Physicist or a formalized Health Physics Program	Specified in the applicable licensing requirements (e.g., 10 CFR part 51 for byproduct material and 10 CFR part 70 for special nuclear material)	If the contract is covered by 10 CFR part 835 or if specified in the contract.	Specified in the applicable licensing requirements (e.g., 10 CFR part 51 for byproduct material and 10 CFR part 70 for special nuclear material)	If the contract is covered by 10 CFR part 835 or if specified in the contract.
Action Level requiring Health Physics Support Under 29 CFR part 1910.120 (e.g., Occupational Safety and Health Guidance manual for Hazardous Waste Site Activities)	At hazardous waste sites: • >2 mrem/hr above background obtain health physicist's assessment before continuing.	At hazardous waste sites: • >2 mrem/hr above background obtain health physicist's assessment before continuing.	At hazardous waste sites: • >1 mrem/hr above background obtain health physicist's assessment before continuing.	At hazardous waste sites: • >1 mrem/hr above background obtain health physicist's assessment before continuing.
Action Level for NORM contamination only	Established by the applicable state. If at a licensed facility may be controlled consistent with the applicable facility license.	Not addressed as separate issue.	Further action required if the dose rate from the item exceed 50 µrad/hr (i.e., consult a health physicist for further actions).	Further action required if the dose rate from the item exceed 50 µrad/hr (i.e., consult a health physicist for further actions).

Notes:
1 TEDE is Total Effective Dose Equivalent. DDE is deep dose equivalent. CEDE is committed dose equivalent. SDE is shallow dose equivalent. DDEM is deep dose equivalent of the mother. TEDEF is TEDE of the embryo/fetus. DFFRM is TEDE to the embryo/fetus from the radionuclides in the mother.
2 Does not include dose from radioactive waste disposal in the sanitary sewer.
3 Requires justification of need and authorization from the regulatory authority.
4 Applicable to declared pregnant workers only.

E.4.3 Contamination

Contamination is not a type of radiation but an understanding of this term is essential in addressing radiological protection. Unless neutrons are present, exposure to radiation does not make personnel, the environment, or equipment radioactive. However, the source of radiation can be attached to personnel or equipment or be released to the environment. In other words they would be contaminated. Contamination is radioactive material in a location where it is not wanted. Radioactive contamination on personnel, equipment, or the environment it may be present as:

- particles (e.g., dust),
- chemical reacted so it is an integral part of the original material, or
- simple material (e.g., gas or liquid) adhering to the surface of personnel, equipment, or portions of the environment.

Table E-5
Dose Effect Relationship for Acute Whole Body Exposure

Acute Dose (DDE) (rad)	Syndrome	Effects
0-5	None	No detectable chemical effects
5-25	None	Detectable levels of chromosome aberration in the blood. No other detectable short-term affects.
25-100	Hematopoietic	Transient reduction in lymphocytes; delayed effects possible.
100-200	Hematopoietic	Nausea and fatigue; reduction in lymphocytes and neutrophils with delayed recovery; delayed effects may shorten life expectancy in 1 percent of cases.
200-300	Hematopoietic	Nausea and vomiting on first day; latent malaise, sore throat, diarrhea, and emaciation; recovery in about 3 months
300-800	Hematopoietic	Nausea, vomiting, diarrhea first hours; latent period as long as a week followed by loss of appetite, malaise, epilation, hemorrhage, inflammation of mouth and throat, and emaciation; some death in 2 to 6 weeks. Possible eventual death to 50 percent of individuals.
500-2000	Gastrointestinal	Loss of appetite, lethargic, depressed, nausea vomiting, diarrhea, dehydration, and hemoconcentration.. Normal flood and fluid intake depressed and absorption through the GI tract reduced. Abdomen distended and peristalsis is absent, typically above 1000 rads results in death within about 1 week.
2000-100,000	Central Nervous System	All gastrointestinal syndrome affects. Disorientation, loss of coordination of muscular movement, respiratory distress, convulsive seizures, coma, and death within 24 hours to a week.
>100,000	Molecular Death	Death during or shortly after irradiation.

Based on:
- Basic Radiation Protection Criteria, National Council on Radiation Protection and Measurement, NCRP 39.
- Radiation Safety at Superfund Sites, U.S.E.P.A., Office of Emergency and Remedial Response, 1983.
- Shleien, Bernard, 1992. The Health Physics and Radiological Health Handbook, Scinta, Inc.
- Casarett, Alison , 1968. Radiation Biology.

Table E-6
Dose Effects Relationship for Acute Partial Body Irradiation

Acute Dose (rem)	Organ	Effect in Relevant Organs
50	Testis	Temporary sterility
200	Bone Marrow	Hematopoiesis
200	Ovary	Sterility, Temporary amenorrhea
500	Skin	Temporary reddening and loss of hair
800	Testis	Permanent sterility
2,000	Liver	Hepatitis
2,500	Skin	Temporary ulceration and permanent loss of hair
2,200	Lung	Pneumonitis, fibrosis
Based on: • Basic Radiation Protection Criteria, National Council on Radiation Protection and Measurement, NCRP 39. • Radiation Safety at Superfund Sites, U.S.E.P.A., Office of Emergency and Remedial Response, 1983. • Shleien, Bernard, 1992. The Health Physics and Radiological Health Handbook, Scinta, Inc. • Casarett, Alison, 1968. Radiation Biology.		

Regulatory agencies have established contamination limits for the uncontrolled release (i.e., public access) of items, persons, and areas. The release limits are based on assurance of compliance with:

- The applicable dose limits discussed previously
- Implementation of ALARA
- The Clean Air Act
- The Clean Water Act
- Other applicable regulations and guidance

These contamination limits are summarized in table E.7. Fixed (versus removable) contamination refers to activity that can**not** be removed by swiping the surface with absorbent cloth or paper (as will be discussed later) is does not mean material that cannot be removed by other means. If personnel exceed these limits efforts shall be made to decontaminate them, if these efforts are unsuccessful the individual's contaminated area should be contained (e.g., covered with a bandage) and then the individual referred to a medical professional for further action. Equipment that cannot be decontaminated to the contamination limits shall be considered potentially radioactive waste or controlled equipment. Public access to the contaminated area or equipment must be precluded.

Table E-7
Contamination (Airborne, Liquid-borne, and Surface) Level Limits[1]

Activity Type	NRC Criteria		DOE Criteria	
	Removable	Total	Removable	Total
Personnel Release Limits				
Beta, Gamma and X-ray Emitters	ANCDLA	ANCDLA	ANCDLA	ANCDLA
Alpha Emitters	ANCDLA	ANCDLA	ANCDLA	ANCDLA
Uncontrolled Release of Liquids				
Water release to a Sanitary Sewer	NA	Monthly Average Concentrations from 10 CFR 20 Appendix A Table 3	NA	• 5 Ci/yr alpha emitters; • 1 Ci/yr C-14; • 1 Ci/yr all other radionuclides[2]
Liquid Effluent	NA	Monthly Average Concentrations from 10 CFR 20 Appendix A Table 1	NA	Annual Average Concentrations from 10 CFR 834 Appendix A Table 1a
Drinking Water Aquifer	NA	• 4 mrem/yr; • Ra-226 plus Ra-228 <5 pCi/L; • Gross alpha 15 pCi/L; • tritium 20,000 pCi/L; • Sr-90 8 pCi/L	NA	• 4 mrem/yr; • Ra-226 plus Ra-228 <5 pCi/L; • Gross alpha 15 pCi/L (excluding Ra and U); • tritium 20,000 pCi/L; • Sr-90 8 pCi/L
Effluent	NA	Applicable NPDES Permit Requirements	NA	Applicable NPDES Permit Requirements
Settable Solids	NA			• 5 pCi/g alpha emitters; • 50 pCi/g beta/gamma emitters[3]
Dose to Aquatic Animals	NA	NA	NA	1 rad/day[3]
Airborne Effluent				
Airborne Concentration	NA	Monthly Average Concentrations from 10 CFR 20 Appendix A Table 1	NA	Annual Average Concentrations from 10 CFR 834 Appendix A Table 1a
Clean Air Act Airborne Pathway Limit[2]	NA	10 mrem/yr (with no more than 3 mrem/yr from iodine)--EDE	NA	10 mrem/yr (with no more than 3 mrem/yr from iodine)--EDE
Radon Release Rate where Ra-226 exists for storage or disposal	NA	NA	NA	20 pCi/m^2/sec

Activity Type	NRC Criteria		DOE Criteria	
	Removable	Total	Removable	Total
Clean Air Act Airborne Pathway Limit[2]	NA	10 mrem/yr (with no more than 3 mrem/yr from iodine)--EDE	NA	10 mrem/yr (with no more than 3 mrem/yr from iodine)--EDE
Radon Release Rate where Ra-226 exists for storage or disposal	NA	NA	NA	20 pCi/m^2/sec
Soil Contamination				
Radon Release	NA	NA	NA	3 pCi/L at a facility and an increase of <0.5 pCi/l above Background
Soil Contamination Ra-226 and Ra-2283	NA	ANCDLA and RUD	NA	• RUD in conjunction with NRC and EPA • 5 pCi/g in the top 15 cm of soil; • 15 pCi/g below 15 cm; • annual average ambient radon <0.02 WL above background in structures; • radon <0.03 WL including background in structures
General[3]	NA	ANCDLA	NA	ALARA and risk management based.
Contamination Values for Release of Items				
Natural Uranium, U-235, U-238, and associated decay products	ANCDLA	ANCDLA	1000 α (dpm/100 cm2)	5000 α (dpm/100 cm2)
Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-129, and Transuranics	ANCDLA	ANCDLA	20 α (dpm/100 cm2)	500 α (dpm/100 cm2)
Natural Thorium, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-125, I-126, I-131, I-133	ANCDLA	ANCDLA	200 α or β (dpm/100 cm2)	1,000 α or β (dpm/100 cm2)
Beta/Gamma/X-ray emitters not otherwise addressed	ANCDLA	ANCDLA	1,000 β or γ (dpm/100 cm2)	5,000 β or γ (dpm/100 cm2)

Activity Type	NRC Criteria		DOE Criteria	
	Removable	Total	Removable	Total
Tritium organic compounds, surfaces contaminated by HT, HTO, and metal tritide aerosols	ANCDLA	ANCDLA	10,000 (dpm/100 cm2)	10,000 (dpm/100 cm2)

Notes:

[1] ANCDL means as needed to ensure compliance with dose limits and ALARA.
NA not applicable.
RUD means Regulations under development.

[2] Does not include Rn-222 and progeny.
[3] These values are based on the draft of 10 CFR 834 and DOE Order 5400.5.

When contamination is found on the skin or protective clothing the dose associated with this contamination must be estimated and included in the individuals exposure records if it exceeds the limits specified in table E.4. To allow assessment of skin dose the following information is needed:

• The type of radiation and the energy of the radiation. Note, alpha contamination would not typically cause a recordable skin dose. If this information is not known keep the decontamination materials, which can be analyzed later to determine this information, if needed.

• The amount of activity present (in units of dpm, Ci, or Bq if feasible; other cpm) and the area contaminated.

• The identification (i.e., type, model, and serial number) of the instrument used in determining the activity present and the calibration data for the instrument.

• If the contamination is not directly on the skin the material and the thickness of the material between the contamination and the skin (including air gaps). In characterizing materials density is important.

• The time the contamination may have been present on the skin.

• The activity remaining on the skin after decontamination.

This data can be used by a professional health physicist to estimate dose. Failure to determine dose can be as important as failure to use dosimeters. The calculation method used by Parsons I&T will be consistent with the assumptions addressed in 10 CFR part 835.205.

E.5 RADIATION MEASUREMENT

The measurement of radiation for the purpose of protection requires both the proper instruments and the proper techniques of using them.

E.5.1 Radiation Instrumentation

There are two major types of instruments for measuring radiation. These are the field survey instruments used for analysis at the site and the laboratory instruments which require the collection of a sample that is transported to the laboratory for analysis. The focus of this section will be with the selection of field instruments for surveys. Field instruments can be segregated into two categories: Portable survey instruments and field measurement instruments. Field measurement instruments are usually very expensive and will be addressed briefly. Portable survey instruments are the instruments normally used by Parsons I&T personnel. There are also devices that can be placed in the field and evaluate later in the laboratory to assess the radiation fields [e.g., environmental TLDs (beta, gamma, and X-ray), EPERMS (radon concentrations)].

Field measurement instruments include equipment like the *in situ* gamma spectroscopy systems which allow for the field identification and possible quantification of radionuclides present in the ambient environment. Continuous air monitors are available which constantly monitor the buildup of radionuclides (i.e., alpha, beta, and gamma emitters) on a collection filter. Continuous radon monitors can assess the radon or associated radon progeny concentration or working level hours. Also available are field portable scalar counting systems for alpha and beta activity collected on smears or air filters.

Portable survey instruments (Knoll, 1979) used for detecting radiation should be selected based upon the type, energy, and intensity of the radiation that is anticipated to be encountered. In addition (as discussed in EPA QA/G-4, draft 1994) the data quality objectives (i.e., the required accuracy, sensitivity, and reproducibility of the measurement) should also be considered and appropriate training and proceduralized controls are necessary for use of this equipment.

Most portable survey meters are count rate or exposure rate instruments [i.e., record a pulse rate, with readouts in counts per minute (CPM), mrad/hr, mrem/hr, or milliroentgen per hour (mR/h)]. All survey meters are small, rugged, and lightweight. It must be remembered that some accuracy and precision is sacrificed to provide the lightweight and small size for a portable instrument. For measurements of very low levels of activity or for measurements requiring a high degree of accuracy, laboratory equipment or field measurement equipment should be used; except for the measurement of ambient radiation fields. Survey instruments frequently incorporate a meter display and an aural output, using earphones or a speaker. For surveying areas, equipment, or personnel, the aural output and the meter display should be used, however, the aural circuitry responds more rapidly to radiation than does the meter. Small radioactive sources can be located more readily by sound than by observing the meter movement. Additionally, the aural circuitry typically does not fail if the device becomes saturated and the meter reads zero.

Portable instruments which are used in measuring exposure or exposure rate are generally small, ionization chambers or scintillation counters.

As radiation passes through a gas, it gives energy to orbital electrons causing ionization and excitation of the gas atoms. Gas ionization detectors use the process of ionization to detect the presence of radiation. The most frequently used detectors are ion chambers, proportional counters, and Geiger-Muller counters.

Ionization Chamber - The portable ionization chamber is used to survey beta and gamma radiation. The instrument comes in various forms, the most common being the pistol-shaped, portable rate meter called the "cutie pie" (CP). These instruments are thin-windowed and often have a removable shield over the window end of the chamber. When the shield is removed, the instrument detects both gamma and beta radiation, but when the shield is in place gamma is primarily detected. Ion chambers are often used to measure high energy fields which cannot be measured by a Geiger-Muller (GM) counter (see below). In addition, with proper use and calibration an ionization chamber can be used to measure dose, where as a GM counter can only be used as an indicator of the presence of activity.

Proportional Counter - Proportional counters are gas ionization detectors. The proportional counters used today are either gas flow or sealed. Field measurement portable scalar counting systems for alpha and beta activity typically use this type of detector. In a gas flow proportional counter, gas travels through the counting chamber at a low flow, removing the degraded gas and contaminants. Sealed proportional counters have a finite life because the radiation eventually causes the degradation of the gas until the detector loses its effectiveness. However, the chamber can be emptied and refilled with new counting gas.

Windowless or very thin windowed gas flow proportional counters are used to monitor alpha and beta radiation. Because alpha particles have a higher linear energy transfer than beta particles, the large pulses created by the alpha interaction with the fill gas can be distinguished from the small pulses from beta particles by adjusting the operating voltage of the instrument. This instrument is especially useful when surveying alpha contamination in an area where there is high beta or gamma radiation levels.

Sealed proportional counters are used to measure neutrons. These instruments are often referred to as rem meters and have the advantage of being insensitive to other types of radiation. Small pulses produced by gamma rays are easily discriminated electronically.

Geiger-Mueller (GM) Counter - Perhaps the most frequently used survey meter is the GM counter. This is a gas ionization detector that can be used to monitor alpha, beta, and gamma radiation. The most popular GM survey meters use a "pancake" (i.e., mica window) tube. This detector is a flat round cylinder with a large thin window which is able to detect alpha radiation above 3 MeV and beta particles above 40 keV. Gamma rays are reduced by the coating of tungsten over the surface of the probe except at the window. For measuring X-ray or gamma in very rugged environments a GM survey instrument with a tube encased in a stainless-steel housing that contains a window is often used. The window can be opened to allow both beta and gamma radiation to enter or can be closed to admit only gamma. This allows the operator to determine the range of the beta contribution of a radioactive field.

GM counters are inexpensive, easy to operate, sensitive, and reliable, however, they have limitations. GM counters are much more efficient in detecting the directly ionizing beta particles than the indirectly ionizing gamma rays. The signals from a GM counter are all constant size, independent of the kinds of particles detected or their energies. Thus a GM tube is purely a radiation-event counter and its output signal will not provide information on the radiation that triggers it as would a ionization chamber or proportional counter. Therefore, a GM counter can only be used to locate radioactive material and as a means for comparing radiation levels to background. The use of a GM counter in a high radiation field requires caution because the counter becomes saturated. The radiation enters the detector tube at such a rate that it is in a state of perpetual discharge, and the count rate circuit fails to function properly. The result is a meter that responds for an instant but falls back to zero. A person entering a high radiation area will not realize it due to the instrument's failure. **It is always essential to assume that the instrument you are using may saturate in high fields (i.e., provide a false zero indication). The instrument must be in operation prior to entering radioactive area so that the operator will be able detect the high field prior to instrument saturation.**

Scintillation Detector - Certain materials fluoresce when struck by radiation. These materials are referred to as phosphors or scintillators. Scintillation detectors were among the earliest detectors used to measure ionizing radiation and continue to be widely used today. Portable scintillation meters are simply rate meters or counters that respond to a specific type of radiation. The selection of the type of radiation response depends on the choice of salt crystal in the probe. (Sodium iodide crystals are used to detect gamma and X radiation. Zinc sulfide crystals measure heavy charged particles, such as alpha.)

The output current from scintillation dose-rate instruments is hundreds of times greater than that from ionization chambers of the same volume, these instruments are not used widely for radiation monitoring. Alpha contamination is typically detected using a scintillation counter (i.e., zinc sulfide scintillator). When measuring ambient radiation near ambient background a microR survey meters, which uses a NaI crystal scintillator is often used. Note, these microR (μR) meter are actually measuring dose typically in μrad/hr rather than the μR/hr specified by its name. Historically, the μR meter used a different detection method.

E.5.2 Radiation Surveys

Parsons I&T personnel must perform radiation surveys whenever they work at a site where radiation sources are used or where their previous use or storage is suspected. Surveying is a method used to monitor radiation exposure to personnel in real time. This information is used to maintain exposure levels within applicable dose-equivalent limits.

Preparation for a survey should begin with the gathering of information concerning the radiation sources that were used or stored in the past or are currently used. This information may be obtained by interviewing personnel or by examining records and written procedures. Examples of information that should be incorporated into the Project Health and Safety Plan include the following:

- Chemical composition and physical form of radioactive material
- Expected type(s) of radiation (e.g., alpha, beta, gamma)
- Potential for release or dispersion of radioactive materials during site operations
- Location of radiation areas (if available)
- Previous survey records (if any)
- Types and numbers of sources (e.g., sealed sources, unsealed sources, etc.)
- Types and energies of radiation produced by source
- Natural background levels.

After evaluating what type of radiation can be expected, the surveyor must select what radiation detection and measurement equipment is best suited for the task.

Area surveys are carried out with a survey instrument sensitive to the radiation present.

General area surveys for beta and gamma are performed best by holding the probe away from the body at about 0.5 to 1 inch above the surface and tracing a systematic path through the area, noting any rise in radiation level marking these locations with spray paint or chalk. Locations must be diagrammed in the logbook. Survey for ambient dose gamma rates (e.g., μrad/hr, mrad/hr) follow the same survey techniques except that the instrument is typically held about waist high (i.e., ≈ 1 m above the surface).

Surface contamination from alpha or weak beta emitters is performed by slowly moving a suitable detector over a systematic path covering the ground, floor, or working surface. The detector probe should be held within 6 mm of the surface. It is useful to have an audio signal, such as from earphones or loudspeaker, since small increases in radiation above background are detected easily by listening to the increase in clicks. It is also easier to pay attention to the surface being monitored if the meter does not require constant viewing. Areas potentially contaminated by alpha emitters or indicating contamination well above background may be checked by a wipe test. In addition, wipe tests are required for compliance with specific regulatory requirements such as uncontrolled release of items or for shipping containers. A piece of filter paper is wiped over an area of approximately 100 cm^2 and then counted with a 50-mm diameter "pancake" probe for alpha and weak beta. A shielded-end window GM detector may be used for counting gamma and high energy beta. Counting may also be performed by inserting the filter paper into a liquid scintillation vial. The vial is sent to the laboratory and counted on a liquid scintillation counter. (Note, the filter paper would typically be dissolved and then place in a scintillation cocktail at a laboratory for liquid scintillation counting.) These instruments have a much greater sensitivity than field survey instruments and are used to identify the particular radionuclide in the sample.

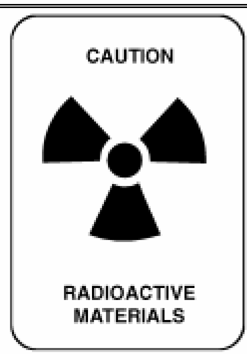
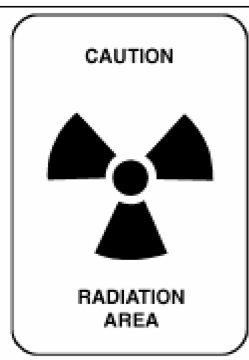
The Project Health and Safety Plan should establish permissible radiation levels based upon the anticipated dose received above that attributed to the radiation that is normally present. If the projected dose rate is anticipated to exceed 1 mrem/hr above background, a Health Physicist should be consulted. Background radiation levels are variable and must be considered when surveying. It is best to measure background radiation at a location away from the work area. Readings on survey instruments ranging from 0.01 to 0.02 mR/h are common. Slightly higher readings may occur in geographical areas where large deposits of naturally occurring radioactive elements are found. A doubling of the background counting rate might be considered a positive indication of contamination. The permissible radiation ceiling for most Parsons I&T projects is set at 1 mrem/h unless a Health Physicist has established a task specific ceiling limit. Above the ceiling limit, work is stopped and a Health Physicist or the Corporate Health and Safety Manager is contacted. For work to continue control methods must be used to reduce exposure to acceptable limits. A controlled area must be established if work is to be performed in any area where the dose is 5 mrem/h or not in excess of 100 mrem/wk. Controlled areas must be conspicuously marked with the postings illustrated in figure E-1. These signs bear the purple or magenta radiation symbol on a yellow background. Note, international requirements may vary from those specified in this appendix. Access to these areas will be controlled for people and equipment by utilizing warning signs and barricades designed to prevent inadvertent exposure to contaminated materials.

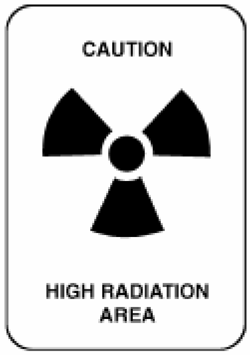
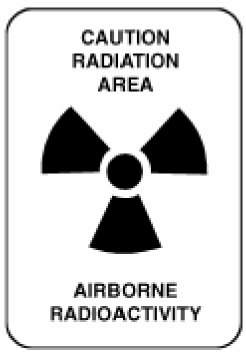
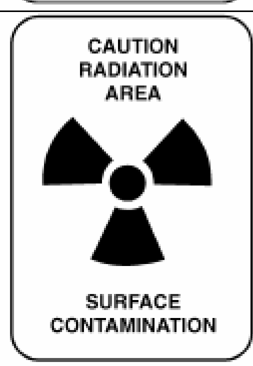
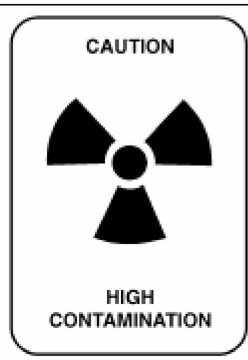
The performance and accuracy of radiation detection and measurement instruments depend upon their proper calibration and reliability checks made during use. Portable survey meters should be sent in for calibration biannually to the instrument's manufacturer or a vendor offering commercial calibration service. Vendors offering calibration services should follow American National Standards Institute methodology (ANSI Publication N323) and ensure that calibration sources are National Bureau of Standard certified. In the field, the survey instrument response should be verified by placing the probe next to a "check" source and noting a change in meter deflection. Checks should be performed daily. Records of instrument calibration and the performance and accuracy checks must be maintained in accordance with section 7 of this manual.

E.5.3 Personnel Monitoring

OSHA requires employers to monitor each employee who works in an area where they are likely to receive a dose in any calendar quarter in excess of 25 percent of the applicable standard shown in 29 CFR part 1910.26 table G-18. The NRC and DOE requirements are specified in table E.4. A dosimeter measures the dose accumulated over an extended period. Personnel monitoring equipment includes: thermoluminescent dosimeters (TLDs), pocket chambers, integrating electronic dosimeters, survey instruments with integration functions, and film badges. The personnel record dosimeter must be supplied and processed by an organization which is qualified under DOE's DOELAP or NRC's NVLAP accreditation program. The accreditation of the program must be consistent with the projected radiation fields that will be encounter at the work site. This justification (i.e., the technical basis) must be addressed if the health and safety plan for any site requiring the use of personnel dosimetry.

Figure E.1 Postings

Posting	Criteria
	**Radioactive Materials Area** Areas where radioactive material is present or stored, but is not otherwise posted. This can also be put on a container rather than an area. Typically when placed on a container the activity in the container is indicated.
	**Radiation Area** Dose Rates at least 5 mrem/hr and less than 100 mrem/hr at 30 cm from the source of the radiation or the surface it penetrates.

<table>
<tr><th>Posting</th><th>Criteria</th></tr>
<tr><td>
</td><td>High Radiation Area
Dose Rate at least 100 mrem/hr at 30 cm from the source of the radiation or the surface it penetrates and less than 500 rad/hr at 1 m from the source of the radiation or the surface it penetrates.
A Very High Radiation Area posting also exists but is not typically required for Parsons activities.</td></tr>
<tr><td>
</td><td>Airborne Radioactivity Areas
Airborne concentration likely to exceed more than 10% of a DAC.</td></tr>
<tr><td>
</td><td>Contamination Area
Contamination levels exceeds the surface contamination limits specified in Table E.7 but is less than 100 times the surface contamination limits.</td></tr>
<tr><td>
</td><td>High Contamination Area
Contamination levels exceeds 100 times the surface contamination limits specified in Table E.7.</td></tr>
<tr><td colspan="2">Note, if the site has an existing posting system it is probably more appropriate to use the existing postings to avoid confusion.</td></tr>
</table>

Thermoluminescent Dosimeter - The "TLD" detectors are suited to general personnel and environmental monitoring of beta, neutron, X-ray, and gamma radiation. (Note, environmental dosimeter must comply with the applicable ANSI or ANS standards and regulatory guidance.)

The principal of operation is that energy absorbed from radiation raises the molecules of the detector material to excited states. They remain in these excited states until they are heated to a temperature that will cause the material to return to its normal state with the emission of light. The amount of light emitted is proportional to the amount of energy absorbed. TLDs have a wide dose-response range and a very low energy dependence. Other advantages of a TLD are that it is small, rugged, and unaffected by environmental variables (unlike film badges). TLDs are very accurate. TLDs are typically used to record external dosimetry.

Since personnel dosimeters record only the dose they have received, it is important that personnel be trained in their proper use.

Pocket Ionizing Chamber - The direct reading pocket ionization chamber consists of a small capacitor charged prior to use and connected to a glass fiber electroscope. These dosimeter provide continuous data but are typically only useful for X-rays and gamma rays with energy greater than 60 keV. Exposure to ionizing radiation results in a loss of charge proportional to the amount of exposure and a corresponding deflection of the fiber. The deflection is viewed directly by mean of a lens and scale built into the instrument. This instrument is particularly useful for keeping a running account of radiation exposure during work in high dose-rate areas. Although pocket ionization chambers are convenient to use they must be handled carefully. Rough handling, shock, or impact to the dosimeter can give erroneous results. Exposure to moisture causes leakage across the insulator resulting in a deflection of the fiber and spurious readings.

Electronic Integrating Dosimeters - The electronic integrating dosimeter, like the pocket ionizing chamber, provides continuous information on radiation dose. In addition, these dosimeters typically provide an audible indication of dose rate and alarm at established doses/dose rates. These devices are typically less likely to give erroneous results. The behavior and response is similar to that of a pocket ionizing chamber.

Survey Instruments with Integration Functions - This is essential a survey instrument with the sensitivity and response of the survey instrument; however it also provides the capability to measure integrated dose like an electronic dosimeter and may have programmable alarm features.

Film Badge - Photographic film is measurably darkened by radiation and can provide an estimation of personnel exposure. The film response depends upon the type, energy, and amount of radiation. The film is incorporated into a film cassette or badge. The badge is designed so radiation can reach the film either through an open window, or through filters. Thin filters of low atomic weight, such as aluminum, are used to distinguish between gamma rays and high energy beta radiation. Most film wrappers will stop radiation with an energy less than 140 keV. Therefore, film badges are not to be used for monitoring exposures to low energy emitters such as tritium or carbon-14. Limitations to the use of these dosimeters are that the film degrades with age and the photographic image fades with humidity or high temperatures. This dosimeter is not typically used outside of medical health physics or university settings.

E.5.4 Personnel Dosimetry Program

As stated earlier, the Nuclear Regulatory Commission, Department of Energy, and OSHA require employers to provide appropriate personnel monitoring equipment to employees who work in a restricted area and will receive or are likely to receive a dose in any calendar quarter in excess of established values. It is Parsons I&T policy to place individuals on a monitoring program whenever there is the likelihood for exposures to exceed 100 mrem/yr or 10 percent of the dose limit (whichever is a more conservative value). Additionally, a personal dosimetry program may be instituted at the discretion of the Project Health and Safety Officer. The monitoring program is developed by the Project Health and Safety Officer with exposure records being forwarded to the Facility Health and Safety Representative and medical oversight contractor for archiving. Personnel monitoring equipment may include use of any of the devices discussed above.

The primary dosimeter used by Parsons I&T for monitoring whole-body external radiation dose should be a thermoluminescent dosimeter or film badge. In high radiation fields, a direct reading dosimeter such as a pocket ionization chamber or electronic dosimeter should be used to supplement the TLD or film badge. This allows the individual to track their exposure when in the field. Direct-reading dosimeters should be used when an individual is likely to receive 5 mrem in 1 hour and must be used in high radiation areas where the dose rate may exceed 100 mrem/h. In high dose rate areas electronic dosimeters are preferred as they provide an audible indication of dose and alarm at an established integrated dose.

The procedures outlined below are an example of a personnel exposure monitoring program that will provide documentation of individual radiation exposure:

1. Personnel who anticipate working in an area containing ionizing radiation shall sign a letter requesting previous radiation exposure history (figure E.2). This letter requests that previous employers supply radiation exposure information so that the worker's total ionizing radiation exposure history can be known.

2. Field workers will be issued a dosimeter by the Project Health and Safety Officer. All personnel shall turn in their dosimeters to the Project Health and Safety Officer at the end of each work day and will receive back the same badge at the beginning of their next shift.

3. Dosimeter badges can be obtained from a vendor (e.g., Landauer, Victoreen, etc.).

4. The dosimeter badges are collected from field personnel and exchanged for new badges at the end of a calendar quarter (or completion of project if field operations are conducted in less than 3 months).

5. When the exchange of dosimeters is complete, the used TLDs or badges shall be shipped by the Project Health and Safety Officer to the vendor or radiation laboratory.

6. When not being worn or shipped back to the vendor or laboratory for reading, dosimeters will be stored in an area of lowest practicable radiation level (usually in a lead container, "pig").

Figure E.2
Letter Requesting Disclosure of
Radiation Exposure History

(date)

(Name of Company)
(Address of Company)
Attention: Dosimetry Department

I request that you release to Parsons Infrastructure & Technology any internal or external radiation exposure history which you may have on file for me during the period I was employed at your facility.

____
(Employee's name, typed or printed)

Social Security Number: ________________________

Periods of Exposure: ____

Please send this information to:
Parsons Infrastructure & Technology
(Address of Employee's Office)
Attn: Facility Health and Safety Representative
Please reply immediately.

Thank you,

(Employee's Signature)

---

7. Upon receipt of dose readings, individual exposure records shall be updated (see figure E.3). If an issued dosimeter is lost or damaged, the Project Health and Safety Officer, in consultation with the Field Team Leader and the employee, shall estimate the dose the individual received during the exposure period. Survey readings, hours worked, and exposure readings from individuals working in the same area will be used to estimate dose.

8. The dosimeter shall be worn on the front of the body between the neck and waist outside the protective clothing when whole body exposure is to be measured.

Figure E.3
Record of Radiation Exposure

Dosimeter Number	Assigned to (Name)	Exposure Period (Dates)	Dose (rem)

Return Form to Facility Health and Safety Representative after Completion of Project

E.6 CONTROL AND REDUCTION OF EXTERNAL RADIATION

External radiation exposure is exposure from a source outside the body. The hazards presented by external radiation and the methods for control are dependent upon the penetrating ability of the radiation and the dose-rate encountered.

The primary methods of reducing external radiation are the use of time, distance, and shielding. These control procedures are most effective when Parsons I&T personnel are performing tasks on or near sources, such as drums of mixed wastes or laboratory packs containing radioactive tracers. Each task involving radioactive material should be carefully evaluated by the Project Health and Safety Officer to determine which control procedures are appropriate. If the projected or actual dose rate for this activity exceeds 2 mrad/hr or 50 mrem/yr (above background) then the associated health and safety plan must have the concurrence of a Health Physicist. If the projected dose rate occurring during the task exceeds 1 rem/hr or the projected exposure from the task (limit to an individual year) exceeds 1 rem the health and safety plan for this task requires the concurrence of a Senior Health Physicist and would typically have a health physics technician onsite when the task is being conducted.

E.6.1 Time

The longer the time spent working in a radiation field, the higher the dose received. A person's working time can be reduced if the work is planned and the individual is proficient in performing the task. For certain tasks, the Project Health and Safety Officer should encourage dry runs or specific training to be performed in nonradioactive areas prior to any work with radioactive materials. Any modifications that could result in a decreased exposure time must be explored. The time spent in a radiation area must be controlled by the use of a timekeeper (this can be the Project Health and Safety Officer). If the dose-rate in a given area is known from instrument readings, then the maximum allowable residence time can then be calculated using the equation below:

$$T = \frac{D}{D_1}$$

T	=	maximum allowable residence time in radiation area
D	=	maximum dose to be received
D_1	=	dose-rate of area

The personnel not directly involved in the task, such as the supervisor and timekeeper, should stand in the support area within sight of the individual(s) in the control area. When the specific time has elapsed, the timekeeper must notify the individual(s) to leave the area immediately.

E.6.2 Distance

Often the time spent near a radiation source or area cannot be reduced. Personnel must then either work farther away from the contamination or place shielding between them and the source. Distance is very effective in reducing radiation incident on the body. The actual relationship follows the inverse square law; that is, for point sources, the intensity varies inversely as the square of distance from the source. The equation for the inverse square law is:

$$D_2 = D_1 \times \frac{(S_1)^2}{(S_2)^2}$$

D_1	=	dose rate at distance 1
D_2	=	dose rate at distance 2
S_1	=	distance 1
S_2	=	distance 2

The inverse square law should be used for small radiation sources (e.g., source where the distance to the source is at least 5 times the largest diameter of source). For large sources, such as a uniformly contaminated tank or drum, a working estimate maybe made by assuming the dose is inversely proportional to the distance. The doses from beta source would be severely overestimated by either of these approaches if the distance from the source is a significant portion of the range of the beta activity. Consult a Health Physicist when estimates of beta doses are needed. The range of the alpha particles typically found on earth outside of accelerator facilities have a range in air on the order of an inch or less and thus do not represent a direct exposure problem.

The Project Health and Safety Officer should carefully evaluate each task to determine what procedures can be used to increase the distance between personnel and the source. Procedures for the reduction of radiation exposure can include remote operations in addition to work distant from the source(s).

E.6.3 Shielding

Shielding is the use of barriers or absorbers placed between an individual and a source to prevent or reduce the radiation from reaching and exposing the individual. Alpha particles are absorbed by a few centimeters of air. Beta particles are stopped by a few millimeters of Plexiglass or aluminum. A gamma shield always allows a fraction of the gamma photon to pass through. The fraction decreases, of course, as the thickness or density of the shielding material increases. It is important to remember with gamma photons a shield that is just thick enough to provide protection for one emitter may not be thick enough for another emitter with significantly higher energy.

The protection offered by a shield must always be evaluated in terms of the source strength. No shield should be trusted until its adequacy has been verified for the source to be shielded. Rarely will Parsons personnel encounter a situation where shielding will be necessary. The determination of shielding material and thickness is a complex operation that should be left to a professional Health Physicist.

E.7 CONTROL OF INTERNAL EXPOSURE

Considerable effort should be expended to prevent radiation exposure resulting from the introduction of radioactive materials into the body through inhalation or ingestion. Because of the internal radiation hazard posed by airborne contamination or the accidental ingestion of surface contamination, every means of preventing the spread of contamination should be exercised. If there is a credible potential for significant internal dose (see table E.4), a baseline (i.e., prior to potential exposure) bioassay or in-vivo count (as appropriate) result should be obtained. After completion of the task, or at termination of employment, a final bioassay or invivo count (as appropriate) should be obtained. The concurrence of a professional Health Physicist is required for the health and safety plans associated with any activity where a significant internal dose may occur. If an internal dose in excess of 50 mrem/yr may occur a Senior Health Physicist's concurrence must be obtained.

The following approaches should be utilized for the control of internal radiation:

- routine surveys for surface contamination
- decontamination of contaminated people or objects
- use of protective clothing and equipment
- administrative guidelines or safe work practices

E.7.1 Surveys for Surface Contamination

Routine surveys for surface contamination should be conducted with a frequency dependent upon the radiotoxicity of the material(s) (if known) and relative ease of spreading or aerosolizing the contamination. Surveys of personnel should be conducted during the course of work in the controlled area and as each person departs to unrestricted areas (e.g., support zone). Surveys shall verify that personnel, equipment, and areas released to the public meet the criteria specified in table E.7. The appropriate survey instrumentation must be identified in the health and safety plan.

E.7.2 Decontamination of People and Equipment

Contaminated personnel and objects must be decontaminated to a safe level prior to removal from the contamination reduction zone (CRZ) or radiation contamination area (see figure E.1). Decontamination procedures for both personnel and objects are described below.

E.7.3 Use of Protective Clothing and Equipment

The purpose of protective apparel is to place a barrier between the radioactive material and the individual. It must be remembered that this barrier has negligible shielding characteristics; its purpose is to prevent contamination of the skin and inhalation of airborne materials.

Protective clothing at a hazardous waste site is selected based upon chemical hazards. Similarly, this protocol should be followed when selecting clothing for mixed waste sites. The only exception is that level D clothing in a radioactive area must always incorporate the use of coveralls, gloves, and boot covers. Clothing materials should not easily puncture or tear.
Protective clothing should be disposable. After decontamination any clothing still contaminated in excess of the release criteria (see table E.7) must be disposed of as radioactive waste or sent to a regulated laundry. Equipment that does not meet the release criteria (see table E.7) after practicable decontamination must either be controlled and handled as radioactive or disposed of as radioactive waste.

Respirators should be selected in accordance with the office's written respiratory program. Note that the maximum use concentration of a respirator in a radioactive environment is determined by multiplying the protection factor of the mask by the value specified for the airborne radioactive material in table 1, column 1 of 10 CFR part 20, appendix B and 10 CFR part 835 appendix A. Thus, the maximum use concentration of the mask should always be greater than the air concentration of the contaminant. As a minimum, full-facepiece air purifying respirators shall be used to protect against airborne radioactive materials.

E.7.4 Safe Work Practices

To maintain a strong safety awareness and enforce safety practices, a list of administrative guidelines or standing orders should be developed and posted at the site [e.g., a radiation work procedure (RWP)]. This will aid in reducing the intake of radioactive materials. A partial listing of standing orders should include the following items:

- Smoking, eating, and drinking shall not be allowed in controlled areas.

- Upon the completion of decontamination, each individual shall survey hands, shoes, and other areas of the body or clothing. Contamination should be removed when found and shall be removed before the individual leaves the CRZ. If significant levels of personnel contamination are found, or if the contamination cannot be readily removed, the Project Health and Safety Officer shall be contacted.

- Frequent radiation surveys shall be performed around controlled areas.

- Radioactive warning labels, tape, signs, etc., shall not be used for purposes other than those for which they are intended.

- Equipment or apparatus that has come in contact with radioactive materials shall not be used for other purposes until it is demonstrated to be free of contamination.

- Work should be planned ahead; whenever possible, a dry run to test the procedure should be done first.

- The buddy system must always be enforced in controlled areas.

- Access to controlled areas must be restricted.

- Ensure appropriate signs are posted in radiation areas.

E.8 DECONTAMINATION

Decontamination has three purposes: (1) to prevent uptake of radioactive material into the body; (2) to limit external radiation exposure; and (3) to prevent the spread of contamination. Decontamination procedures must be established for both personnel and equipment. The specific decontamination method selected for a particular circumstance depends upon the type and extent of contamination.

The CRZ or radiation contamination area should be organized in accordance with the project health and safety plan. The CRZ or radiation contamination area should be posted and barriers established along its perimeter to limit access and prevent the spread of contamination. Personnel working in the CRZ or radiation contamination area must be protected against contamination by the use of protective clothing and equipment. For example, for decontamination operations involving tritium, organic solvents, or other wet substances, impervious clothing should be selected to prevent absorption. Respiratory protection must be used when highly contaminated articles or equipment are being decontaminated. The decontamination process should minimize aerosolizing loose contamination.

E.8.1 Personnel Decontamination

To prevent harmful materials from being transferred into clean areas and exposing unprotected workers, personnel exiting a controlled area will undergo decontamination. Unlike decontamination for hazardous waste operations where washing and rinsing are performed with a sequential doffing of clothing, personnel decontamination at radioactive sites involves only the removal of contaminated clothing. No washing or rinsing should be performed.

The last step in the contamination reduction corridor before the individual enters an unrestricted area is to determine the extent and magnitude of any residual skin contamination using personnel survey techniques. If skin contamination is discovered, removal of the contamination with adhesive tape is generally the best initial approach. This can be followed by harsher methods when necessary, such as mild abrasive soap; complexing solution; and mild organic acids. Table E.8 lists basic methods for personnel decontamination.

Any potential contamination of wounds or injection of radioactive material into the body shall be evaluated by a Senior Health Physicist to determine if medical intervention is appropriate. If the methods of decontamination discussed in this section fails to achieve the required results, or there appears to be the potential for creating an opening in the skin, contain the contamination (e.g., bandage the area) and contact a Senior Health Physicist and a doctor for further assistance.

Table E.8
Personnel Decontamination Methods

Method[a]	Common Agents	Action
Tape	Adhesive tape, masking tape	Removes by adhesion of contamination to tape
Flushing	Water	
Mild soap and water	Bar soap, liquid soap	Emulsifies and dissolves contaminant
Detergent and water	Household laundry detergents	Emulsifies, dissolves, and abrades
Chemical complexing	10% EDTA solution	Chelates (bonds to contaminant)
Oxidizing agents	Household bleach, potassium permanganate, and sodium bisulfite	Dissolves contaminant absorbed in the epidermis

Personnel with open wounds (i.e., breaks in the skin) are not allowed to work in contaminated areas.

If extensive washing is required or harsh methods are used, the chapping or cracking of the skin must be avoided. Chapping or cracking of the skin from repeated washing or abrasion may result in the intake of radioactivity through minor cuts. Lukewarm water should be used for all washing and rinsing. Hot water will cause the pores to open, driving the contamination deeper into the skin.

E.8.2 Equipment Decontamination

As part of your ALARA program, minimize the amount of equipment taken in to a radiation contamination area. Equipment exiting a controlled area must be decontaminated to reduce the spread of contamination and the potential for exposure to personnel. Decontamination should be performed as soon as site activities are completed. Materials that cannot be easily cleaned or cost-effectively decontaminated should be evaluated for limited use in restricted areas. Porous items of low replacement cost such as wood handled tools may have to be disposed of. Expensive instrumentation (i.e., air monitoring equipment) should be wrapped in plastic before transporting into heavily contaminated areas.

Equipment decontamination involves removing radioactivity by cleaning, abrasive, chemical, and electrochemical processes. Cleaning methods are nondestructive, but if the contamination is extensive may require the partial disassembly of equipment for maximum effectiveness. Cleaning includes manual (e.g., wiping, tape patches, vacuuming) and the less frequently used mechanical (e.g., water jet, ultrasonic cleaning, etc.) techniques. Abrasive methods are destructive involving the progressive removal of contaminated material. Examples of abrasive decontamination are sand blasting and grinding. The problem with abrasive decontamination is that it tends to generate airborne contaminants. Chemical methods involve both nondestructive techniques (e.g., use of detergents and complexing agents that remove contaminants through emulsification and ion exchange) and destructive techniques (e.g., the use of caustics and acids which dissolve and corrode contamination). Chemical methods are most effective when nonporous surfaces are to be decontaminated. Electrochemical methods are destructive, electrolytically removing contamination and some of the base material. Electropolishing, for instance, is highly efficient at decontaminating small tools and parts. All materials must be surveyed prior to release into nonrestricted areas.

E.9 TRAINING

The foundation of any safety program is training. Parsons I&T personnel who perform activities at sites where they are likely to encounter radioactive materials must receive a site specific training that incorporates radiation protection. Basic radiation protection training shall cover three major areas: (a) precautions or procedures that will be used to minimize exposure; (b) radioactive measurements, monitoring techniques and instruments to be used; and (c) biological effects of radiation. Site specific training is to be performed by the Project Health and Safety Officer before beginning site operations. This training must be documented. Additionally, personnel working at the site must have documentation of applicable initial and refresher training (e.g., 40-hour hazardous waste operations training, 8-hour hazardous waste operations refresher training, etc.).

This training must be documented. Additionally, personnel working at the site must have documentation of applicable initial and refresher training (e.g., 40-hour hazardous waste operations training, 8-hour hazardous waste operations refresher training, etc.).

If the occupational exposure limits are applied to workers, then these workers must be qualified as radiation workers. Completion of the 40-hour hazardous waste operations training typically does **NOT** qualify an individual as a radiation worker. Criteria for qualification of personnel as radiation workers may be found in DOE and NRC guidance documents. This training and qualification criteria guidance must be fully implemented if the radiation worker exposure limits are applied to control of worker exposures. These limits are based on informed consent. Further individuals designated as health physics technician shall be the substantive requirement criteria guidance for qualification of these technician, at a minimum.

E.10 RECORDS

All records related to the documentation of the implementation of radiological control requirements are considered radiological safety records. This would include:

- Dosimetry results and investigation results;
- Radiation inventory and survey records;
- Health and Safety Plans;
- Training documentation;
- Calibration and accuracy check records; and
- Other supporting documentation necessary to verify Parsons I&T compliance with applicable regulations, orders, standards, guidance, and industry practices to ensure safety of workers and the public and to protect the environment.

These records will be maintained, as appropriate, by the Facility Health and Safety Representative, or a designate records repository (medical oversight contractor) shall maintain these records in a manner consistent with the requirements of this manual.

GLOSSARY

ALARA: An acronym for "as low as reasonably achievable"; refers to an operating philosophy in which occupational exposures are reduced as far below specified limits as is reasonably achievable.

ALPHA PARTICLE: A charged particle that is emitted from the nucleus of an atom and that has a mass and charge equal in magnitude to those of a helium nucleus, i.e., two protons and two neutrons.

ATOM: The smallest unit of an element that is capable of entering into a chemical reaction.

ATOMIC NUMBER: The number of protons in the nucleus of an atom of a nuclide.

BETA PARTICLE: A charged particle emitted from the nucleus of an atom, with a mass and charge equal in magnitude to those of the electron.

CALIBRATION: The determination of a measuring instrument's variation from a standard, to ascertain necessary correction factors.

CALENDAR QUARTER: Any 3-month period as specified in 29 CFR Part 1910.96[b][4].

CHRONIC EXPOSURE: Radiation exposure of long but not necessarily continuous duration.

COMMITTED EFFECTIVE DOSE EQUIVALENT (CEDE): The dose equivalent calculated to be received by a tissue or organ over a 50-year period after the intake of a radionuclide into the body.

COUNT (RADIATION MEASUREMENTS): The external indication of a device to enumerate ionizing events. It may refer to a single detected event or to the total number registered in a given period of time. The term is often used erroneously to designate a disintegration, ionizing event, or voltage pulse.

DECAY, RADIOACTIVE: The disintegration of the nucleus of an unstable nuclide by the spontaneous emission of charged particles and/or photons.

DECONTAMINATION: The reduction or removal of radioactive contamination from any given surface.

DEEP DOSE EQUIVALENT (DDE): The dose equivalent derived from external radiation at a depth of 1 cm of tissue.

DETECTOR, INTEGRATING: A detector that measures a total accumulated radiation quantity (such as exposure or dose) rather than the rate of accumulation of the radiation. Devices that accumulate and hold charges (e.g., electrometers) and that indicate measures proportional to the total dose are of this type. Examples of integrating detectors are electrometers, electronic dosimeter, film badges, pocket dosimeters, and neutron activation detectors.

DETECTOR, SCINTILLATION: A radiation detector whose response is a light signal generated by the incident radiation and a scintillating medium. The light signal is transformed into an electronic signal through an adjacent, optically coupled, photo-sensitive device such as a photomultiplier tube.

DIRECTLY IONIZING RADIATION: Radiation removes electrons from the atoms of the absorbing media directly by charge particle interaction.

DOSE: A general term denoting the quantity of radiation or energy absorbed. For special purposes, the term must be appropriately qualified. If unqualified, it refers to absorbed dose.

DOSE, ABSORBED: The amount of energy imparted to matter in a volume element by ionizing radiation, divided by the mass of irradiated material in that element. Also called dose. The common unit of absorbed dose is the rad, which is equal to 100 ergs of absorbed energy per gram of material (or 0.01 J/kg). The SI unit of absorbed dose is the gray, which is equal to 100 rad or to 1 joule of absorbed energy per kilogram of material.

DOSE, WHOLE BODY: The average uniform absorbed dose or dose equivalent received by a person whose whole body is exposed to ionizing radiation from an external source.

DOSE EQUIVALENT: The product of the absorbed dose, the quality factor, and other modifying factors necessary to evaluate the effects of irradiation received by exposed persons. This unit of measure takes into account the particular characteristics of the exposure. The common unit of dose equivalent is the rem. The SI unit is the sievert. Absorbed doses of different types of radiation are not additive, but dose equivalents are, because they express a common scale the amount of damage incurred.

DOSIMETER: An instrument to detect and measure accumulated radiation exposure. In common usage, a pencil sized ionization chamber with a self-reading electrometer, used for personnel monitoring.

DOSIMETER, PERSONAL: A dosimeter of small size carried by a person to determine the exposure, absorbed dose, and/or dose equivalent received during the carrying time. Also called personal exposure meter.

DOSIMETER, POCKET: A dosimeter the shape and size of a fountain pen with a clip, to be worn in the pocket like a fountain pen.

DOSIMETER, THERMOLUMINESCENT: An integrating detector that utilizes a phosphor sensitive to ionizing radiation. The phosphor stores the energy of the ionization within itself and releases it as low-energy photons (light) when heated. The total amount of light released is proportional to the total absorbed dose.

ELECTRON VOLT: A unit of energy equivalent to the energy gained by an electron in passing through a potential difference of 1 volt. Larger multiple units of the electron volt are frequently used: KeV for thousand or kilo-electron volts; MeV for million or mega-electron volts. 1 eV = $1.6 * 10^{-12}$ erg.

EXPOSURE: (1) The incidence of radiation upon inanimate or living matter by intent or accident.
(2) For x or gamma radiation tests, the sum of the electrical charges of all the ions of one sign produced in air when all electrons liberated by photons in a suitable small volume of air are completely stopped in air, divided by the mass of air in the volume.

EXPOSURE RATE: (1) The exposure divided by the time over which it was accumulated. (2) The increment of exposure during a suitably small interval of time, divided by that interval of time. The usual unit of exposure rate is roentgens per hour (R/h).

GAMMA RADIATION: Electromagnetic radiation releases as the result of nuclear decay. Gamma radiation is the most penetrating of all radiation.

GEIGER-MUELLER COUNTER: A highly sensitive, gas-filled radiation measuring device. It operates at voltages high enough to produce avalanche ionization.

INDIRECTLY IONIZING RADIATION: Radiation which results in interactions that remove electrons from the atoms of the absorbing media by deposition of energy in the atom.

IONIZATION CHAMBER: An instrument designed to measure a quantity of ionizing radiation in terms of the charge of electricity associated with ions produced within a defined volume.

ISOTOPES: Nuclides that have the same number of protons in their nuclei, hence the same atomic number, but that differ in the number of neutrons and therefore in the mass number. Isotopes of a particular element have almost identical chemical properties. The terms should not be used as a synonym for nuclide.

LINEAR ENERGY TRANSFER (LET): The linear rate of loss of energy (locally over distance by an ionizing particle moving in a material medium. The usual unit of LET is keV/um.

PIG: A container, usually lead, used to store radioactive materials.

PROFESSIONAL HEALTH PHYSICIST: A health physicist (as defined by the National Health Physicist) with at least 5 years of experience at least 2 of which should be in operational health physics (minimum 1 year) or dosimetry.

PROPORTIONAL COUNTER: A gas-filled radiation detector tube operated in that range of applied voltage in which the charge collected per isolated count is proportional to the charge liberated by the original ionizing event. The range of applied voltage depends upon the type and energy of the incident radiation.

RAD: The unit of absorbed dose equal to 0.01 J/kg in any medium.

RADIATION AREA: An area where the dose rate at 30 cm from the source of radiation or any surface it penetrates through is at least 5 mrem/hr and less than 100 mrem/hr.

RADIATION, DIRECT: Radiation reaching a given location directly from an emitting source without collision or energy degradation. Also called unscattered or uncollided radiation.

RADIATION, INDIRECT: Radiation reaching a given location after having been scattered at least once. Also called scattered radiation.

RADIATION WEIGHTING FACTOR (QF): The factor dependent on linear energy transfer by which absorbed doses are multiplied to obtain (for radiation protection purposes) a quantity that expresses the effect of the absorbed dose on a common scale for all ionizing radiations. The weighting factor for Gamma, X-ray, and Beta radiation is 1. The weighting factor for Alpha radiation is 20. Radiation weighting factor used to be called quality factor.

RADIATION WORKER: A trained and qualified individual who meets the substantive criteria and guidance established by DOE and/or the NRC.

REM: A special unit of dose equivalent. The dose equivalent in rems is numerically equal to the\ absorbed dose in rads multiplied by the quality factor and any other necessary modifying factors.

ROENTGEN: One roentgen is the quantity of charge liberated by x or gamma radiation and is equal to $2.58 * 10^{-4}$ coulombs per kilogram of dry air. It is equivalent to the energy absorption of x or gamma radiation of 87.7 ergs/g of air or 96.5 ergs/g of tissue (0.00877 J/kg and 0.00965 J/kg).

SENIOR HEALTH PHYSICIST: A professional health physicist certified by the ABHP (preferred) or a professional health physicist with 10 years of experience at least 2 of which should be in operational health physics (minimum 1 year) or dosimetry.

SHIELD: A body of material used to prevent or reduce the passage of particles or radiation.

SHALLOW DOSE EQUIVALENT: The dose equivalent derived from external radiation at a depth of 0.007 cm in tissue.

TOTAL EFFECTIVE DOSE EQUIVALENT (TEDE): The sum of the effective dose equivalent (for external exposure) and the committed effective dose equivalent (for internal exposures).

ADDENDUM III

1.0 PURPOSE

This procedure establishes the requirements for the decontamination of equipment, material, and tools that become contaminated with radioactive material.

2.0 SCOPE

The purpose of this procedure is to provide general instruction for decontaminating equipment, material, and tools. Each decontamination operation is unique; thus, this procedure provides general, effective decontamination techniques and guidelines to be utilized by field personnel. This document applies to all personnel involved in the decontamination process.

3.0 REFERENCES

1. Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), Final, December 1997.
2. Regulatory Guide 1.86, Termination of Operating Licenses For Nuclear Reactors.
3. Task-Specific Health and Safety Plan.
4. Procedure RAD-1, Gamma Radiation Rate Instrument Operation, Parsons ES
5. Procedure RAD-2, Beta-Gamma Surface Radiation Instrument Operation, Parsons ES
6. Procedure RAD-7, Alpha Surface Radiation Instrument Operation, Parsons ES

4.0 DEFINITIONS

1. Survey Area - An area where radioactive materials or contamination are or may be present. Survey areas include areas where samples/smears (which may contain radioactivity) are being screened.

5.0 GENERAL REQUIREMENTS AND LIMITATIONS

5.01 Only qualified and trained personnel are allowed to decontaminate equipment.

5.02 All decontamination of contaminated tools or equipment shall be performed in accordance with the direction of the RCT providing the job coverage in accordance with this Procedure and the Radiological Work Permit (RWP).

5.03 Decontamination activities shall be performed within a designated area.

5.04 Controls to contain the spread of loose contamination during the decontamination activity shall be determined prior to the decontamination of equipment, material, and tools.

5.05 Protective clothing, including respiratory protection, worn by the personnel involved in decontamination activities shall be determined by the Health and Safety Manager in conjunction with the Project Health Physicist and stipulated in the RWP.

5.06 Decontamination cleaning solvents/solutions shall only be used in accordance with the directions and limitations listed on the manufacturer supplied MSDS. Solvents/solutions requiring a pH adjustment shall be modified prior to use.

5.07 Every effort will be made to avoid re-contamination of decontaminated materials. Contamination controls shall always be observed throughout a decontamination operation.

6.0 RESPONSIBILITIES

6.01 Project Health Physicist is responsible for:

(a) Training the Radiological Control Technicians (RCTs) in the implementation of this procedure.

(b) Establishing the personal protective equipment requirements for performing the decontamination activities.

6.02 Radiological Control Technicians are responsible for:

(a) Performing the decontamination in accordance with this procedure and the applicable training.

(b) Reporting any unsafe or unusual conditions to the Field Supervisor.

7.0 PROCEDURES

7.01 General

(a) A radiological survey shall be performed on any object which is to be removed from a Radiological Control Area (RCA) that may be contaminated.

(b) If a survey indicates that decontamination is required, the item shall be bagged, wrapped, or contained, and tag the item "Requires Decontamination."

7.02 Establishing a Decontamination Area

(a) The Field Supervisor and RCT shall determine a location for set-up of the decontamination area.

(b) The following materials may be required for decontamination:

- Safe, sturdy work stations with contamination resistant surfaces.
- Adequate supply of approved cleaning solutions and solvents.
- Light duty decontamination equipment such as paper wipes, paper towels, masslinn towels, etc.
- Medium duty decontamination equipment such as scrub pads, wire brushes, steel wool, files, sandpaper, etc.
- Radioactive material storage bags, stickers, etc.
- Buckets, barrels or drums for the storage of contaminated liquids, sludges or slurries, if applicable.
- Blotter paper or absorbent material such as oil dry.
- Storage drums/bags for the storage of contaminated protective clothing.
- Adequate supply of personal protective clothing.
- Step-off pad or double step-off pad in accordance with the provisions of the RWP.
- A designated area within the decontamination area for the segregation of and monitoring of radioactive waste.

(c) Once the decontamination area has been established and stocked for operation, the bagged or wrapped contaminated equipment can be placed in the decontamination work area.

7.03 Decontamination

(a) The preparation for decontaminating a particular tool, material, or piece of equipment shall be performed as follows:

- Position the wrapped item so that the written in formation on the wrapping is visible.
- The item shall be removed from the wrapping in such a manner (rolling plastic wrapping inside out, etc.) to control the spread of contamination.
- An item that is highly contaminated with removable contamination should be misted with an approved liquid. The water vapor will wet down the particulate contamination and help prevent the possibility of airborne contamination.

- Once the item has been removed from the wrapping and has been properly positioned, discard the wrapping as radioactive waste.

(b) General decontamination considerations

- Any contaminated equipment with inaccessible areas shall be dismantled so that all surfaces are accessible for decontamination and for survey.
- Decontamination shall be performed in a safe, effective manner.

(c) Considerations for decontaminating items with removable contamination.

- Moisten the surface of the item with an approved liquid
- Fold a paper or cloth wipe into sections, using one surface of the wipe, gently wipe contamination off in ONE direction AWAY from the body to reduce the possibility of personnel contamination.
- Re-fold the paper or cloth wipe so that a CLEAN surface is available (this should prevent cross-contamination) and continue until the item is ready for survey.
- For some materials, duct tape will effectively remove contamination. Wrap the duct tape loosely around the gloved hand, ADHESIVE side OUT. Roll the tape over the contaminated area.

(d) Considerations for abrasive hand decontamination techniques.

- Remove as much removable contamination as possible as indicated in Paragraph 7.03(c).
- Moisten the surface of the item to be decontaminated.
- Use an abrasive cleaning tool (e.g. sandpaper, steel wool, steel brush, etc.) to loosen fixed contamination. Clean in one direction ONLY and clean AWAY from the body to prevent personnel contamination.
- Continue to moisten the surface of the items to contain contamination.
- Periodically remove as much removable contamination as possible in accordance with Paragraph 7.03(c).
- Survey the surface per Paragraph 7.03(e).to determine the effectiveness of the decontamination process.
- Continue abrasive process until the item is decontaminated or three abrasive cycles have been attempted.

(e) Items are to be scanned for radioactive contamination in accordance with appropriate procedures (Refs. 4, 5, and 6). If the readings are below the baseline survey for the item or 2X background, the item is considered to be decontaminated.

(f) If contamination remains after attempting to decontaminate the item, contact the Project Health Physicist for further direction.

(g) Items that cannot be effectively or economically decontaminated, will either be managed as radiological waste or sent to a decontamination vendor.

(h) After all decontamination operations have been completed, survey the decontamination area to ensure that no residual contamination remains.

7.04 Personnel Decontamination

7.04.01 Personnel decontamination methods are addressed in the Task-Specific Health and Safety Plan.

NOTE: NO WOUND SHALL BE DECONTAMINATED IN THE FIELD. MEDICAL ATTENTION MUST BE OBTAINED FOR DECONTAMINATING WOUNDS.

8.0 RECORDS

8.01 Use a field notebook to record decontamination notes.

Attachment A-3

Respiratory Protection Program

APPENDIX H
GENERIC RESPIRATORY PROTECTION PROGRAM

H.1 OBJECTIVE

The objective of this Respiratory Protection Program is to provide employees with sufficient information and guidance to adequately protect themselves from potential inhalation hazards during field operations. The use of respirators to protect personnel from inhalation hazards is permitted by OSHA under 29 CFR 1910.134 when other more positive methods of protection, such as engineering controls (e.g., ventilation) or work practices (e.g., substitution) are not feasible.

H.2 NEED FOR RESPIRATORY PROTECTION

OSHA and ACGIH have established occupational exposure limits for various airborne contaminants. If there is the potential for workers to be exposed to airborne contaminants above occupational exposure limits, than feasible engineering controls and administrative measures should be instituted. If engineering controls are not feasible, employers are required to provide respirators for employee protection. Traditional industrial hygiene engineering controls are often not feasible for site work, hence, respirators must be relied upon as the primary means for respiratory protection during field investigations. All respiratory protection practices shall comply with this program.

H.3 MINIMUM REQUIREMENTS OF AN ACCEPTABLE RESPIRATOR PROGRAM

The requirements for an acceptable respiratory protection program are outlined in 29 CFR 1910.134. An OSHA acceptable program includes the following elements:

- Procedures for selecting respirators for use in the workplace.
- Training of employees on the proper selection, use, and limitations of respirators.
- Procedures for proper maintenance, cleaning, storage, inspection and repair of respirators.
- Fit testing procedures for tight-fitting respirators.
- Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators.
- Medical screening of employees to determine if they are physically able to perform their assigned work using respiratory protective equipment.
- Procedures for regularly evaluating the effectiveness of the program.

H.4 ESTABLISHMENT OF THE RESPIRATOR PROGRAM

Personnel with specific responsibilities for the implementation of the program include the following:

H.4.1 Facility Health and Safety Representative

The Facility Health and Safety Representative is responsible for:

- Administering the respiratory protection program.
- Setting up and conducting training.
- Ensuring the office has the necessary respiratory protective equipment for the work performed by that office.
- Scheduling and conducting respirator fit testing.
- Maintaining fit test and medical records.
- Ensuring that respirators are properly stored and maintained in the office.
- Maintaining respirator repair records.
- Distributing respirators to field team members.
- Evaluating and updating the office respiratory protection program.

H.4.2 Project Health and Safety Officer (PHSO)

All hazardous waste and industrial field investigations should have assigned to it a PHSO. The PHSO is responsible for:

- Ensuring that field team members assigned to wear respirators are trained in proper respirator selection and use.
- Performing site specific respiratory protection training.
- Evaluating the respirator requirements for each field task.
- Verifying that all field team members assigned to wear respirators have received appropriate fit-testing and are medically certified to wear the class of respirator assigned to them.
- Developing a project health and safety plan that specifies respiratory protection requirements for each anticipated site task.
- Ensuring that respirators are maintained and stored properly at the work site.

- Maintaining an adequate supply of cartridges when air purifying respirators are used and ensuring that Grade D or better breathing air is used to supply self-contained breathing apparatuses and airline respirators.

H.4.3 Project Staff

All project team members must read and conform to the Project Health and Safety Plan. In the field, employees are responsible for performing daily inspections and cleaning of their assigned respirator and for storing them in a clean and sanitary location. Workers must report any problems with respiratory equipment to their PHSO immediately.

H.5 FACTORS TO CONSIDER WHEN SELECTING A RESPIRATOR

Proper respirator selection is a complex process that takes into consideration a variety of factors. The workplace must be thoroughly evaluated prior to selecting a respirator. This evaluation must include a reasonable estimate of employee exposure to respiratory hazards and an identification of the contaminant's chemical state and physical form. Additionally, work factors such as exposure time, temperature, relative humidity, and expected physical work effort must be evaluated when selecting a respirator.

H.5.1 Hazard Determination

Identifying and evaluating potential respiratory hazards is key to proper respirator selection. In the project health and safety plan the respiratory hazards for each anticipated operation should be determined. Once the nature of the respiratory hazard or hazards present have been identified, the PHSO must evaluate the magnitude of the hazard to determine the potential exposure of each employee and the extent to which respirators of various types can reduce the harm caused by exposure. The steps for hazard determination are as follows:

1. Determine what contaminants may be present at the site (review site history or past environmental sampling data; know contaminants that are released from operation [welding fumes]).

2. Determine whether there are occupation exposure limits (OSHA permissible exposure limits or ACGIH threshold limit values) for the identified contaminants.

3. Determine if there is a comprehensive health standard (e.g., asbestos, lead) for the contaminant(s). If so, there may be specific respirators required that will influence the selection process.

4. Determine the IDLH levels for the contaminants (refer to section H.5.2).

5. Evaluate if the operation involves entry into a potentially oxygen deficient environment.

6. Estimate the concentration of contaminants (use historical exposure sampling data or calculate exposure estimates using environmental sampling data).

7. Determine the physical state of the contaminants (are contaminants fumes, mists, vapors, or gases). If the contaminants are aerosols, estimate particle size based on whether the contaminants are fumes, mists, or dusts. If contaminants are vapors or gases, evaluate cartridge or canister efficiency in removing the contaminants.

8. Determine whether the contaminants are eye irritants.

Clearly, personal exposure monitoring data is the most reliable approach for assessing how much and what type of respiratory protection is required in a given circumstance. Parsons I&T has extensive personal monitoring data for UST removals, asbestos abatement, and lead paint removal operations that can be used by PHSOs to evaluate respiratory protection needs for employees assigned to similar operations. For hazardous waste and industrial field investigations, site specific exposure monitoring data may not be available, however results from previous environmental sampling investigations conducted at the site may be accessible. If available, review results of the sampling data to assess volatile contaminant(s) that may be encountered during anticipated operations. From this information calculate the potential for exposure above occupational exposure limits based on substance(s) concentration, vapor pressure, and solubility.

Models for calculating airborne exposure levels of contaminants based on the concentrations of the contaminants in soil and water may be found in Attachment H-1 at the end of this Appendix. Many substances are not volatile (metals, PAH, PCBs, etc.), thus knowledge of the anticipated operation becomes critical in determining the need for respiratory protection. For example, high concentrations of lead in soil by itself is not justification for wearing a respirator. The anticipated operation must create a dust hazard (such as the excavation of soil) for inhalation to occur. As mentioned above, knowledge of the particle size is important for determining proper respirator selection. If the contaminant is an aerosol with a particle size greater than 2 *u*m mass median aerodynamic diameter (MMAD), an air purifying respirator with any filter type (95, 99, or 100) may be used (refer to section H.6.1.2). If the contaminant is an aerosol with an unknown particle size or a particle size less than 2 ∝m MMAD, than only a series 100 filter may be used.

The identification and evaluation of contaminants and operations provides the basis for the initial selection of a respirator. Once a level of respiratory protection has been selected the PHSO can change the respirator selection based on real-time air monitoring and professional judgment (refer to section H.7 of this Appendix).

H.5.2 Immediately Dangerous to Life or Health (IDLH)

The definition of IDLH provided in 29 CFR 1910.134(b) is as follows:
Immediately Dangerous to Life or Health means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

The purpose of establishing an IDLH exposure concentration is to ensure that the worker can escape without injury or irreversible health effects in the event of failure of the respiratory protective equipment. Only the following respirators may be permitted in an IDLH atmosphere:

- A full face-piece pressure demand SCBA certified by NIOSH for a minimum service

- life of thirty minutes; or

- A combination full face-piece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.

All oxygen-deficient atmospheres shall be considered IDLH environments. IDLH values for specific chemicals can be obtained from the *NIOSH Pocket Guide to Chemical Hazards*. Note OSHA states in 29 CFR 1910.134(c) that in "instances where the employer cannot identify or reasonably estimate the employee exposure, the employer shall consider the atmosphere to be IDLH." Thus, the sampling of an unknown drummed waste must be considered an IDLH operation.

H.5.3 Assigned Protection Factor and Maximum Use Concentration

The assigned protection factor (APF) is the minimum anticipated protection provided by a properly functioning respirator or class of respirators to a given percentage of properly fitted and trained users. An APF of 10 for a respirator means that a user could expect to inhale no more than one tenth of the airborne contaminant present. It should be noted that APFs are based solely on laboratory fit testing and should be viewed and applied with particular caution. APFs are not based on measurements of actual field (workplace) performance. The protection factors listed in Table H-1 are from the OSHA cadmium standard.

Protection factors are used to calculate the maximum use concentration (MUC) of a respirator for a particular substance. The APF of a given respirator for a specific user multiplied by the PEL or TLV for a given substance is the maximum use concentration of that substance for which the respirator may be used. For example, if the APF for a half face air purifying respirator is 10 and substance X has a PEL (or TLV) of 10 ppm, the half-face mask respirator will provide protection up to 100 ppm.

On a given site, individual exposures may vary widely between workers, during a workshift, and between days. The range of potential exposures should be appropriately determined for all workers and for all circumstances that can be reasonably anticipated. The highest anticipated exposure for each respirator wearer should be used to compute the protection factor required for each wearer.

Table H-1
Assigned Respirator Protection Factors

Type of Respirator	OSHA Cadmium Standard
Air Purifying	
Filtering face-piece	10
Half-mask	10
Full-face	50
Powered Air Purifying	
Half-mask	50
Full face-piece	250
Loose fitting face-piece	25
Hood or helmet	25

Type of Respirator	OSHA Cadmium Standard
Air Line	
Half-mask (demand)	10
Half-mask (continuous)	50
Half-mask (pressure demand)	1000
Full face-piece (demand)	50
Full face-piece (continuous flow)	250
Full face-piece (pressure demand)	1000
Self Contained Breathing Apparatus	
Demand	50
Pressure Demand	>1000

H.5.4 Eye Irritation

The decision of whether to use a full-face, half-face or quarter-face respirator is often made by considering the chemical's potential for producing eye irritation or damage. The following guidelines should be used for selecting the proper mask. Any eye irritation is considered unacceptable for routine work activities. Therefore, only full face-piece respirators are permissible in contaminant concentrations that produce eye irritation. Some eye irritation is permissible when using an escape respirator if it is determined that such irritation would not inhibit escape and such irritation is reversible.

In instances where quantitative eye irritation data cannot be found in literature references and theoretical considerations indicate that the substance should not be an eye irritant, half face piece respirators are allowed. In cases where a review of the literature indicates a substance causes eye irritation but no eye irritation threshold is specified, full face-piece respirators should be used.

H.5.5 Service Life Information

Because human senses are not foolproof in detecting gases and vapors and because many gases and vapors found in the workplace do not have adequate warning properties (low odor thresholds), OSHA only permits the use of air purifying respirators for protection against vapors and gases when:

- The respirator is equipped with an end-of-service life indicator (ESLI) certified by NIOSH or

- The employer establishes a change out schedule for cartridges or canisters that will ensure that the cartridges or canisters are changed out before breakthrough.

To date, only five contaminant-specific ESLIs have been granted by NIOSH. Thus for most projects the PHSO will have to establish a cartridge or canister change out schedule to prevent contaminant breakthrough. Change out schedules may be established through a review of breakthrough test data or from recommendations provided by the respirator cartridge or canister manufacturer or supplier.

OSHA emphasizes that a conservative approach is recommended when evaluating service life testing data. Temperature, humidity, air flow through the sorbent, the work rate, and the presence of other potential interfering chemicals in the workplace all can have a serious effect on the service life of an air-purifying cartridge or canister. In establishing a schedule for cartridge replacement, it is important that the PHSO base the schedule on worst-case conditions. Assuming worst-case conditions will provide the greatest margin for safety in using air-purifying respirators for protection against gases and vapors.

Table H-2 provides breakthrough times for 42 chemicals at various concentrations. These breakthrough times were derived from the Gerry O. Wood math model (Wood, G.O., Estimating Service Lives of Organic Vapor Cartridges, American Industrial Hygiene Association Journal, 55:11-15, 1994). Note the table uses the following standard conditions to calculate breakthrough times:

- Flow rate is 53.3 liters per minute
- Sorbent mass per cartridge is 26 grams
- Relative humidity is <50%
- Temperature is 72°F

If site conditions are significantly different from the standard conditions, the PHSO will need to make appropriate corrections to the times presented in Table H-2.

H.6 RESPIRATOR TYPES

The basic purpose of any respirator is, simply, to protect the respiratory system from inhalation of hazardous atmospheres. Respirators provide protection either by removing contaminants from the air before it is inhaled or by supplying an independent source of respirable air. The principal classifications of respirator types are based on these categories.

Table H-2
Estimate of Breakthrough Times

Chemical	Concentration 50 ppm	Concentration 100 ppm	Concentration 500 ppm
Aromatics			
Benzene	Work Shift	Limited to 50 ppm for negative pressure APR	Limited to 50 ppm for negative pressure APR
Toluene	1018	562	135
Ethylbenzene	1133	604	135
m-Xylene	1143	608	136
Cumene	1122	586	126

Chemical	Concentration 50 ppm	Concentration 100 ppm	Concentration 500 ppm
Alcohols			
Methanol	Compound is not applicable to this calculation	Compound is not applicable to this calculation	Compound is not applicable to this calculation
Ethanol	123	105	60
Isopropanol	425	286	101
Propanol	551	364	123
Butanol	1073	615	156
2-Pentanol	1091	601	143
Monochlorides			
Vinyl chloride	Refer to vinyl chloride standard 1910.1017	Refer to vinyl chloride standard 1910.1017	Refer to vinyl chloride standard 1910.1017
Ethyl chloride	Not applicable, boiling point below ambient	Not applicable, boiling point below ambient	Not applicable, boiling point below ambient
2-Chloropropane	224	150	54
Chlorobenzene	1327	709	160
1-Chlorohexane	993	530	119
1-Chloroheptane	930	492	56
Dichlorides			
Dichloromethane	Refer to Methylene chloride standard 1910.1052	Refer to Methylene chloride standard 1910.1052	Refer to Methylene chloride standard 1910.1052
1,1-Dichloroethane	234	157	57
Cis 1,2-Dichloroethylene	356	236	82
1,2-Dichoroethane	482	310	101
1,2-Dichloropropane	776	452	121
Trichlorides			
Chloroform	409	263	87
Methyl chloroform	618	366	102
Trichloroethylene	749	441	122
1,1,2-Trichloroethane	976	558	143
Tetrachlorides			
Carbon tetrachloride	677	398	109
Perchloroethylene	1106	609	145
Ketones			
Acetone	118	92	44
2-Butanone	423	271	88
2-Pentanone	729	424	113
4-Methly-2-Pentanone	884	448	117
Cyclopentanone	1020	589	153
3-Heptanone	1061	561	123
Cyclohexanone	1257	683	157
Alkanes			
Pentane	332	581	136
Hexane	585	334	87
Heptane	769	420	99
Nonane	907	470	100
Decane	902	461	95

Chemical	Concentration 50 ppm	Concentration 100 ppm	Concentration 500 ppm
Amines			
Ethylamine	Not applicable, boiling point below ambient temperature	Not applicable, boiling point below ambient temperature	Not applicable, boiling point below ambient temperature
Proplamine	226	117	46

A respirator that removes contaminants from the ambient air is called an air-purifying respirator. A respirator that provides air from a source other than the surrounding atmosphere is an atmosphere-supplying respirator. Both types of respirators are described below.

H.6.1 Air Purifying Respirators (APRs)

The air purifying device cleanses the contaminated atmosphere. Ambient air passes through a cartridge or canister that removes specific gases or vapors, aerosols, or a combination of these contaminants. An APR is limited to use in environments where there is sufficient oxygen to support life (>19.5% by volume), where contaminant levels are below IDLH levels, and the MUC for the specific respirator is not exceeded.

H.6.1.1 APR Configurations

APRs are made of flexible molded rubber, silicone, neoprene, or other materials. Present designs incorporate rubber or woven elastic headstraps that are attached at two to six points. Face-pieces are available in three basic configurations. The first, called a “quarter mask,” covers the mouth and nose, and the lower sealing surface rests between chin and mouth. Good protection may be obtained with a quarter mask, but it is more easily dislodged than other types.

Quarter mask APRs may only be used at Parsons I&T sites for protection against nuisance dusts. A second type, the “half mask,” fits over the nose and under the chin. Half masks are designed to seal more reliably than quarter masks, so they are preferred for use against more toxic materials. Half mask APRs may be used for protection against low levels of vapors, gases, and aerosols, provided that these substances are not eye irritants.

A third type, the “full face-piece,” covers from roughly the hairline to below the chin. On the average they provide the greatest protection, usually seal most reliably, and provide eye protection as well. Full face-piece respirators are designed for use in higher concentrations of toxic materials than are quarter or half mask respirators. Because of their additional protection, most Parsons I&T operations requiring APRs are performed using full face-piece respirators.

H.6.1.2 Aerosol Removing Respirators

Aerosol removing respirators offer protection against airborne particulate matter, including dusts, mists, and fumes. All aerosol filtering APRs use fibrous material (a filter) to remove the contaminant. As a particle is drawn onto or into the filter, it is trapped by the fibers. Currently, there are nine classes of filters (three levels of filter efficiency, with three categories of resistance to filter efficiency degradation). The three levels of filter efficiency are 95%, 99%, and 99.97% (series 95, 99, 100). The three categories of resistance to filter efficiency degradation are labeled N (Not resistant to oil), R (Resistant to oil), and P (oil Proof). These certification categories apply only to non-powered, air-purifying, particulate-filter respirators. Powered air-purifying respirators (PAPRs) for particulates are approved only with high-efficiency filters.

The selection process for using aerosol removing APRs is outlined below:

- The selection of N-, R-, and P-series filters depends on the presence or absence of oil particles, as follows:

- If no oil particles are present in the work environment, use a filter of any series (i.e., N-, R-, or P-series).

- If oil particles (e.g., lubricants, cutting fluids, glycerine, etc.) are present, use only R- or P-series filters.

- If oil particles are present and the filter is to be used for more than one work shift, use only a P-series filter.

- Selection of filter efficiency (i.e., 95%, 99%, or 99.97%) depends on how much filter leakage can be accepted. Higher filter efficiency means lower filter leakage. As stated earlier, if the contaminant is an aerosol with an unknown particle size or one with a MMAD less than 2 *u*m, the highest efficiency filter must be used (N-, R-, or P-100 series filters). Always use a 100 series filter for protection against radioactive dust, metal fumes, asbestos, or when the substance specific standard specifies the use of HEPA or series 100 filters.

- The choice of face-piece depends on the level of protection needed-that is, the assigned protection factor (APF) required.

H.6.1.3 Gas and Vapor Removing Respirators

These air purifying respirators protect against certain gases and vapors by using various chemical filters to purify the inhaled air. They differ from aerosol filters in that they use cartridge or canisters containing sorbents to remove harmful gases and vapors. The cartridges may be replaceable or the entire respirator may be disposable. Sorbents are granular, porous materials that interact with the gas or the vapor molecule to clean the air. In contrast to aerosol filters, which are effective to some degree no matter what the particle, sorbent cartridges are designed for protection against specific contaminants (mercury vapor or ammonia gas) or classes of contaminants (such as organic vapors or acid gases).

The basic difference between cartridges and canisters is the volume of sorbent. Cartridges are vapor and gas removing elements that may be used singly or in pairs on quarter and half masks and on full face-pieces. The sorbent volume of a cartridge is small, about 50–200 cm_3 so its useful lifetime is usually short, particularly in high gas or vapor concentrations. Canisters have a larger sorbent volume (1000–2000 cm_3) and can be used in higher vapor and gas concentrations (up to the IDLH level) than cartridges. Limitations to the use of sorbent cartridge or canister respirators include:

- A canister or cartridge respirator shall not be used when there is reason to suspect that the sorbent does not provide adequate efficiency against the removal of a specific contaminant(s) that may be encountered at the site.

- Where there is reason to suspect that a sorbent has a high heat of reaction with a substance present at the site.

- Where there is reason to suspect that a substance sorbed onto the surface of a cartridge or canister is shock sensitive.

H.6.2 Atmosphere Supplying Respirators (ASRs)

Atmosphere supplying devices are the class of respirators that provide a respirable atmosphere to the wearer independent of the ambient air. The breathing atmosphere is supplied from an uncontaminated source. The air source for an ASR must as a minimum conform to grade D requirement as specified in the Compressed Gas Association Standard *G-7.1*. ASRs may be classified into two groups: air-line respirators and self-contained breathing apparatus.

H.6.2.1 Air-Line Respirator

Air-line respirators deliver breathing air through a supply hose connected to a face-piece or head enclosure (welding helmet). Either a compressor or compressed air cylinders supply the breathing air. When air is supplied by a compressor it must be equipped with specific safety devices in accordance with OSHA requirements. For example, all compressors must have an alarm to indicate overheating and compressor failure. If the compressor is oil lubricated, a carbon monoxide alarm must be installed. All air-line respirators must comply with the following requirements:

- The maximum permissible inlet pressure is 125 psi.

- The hose length must be between 25 and 300 feet (review certification for specific respirator).

- Flow rates can not be less than 115 liters per minute (lpm) or greater than 425 lpm (tight fitting face-piece)

Air-line respirators are available in demand, pressure-demand, and continuous-flow configurations.

Demand. Demand air-line respirators are equipped with either half or full face-pieces. They deliver airflow only upon inhalation. Due to their design, a negative pressure is created in the face-piece upon inhalation. These respirators shall not use by Parsons I&T employees.

Pressure demand. Pressure demand respirators are similar to demand respirators except that because of their design the pressure inside the face-piece is generally positive with respect to the outside air pressure during both inhalation and exhalation. The positive pressure means that when a leak develops in the face seal the leakage of air would be outward. Thus, these respirators provide a higher degree of protection to the user than air-line respirators that operate in the demand mode. Most Parsons I&T hazardous waste operations that require atmosphere supplying respirators use pressure demand air-line respirators because of their high degree of protection and long use time. When a pressure demand air-line respirator is equipped with an auxiliary SCBA, it may be used in IDLH environments. The auxiliary air supply can be engaged in the event that the primary air supply fails, allowing the worker to escape from the IDLH atmosphere.

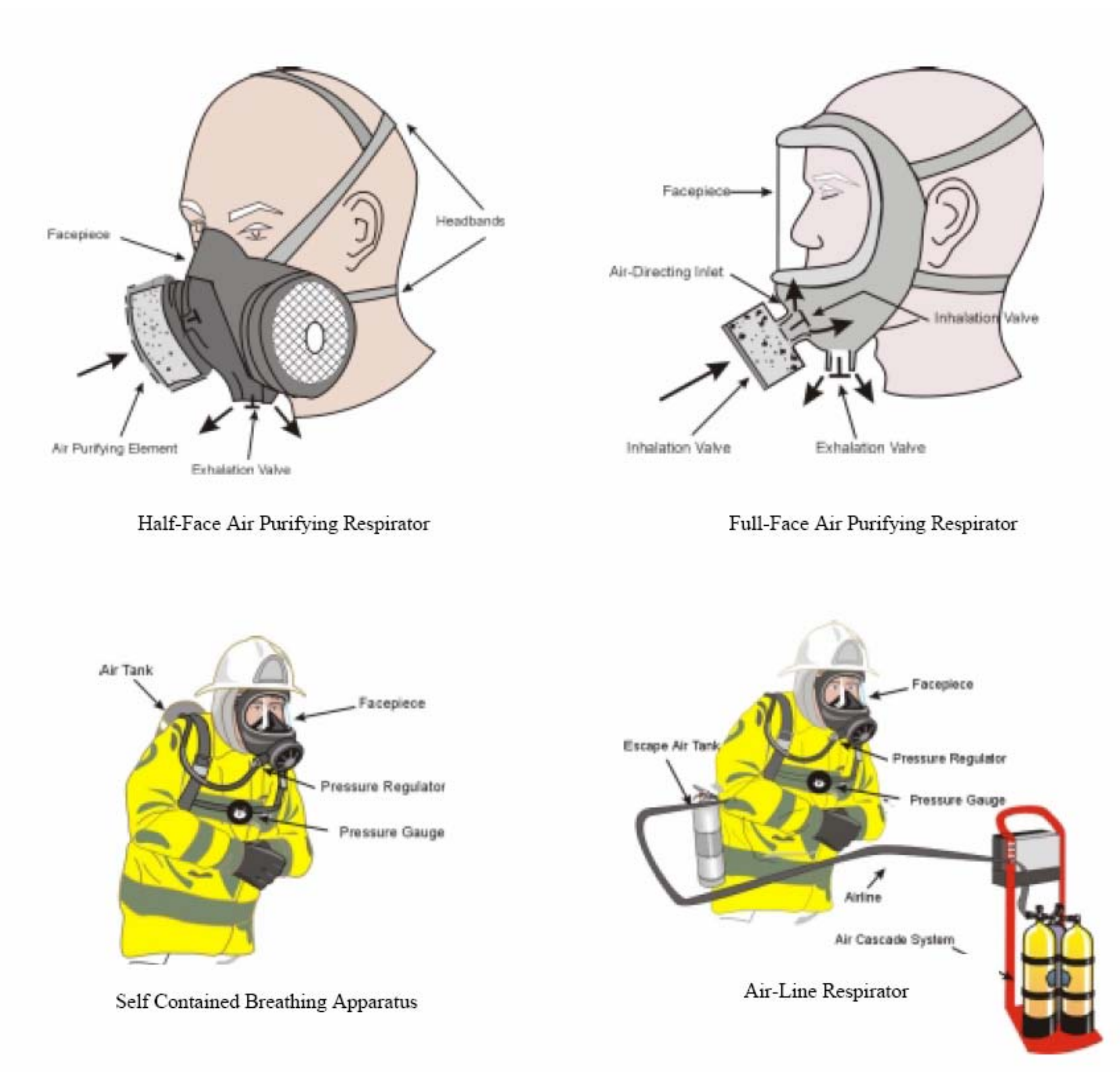
Continuous flow. A continuous flow respirator has a regulated amount of air delivered to the face-piece or head enclosure and is normally used where there is an ample air supply such as that provided by an air compressor. These respirators may be equipped with either tight fitting or loose fitting head enclosures. For tight fitting face-pieces, the air flow must be at least 115 lpm. For loose fitting hoods or helmets, the minimum flow is 170 lpm. Parsons I&T operations that involve the use of continuous flow air-line respirators include welding and abrasive blasting.

H.6.2.2 Self-Contained Breathing Apparatus (SCBA)

The SCBA provides respiratory protection against gases, vapors, particulates and oxygen deficient environments. The wearer is independent of the surrounding environment because the breathing air is carried by the wearer. Pressure demand SCBAs may be used in IDLH and oxygen deficient environments either as escape only devices or for short-term entry. A full face piece is most commonly used with SCBAs. There are two major types of SCBAs: closed circuit and open circuit. Parsons I&T only uses open circuit pressure demand SCBAs.

In an open circuit SCBA the exhaled air is exhausted to the environment rather that being recirculated (a closed circuit SCBA). A cylinder of high pressure (2000–4500 psi) compressed air supplies air to a regulator that reduces the pressure for delivery to the face-piece. Most opencircuit SCBAs have a service life of 30 minutes to 60 minutes based on NIOSH breathing machine tests. However, a service life of 30 or 60 minutes is rarely obtained during field operations. The PHSO should plan for operations to be completed with no less than 20% of the air remaining in the tank.

Figure H-1
Types of Respirators



Half-Face Air Purifying Respirator

Full-Face Air Purifying Respirator

Self Contained Breathing Apparatus

Air-Line Respirator

H.7. Selection of Respirators Using Real-Time Measurements

The identification and evaluation of contaminants at a site provide the basis for the initial selection of a respirator. Once a level of respiratory protection has been selected it can be modified based on real-time air monitoring, supplemented with background information and professional judgment.

Below are the allowed modifications. Please note the qualifiers.

- **ASR (Level B) to No respirator (Level D):** This modification may be made by the PHSO when there is a sustained absence of volatiles or aerosols as measured on realtime equipment. A level D ensemble cannot be used in an oxygen deficient environment.

- **APR (Level C) to No Respirator (Level D):** Same as Level B to Level D

- **Level D to Level B:** May be made at the direction of the PHSO based on the magnitude of the measurements and action level requirements specified in the project health and safety plan.

- **Level C to Level B:** Permissible at the direction of the PHSO in instances where volatiles or aerosol measurements exceed the preset level B action level specified in the project health and safety plan. Level B (or engineering controls) shall be used when an oxygen deficient environment exists.

- **Level D to Level C:** Permissible at the direction of the PHSO when volatiles or aerosols exceed the preset action level specified in the project health and safety plan. (Contaminants must be known in order to wear an air purifying respirator).

- **Level B to Level C:** May be made at the direction of the PHSO only when the contaminants and their concentrations are known. This modification should not be made without knowledge of the chemicals on-site, their expected concentrations, and ability of the cartridges to absorb or filter out the chemicals.

H.7 TRAINING

H.7.1 Worker Training

Selecting the respirator appropriate for a given hazard is important, but equally important is using the selected device properly. Parsons I&T provides initial respiratory protection training for workers that are assigned to activities requiring respirator use.

H.7.1.1 Initial Training

Employees must receive training in proper respirator selection and use prior to assignment to operations requiring respiratory protection. Initial respirator training may be provided by the Corporate H&S Staff (as part of the 40-hour HAZWOPER training class), the Facility H&S Representative, or the PHSO (as part of a site-specific training). In each case the following topics must be presented:

- Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.

- The limitations and capabilities of the respirator.

- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.

- The proper donning and doffing of the respirator.

- Procedures for inspecting and checking the respirator before donning.

- Procedures for the proper maintenance, cleaning, and storage of the respirator.

- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.

- A general review of the OSHA Respiratory Protection Standard.

Training must involve classroom lecture and “hands-on” practice with the respirator. Training must be documented.

H.7.1.2 Re-Training

Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace render previous training obsolete.

- Changes in the types of respirators used render previous training obsolete.

- Inadequacies in an affected employee’s knowledge or use of an assigned respirator indicates that the employee has not retained the requisite understanding or skill.

Annual training shall be provided by the Facility H&S Representative or designee.

H.7.2 PHSO Training

PHSOs that oversee site operations involving respirator use should have a comprehensive knowledge respiratory protection practices. Their training should include, but not necessarily be limited to, knowledge of the following:

- Initial worker training and instruction (see section H.7.1.1);

- Basic respiratory protection practices;

- Selection and use of respirators to protect workers from the respiratory hazards to which they may be exposed;

- Factors that must be considered in establishing respiratory protection action levels for the project health and safety plan.

- Proper use of air monitoring equipment;

- The nature and extent of the respiratory hazards to which workers may be exposed; and

- The structure and operation of the entire respiratory protection program.

H.8 Respirator Fit Testing

All respirators that rely on a mask-to-face seal need to be checked with either qualitative or quantitative methods to determine whether the mask provides an acceptable fit to a wearer. The qualitative fit test procedures rely on a subjective sensation (taste, irritation, smell) of the respirator wearer to a particular test agent while the quantitative test uses instruments to measure face seal leakage. The relative workplace exposure level determines what constitutes an acceptable fit and which fit test procedure is required. Qualitative fit testing may be used to fit test negative pressure air-purifying respirators, if they will be used in atmospheres less than ten times the PEL (Table H-3). If exposures are anticipated to be greater than 10 times the PEL, quantitative fit testing must be used. The reason for this is because the qualitative fit test protocols established by OSHA are only valid to achieve a fit factor of 100 (an assigned protection factor of 10). When quantitative fit testing is used, all full face-piece respirators must meet or exceed a fit factor of 500, while quarter - and half-mask respirators must meet or exceed 100. For positive pressure, atmosphere-supplying respirators, either qualitative or quantitative fit testing may be used. The fit testing of tight-fitting atmosphere supplying respirators and tightfitting powered air-purifying respirators shall be accomplished by performing the fit test in the negative pressure mode. In all instances the employee must be fit tested with the same make, model, style, and size of respirator that will be used in the field.

Fit testing must occur prior to initial respirator use, whenever a different respirator face-piece (size, style, model or make) is used, and annually thereafter. The Facility H&S or his or her designated representative is responsible for performing fit testing in accordance with OSHA accepted protocol. Accepted protocols for qualitative and quantitative fit testing are presented in attachment H-2.

Table H-3
Acceptable Fit Test Methods

Respirator Type	Qualitative Fit Test	Quantitative Fit Test
Half-face, negative pressure, APR (<100 fit factor)	Yes	Yes
Full-face, negative pressure, APR, (<100 fit factor) used in atmospheres up to 10 times the PEL	Yes	Yes
Full-face, negative pressure, APR (>100 fit factor)	No	Yes
Supplied-air respirators (SAR), or SCBA used in negative pressure mode (demand mode) (>100 fit factor)	No	Yes
Supplied-air respirators (SAR), or SCBA used in positive pressure mode (pressure demand mode)	Yes	Yes

H.8.1 General Requirements

The employee shall evaluate respirator fit using the following procedures:

- The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes. (By providing several sizes and models the subject is likely to find a respirator that fits correctly and is comfortable.)

- Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator.

- The test subject shall be informed that he or she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

- The test subject shall be instructed to hold each chosen face-piece up to the face and eliminate those that obviously do not give an acceptable fit.

- The more acceptable face-pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to evaluate comfort.

After the subject has determined the respirator of greatest comfort, that person shall conduct a negative and positive pressure fit check (section H.9) or other fit checks recommended by the respirator manufacturer. Another face-piece shall be selected and re-tested if the test subject fails the fit checks.

Qualitative or quantitative fit testing shall not be conducted if there is any hair growth between the skin and the face-piece sealing surface, such as stubble beard growth, mustache, or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed. If the subject exhibits difficulty in breathing, the test shall be discontinued and the medical oversight contract (MOC) physician shall be contacted.

After the successful completion of the fit checks, the respirator fit shall be tested using the applicable method from attachment H-2. No matter which test protocol is used, the employee shall be given a description of the fit test protocol and their responsibility during the test procedure. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit (ear muffs). The following test exercises must be performed during all fit testing methods prescribed in attachment H-2:

- Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

- Deep breathing, as during heavy exertion.

- Side-to-side and up-and-down head movements. These movements should not be exaggerated, but should approximate those that take place on the job.

- Talking. This is most easily accomplished by reading a prepared text (e.g., Rainbow Passage) loudly enough to be understood by someone standing nearby.

- Grimace. The test subject shall grimace by smiling or frowning. (this applies only to quantitative testing, it is not performed for qualitative fit testing).

- Bending over. The test subject shall bend at the waist as if to touch his or her toes.

- Normal breathing (repeat of first bullet)

Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the Facility H&S Representative or designee regarding the comfort of the respirator upon completion of the protocol. If the respirator is uncomfortable, another model respirator shall be tried. The respirator shall not be adjusted once the fit test begins. Any adjustment voids the test, and the process must be repeated. After the fit test has been successfully completed, a fit test log (see Appendix A) will be issued to the test subject. A copy of the log shall be maintained by the Facility Health and Safety Representative in accordance with section 7.6 of this manual.

H.9 DAILY QUALITATIVE FIT CHECKS AT THE SITE

In the field, each employee is responsible for performing daily qualitative fit checks of their assigned APR respirator prior to entry into a hazardous atmosphere. The daily determination of fit will consist of a negative and positive pressure fit checks as described below.

H.9.1 The Negative Pressure Check

In this test, the user closes off the inlet of the canister, cartridge, or filter by covering it with the palm of their hand; inhales gently so that the face-piece collapses slightly; and holds their breath for about 10 seconds. If the face-piece remains slightly collapsed and no inward leakage is detected, the respirator is probably functioning correctly.

H.9.2 The Positive Pressure Check

This test is conducted by closing off the exhalation valve and exhaling gently into the facepiece. The fit is considered satisfactory if slight positive pressure can be built up inside the facepiece without any evidence of outward leakage.

H.10 RESPIRATOR INSPECTION, CLEANING, MAINTENANCE, AND STORAGE

Respirator inspection is an integral part of the overall respirator program. Wearing a poorly maintained or malfunctioning respirator is, in one sense, more dangerous than not wearing a respirator at all. The employee wearing a defective device thinks they are protected when, in reality, they are not. Emergency escape devices are particularly vulnerable to poor maintenance since they are generally used infrequently and often in the most hazardous and demanding circumstances. The possible consequences of wearing a defective emergency escape and rescue device are lethal.

The OSHA standards strongly emphasize the importance of an adequate maintenance program, but permit its tailoring to the type of working conditions and hazards involved. However, all programs are required to include at least:

- Inspection for defects (including a leak check)

- Cleaning and disinfecting
- Repair, and
- Storage.

A proper maintenance program ensures that the worker's respirator remains as effective as when it was new.

H.10.1 Inspection for Defects

The Facility H&S Representative is responsible for inspecting respirators prior to assignment to individuals and upon receipt of the respirator after completion of field operations. Results of the inspection shall be recorded on form HS07-06 (Appendix A). In the field, the employee is responsible for inspecting his or her APR respiratory every day before and after use. The PHSO is responsible for performing daily inspections of actively used ASRs (air-line or SCBA) and for the monthly inspection of emergency escape respirators.

H.10.1.1 Inspection of Air Purifying Respirators

Routinely used air-purifying respirators should be checked as follows before and after each use:

- Examine the face-piece for:
  - Excessive dirt;
  - Cracks, tears, holes, or distortion from improper storage;
  - Inflexibility (stretch and massage to restore flexibility);
  - Cracked or badly scratched lenses;
  - Incorrectly mounted full face-piece lens or broken or missing mounting clips; and
  - Cracked or broken air-purifying element holder(s), badly worn threads, or missing gasket(s) (if required).

- Examine the head-straps or head harness for:
  - Breaks;
  - Loss of elasticity; and
  - Broken or malfunctioning buckles and attachments, and excessively worn serrations on the head harness which might permit slippage.

- Examine the exhalation valve for:
  - Foreign material, such as detergent residue, dust particles, or human hair under the valve seat;
  - Cracks, tears, or distortion in the valve material;
  - Improper insertion of the valve body in the face-piece;
  - Cracks, breaks, or chips in the valve body, particularly in the sealing surface;
  - Missing or defective valve cover; and
  - Improper installation of the valve in the valve body.

- Examine the air-purifying elements for:
  - Incorrect cartridge, canister, or filter for the hazard;
  - Incorrect installation, loose connections, missing or worn gaskets, or crossthreading in holder;
  - Expired shelf-life date on cartridge or canister;
  - Cracks or dents in outside case of filter, cartridge, or canister; and
  - Evidence of prior use of sorbent cartridge or canister, indicated by absence of sealing material, tape, foil, etc., over inlet.

H.10.1.2 Inspection of Atmosphere Supplying Respirators

For a routinely used atmosphere-supplying device, use the following procedures.

- If the device has a tight-fitting face-piece, use the procedures outlined above for air purifying respirators, except those pertaining to the air-purifying elements. If the device is a hood, helmet, blouse, or full suit, use the following procedures:

- Examine the hood, blouse, or full suit for rips and tears, seam integrity, etc.

- Examine the protective headgear, if required, for general condition, with emphasis on the suspension inside the headgear.

- Examine the protective face-shield for cracks or breaks or impaired vision due to rebounding abrasive particles.

- Make sure that the protective screen is intact and secured correctly over the faceshield of abrasive blasting hoods and blouses.

- Examine the air supply system for:

- Integrity and good condition of air supply lines and hoses, including attachments and end fittings, and

- Correct operation and condition of all regulators and valves.

- Self-contained breathing apparatuses must be inspected by the PHSO before initiating field operations. The results of the initial inspection must be documented on form HS07-07 (Appendix A). Each worker is responsible for inspecting his or her individual face-piece assembly for defects (e.g., frayed or cut hoses or straps) prior to use each day. Infrequently used respirators, such as emergency escape packs, must be inspected monthly. Inspection must include the following:
  - Examine air supply (ensure tank is fully charged).
  - Examine hood integrity (no cracks).
  - Ensure that the respirator is clean.
  - Examine air delivery hose for cuts and cracks.
  - Examine harness integrity.

H.10.2 Cleaning and Storage

The Facility H&S Representative or designee is responsible for inspecting and cleaning all respirators returning from the field. Cleaning is accomplished by using the procedures presented in Attachment H-3. After cleaning, sanitizing and inspecting the respirator, the Facility H&S Representative will repackage and store the respirator in an area protected against dust, sunlight, heat, extreme cold, excessive moisture or damaging chemicals. Respirators must be packed and stored so that the exhalation valve will rest in a normal position. When a respirator is used in the field, it must be cleaned each day by the respirator user.

H.10.3 Maintenance

Continued usage of respirators will require periodic repair or replacement of component parts. Replacement of parts and repair of air purifying respirators, in most cases, present few problems. Replacement parts for respiratory protective devices **must** be those from the manufacturer of the equipment. Substitution of parts from a different brand or type of respirator will void the respirator's NIOSH approval. An SCBA is more difficult to maintain than an APR primarily because of the SCBA's valve and regulator assembly. For this reason, SCBA repairs and adjustments must be performed by a certified technician. Respirator maintenance must be documented.

H.11 MEDICAL ASPECTS OF RESPIRATOR USE

No employee will be permitted to wear a respirator without clearance from the MOC physician. The diagnostic protocol for a fit-to-work classification includes an assessment of the worker's ability to wear an air purifying respirator, an airline respirator, and a SCBA. The Facility Health and Safety Representative shall not assign a worker to perform a task requiring respirator use unless he or she has received the medical report from the MOC physician that states that the employee has no limitation in wearing the assigned respirator.

H.12 EVALUATION OF THE RESPIRATOR PROGRAM

The respirator program will be periodically evaluated by the Facility Health and Safety Representative and modified as appropriate. The auditing of respirator practices will be used to assess whether respirators are being selected and worn properly. Examination of respirators in use and in storage will indicate how well the equipment is being maintained. The results of periodic audits will be used to assess the effectiveness of the program and aid the Facility Health and Safety Representative in identifying areas that need improvement.

ATTACHMENT H-1
EXPOSURE CALCULATIONS

CALCULATING EXPOSURE ESTIMATES FROM VOLATILES IN WATER AND SOIL

Vapor concentrations can be measured through the use of a photoionization detector, flame ionization detector, infrared spectrometry, or other techniques. Exposure levels can also be estimated using the following calculations.

Calculating Saturation Vapor Pressure

Contaminants that have high vapor pressures are more likely to be present in the atmosphere as vapors. The potential exposure to volatile contaminants can be estimated if the soil or water concentration and vapor pressure of the contaminants are known. The concentration of a vapor in a workspace can not exceed its saturation concentration. If the vapor pressure (in torr or mm of Hg) multiplied by 1316 ppm/torr is less than the exposure limit of the contaminant, than the breathing air can not contain vapor concentrations above that limit.
PPM= Vapor pressure of contaminant x 1316 ppm/torr

Estimating Exposure Concentration for Volatiles in Water Pressure Over Solutions Using Raoult's Law

If the vapor from a contaminant is water soluble and the concentration of the contaminant in water is known, an estimate of the maximum air concentration for that contaminant can be obtained using Raoult's law. Raoult's law relates vapor pressure to concentration as follows:

P_A= Partial pressure of contaminant A in gas phase
Y_A= Mole fraction of contaminant A in liquid phase
P_{AVAP} = Vapor pressure of pure contaminant A
Raoult's law is more accurate for concentrated solutions (>0.5mol/liter).
Raoult's law is more accurate for soluble contaminants (>1 mol/liter).

Example:

Methyl ethly ketone (MEK) is present in surface water at 5,000mg/liter. Because MEK is soluble in water (3 moles/liter), Raoult's law can be use. The vapor pressure of pure MEK is 90.6 mm of Hg and the molecular weight is 72.1 g/mol. P_A can be calculated as follows:

$$P_A = \frac{90.6\ mm\ \ of\ \ Hg \times 5\ g/l}{72.1\,g/mol \times 55.5\ mol/l} = \quad 0.113\ torr \times 1{,}316\ \ ppm/torr\ = 148\ \ ppm$$

Pressure Over Solutions Using Henry's Law

If the contaminant has a low solubility in water, an estimate of the contaminant's maximum vapor concentration can be made using Henry's Law. Henry's law relates vapor pressure to concentration as follows:

> P_A= Partial pressure of contaminant A in the gas phase
> H= Henry's law constant
> Y_A = Mole fraction of A in the liquid phase

Henry's law constants are published in environmental sources like Howard's *Handbook of Environmental Fate and Exposure Data*. These sources often provide the constant in inconvenient units like atm–m3/ mole. An estimate of the Henry's law constant, in more useful units, can be derived by dividing the solubility of the compound in water by its pure state vapor pressure. This estimate can be used for compounds with limited solubility (< 1 mol/ liter)

> Example*:*
> Methyl chloroform is present in water at 6 ppm. Since methyl chloroform has a low solubility use Henry's law to calculate the vapor pressure of the contaminant. To derive the vapor pressure of the methyl chloroform contaminant the Henry's law constant can be calculated by knowing the saturation vapor pressure (124 mm of Hg) and water solubility (4,400mg/l) of methyl chloroform.

$$H = \frac{124\ mm\ of\ Hg}{4.400\ mg/l} = \frac{0.028\ torr}{mg/l} \times \frac{1{,}316\ ppm}{torr} = 37\,\frac{ppm}{mg/l}$$

$$P_A = 6mg/l\ \times\ 37\ ppm/(mg/l) = 222\ ppm \quad (64\%\ of\ the\ OSHA\ PEL)$$

Calculating Exposure Estimates for Volatiles in Soil

The rate at which volatile chemicals from contaminated soil enter the air depends on the chemical, its concentration, moisture in the soil, and the clay or organic carbon faction (f_{oc}) of the soil. To calculate the air concentration for volatiles in soil use the following formula:

$$C_{air} = (1316C_{soil}\ x\ P_{sat})/\ (C_{sat}\ x\ f_{oct}\ x\ K_{oc})$$

Where the units are as follows:

> C_{air} = Concentration of contaminant in air, parts per million by volume
> C_{soil} = Concentration of contaminant in soil, milligrams per kilogram (from results of previous sampling investigation)
> P_{sat} = Saturation vapor pressure, torr or mm of Hg (from chemical reference handbook)
> C_{sat} = Saturation water solubility, milligrams per liter (from chemical reference handbook)
> f_{oc} = Organic carbon content, dimensionless ratio (from soil science reference)

K_{oc} = Organic carbon partition coefficient, dimensionless ratio (from risk assessment reference manual)

Similar to the calculation for volatiles in water, the above approach for calculating air concentrations from contaminated soil is very conservative. If the calculated contaminant concentration is less than the occupational exposure limit, than a respirator would not be required.

Calculating Exposure Limits for Mixtures

When two or more substances which act upon the same organ system are present, their combined effect shall be given primary consideration. In the absence of information to the contrary, the effects of the different hazards should be considered additive. To evaluate if the exposure limit for a mixture will be exceeded, use the following formula.

$C_1/T_1 + C_2/T_2 + \ldots C_n/T_n$
C= The calculated concentration for contaminant
T= The occupational exposure limit for contaminant

If the sum exceeds unity, then the exposure limit for the mixture is exceeded and a respirator should be donned. An exception to the rule may be made when there is good reason to believe that the chief effects of the different harmful substances are not additive but are independent. In such cases the exposure limit is exceeded when any one component of the mixture (C_1/T_1 or C_2/T_2) has a value that exceeds unity.

ATTACHMENT H-2
FIT TEST PROTOCOLS

QUALITATIVE FIT TEST (QLFT) PROTOCOLS

General

The Facility H&S Representative administering the QLFT must be able to prepare test solutions, calibrate equipment, perform the tests properly, recognize invalid tests, and ensure that the test equipment is working properly**.** QLFT equipment must be kept clean and well maintained so it operates within the parameters for which it was designed

Isoamyl Acetate Protocol

This protocol is appropriate for the fit testing of respirators with organic vapor cartridges or canisters.

Odor Threshold Screening

Odor threshold screening is performed without the subject wearing a respirator. The screening is intended to determine if the subject can detect the odor of isoamyl acetate at low levels.

1. Three 1 liter glass jars with metal lids are required.

2. Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

3. The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 mls of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

4. The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

5. The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 mls of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

6. A test blank shall be prepared in a third jar by adding 500 mls of odor-free water.

7. The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

8. The following instructions shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): “The purpose of this test is to determine if you can smell

banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the Facility Health and Safety Representative which bottle contains banana oil."

9. The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

10. If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

11. If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

Isoamyl Acetate Fit Test

1. The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

2. Each respirator used for the fit test shall be equipped with organic vapor cartridges or an organic vapor canister.

3. After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room.

4. A copy of the test exercises (section H.8.1) and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

5. Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA.

6. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

7. Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. At this time the Facility Health and Safety Representative should explain the fit test exercises.

8. If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

9. If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another

respirator, return to the test area and again begin the fit test procedure. The process continues until a respirator that fits has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before re-testing. Odor sensitivity will usually have returned by this time.

10. If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

11. When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

Irritant Smoke (Stannic Chloride) Protocol

This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator. The respirator to be tested must be equipped with a P-, R, or N- 100 series filter. An enclosure shall not be used for this test. The smoke can be irritating to the eyes, lungs, and nasal passages, thus the Facility H&S Representative shall take precautions to minimize the test subject's exposure to the irritant smoke by performing the test in a well-ventilated area.

Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

1. The Facility Health and Safety Representative shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute or an aspirator squeeze bulb. The Facility Health and Safety Representative shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury to the subject from the jagged end of the smoke tube.

2. The Facility Health and Safety Representative shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his or her eyes closed while the test is performed.

3. The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he or she can detect the irritating properties of the smoke. The Facility Health and Safety Representative shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he or she can detect it.

Irritant Smoke Fit Test Procedure

1. The person being fit tested shall don the respirator without assistance, and perform the required negative and positive pressure fit check(s).

2. The test subject shall be instructed to keep his or her eyes closed.

3. The Facility Health and Safety Representative shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The Facility Health and Safety Representative shall begin at least 12 inches from the face-piece and move the smoke stream around the whole perimeter of the mask. The Facility Health and Safety Representative shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

4. If the person being tested has not had an involuntary response to the irritant smoke, proceed with the test exercises.

5. The exercises identified in section H.8.1 shall be performed by the test subject while the respirator seal is being continually challenged by the smoke. Smoke shall be directed around the perimeter of the respirator at a distance of six inches.

6. If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being tested must repeat the entire sensitivity check and fit test procedure.

7. Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check. This check involves squeezing a small smoke stream from the tube after the respirator has been removed. If the test subject fails to evoke a response, the fit test is voided.

8. If a response is produced during this second sensitivity check, then the fit test is passed.

QUANTITATIVE FIT TEST (QNFT) PROTOCOL

General

The Facility H&S Representative administering the QNFT must able to calibrate equipment, perform the tests properly, recognize invalid tests, and ensure that test equipment is working properly**.** QNFT equipment must be kept clean and well maintained so it operates within the parameters for which it was designed.

Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol.

The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount TM) protocol quantitatively fit tests respirators by collecting samples from the inside of the mask. To perform the quantitative fit test a respirator with a sampling probed is used. The probed respirator has a special sampling device that allows the probe to sample air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing using the employee’s own respirator. A minimum fit factor pass level of at least 100 is necessary for a negative pressure half-mask respirator and a minimum fit factor pass level of at least 500 is required for a negative pressure full face-piece respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

Portacount Fit Test Requirements

1. Check the respirator to make sure the sampling probe and line are properly attached to the face-piece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test per manufacturer's instruction.

2. Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable.

3. Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; and Tendency of the respirator to slip.

4. Have the person wearing the respirator perform negative and positive fit checks. If leakage is detected, determine the cause. If leakage is from a poorly fitting face-piece, try another size respirator.

5. Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

6. The test subject shall be instructed to perform the exercises in section H.8.1 of this Appendix.

7. After the test exercises, the test subject shall be questioned by the Facility Health and Safety Representative regarding the comfort of the respirator upon completion of the protocol. If the respirator has become uncomfortable, another model should be used.

Portacount Test Instrument

The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The pass or fail message will indicate whether or not the test was successful. If the test was passed, the fit test is over. Since the pass or fail criterion of the Portacount is user programmable, the Facility H&S Representative shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance (fit factor of 100 for half face mask, fit factor of 500 for full face mask). A record of the test needs to be maintained in accordance with section 7.6 of this manual. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; the fit test operator's name, and the date of testing.

ATTACHMENT H-3

CLEANING PROTOCOL

These procedures are provided for use when cleaning respirators. They are general in nature, and should be used as an alternative to the procedures provided by the manufacturer of the respirator.

- Remove filters, cartridges, or canisters. Disassemble face-pieces by removing speaking diaphragms, demand and pressure- demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

- Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

- Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

  - Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

  - Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

  - Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

- Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized since detergents or disinfectants that dry on face-pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

  - Components should be hand-dried with a clean lint-free cloth or air-dried.

  - Reassemble face-piece, replacing filters, cartridges, and canisters where necessary.

  - Test the respirator to ensure that all components are working properly.

Attachment A-4

Activity Hazard Analyses (AHA)

Workplace: Seneca Army Depot Activity
Activity being evaluated: Soil Sampling - with Drill Rig
Summary: Activity that involves transporting the drill rig to and from the site, safely operating the drill rig and collecting soil samples/borings.

Principal Steps:	Potential Hazards:	Controls:
Transport drilling rig to site	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
Mobilize at site	Struck by passing vehicle	Erect signs stating "Danger Construction Zone" on orange background with black letters, post them at least 100 yards from both sides of traffic. Lights or reflectors shall be used on signs for night work.
Perform drilling activity	Struck by passing vehicle	Post flagperson(s) at both sides of traffic to control movement of traffic and personnel. Flag signaling will be done with 18 inch square red flags or paddles. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
Mobilization / Site Set Up	Struck By	All equipment, augers, rods and tools will be properly secured during transport. **All vehicles and equipment will comply with DOT requirements.**
	Tip Over	Never move the drilling rig with the mast upright. Set hydraulic leveling jacks before raising the mast. Ensure the drilling site foundation is stable and as level as possible.
	Backing	Use a ground guide along with a functioning back-up alarm during equipment backing.
	Electrocution / Explosion	Inspect for buried and overhead utilities in the vicinity of the drilling location. A drilling clearance permit shall be obtained from base personnel or utility companies prior to initiating intrusive operations.
	Slips, Trips, Falls	Clear trees, roots, weeds, limbs and other ground hazards from the drilling location. Practice good housekeeping to keep the ground around the drilling site clear of obstructions, equipment and other tripping hazards. Wear appropriate foot protection to prevent slips and trips. Use caution when working on uneven and wet ground surfaces.

Workplace: **Seneca Army Depot Activity**

Activity being evaluated: **Soil Sampling - with Drill Rig**

Summary: **Activity that involves transporting the drill rig to and from the site, safely operating the drill rig and collecting soil samples/borings.**

Principal Steps:	Potential Hazards:	Controls:
	Heat Stress / Cold Stress Injuries	SHSO to implement heat and cold stress control program in accordance with the work plan.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
Drill Rod / Auger / Tool Handling	Struck By	Drill rods and augers stored and transported in racks shall be blocked to prevent shifting. Unload drill rods and augers layer by layer. Be prepared for sudden shifting when tailing rod sections. Keep a wide base and secure footing.
	Back Strain	Use proper lifting techniques when manually handling rods, augers and tools. Use mechanical equipment during lifting whenever possible. Use the buddy system when lifting tools and supplies.
Hoisting Operations	Struck By	Never engage the rotary clutch until all personnel and equipment are clear. Never leave the brake unattended when engaged. Drill rods and auger sections should not be picked up or dropped suddenly. Do not lift more than 10 feet of augers or one joint of pipe between tool breaks. Test the brakes daily. Use caution when drilling in wet or damp conditions. Suspend drilling activities if moisture comprises the performance of the braking mechanism.
Catline Operations	Struck By	Do not use more wraps than necessary to lift the load. More than one layer of wraps on the cathead is not allowed. Personnel should not stand near, step over or go under the cathead rope under tension. The cathead must be kept clear of obstructions and entanglements. Never leave the cathead unattended when engaged. Do not stand under the object being lifted with the cathead.
	Noise	Hearing protection will be worn in hazardous noise areas.
Derrick Operations	Fall	The mast should be lowered, if possible, to make repairs or to free up entangled wire rope or obstructions. If the mast must be ascended while upright, a proper ladder safety climbing device or safety block system must be used in conjunctior with a full body harness.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Sampling - with Drill Rig**
Summary: **Activity that involves transporting the drill rig to and from the site, safely operating the drill rig and collecting soil samples/borings.**

Principal Steps:	Potential Hazards:	Controls:
	Weather	The drill rig operator must be aware of weather conditions and terminate operations in the event of unsafe conditions.
Auger Operations	Struck By	Use a long handled flat head shovel when removing auger cuttings. Stay away from the augers when rotating. Prevent shovel from lodging into the augers and kicking out. Do not wear loose clothing when working with augers.
Maintenance	Equipment	The drilling rig and associated equipment must be maintained in a proper functioning condition. All motors must be shut off and electrical, mechanical and hydraulic components locked out of service when making repairs. All equipment must be inspected daily prior to use. Equipment must be operated and maintained in accordance with EM 385-1-1 and manufacturers guidelines. Safety shutoff system must be tested daily and not disabled. Bleed off pressure on hydraulic lines before undoing fittings. Do not leave tools or parts loose on the rig after maintenance has been performed.
	Fire Hazards	All motors must be shut off during refueling. Smoking in the vicinity of the drilling rig is not permitted. An A-B-C fire extinguisher must be maintained on the drilling rig and associated motorized equipment. Fuel containers will not be stored within 10' of the drilling rig motor. Fuel will be stored in UL approved safety containers with contents clearly labeled.
Pumping / Grouting	Blow Out	The pump must not exceed maximum pressure of grout and mud lines. High-pressure lines must be secured to the rig. Lines and hoses must be inspected daily and replaced if worn or damaged. Engage pump in low gear then shift to subsequent higher gears.
HTRW Drilling	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	In addition to the controls listed above under mobilization/site set-up, radiation monitoring of soils raised to the ground surface during the sampling will be performed and recorded periodically. Each split spoon sample will be monitorec and recorded. All soil samples will be monitored.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Sampling - with Drill Rig**
Summary: **Activity that involves transporting the drill rig to and from the site, safely operating the drill rig and collecting soil samples/borings.**

Principal Steps:	Potential Hazards:	Controls:
Hazardous Drilling Locations	Explosion	Special procedures will be implemented when drilling in known natural gas locations, such as special mud procedures and blow out preventers.

Equipment/Materials to be Used: Split spoons, drill rig, hand tools, low-flow sampling pumps, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: Drill rig to be fully inspected by drillers prior to commencement of project work. Drill rig safety inspections will be performed and documented daily, or as required in the HSP. A daily inspection of PPE by workers will be conducted. Equipment will be inspected by workers daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will look for fissures and cracks in the walls and will ensure that engineering controls are still appropriate. During site set-up, equipment generating noise will be monitored by the SSHO to determine whether or not hearing protection is required.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Operators will be trained in the safe use of required equipment and in the required personal protective equipment. UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. Before entering a confined space, all personnel will show proof of confined space training to the SSHO.

Name: Timothy S Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Soil Sampling - with Hand Tools
Summary: Activity that includes mobilizing to the site, equipment set up, use of hand tools, collection of soil samples.

Principal Steps:	Potential Hazards:	Controls:
Setup / Preparation for excavation	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards. Keep work area neat, remove any unused tools or equipment.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Soil Sampling - with Hand Tools
Summary: Activity that includes mobilizing to the site, equipment set up, use of hand tools, collection of soil samples.

Principal Steps:	Potential Hazards:	Controls:
Hand digging	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	In adition to the controls listed above under site preparation, radiation monitoring of soils raised to the ground surface during the sampling will be performed and recorded periodically. Each split spoon sample will be monitored and recorded. All soil samples will be monitored.
	Unplanned Detonation	UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. Dig team or SSHO will stop all operation when non-essential personnel are in the EZ.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards. Keep work area neat, remove any unused tools or equipment.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Underground Utilities	The local utility locating hotline will be contacted to identify the locations of buried utilities before subsurface activities are allowed to commence. Potential subsurface activity locations will be cleared with SEDA personnel prior to commencement of work.
	Confined space	Install shoring or implement benching/sloping when excavation exceeds 4 feet if worker entrance is required. Implement confined space entry program (as required). Periodic trench inspections.
Collect HTW / RCWM samples	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Sampling - with Hand Tools**
Summary: **Activity that includes mobilizing to the site, equipment set up, use of hand tools, collection of soil samples.**

Principal Steps:	Potential Hazards:	Controls:
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
Segregate scrap and suspect CWM items for assessment	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
Load contaminated soil in drums	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Unplanned Detonation	UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. Dig team or SSHO will stop all operation when non-essential personnel are in the EZ.
Load contaminated soil in drums	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Sampling - with Hand Tools**
Summary: **Activity that includes mobilizing to the site, equipment set up, use of hand tools, collection of soil samples.**

Principal Steps:	Potential Hazards:	Controls:
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.

Equipment/Materials to be Used: Hand digging tools (e.g., shovel), Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: A daily inspection of PPE by workers will be conducted. Equipment will be inspected by workers daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will look for fissures and cracks in the walls and will ensure that engineering controls are still appropriate. During site set-up, equipment generating noise will be monitored by the SSHO to determine whether or not hearing protection is required.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Operators will be trained in the safe use of required equipment and in the required personal protective equipment. UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. Before entering a confined space, all personnel will show proof of confined space training to the SSHO.

Name: Timothy S. Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
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Workplace: Seneca Army Depot Activity
Activity being evaluated: Surface Water Sampling
Summary: Surface water sampling will include mobilization of personnel and equipment to the sampling location, and collection of samples.

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Heat Stress / Cold Stress Injuries	SHSO to implement heat and cold stress control program in accordance with the work plan.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting. Use proper ergonomic lifting techniques.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform SHSO or project manager of any slip, trip, or fall hazards.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Surface Water Sampling**
Summary: **Surface water sampling will include mobilization of personnel and equipment to the sampling location, and collection of samples.**

Principal Steps:	Potential Hazards:	Controls:
Surface Water Sample Collection	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants.
	Radiological Hazard Exposure	In addition to those listed under general site activities, all surface water samples will be monitored and recorded.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform SHSO or project manager of any slip, trip, or fall hazards.
	Surface Water Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Use face shield as appropriate.

Equipment/Materials to be Used: Clean sample container, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, UXO awareness and recognition, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Groundwater sampling**
Summary: **Groundwater sampling will begin by mobilization of personnel and equipment to the site. The existing groundwater monitoring wells will then be purged and groundwater samples will be collected. Groundwater expelled from the monitoring wells will be drummed for later disposal.**

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Heat and Cold Stress Injuries	SHSO to implement heat and cold stress control program in accordance with the work plan.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting. Use proper ergonomic lifting techniques.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform SHSO or project manager of any slip, trip, or fall hazards.
Groundwater Sample Collection	Injury from improper use of sampling instruments.	SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform supervisors if tools require repair or replacement.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Groundwater sampling**
Summary: **Groundwater sampling will begin by mobilization of personnel and equipment to the site. The existing groundwater monitoring wells will then be purged and groundwater samples will be collected. Groundwater expelled from the monitoring wells will be drummed for later disposal.**

Principal Steps:	Potential Hazards:	Controls:
	Sample Preservative Exposure	Training and safety awareness of potential exposure to corrosive or flammable sample preservatives. Appropriate PPE (tyvek coverall – optional, safety glasses, gloves, and steel-toe boots).
	Groundwater Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Watch for bees/wasps/spiders in protective well casings.
	Radiological Hazard Exposure	In addition to those listed under general site activities, groundwater purge water will be monitored and recorded during pumping. All groundwater samples will be monitored.

Equipment/Materials to be Used: Low-flow sampling pumps, photoionization detector, compound-specific Draeger Tubes if warranted, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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(person certifying that the evaluation has been performed)

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(date of evaluation)

Note(s):
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Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Monitoring Well Installation**
Summary: **Activity includes mobilization to the site, equipment set up, monitoring well installation.**

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Heat and Cold Stress Injuries	SHSO to implement heat and cold stress control program in accordance with the work plan.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Working area shall be blocked off from vehicles and pedestrians.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting. Use proper ergonomic lifting techniques.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform SHSO or project manager of any slip, trip, or fall hazards.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Monitoring Well Installation**
Summary: **Activity includes mobilization to the site, equipment set up, monitoring well installation.**

Principal Steps:	Potential Hazards:	Controls:
Transport drilling rig to site	Collision with vehicles	Practice defensive driving
Soil Boring and Monitoring Well Installation	Injury from Heavy Equipment Roll Over	Operation of heavy equipment in accordance with the work plan. Spotter and equipment operator will maintain close communication. Spotter will ensure that his actions are plain to the operator at all times. Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. Use hardhat (as required).
	Injury from Power Tool Operation	Personnel awareness of potential hazards from power tool operation. Power tools will be inspected prior to use and will be maintained and adjusted by qualified personnel. Personnel to inform supervisors if tools require repair or replacement. Operations will be conducted by authorized and trained personnel. Other personnel should stay away from the operation area. Requirements outlined in EM 385-1-1 Section 13 will be observed.
	Fire Hazards	All motors must be shut off during refueling. Smoking in the vicinity of the drilling rig is not permitted. An A-B-C fire extinguisher must be maintained on the drilling rig and associated motorized equipment. Fuel containers will not be stored within 10’ of the drilling rig motor. Fuel will be stored in UL approved safety containers with contents clearly labeled.
	Radiological Hazard Exposure	In addition to those discussed above, radiation monitoring of soils raised to the ground surface during boring/installation will be performed and recorded periodically. Each split spoon sample will be monitored and recorded. Groundwater purge water will be monitored and recorded during pumping. All soil and groundwater samples will be monitored.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Noise	Hearing protection will be worn in hazardous noise areas.

Workplace: Seneca Army Depot Activity

Activity being evaluated: Monitoring Well Installation

Summary: Activity includes mobilization to the site, equipment set up, monitoring well installation.

Principal Steps:	Potential Hazards:	Controls:
Excavated Soil and Purged Groundwater Loading into Drums	Injury from Heavy Equipment Roll Over	Operation of heavy equipment in accordance with the work plan. Spotter and equipment operator will maintain close communication. Spotter will ensure that his actions are plain to the operator at all times. Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. Use hardhat (as required). Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Noise	Hearing protection will be worn in hazardous noise areas.

Equipment/Materials to be Used: Split spoons, drill rig, low-flow sampling pumps, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: Drill rig to be fully inspected by drillers prior to commencement of project work. Safety inspections will be performed daily, or as required in the HSP. A daily inspection of PPE by workers will be conducted. Equipment will be inspected by workers daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will look for fissures and cracks in the walls and will ensure that engineering controls are still appropriate. During site set-up, equipment generating noise will be monitored by the SSHO to determine whether or not hearing protection is required.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: Radiation Scanning
Summary: Activities that involve radiation scanning, using various detection equipment, indoors and outdoors.

Principal Steps:	**Potential Hazards:**	**Controls:**
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Heat and Cold Stress Injuries	SHSO to implement heat and cold stress control program in accordance with the work plan.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform SHSO or project manager of any slip, trip, or fall hazards.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Radiation Scanning**
Summary: **Activities that involve radiation scanning, using various detection equipment, indoors and outdoors.**

Principal Steps:	**Potential Hazards:**	**Controls:**
Radiation Scanning	Injury from Equipment/Instrument Lifting	Personnel awareness of potential hazards from day-to-day equipment or instrument lifting. Use proper ergonomic lifting techniques. Use team-lift where needed. Take frequent breaks as needed, strech or change position to avoid shoulder or back strain.
	Injury from improper use of Ladder	Maintain three points of contact with the ladder at all times. Ensure the ladder is set up on an even surface prior to use. Avoid carrying equipment/instruments while climbing up or down the ladder.
	Illumination Hazards	Ensure that adequate lighting is provided to illuminate the work area, as discussed in the Generic Site-Wide Health and Safety Plan. Contact the SHSO or project manager if more lighting is needed.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards (both indoors and outdoors). Wear proper footwear for climbing igloo rooftops. Walk sideways up the rooftop, if possible. Avoid carrying equipment/tools while climbing. If possible, have the igloo rooftop mowed prior to commencement of project work.
	Heat and Cold Stress Injuries	SHSO to implement heat and cold stress control program in accordance with the work plan.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area. Watch for animal burrows or underground bees nests while working on igloo rooftops.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.

Equipment/Materials to be Used: Ladders, hand tools, Geiger-Mueller pancake-type detector, Phoswich Alpha/Beta detector, Floor Monitor Alpha/Beta detector, others as necessary.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Radiation Scanning**
Summary: **Activities that involve radiation scanning, using various detection equipment, indoors and outdoors.**

Principal Steps:	Potential Hazards:	Controls:

CONTINUED FROM PREVIOUS PAGE:

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Prior to working in a new space (building, igloo, rooftop) all workers will participate in a site inspection/walk through to identify potential hazards.

Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f), and will have completed radiation safety training. Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

Name: Timothy S Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
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2. Radiological Hazard Exposure continued from above:

All field inspectors will be provided training in the use of hand-held radiation meters prior to their assignment as lead representative on a survey crew. Surface screening of an area of roughly 900 ft2 will be conducted to determine radiation levels that are present before allowing any site work to begin in the area. The proposed investigation methodology will be reviewed and modified in the event that elevated levels of radiation are found. When intrusive activities are in progress, field inspector will measure and record the radiation level present in the designated work zone that the beginning of each day and periodically during the work day. Work will be suspended if radiation levels exceed two times background. Before indoor work commences, a walk through of the rooms of the building with a Micro-Rem exposure rate meter will be performed to determine the radiation level. The PHSO/RSO will evaluate the results and determine what actions need to be taken if the levels exceed two times of background.

Workplace: Seneca Army Depot Activity
Activity being evaluated: UXO Avoidance
Summary: Activity that involves locating anomalies and sample points, marking them, and clearing work areas as needed.

Principal Steps:	Potential Hazards:	Controls:
Locate anomalies and sample points selected for intrusive investigation.	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
Uses stakes or flags to mark the locations and extent of areas to be investigated.	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
Clear lines of sight using hand tools where needed.	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **UXO Avoidance**
Summary: **Activity that involves locating anomalies and sample points, marking them, and clearing work areas as needed.**

Principal Steps:	Potential Hazards:	Controls:
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Back injury	Employees will use proper lifting techniques.

Equipment to be used: GPS, various hand tools (shovel, mallet)

Inspection Requirements: A daily inspection of PPE by workers will be conducted. Equipment will be inspected daily by workers prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect loading locations at least daily.

Training Requirements: Operators will be trained in the safe use of required equipment and in the required personal protective equipment. All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

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(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
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Workplace: Seneca Army Depot Activity
Activity being evaluated: Test Pits
Summary: Activity that involves site reconnaissance, staking test pit locations, test pit excavation.

Principal Steps:	Potential Hazards:	Controls:
Project Setup: Site reconnaissance, staking test pit locations.	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Cold and Heat Stress Injuries	SHSO to implement heat stress/cold injury control program in accordance with the site-specific HSP
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Working area shall be blocked off from vehicles and pedestrians. Traffic control operations will comply with DOT requirements.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting. Utilize team-lift techniques as necessary.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
Test Pit Excavation	Injury from Heavy Equipment or Equipment Roll Over	Operation of heavy equipment in accordance with the Generic Site-Wide Health and Safety Plan. Spotter and equipment operator will maintain close communication. Spotter will ensure that his actions are clear to the operator at all times. Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. Use hardhat (as required). Personnel will generally remain 3 to 5 feet away from the test pit excavation except when samples are being collected.
	Test Pit Collapse	Workers will not enter excavations at any time. Soil samples will be collected from soil in the bucket collected from the specified depth interval.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Test Pits
Summary: Activity that involves site reconnaissance, staking test pit locations, test pit excavation.

Principal Steps:	Potential Hazards:	Controls:
	Encountering Utilities During Excavation	Utility clearance will be performed and documented prior to commencement of test pit excavation. Excavation locations will be cleared with SEDA personnel prior to commencement of excavation.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Injury from Power Tool Operation	Personnel awareness of potential hazards from power tool operation. Power tools will be inspected prior to use and will be maintained and adjusted by qualified personnel. Personnel to inform SHSO if tools require repair or replacement. Operations will be conducted by authorized and trained personnel. Other personnel shall stay away from the operation area. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Fire Hazards	All motors must be shut off during refueling. Smoking in the vicinity of the drilling rig is not permitted. An A-B-C fire extinguisher must be maintained on the drilling rig and associated motorized equipment. Fuel containers will not be stored within 10’ of the drilling rig motor. Fuel will be stored in UL approved safety containers with contents clearly labeled.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Test pits will be blocked off from general traffic to prevent hazards.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Test Pits**
Summary: **Activity that involves site reconnaissance, staking test pit locations, test pit excavation.**

Principal Steps:	Potential Hazards:	Controls:
	Noise	Hearing protection (i.e. ear plugs or muffs) will be worn by the equipment operator and equipment spotter when equipment is running.

Equipment/Materials to be Used: Backhoe, various hand and power tools, photoionization detector, sample bottle preservation materials, bowls, and spoons and dust monitor.

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. During site set-up, equipment-generating noise will be monitored by the SHSO to determine whether or not hearing protection is required.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

Name: Timothy S. Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
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Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Monitoring Well Abandonment**

Summary: **Activities that involve monitoring well abandonment.**

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Cold and Heat Stress Injuries	SHSO to implement heat stress/cold injury control program in accordance with the work plan.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Monitoring Well Abandonment**

Summary: **Activities that involve monitoring well abandonment.**

Principal Steps:	Potential Hazards:	Controls:
Casing pulling, protective casing and bollard removal	Injury from Heavy Equipment or Equipment Roll Over	Operation of heavy equipment in accordance with the work plan. Spotter and equipment operator will maintain close communication. Spotter will ensure that his actions are clear to the operator at all times. Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. Use hardhat (as required). Personnel will generally remain 3 to 5 feet away from the item being removed. Personnel will remain watchful of activities in the area immediately surrounding the drill rig.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Injury from Power Tool Operation	Personnel awareness of potential hazards from power tool operation. Power tools will be inspected prior to use and will be maintained and adjusted by qualified personnel. Personnel to inform SHSO if tools require repair or replacement. Operations will be conducted by authorized and trained personnel. Other personnel shall stay away from the operation area. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Fire Hazards	All motors must be shut off during refueling. Smoking in the vicinity of the drilling rig is not permitted. An A-B-C fire extinguisher must be maintained on the drilling rig and associated motorized equipment. Fuel containers will not be stored within 10’ of the drilling rig motor. Fuel will be stored in UL approved safety containers with contents clearly labeled.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Any pits generated during the project will be blocked off from general traffic to prevent hazards.
	Noise	Hearing protection will be worn in hazardous noise areas.
Excavated Soil and Expelled Groundwater Loading In Drums	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Monitoring Well Abandonment

Summary: Activities that involve monitoring well abandonment.

Principal Steps:	Potential Hazards:	Controls:
	Noise	Hearing protection will be worn in hazardous noise areas. Requirements outlined in the HSP will be observed.
	Injury from Heavy Equipment or Equipment Roll Over	Operation of heavy equipment in accordance with the work plan. Spotter and equipment operator will maintain close communication. Spotter will ensure that his actions are clear to the operator at all times. Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. Use hardhat (as required).

Equipment/Materials to be Used: Backhoe, drill rig, and/or other similar large equipment.

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. During site set-up, equipment-generating noise will be monitored by the SHSO to determine whether or not hearing protection is required.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: IDWs / Drum Moving / Filling / Emptying
Summary: Activities that involve drum moving, filling and emptying

Principal Steps:	Potential Hazards:	Controls:
Transfer drums or MRC to / from transport vehicle	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold and heat stress control program.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Noise	Hearing protection will be worn in hazardous noise areas.
	Back injury	Personnel will utilize proper lifting techniques, and team-lift techniques where needed.
Filling Drums	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Noise	Hearing protection will be worn in hazardous noise areas.
	Back injury	Personnel will use caution when shoveling dirt into a drum to avoid spraying rocks or dirt. If possible, only one worker will fill a drum at a time.
	Hand injury	Thick gloves will be worn while filling drums. Personnel will follow established procedures for opening or closing drums.
Emptying Drums	Injury from sliding/falling drum	Personnel will determine who will be in charge of the task, this person will direct all subsequent actions (Tip, Roll, Dump, etc.).
	Noise	Hearing protection will be worn in hazardous noise areas.
	Back injury	Personnel will utilize team-lift techniques for emptying all drums.
	Hand injury	Thick gloves will be worn while filling drums. Personnel will follow established procedures for opening or closing drums.
Drum / MRC Transport	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **IDWs / Drum Moving / Filling / Emptying**
Summary: **Activities that involve drum moving, filling and emptying**

Principal Steps:	Potential Hazards:	Controls:
	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Injury from sliding/falling drum	Drums will be carefully loaded and secured prior to transport. Heavy gloves will be worn while moving or adjusting drums.
	Noise	Hearing protection will be worn in hazardous noise areas.

Equipment/Materials to be Used: Drum dolly, forklift, drum wrench, shovels.

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: Driving in the Ammo Area / "Q"
Summary: Activities that involve driving within the Ammo Area or Q

Principal Steps:	Potential Hazards:	Controls:
Driving within the Ammo Area	Access	Personnel will obtain the gate keys from SEDA personnel in Building 123, keys will be signed out, and must be returned upon to project completion.
	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, and will obey posted speed limits. Personnel will practice defensive driving techniques.
	Struck By	Personnel will be aware of wildlife hazards within the Q that may include but are not limited to: deer, turkeys. Personnel will drive slowly, and will stop if necessary to allow for wildlife passage.
	Imobilized Vehicle	Personnel will drive only on paved or cleared dirt roads, and will park their vehicles only on paved or dirt roads. Vehicles will be parked facing the exit, and keys will be left in or on the vehicle.
	Communication	Prior to commencement of daily activities, the method of communication will be discussed. Personnel that will be working within the Ammo Area will have either two-way radios or cellular phones with which to communicate with each other and with the field office.
Driving within the Q	Access	Personnel will obtain the gate control (garage door opener type) from SEDA personnel in Building 123, control will be signed out, and must be returned upon to project completion.
	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, and will obey posted speed limits. Personnel will practice defensive driving techniques.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Driving in the Ammo Area / "Q"**
Summary: **Activities that involve driving within the Ammo Area or Q**

Principal Steps:	Potential Hazards:	Controls:
	Struck By	Personnel will be aware of wildlife hazards within the Q that may include but are not limited to: deer, turkeys. Personnel will drive slowly, and will stop if necessary to allow for wildlife passage.

Equipment/Materials to be Used: Motor Vehicle.

Inspection Requirements: Motor vehicle will be in good working order.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment. All Parsons personnel will have completed the defensive driving training course.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: Decontamination Area Set-up
Summary: Activities involved with decontamination area set-up

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Cold and Heat Stress Injuries	SHSO to implement heat stress/cold injury control program in accordance with the work plan.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform Site Manager or SHSO of any slip, trip, or fall hazards. Practice good housekeeping, keep work areas neat.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
Decontamination area set-up.	Slips trip and falls	Be aware of tripping hazards.
	Back injury	Personnel will utilize proper lifting techniques. See Drum AHA if moving drums is involved.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Decontamination Area Set-up
Summary: Activities involved with decontamination area set-up

Principal Steps:	Potential Hazards:	Controls:
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Electrocution	Inspect for buried and overhead utilities in the vicinity of the work area. A clearance permit shall be obtained from base personnel or utility companies prior to initiating intrusive operations.
	Injury from Power Tool Operation	All tools will be in good working order. No damaged equipment will be used until repaired or replaced. When power operated tools are designed to accommodate guards, the guard must be in place on the tool. Fuel powered tools may be refueled, serviced, or maintained only while the tools are stopped and not operating.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.

Equipment to be used: Drums, lumber, sheet plastic, hand tools, power tools, decon buckets, brush, nominal 5% bleach solution, detergent, and water.

Inspection Requirements: Equipment will be inspected by workers daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired or replaced. The SSHO will ensure prior to daily operations that the PDSs are ready for operations.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

Name: Timothy S Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Building Soil Piles
Summary: Activities that involve building soil piles

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Cold and Heat Stress Injuries	SHSO to implement heat stress/cold injury control program in accordance with the work plan.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Motorized/Pedestrian Traffic	Personnel exercise caution while working in the vicinity of a street and near vehicular traffic. Working area shall be blocked off from vehicles and pedestrians.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Building Soil Piles**
Summary: **Activities that involve building soil piles**

Principal Steps:	Potential Hazards:	Controls:
Building Soil Piles	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	In adition to the controls listed above under site preparation, radiation monitoring of soils raised to the ground surface during the sampling will be performed and recorded periodically.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Contamination Management	All soil piles will be built on top of tarps or plastic. Piles will be covered tightly with the same, and either weighted-down or staked down upon project completion.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.

Equipment/Materials to be Used: Hand tools, Heavy Equipment, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: None.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Building Soil Piles**
Summary: **Activities that involve building soil piles**

Principal Steps:	Potential Hazards:	Controls:

CONTINUED FROM PREVIOUS PAGE:

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

Name: Timothy S. Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Surveying / GPS
Summary: Activities that involve surveying or GPS work

Principal Steps:	Potential Hazards:	Controls:
Gather geophysical data on subsurface anomalies by carrying instruments across the site.	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Back injury	Personnel will utilize proper lifting techniques.
UXO teams will preceed the geophysics team to ensure UXO avoidance.	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Unplanned Detonation	UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. Dig team or SSHO will stop all operation when **non-essential** personnel are in the EZ.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Surveying / GPS
Summary: Activities that involve surveying or GPS work

Principal Steps:	Potential Hazards:	Controls:
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Back injury	Proper lifting techniques.

Equipment to be used: Geophysical instruments.

Inspection Requirements: A daily inspection of PPE by workers will be conducted. Equipment will be inspected daily by workers prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect loading locations at least daily.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Name: Timothy S Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Working on Igloo Rooftops**
Summary: **Activities that involve working on igloo rooftops**

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Cold and Heat Stress Injuries	SHSO to implement heat stress/cold injury control program in accordance with the work plan.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Working on Igloo Rooftops**
Summary: **Activities that involve working on igloo rooftops**

Principal Steps:	Potential Hazards:	Controls:
Working on Igloo Rooftops	Fall Protection	Personnel should stay more than 10 feet away from the front edge of the igloo (side facing the driveway). See note below for a description of an igloo. If personnel must perform work within 0-10 feet of the front edge, the SHSO will implement a fall protection program in accordance with 29 CFR 1926 Subpart M.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards unique to igloo rooftops. Wear proper footwear for climbing igloo rooftops. Walk sideways up the rooftop, if possible. Avoid carrying equipment/tools while climbing. If possible, have the igloo rooftop mowed prior to commencement of project work.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area. Watch for animal burrows or underground bees nests while working on igloo rooftops.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.

Equipment/Materials to be Used: Various hand tools and equipment, various radiation detection instruments.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Working on Igloo Rooftops**
Summary: **Activities that involve working on igloo rooftops**

Principal Steps:	Potential Hazards:	Controls:

CONTINUED FROM PREVIOUS PAGE:

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Prior to working in a new space (building, igloo, rooftop) all workers will participate in a site inspection/walk through to identify potential hazards.

Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

Name: Timothy S Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.
2. Igloos at SEDA have three gradually sloping sides that are covered with dirt, grass, trees and bushes. The fourth side faces the igloo driveway, and has a steep drop (approx. 20 feet from the roof to the driveway below).

Workplace: Seneca Army Depot Activity
Activity being evaluated: Building Decontamination
Summary: Activities involved with building decontamination

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Cold and Heat Stress Injuries	SHSO to implement heat stress/cold injury control program in accordance with the work plan.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
Building Decontamination	Noise	Hearing protection will be worn in hazardous noise areas.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Building Decontamination
Summary: Activities involved with building decontamination

Principal Steps:	Potential Hazards:	Controls:
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Asbestos, Lead Paint, Histoplasmosis (from bird droppings) hazards will be addressed as applicable.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards. Work areas will be kept neat.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.
	Injury from Power Washer Operation	Personnel will be trained in the proper use of high-pressure power washers prior to commencement of work. Proper PPE (including safety glasses) will be worn at all times.
	Injury from Material Lifting	Personnel will use caution when filling or moving containers that contain decontamination process wastes and residues. Team lift techniques will be utilized as needed.

Equipment/Materials to be Used: Sponges, brushes, buckets, detergent, water, high-power pressure washer, containers (drums).

Inspection Requirements: Personnel will conduct a daily inspection of PPE and equipment. Equipment will be inspected prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, it is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Building Decontamination**
Summary: **Activities involved with building decontamination**

Principal Steps:	Potential Hazards:	Controls:

CONTINUED FROM PREVIOUS PAGE:

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

Name: Timothy S. Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Trenching
Summary: Activities that involve trench digging

Principal Steps:	Potential Hazards:	Controls:
General Site Activities	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Cold and Heat Stress Injuries	SHSO to implement heat stress/cold injury control program in accordance with the work plan.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Injury from Material Lifting	Personnel awareness of potential hazards from day-to-day material lifting.
	Injury from Hand Tool Operation	Personnel awareness of potential hazards from hand tool operation. SHSO will ensure that all tools used on site are in proper working order and are in good condition. Personnel to inform SHSO or project manager if tools require repair or replacement. Requirements outlined in EM385-1-1 Section 13 will be observed.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Trenching
Summary: Activities that involve trench digging

Principal Steps:	Potential Hazards:	Controls:
Trenching	Vehicle and Heavy Equipment Traffic in Work Area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. During excavations with a backhoe, there must be an observer at all times to watch the backhoe bucket. The observer will visually identify and alert the operator to any obstructions while the bucket is excavating. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Tripping Hazards	Personnel awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	In addition to those discussed above, radiation monitoring of soils raised to the ground surface during boring/installation will be performed and recorded periodically. Each split spoon sample will be monitored and recorded. Groundwater purge water will be monitored and recorded during pumping. All soil and groundwater samples will be monitored.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Confined space	Install shoring or implement benching/sloping when excavation exceeds 4 feet if worker entrance is required. Implement confined space entry program (as required). Periodic trench inspections.
	Unplanned Detonation	UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. Dig team or SSHO will stop all operation when non-essential personnel are in the EZ.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Trenching**
Summary: **Activities that involve trench digging**

Principal Steps:	Potential Hazards:	Controls:
	Electrical/Other Underground Utillities	The local utility locating hotline will be contacted to identify the locations of buried utilities before subsurface activities are allowed to commence. Potential subsurface activity locations will be cleared with SEDA personnel prior to commencement of work. When excavations occur within 2 ft, vertically or horizontally, of a direct buried electrical or communication cable, exploratory hand trenching must be done to authenticate the actual location of the cable. Excavation areas will be swept with a metal detector, and probing will be conducted as required in the HSP. If pipe or other obstacles are encountered, shoring and hand excavation are required until the obstacles are identified and cleared. Should any underground obstructions be encountered, the Parsons designated person must immediately notify the designated client representative, who in turn notifies the proper personnel to assist in identification of the obstruction and its possible removal or re-routing.
	Trench Collapse	During hand excavations, if a person's head is below the top of the excavation or if the trench is greater than 4 ft deep, shoring is required.

Equipment/Materials to be Used: Hand tools, backhoe, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: A daily inspection of PPE by workers will be conducted. Equipment will be inspected daily by workers prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. A competent person will inspect trenching locations at least daily or after any significant weather event - if personnel will be working in trench (not required if no personnel will need to enter).

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

Name: Timothy S Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
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Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Excavation**
Summary:

Principal Steps:	Potential Hazards:	Controls:
Setup / Preparation for excavation	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Noise	Hearing protection will be worn in hazardous noise areas.
Hand digging	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Unplanned Detonation	UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. Dig team or SSHO will stop all operation when non-essential personnel are in the EZ.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Soil Excavation
Summary:

Principal Steps:	Potential Hazards:	Controls:
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All personnel will be required to complete the Radiation Safety Training prior to being allowed to work onsite. The training class will be refreshed annually. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Underground Utilities	The local utility locating hotline will be contacted to identify the locations of buried utilities before subsurface activities are allowed to commence. Potential subsurface activity locations will be cleared with SEDA personnel prior to commencement of work.
	Confined space	Install shoring or implement benching/sloping when excavation exceeds 4 feet if worker entrance is required. Implement confined space entry program (as required). Periodic trench inspections.
Mechanical Excavation	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Unplanned Detonation	UXO awareness training provided by SSHO. Personnel within the EZ will observe EP-3851-95a, Basic Safety Concepts and Consideration for OE, dtd June 01. Only UXO technicians will handle OE/UXO/Demolition material. Personnel, in the immediate vicinity of the operations, will be kept to the minimum necessary for safe operations. Dig team or SSHO will stop all operation when non-essential personnel are in the EZ.
	Cold and heat stress injuries	Implement heat stress/cold injury control program.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Excavation**
Summary:

Principal Steps:	Potential Hazards:	Controls:
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Noise	Hearing protection will be worn in hazardous noise areas.
	Electrical/Other Underground Utillities	The local utility locating hotline will be contacted to identify the locations of buried utilities before subsurface activities are allowed to commence. Potential subsurface activity locations will be cleared with SEDA personnel prior to commencement of work. When excavations occur within 2 ft, vertically or horizontally, of a direct buried electrical or communication cable, exploratory hand trenching must be done to authenticate the actual location of the cable. Excavation areas will be swept with a metal detector, and probing will be conducted as required in the HSP. If pipe or other obstacles are encountered, shoring and hand excavation are required until the obstacles are identified and cleared. Should any underground obstructions be encountered, the Parsons designated person must immediately notify the designated client representative, who in turn notifies the proper personnel to assist in identification of the obstruction and its possible removal or re-routing.
	Excavation and trenching	Install shoring or implement benching/sloping when excavation exceeds 4 feet if worker entrance is required. Implement confined space entry program (as required). Periodic trench inspections by the SSHO.
Collect HTW / RCWM samples	Cold and heat stress injuries	Implement heat stress/cold injury control program.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). CWM, HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
Segregate scrap and suspect CWM items for assessment	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Excavation**
Summary:

Principal Steps:	Potential Hazards:	Controls:
	Cold and heat stress injuries	Implement heat stress/cold injury control program.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Excavation**
Summary:

Principal Steps:	Potential Hazards:	Controls:
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
Backfill excavation.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Noise	Hearing protection will be worn in hazardous noise areas.
Compacting soil.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Excavation**
Summary:

Principal Steps:	Potential Hazards:	Controls:
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Noise	Hearing protection will be worn in hazardous noise areas.
Seeding.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.

Equipment to be used: Excavator, loader, compactor, shoring, and hand tools, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: All excavator, compactor equipment will be inspected prior to use. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can b repaired or replaced.

A daily inspection of PPE by workers will be conducted. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will look for fissures and cracks in the walls and will ensure that engineering controls are still appropriate.

During site set-up, equipment generating noise will be monitored by the SSHO to determine whether or not hearing protection is required.

A competent person will inspect the excavation at least daily or after any significant weather event - if personnel will be working (collecting samples, etc.) in the excavation (not required if personnel will not enter).

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Soil Excavation**
Summary:

Principal Steps:	**Potential Hazards:**	**Controls:**

CONTINUED FROM PREVIOUS PAGE:

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Operators will be trained in the safe use of required equipment and in the required personal protective equipment. UXO Personnel must be certified as EOD-trained and must be approved for the project by the USAESCH Safety Officer and Contracting Officer. Before entering a confined space, all personnel will show proof of confined space training to the SSHO. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Name: Timothy S. Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

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Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Site Walk / Visit**
Summary: **Activities where visitors to the site would enter the Exclusion Zone (active work area)**

Principal Steps:	Potential Hazards:	Controls:
Site Walk / Visit	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles (Parsons only). Visitors will be aware of road conditions and hazards, which include wildlife at the Depot. Visitors will practice defensive driving techniques.
	Site Hazardous Material Exposure	Visitors will be aware of potential exposure to contaminants at the site. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots).
	Tripping Hazards	Visitor awareness of potential slippery surfaces and tripping hazards. Inform field coordinator or SHSO of any slip, trip, or fall hazards.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Radiological Hazard Exposure	Safety awareness of radiological hazards. All visitors will wear personal radiation dosimeters while within the Exclusion Zone. All visitors shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking.
	Noise	Hearing protection will be worn in hazardous noise areas.
	Vehicle and heavy equipment traffic in work area	Visitors will be alert when walking around heavy equipment.

Equipment/Materials to be Used: None.

Inspection Requirements: None.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Site Walk / Visit**
Summary: **Activities where visitors to the site would enter the Exclusion Zone (active work area)**

Principal Steps:	Potential Hazards:	Controls:

CONTINUED FROM THE PREVIOUS PAGE:

Training Requirements: All visitors must make arrangements with both the resident Army client and Parsons well in advance of the planned visit. Any visitors that wish to enter the Exclusion Zone (EZ) will provide written documentation of the following: appropriate, up-to-date hazardous waste operations training, current participation in a medical surveillance program per requirements of 29 CFR 1910.120, and evidence of the ability to use a respirator in accordance with 29 CFR 1910.134. If the EZ is a radiological site as described in EM 385-1-1 Section 06.E (c), approved visitors must be willing to participate in appropriate dosimetry use that is coordinated with the RSO.

Once approved, visitors will be briefed by a qualified person on the hazards expected at the site and the health controls required. They will be escorted by the site manager or his/her designee, and will follow all advice and instructions provided by the Parsons' Site Manager and SHSO.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: Power and Hand Tool Operation
Summary: Activities that involve power or hand tool operation

Principal Steps:	Potential Hazards:	Controls:
Power Tool Operation	Hand Injury	Tools will be operated per the manufacturer's instructions. PPE will be worn as described in the HSP. In general, thick work gloves will be worn while operating power tools. Employees will be trained how to properly use new or unfamiliar equipment.
	Back Injury	Personnel will use proper lifting techniques, and will take breaks as needed to strech or change position.
	Eye Injury	Safety glasses and/or face shields will be worn while power tools are being used.
	Electrocution	Inspect for buried and overhead utilities in the vicinity of the work area. A clearance permit shall be obtained from base personnel or utility companies prior to initiating intrusive operations.
	General Use	All tools will be in good working order. No damaged equipment will be used until repaired or replaced. When power operated tools are designed to accommodate guards, the guard must be in place on the tool. Fuel powered tools may be refueled, serviced, or maintained only while the tools are stopped and not operating. Electrical power tools must be plugged into Ground Fault Circuit Interrupters (GFCI).
	Tripping	Work areas will be kept neat, unused tools will be put away. Power cords will be secured to the ground.
	Noise	Hearing protection will be worn in hazardous noise areas.
Hand Tool Operation	Hand Injury	Tools will be used in a correct and safe manner. PPE will be worn as described in the HSP. In general, thick work gloves will be worn while operating power tools. Employees will be trained how to properly use new or unfamiliar equipment.
	Back Injury	Personnel will use proper lifting techniques, and will take breaks as needed to strech or change position.
	Eye Injury	Safety glasses and/or face shields will be worn while hand tools are being used.
	General Use	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Power and Hand Tool Operation**
Summary: **Activities that involve power or hand tool operation**

Principal Steps:	Potential Hazards:	Controls:
	Tripping	Work areas will be kept neat, unused tools will be put away.

Equipment/Materials to be Used: Any power or hand tools, ground fault circuit interrupters

Inspection Requirements: All tools will be inspected prior to use.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: Heavy and Motorized Equipment Operation
Summary: Activity involving use of heavy or motorized equipment

Principal Steps:	Potential Hazards:	Controls:
Transport to the site	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Struck by passing vehicle	Erect signs stating "Danger Construction Zone" on orange background with black letters, post them at least 100 yards from both sides of traffic. Lights or reflectors shall be used on signs for night work.
	Struck By	All equipment and tools will be properly secured during transport. **All vehicles and equipment will comply with DOT and OSHA requirements.**
	Tip Over	Never move the equipment with the bucket upright. Set hydraulic leveling jacks before use (as applicable). Ensure the work area foundation is as stable as possible. Blades and buckets must be lowered to the ground and parking brakes set before shutting off a heavy equipment or vehicle.
	Backing	Use a ground guide along with a functioning back-up alarm (that is audible above the site noise) during equipment backing.
Heavy or Motorized Equipment Operation	Equipment Maintenance	The equipment must be maintained in a proper functioning condition. All motors must be shut off and electrical, mechanical and hydraulic components locked out of service when making repairs. Safety shutoff system must be tested daily and not disabled. Bleed off pressure on hydraulic lines before undoing fittings. Do not leave tools or parts loose on the equipment after maintenance has been performed.
	General use	All equipment must be inspected daily prior to use. Equipment must be operated and maintained in accordance with EM 385-1-1 and manufacturers guidelines. Vehicle cab must be kept free of all nonessential items, and all loose items must be secured. Safety glass must be used in windshields, windows, and doors. Cracked or broken glass must be replaced prior to use. Large construction motor vehicles and heavy equipment must be provided with necessary safety equipment (seat belts, rollover protection, emergency shutoff in case of rollover, and backup warning lights and audible alarms). Any equipment that is unattended must be immobilized and secured against accidental movement.
	Fire Hazards	All motors must be shut off during refueling. Smoking in the vicinity of the drilling rig is not permitted. An A-B-C fire extinguisher must be maintained on the drilling rig and associated motorized equipment. Fuel containers will not be stored within 10’ of the drilling rig motor. Fuel will be stored in UL approved safety containers with contents clearly labeled.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Heavy and Motorized Equipment Operation
Summary: Activity involving use of heavy or motorized equipment

Principal Steps:	**Potential Hazards:**	**Controls:**
	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques. Operators of heavy equipment will be trained in the operation of such, and will provide documentation to the SHSO prior to operation.
	Tip Over	Never move the equipment with the bucket upright. Set hydraulic leveling jacks before use (as applicable). Ensure the work area foundation is as stable as possible. Blades and buckets must be lowered to the ground and parking brakes set before shutting off a heavy equipment or vehicle. Load composition, stability, stacking, unstacking and transport will be conducted in accordance with the site-specific HSP. If a load is in a raised position, an operator will attend to the controls. The maximum rated load for a lift vehicle will not be exceeded.
	Struck By	No part of any load will pass above a worker. Loads that might tip or fall must be secured. Loads will be transported as low to the ground as feasible.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Electrocution	Inspect for buried and overhead utilities in the vicinity of the work area. A clearance permit shall be obtained from base personnel or utility companies prior to initiating intrusive operations.
	Noise	Hearing protection will be worn in hazardous noise areas.

Equipment/Materials to be Used: Any heavy equipment (excavator, backhoe, forklift, etc.)

Inspection Requirements: Equipment will be inspected daily prior to use. Vehicle operators must check brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Heavy and Motorized Equipment Operation**
Summary: **Activity involving use of heavy or motorized equipment**

Principal Steps:	Potential Hazards:	Controls:

CONTINUED FROM THE PREVIOUS PAGE:

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: Project Mobilization / Demobilization
Summary: Activities involved with project mobilization and demobilization

Principal Steps:	Potential Hazards:	Controls:
Mobilization / Set up Work Area	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Operation of Motor Vehicle	Drivers will have a valid driver's license and will wear a seat belt at all times. Drivers are prohibited from using any communication devices (e.g., cell phones) while operating any motor vehicles. Personnel will be aware of road conditions and hazards, which include wildlife at the Depot. Personnel will practice defensive driving techniques.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Imobilized Vehicle	Personnel will drive only on paved or cleared dirt roads, and will park their vehicles only on paved or dirt roads. Vehicles will be parked facing the exit, and keys will be left in or on the vehicle.
	Communication	Prior to commencement of daily activities, the method of communication will be discussed. Personnel that will be working within the Ammo Area will have either two-way radios or cellular phones with which to communicate with each other and with the field office.
	Noise	Hearing protection will be worn in hazardous noise areas.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Back injury	Personnel will utilize proper lifting techniques.
Demobilization / Restore site.	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement cold/heat stress control program.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Project Mobilization / Demobilization**
Summary: **Activities involved with project mobilization and demobilization**

Principal Steps:	Potential Hazards:	Controls:
	Biological Hazard (ticks, bees, mosquitoes, snakes, spiders, etc.)	Personnel awareness of potential exposure to biological hazards. Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, and boots) and insect repellants. Wear thick gloves when clearing plants or debris from work area.
	Vehicle and heavy equipment traffic in work area	Operation of heavy equipment in accordance with the HSP. Be alert when working around heavy equipment. Ground guide for the backing of all vehicles. No heavy equipment will be operated without a ground guide. Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.
	Noise	Hearing protection will be worn in hazardous noise areas.
	Hand tools	All tools will be in good working order. No damaged equipment will be used until repaired or replaced.
	Back injury	Proper lifting techniques.

Equipment/Materials to be Used: Common hand tools, vehicles, and forklift/crane.

Inspection Requirements: All equipment will be inspected daily by workers prior to use. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired or replaced.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment.

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Workplace: Seneca Army Depot Activity
Activity being evaluated: Personnel Decontamination
Summary: Activities involving personnel decontamination

Principal Steps:	Potential Hazards:	Controls:
Decontaminate personnel exiting from the EZ.	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). HTW, radiation, and UXO training and safety awareness during site specific training and refreshed during morning tailgate briefing. Air monitoring for chemical agents and dust while digging. Use face shield as appropriate.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All survey personnel will wear personal radiation dosimeters during the work. All personnel and equipment shall be frisked using the Geiger-Mueller pancake-type detector prior to leaving the work area and prior to eating, smoking, or drinking. Detailed radiation decontamination procedures are included in Attachment A-2 and will be reviewed will personnel prior to commencement of project work.
	Eye injury	PPE (safety glasses, face shield) will be worn as required in the HSP.
	Slips trip and falls	Be aware of tripping hazards.
	Cold Stress/Heat Injuries	Implement cold injury/heat stress control program.
	General	Decontamination procedures may vary for each work area. Personnel will follow decontamination procedures outlined in the site-specific HSP. PPE and decon water will be collected and disposed of according to the HSP.
Support rescue personnel (as required).	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site. Training of personal decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). Personnel will follow decontamination procedures outlined in the site-specific HSP.
	Bloodborne Pathogens	Personnel will be trained in risks associated with bloodborne pathogens, in accordance with the Generic Site-Wide Health and Safety Plan.
	Cold/heat injuries	Implement cold injury/heat stress control program.
	Back injury	Personnel will utilize proper lifting techniques.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Personnel Decontamination**
Summary: **Activities involving personnel decontamination**

Principal Steps:	**Potential Hazards:**	**Controls:**
	Slips trip and falls	Be aware of tripping hazards.

Equipment/Materials to be Used: Decon buckets, brush, nominal 5% bleach solution, detergent, and water, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: All PPE will be inspected daily by workers prior to use.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment. Personnel will be trained in the site-specific decontamination procedures prior to commencement of Exclusion Zone work. Site-specific decontamination procedures will be outlined in the HSP.

Name: Timothy S Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.

Workplace: Seneca Army Depot Activity
Activity being evaluated: Tool / Equipment Decontamination
Summary: Activities involving personnel decontamination

Principal Steps:	Potential Hazards:	Controls:
Process items through decontamination in accordance with HSP.	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site and decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots). Personnel will follow decontamination procedures outlined in the site-specific HSP.
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. All survey personnel will wear personal radiation dosimeters during the work. Detailed radiation decontamination procedures are included in Attachment A-2 and will be reviewed will personnel prior to commencement of project work.
	Tripping hazards	Worker awareness of potential slippery surfaces and tripping hazards.
	Cold and heat stress injuries	Implement heat stress control program.
	Eye injury	PPE (safety glasses, face shield) will be worn as required in the HSP.
	General	Decontamination procedures may vary for each work area. Personnel will follow decontamination procedures outlined in the site-specific HSP. PPE and decon water will be collected and disposed of according to the HSP.
Remove gross contamination with brush.	Chemical warfare agents	CWM training and safety awareness. Personnel UXO safety awareness. All items found during the investigation will be assessed by UXO personnel prior to decontamination. If any suspect items not previously assessed are encountered, work will stop to have the items investigated by a trained UXO specialist. Headspace analysis will be performed on all items prior to decontamination to ensure that personnel are wearing the proper PPE
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site and decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots).
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. Appropriate PPE will be worn.
	Eye Injury	PPE (safety glasses, face shield) will be worn as required in the HSP.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Tool / Equipment Decontamination**
Summary: **Activities involving personnel decontamination**

Principal Steps:	Potential Hazards:	Controls:
Place in decontamination bucket or rinse with decontamination solution.	Chemical warfare agents	CWM training and safety awareness. Personnel UXO safety awareness. All items found during the investigation will be assessed by UXO personnel prior to decontamination. If any suspect items not previously assessed are encountered, work will stop to have the items investigated by a trained UXO specialist. Headspace analysis will be performed on all items prior to decontamination to ensure that personnel are wearing the proper PPE
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site and decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots).
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. Appropriate PPE will be worn.
	Eye Injury	PPE (safety glasses, face shield) will be worn as required in the HSP.
	Cold and heat stress injuries	Implement heat stress control program.
Clean with soap solution.	Chemical warfare agents	CWM training and safety awareness. Personnel UXO safety awareness. All items found during the investigation will be assessed by UXO personnel prior to decontamination. If any suspect items not previously assessed are encountered, work will stop to have the items investigated by a trained UXO specialist. Headspace analysis will be performed on all items prior to decontamination to ensure that personnel are wearing the proper PPE
	Site Hazardous Material Exposure	Training and safety awareness of potential exposure to contaminants at the site and decontamination procedure. Appropriate PPE (tyvek coverall - optional, safety glasses, gloves, and steel-toe boots).
	Radiological Hazard Exposure	Training and safety awareness of radiological hazards during site-specific training. Appropriate PPE will be worn.
	Eye Injury	PPE (safety glasses, face shield) will be worn as required in the HSP.
Rinse with water.	Eye Injury	PPE (safety glasses, face shield) will be worn as required in the HSP.
	Cold and heat stress injuries	Implement heat stress control program.

Workplace: **Seneca Army Depot Activity**
Activity being evaluated: **Tool / Equipment Decontamination**
Summary: **Activities involving personnel decontamination**

Principal Steps:	Potential Hazards:	Controls:
Screen for contamination.	Hand Injury	Tools and instruments will be used in a correct and safe manner. PPE will be worn as described in the HSP. Employees will be trained how to properly use new or unfamiliar equipment.

Equipment/Materials to be Used: Decon buckets, brush, nominal 5% bleach solution, detergent, and water, Geiger-Mueller pancake-type detector, other radiation detection equipment, as necessary.

Inspection Requirements: All PPE will be inspected daily by workers prior to use.

Training Requirements: All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additional training (such as first aid/CPR, bloodborne pathogens, respiratory protection, confined space entry, etc.) will be provided as applicable. Personnel will be trained in the safe use of required equipment and in the required PPE. All personnel operating heavy equipment will provide proof of competency with the equipment to the SHSO prior to operating the equipment. Personnel will be trained in the site-specific decontamination procedures prior to commencement of Exclusion Zone work. Site-specific decontamination procedures will be outlined in the HSP.

Name: Timothy S. Mustard, CIH
(person certifying that the evaluation has been performed)

Date: 2/24/2005
(date of evaluation)

Note(s):
1. This analysis serves as certification of hazard assessment and is in compliance with EM 385-1-1 Section 06.A.02 for Hazard Evaluation.

Attachment A-5

Confined Space Work

SECTION 9
CONFINED SPACE WORK

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Confined Space Monitor Log

Confined Space Sign In/Out Form

Special Precaution Permit for Hot Work or Entry

9 CONFINED SPACE WORK

This section establishes the procedures that must be followed before personnel may enter a confined space.

9.1 SCOPE

Before any person enters a confined space, a job task analysis (JTA) and an entry permit must be issued in accordance with this procedure. All other applicable permits, such as hot work permits, must also be obtained. Entry permits authorize specific work in specific locations.

All these permits and other authorities must certify that existing and potential hazards have been evaluated, and that all necessary protective measures have been taken to ensure the safety of each worker.

The JTA, entry permit, and all other applicable permits must be approved by the Construction Manager or authorized designate and issued by the relevant craft supervisor.

In addition, before any confined space entry can be permitted, a permit space rescue plan must be written for that space. Refer to subsection 9.6 for instructions on completing a confined space rescue plan. The confined space rescue plan should be generated as a self-contained document so it can be readily accessible to affected employees and be posted near the confined space it is designed for.

9.2 DEFINITIONS

A **permit-required confined space** is any enclosed space that:

1. Is large enough and configured so that an employee can enter bodily and perform assigned work
2. Provides limited or restricted means for entry or exit (tanks, vessels, silos, storage bins, hoppers, vaults, pits, and diked areas)
3. Is not designed for continuous occupancy
4. Has one or more of the following characteristics:
    a. Contains or has a known potential to contain a hazardous atmosphere
    b. Contains a material that could engulf an employee
    c. Is internally configured in a way that could trap or asphyxiate an entrant because of its inwardly converging walls, or because its floor slopes downward and tapers to a smaller cross-section
    d. Contains any other recognized serious safety or health hazard

A **hazardous atmosphere** is any atmosphere that exposes employees to the risk of death, injury, or acute illness from one or more causes such as:

1. Flammable gases, vapor, or mist in excess of 10% (1/10) of the lower explosive limit (LEL)
2. A concentration of airborne combustible dust that meets or exceeds the LEL or that obscures vision at a distance of 5 ft or less
3. An oxygen concentration less than 19.5% or greater than 23.5%
4. A concentration of any substance above the threshold limit value (TLV)
5. Any other atmospheric condition considered immediately dangerous to life and health (IDLH)

9.3 PREPARATION AND PRECAUTIONS

All preparatory work must be completed before an entry permit can be issued. Preparatory work includes but is not limited to the following steps.

9.3.1 BLINDING

Blind confined spaces properly to prevent the release of hazardous materials into the space or eliminate the potential for employees becoming engulfed by any liquid or solid material.

9.3.2 LOCKOUT AND TAGOUT

Lockout and tagout any electrical connection, pipe, line, or duct into the confined space in accordance with the lockout/tagout procedure contained in section 10.

9.3.3 MECHANICAL HAZARDS

In accordance with the lockout/tagout procedure, secure all mechanical hazards such as agitators, fans, and other power-driven moving parts in vessels and confined spaces. Entry is not permitted until such parts have been rendered motionless.

9.3.4 PURGING AND CLEANING

Purge, steam, and wash a vessel or confined space as needed to free the area of all possible contaminants. Give special attention to removing liquid product, sludge, and residue; to controlling escaping gases and vapors in the surrounding area; to preventing access to the area by unauthorized personnel; and to controlling all ignition sources in the area.

9.3.5 FRESH AIR

Establish a flow of positive fresh air ventilation (eductor or blower) in the vessel or confined space. Natural ventilation is not sufficient.

9.3.6 HAZARD NOTICE

Ensure that all personnel are familiar with all job hazards, that all equipment is in good condition and compatible with the work involved, and that notice is given in the form of signage, during task training, and on permits to indicate specific hazards of the confined space.

9.3.7 BARRICADES

Provide pedestrian, vehicle, or other necessary barriers to protect workers entering a confined space work area from external hazards.

9.3.8 ATTENDANTS

Provide a trained attendant outside each vessel or confined space equipped with a suitable respirator as required. The attendant must be able immediately to perform all planned rescue duties. At no time may an attendant enter a confined space. Attendant duties include:

- Maintaining surveillance of personnel working in the confined space
- Maintaining the conditions and requirements stated on the confined space permit
- Evacuating personnel from a confined space if hazardous conditions are observed
- Maintaining communications with personnel working in a confined space through visual, voice, telephone, or two-way radio
- Obtaining additional assistance if necessary

9.3.9 SAFETY HARNESSES

Safety harnesses with lifelines are required if toxic or flammable atmospheres could exist, if an oxygen deficiency exists or could develop, if there is potential for engulfment, or if the work is to be performed at heights. Refer to the tie-off policy in subsection 1.9 of this manual for specific tie-off requirements.

9.3.10 RESCUE EQUIPMENT

The person responsible for the work must implement procedures and provide the equipment necessary to rescue personnel working in confined spaces. Such equipment should include tripods, lifelines, hoists, and harnesses.

9.3.11 TEMPORARY LIGHTING/GROUND FAULT CIRCUIT INTERRUPTER (GFCI)

Ensure that all temporary lighting in confined spaces is no more than 12 volts, that lights are protected against damage, that cords are heavy duty, and that lights and light cords are kept clear of workspaces and walkways. However, 120-volt lights may be used if protected by a ground fault circuit interrupter. All electrical circuits, lighting, portable tools, and other equipment must be approved for the area classification in which they are used. Ground fault circuit interrupters must be placed outside a confined space.

9.4 CONFINED SPACE TRAINING

The following paragraphs cover training requirements for confined space work for authorized entrants, attendants, persons authorizing or supervising confined space work, and rescue team members. All employees expected to engage in any aspect of confined space activities must meet the training requirements of these paragraphs before they may participate in the work.

9.4.1 AUTHORIZED ENTRANTS

Personnel qualifying as authorized entrants must be trained in the following areas.

1. **Hazard Recognition.** During training, entrants will:

    a. Be informed of all hazards that might be encountered during entry or occupancy of a confined space

    b. Be trained to recognize the symptoms of exposure to chemical hazards and oxygen deficiency. Oxygen deficient atmospheres contain less than 19.5% oxygen

    c. Understand the results of exposure to confined space hazards

2. **Communication.** Entrants will:

    a. Understand need for maintaining contact with the attendant (hole watch) and the methods used for communication with an attendant

    b. Understand the requirement to notify the attendant when the entrants initiate evacuation

3. Protective Equipment. Entrants will:

    a. Be aware of all personal protective equipment requirements and the use of such equipment

    b. Be aware of the barriers needed to protect workers from external hazards

4. **Self-Rescue.** Entrants will be aware that they must evacuate a confined space when directed by the attendant, when an alarm is sounded, or when an entrant perceives danger.

5. **Rescue Plan.** Entrants will be aware of the provisions of the rescue plan for the task.

9.4.2 ATTENDANTS

Personnel qualifying as attendants must be trained in the following areas.

1. **Hole Watch.** Attendants will understand the requirement to remain outside a confined space at all times while authorized entrants are working in the space.

2. **Personnel Count.** Attendants will understand the need to maintain an accurate count of all persons in a confined space at all times.

3. **Hazard Recognition.** Attendants will be able to recognize the hazards associated with working in a confined space.

4. **Monitoring.** Attendants will be able to use and interpret any monitoring equipment and understand that monitoring is performed in accordance with specifications contained in the confined space entry permit.

5. **Communication.** Attendants will understand that they must maintain continuous contact with entrants, and understand the methods of communication.

6. **Evacuation.** Attendants will understand the circumstances requiring entrant evacuation. Those circumstances include:

   a. Observing a condition that is not allowed for on a permit
   b. Observing behavioral changes in entrants as a result of exposure to hazards
   c. Detecting an external condition that could endanger entrants
   d. Detecting an uncontrolled hazard in the permit space
   e. Attendant leaving his or her station
   f. Unauthorized personnel ignoring requests by the attendant to leave the permit area

7. **Emergency Notification.** Attendants will understand that they must notify emergency personnel as soon as they have determined the need to evacuate authorized entrants, either because of hazards in the confined space or because the entrants need assistance in the confined space.

8. **Unauthorized Entrants.** Attendants will understand that they are required to warn unauthorized persons away from a confined space, requesting that such persons leave the area, and advising authorized entrants that unauthorized persons have entered the space.

9. **Rescue Procedures.** Attendants will:

   a. Understand that they are not authorized to enter a permit space to attempt to rescue anyone inside the confined space

   b. Know how to use external rescue and protective equipment, and know their rescue responsibilities

   c. Understand the permit rescue plan outlined in the rescue plan document

9.4.3 ENTRY AUTHORITIES

Individuals in charge of or authorizing entry are responsible for:

1. Determining whether the permit for entry is complete

2. Determining whether all necessary precautions, procedures, and equipment are in effect before authorizing entry into a confined space

3. Terminating any entry authorization for which the permit requirements are being violated

4. Concluding entry and terminating a permit upon work completion, including:

a. Removing all tools and equipment from the confined space

b. Verifying that all personnel and equipment have been removed from the confined space

c. Removing all entry caution signs

d. Closing and securing all entry points

5. Becoming familiar with the permit space rescue plan outlined in the confined space permit

Persons in charge of or authorizing entry may also serve as authorized entrants or attendants upon completing the appropriate training.

9.4.4 ONSITE RESCUE TEAMS

The person responsible for the work must decide whether to use an onsite rescue team or an outside rescue team.

Onsite rescue teams must receive training about the site rescue plan, the hazards of working in a confined space, and the personal protective and rescue equipment required.

At least one team member must have current certification in first-aid procedures and cardio-pulmonary resuscitation (CPR) and training about bloodborne pathogens.

Onsite rescue personnel must receive the same training as authorized entrants.

9.4.5 OUTSIDE RESCUE TEAMS

Outside rescue team members must be made aware of the hazards they may encounter during a rescue so that they can equip themselves properly.

9.5 UNAUTHORIZED ENTRANTS

Unauthorized entrants are not allowed in permit areas. If they enter a permit area, the confined space attendant or person authorizing entry must take the following actions.

1. **Request and Notify**. Request the unauthorized person or persons to leave, then notify the entrants that unauthorized personnel are in the permit area.

2. **Stop Operations and Evacuate**. If the unauthorized personnel fail to respond, stop operations and order evacuation of the permit area.

3. **Discipline**. Begin disciplinary procedures, including termination, for any unauthorized entrants who fail to leave a permit space upon request from the area authority.

9.6 PERMIT SPACE RESCUE PLAN

Before entry into any confined space can be authorized, a task-specific rescue plan must be written specifically for that space. All employees involved in confined space work must be familiar with the rescue plan. All rescue plans must include at least the following:

1. Who is to perform the rescue; an onsite team (list names) or an outside team
2. How the rescue team is notified
3. Rescue equipment available
4. Special hazards of the permit space that could be encountered during a rescue

At no time may any authorized rescue person enter a confined space for rescue purposes unless wearing a self-contained breathing apparatus (SCBA) or an airline respirator with an escape pack, or unless atmospheric measurements have confirmed that the LEL and the levels of O_2 and any hazardous gases are in the proper range to permit entry into the confined space without the aid of such equipment.

9.7 CONFINED SPACE ENTRY

The following general requirements must be completed before a confined space entry permit can be issued.

- A job task analysis (JTA) is prepared in accordance with subsection 1.11 of this manual
- All associated hazards are identified and controlled
- All employees engaged in confined space work are thoroughly trained
- A rescue plan is prepared in accordance with subsection 9.6
- All other applicable permits are obtained, including hot work permits or other task-specific work permits
- The confined space is prepared in accordance with subsection 9.3

In addition, the Construction Manager or other designated authority issues the entry permit only after the following specific requirements have been met.

9.7.1 VENTILATION

The job supervisor or person in charge of entry must determine that proper ventilation is maintained at all times employees are operating in confined spaces.

- **Before Start of Work**. Ensure that proper venting and exhausting systems are in place.
- **Venting/Exhausting.** Ensure that air, not oxygen, is vented or exhausted before and during confined space work to avoid concentrations of toxic or hazardous gases or dusts that could exceed permissible limits or result in an oxygen-deficient atmosphere.
- **Explosive Atmospheres.** Ensure that fresh air is supplied to any space that may contain explosive vapors, rather than having the vapors be exhausted through the fan only.
- **Ventilation Ducting.** Ensure that ventilation ducting is arranged to avoid restricting personnel evacuation from the confined space and to prevent risk of exposure to hazardous conditions to persons working nearby.

- **Respiratory Protection.** Ensure that, where adequate venting or exhausting cannot meet standards, personnel are wearing appropriate respiratory protection.

9.7.2 TOXIC MATERIALS

Table 9-1 provides definitions of the respiratory protections required for entering atmospheres containing various levels of toxic materials. Permissible levels for all these materials are defined in Material Safety Data Sheets supplied by the manufacturers of the materials.

9.7.3 FLAMMABLE GASES, VAPORS, OR MISTS

Table 9-2 provides definitions of requirements in regards to explosive levels of flammable gases, vapors, and mists. If there is potential for an explosive atmosphere, refer to the guidelines in paragraph 9.7.1, Ventilation. Also note that continuous monitoring of the atmosphere must be maintained.

Table 9-1 – Respiratory Protection Against Toxic Atmospheres

Atmosphere	Definition
Below Threshold Limit Value	Atmospheres containing toxic materials below the TLV may be entered without respiratory protection only after oxygen and flammable gases are determined to be at permissible levels.
Below IDLH/Above TLV	Atmospheres containing toxic materials below levels immediately dangerous to life or health (IDLH), but above the TLV, may be entered when respiratory equipment, as defined in the respiratory protection program, is worn and when flammable gases and oxygen are at permissible levels.
At IDLH (generally forbidden)	Atmospheres containing toxic materials IDLH may be entered only by employees protected by equipment approved for such exposure, when flammable gases are at permissible levels, and only after receiving written approval to enter the IDLH atmosphere from the Parsons construction manager and the designated client representative as well as any other project authority required. Emergency rescues may also be required in IDLH atmospheres.
Corrosive/Absorption Hazards	Atmospheres that contain or could contain corrosive materials or materials that are toxic through skin absorption require personal protective equipment to prevent skin and/or eye contact.
Unknown Toxins	Entry is prohibited in confined space atmospheres where the toxicity is unknown.

Table 9-2 – Explosive Levels of Gases, Vapors, and Mists

Level	Definition
Less than 10% LEL	Atmospheres containing flammable gases, vapors, or mists less than 10% (1/10) of the lower explosive limit (LEL) may be entered without respiratory equipment only after oxygen and toxic materials are determined to be at permissible levels.

At or Above 10% LEL	Atmospheres containing flammable gases, vapors, and mists above 10% (1/10) of the LEL may not be entered until the atmosphere is properly cleaned and purged and flammable gases, oxygen, and toxic materials are determined to be at permissible levels.

9.7.4 OXYGEN LEVELS

Table 9-3 provides definitions of entry requirements in regard to oxygen levels.

Table 9-3 – Permissible Oxygen Levels

Oxygen Level	Definition
19.5% to 23.5%	Atmospheres with an oxygen content of 19.5% to 23.5% at sea level may be entered without respiratory equipment if flammable and toxic materials are determined to be at permissible levels.
Deficient	Atmospheres with an oxygen content of less than 19.5% at sea level may be entered only by workers wearing respiratory equipment in accordance with the respiratory protection program, and after the introduction of a constant flow of fresh air. Respiratory equipment must be chosen for its ability to handle any toxins that may be present. Flammable materials must be at permissible levels. Pure oxygen must not be used to raise the level of oxygen in an atmosphere. Instead, air must be vented or exhausted before and during confined space work. Refer to paragraph 9.7.1.
Enriched	Atmospheres with an oxygen content greater than 23.5% at sea level may not be entered until it has been determined that no fire hazard exists, that flammable and toxic materials are at permissible levels, and until fresh air has been introduced to bring the oxygen level to within 19.5% to 23.5%.

9.7.5 HOT WORK

When hot work is required in a confined space, it must be in accordance with the hot work entry permit procedure in subsection 13.2. Hot work also requires a separate permit.

If hot work involves the generation of toxic gases, vapors, or fumes, ventilation or respiratory protection is required. The type of contaminant generated determines the type of respiratory equipment used.

In addition, the following precautions must be taken before any hot work is started.

- **Fire Extinguishers.** Fire extinguishers of the proper type are used.
- **Fuel Gas.** Oxygen, acetylene, or other fuel gas may not be taken into confined spaces.
- **Fuel Gas Shutoff.** The gas supply to a torch must be positively shut off at the cylinder whenever the torch is not in use or is left unattended. At change of shift and overnight, all torches and hoses must be removed from a confined space.

- **Flammable Gas Equipment.** Flammable gas equipment, gauges, and hoses must be inspected and found free of defects by the user before each use.

9.8 TOXIC OR FLAMMABLE MATERIALS IN CONFINED SPACES

Frequently, work in confined spaces requires the use of toxic or flammable materials, including coatings, linings, paints, cements, and solvents. The following guidelines apply when using these materials.

9.8.1 QUANTITIES

Any toxic or flammable materials brought into or used in a confined space are limited to the smallest amount consistent with efficient use during each shift. Only approved containers and dispensers may be used. Toxic or flammable materials may not be stored in confined spaces.

9.8.2 CONTAINERS AND DISPENSERS

Containers must be designed to minimize evaporation and spillage. Safety cans or small squeeze bottles are preferable when appropriate.

9.8.3 VENTILATION

Continuous ventilation must be provided in sufficient quantity and design to control fire and health hazards.

9.8.4 TESTING

Atmospheres must be tested or evaluated for the existence of hazards. In no instance may flammable vapor concentrations exceed 10% (1/10) of the LEL. Confined space atmospheres must be evaluated at regular intervals to ensure that no hazardous materials build up.

9.8.5 SPRAY OPERATIONS

Spraying toxic or flammable substances such as paint is not recommended.

9.8.6 IGNITION SOURCES

All ignition sources must be removed from a confined space when flammable liquids are being used.

9.8.7 RESPIRATORY PROTECTION

Respiratory protective equipment must be used as defined in the respiratory protection program or as required by this procedure.

9.9 MONITORING

Levels of oxygen, flammable gases, and toxic materials in a confined space must be monitored and logged. The frequency of monitoring must be specified on the confined space entry permit. Monitoring frequency can be continuous or intermittent.

- **Continuous Monitoring.** If there is a risk of an IDLH (immediately dangerous to life and health) atmosphere, monitoring should be conducted on a continuous, real-time basis.
- **Intermittent Monitoring.** Whether intermittent monitoring can be used depends on the degree of risk anticipated. Intermittent monitoring can range from four times each hour (every quarter hour) to once every four hours depending on the nature of the hazards.

9.10 IMMEDIATELY DANGEROUS TO LIFE AND HEALTH CONDITIONS

Work in IDLH atmospheres is forbidden except in emergencies or when it is impossible to bring IDLH to acceptable levels. Work in IDLH atmospheres, other than emergency rescue, requires the written approval of the Parsons Construction Manager, the designated client representative, and any other necessary approvals. Atmospheres must be ventilated to lower the toxicity of IDLH atmospheres. The following precautions must be taken in IDLH conditions.

- **Respiratory Protection.** Only self-contained breathing apparatuses (SCBAs) or airline respirators with escape bottles may be used in IDLH atmospheres.

  All rescue personnel must be trained in the use of a self-contained breathing apparatus or airline respirators with escape bottles.
- **Airline Respirators.** In confined spaces where workers use only airline respirators, a breathing air attendant from or assigned by the department responsible for the work must be in constant attendance to monitor the breathing air stations or low pressure alarms near the workers.
- **Safety Harnesses.** Workers entering confined spaces with IDLH atmospheres must wear approved safety harnesses, wristlets, or vests with lifelines. Each employee/lifeline must be manned by an employee outside the enclosure.
- **Explosive Atmospheres.** No work may be done in environments containing explosive gas atmospheres greater than 10% (1/10) of the LEL indicated by a combustible gas indicator. Appropriate dilution ventilation must be provided.

9.11 SIGNS

Signs must be posted near permit spaces notifying employees of the hazards present and that only authorized entrants may enter the permit area.

9.12 SIGN IN/OUT SHEET

Authorized entrants must sign in and out when entering or leaving a confined space area.

9.13 FORMS

The forms in Exhibit 9-1 may be used in whole or in part as guidelines to develop site-specific confined space procedures. All site-specific forms must comply with OSHA and client regulations.

Attachment A-6

Power and Hand Tool Operation

SECTION 12
HAND AND POWER OPERATED TOOLS

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12 HAND AND POWER OPERATED TOOLS

All tools must be maintained in a safe condition.

When power operated tools are designed to accommodate guards, the guard must be in place on the tool.

The point of operation (the area on the machine where the work is being performed) must be guarded to prevent the operator from having any part of his or her body in the danger zone when there is exposure that could cause injury to the operator.

Belts, sprockets, gears, chains, spindles, drums, flywheels, or any moving or rotating part of equipment must be guarded if the parts could injure employees or otherwise create a hazard.

The periphery of blades must be guarded. The guards may not have openings larger than 1/2 in.

Employees must use the specific personal protective equipment necessary to protect against hazards such as dusts, fumes, mists, vapors, gases, falling objects, or flying, abrasive, and splashing objects.

Circular saws, chain saws, and percussion tools without positive accessory holding means, must be equipped with a switch that will shut the power off when it is released.

Machines designed for fixed locations must be anchored to prevent moving or walking.

12.1 HAND TOOLS

The use of unsafe hand tools is prohibited.

Wrenches such as adjustable, pipe, end, and socket wrenches may not be used when the jaws are sprung and slippage could occur.

Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads.

Wooden-handled tools must be replaced if the handles become splintered or cracked. Wooden handles must be tight.

12.2 ELECTRIC POWER TOOLS

Electric power hand tools must be of the approved double insulated type or must be in conformance with the assured grounding program requirements defined in section 11 of this manual.

Electric cords must not be used for hoisting, lowering, or any purpose other than their intended use.

Electric power tools that are damaged in any way must be taken out of service immediately.

12.3 PNEUMATIC POWER TOOLS

Pneumatic power tools must be secured to their hoses or whips by a positive means to prevent the tools from being disconnected accidentally.

Pneumatic impact tools must have safety clips or retainers securely installed to prevent attachments from accidentally disconnecting.

All pneumatic nailers (or other similar equipment with automatic fastener feeds that operate at 100 psi) must have a device that will allow only fasteners to eject when the muzzle is in contact with the work surface and when a triggering device that is separate from the muzzle is activated simultaneously.

Compressed air used for cleaning purposes must be less than 30 psi. Effective chip guarding and personal protective equipment such as safety glasses or face shields must be used during cleaning.

Compressed air may not be used to clean the pneumatic tool operator or other persons.

The manufacturer's guidelines for hose types, pipe valves, filters and other fittings must be followed at all times.

Hoses must not be used for hoisting and lowering objects.

All hoses having an inside diameter of more than 1/2 in. must have a safety device at the source of supply or branch line to reduce pressure in case of hose failure (refer to Appendix J).

Airless spray guns that atomize paint or other fluids at high pressures (1,000 psi or more) must have a manual or automatic device that prevents the trigger from being pulled until the safety device is manually released.

In lieu of the above requirement, a diffuser nut may be used that prevents high-pressure, high-velocity release and a nozzle tip guard that prevents the tip from coming into contact with the operator.

Abrasive blast cleaning nozzles must have a valve that must be manually held open.

12.4 FUEL POWERED TOOLS

Fuel powered tools may be refueled, serviced, or maintained only while the tools are stopped and not operating.

Fuels must be transported, handled, and stored in accordance with *29 CFR 1926, subpart F*.

When fuel powered tools are used indoors, extreme caution must be taken to prevent the buildup of carbon monoxide or other hazardous gases to concentrations that exceed established safe levels. Air movers, ventilation, and exhaust ducts are some controls required to reduce unsafe levels of hazardous gases. Personal protective equipment such as respirators must be used only after it has been determined that engineering controls will not reduce hazardous gas concentrations to safe levels.

12.5 ABRASIVE WHEELS AND TOOLS

Floor-stand and bench-mounted abrasive wheels must be provided with substantial guards. The maximum angular exposure must not be more than 90 degrees. When the work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure must not exceed 125 degrees. Exposure must not begin at more than 65 degrees above the horizontal plane of the spindle.

Floor- and bench-mounted grinders must be provided with work rests adjusted to no more than 1/8 in. from the surface of the wheel.

Portable grinders must be guarded. The maximum angular exposure of the grinding wheel must not exceed 180 degrees. Exceptions are:

- When the work location makes the use of such guards impossible. In such circumstances, a wheel equipped with safety flanges must be used for wheels designed to fit the flanges.
- When wheels of 2 in. or less in diameter securely mounted on the steel mandrel are used. In such circumstances, a wheel equipped with safety flanges must be used for wheels designed to fit the flanges.
- When the wheel is entirely within the work being ground. In such circumstances, a wheel equipped with safety flanges must be used for wheels designed to fit the flanges.

Abrasive wheels must be inspected and ring-tested before mounting to ensure that the wheels are free of cracks or defects.

Do not force abrasive wheels onto spindles or overtighten the wheels onto the spindles.

The operating speeds indicated on the abrasive wheel must not be exceeded.

Safety glasses and face shields must be worn when grinding with abrasive wheels.

12.6 WOODWORKING TOOLS

All fixed woodworking tools must be equipped with a disconnect that can be locked in the *OPEN* position only.

The operating speeds indicated on the saw blades must not be exceeded.

All portable power saws must be equipped with guards above and below the baseplate shoe. When the tool is withdrawn from the work, the lower guard must automatically and instantly return to the covering position.

12.7 POWDER ACTUATED TOOLS

A number of tools using explosive charges to drive fastenings and perform similar functions are in wide use throughout the industry. The manufacturers of these devices provide detailed instructions regarding their use. Those instructions should be followed at all times.

The two types of powder actuated tools are direct acting and indirect acting.

- **Direct Acting Tool.** A tool in which the expanding gas of the power load acts directly on the fastener to be driven.
- **Indirect Acting Tool.** A tool in which the expanding gas of the power load acts on a captive piston, which in turn drives the fastener.

The three classes of tools are low velocity, medium velocity, and high velocity.

- **Low Velocity Tool.** A tool whose test velocity has been measured 10 times while using the highest velocity combination of:
  - The lightest commercially available fastener designed for that specific tool
  - The strongest commercially available power load that will properly chamber in the tool
  - The piston designed for that tool and appropriate for that fastener that will produce an average test velocity from the 10 tests not in excess of 10 meters per second (m/s) or 328 feet per second (ft/s) with no single test showing a velocity of more than 108 m/s (354 ft/s).
- **Medium Velocity Tool.** A tool whose test velocity has been measured 10 times while using the highest velocity combination of:
  - The lightest commercially available fastener designed for the tool
  - The strongest commercially available power load that will properly chamber in the tool
  - The piston designed for that tool and appropriate for that fastener that will produce an average test velocity from 10 tests in excess of 100 m/s (328 ft/s) but not in excess of 150 m/s (492 ft/s), with no single test having a velocity of 160 m/s (525 ft/s).
- **High Velocity Tool.** A tool whose test velocity has been measured 10 times while using a combination of:
  - The lightest commercially available fastener designed for the tool
  - The strongest commercially available power load that will properly chamber in the tool that will produce an average velocity from the 10 tests in excess of 150 m/s (492 ft/s)

12.7.1 TOOL SELECTION

Many applications requiring powder actuated tools can be successfully accomplished using the low velocity piston tool (trigger or hammer actuated). The low velocity piston tools should be used whenever possible because they impose the least potential risk to operator safety.

Only tools approved by a state or other governing agency should be used.

12.7.2 Operating Recommendations

The assistance and services of the tool manufacturer or authorized distributor should be called on whenever doubt exists concerning proper use or service, or if operator training is required.

1. Powder actuated tools must only be used by properly trained and qualified operators. Users must possess qualified operator's cards which are issued by a particular manufacturer's authorized dealer or distributor or other competent source only after thorough training. Instructors must be authorized by the manufacturer. See Figure 12-1-1 for a sample Authorized Instructor's Card and Figure 12-1-2 for a sample Qualified Operators Card. Both figures appear in Exhibit 12-1.

2. Safety goggles must be worn by operators and assistants at all times while operating powder actuated tools. If a potential hazard could cause injury to an operator's face, transparent face shields must be used in addition to safety goggles.

3. Hearing protection must be used when operating the tools.

4. A loaded tool must never be carried away from a worksite. Tools must always be left unloaded until ready for use. Loaded tools must never be left unattended. Tools not in use must be kept in a locked case labeled *POWDER ACTUATED TOOL*.

5. Tools must never be pointed at anyone, whether loaded or unloaded, and hands must be kept clear of the open muzzle end at all times.

6. Powder actuated tools must never be stored or used in explosive atmospheres, in the vicinity of highly flammable materials, or where nonsparking tools are required.

7. Tools must be held firmly against and perpendicular to the surface being driven into, except for specific applications recommended by the tool manufacturer.

8. In the event of jamming or obstruction in the bore, the manufacturer's instructions must be carefully followed.

9. Tools must be inspected in accordance with manufacturers' recommendations before each use to ensure that:

   a. Safety devices are in proper working condition
   b. Tools are clean
   c. All moving parts operate freely
   d. Barrels are free from obstruction

   Any tool not in working order or that develops a defect during use must be removed immediately from service and not used until proper repairs have been made by competent personnel. Before testing, check to make sure the tool is not loaded. Any tools found to be defective must be removed from service and from power loads and tagged *DEFECTIVE, DO NOT USE*.

10. Tools must be inspected and maintained on a regular basis and inspection documentation must be maintained at the site.

11. As required, use the appropriate safety guards supplied by manufacturers. Also follow the safety guard requirements in *ANSI A10.3-1985*.

12. Always use the proper type and powder level load. The preferred power loads are recommended by the manufacturer of each tool being used. To decrease power, use a lower number; to increase power, use a higher number.

13. In areas where powder actuated tools are being used extensively, warning signs (available from manufacturers) and barriers, if necessary, identifying the hazard area are recommended.

14. An operator's instruction manual must be kept in the carrying case for the specific tool being used for reference, when necessary, concerning proper operation, service, etc.

15. Only fasteners that are specially designed and manufactured for use in powder actuated tools may be used.

12.7.3 OPERATING LIMITATIONS

Manufacturer's recommendations must be referred to if doubt exists about a fastening application. Do not drive into hard or brittle materials such as cast iron, glazed tile, surface-hardened steel, glass brick, live rock-face brick, and hollow tile.

To prevent flying hazards, no stud or attachment should be driven without first making sure that it will not pass completely through the material into which it is being driven.

Only fasteners specially designed and manufactured for use in powder actuated tools may be used.

Fasteners driven by standard velocity tools must not be driven directly into masonry materials closer than 3 in. from an unsupported edge or corner, or into steel closer than 1/2 in. from an edge or corner. Specific applications recommended by tool manufacturers are the only exceptions.

Fasteners may not be driven through existing holes unless the holes are used solely as guides, as recommended by tool manufacturers, and to ensure positive alignment.

Fasteners must not be driven into concrete unless material thickens and is at least three times the penetration depth of the fastener shank.

In the event of a misfire, tools must not be removed from the working surface for a minimum of 30 seconds. Then, the explicit instructions in the manufacturer's manual for the specific tool must be carefully followed.

12.8 CAPTIVE STUD TOOLS

These tools are designed to stop a stud or pin in its tracks should it be fired mistakenly into soft or insubstantial materials. The stud is prevented from free flight by a piston and buffer in the guard assembly. A partial turn of the tool frees it from a stud properly set in the work surface.

Captive stud tools have been replaced by low velocity powder actuated tools and are no longer available. However, some may still be in use in the field.

12.9 IDENTIFICATION OF CASED LOADS

The standard means of identifying power levels of loads used in tools uses the uniform colors and printed descriptions shown in Table 12-1. The color codes are strikingly printed on the load containers to provide a visual indication of the power level of the load.

12.10 TOOL DESIGN REQUIREMENTS

Among other requirements, the following design criteria must be complied with.

1. The tool must be designed to prevent inadvertent actuation.
2. The tool must be designed to prevent actuation that could propel a fastener or any part thereof into the air when dropped from a height of 3 meters (10 ft) onto a smooth, hard surface such as concrete or steel.
3. Actuation of any tool must depend on at least two separate and distinct operations by the operator, with at least one operation being other than the operation of holding the tool against the work surface.
4. The tool must be designed not to be operable other than against a work surface with a force on the work surface equal to 22 newtons (N) 5 lb greater than the weight of the tool, or a minimum impact energy of 4 joules (3 ft-lb).
5. All tools must be designed so that compatible protective shields or fixtures designed, built, and supplied by the tool manufacturer can be used.
6. Tools must be designed so that a determinable means of varying the power levels is available for selecting a power level adequate to perform the desired work.
7. Tools must be designed so that all principal functional parts can be checked for any foreign matter that may affect operation.
8. Tools must be designed so that all parts are of adequate strength to resist maximum stresses on actuation when the tool is used in accordance with the manufacturer’s instruction and is powered by any commercially available power load that will properly chamber in the tool.

Table 12-1 – Recommended Power Loads

Power Level	Color Identification		Nominal Velocity (ft/sec)
	Case Color	Load Color	
1	Brass	Gray	300
2	Brass	Brown	390
3	Brass	Green	480
4	Brass	Yellow	570
5	Brass	Red	660
6	Brass	Purple	750
7	Nickel	Gray	840
8	Nickel	Brown	930
9	Nickel	Green	1,020
10	Nickel	Yellow	1,110
11	Nickel	Red	1,200
12	Nickel	Purple	1,290
The nominal velocity applies to 3/8-in. diameter, 350 grain ballistic slug fired in a test device. It has no reference to the actual fastener velocity developed in any specific size or type of tool.			

Attachment A-7

Motor Vehicle and Heavy Equipment Safety

13.0 CONSTRUCTION SAFETY

Construction work is one of the most dangerous occupations. More than 1,300 U.S. workers die each year from construction-related accidents. Parsons I&T personnel perform construction management and oversight throughout the world. Employees performing construction operations must comply with the procedures and policies outlined in this section and the ***Parsons Construction Health and Safety Manual***. If there are conflicts between procedures, the more conservative approach will be used.

Note: Portions of Section 13 were not applicable to this Health and Safety Plan and have been removed.

13.11 MOTOR VEHICLES AND HEAVY EQUIPMENT SAFETY

Working with large motor vehicles and heavy equipment can be a major hazard at construction sites. Injuries can result from equipment hitting or running over personnel or from the overturning vehicles. Vehicle and heavy equipment design and operation must be in accordance with 29 CFR 1926.600 through 1926.602. In particular, the following precautions must be used to help prevent injuries:

- Vehicle operators must check brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices at the beginning of each shift.
- Large, construction motor vehicles will not be backed up unless:
- The vehicle has a reverse signal alarm audible above the surrounding noise level.
- The vehicle is backed up under the direction of a signalman.
- Heavy equipment or motor vehicle cabs must be kept free of all nonessential items, and all loose items must be secured.
- Safety glass must be used in windshields, windows, and doors. Cracked or broken glass must be replaced.
- Large construction motor vehicles and heavy equipment must be provided with necessary safety equipment (seat belts, rollover protection, emergency shutoff in case of rollover, and backup warning lights and audible alarms).
- Blades and buckets must be lowered to the ground and parking brakes set before shutting off a heavy equipment or vehicle.
- Any person operating a motor vehicle must hold a permit valid for the equipment being operated.

13.11.1 Earthmoving and Excavation Equipment

The first operation performed at most construction sites is to change the landscape. Land is cleared and reshaped by excavating and moving earth. Equipment used to move earth must conform to OSHA requirements in 29 CFR 1926.602 and 1926.1001. Excavators, bulldozers, graders, compactors, road rollers, and other mobile equipment require rollover protective systems (ROPS). ROPS must comply with the performance criteria set forth in Society of Automotive Engineers Standard J1040 (adopted by OSHA in 29 CFR 1926.1001). Additionally, seat belts must be provided for vehicles equipped with ROPS. Large excavators working next to water should have an alternate escape route from the cab so the operator has a way out if the vehicle overturns in the water.

13.11.2 Dump Trucks

Dump trucks brought onto a construction site must comply with the requirements specified below before being place into service.

- All dump trucks must be equipped with a holding device to prevent accidental lowering of the body while maintenance or inspection is being performed.

- All hoist levels must be secured to prevent accidental slipping or tripping of the mechanism.

- All off-highway end-dump trucks must be equipped with a means (plainly visible from the operator’s position when looking ahead) to determine whether the dump box is lowered.

- Trip handles for tailgates on all dump trucks must be positioned to keep the operator in the clear when the gate is opened.

- Brakes, tires, horn, steering mechanism, seat belts, operating controls, safety devices, and accessories must be operating correctly.

13.11.3 Powered Industrial Trucks

Powered industrial truck accidents cause approximately 100 fatalities and 36,000 serious injuries each year. Forklifts must be selected based on fire hazard designation, carrying capacity, reach capability, terrain over which loads will be carried, atmospheric conditions in the workplace, and design of the workplace. For example, gasoline- or diesel-operated lift trucks are not recommended for use in locations where explosive concentrations of flammable gases or vapors may be present.

Forklifts that can elevate a load above the operator’s head or forklifts used in locations where objects may fall on the operator must be equipped with an overhead falling object protective system (FOPS). FOPSs must comply with the design criteria specified in American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1. Additionally, the Construction Safety Manager or a designee ensures that forklifts are equipped with the following safety features:

- Warning devices (backup alarm) and lights appropriate for the work environment.

- Seat belt or other restraining device.

- A load chart showing the maximum rated load and the variation of the rated safe load capacity with the reach of the equipment must be present in the operator's cab.

Violations of regulatory requirements for work practices and traffic management are frequently cited as contributing factors in a number forklift fatalities. Thus, as a minimum, the following requirements must be met:

- No part of a load may pass over any worker.

- A lift truck left unattended must be immobilized and secured against accidental movement.

- Forks, buckets, or other attachments must be in the lowered position.

- The maximum rated load for the lift truck may not be exceeded. Loads must be handled in accordance with the height and weight restrictions on the load chart.

- When a load is in the raised position, an operator must attend the controls.

- If an operator does not have a clear view of the path, a signalman must be used.

- Loads must be carried as close to the ground or floor as the situation permits.

- Loads that might tip or fall and endanger workers must be secured.

- A lift truck must not be used to support, raise, or lower a worker.

- Barriers, warning signs, designated walkways, or other safeguards must be provided where pedestrians are exposed to the risk of collision.

An estimated 25 percent of powered industrial truck-related injuries result from inadequate operator training. In 1998, OSHA promulgated training requirements for forklift operators.

Powered industrial truck operators must receive initial training in the topics listed below that are applicable to their work.

Truck related topics

- Operating instructions, warnings, and precautions for type of truck being used

- Similarities to and differences from automobiles

- Control and instrumentation location and use

- Engine or motor operation

- Steering and maneuvering

- Visibility

- Fork and attachment limitations and use
- Vehicle capacity
- Vehicle stability
- Vehicle inspection, maintenance, and refueling
- Operating limitations
- Other operating instructions, warnings, or precautions listed in the operation manual

Workplace related topics

- Surface conditions where truck is used
- Load composition and stability
- Load stacking, unstacking, and transport
- Pedestrian traffic
- Narrow aisle and restricted area operation
- Operation in hazardous locations
- Ramp and sloped surface operation
- Unique or potentially hazardous conditions
- Operating the vehicle in closed environments

The employer must evaluate the performance of each powered industrial truck operator every three years. If the operator receives a deficient evaluation, then the operator must receive refresher training. Retraining must also be conducted when:

- There is reason to believe that an unsafe act has been committed.
- An accident or near-miss occurs.
- The operator is assigned to a different type of truck.
- A workplace condition changes that could effect truck operation.

Employers must provide certification that each operator has been trained and evaluated in accordance with OSHA requirements. The Construction Safety Manager must obtain copies of operator training certificates before forklift operation is permitted.

Attachment A-8

Lock Out / Tag Out

SECTION 10
LOCKOUT/TAGOUT ENERGY CONTROL

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10 LOCKOUT/TAGOUT ENERGY CONTROL

To perform work on industrial equipment safely, all employees must understand the importance of energy control and the requirements of the *OSHA Lockout and Tagout Standard*. They must also know how to apply energy isolation and lockout/tagout procedures.

The following procedures must be followed on all Parsons sites, except in those cases where client procedures supersede the Parsons requirements.

All lockout/tagout materials are supplied by Parsons unless client procedures or requirements supersede Parsons requirements.

10.1 DEFINITIONS

- **Energy Source.** Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other source of energy.
- **Lockout.** A lockout is a method of keeping equipment from being set in motion and endangering workers.
- **Tagout.** The energy isolation device is placed in the safe position and a written warning is attached to it.

10.2 LOCKOUT STEPS

The following steps must be used to ensure that lockout is performed safely and effectively.

1. Ensure that a disconnect switch, circuit breaker, valve, or other energy isolating mechanism is in the *SAFE* or *OFF* position.
2. Ensure that any protective device placed over the energy isolating mechanism is in the *OFF* position.
3. Attach a lock to ensure that the equipment cannot be energized or actuated.

10.3 TAGOUT TAG PROPERTIES

Tagout tags must have the following characteristics to ensure compliance with applicable OSHA and Parsons standards.

- Durable, to withstand wear
- Substantial, so it cannot easily come off
- Contains identifying information about the person who applies it

Tagout/lockout should be used when an employee is performing service or maintenance around any machine which, if suddenly set in operation or motion, could cause injury. For example, unexpected startup of equipment or release of stored energy could cause injury to any person in close proximity to that machinery.

10.4 LOCKOUT/TAGOUT SITUATIONS

Situations that are most likely to need lockout/tagout include:

- When a guard or other safety device must be removed or bypassed
- When someone working in close proximity to moving machinery risks catching a body part in that machinery
- During repair of electrical circuits
- When cleaning or oiling machinery having moving parts
- When clearing jammed mechanisms

10.5 PARSONS LOCKOUT/TAGOUT

Parsons uses lockout/tagout in combination on all equipment. The single use of a tag without a lock, or a lock without a tag, is not permitted. In addition, locks and tags by themselves do not de-energize equipment. They must be attached only after a machine has been isolated from its sources.

Parsons uses two methods to determine that its lockout/tagout procedures are properly understood.

- **Documentation:** a written statement of Parsons' energy control program.
- **Employee training:** to help employees understand how to use the energy control program.

10.6 ENERGY

For purposes of this manual, energy is defined as movement or the possibility of movement. Whether a power switch is *ON* or *OFF*, energy of some sort is always present in any powered equipment. The two most common types of energy are:

- **Kinetic energy**: the force caused by the motion of an object.
- **Potential energy**: the force in an object that is not moving.

10.7 PROTECTIVE ENGINEERING

Examples of protective engineering include:

- Machine guards
- Electrical disconnects
- Mechanical stops such as pins and valves
- Point-of-operation guards, which provide automatic protection against human error

Engineering guards and engineering safety features can be defeated. Engineering guards are designed specifically to provide automatic protection against human error. Never bypass a point-of-operation guard or let a coworker do so, and never rely solely on engineering safety features.

10.8 APPLYING AND ENFORCING ENERGY CONTROL

Procedures for applying an energy control program include:

- Ensuring that energy isolation and lockout/tagout are applied only by trained employees authorized to perform service or maintenance
- Notifying all employees who work in an affected area before lockout/tagout is applied

Procedures for enforcing compliance with an energy control program include:

- Inspections at least once each month to determine that energy control procedures are being carried out
- Fair and uniform enforcement of safety rules
- Penalties for failure to follow written procedures

The OSHA regulation requires that control of hazardous energy be done according to a 6-step procedure. Components of the 6-step procedure and guidelines for successfully completing each step are shown in Table 10-1.

10.9 BASIC WORK RULES

Basic common sense should govern work around potentially hazardous power operated equipment. Fundamentals include:

- Look ahead, and avoid doing anything that could re-activate the equipment
- Do not bypass the lockout when installing new pipe or wiring

10.10 LOCKOUT/TAGOUT REMOVAL

This procedure must be followed when removing lockout/tagout.

- Determine that the equipment is safe to operate by removing all tools from the work area and verifying that the system is fully assembled.
- Safeguard all employees by conducting a headcount to make sure everyone is clear of the equipment; also, notify everyone in the area that lockout/tagout is being removed.
- Remove the lockout/tagout devices. Except in emergencies *each device must be removed by the person who attached it*.

Table 10-1 – Lockout/Tagout Steps

OSHA Lockout/Tagout Procedure	Precautions
1. Preparation for Shutdown	Know the types and amounts of energy that power the equipment being shut down Know the hazards of that energy Know how the energy can be controlled
2. Equipment Shutdown	Shut the system down using its operating controls Follow the correct procedure for the equipment to avoid endangering anyone during shutdown
3. Equipment Isolation	Operate all energy isolating devices so that the equipment is isolated from its energy source Be sure to isolate all energy sources; secondary power supplies as well as the main one Never pull an electrical switch while it is under load Never remove a fuse instead of disconnecting it
4. Applying Lockout/Tagout Devices	Ensure that all energy isolating devices are locked and tagged Use only standard devices supplied by Parsons (or, in some cases, by the client) for lockout/tagout. Do not use such devices for any other purpose Use a lockout device if a lock cannot be placed directly on the energy control When using lockout, each employee working on a system must attach his or her personal lock to that system More than one employee can lock out a single energy isolating device by using a multiple-lock hasp Attach tags at the same point as the lock Tags must be filled out completely and correctly

Table 10-1 – Lockout/Tagout Steps (Contd)

OSHA Lockout/Tagout Procedure	Precautions
5. Control of Stored Energy	Inspect each system to ensure all parts have stopped moving Install ground wires Relieve trapped pressure Release the tension on springs or block the movement of spring-driven parts Block or brace parts that could fall Block parts in hydraulic and pneumatic systems that could move from loss of pressure. Bleed lines and leave vent valves open. Drain process piping systems and close valves to prevent hazardous material flow If a line must be blocked where there is no valve, use a blank flange Purge reactor tanks and process lines Allow dissipation of extreme cold or heat. If time does not allow full dissipation, wear protective clothing to perform this step If stored energy can reaccumulate, monitor it to make sure it stays below hazardous levels
6. Verifying Isolation	Ensure that all dangerous areas are clear of personnel of equipment Verify that the main disconnect switch or circuit breaker cannot be moved to the *ON* position Use a voltmeter or other equipment to check that the switch is not hot Press all start buttons and other activating controls on the equipment to ensure that equipment has been isolated from its energy sources Shut down all machine controls when the testing is finished

- In some workplaces, the last person to remove a lock may have extra duties, such as removing the hasp and lockout device, and removing tags, signing them, and turning them in. In addition, the Parsons supervisor in charge of the work generally the last one to remove his or her tag and lock. The exception to this is the case where the client's designated personnel remove their locks and tags last.
- Develop and follow a checklist of required steps to re-energize the system.

10.11 SERVICE, MAINTENANCE, AND TEMPORARY REACTIVATION

In certain cases where service or maintenance must be performed by others during lockout/tagout, the outside contractor and the onsite employer must exchange lockout/tagout information. Employees onsite must understand the rules used in other companies' energy control programs. Field personnel should be alert for new types and styles of lockout/tagout devices.

If equipment must be temporarily re-activated, remove unnecessary tools from the work area and make sure everyone is clear of the equipment. Then remove all lockout/tagout devices and re-energize the system. As soon as the energy is no longer needed, isolate the equipment and re-apply lockout/tagout, using the OSHA 6-step procedure in Table 10-1.

If servicing equipment requires more than one work shift, lockout/tagout protection must not be interrupted. Employees leaving work must not remove their locks until the next shift arrives and is ready to lock out.

10.12 SPECIAL LOCKOUT PRECAUTIONS

When the person who installed a lock is not available to remove it:

- The lock can be removed only in an emergency, and only under the direction of the Parsons supervisor in charge of the work.
- The lock may not be removed until the person removing it makes sure it is absolutely safe.

These procedures give onsite employees the tools needed to work safely around hazardous energy sources. It is essential that these rules be followed to guard lives and health.

Attachment A-9

Fall Protection

SECTION 19
FALL PROTECTION

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EXHIBITS

19 FALL PROTECTION

This section provides the minimum requirements necessary to prevent or reduce the risk of injury from fall hazards.

19.1 APPLICABILITY

This section is applicable to all types of work (including maintenance, operations, construction, and research) where an employee may be exposed to a fall hazard.

This section is not applicable to employees performing steel erection work on buildings. Steel erection is covered in section 5 of this manual.

This section is not applicable to employees engaged in the construction of electric transmission and distribution lines and equipment.

The requirements of this document may not apply when employees are making an inspection, investigation, or assessment of workplace conditions before the actual start of work or after all work has been completed with the construction manager's approval and Safety Representative's concurrence.

Stricter requirements may be imposed upon subcontractors by the directing client, project management, or contract terms.

19.2 REQUIREMENTS

19.2.1 RESPONSIBILITIES

Responsible managers (see definition) are responsible for ensuring that:

- Walking/working surfaces (see definition) on which employees are to work have the strength and structural integrity to support employees safely.
- Prompt rescue of employees is provided in the event of a fall.
- Competent persons (see definition), qualified persons (see definition), and safety monitors (see definition) are designated for their area of responsibility.
- Training is provided for each Parsons employee who might be exposed to fall hazards.
- Fall hazard issues are considered and resolved in the design review of new equipment and facilities.

Construction Safety representatives (competent persons) are responsible for:

- Facilitating the implementation of this section.
- Resolving any misunderstanding concerning this section.

- Developing a fall hazard prevention analysis (FHPA) for routine tasks in assigned areas.
- Assisting the qualified person in developing Fall Protection Plans (FPPs).
- Assigning appropriate protective measures for fall hazards on work central documents.

Supervisors are responsible for:

- Enforcing compliance with the requirements of this section.
- Monitoring employee safety performance.
- Notifying the Safety Representative of the need for retraining of employees when:
    - There is reason to believe an affected employee's knowledge and use of fall protection systems or equipment indicate that the employee does not possess adequate understanding or skill.
    - Changes in the workplace render previous training obsolete.
    - Changes in the types of fall protection systems or equipment to be used render previous training obsolete.

All employees are responsible for:

- Inspecting their personal fall protection equipment for wear, damage, and other deterioration prior to each use.
- Reporting and removing defective components from service.
- Using only the fall protection equipment for which they have been trained.
- Complying with the requirements of this section.

19.2.2 GENERAL

Any employee exposed to a fall hazard greater than 6 feet must be protected by a conventional fall protection system (see definition).

EXCEPTION 1

Employees may be exposed to falls from heights greater than 6 feet with an approved FPP.

EXCEPTION 2

A travel restriction system (see definition) may be used to prevent exposure to a fall hazard.

Employees working off portable ladders above 10 feet use a personal fall arrest system (PFAS).

Three-point contact (see definition) must be maintained at all times when an employee works above 6 feet.

All fall protection equipment must meet the requirements of *ANSI A10.14-1991* or *ANSI 359.1-1992*.

Employees are allowed to work on only those surfaces that have adequate strength and structural integrity.

19.2.3 CONDITIONS

Working at heights outdoors is not permitted during bad weather (see definition).

Note: If there is any question concerning safe weather conditions, the area Safety Representative should be consulted

Employees working less than 6 feet above dangerous equipment (see definition) must be protected from falling into or onto the dangerous equipment by a guardrail system (see definition) or by equipment guards.

Employees working more than 6 feet above dangerous equipment must be protected by conventional fall protection.

19.2.4 WORK ON LOW-SLOPE ROOFS

- Employees working within 6 feet of the roof edge must be protected by one of the following:
  - A conventional fall protection system.
  - A travel restriction system.
  - A warning line system (see definition) in combination with a safety monitor.
  - A safety monitor alone, on roofs with a width of less than 50 feet.

Materials and equipment may not be stored within 6 feet of a roof edge unless guardrails are erected at the edge.

Mechanical equipment (see definition) on roofs is used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system (CFAS; (see definition).

19.2.5 PROTECTION FROM FALLING OBJECTS

When an employee is exposed to potential falling objects, that employee must wear a hard hat. One of the following must be implemented:

- Toeboards (see definition), screens, or guardrail systems must be erected:
  - With opening sizes in the barrier smaller than the size of the potential falling objects.
  - At a sufficient distance to prevent objects from falling from higher levels.

OR

- A canopy structure of sufficient strength to prevent collapse or penetration must be erected.

OR

- The area to which objects could fall must be barricaded and employees prohibited from entering the barricaded area.

Objects that may fall from a higher to a lower level must be kept far enough away from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced.

Materials which are piled, grouped, or stacked near a roof edge must be stable, self-supporting, and secured.

19.2.6 OVERHAND BRICKLAYING AND RELATED WORK (SEE DEFINITION)

No materials or equipment except masonry and mortar must be stored within 4 feet of the working edge.

Excess mortar, broken or scattered masonry units, and all other materials and debris must be kept clear from the work area by removal at regular intervals.

A controlled access zone (CAZ; see definition) must be erected around the area to which objects could fall.

- The CAZ must be defined by a control line erected not less than 10 feet or more than 15 feet from the working edge.
- The control line should extend for a distance sufficient for the CAZ to enclose all employees performing overhand bricklaying and related work at the working edge.

The control line be approximately parallel to the working edge.

Additional control lines be erected at each end to enclose the CAZ.

On floors and roofs where guardrail systems are not in place before the beginning of overhand bricklaying operations, CAZs must be enlarged, as necessary, to enclose all points of access, material handling areas, and storage areas.

On floors and roofs where guardrail systems are in place but need to be removed to allow overhand bricklaying work or leading edge (see definition) work to take place, only that portion of the guardrail needed to accomplish that day's work may be removed.

Only employees engaged in overhand bricklaying or related work are permitted in the CAZ.

19.2.7 INSPECTIONS (PRE-USE AND FORMAL)

Employees must conduct pre-use inspections on all fall protection gear prior to each use.

When gear fails its pre-use inspection, it must be removed from service and taken to the competent person responsible for the gear in that area.

A competent person must conduct a formal inspection of all fall protection gear every six months.

Fall protection gear must be marked to indicate the six-month inspection has been performed.

19.2.8 Facility Fall Hazard Prevention Analysis (FHPA)

Note: A job hazard analysis (JHA) or other work control documents that meet the requirements of this section may be used as the FHPA.

FHPAs are attached to and retained with (standard work control records retention) other applicable work control documents associated with the task.

Each facility must conduct an FHPA (see Exhibit 19-1) for routine tasks.

The FHPA must identify, as a minimum:

- Each fall hazard associated with a routine task.
- The conventional fall protection system that will be used to mitigate the consequences of a fall.
- Anchor points.
- The fall protection equipment for each individual fall hazard.

The FHPA must be approved by the job supervisor, responsible manager, and a Safety Representative (competent person).

Employees working under the FHPA must sign and date the FHPA to indicate that they have read and will comply with the instructions of the FHPA.

19.2.9 Climbing

Employees climbing to work locations must be provided fall arrest protection when climbing above 6 feet without a standard access route (such as portable or fixed ladders and stairs).

19.2.10 Aerial Lifts

A body harness (see definition) with a positioning lanyard (see definition) must be worn when operating or working from the platform of all aerial lift devices (see definition).

Lanyards must be adjusted to restrict travel to the inside of the platform basket.

Employees must use only the floor of the platform as the walking/working surface.

Employees must not anchor off to an adjacent structure or equipment while in the lift.

19.2.11 Scaffolds

Employees erecting scaffolds or working on completed scaffolds above 6 feet must be provided with a PFAS.

EXCEPTION

This requirement is not applicable when working on scaffolds erected in compliance with *29 CFR 1926.451*.

19.2.12 Compatibility of Equipment

Note: Fall protection components from different manufacturers, meeting *ANSI 359.1* and used as designed, may be mixed together to provide a PFAS.

All fall protection equipment used in a PFAS must be compatible (see definition).

19.2.13 Personal Fall Arrest Systems (PFASs)

Only full body harnesses may be used.

Only self-closing, self-locking type snaphooks (see definition) may be used.

Only ropes and straps (webbing) made from synthetic fibers may be used in fall protection components.

PFASs must be rigged such that an employee can neither free fall (see definition) more than 6 feet, nor contact any lower level.

PFASs may be used only by an employee having a combined person and tool weight of less than 310 pounds.

PFASs and associated components subjected to impact loading (see definition) must be immediately removed from service.

- A competent person must inspect the PFAS or components for damage and suitability for reuse.
- The PFAS and associated components may not be used for employee protection until the equipment is certified for reuse by a Safety Representative (competent person) or the manufacturer.

PFASs may not be attached to guardrail systems or hoists.

When a PFAS is used at hoist areas, it must be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

A positioning system (see definition) must be used in addition to the PFAS when the task demands the use of both hands.

19.2.14 Lifelines

On suspended scaffolds or similar work platforms with horizontal lifelines (see definition) which may become vertical lifelines, the devices used to connect to a horizontal lifeline must be capable of locking in both directions on the lifeline.

Horizontal lifelines must be designed, installed, and used, under the supervision of a qualified person, as part of a complete PFAS, which maintains a safety factor of at least two.

When vertical lifelines are used, each employee must be attached to a separate lifeline.

During construction or maintenance of elevator shafts, two employees must be allowed to be attached to the same lifeline in the hoistway, provided:

- Both employees are working atop a false car that is equipped with guardrails.
- The strength of the lifeline is 10,000 pounds (5,000 pounds per employee attached) or a two to one safety factor.
- All other criteria specified in this section for lifelines have been met.

19.2.15 ANCHORS

Anchors used for attachment of personal fall arrest equipment must be independent of any anchorage (see definition) being used to support or suspend platforms.

Anchors must be designed to at least one of the following criteria

- Anchors must be capable of supporting at least 5,000 pounds per employee attached.

OR

- Anchors must be designed, installed, and used as follows:
  - As part of a complete PFAS which maintains a safety factor of at least two.
  - Under the supervision of a qualified person.

Anchors must have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet or the free fall distance (see definition) permitted by the system, whichever is less.

Anchors for travel restriction must be capable of supporting at least 500 pounds.

Note: The requirement in the preceding paragraph is an exception to the anchorage requirements in subsection 19.2.16 of this section. This requirement is applicable to work in elevator shafts only.

19.2.16 WARNING LINES

Where warning lines are used, they must be designed to the performance criteria in Exhibit 19-2 and the following:

- The warning line must be erected around all sides of the roof or work area.
- When mechanical equipment is not being used, the warning line must be erected not less than 6 feet from the roof edge.
- When mechanical equipment is being used, the warning line must be erected:
  - Not less than 6 feet from the roof edge which is parallel to the direction of mechanical equipment operation, and

- Not less than 10 feet from the roof edge which is perpendicular to the direction of mechanical equipment operation.

Points of access, materials handling areas, storage areas, and hoisting areas must be connected to the work area by an access path formed by two warning lines.

When the path to a point of access is not in use, one of the following must be performed.

- A rope, wire, chain, or other barricade equivalent (see definition) in strength and height to the warning line must be placed across the path at the point where the path intersects the warning line erected around the work area.

OR

- The path must be offset such that a person cannot walk directly into the work area.

No employee is allowed in the area between a roof edge and a warning line unless that employee is performing roofing work in that area.

19.2.17 Controlled Access Zones (CAZ)

Where CAZ lines are used, they must be designed to the performance criteria in Exhibit 19-2 and comply with the following:

- When used to control access to areas where leading edge and other operations are taking place, the CAZ must be defined by a control line or by any other means that restricts access.
- When control lines are used, they must be erected not less than 6 feet nor more than 25 feet from the unprotected edge (see definition) or leading edge, except when erecting precast concrete members.
- When erecting precast concrete members, the control line must be erected not less than 6 feet nor more than 60 feet or half the length of the member being erected, whichever is less, from the leading edge.

The control line must extend along the entire length of, and approximately parallel to, the unprotected or leading edge.

The control line must be connected on each side to a guardrail system or wall.

19.2.18 Safety Monitors

The safety monitor must be competent to recognize fall hazards.

The safety monitor must warn the employee when it appears that an employee is unaware of a fall hazard or is acting in an unsafe manner.

The safety monitor must be on the same walking/working surface and within visual sighting distance of the employee being monitored.

The safety monitor must be close enough to communicate orally with the employee.

The safety monitor must not be assigned other responsibilities which could take the monitor's attention from the monitoring function.

Mechanical equipment may not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs (see definition).

Only employees engaged in roofing work (see definition) on low-sloped roofs or those covered by an FPP, are allowed in an area where an employee is being protected by a safety monitoring system.

Employees must comply with the safety monitor's instructions.

19.2.19 HOLES, OPENINGS, AND COVERS

Holes (see definition) and openings (see definition) must be barricaded or covered whenever work is not being actively performed in the hole or opening.

Note: Skylights are considered to be a type of a hole.

Covers in floors, roofs, and other walking/working surfaces (including roadways and vehicular aisles) must be capable of supporting at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

All covers must be secured when installed so as to prevent accidental displacement.

All temporary covers must be color coded or marked with the word "HOLE" or "COVER" to warn of the hazard.

EXCEPTION

> This requirement does not apply to cast iron manhole covers or steel grates used on streets or roadways, nor to confined space accesses or equipment access hatchways.

19.2.20 FALL PROTECTION PLAN

Note: Other forms of work control may be used as an FPP provided they conform to the criteria in this section.

Fall protection plans (FPPs) must be attached to and retained with (standard work control records retention) other applicable work control documents associated with the task.

Only those employees engaged in leading edge work, precast concrete erection work or who can demonstrate that it is unfeasible (see definition) or it creates a greater hazard to conventional fall protection system are allowed to work under an FPP (see Exhibit 19-3 for a standardized FPP).

Note: There is a presumption that the use of conventional fall protection system is feasible and will not create a greater hazard to implement. Accordingly, Parsons has the burden of establishing that it is appropriate to implement an FPP for a particular workplace situation.

An FPP must document the reasons why the use of conventional fall protection systems are infeasible or why their use would create a greater hazard.

The FPP must include a written discussion of other measures that will be taken to reduce or eliminate the identified fall hazard.

The FPP must identify each location where conventional fall protection systems cannot be used.

These locations must be classified CAZs.

Where no other alternative measure has been implemented, the employer must implement safety monitoring.

Each employee working under an FPP must be identified by name.

Only designated employees are allowed to enter CAZs.

The FPP must be developed specifically for the site where the work is being performed.

The FPP must be kept up to date.

Any changes to the FPP must be approved by a qualified person.

A copy of the FPP with all approved changes must be maintained at the jobsite.

The implementation of the FPP must be under the supervision of a Safety Representative (competent person).

In the event an employee falls or some other related, serious incident occurs (such as a near miss), the employer must investigate the circumstances of the fall or other incident to determine if the FPP needs to be revised.

The employer must implement identified changes to prevent similar types of falls or incidents.

19.3 DEFINITIONS

Aerial lift devices	Any vehicle mounted device, telescoping, articulated, or both, used to position personnel above a lower level.
Anchorage	A secure point of attachment for lifelines, lanyards, or deceleration devices.
Bad weather	For the purposes of this section, any weather condition that may increase the hazard of falling for personnel working from heights including snow, rain, icing or wind gusts of 35 miles per hour or sustained winds of 25 miles per hour.
Body harness	An arrangement of straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a PFAS.

Compatible	For the purposes of this document, system subcomponents are used and arranged in the system based on their design intent and that subcomponent connectors are arranged so that no combination of twisting and pressure between snaphooks, carabiners, etc., can cause rollout.
Competent person	An individual capable of identifying hazardous or dangerous conditions in a PFAS or any component thereof, capable of identifying hazardous or dangerous conditions in the application and use of the PFAS or any component thereof with related equipment, and knowledgeable in the requirements of *29 CFR 1926, subpart M.*
Controlled access zone	An area in which certain work (for example, overhand bricklaying) may take place without the use of guardrail systems, PFASs, or safety net systems and access to the zone is controlled.
Conventional fall protection system	The use of a PFAS, guardrail system, or safety nets to protect employees from the consequences of a fall.
Dangerous equipment	Equipment (such as pickling or galvanizing tanks, degreasing units, machinery, and open electrical equipment) which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.
Equivalent	Alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in this section or *29 CFR 1926, subpart M.*
Free fall	The act of falling before a PFAS begins to apply force to arrest the fall.
Free fall distance	The vertical displacement of the fall arrest attachment point on an employee's body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline or lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline or lanyard extension before they operate and fall arrest forces occur.
Guardrail system	A physical barrier erected to prevent employees from falling to lower levels.
Holes	Gaps or voids in a floor, roof, or other walking/working surface.

Infeasible	For the purposes of this section, a term used to indicate that it is impossible to perform work using a conventional fall protection system (for example, a guardrail system or PFAS) or that it is technologically impossible to use any one of these systems to provide fall protection.
Impact loading	A component or components of a PFAS or a PFAS that has received the forces generated by someone falling while connected to the system.
Lanyard	A flexible line or strap which generally has a connector at each end for connecting the body harness to a deceleration device, lifeline, or anchorage.
Leading edge	The edge of a floor, roof, or form work for a floor or other walking/working surface (such as a deck) which changes location as additional floor, roof, decking, or form work sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.
Lifelines	Components consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a PFAS to the anchorage.
Low-slope roofs	Roofs having a slope less than or equal to 4 in 12 (vertical to horizontal).
Mechanical equipment	For the purposes of this section, all motor or human propelled, wheeled equipment used for roofing work except wheelbarrows and mop carts.
Opening	A gap or void 30 inches or more high and 18 inches or more wide, in a wall or partition, through which employees can fall to a lower level.
Overhand bricklaying and related work	The process of laying bricks and masonry units such that the surface of the wall to be jointed is on the opposite side of the wall from the mason, requiring the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

Personal fall arrest system (PFAS)	A system used to arrest an employee in a fall from a working level It consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.
Positioning system	A body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning. It is a one type of a personal restraint system.
Qualified persons	Individuals with a recognized degree or professional certificate and extensive knowledge and experience in the subject field and who are capable of design, analysis, evaluation and specifications in the subject work, project, or product.
Responsible manager	Any person directing activities of personnel exposed to fall hazards. This includes construction management, facility managers and project managers.
Roofing work	The hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal and vapor barrier work, but not including the construction of the roof deck.
Safety monitors	Competent persons assigned to observe other employees and who are responsible for recognizing and warning employees of fall hazards.
Snaphooks	Connector comprised of hook-shaped members with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are generally one of two types: 1. The **locking type** has a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection. 2. The **nonlocking type** has a self-closing keeper which remains closed until pressed open for connection or disconnection. This type of snaphook is not used on Parsons projects.
Three-point contact	The process of maintaining at least three points of contact with a ladder; for example, two feet and one hand in contact with the ladder.

Toeboards	Low protective barriers that will prevent the fall of materials and equipment to lower levels and provide some protection from falls for personnel and stepping into small floor holes
Travel restriction system	A type of personal restraint system which prevents one from reaching a location where a fall hazard exists. Travel restriction is a type of exposure prevention and is preferred over the use of a fall arrest system.
Unprotected side	For the purposes of this section, any side or edge (except at entrances to points of access) of a walking/working surface, (such as a floor, roof, ramp, or runway) where there is no wall or guardrail system at least 39 inches high.
Walking/working surface	A term used to describe any surfaces, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, form work and concrete reinforcing steel. This type of surface does not include ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.
Warning line system	A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area in which roofing work may take place without the use of conventional fall protection systems to protect employees in the area.

19.4 REFERENCES

- 29 CFR 1926, Subpart M, Fall Protection
- 29 CFR 1910.66 Attachment C, Powered Platforms, Manlifts, and Vehicle Mounted Work Platforms
- ANSI A10.161991, Requirements for Safety Belts, Harnesses, Lanyards, and Lifelines for Construction and Demolition Use
- ANSI Z359.1-1992, Safety Requirements for Personal Fall Arrest Systems, subsystems and components

Attachment A-10

Haul Roads

08.D HAUL ROADS

08.D.01 Access/haul roads shall be designed in accordance with current engineering criteria. Prior to construction, the Contractor shall provide the GDA with a copy of the plan for review and acceptance. Work on the haul road shall not commence until the GDA has accepted the plan. The plan shall address the following items:

a. Equipment usage, traffic density, and hours of operation;

b. Road layout and widths, horizontal and vertical curve data, and sight distances;

c. Sign and signalperson requirements, road markings, and traffic control devices;

d. Drainage controls;

e. Points of contact between vehicles and the public, and safety controls at these points of contact;

f. Maintenance requirements, including roadway hardness and smoothness and dust control; and

g. Hazards adjacent to the road such as bodies of water, steep embankments, etc.

08.D.02 No employer shall move, or cause to be moved, any equipment or vehicle upon an access or haul road unless the roadway is constructed and maintained to safely accommodate the movement of the equipment or vehicle involved.

08.D.03 When road levels are above working levels, berms, barricades, or curbs shall be constructed to prevent vehicles overrunning the edge or end of embankment. Berms/curbs shall be constructed to one-half the diameter of the tires of the largest piece of equipment using the roadway.

08.D.04 Roadways shall have a crown and ditches for drainage. Water shall be intercepted before reaching a switch back or large fill and be led off.

08.D.05 Haul roads shall be constructed to widths suitable for safe operation of the equipment at the travel speeds proposed by the Contractor and accepted by the GDA.

08.D.06 All roads, including haul roads, shall be posted with maximum speed limits.

08.D.07 An adequate number of turn-outs shall be provided on single lane roads haul roads with tow-way traffic. When turn-outs are not practical, the Contractor shall provide a traffic control system to prevent accidents.

08.D.08 Whenever possible, use a right-hand traffic pattern on two-way haul roads.

08.D.09 Curves

a. All curves shall have open sight line and as great a radius as practical.

b. Vehicle speed shall be limited on curves so that vehicles can be stopped within one-half the visible distance of the roadway.

c. The design of horizontal curves shall consider vehicle speed, roadway width and surfacing, and super elevation.

08.D.10 Grades

a. When necessary, based on grade and machine and load weight, machines shall be equipped with retarders to assist in controlling downgrade descent.

b. Truck haul roads should be kept to less than a 10% grade. There should be no more than 400 ft (121.9 m) of grade exceeding 10%.

c. The maximum allowable grade shall not exceed 12%.

08.D.11 Lighting shall be provided as necessary.

08.D.12 Traffic control lights, barricades, road markings, signs, and signalpersons for the safe movement of traffic shall be provided in accordance with the DOT Federal Highway Administration's *"Manual on Uniform Traffic Control Devices"* and this Section.

08.D.13 Roadway hardness, smoothness, and dust control shall be used to maintain the safety of the roadway.

08.D.14 All roads shall be maintained in a safe condition and eliminate or control dust, ice, and similar hazards.

08.D.15 The deposition of mud and or other debris on public roads shall be minimized to the extent possible and in accordance with local requirements.

Attachment A-11

Abrasive Blasting

SECTION 5
TASK SPECIFIC SAFETY

TABLE OF CONTENTS

Note: Portions of Section 5 were not applicable to this Health and Safety Plan and have been removed.

5 TASK SPECIFIC SAFETY

5.2 ABRASIVE BLASTING

Abrasive blasting consists of propelling an assortment of abrasive materials in a stream at high speeds using compressed air, water, steam, centrifugal wheels, or paddles against a surface to clean, cut, gouge, abrade, etch, or otherwise change the original appearance or condition of that surface.

5.2.1 DEFINITIONS

Abrasives	Solid substances used in an abrasive blasting operation.
Blast Cleaning Barrel	Complete enclosure that rotates on an axis, or which has an internal moving tread to tumble the parts to expose various surfaces of the part to the action of the automatic blast spray.
Respirator	Continuous flow airline respirator constructed to cover the wearer’s head, neck, and shoulders to protect from rebounding abrasive.
Abrasive Blasting	The forcible application of an abrasive to a surface through the use of pneumatic pressure, hydraulic pressure, or centrifugal force.
Clean Air	Air of such purity that it will not cause harm or discomfort to an individual if it is inhaled for extended periods.
Particulate Filter Respirator	An air purifying respirator, commonly referred to as dust or fume respirator, that removes most of the dust or fumes from the air passing through the device.
Respirable Dust	Airborne dust in sizes capable of passing through the upper respiratory system to reach the lower lungs.
Particulate Air Filter	A safety device used to remove water and/or oil mist, scale, and odors from the breathing air supplied to the operators.
Deadman Control	A safety control device located at the blast nozzle, which the operator must keep closed manually to activate the remote control system of a blast machine.

5.2.2 PERSONAL PROTECTIVE EQUIPMENT

Only respiratory protection equipment approved by MSHA and/or the National Institute of Safety and Health (NIOSH) may be used to protect personnel from dusts produced during abrasive blasting operations.

5.2.2.1 AIRLINE RESPIRATORS

Airline respirators and hoods must be worn by operators of abrasive blasting equipment under the following conditions:

- When using silica sand in manual blasting operations
- Where concentrations of toxic dust dispersed by abrasive blasting could exceed the limits set forth in *29 CFR 1910.1000*
- Where the blast and nozzle are not physically separated from the operator

5.2.2.2 PARTICULATE FILTER RESPIRATORS

Properly fitted particulate filter respirators may be used for short, intermittent, or occasional dust exposure such as cleanup, dumping of dust collectors, unloading shipments of sand at the receiving point, or when it is not feasible to control the dust by enclosure, exhaust ventilation, or other means.

Any respirators used must be approved for protection from the type of dust encountered.

Dust filter respirators may not be used for continuous protection where silica sand is used as the blasting abrasive, or where toxic materials are being blasted.

In all cases requiring respiratory protection, the respiratory policies and procedures in subsection 4.3 of this manual should be reviewed before use to determine the advantages and limitations of personal protective equipment.

5.2.2.3 PROTECTIVE CLOTHING

Operators must wear heavy leather or canvas gloves and aprons or equivalent protection to protect against impact by abrasive particles.

5.2.3 AIR SUPPLY

Air for abrasive blasting respirators must be free from harmful quantities of dust, mist, or noxious gases, and meet requirements for air purity set forth in *ANSI Z9.2*.

Fresh air pumps may be used for airline respirators, but they must be approved for that use. Compressed plant air can be used provided the client approves the following:

- Trap and carbon filters are installed and maintained
- A pressure reducing diaphragm or valve is installed to reduce pressure to the requirements of the respirator

- Automatic control is provided to sound an alarm or shut down the compressor in case of overheating
- The oxygen and carbon monoxide content of the air are monitored

Compressed air plant systems that have an inert gas backup system may not be used for breathing air on abrasive blasting efforts.

5.2.4 PORTABLE AIR COMPRESSORS FOR BREATHING AIR

Portable air compressors for supplying breathing air must be equipped with all necessary safety and standby devices.

A breathing air compressor shall be used. Compressors must be constructed and situated to prevent entry of contaminated air into the system, and suitable inline air purifying sorbent beds and filters must be installed to further ensure breathing air quality.

A receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in the event of compressor failure, and alarms to indicate compressor failure and overheating, must be installed in the compressor system. If an oil-lubricated compressor is used, it must have a high-temperature activated or carbon monoxide activated alarm, or both. If a high-temperature alarm only is used, the air from the compressor must be frequently tested for carbon monoxide to ensure that it meets the specifications in *29 CFR 1910.134(d)(1), Air Quality: Breathing air shall meet at least the requirements of the specifications for Grade D breathing air as described in Compressed Gas Association commodity specification G-7.1 1966*.

Compressed oxygen must not be used in airline respirators.

5.2.5 OPERATIONAL PROCEDURES

Anyone preparing to perform abrasive blasting must ensure that the following guidelines are being implemented at all times during the work.

1. Dust must never be allowed to accumulate on floors, walkways, or aisles.
2. Dust spills must be cleaned as soon as possible.
3. All aisles and walkways must be kept clear of steel shot or similar abrasives that may create a slipping hazard.
4. Blast operators must wear blast helmets that prevent inhalation of silica dust. Blast helmets will be supplied by the task supervisors.
5. Operators may not point energized blast nozzles at anything other than the surface to be abraded.
6. Blast cleaning equipment must never be subjected to air pressure in excess of 125 psi, or the maximum pressure recommended by the manufacturer.
7. Air hose couplings must be safety wired to prevent accidental uncoupling under pressure.

8. The tanks of blasting equipment must never be cut or welded on unless pressure vessel codes are followed exactly.
9. Air compressors and/or blast machines must have a safety relief valve that will automatically open when the discharge pressure reaches 125 psi.
10. A pneumatic safety valve must be installed at the manifold of the source of the air supply to prevent sudden air discharge should a hose break or inadvertently uncouple.
11. Each blast nozzle must be equipped with a remote control deadman system that can only be activated by each operator at each individual blast nozzle.
12. Blast hoses must be kept as short as possible. Never allow hoses to kink or be coiled during use.
13. Only blast hoses may be used that are manufactured for blast cleaning service, are built to withstand pressure, wear, abuse, and are static dissipating.
14. Wind direction and speed must be monitored to ensure dusts are not dispersed on unprotected personnel. Environmental criteria for the location must also be considered.
15. When abrasive blasting is required in areas where access and egress are a problem, the confined space requirements of Section 9 should be reviewed and used, if applicable.

5.2.6 BLASTING HAZARDOUS/CONTAMINATED MATERIAL

Blasting of contaminated materials must follow these additional requirements.

1. The contaminated material must be thoroughly characterized to identify any contaminates.
2. All operators must be trained in the hazards associated with the contaminated material in accordance with the *OSHA Hazard Communication Standard, 29 CFR 1926.59 and/or 29 CFR 1910.1200*.
3. Atmospheric testing equipment must be installed for any abrasive blasting operation and continuously monitored to ensure that the threshold limit value (TLV) for the contaminates has not been exceeded. If the TLV is reached, all blasting operations must immediately cease.
4. Waste must be properly disposed of in accordance with local, state, and federal laws.
5. All contaminated waste must be immediately removed and properly stored until it can be properly disposed of.
6. Personnel performing abrasive blasting in a hazardous or contaminated environment must wear approved respirators and clothing designated for the hazard, both during the blasting operation and while handling disposable wastes.

Attachment A-12

Building Demolition (Including Asbestos Abatement)

SECTION 7
DISMANTLING AND DEMOLITION

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7 DISMANTLING AND DEMOLITION

7.1 GUIDELINES

This section provides guidelines for accomplishing all tasks relating to dismantling or demolition operations at Parsons construction sites.

7.1.1 STRUCTURING OF SITE-SPECIFIC KNOWLEDGEABLE MANAGEMENT TEAMS

Before demolition can begin, the structuring of a management team supervising the demolition must be considered early. The use of experienced supervisory staff ensures that relevant local knowledge will be retained for when demolition begins, and will also ensure that the appropriate permits are issued before demolition begins. Such experienced personnel must also be competent to perform atmosphere tests and the other responsibilities of site management.

7.1.2 DEMOLITION PLAN

Before a demolition plan can be developed, an engineering survey must be performed by a competent engineer. The survey must include the condition of the structure to be demolished as it pertains to framing, floors, walls, and risk of unplanned collapse, as well as the condition of any adjacent structure where workers may be exposed to risk.

The engineer performing the survey provides a written report for filing with the Construction Manager or authorized designate. The survey report becomes the basis for developing a demolition plan.

Once Parsons issues a firm directive to proceed with demolition, the person responsible for the work must prepare a plan outlining the specific sequence of events for demolition. This plan must be approved by the Parsons management team overseeing the project and reviewed by the Site Safety Manager before any demolition work begins. The final demolition plan may not be deviated from unless a safer method of demolition is discovered before demolition begins. Any change must be documented in the plan.

The procedure for performing a job task analysis (JTA) outlined in subsection 1.11 of this manual must also be followed for developing a demolition plan.

Many countries require that statutory safety authorities be informed when demolition is to take place. If appropriate, early contact with such authorities should be arranged to ensure that all legislative requirements are correctly met. The party assigned to contact the appropriate authorities is based on the contract for the project.

7.1.3 POTENTIALLY HAZARDOUS SUBSTANCES

Before demolition work can begin, potentially hazardous substances, process materials, and services in the area should be removed or otherwise determined to be safe. These steps should be taken to the extent possible with the support and confirmation of the plant operations personnel during the plant decommissioning phase.

Hazardous substances, process materials, and services include:

- Residual feedstocks, process materials, and products in pipelines, piping and equipment, and storage vessels and drains
- Catalyst materials in process vessels
- Residual chemical stocks in treatment systems
- Surface deposits such as lead in tankage, pyrophoric iron, and vanadium in fired heaters and boilers
- Insulation materials, particularly asbestos
- Electrical, water, steam, compressed air, and any other services unnecessary for any remaining activities
- Interconnecting piping such as flare or blowdown systems
- All sources of ionizing radiation

7.1.4 EQUIPMENT PREPARATION

The demolition contractor is responsible for keeping records indicating the condition of each plant item, the date of preparation for demolition, and the person responsible.

Any serviceable equipment to be retained or sold should be removed by the demolition contractor and placed in a specified storage location once it has been made safe. An inventory of such equipment should be prepared by Parsons onsite personnel to help account for movable assets at all stages of demolition.

7.1.5 MATERIALS DISPOSITION

The environmental impact of the demolition material may be considerable; therefore, site management should seek the advice of professional environmental services where necessary.

Safety and environmental issues to be considered include:

- Dumping rubble or potential spillage of material
- Potential traffic hazards while in transit
- Disposal of contaminated soil and sludges
- Cutting up and removing plant components

- Burning wood and other combustibles, taking into account possible toxic fumes from contaminants
- Draining lakes and reservoirs and pumping out sumps, tanks, and drains
- Filling shafts, pits, trenches, sumps, and tunnels
- Removing or making safe underground pipework, cabling, foundations, and piling
- Removing superstructure and piling from jetties
- Access to and method of excavating cross-country pipelines, particularly where they cross rivers, roads, railways, and utilities
- Landscaping, regrading, and reinstating land or fences for cross-country pipelines
- Transporting or towing heavy plant or structures to another site or location for demolition

7.2 TENDER SPECIFICATION PREPARATION

Each client is responsible for the overall safety and environmental control of a site until demolition is completed, even though Parsons typically carries out most of the work.

7.2.1 SITE SURVEY

The site must be surveyed to determine the nature and extent of any hazards, and to facilitate the creation of an appropriate tender document. During this and subsequent phases of a project, hazard analysis teams should be assisted by personnel familiar with site operations. A hazard analysis team may consist of Parsons or third-party consultant personnel. Such persons provide required detailed knowledge about electrical services, isolation systems, drains, methods of cleaning or inerting contaminated plants, and interaction with third parties in the case of pipelines and jetties.

The survey report should provide answers to at least the following questions.

1. What plans for plant or site and surrounding area are available that show access roads, services to the site, the relationship of any pipelines to nearby third-party sites, and modifications or alterations to the original arrangements?
2. Does the location of the demolition site affect the neighborhood; e.g., noise, dirt, vibration, or risk of structures collapsing?
3. What are the electrical zone classifications for adjacent areas where operations may continue during demolition?
4. Is access to the plant or site for initial inspection safe both above- and belowground?
5. Has the plant or site been adequately decommissioned or otherwise made safe? What records are available? Have tanks and systems intended to contain hazardous process materials been cleaned out, purged, or rendered inert? What will be the frequency of checks for flammable or toxic materials during the project? Are the roofs of floating roof

tanks adequately supported? What safety requirements are provided for entry into columns or vessels?

6. Does any plant require specialist attention to deal with residual toxic materials such as asbestos and lead compounds?
7. Are there any areas where hazardous substances may have collected? Do any vessels have separate linings that may release flammable or toxic residues on demolition? Is any ground on or surrounding the site contaminated with oil or toxic deposits?
8. What is under the ground? Does the site contain locations where heavy loads cannot be placed with safety? Is there a requirement to provide new access roads? Are there any conditions that might limit excavations?
9. Are there any height conditions that could restrict operations, especially overhead power lines?
10. Can the plant or site be easily isolated from all external services? Do some services need to be retained or diverted, such as electricity, air, water, steam, or sewage? Can these services be adequately identified?
11. Are the existing provisions for firefighting and emergency medical services adequate? If not, how will adequate coverage be provided? Is adequate telephone communication to outside emergency services available?
12. Must external authorities be notified? Who is responsible for such notification?
13. Is there a need to protect adjacent plant or property from the effects of demolition such as ground vibration, dust, and missiles?
14. Will demolition affect the integrity of an adjacent plant or property? Could land slip occur? Will people need to be evacuated? Could leakage or hazardous substance emissions occur offsite?
15. How will safe areas be defined or allocated for housing contractor staff, providing eating and washing facilities, and parking vehicles?
16. How will safe areas be defined for cutting, cleaning, storing, or handling dismantled materials without posing danger to site operators or other personnel?
17. Could the local climate or weather (wind, heat, cold, snow, tides, waves) adversely affect the safety of a demolition project?
18. What security arrangements will be required to protect any adjacent plant or property?
19. How will the removal of commercially valuable scrap metals, such as nonferrous metals and mercury, be controlled and monitored to protect the interests of the client and contractor?

7.2.2 SAFETY AND ENVIRONMENTAL REVIEW

At a suitable time before an invitation to submit tender documents is issued, a formal review should take place to determine that, as far as is practicable, all aspects of the work relating to safety and environmental management have been adequately considered and included in the tender.

The review team should include representatives of the Safety, Security, Operations, and Engineering departments, with environmental support as needed. Its members should have as much direct experience of and familiarity with a particular operation or site as possible.

Review team activities should include:

1. Precisely defining the scope of the work.
2. Identifying each plant process material or service to be isolated and specifying the method of isolation. All pipework, ducting, and cables, both above- and belowground, must be taken into account.
3. Identifying all hazardous substances likely to be encountered during demolition or dismantling. Methods of handling and disposal should take into account applicable statutory requirements.

   If practicable, all harmful substances should be removed under Parsons supervision before demolition commences. Specialist contractors may be required to safely remove asbestos, lead compounds, and sludge.
4. Critically examining systems and procedures for controlling hot work.
5. Noting any limiting conditions or circumstances that a contractor might need to be aware of to prepare a realistic tender. Such conditions include limits on work hours, permit system operation, and special environmental considerations.
6. Specifying requirements for initial medical examination of all contractor employees, especially if site cleanup involves burning lead or lead-coated materials.

These precautions are intended to place most of an installation into a clean state, free from oil, gas, and other residues, and reduce the possibility of incidents arising through errors or misunderstandings once demolition contractors are onsite.

7.3 CONTRACTOR SELECTION CRITERIA

Site demolition generally requires the services of contractors specializing in demolition operations. Those contractors may, in turn, use subcontractors and hire special equipment to satisfactorily perform any demolition.

Those responsible for selecting demolition contractors must determine that an appropriately experienced company is engaged.

To protect the interests of Parsons and the plant owner, contractor selection criteria must include the contractor's ability to manage the safety and environmental impact of its operations. If a trade organization regulates dismantling and demolition contractors in a particular country, site management should ask members of that body to submit tenders. Management should also carry out a precontractual evaluation of potential candidates with respect to safety and environmental awareness and competence, as well as relevant experience and incident statistics. When possible, onsite visits to sites where candidates are working should be arranged.

Criteria for selecting contractors should include the following questions.

1. Is a candidate contractor a member of a national federation of dismantling and demolition contractors or of an appropriate regulatory body? Is each candidate familiar with recognized standards such as *BS 6187, ANSI A10.6* for demolition?

2. What is the contractor's previous experience? Are tenderers being required to submit outlines of planned demolition sequences and methods to be used?

3. What is the contractor's policy and organization for safety and environmental control? Does the contractor have formalized safety management procedures? What are the contractor's accident and injury statistics?

4. To what extent will work be delegated to subcontractors? What is the contractor's experience handling subcontractors in various disciplines? What types of contracts and methods of reimbursement will be used?

5. Does the contractor have special procedures for dealing with identified hazards?

6. Is the contractor aware that its safety performance will be formally monitored by Parsons?

When possible, subcontractors should be nominated by the principal contractor before a tender is accepted. Although Parsons site management may not directly control the selection of subcontractors or specialist equipment, it has a duty to determine safe work practices on behalf of employees and all others on the site or living nearby. Site management should therefore monitor the performance of all contractor and subcontractor personnel and take appropriate action to determine that any dangerous practices or deficiencies are corrected.

Should an unavoidable change of subcontractors occur during the period of contract performance, the principal contractor must inform site management in advance of any potential problems.

Local statutory requirements may regulate the use of explosives, underwater work, or other operations, and site management should be prepared to monitor compliance with all relevant regulations on the part of contractors and subcontractors.

Site management is also responsible for determining that all contractor and subcontractor staff are informed of client site safety and environmental rules, emergency procedures, and any hazards Parsons site staff may have encountered before contract start.

7.3.1 WORK PROCEDURES

The principal contractor and client site management should discuss proposed work procedures before any contract is signed. Following these discussions, site management should require the contractor to submit a draft plan for demolition that summarizes the proposed procedures.

Matters to be discussed include:

1. Types of equipment to be used, equipment certification, maintenance, and periodic check routines.

2. Methods for cutting process steelwork, including the use of hydraulic shears or other cold-cutting equipment to avoid residual fire risks and increase work rates.

3. Special equipment and techniques such as explosives, thermal lance, water jet cutting, diving, and work in inert atmospheres that may be required. Where will the required skills come from?

4. The work permit system to be used for access, cleaning, removal, and hot work. Typically, the client site permit system is used; therefore, the contractor's proposed procedure should comply with the client's.

5. Provisions for isolating plant and services. Isolations are typically carried out by client site staff; therefore, the contractor's system for identifying isolations should agree with the client's.

6. Approach to testing for hazardous materials and substances. Will testing be carried out by Parsons site staff or will third-party services be required for analyzing asbestos counts and other hazards? How will materials disposal be controlled?

7. Job responsibilities, terms of reference, and reporting responsibilities for the contractor's site managers and supervisors. Who will interact with the client project manager and safety engineer? Who will interact with statutory authorities and subcontractors?

8. The contractor's system for managing the safety and environmental issues resulting from its operations and those of its subcontractors.

9. Responsibility for reporting and investigating accidents and near accidents.

10. Responsibilities and methods used for testing atmosphere safety and for inspecting confined spaces before entry. Client site managers typically control such tests. The contractor's work proceeds under the site permit system.

11. Contractor proposed procedures for demolishing structures. Particular hazards arise during the demolition of pre- and post-stressed concrete structures, such as chimney stacks, columns, and other tall or heavy items. Are specialized engineering services required for these areas?

12. Induction and training required for contractor employees, including operation of permit to work system and use of protective equipment and breathing apparatus.

13. The means of identifying pipes, vessels, and tanks that have been rendered safe for further work or that remain unsafe.

14. The use of personal protective equipment provided by a contractor for its employees. The type of equipment proposed must be acceptable to client site management.

15. Proposed methods of moving components around the site and safe access routes for cranes and heavy trucks.

16. Proposed residual waste removal techniques and handling and disposal of waste.

17. Proposed means of storing and issuing gas cylinders and checking their correct use.

18. Methods for cutting up scrap metal and designating suitable areas for this work. Particular attention should be paid to the hazard potential of steel plate or pipework that has been in contact with lead compounds.

19. Provision of temporary services for the demolition crew, including lighting, telephones, power, water, and sewage disposal.

20. Provision of fire prevention, detection, and extinguishing systems and location of fire alarms and fire points.

21. Means of defining demolition site boundaries and controlling access of both personnel and vehicles. Access may be adjacent to or through operating plant areas; thus, effective control or segregation by fencing or other means will be required.

22. Provision for removing glass and other hazardous substances from buildings, for possible collapse of floors, and any requirement for heavy lifts.

23. Methods for sealing off drains that may release toxic or flammable materials.

24. Provision for using existing equipment such as hoists or lifts. Redundant equipment must not be used unless current certificates of examination are available.

25. Procedures for dealing with emergencies, including site evacuation arrangements, alarm signals, and assembly areas.

26. Provisions for first aid medical facilities.

7.3.2 NOTIFICATIONS

After demolition begins, technical or commercial factors may require changes to the original plan. The contract terms should delineate the principal contractor's responsibility to inform site management in advance of any proposed modification. Site management should then approve any acceptable modification.

7.4 MONITORING PROJECT PERFORMANCE

Before a demolition project begins, Parsons site management, contractors' site representatives and, where appropriate, local statutory safety authorities should meet to address the proposed plan of work and any safety and environmental management features of the contract.

7.4.1 COORDINATION MEETINGS

Once demolition begins, Parsons site management and the contractor must meet at least once each week to monitor progress. Any problems that may have arisen during the previous week should be resolved during these meetings. The proposed work plan for the coming week should be reviewed and relevant safety or environmental control aspects highlighted. Meeting minutes should be issued to all attendees as quickly as possible after each meeting to determine that all action items are completed.

7.4.2 CONTRACTUAL OBLIGATIONS

In addition to weekly coordination meetings, Parsons site management should safeguard its interests by monitoring the contractor's performance. Matters to be monitored, either by written agreement with the contractor or through the contract itself, include:

1. The right of access to the site by Parsons representatives
2. Frequency of safety reviews and method of reporting
3. Grounds for halting work and procedures for resolving disputes over safety matters
4. Defining responsibilities of all parties for dealing with emergencies

Where appropriate, each contract should incorporate provisions that enable Parsons to terminate a contractor's services and the services of employees or of subcontractors in the event of unsatisfactory safety or environmental performance.

7.4.3 DOCUMENTATION

Parsons site management should require documentary evidence of the following.

1. Current and valid certificates of periodic examination of cranes, lifting tackle, air receivers, and other critical equipment

2. Trained, experienced vehicle drivers

3. Reporting program for accidents and incidents

4. Ongoing, adequate monitoring of persons exposed to toxic or radiation hazards, including any evidence required of satisfactory initial medical examination. Hazards include lead, asbestos, and x-ray

5. The correct use of personal protective equipment

6. The safe treatment and disposal of hazardous substances

7. The observance of agreed working hours. Shift changes should be coordinated so that adequate safety, medical, and fire coverage is always available

8. Appropriate procedures for handling debris, fumes, dust, and spillages to minimize risk to personnel in adjacent areas
9. The correct use of scaffolding, ladders, chutes, cranes, hoists, vehicle, and cutting equipment

7.5 PROJECT CONCLUSION

At the conclusion of demolition operations, Parsons performs a final safety and environmental review with the contractor to determine whether the site is ready for a new owner or can be left without further attention. Careful supervision of the contractor during the final phases of a project is required to determine that safe conditions are established before the contractor leaves the site.

12.0 ASBESTOS PROJECT HEALTH AND SAFETY

Parsons I&T is increasingly involved in asbestos management projects that involve: asbestos inspections and sampling, preparation of abatement specifications, and inspection of abatement work. Parsons I&T employees that perform building inspections, bulk sampling operations, and abatement management can be exposed to airborne asbestos fibers. This section, in conjunction with applicable federal, state, and local asbestos regulations, must be followed when conducting operations involving the potential exposure to asbestos containing materials (ACM).

12.1 APPLICABLE REGULATIONS

OSHA regulates occupational exposure to asbestos. These regulations are published in 29 CFR Part 1910.1001 (occupational exposures to asbestos exclusive of construction and shipyard work), 29 CFR Part 1926.1101 (occupational exposures to asbestos on construction projects), and 29 CFR Part 1915.1001 (occupational exposure to asbestos in shipyards).

The OSHA permissible exposure limit (PEL) for asbestos is 0.1 fibers per cubic centimeter (f/cc) of air as an 8-hour, time-weighted average (TWA). OSHA has also added an excursion limit of 1 f/cc over a sampling period of 30 minutes. Parsons I&T must ensure that no employee is exposed to concentrations above these limits without respiratory protection. Exposure above the PEL triggers requirements for air monitoring, medical monitoring, and employee training.

12.2 TRAINING

OSHA requires (29 CFR parts 1910.1001(j)(5) and 1926.1101(k)(3)) employers institute a training program for employees that may be exposed to asbestos above the PEL. Training shall be provided to employees prior to initial assignment to asbestos operations and annually thereafter. Training is obtained by attending an asbestos course, such as the Building Inspector or the Supervision of Asbestos Abatement Project courses that comply with EPA's Model Accreditation Plan (refer to 40 CFR Part 763).

The following topics must be covered in the training:

- Health effects associated with asbestos exposure
- Relationship between smoking and asbestos exposure in producing lung cancer
- Types, locations, and manners of use of materials that can contain asbestos; release mechanisms of asbestos fibers; and storage requirements for asbestos products
- Specific operations that can result in exposure to airborne asbestos fibers
- Engineering controls and work practices needed to reduce asbestos exposures, including emergency cleanup procedures and use of protective equipment.
- Purpose, proper use, and limitations of respirators and personal protective equipment.
- Purpose and description of the medical monitoring program.
- Review of the OSHA asbestos regulations.
- Names, addresses, and phone numbers of public health organizations that provide smoking cessation programs.

12.3 MEDICAL PROGRAM

Parsons I&T's medical monitoring program states that all employees whose work involves regular potential exposure to hazardous substances above OSHA PELs, OSHA action levels, or ACGIH TLVs, including asbestos, must participate in the medical monitoring program. The medical monitoring program is necessary to assess the employee's physical ability to perform the assigned work; to monitor possible changes in the worker's health; to provide emergency care as necessary; and to keep accurate records for future reference. The Parsons I&T medical examination for asbestos workers follows the environmental field test protocol (refer to appendix B).

The employee must note on the History and Physical form that their job assignment involves the potential exposure to asbestos containing materials. (This form is submitted to the physician at the time of the examination.) The physical examination for asbestos workers emphasizes pulmonary and cardiovascular testing.

12.4 ASBESTOS ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT FOR EMPLOYEE PROTECTION

The following sections provide general guidelines for the conduct of asbestos field operations. Detailed procedures must be developed by the Project Health and Safety Officer on a project-by-project basis.

12.4.1 Bulk Sampling of Suspected Asbestos-Containing Materials (ACM)

Asbestos sampling shall follow Asbestos School Hazard Abatement Reauthorization Act (ASHARA) and OSHA protocol. Site-specific sampling procedures must be developed and communicated to employees. General sampling requirements are as follows:

- Sampling personnel must be enrolled in a medical monitoring program, trained in the use of personal protective equipment, received a respirator fit-test, and attended an EPA accredited asbestos inspector's course.
- A "buddy system" system should be used whenever possible.
- The protective clothing and equipment used by personnel conducting bulk sampling shall include: a hooded Tyvek® suit, surgical-latex gloves, and a full-face air purifying respirator or powered air purifying respirator equipped with HEPA cartridges when asbestos exposure is expected to exceed the OSHA PEL of 0.1 f/cc.
- The suspected ACM must be sampled in a "wet state" sufficient to prevent fiber emissions during sampling. A wet state can consist of misting with amended water (water containing a surfactant) from a spray bottle or by placing a moist sponge over the ACM and coring through the sponge to obtain a core sample of material.
- Engineering controls (i.e., glove bags or mini-enclosures) will be used as appropriate to limit asbestos fiber release.
- Any spills or accidental releases of bulk ACM onto floors or other surfaces must be cleaned up as soon as possible using wet methods (wet rags, sponges, or mops) or high efficiency particulate filtering (HEPA) vacuuming equipment.
- A project (site specific) health and safety plan will be developed describing the protective measures to be use during bulk sampling.
- In occupied areas, sampling should be done after normal work hours, if possible.

- Protective clothing will be removed carefully and disposed of as asbestos waste.
- Where practical sampling personnel should shower after sampling to minimize the potential for exposure.

12.4.2 Building Inspection and Asbestos Quantity Estimates

Frequently Parsons I&T is hired to conduct detailed inspections of buildings to estimate ACM quantities for the development of abatement specifications and bid packages. Personnel must assess the potential for asbestos exposure to determine the proper personal protective equipment and clothing to wear during the inspection.

12.4.3 Abatement Project Inspection and Monitoring

Parsons I&T personnel performing inspections or conducting air monitoring during abatement operations must enter "regulated areas" (containment areas) to perform their work. Inspectors must be trained in all aspects of asbestos abatement (i.e., construction of containment, asbestos removal, and proper disposal of ACM) and must have "Competent Person" training as outlined in 29 CFR Part 1926.1101.

12.5 OCCUPATIONAL EXPOSURE MONITORING

Employees performing operations where there is the potential for the PEL to be exceeded, must be monitored for their exposure to asbestos. Compliance sampling must be conducted in accordance with NIOSH Method 7400. Results of exposure monitoring are to be maintained with the employee's medical file with a copy forwarded to the Parsons I&T medical oversight contractor.

12.6 HEALTH AND SAFETY PLAN

Parsons I&T requires the development of a project health and safety plan for all asbestos operations. The cognizant Project Health and Safety Officer is responsible for developing the project health and safety plan. The Project Manager and Facility Health and Safety Representative are responsible for reviewing and approving the plan. The Facility Health and Safety Representative and Project Manager must sign and date the plan to document their approval.

The approved project health and safety plan should, as a minimum, be distributed to all Parsons I&T personnel participating in the asbestos work. The Project Health and Safety Officer shall discuss the plan in detail with the participants prior to initiating field activities. Parsons I&T employees are required to document the receipt of the project health and safety plan by signing the Plan Acceptance Form (see appendix A). Plan Acceptance Forms and a copy of the health and safety plan are to be maintained in the project file. Any project health and safety plan requiring supplied air respirators, must be approved by the Corporate Health and Safety Manager or his designee.

The minimum information requirements to be addressed in the plan include the following:

- Site description and scope of work
- Project team organization, including designation of persons responsible for health and safety at the project site

- Personal protective equipment to be used by employees for each task and operation
- Air monitoring requirements and calibration procedures for monitoring equipment
- Decontamination procedures
- Emergency response
- MSDSs for all hazardous substances used by Parsons I&T personnel at the site
- Standard operating procedures for the site

Attachment A-13

Excavation & Trenching

SECTION 8
EXCAVATION AND TRENCHING

TABLE OF CONTENTS

8 EXCAVATION AND TRENCHING

8.1 EXCAVATIONS

All excavations and trenching performed on Parsons construction sites must conform to applicable federal and state regulations, and to the safety policies and procedures in this manual.

8.1.1 INSPECTIONS

Daily inspections of excavations and trenches must be made by a designated competent person. Refer to Appendix O for sample letter designating a competent person. If evidence of potential cave-ins, slides, or water accumulation is found, all work in the excavation or trench must cease until the necessary precautions have been taken to safeguard employees.

All excavations and trenches must be inspected by a designated competent person after every rainstorm or other hazard-increasing occurrence, and safeguards against slides and cave-ins must be increased, if warranted.

Refer to the tables in the relevant OSHA regulations as a reference guide to angle of repose and shoring techniques used in excavations and trenches. These tables show the minimum requirements. Added measures must be taken if conditions warrant. Refer to Appendixes A through E of *OSHA Excavation Standard 1926.652* and Appendix L of this manual for those tables and for other pertinent information such as soil classifications.

8.1.2 GENERAL REQUIREMENTS

Excavations 4 ft or more deep must be shored or sloped in an approved manner unless they are made entirely in stable rock.

Sides of trenches above the 4-ft level may be sloped in lieu of shoring, but the slope may not be steeper than 1-1/2 H:1 V.

Each trench where employees are working 3 ft deep or more must have ladders to provide safe exits. There must be no more than 25 ft of lateral travel distance to the nearest ladder.

Excavated or other material must not be stored nearer than 4 ft, if possible, and no closer than 2 ft from the edge of any excavation. Surface encumbrances that create a hazard must be moved or supported, as necessary.

The locations of any underground installations such as sewer lines, electric lines, etc. are determined before excavation. Utility companies must be notified of the proposed work to establish the locations of utility installations before the start of an excavation. All such installations must be appropriately identified for the safety of persons working nearby.

Employees exposed to vehicular traffic must be provided with, and be instructed to wear, warning vests marked with or made of reflecting or high-visibility material.

No employee is permitted under loads handled by lifting or digging equipment.

When mobile equipment operates adjacent to or approaches the edge of an excavation, a warning system such as barricades, hand or mechanical signals, or stop logs must be used.

The use of water control and removal equipment must be monitored by a competent person.

Sloping or benching excavations greater than 20 ft deep must be designed by a registered professional engineer.

If the excavation is considered a high hazard task as defined in subsection 1.11 of this manual, the job task analysis procedure must be followed.

8.1.3 Hazardous Atmospheres

If the possibility exists in an excavation of an oxygen deficient atmosphere (less than 19.5% oxygen) or an atmosphere in excess of 20% of the lower flammable limit (or lower explosive limit) of a gas, atmospheric testing must be conducted before employees enter the excavation. Refer to Confined Space Work (section 9) and Respiratory Protection (subsection 4.3) for additional guidance.

Proper respiratory equipment and ventilation must be established for each excavation before employees enter the excavation.

Atmospheric monitoring must be conducted to ensure that atmospheres remain safe when controls are being used to reduce the level of contaminants. Refer to the confined space work and respiratory protection sections for additional guidance.

8.1.4 Rescue Equipment

When hazardous atmospheres exist, or are likely to develop, breathing apparatus and a safety harness and line or basket stretcher must be readily available. This equipment must be attended when in use.

Employees entering bell-bottom pier holes or similar confined footing excavations must be equipped with safety harnesses and individual lifelines. An individual must be in attendance at all times while an employee is in an excavation of this type.

8.1.5 Stability of Adjacent Structures

Support systems such as shoring or underpinning must be provided for adjacent structures that may be endangered by excavation operations.

Excavations below the level of the base or footing are normally not permitted unless.

- A support system is used
- The excavation is stable

- A registered engineer has determined that the structure is sufficiently removed from the excavation to avoid cave-ins
- A registered engineer has determined that no other hazard exists

8.1.6 PERSONAL PROTECTIVE EQUIPMENT

All employees must have personal protective equipment for the head, eyes, ears, respiratory organs, feet, hands, and other parts of the body as outlined below.

- Head protection must be worn at all times.
- Appropriate eye protection must be worn when the danger exists of eye or face injury from physical, chemical, or radiant agents.
- If it is not feasible to reduce noise levels or noise exposure duration, hearing protective devices must be provided and used. Plain cotton is not an acceptable protective device.
- If engineering controls are inadequate or fail to control exposure to dust, fumes, vapors, and gases, respiratory protection must be provided and used.
- Mechanical guards or protective devices must be provided and used when hands and feet are exposed to potential injury from mechanical devices or other harmful agents.

8.1.7 FALL PROTECTION

Walkways and bridges over excavations must be provided with standard guardrails. Adequate barriers must be provided at all excavations. All wells, pits, shafts, etc., must be barricaded or covered.

Upon completion of exploration and similar operations, all wells, pits, shafts, etc., must be backfilled.

8.1.8 PROTECTIVE SYSTEMS

Employees working in excavations must be protected by shoring, sloping, or benching. Exceptions to this requirement are:

- Excavations made entirely in stable rock
- Excavations less than 4 ft deep and where examination of the ground by a competent person provides no indication of potential cave-in

All protective systems for excavation sites must be designed by a registered professional engineer when it is not feasible to attain required slope configurations in accordance with *1926.652(b)(1), (2) and (3).*

Sloping or benches greater than 20 ft deep must be approved by a registered engineer. Appendix L contains the requirements for soil classifications and sloping and benching to be used by registered engineers in determining sloping and benching for a particular excavation site.

The registered professional engineer's recommended protective systems must be documented in sufficient detail to establish compliance with OSHA excavation requirements. The recommendations must be signed by the registered professional engineer, and the report must be maintained at the jobsite.

When manufactured support systems are used, the manufacturer's written specifications, recommendations, and limitations must be maintained at the jobsite.

A designated competent person must monitor the construction and maintenance of the recommended protective systems and their use in excavations.

8.2 PROBING AND EXPLORATORY TRENCHING

This procedure supplements the procedures in subsection 8.1, Excavations, and should be read in conjunction with those procedures.

On many Parsons projects it is necessary to perform excavations. In virgin soil, a probing and exploratory trenching procedure normally is not necessary. However, many Parsons projects deal with chemical and refining construction in existing facilities. Extreme caution must be taken to ensure the safety of employees and the client's property. Underground utilities and other obstructions present a very real danger and every effort must be taken to determine that excavation operations are performed safely. Therefore, where excavations are required to be performed on Parsons construction sites, the following probing and exploratory trenching procedures must be followed.

8.2.1 RESPONSIBILITIES

The Parsons project Construction Manager designates a representative to conduct a search for drawings of all areas requiring excavation. This search must be completed during the design phase, so all pertinent drawings are issued with the construction package.

The designated person holds a constructability meeting with the client representative and Parsons personnel as early in the design stage as possible. If required, a registered professional engineer must approve the excavation plan.

If subcontractors are used, the subcontractor supervisor and the designated Parsons person review in detail any pertinent drawings and as-built drawings that are available to determine the location of the piping or other underground obstacles.

The Parsons designated person schedules a task force meeting with the responsible subcontractor personnel, as required.

It is the duty of the Parsons designated person to see that all workers involved in the task receive all known information. This includes subcontractors, if applicable.

8.2.2 REQUIREMENTS

All excavations are performed with extreme caution to prevent injury or damage to underground piping, electrical wiring, etc.

If there are known underground obstacles, the task force meeting defines appropriate protective measures.

When excavations occur within 2 ft, vertically or horizontally, of a direct buried electrical or communication cable, exploratory hand trenching must be done to authenticate the actual location of the cable.

Before and during excavations, these additional requirements must also be met.

The area to be excavated must be swept with a metal detector.

When excavating with mechanical equipment or other means, probing is required every 4 in. on center over the total area to be excavated.

Exploratory trenching can be used at the perimeter of an area to be excavated by probing and trenching on 4-in. centers. The depth of the trench is determined by the depth needed to accommodate the footings, supports, pipe, etc., that will be placed inside the perimeter area.

Probing may be performed by jetting or dry probing; however, the depth of probing must always exceed the depth of excavating by at least 1 ft. The selected depth of probing must be consistent; that is, if one hole is probed at 3 ft, another hole cannot be probed at 4 ft.

8.2.3 OPERATIONS

The Parsons designated person may elect to use either dry probing or a water probing system. Water probing systems must adhere to the following procedures.

When using water jetting, the Parsons person in charge of work must require all employees to wear safety glasses and face shields. The person actually probing must wear both a face shield and goggles.

During excavations with a backhoe, there must be an observer at all times to watch the backhoe bucket. This observer should be stationed adjacent to the excavation to avoid the operations of the hoe. The observer is responsible for visually identifying any obstruction while the bucket is excavating, and alerting the operator immediately if any obstructions are observed.

If the observer leaves the excavation area, excavation efforts must be stopped immediately until an observer returns.

If pipe or other obstacles are encountered, shoring and hand excavation are required until the obstacles are identified and cleared.

Air-operated clay spades may be used during hand excavations, provided extreme care is taken.

During hand excavations, if a person’s head is below the top of the excavation or if the trench is greater than 4 ft deep, shoring is required.

Should any underground obstructions be encountered, the Parsons designated person must immediately notify the designated client representative, who in turn notifies the proper personnel to assist in identification of the obstruction and its possible removal or re-routing.

Attachment A-14

Compressed Gas Safety

APPENDIX F
COMPRESSED GAS SAFETY

Few people realize the incredible power that is stored in a cylinder. Like most other familiar field or laboratory equipment, compressed gas cylinders are never noticed except when needed. Cylinders are frequently handled without regard to their potential hazards.

When accidents occur involving compressed gas cylinders they are often spectacular. One classic case reported by the National Safety Council involved a cylinder of carbon dioxide. Briefly here is what occurred: during building construction, a painter was moving a 215 pound, 220-cubic foot cylinder of carbon dioxide by rocking it along the ground with the cylinder cap removed. Eventually, the cylinder twisted out of the painter's hand and fell to the ground breaking the valve. The cylinder rocketed along the floor into other cylinders damaging their valves. This caused the cylinder to change direction where it rammed into a scaffold resulting in its collapse. A painter working on the scaffold fell to the ground fracturing his legs. The cylinder then took off down the room chasing an electrician. The electrician escaped by jumping through a door opening (resulting in injury); finally, the cylinder fell into a truck well where its energy was spent harmlessly.

Other stories of accidents have been circulated describing fires resulting from the use of oxygen cylinders, explosions resulting from leaking hydrogen cylinders and injuries resulting from exposure to toxic or corrosive gases. Clearly, compressed gases are hazards that must be taken seriously.

F.1 CHARACTERISTIC AND HAZARD CATEGORIES OF COMPRESSED GASES

F.1.1 Definition of Compressed Gas

The U.S. Department of Transportation (DOT) regulates the transportation of compressed gases and, by extension, much of the compressed gas industry. DOT defines a compressed gas as ".... any material or mixture having in a container an absolute pressure exceeding 40 psia at 70°F or, regardless of the pressure at 70°F, having a pressure exceeding 104 psia at 130°F." In other words, a compressed gas is either a gas under at least 40 psi of absolute pressure at room temperature or a substance that exerts an appreciable pressure at elevated temperatures.

F.1.2 Hazard Categories

Compressed gases are characterized into five different hazard groups based upon their physical or health properties. A gas may be placed into more than one group if its properties warrant (see table F.1).

Table F.1. Common Gases and Their Hazards

Gas	Physical State		Hazard Characteristic					
	Liquified(1)	Cryogenic(2)	Flammable(3)	Toxic	Asphyxiant	Inert	Corrosive	Oxidizer
Air	No	No	No	No	No	No	No	No
Ammonia (anhydrous)	Yes	No	No	Yes	No	No	Yes	No
Argon	No	Yes	No	No	Yes	Yes	No	No
Butane	Yes	No	Yes	Slightly anesthetic	Yes	No	No	No
Carbon dioxide	Yes	No	No	Low	Yes	No	No	No
Carbon monoxide	No	Yes	No	Yes	No	No	No	No
Chlorine	Yes	No	No	High	No	No	Yes	Yes
Ethylene	Yes	No	Yes	Anesthetic	Yes	No	No	No
Fluorine	No	No	No	High	No	No	Yes	Yes
Halocarbon R12	Yes	No	No	Low	Yes	No	No	No
Helium	No	Yes	No	No	Yes	Yes	No	No
Hydrogen	No	Yes	Yes	No	No	No	No	No
Hydrogen chloride	Yes	No	No	High	No	No	Yes	No
Hydrogen fluoride	Yes	No	No	High	No	No	Yes	No
Methane	No	Yes	Yes	No	Yes	No	No	No
Nitrogen	No	Yes	No	No	Yes	No	No	No
Oxygen	No	Yes	No	No	No	No	No	Yes
Propane	Yes	No	Yes	Low	Yes	No	No	No

(1) Available only as a liquefied gas under pressure.
(2) Available as a cryogenic liquid (normal boiling point below - 150°C).
(3) As designated by the U.S. Department of Transportation.

Corrosive - Corrosive gases cause decomposition or corrosion of material or damage to living tissue. The handling of corrosive gases requires special equipment and procedures. Every effort must be made to avoid contacting the skin or eyes or inhaling any corrosive gas. Areas where corrosive gases are used must be equipped with emergency showers and eyewash fountains. The capabilities for prompt emergency first aid and medical treatment must be provided. Examples of corrosives are chlorine, hydrogen chloride, anhydrous ammonia.

Toxic Gases - Toxic gases are poisons. Examples of toxic gases are carbon monoxide, nitrogen dioxide, and sulfur dioxide.

Flammable Gases - Flammable gases are those that form a flammable mixture with air at 13 percent or less by volume or have a flammable range in air of greater than 12 percent by volume regardless of the lower flammable limit. The flammable range of a gas is dependent upon the temperature, pressure or oxidant concentration of or in the vicinity of the gas. Thus, controls of physical conditions near the gas are important. Examples of flammable gases include hydrogen, methane and propane.

Inert Gases - Inert gases do not react with other materials at ordinary temperatures and pressures. If released in a confined space, inert gases may become an asphyxiation hazard by displacing oxygen. Thus, these gases must be used in a well ventilated area, or if used in a confined space, oxygen levels must be continuously monitored. Examples of inert gases include helium, nitrogen, noble gases and most halocarbons (freons).

Oxidants - Oxidizing gases are nonflammable gases but in the presence of an ignition source and a fuel, they can support and vigorously accelerate combustion. Examples of common oxidizing agents include oxygen, chlorine, nitrous oxide and fluorine. Although oxygen is nonflammable, materials which will not normally burn in air can burn in an oxygen enriched environment. In an oxygen enriched environment materials burn more vigorously and at higher temperatures. Oxygen is extremely reactive with organic materials. Cylinders and gas piping used in oxidizer gas service must be void of oil, grease, or other combustibles.

F.2 CHARACTERISTICS OF THE CYLINDER AND ITS PARTS

F.2.1 The Cylinder

The container or tank holding the compressed gas is called the cylinder and is manufactured to meet stringent DOT specifications. DOT specifications govern the choice of the material used to construct the cylinder, its capacity, pressure test procedures, and the approved range of service pressures (filling pressure for particular gas). On the shoulder of the cylinder there should be a label or an indentation indicating the dates of the initial and most recent hydrostatic testing (see figure F.1). Hydrostatic tests for self contained breathing apparatus (SCBA) are required every 5 years for the steel cylinders and every 3 years for fiberglass wrapped tanks. Visual inspections of the inside of these cylinders are required every five years. These tests are performed to assess the cylinder's fitness for continued use.

The service pressure for the cylinder should be marked on its shoulder. The service pressure indicates the maximum pressure to which the cylinder may be filled with a non-liquefied gas. It does not indicate the maximum pressure the cylinder is capable of holding without bursting. For non-liquefied, non-flammable gases, such as the breathing air used for SCBAs, DOT regulations allow overfilling up to 10 percent.

GAS CYLINDER AND ITS PARTS

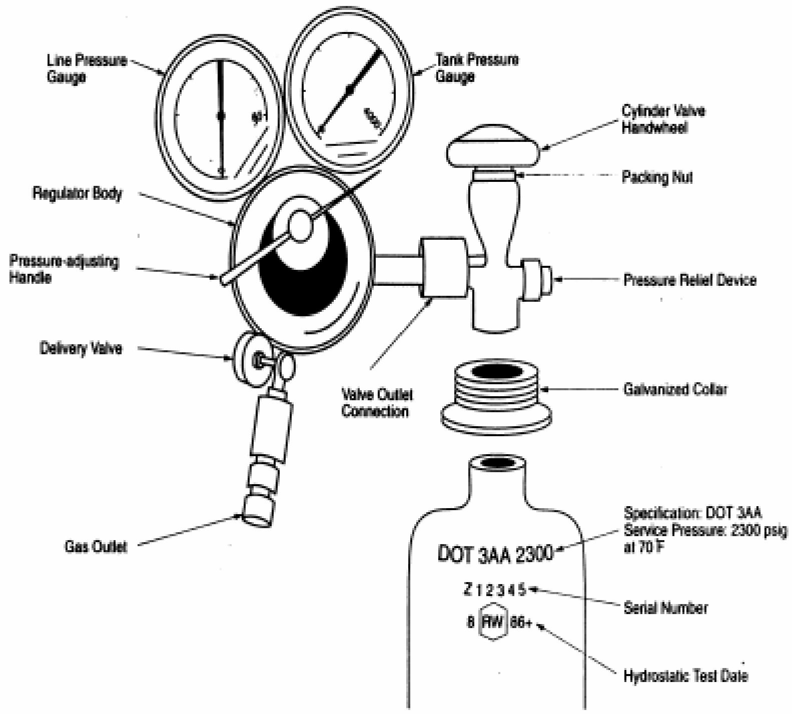

Figure F.1 Gas Cylinder and its Parts

Cylinders may be frequently painted by the gas supplier to permit the supplier to help recognize their content and to segregate them more readily in their handling operation. However, in the U.S. there is no uniform color system for nonmedical gases, thus, different gas suppliers may paint the same gas different colors. Never rely on a cylinder's color to determine its content. Cylinders must be labeled as required by OSHA in the Hazard Communication Standard (refer to 29 CFR part 1910.1200). As a minimum, labels must reveal content of cylinder, hazard information, and name and address of gas manufacturer. Improperly labeled cylinders must be returned to gas supplier.

F.2.2 Cylinder Collar

The collar is attached to the cylinder head and is used to secure the cylinder cap. Be careful not to damage the threads of the collar.

F.2.3 Cylinder Valve

The cylinder valve is used to empty and fill the cylinder. The valve consists of a valve handwheel, a packing nut, a pressure relief device, and an outlet connection.

Valve Handwheel - The container valve should be kept closed at all times except when in use. A valve handwheel too tight to open by hand is a indication of corrosion or damage and the gas supplier should be contacted for instructions. Never use a wrench, hammer, or other tools to open a frozen handwheel valve.

Packing Nut and Gland - The packing gland seals the valve stem to prevent leakage around the stem when the cylinder is open. When the cylinder is placed into service, check for leaks around the valve stem at the packing nut. Leakage is an indication of a loose or faulty packing gland. Place the leaking cylinder in a well ventilated area (e.g., outdoors) and notify the supplier.

Pressure Relief Device - The pressure relief device permits gas to escape if the cylinder temperature is great enough to cause cylinder rupture. These safety devices are used in all cylinders except those containing very toxic gases where potential exposure is more of a risk than cylinder rupture. Never tamper with the cylinder's pressure relief device.

Outlet Connection - The Compressed Gas Association (CGA) and The American National Standards Institute (ANSI) have established several different standards for the fittings and threads used for outlet connections. The purpose, of course, is to prevent the attachment of incompatible materials or pressures. Fittings are identified by CGA codes. For example, CGA- 580 is a nitrogen gas outlet connection pipe. Pipe compound or teflon tape should not be used on CGA-580 outlet threads since these connections often require a metal-to-metal contact. Some connections require a fiber washer (e.g., carbon dioxide, CGA-320); lead washers must be replaced with each chlorine cylinder change. Do not substitute a washer of another material since it could be incompatible with the gas. Never tamper with the CGA connections or "juryrig" connections, this can lead to dangerous situations.

F.2.4 Cylinder and Valve Outlet Caps

The cylinder cap is an essential piece of safety equipment. It must be in place and screwed securely every time the cylinder is moved (even if for a short distance). The cap protects the valve from damage should the cylinder fall. The cap should remain in place until the user is ready to withdraw the cylinder's content.

Where valve outlet caps and/or plugs are provided by the manufacturer, the user shall keep the plugs or caps on the valve outlet at all times except when the container is secured and connected to dispensing equipment. Gas tight outlet caps and plugs serve the purpose of preventing the release of any residual product and are required for toxic and corrosive containers. All containers returned to the supplier shall have a cylinder cap and valve outlet caps or plugs (if required) secured prior to shipment.

F.2.5 Pressure Regulator

The pressure regulator is the attachment used to withdraw cylinder contents. Regulators are designed to reduce the pressure of the exiting gas to the level that is needed for the specific application. Attach the regulator to the valve outlet without forcing the threads. Ensure that the threads on regulator connections or auxiliary equipment match those of the cylinder valve outlet. For example, only pressure regulating devices approved for use with oxygen shall be used in oxygen service. Choosing a regulator depends upon the delivery pressure range and the accuracy of the pressure and flow rate desired.

The two most frequently encountered regulator designs are the single-stage and two-stage regulators.

- The operation of a single-stage regulator is characterized by a variation in delivery pressure as the cylinder pressure drops.
- The two-stage regulator produces a more even delivery pressure over a wider range of supply pressures than does the single-stage device.

The CGA does not specify servicing frequency for pressure regulators. Monthly pressure testing of regulators should be conducted to assess if servicing is required. The pressure test is initiated by connecting the pressure regulator to the valve outlet. This connection must be gas tight (refer to gas tight connections). Next the regulator outlet delivery valve is closed followed by the cylinder valve. The tank pressure gauge and line pressure gauge should accurately reflect tank and line pressures, respectively. If either the tank or line pressure readings drop over a 5 minute period then the regulator has a leak (usually in the diaphragm or valve seat) and must be serviced. Regulator pressure testing is most effective when performed with a fully change cylinder.

F.2.6 Manifold

Where compressed gas containers are connected to a manifold, the manifold and its related equipment, such as regulators and piping materials, shall be of proper design for the product(s) they are to contain at the appropriate temperatures, pressures, and flows. For instance, pressure demand airline respirators connected to a manifold have restrictions in hose length (25–300 ft.) and line pressure (60–120 psi).

F.3 GAS TIGHT CONNECTIONS

Piping, regulators, and other apparatus shall be maintained gas tight to prevent leakage. This is confirmed by the use of a compatible leak test solution or an appropriate leak detection instrument. The application of a mild soap and water solution is the most frequently used procedure for leak testing. The soapy solution is brushed (using a soft brush) or wiped along the piping and connections. The observation of bubbles is an indication of a leak. Soap films will not detect gross leaks because the solution is blown away without bubble formation. Therefore, it is important to listen for leaks. Leak detection instruments (i.e., combustible gas indicators, chlorine monitors, organic vapor analyzers, etc.) must be properly calibrated and maintained. The operator must be familiar with the instrument's operation and limitations. Leak testing should be routinely performed at maximum operating pressure.

F.4 SAFE HANDLING AND USE OF COMPRESSED GASES

Proper handling of the cylinder is important from the moment the cylinder arrives at the site or laboratory until it leaves. There are procedures that must be followed for each step of the cylinder stay on the premises (i.e., receiving, transporting, storing, placing into use, and returning to supplier). Each step will be examined in detail below.

F.4.1 Receiving Cylinders

Every cylinder must be inspected upon receipt. Verify that cylinder content is identified as prescribed by DOT and OSHA. Containers not bearing a legibly written, stamped, or stenciled identification of the content shall not be used. Improperly labeled cylinders must be segregated for return to the gas manufacturer or distributor. Labels must never be defaced or removed by the user. If the cylinder is properly labeled, check it for shipping damage. Cylinder caps should be in place and valves should be tight. Cylinders must never be rolled or dragged on the floor as they are unloaded from the truck. Always use an appropriate cylinder cart. For heavy cylinders (i.e., 1- ton chlorine cylinders), an overhead crane or gantry is used to lift and position. Cranes and gantry must conform to OSHA requirements specified in 29 CFR Part 1910.179.

F.4.2 Transporting Cylinders

When moving cylinders caution should be used to guard against dropping or permitting the cylinders to violently strike against each other or other surfaces. A suitable cylinder cart or similar material handling device should be used with containers properly secured (e.g., chained, strapped, etc.). Personnel who handle the cylinders shall be instructed never to lift cylinders by their valve cap. Never use ropes, chains, or slings to suspend containers.

Transporting Cylinders to Field - The Compressed Gas Association discourages the transportation of compressed gas cylinders in automobiles or in closed body vehicles. Leaks can develop from improper securing of cylinders, inadequate valve protection, or extended confinement in a enclosed compartment where the cylinder can be subjected to excessive heating by the sun in a trunk or passenger compartment. Leaking flammable gases will present a serious explosion hazard whereas a leaking inert gas can result in asphyxiation. Whenever possible, compressed gases required for field investigations (i.e., calibration gas, hydrogen for FID instruments, SCBA air cylinders, etc.) should either be shipped to or purchased at the site.

Occasionally it is impractical or impossible to ship or purchase compressed gases in the field, then under these conditions motor vehicle transport may be used. Parsons I&T personnel asked to transport compressed gas cylinders must comply with DOT regulations as specified in 49 CFR part 177. Vehicles must be equipped with brackets or racks to prevent the overturning of cylinders during transport (refer to 49 CFR part 177.840[a][1]). Cylinder and valve outlet caps must be secured to containers before transport can proceed. Additionally, vehicles used to transport cylinders must have a bulkhead between cargo and passenger compartments. Hazardous materials which are incompatible must not be loaded or transported together (refer to segregation and separation chart 49 CFR part 177.848); thus the transport of flammable and oxidizing liquids or gases in the same vehicle (i.e., mobile laboratory) is prohibited. Only open bodied vehicles equipped with suitable racks or supports to hold cylinders upright may be used to transport hydrogen gas.

Drivers transporting compressed gas cylinders or other hazardous materials must have in their possession shipping papers that meet the requirements of 49 CFR part 172, subpart C. Shipping papers (see form HS07-13, appendix A) must as a minimum contain the following information:

- The proper shipping name prescribed for the material in 49 CFR parts 172.101 or 172.102.
- The hazard class prescribed for the material in 49 CFR parts 172.101 or 172.102.
- The identification number (preceded by "UN" or "NA").
- Total quantity by weight or volume of the hazardous material (refer to 49 CFR part 172.202 for exemptions).

Placards must be affixed on the sides and ends of transport vehicles when the gross weight of all hazardous materials (i.e., compressed gas, flammable liquids, corrosives, etc.) being transported exceeds 1000 lbs. The type of placard displayed is determined by the classification of the material being transported (refer to 49 CFR part 172.504 table 2).

The Department of Transportation prescribes training requirements for employees who package, load, or transport hazardous materials (HAZMAT employees). HAZMAT employee training must include the following:

- *General awareness training*. This training is designed to provide familiarization with the DOT hazardous material shipping requirements.

• *Function specific training*. Employees are to receive training specific to their assign responsibility. (Thus, employees assigned to transport compressed gas cylinders to a site must be instructed in: the procedures for loading and unloading the cylinders; the requirements for segregating cylinders based on hazard class (49 CFR part 177.848), the need for shipping papers and material safety data sheets for the gases being transported, the placarding standard, and procedures to implement in the event of an accident (49 CFR part 177 subpart D).

• *Safety training*. Employees must be familiar with the hazards of the substances they handle and the measures they should implement to protect themselves from exposure. Additionally, emergency response information (49 CFR part 172 subpart G) must beprovided to employees handling hazardous materials.

Operators of commercial motor vehicles must comply with the requirement stated in Section 8.6.1 of this manual. In addition to meeting the above requirements, any employee transporting placard quantities of hazardous material must have a current commercial driver's licensee and must be enrolled in a DOT substance abuse testing program.

F.5 STORING CYLINDERS

F.5.1 General Requirements for Indoor Storage

Storage areas shall be designed to accommodate the various gases to be used. Adequate spacing or segregation by partitioning in accordance with applicable codes shall be provided so that containers can be grouped by hazard class. Flammable gases should never be stored adjacent to oxidizers. Store full and empty cylinders separately. Cylinder storage shall be in dry, wellventilated[1] areas, preferably of fire resistive construction. Storage area temperatures shall not exceed 125°F. Laboratory personnel using cylinders shall not store or use cylinders adjacent to easily ignitable substances, such as gasoline, or corrosive chemicals or fumes that may damage the cylinder's valve. Parsons I&T operations (i.e., laboratory, treatment plants, source evaluation, etc.) should establish their storage areas to permit stock rotation using the oldest cylinders first.

The storage of compressed gas cylinders in garages, equipment warehouses, or other location where vans or cars may strike them is prohibited.

[1]OSHA specifies ventilation requirement for hydrogen gas storage areas (see pages F-9 through F-11). Ventilation volume required for other gases would be dependent upon room size, toxicity of gas, and cylinder size.

F.5.2 General Requirements for Outdoor Storage

Compressed gas cylinders should be stored outdoors during site operations. Preferably, cylinders should be stored on paved surfaces, such as asphalt or concrete, which has been graded to prevent the accumulation of water. Cylinder cabinets or cages are often used for protection against vandals and to shield pressure regulators from rain. Always locate the storage area where bottom corrosion to the cylinder can be avoided. Cylinders may be stored in the sun except in locations where extreme temperatures prevail (above 125°F). If the gas manufacturer specifies storage in the shade, such recommendations shall be observed. If a cylinder becomes covered with ice, do not heat to thaw it; allow the cylinder to thaw at room temperature or use warm water (below 125°F) making sure there are no leaks in the delivery system before applying the water. Containers stored (either inside or outside) shall not obstruct exit routes or other areas normally used or intended for the safe exit of people.

F.5.3 Cylinder Position in Storage

All compressed gas cylinders whether empty or full in service or storage shall be secured to prevent falling. Chaining cylinders to walls or bench brackets are common methods used to secure cylinders. Cylinder cabinets may also be used to prevent cylinders from overturning. The nesting[2] of cylinders will not be permitted.

F.5.4 Signs

Container storage areas shall be prominently posted with the hazard class or the name of the gases to be stored. "No Smoking" signs shall be posted where appropriate.

F.5.5 Handling and Storage of Flammable Gases

Flammable gases are frequently used both in laboratory and field operations. Compressed gas cylinders of hydrogen and acetylene are required for the operation of flame ionization detectors and atomic absorption spectrophotometers respectively in the laboratory. Field operations often use hydrogen to recharge organic vapor analyzers used for detecting volatile organic compounds. The CGA has developed general requirements for the handling and storage of flammable compressed gases. OSHA provides specific regulations for the storage and use of hydrogen. CGA recommendations should be followed by Parsons I&T personnel when handling flammable gases not covered by OSHA.

The Compressed Gas Association in their publication "Safe Handling of Compressed Gas in Containers" provides general recommendations for the storage of flammable gases. CGA states that flammable gases shall not be used near open flames, sources of heat, adjacent to oxidizers and non-explosion proof electrical systems or near underground electrical equipment.

Transportation and use should be in open bodied vehicles and well ventilated areas. Electrical equipment used in areas where flammable gases are stored shall comply with applicable electrical codes. Spark proof tools (i.e., bronze) should be used when working with or on flammable compressed gas cylinders or systems.

[2]Nesting is a method of securing flat bottom cylinders upright in a tight mass using a contiguous three-point contact system whereby all cylinders within a group have a minimum of three-points of contact with other cylinders, wall, or bracing.

Portable fire extinguishers (of carbon dioxide or dry chemical) shall be available for fire emergencies at storage installations. No smoking signs (note: signs outside a hydrogen storage area must read "Hydrogen - Flammable Gas - No Smoking - No Open Flames") shall be posted around the storage area of the building or at all entrance(s) to storage rooms. Never use a flame for detection of flammable gas leaks; use leak detection instruments or leak detection solutions. OSHA has promulgated specific requirements for the storage of hydrogen systems with a total content greater than 400 cubic feet (refer to 29 CFR part 1910.103). OSHA specifies the location of a hydrogen system based upon the maximum total contained volume of hydrogen. Order of location preference is indicated by the roman numerals in table F.2 (i.e., I represents 1st preference). Hydrogen systems used by Parsons I&T may be located outdoors, in a separate building, in a special room, or inside buildings where they are exposed to occupants.

Table F.2 Storage Locations for Hydrogen Systems

Nature of location	Size of Hydrogen System: Less than 3,000 Cu. Ft.	3,000 Cu. Ft. to 15,000 Cu. Ft.	In excess of 15,000 Cu. Ft.
Outdoors	I	I	I
In a separate building	II	II	II
In a special room	III	III	Not permitted
Inside buildings not in a special room and exposed to other occupancies	IV	Not permitted	Not permitted

Reference: Title 29 Code of Federal Regulations, Part 1910.103.

Storage of Hydrogen Outdoors (29 CFR part 1910.103[b][3][i]) - The best storage location for hydrogen gas cylinders is outdoors in a location where there is proper drainage of rain. If protective walls or roofs are provided, the construction materials shall be noncombustible. Sheds or delivery docks, or other structures where enclosing sides adjoin each other must be properly ventilated.

Any electrical equipment located within 15 feet of the hydrogen storage area shall meet applicable OSHA requirements (29 CFR part 1910, subpart S).

Storage of Hydrogen in a Separate Building without Occupancy (29 CFR part 1910.103[b][3][ii]) - Separate buildings used for hydrogen cylinder storage are to be constructed of noncombustible materials. Windows and doors shall be located so as to be readily accessible in the event of an emergency. Windows must be of glass or plastic in metal frames. The general ventilation and explosion venting in this building must meet the specifications listed below in the "Storage in Special Rooms without Occupancy" section. Heat for the building shall be by steam, hot water, or other indirect means. Direct heating by flames or fire is prohibited. Electrical equipment shall meet specification for a Class I, division 2 location. The interior and the area surrounding the exterior of the building shall be free of combustible materials.

Storage of Hydrogen in Special Rooms without Occupancy (29 CFR part 1910.103[b][3][iii]) - Operations which designate a room for cylinder storage must ensure the construction of the room meets applicable OSHA requirements. Floors, walls, and ceilings of these rooms shall have a fire resistant rating of at least two-hours. Walls or partitions shall be continuous from floor to ceiling and must be securely anchored. At least one wall shall be an exterior wall. Windows and doors shall be only in exterior walls and accessible in the event of an emergency. Openings to other parts of the building are not permitted.

Adequate ventilation to the outdoors in this special storage room must be provided. Inlet openings shall be located near the floor in exterior walls only, while outlet openings must be at the high point in the exterior walls or roof (i.e., this is a gravity ventilation system). Openings of outlets and inlets shall have minimum total area of one square foot per 1,000 cubic feet of room volume. Additionally, explosion venting must be provided. The explosion venting area cannot be less than one square foot per 30 cubic feet of room volume. Explosion venting shall only be provided in the exterior wall or roof and may consist of any of the following methods:

- Lightly fastened hatch covers.

- Lightly fastened swinging door in exterior wall opening outwards.

- Lightly fastened walls or roof designed to relieve at a maximum pressure of 25 pounds per square foot.

Wiring and electrical equipment installed in these storage rooms shall be approved for Class I, division 2 locations.

Storage of Hydrogen in Buildings and Rooms with Occupancy (29 CFR part 1910.103[b][2][ii]) - The use and storage of hydrogen gas systems in buildings (not in special rooms) that are occupied must comply with the following requirements:

- A maximum of 3,000 cubic feet of hydrogen gas may be stored inside the building.

- The hydrogen system must be located a minimum of 20 feet from stored flammable materials or oxidizing gases.

- The hydrogen system must be stored in a room with adequate ventilation (refer to *Storage in Special Rooms without Occupancy*).

- The hydrogen system must be at least 25 feet from open flames, ordinary electrical equipment, or other sources of ignition.

- Cylinders must be located 25 feet from concentrations of people and 50 feet from intakes of ventilation or air conditioning equipment and air compressors.

- Cylinder of hydrogen gas must be protected from falling objects or work activities in the vicinity.

Storage of Acetylene - Acetylene is used to operate atomic absorption spectrophotometers. The CGA does not differentiate between the storage requirements for hydrogen and other flammable gases with the exception that not more than 2,500 cubic feet of acetylene can be stored in an occupied building. Acetylene cylinders must never be positioned horizontally because of the possibility of solvent discharge.

F.5.6 Handling and Storage of Toxic and Corrosive Gases

The storage of toxic and corrosive gases shall be outdoors or in adequately ventilated rooms such that a catastrophic rupture could not result in concentration above OSHA permissible exposure limits. Total quantities of these gases should be limited to the users' near-term requirements. Only trained and qualified personnel shall be allowed to use corrosive and toxic gases. Training shall include understanding the hazards of the gas, precaution to take to protect oneself, proper use of protective equipment, and emergency response procedures. Material Safety Data Sheets (MSDS) shall be made accessible to all personnel. Users shall refer to the MSDS for appropriate guidance on storage and compatibility requirements.

F.6 USING COMPRESSED GASES

When the cylinder arrives at the laboratory or site it should immediately be secured in place. The cylinder's content should be checked by examining the label. The user should understand all information on the label. Only then should the cylinder cap be removed. Inspect the valve outlet for foreign material and clean it with a brush. Choose the proper regulator for the gas and service pressure. Read and understand the instructions for installing and using the regulator. (For instance, some applications using compressed gases require the regulator to be purged with inert gas prior to use). Connect the regulator supply CGA fitting to the cylinder valve outlet and handtighten.

Secure the connection using a wrench (remember non-sparking tools for flammable gases). Never force the connection. Start the flow of gas carefully. Stand to the side of the cylinder opposite the regulator and open the valve.

After the valve is open, the regulator inlet gauge should register the cylinder pressure. Next, check for leaks using either a leak detection instrument or a leak detection solution. Adjust the delivery pressure by turning the pressure adjusting handle of the regulator until the desired pressure is indicated. If your regulator has a delivery valve, open it and recheck the discharge pressure gauge. Other considerations that should be observed when using compressed gases are listed below:

- Plan your use of compressed gases to avoid storage of cylinders beyond the maximum time recommended by the manufacturer. A six-month maximum retention period is recommended for corrosive gases which can damage cylinder valves. Normally, flammable gases and oxygen have cylinder retention periods of 36 months.

- If a cylinder begins to leak, and tightening the valve packing nut does not help, cap the cylinder and secure it in a hood or move it outdoors until the supplier can be contacted.

- Bond and ground all cylinders and equipment used with flammable compressed gases to prevent ignition from static discharge.

- Wear appropriate protective equipment when using compressed gases. Depending on the specific hazard involved, this may include safety goggles, face shield, safety shoes, gloves and/or respiratory protection.

- Use a check valve or trap as appropriate when discharging a compressed gas into a liquid. This prevents the liquid from backing up into the regulator or cylinder.

- Flush (purge) regulators used for corrosive gases with dry air or dry nitrogen into a trap or hood.

- Never lubricate or attempt to service regulators. This is a job for professional service personnel.

- Emergency repair kits should be available for use in the event of a chlorine cylinder leak (for 1-ton and 1,500-pound containers used at wastewater treatment plants). Personnel must be trained in the proper application of the repair kits.

F.7 RETURNING EMPTY CYLINDERS

When the cylinders are emptied (psig of 25) or no longer in use, the regulator should be removed and the cap reinstalled. Before removing the regulator, be certain that the cylinder valve is closed and any residual pressure in the regulator or associated tubing and equipment is drained. If the gas being drained is flammable, toxic or corrosive, use appropriate precaution such as venting outdoors or into a fire hood. Mark the cylinder "empty" and move it using a cylinder cart to an area reserved for empty cylinder storage and secure the cylinder. Segregation of full and empty cylinders ensures that empty cylinders will not be mistakenly connected to pressurized systems. Never empty any residual gas from a cylinder. Cylinder should be returned with a minimum pressure of 25 psig. Labels, decals, or other identifying markings should not be removed or defaced. Suppliers must be able to identify the contents.

F.8 EMERGENCY RESPONSE

Parsons I&T laboratories must develop (as part of their written Chemical Hygiene Plan) an emergency action program which details evacuation and response procedures to be used in the event of a cylinder leak or rupture. The need for appropriate respiratory equipment and protective clothing should be considered in the development of emergency response procedures. Personnel expected to use such equipment must be properly trained (including practice drills). Equipment should be located in close proximity to the area where the cylinders are being used but not so close as to be affected by the release of hazardous materials. Non-emergency response personnel should be promptly evacuated from the immediate danger area and located up wind at a sufficient distance to avoid any inhalation or contact with potentially hazardous gases until safe re-entry can be assumed.

Professional emergency response advice and assistance is available 24-hours a day, seven days a week throughout the U.S. by telephoning the Chemical Transportation Emergency Center (CHEMTREC) AT 1-800-424-9300. CHEMTREC will request assistance from the appropriate Compressed Gas Emergency Action Plan (COMPGEAP) responder. The gas suppliers and CHEMTREC phone numbers should be posted in a conspicuous location along with other emergency numbers such as police, fire department, and medical assistance.

Attachment A-15

Forms and Checklists

1. Health and Safety Plan Acceptance Form
2. Safety Meeting Attendance Log
3. Parsons Accident Report Forms and Instructions
4. Army Accident Report Forms and Instructions
5. Accident Report Follow-Up Form
6. Respirator Qualitative Fit-Test Form
7. Pre-drilling/Subsurface Checklist for Intrusive Fieldwork
8. Site-Specific Training Checklist
9. Site-Specific Training Form
10. Worker's Compensation Information

Attachment A-15
Forms and Checklists

Health and Safety Plan Acceptance Form

Project Health and Safety Plan

Plan Acceptance Form

Instructions: This form is to be completed by each person to work on the subject project work site and returned to the Site Health and Safety Officer (SHSO). Send copy to the Boston Office Health and Safety Representative, Jessica.Smith@Parsons.com or fax to 617-946-9777.

SITE NAME:

LOCATION: Romulus, NY

PROJECT NUMBER:

I understand, and agree to comply with, the provisions of the HSP for the above-referenced site. I agree to report any injuries, illnesses or exposure incidents to the Site Health and Safety Officer (SHSO).

PRINTED NAME	SIGNATURE	DATE

Attachment A-15
Forms and Checklists

Safety Meeting Attendance Log

Safety Meeting Attendance Log

Date:	Time:	Contract Number:
Delivery Order Number:	**Location: Seneca Army Depot Activity, Romulus, NY**	
Weather Conditions: **(Low/High Temp, Wind/Speed/Dir)** **(Severe Weather)**		
Safety Meeting Topic **(Briefly describe)**		
Attendees:		

Name	Signature	Company

Attendees:		
Name	**Signature**	**Company**

____

XXXXXXXXXXXXXXX
Site Health and Safety Officer

Maintain in project files in Parsons Field Office.

Attachment A-15
Forms and Checklists

Parsons Accident Report Form and Instructions

Parsons Project Incident/Accident Report Form

PLEASE PRINT

Attach all supplemental documentation, including photos, diagrams, witness statements and field reports

PROJECT Information	Project Title		Location	
	Subcontractor			
	Address			
	City, State, Zip			
	Contact Name		Phone Number	

INCIDENT Type	☐ **Worker's Compensation** ☐ Emergency Response Notified (Police, Fire, Medic, etc.) ☐ First-Aid Only ☐ Recordable Injury	☐ **General Liability** ☐ Bodily Injury/Illness ☐ Real Property Damage ☐ Personal Property Damage ☐ Utility Property Damage	☐ **Builder's Risk** ☐ Equipment ☐ Supplies ☐ Machinery ☐ Work

Incident Location	Date of Loss		Time of Loss	
	Place (exact location)			

Incident Description	Detailed Description of Accident

<table>
<tr><td rowspan="8">Worker's Comp Or Personal Injury
(circle one)</td><td>Injured Name</td><td colspan="3"></td></tr>
<tr><td>Address</td><td colspan="3"></td></tr>
<tr><td>City, State, Zip</td><td colspan="3"></td></tr>
<tr><td>Home Phone</td><td></td><td>Date of Birth</td><td></td></tr>
<tr><td>Nature of Injury</td><td colspan="3"></td></tr>
<tr><td>Medical Facility</td><td></td><td>Work Status</td><td></td></tr>
<tr><td colspan="4">Treatment Received</td></tr>
<tr><td colspan="4"></td></tr>
</table>

<table>
<tr><td rowspan="8">Property Damage Or Builder's Risk
(circle one)</td><td>Owner's Name</td><td colspan="3"></td></tr>
<tr><td>Address</td><td colspan="3"></td></tr>
<tr><td>City, State, Zip</td><td colspan="3"></td></tr>
<tr><td>Home Phone</td><td></td><td>Work Phone</td><td></td></tr>
<tr><td>Damage Type</td><td></td><td>Estimated Cost</td><td></td></tr>
<tr><td>Utility Type</td><td></td><td>Marked or Unmarked</td><td></td></tr>
<tr><td colspan="4">Description of Damage</td></tr>
<tr><td colspan="4"></td></tr>
</table>

<table>
<tr><td rowspan="5">WITNESS Information</td><td>Name</td><td colspan="3"></td></tr>
<tr><td>Address</td><td colspan="3"></td></tr>
<tr><td>City, State, Zip</td><td colspan="3"></td></tr>
<tr><td>Home Phone</td><td></td><td>Work Phone</td><td></td></tr>
<tr><td>Where to contact</td><td></td><td>Time to contact</td><td></td></tr>
</table>

<table>
<tr><td rowspan="2">Contractor Subcontractor Action</td><td>Describe actions taken</td></tr>
<tr><td></td></tr>
</table>

Signature ______________________ Employer ______________________

Print Name ______________________ Date ______________________

Phone No. ______________________ Fax Number ______________________

On-Line Safety Reporting System

Policy Requirements

- Initial incident reports for all incidents, including near misses, shall be reported within 4 hours.
- Detail incident reports are required within 24 hours.
- Reporting is done via on-line (PWeb) incident report form.
- Injuries with Days Away from Work - immediate supervisor and PM must teleconference with GBU President within 4 hours.
- Projects enter hours via on-line form by FIRST Friday of new period.

Reporting Incidents

Corporate policy requires that all employees report safety incidents to their supervisor immediately. Supervisors must report all incidents to the appropriate Project Manager (Department Manager if the incident is not related to a project), who must officially report the incident to the GBU within four hours. This official reporting is done via the PWeb, unless PWeb is unavailable, in which case the incident can be reported by email, fax or telephone.

"Incidents" include work related injuries, work related illness, accidents with property damage only and near misses. "Near misses" are any unplanned event that had the potential to (but did not) result in injury or property damage.

Incident reports should reflect the best available information at the time. Where exact information is not known (recordability, days away from work, etc.) the PM's best judgment should be used when completing the initial incident report. This information can be subsequently revised when the detail incident report is submitted.

When in doubt, submit an initial report or contact the GBU Safety Manager.

On-line Reporting System

The on-line reporting system can be found on the PI&T Safety Page on PWeb. To locate the system, follow these steps:

1. From the Corporate PWeb Homepage, select PI&T from the Org Units menu
2. Locate and select "Safety" from the list of pages in the right hand column
3. Select the "Incident Reporting Form" link

To create and submit a new incident report, select the orange "Add" button from the main page of the reporting system. To update and existing incident report or complete the Detail Incident page, locate and select the appropriate incident from the list.

Creating or Updating Incidents

The Initial Incident page of the report must be completed within four hours of the incident occurring. This page includes basic information needed for the first notification to our insurance carriers. If possible, all of the fields should be completed in the initial report. A list is provided at the end of this document describing all fields contained on the initial incident page.

Incident Detail Reports

Within 24 hours of the incident occurring, the Incident Detail page of the on-line report must be completed. This page includes detailed information about the injured party, the nature and extent of injuries, medical treatment provided, corrective actions taken, and witness statements. In the event of property damage, this page also includes descriptive information on the property owner. Finally, the page includes a section to include electronic attachments. These might include photographs, signed witness statements, etc.

Monthly Reporting of Hours

Hours must be entered into the on-line reporting system no later than the first Friday of the new period. If an accurate accounting of hours is not available, estimated hours are submitted into the system. The estimated hours can be revised later in the month, or the following month, when accurate data is available.

From the "Hours" page, select the GBU and the period (month and year) that is being reported. The system only allows hours to be entered for the period selected. MTD and PTD figures are calculated totals based on the sum of all monthly entries. To enter or correct a prior period entry, simply select that month from the drop-down box and correct the figures for that month.

Be sure to select the correct month and year when entering hours.

Hours must be entered for each (as applicable) of six different labor categories. The categories are as follows:

- Contractor (Field/Craft)
- Contractor (Office/Admin)
- JV Partner (Field/Craft)
- JV Partner (Office/Admin)
- Parsons Employee (Field/Craft)
- Parsons Employee (Office/Admin)

Monthly Statistics Summary Reports

The on-line reporting system automatically calculates incident rates based on incidents and hours entered into the system. To view the statistics, select the "Reports" page from the on-line system. Select "Parsons Safety Statistics Summary", the appropriate GBU, and the appropriate period. (NOTE: The system does not yet provide reports at the Division and Sector level. That enhancement is pending.) Use the checkboxes to select the labor categories desired.

Contact Rick McAlpin or Jim Owen for Assistance

Initial Incident Report Fields

1. GBU – Select the GBU from the drop down box. Incidents are reported primarily by project, and the GBU should reflect the unit responsible for the project. This may be different from the GBU that employees the person injured.
2. Field Project Name, Office Location or Other – If the applicable project is listed in the "Field Project" list, select from that box. If not, and if the incident occurred in a Parsons corporate office, select the office from the drop box. Otherwise, type in the name of the responsible organizational unit in the "Other" field. The GBU must be selected BEFORE attempting to select a Project/Office. Do NOT select both a field project AND an Office Location (or Other). If the appropriate Project or Office name can not be found, manually enter it into the "Other" field.
3. Job and WBS Numbers – These fields should reflect the charge number responsible for the incident. In general, that will be the number that the employee was charging at the time of the incident. Projects are responsible for visitors, regardless of what charge number they use while visiting the job. For example, if the Division Manager is injured while visiting Project X, the project number is entered, not the division overhead account.
4. Near Miss – Check this box if the report is for a near miss only (no injury or property damage occurred).
5. Emergency Response Notified – Check this box if fire, police or ambulance was called as a result of the incident.
6. Three or More Employees Hospitalized – Check this box if three or more employees were injured as the result of a single incident. In this case, the GBU or Corporate Safety Manager must also be immediately notified by telephone.
7. Extent of Injury – Select the appropriate radio button. First aid cases are as defined by OSHA 1904 criteria. All other injuries are considered recordable.
8. Restricted Duty (# of days) – If the injured person was limited (by a physician) to less than normal work duration or duties, enter the number of days. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury.
9. Days Away From Work (# of days) – If the injured person was ordered by a physician not to return to work, enter the number of days missed. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury. Injuries with Days Away From Work require a phone call to the GBU President within 4 hours.
10. Fatality (Date of Death) – In the event of a work related fatality, enter the date of death here. NOTE: Fatalities require immediate phone notification of the Division Manager, GBU President, GBU Safety Manager, and Corporate Safety Manager.
11. Property Damage – Check the appropriate boxes if applicable.
12. Place – Describe the exact location that incident occurred. For example, "in the north stairwell of building 21, between the second and third floor."
13. Date – This field reflects the date the incident occurred, not necessarily the date it was reported. If the exact date is not known, an estimate should be used.
14. Time – This field reflects the time of day that the incident occurred. If the exact time is not known, an estimate should be used.
15. Incident Description – Provide a detailed description of the incident. This is a memo field and text will scroll down the window as it is entered. Use as much space as needed to accurately describe the incident and the resulting injuries.

16. Reported by – This field defaults to the employee login ID that was used to access PWeb. However, the field can be over-written if needed.
17. Name – First and last name of the injured party.
18. Status – Select the most appropriate category from the drop box (Employee - Field, Subcontractor - Field, Partner - Field, Employee - Office, Subcontractor - Office, Partner - Office or 3rd Party).
19. Trade/Function – Select the most appropriate category from the drop box.

Attachment A-15
Forms and Checklists

Army Accident Report Form and Instructions

(For Safety Staff only)	REPORT NO.	EROC CODE	UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*

b. AGE

c. SEX ☐ MALE ☐ FEMALE

d. SOCIAL SECURITY NUMBER

e. GRADE

f. JOB SERIES/TITLE

g. DUTY STATUS AT TIME OF ACCIDENT ☐ ON DUTY ☐ TDY ☐ OFF DUTY

h. EMPLOYMENT STATUS AT TIME OF ACCIDENT ☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)* ________

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*

b. TIME OF ACCIDENT *(Military time)* hrs

c. EXACT LOCATION OF ACCIDENT

d. CONTRACTOR'S NAME

(1) PRIME:

(2) SUBCONTRACTOR:

e. CONTRACT NUMBER ________

☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)* ________

f. TYPE OF CONTRACT ☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)* ________

g. HAZARDOUS/TOXIC WASTE ACTIVITY ☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)* ________

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

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 help menu)*

a. SEVERITY OF ILLNESS/INJURY ________ (CODE) #

B. ESTIMATED DAYS LOST

C. ESTIMATED DAYS HOSPITALIZED

D. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED

PRIMARY ________ (CODE) #

SECONDARY ________ (CODE) #

f. NATURE OF ILLNESS / INJURY ________ (CODE) #

g. TYPE AND SOURCE OF INJURY/ILLNESS

TYPE ________ (CODE) #

SOURCE ________ (CODE) #

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT ________ (CODE) #

b. PERSONAL FLOATATION DEVICE USED? ☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE ☐ PICKUP/VAN ☐ AUTOMOBILE ☐ TRUCK ☐ OTHER *(Specify)* ________

b. TYPE OF COLLISION ☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)* ________

c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
(1) FRONT SEAT			
(2) REAR SEAT			

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 help menu)*

a. TYPE OF VESSEI/FLOATING PLANT ________ (CODE) #

b. TYPE OF COLLISION/MISHAP ________ (CODE) #

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

11. **CAUSAL FACTOR(S)** *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)

	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*

	YES	NO
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?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. **TRAINING**

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(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 COMPLETING REPORT	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL
CORPS ______ CONTRACTOR ______			

16. **MANAGEMENT REVIEW** *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

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

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. **SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW**

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. **COMMAND APPROVAL**

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE *(Continuation)*

13b.	INDIRECT CAUSES *(Continuation)*

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

GENERAL. Complete a separate report for each person who was *injured, caused, or contributed* to the accident (excluding uninjured personnel and witnesses). Use of this form for reporting USACE employee first-aid type injuries not submitted to the Office of Workers' Compensation Programs (OWCP) shall be at the descretion of the FOA commander. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16. and 17.

INSTRUCTIONS FOR SECTION 1 — ACCIDENT CLASSIFICATION. *(Mark All Boxes That Are Applicable.)*

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of OWCP Forms CA-1 (injury), CA-2 (illness), or CA-6 (fatality) to OWCP; mark if accident resulted in military personnel lost-time or fatal injury or illness.

(2) PROPERTY DAMAGE — Mark the appropriate box if accident resulted in any damage of $1000 or more to government property (including motor vehicles).

(3) VEHICLE INVOLVED — Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY — Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in any contractor lost-time injury/illness or fatality.

(2) PROPERTY DAMAGE — Mark the appropriate box if accident resulted in any damage of $1000 or more to contractor property (including motor vehicles).

(3) VEHICLE INVOLVED — Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY — Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in public fatality or permanent total disability. (The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander).

(2) VOID SPACE — Make no entry.

(3) VEHICLE INVOLVED — Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" is marked.

(4) VOID SPACE — Make no entry.

INSTRUCTIONS FOR SECTION 2 — PERSONAL DATA

a. NAME — (MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS). Enter last name, first name, middle initial of person involved.

b. AGE — Enter age.

c. SEX — Mark appropriate box.

d. SOCIAL SECURITY NUMBER — (FOR GOVERNMENT PERSONNEL ONLY) Enter the social security number (or other personal identification number if no social security number issued).

e. GRADE — (FOR GOVERNMENT PERSONNEL ONLY) Enter pay grade. Example: O-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE — For *government civilian employees* enter the pay plan, full series number, and job title, e.g. GS-0810/Civil Engineer. For *military personnel* enter the primary military occupational specialty (PMOS), e.g., 15A30 or 11G50. For *contractor employees* enter the job title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.,

g. DUTY STATUS — Mark the appropriate box.

(1) ON DUTY — Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.

(2) TDY - Person was on official business, away from the duty station and with travel orders at time of accident. Line-of-duty investigation required.

(3) OFF DUTY - Person was not on official business at time of accident

h. EMPLOYMENT STATUS — (FOR GOVERNMENT PERSONNEL ONLY) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

INSTRUCTION FOR SECTION 3 — GENERAL INFORMATION

a. DATE OF ACCIDENT — Enter the month, day, and year of accident.

b. TIME OF ACCIDENT — Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).

c. EXACT LOCATION OF ACCIDENT — Enter facts needed to locate the accident scene. (installation/project name, building number, street, direction and distance from closest landmark, etc.,).

d. CONTRACTOR NAME

(1) PRIME — Enter the exact name (title of firm) of the prime contractor.

(2) SUBCONTRACTOR — Enter the name of any subcontractor involved in the accident.

e. CONTRACT NUMBER — Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.

f. TYPE OF CONTRACT — Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

g. HAZARDOUS/TOXIC WASTE ACTIVITY (HTW) — Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (IRP) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (FUDS) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

INSTRUCTIONS FOR SECTION 4 — CONSTRUCTION ACTIVITIES

a. CONSTRUCTION ACTIVITY — Select the *most appropriate* construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

CONSTRUCTION ACTIVITY LIST

1. MOBILIZATION	14. ELECTRICAL
2. SITE PREPARATION	15. SCAFFOLDING/ACCESS
3. EXCAVATION/TRENCHING	16. MECHANICAL
4. GRADING (EARTHWORK)	17. PAINTING
5. PIPING/UTILITIES	18. EQUIPMENT/MAINTENANCE
6. FOUNDATION	19. TUNNELING
7. FORMING	20. WAREHOUSING/STORAGE
8. CONCRETE PLACEMENT	21. PAVING
9. STEEL ERECTION	22. FENCING
10. ROOFING	23. SIGNING
11. FRAMING	24. LANDSCAPING/IRRIGATION
12. MASONRY	25. INSULATION
13. CARPENTRY	26. DEMOLITION

b. TYPE OF CONSTRUCTION EQUIPMENT—Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

CONSTRUCTION EQUIPMENT

1. GRADER
2. DRAGLINE
3. CRANE (ON VESSEL/BARGE)
4. CRANE (TRACKED)
5. CRANE (RUBBER TIRE)
6. CRANE (VEHICLE MOUNTED)
7. CRANE (TOWER)
8. SHOVEL
9. SCRAPER
10. PUMP TRUCK (CONCRETE)
11. TRUCK (CONCRETE/TRANSIT MIXER)
12. DUMP TRUCK (HIGHWAY)
13. DUMP TRUCK (OFF HIGHWAY)
14. TRUCK (OTHER)
15. FORKLIFT
16. BACKHOE
17. FRONT-END LOADER
18. PILE DRIVER
19. TRACTOR (UTILITY)
20. MANLIFT
21. DOZER
22. DRILL RIG
23. COMPACTOR/VIBRATORY ROLLER
24. OTHER

INSTRUCTIONS FOR SECTION 5—INJURY/ILLNESS INFORMATION

a. SEVERITY OF INJURY / ILLNESS - Reference para 2-10 of USACE Suppl 1 to AR 385-40 and enter code and description from list below.

NOI NO INJURY
FAT FATALITY
PTL PERMANENT TOTAL DISABILITY
PPR PERMANENT PARTIAL DISABILITY
LWD LOST WORKDAY CASE INVOLVING DAYS AWAY FROM WORK
NLW RECORDABLE CASE WITHOUT LOST WORKDAYS
RFA RECORDABLE FIRST AID CASE
NRI NON-RECORDABLE INJURY

b. ESTIMATED DAYS LOST—Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED—Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY—Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED—Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

GENERAL BODY AREA	CODE	BODY PART NAME
ARM/WRIST	AB	ARM AND WRIST
	AS	ARM OR WRIST
TRUNK, EXTERNAL MUSCULATURE	B1	SINGLE BREAST
	B2	BOTH BREASTS
	B3	SINGLE TESTICLE
	B4	BOTH TESTICLES
	BA	ABDOMEN
	BC	CHEST
	BL	LOWER BACK
	BP	PENIS
	BS	SIDE
	BU	UPPER BACK
	BW	WAIST
	BZ	TRUNK OTHER
HEAD, INTERNAL	C1	SINGLE EAR INTERNAL
	C2	BOTH EARS INTERNAL
	C3	SINGLE EYE INTERNAL
	C4	BOTH EYES INTERNAL
	CB	BRAIN
	CC	CRANIAL BONES
	CD	TEETH
	CJ	JAW
	CL	THROAT, LARYNX
	CM	MOUTH
	CN	NOSE
	CR	THROAT, OTHER
	CT	TONGUE
	CZ	HEAD OTHER INTERNAL
ELBOW	EB	BOTH ELBOWS
	ES	SINGLE ELBOW
FINGER	F1	FIRST FINGER
	F2	BOTH FIRST FINGERS
	F3	SECOND FINGER
	F4	BOTH SECOND FINGERS
	F5	THIRD FINGER
	F6	BOTH THIRD FINGERS
	F7	FOURTH FINGER
	F8	BOTH FOURTH FINGERS
TOE	G1	GREAT TOE
	G2	BOTH GREAT TOES
	G3	TOE OTHER
	G4	TOES OTHER
HEAD, EXTERNAL	H1	EYE EXTERNAL
	H2	BOTH EYES EXTERNAL
	H3	EAR EXTERNAL
	H4	BOTH EARS EXTERNAL
	HC	CHIN
	HF	FACE
	HK	NECK/THROAT
	HM	MOUTH/LIPS
	HN	NOSE
	HS	SCALP
KNEE	KB	BOTH KNEES
	KS	KNEE
LEG, HIP, ANKLE, BUTTOCK	LB	BOTH LEGS/HIPS/ ANKLES/BUTTOCKS
	LS	SINGLE LEG/HIP ANKLE/BUTTOCK
HAND	MB	BOTH HANDS
	MS	SINGLE HAND
FOOT	PB	BOTH FEET
	PS	SINGLE FOOT
TRUNK, BONES	R1	SINGLE COLLAR BONE
	R2	BOTH COLLAR BONES
	R3	SHOULDER BLADE
	R4	BOTH SHOULDER BLADES
	RB	RIB
	RS	STERNUM (BREAST BONE)
	RV	VERTEBRAE (SPINE; DISC)
	RZ	TRUNK BONES OTHER
SHOULDER	SB	BOTH SHOULDERS
	SS	SINGLE SHOULDER
THUMB	TB	BOTH THUMBS
	TS	SINGLE THUMB
TRUNK, INTERNAL ORGANS	V1	LUNG, SINGLE
	V2	LUNGS, BOTH
	V3	KIDNEY, SINGLE
	V4	KIDNEYS, BOTH
	VH	HEART
	VL	LIVER
	VR	REPRODUCTIVE ORGANS
	VS	STOMACH
	VV	INTESTINES
	VZ	TRUNK, INTERNAL; OTHER

f. NATURE OF INJURY/ILLNESS - Select the most appropriate nature of injury / illness from the list below. This nature of injury / illness shall correspond to the primary body part selected in 5e, above. Enter the nature of injury / illness name on the line and place the corresponding CODE letters in the box provided.

* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
*TRAUMATIC INJURY OR DISABILITY	TA	AMPUTATION
	TB	BACK STRAIN.
	TC	CONTUSION; BRUISE; ABRASION
	TD	DISLOCATION
	TF	FRACTURE
	TH	HERNIA
	TK	CONCUSSION
	TL	LACERATION, CUT
	TP	PUNCTURE
	TS	STRAIN, MULTIPLE
	TU	BURN, SCALD, SUNBURN
	TI	TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS
	TR	TRAUMATIC RESPIRATORY DISEASE
	TQ	TRAUMATIC FOOD POISONING
	TW	TRAUMATIC TUBERCULOSIS
	TX	TRAUMATIC VIROLOGICAL/ INFECTIVE/PARASITIC DISEASE
	T1	TRAUMATIC CEREBRAL VASCULAR CONDITION/STROKE
	T2	TRAUMATIC HEARING LOSS
	T3	TRAUMATIC HEART CONDITION
	T4	TRAUMATIC MENTAL DISORDER; STRESS; NERVOUS CONDITION
	T8	TRAUMATIC INJURY — OTHER (EXCEPT DISEASE, ILLNESS)

**A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which doses not meet the definition of traumatic injury or disability as described above.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
**NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY		
RESPIRATORY DISEASE	RA	ASBESTOSIS
	RB	BRONCHITIS
	RE	EMPHYSEMA
	RP	PNEUMOCONIOSIS
	RS	SILICOSIS
	R9	RESPIRATORY DISEASE, OTHER
VIROLOGICAL, INFECTIVE & PARASITIC DISEASES	VB	BRUCELLOSIS
	VC	COCCIDIOMYCOSIS
	VF	FOOD POISONING
	VH	HEPATITIS
	VM	MALARIA
	VS	STAPHYLOCOCCUS
	VT	TUBERCULOSIS
	V9	VIROLOGICAL/INFECTIVE/ PARASITIC—OTHER
DISABILITY, OCCUPATIONAL	DA	ARTHRITIS, BURSITIS
	DB	BACK STRAIN, BACK SPRAIN
	DC	CEREBRAL VASCULAR CONDITION; STROKE
	DD	ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S)
	DE	EFFECT OF ENVIRONMENTAL CONDITION
	DH	HEARING LOSS
	DK	HEART CONDITION
	DM	MENTAL DISORDER, EMOTIONAL STRESS NERVOUS CONDITION
	DR	RADIATION
	DS	STRAIN, MULTIPLE
	DU	ULCER
	DV	OTHER VASCULAR CONDITIONS
	D9	DISABILITY, OTHER

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
SKIN DISEASE OR CONDITION	SB	BIOLOGICAL
	SC	CHEMICAL
	S9	DERMATITIS, UNCLASSIFIED

g. TYPE AND SOURCE OF INJURY/ILLNESS (CAUSE) - Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the initiating source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk.
TYPE: 210 (fell on same level) SOURCE: 0110 (walking/working surface)

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/ oak.
TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.
TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle..
TYPE: 800 (traveling in) SOURCE: 0421 (government-owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

CODE	TYPE OF INJURY NAME
	STRUCK
0110	STRUCK BY
0111	STRUCK BY FALLING OBJECT
0120	STRUCK AGAINST
	FELL, SLIPPED, TRIPPED
0210	FELL ON SAME LEVEL
0220	FELL ON DIFFERENT LEVEL
0230	SLIPPED, TRIPPED (NO FALL)
	CAUGHT
0310	CAUGHT ON
0320	CAUGHT IN
0330	CAUGHT BETWEEN
	PUNCTURED, LACERATED
0410	PUNCTURED BY
0420	CUT BY
0430	STUNG BY
0440	BITTEN BY
	CONTACTED
0510	CONTACTED WITH (INJURED PERSON MOVING)
0520	CONTACTED BY (OBJECT WAS MOVING)
	EXERTED
0610	LIFTED, STRAINED BY (SINGLE ACTION)
0620	STRESSED BY (REPEATED ACTION)
	EXPOSED
0710	INHALED
0720	INGESTED
0730	ABSORBED
0740	EXPOSED TO
0800	TRAVELING IN

CODE	SOURCE OF INJURY NAME
0100	BUILDING OR WORKING AREA
0110	WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC)
0120	STAIRS, STEPS
0130	LADDER
0140	FURNITURE, FURNISHINGS, OFFICE EQUIPMENT
0150	BOILER, PRESSURE VESSEL
0160	EQUIPMENT LAYOUT (ERGONOMIC)
0170	WINDOWS, DOORS
0180	ELECTRICITY

CODE	SOURCE OF INJURY NAME
0200	ENVIRONMENTAL CONDITION
0210	TEMPERATURE EXTREME (INDOOR)
0220	WEATHER (ICE, RAIN, HEAT, ETC.)
0230	FIRE, FLAME, SMOKE (NOT TOBACCO)
0240	NOISE
0250	RADIATION
0260	LIGHT
0270	VENTILATION
0271	TOBACCO SMOKE
0280	STRESS (EMOTIONAL)
0290	CONFINED SPACE
0300	MACHINE OR TOOL
0310	HAND TOOL (POWERED: SAW, GRINDER, ETC.)
0320	HAND TOOL (NONPOWERED)
0330	MECHANICAL POWER TRANSMISSION APPARATUS
0340	GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK)
0350	VIDEO DISPLAY TERMINAL
0360	PUMP, COMPRESSOR, AIR PRESSURE TOOL
0370	HEATING EQUIPMENT
0380	WELDING EQUIPMENT
0400	VEHICLE
0411	AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE
0412	AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE
0421	DRIVER OF GOVERNMENT VEHICLE
0422	PASSENGER OF GOVERNMENT VEHICLE
0430	COMMON CARRIER (AIRLINE, BUS, ETC.)
0440	AIRCRAFT (NOT COMMERCIAL)
0450	BOAT, SHIP, BARGE
0500	MATERIAL HANDLING EQUIPMENT
0510	EARTHMOVER (TRACTOR, BACKHOE, ETC.)
0520	CONVEYOR (FOR MATERIAL AND EQUIPMENT)
0530	ELEVATOR, ESCALATOR, PERSONNEL HOIST
0540	HOIST, SLING CHAIN, JACK
0550	CRANE
0551	FORKLIFT
0560	HANDTRUCK, DOLLY
0600	DUST, VAPOR, ETC.
0610	DUST (SILICA, COAL, ETC.)
0620	FIBERS
0621	ASBESTOS
0630	GASES
0631	CARBON MONOXIDE
0640	MIST, STEAM, VAPOR, FUME
0641	WELDING FUMES
0650	PARTICLES (UNIDENTIFIED)
0700	CHEMICAL, PLASTIC, ETC.
0711	DRY CHEMICAL—CORROSIVE
0712	DRY CHEMICAL—TOXIC
0713	DRY CHEMICAL—EXPLOSIVE
0714	DRY CHEMICAL—FLAMMABLE
0721	LIQUID CHEMICAL—CORROSIVE
0722	LIQUID CHEMICAL—TOXIC
0723	LIQUID CHEMICAL—EXPLOSIVE
0724	LIQUID CHEMICAL—FLAMMABLE
0730	PLASTIC
0740	WATER
0750	MEDICINE
0800	INANIMATE OBJECT
0810	BOX, BARREL, ETC.
0820	PAPER
0830	METAL ITEM, MINERAL
0831	NEEDLE
0840	GLASS
0850	SCRAP, TRASH
0860	WOOD
0870	FOOD
0880	CLOTHING, APPAREL, SHOES
0900	ANIMATE OBJECT
0911	DOG
0912	OTHER ANIMAL
0920	PLANT
0930	INSECT
0940	HUMAN (VIOLENCE)
0950	HUMAN (COMMUNICABLE DISEASE)
0960	BACTERIA, VIRUS (NOT HUMAN CONTACT)

CODE	SOURCE OF INJURY NAME
1000	PERSONAL PROTECTIVE EQUIPMENT
1010	PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES
1020	RESPIRATOR, MASK
1021	DIVING EQUIPMENT
1030	SAFETY BELT, HARNESS
1040	PARACHUTE

INSTRUCTIONS FOR SECTION 6 — PUBLIC FATALITY

a. ACTIVITY AT TIME OF ACCIDENT—Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the *most* appropriate primary activity area (water related, non-water related or other activity), the code number for "Other", and write in the activity being performed at the time of the accident.

WATER RELATED RECREATION

1. Sailing
2. Boating—powered
3. Boating—unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (skin diving, scuba, etc.)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

NON-WATER RELATED RECREATION

16. Hiking and walking
17. Climbing (general)
18. Camping/picnicking authorized area
19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (baseball, football, etc.)
24. Sports/winter (skiing, sledding, snowmobiling etc.)
25. Cycling (bicycle, motorcycle, scooter)
26. Gliding
27. Parachuting
28. Other non-water related

OTHER ACTIVITIES

29. Unlawful acts (fights, riots, vandalism, etc.)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. PERSONAL FLOTATION DEVICE USED—If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

INSTRUCTIONS FOR SECTION 7—MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE—Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

b. TYPE OF COLLISION—Mark appropriate box.

c. SEAT BELT—Mark appropriate box.

INSTRUCTIONS FOR SECTION 8—PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM—Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

b. OWNERSHIP—Enter ownership for each item listed. (Enter one of the following: *USACE; OTHER GOVERNMENT; CONTRACTOR; PRIVATE)*

c. $ AMOUNT OF DAMAGE—Enter the total estimated dollar amount of damage (parts and labor), if any.

INSTRUCTIONS FOR SECTION 9—VESSEL/FLOATING PLANT ACCIDENT

a. TYPE OF VESSEL/FLOATING PLANT—Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel/floating plant.

VESSEL/FLOATING PLANTS

1. ROW BOAT	7. DREDGE/DIPPER
2. SAIL BOAT	8. DREDGE/CLAMSHELL, BUCKET
3. MOTOR BOAT	9. DREDGE/PIPE LINE
4. BARGE	10. DREDGE/DUST PAN
5. DREDGE/HOPPER	11. TUG BOAT
6. DREDGE/SIDE CASTING	12. OTHER

b. COLLISION/MISHAP—Select from the list below the object(s) that contributed to the accident or were damaged in the accident.

COLLISION/MISHAP

1. COLLISION W/OTHER VESSEL	7. HAULAGE UNIT
2. UPPER GUIDE WALL	8. BREAKING TOW
3. UPPER LOCK GATES	9. TOW BREAKING UP
4. LOCK WALL	10. SWEPT DOWN ON DAM
5. LOWER LOCK GATES	11. BUOY/DOLPHIN/CELL
6. LOWER GUIDE WALL	12. WHARF OR DOCK
	13. OTHER

INSTRUCTIONS FOR SECTION 10—ACCIDENT DESCRIPTION

DESCRIBE ACCIDENT—Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

INSTRUCTIONS FOR SECTION 11—CAUSAL FACTORS

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

(1) DESIGN—Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) INSPECTION/MAINTENANCE—Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?

(3) PERSON'S PHYSICAL CONDITION—Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?

(4) OPERATING PROCEDURES—Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) JOB PRACTICES—Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) HUMAN FACTORS—Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) ENVIRONMENTAL FACTORS—Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

(8) CHEMICAL AND PHYSICAL AGENT FACTORS—Did exposure to chemical agents (either single shift exposure or long-term exposure) such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.,), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) OFFICE FACTORS—Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) SUPPORT FACTORS—Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation, etc?

(11) PERSONAL PROTECTIVE EQUIPMENT—Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) DRUGS/ALCOHOL—Is there any reason to believe the person's mental or physical capabilities, judgement, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS—Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. *If one was performed, attach a copy of the analysis to the report.*

INSTRUCTIONS FOR SECTION 12—TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?—For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

b. TYPE OF TRAINING—Mark the appropriate box that best indicates the type of training; (classroom or on-the-job) that the injured person received before the accident happened.

c. DATE OF MOST RECENT TRAINING—Enter the month, day, and year of the last *formal* training completed that covered the activity-task being performed at the time of the accident.

INSTRUCTIONS FOR SECTION 13—CAUSES

a. DIRECT CAUSES—The direct cause is that single factor which most directly lead to the accident. See examples below.

b. INDIRECT CAUSES—Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

Examples for section 13:

a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: failure to provide fall protection at elevation.
Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (note USACE vehicle was in proper/safe working condition).
Direct cause: failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

INSTRUCTIONS FOR SECTION 14—ACTION TO ELIMINATE CAUSE(S)

DESCRIPTION—Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

INSTRUCTIONS FOR SECTION 15—DATES FOR ACTION

a. BEGIN DATE—Enter the date when the corrective action(s) identified in Section 14 will begin.

b. COMPLETE DATE—Enter the date when the corrective action(s) identified in Section 14 will be completed.

c. TITLE AND SIGNATURE—Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE Supervisor shall also sign the report. Upon entering the information required in 15.d, 15.e and 15.f below, the responsible USACE supervisor shall forward the report for management review as indicated in Section 16.

d. DATE SIGNED—Enter the month, day, and year that the report was signed by the responsible supervisor.

e. ORGANIZATION NAME—For GOVERNMENT employee accidents enter the USACE organization name (Division, Branch, Section, etc.) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15.c. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

f. OFFICE SYMBOL—Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15.e.

INSTRUCTIONS FOR SECTION 16—MANAGEMENT REVIEW (1st)

1ST REVIEW—Each USACE FOA shall determine who will provide 1st management review. The responsible USACE supervisor in section 15.c shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (2nd review) for review and comment.

INSTRUCTIONS FOR SECTION 17—MANAGEMENT REVIEW (2nd)

2ND REVIEW—The FOA Staff Chief (i.e., FOA Chief of Construction, Operations, Engineering, Planning, etc.) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

INSTRUCTIONS FOR SECTION 18—SAFETY AND OCCUPATIONAL HEALTH REVIEW

3RD REVIEW—The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc, are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

INSTRUCTION FOR SECTION 19—COMMAND APPROVAL

4TH REVIEW—The FOA Commander shall (to include the person designated Acting Commander in his absence) review the completed report, comment if required, sign, date, and forward the report to the FOA Safety and Occupational Health Office. Signature authority shall not be delegated.

CEHNC-SO (385-10f) 5 April 2004

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Accident Reporting Requirements

1. References:

a. AR 385-40, Accident Reporting, 1 November 1994

b. U.S. Army Corps of Engineer (USACE) Draft Supplement 1 to AR 385-40, 5 October 2000

c. USASC Message, CSSC-Z, 081810Z Jun 01, subject: Clarification of Army Accident Classes

d. CEHNCR 385-1-1, Safety and Occupational Health Program Management, 19 June 1997

e. EM 385-1-1, U.S. Army Corps of Engineers Safety Manual, 03 November 2003

2. Accident Definitions:

a. Class A - Fatality or permanent total disability (Government Civilian, Military Personnel, and/or Contractor), or > $1,000,000 property damage*.

b. Class B - Permanent partial disability or inpatient hospitalization of 3 or more persons (Government Civilian, Military Personnel, and/or Contractor), $200,000 ≤ $1,000,000 property damage*.

c. Class C - Lost Workday (Contractor) or Lost Time (Government Civilian and Military Personnel), $20,000 ≤ $200,000 property damage*.

d. Class D - $2000 ≤ $20,000 property damage*.

*Property damage examples - rental cars, leased items/equipment, GSA property, Huntsville Center (HNC) property, installation property, land owner property.

3. All accidents meeting the definitions above, both contactor and government civilian, are to be reported immediately. Government civilian accidents are to be reported to the first line supervisor; for contractor accidents, either the project manager (PM), contracting officer (KO), contracting officer representative (COR) and/or resident engineer (RE) herein referred to as the “Government Designated Authority (GDA)”, who by position is responsible for overseeing, managing, directing, and/or administering the project/activity, operation, material

or person(s) involved at the time of an accident. The supervisor or GDA upon learning of an accident must promptly contact the CEHNC Safety Office and provide a brief summary of the events surrounding the accident. The Safety Office will notify the Command Group.

4. In addition to the accidents described in paragraph 2, the following conditions must also be reported per the guidance outlined in paragraph 3.

a. Army civilian or contractor personnel injured while on duty or on TDY status. Exception: Contractor employee injuries, occupational illnesses, and property damage accidents that occur away from, and involve activities unrelated to, a Corps project/activity for which the contractor is working, are not required to be reported.

b. Accidents or mishaps incident to a Corps project/activity that could cause embarrassment to USACE.

c. Serious near misses.

d. Injuries to CEHNC military personnel, on or off-duty.

e. Medical expenses incurred by government civilians regardless of whether or not the injury meets one of the accident definitions above.

5. For government civilian accidents the supervisor is responsible for investigating the accident. For contractor accidents occurring incident to a CEHNC project/activity, the contractor is responsible for performing the accident investigation in accordance with the contractor's accepted Accident Prevention Plan (APP). The investigation is the supervisor's or contractor's documented internal review, analysis and account of the accident, based on factual information gathered by a thorough and conscientious examination of all causal factors. Its purpose is PREVENTION. Therefore, it is essential for the supervisor or contractor to take positive measures and any necessary corrective actions to prevent future occurrences. At the conclusion of the investigation, the supervisor or contractor must submit a completed original ENG Form 3394, with its instructions to the CEHNC Safety Office for review and processing within 5 working days following the accident. A copy of the ENG Form 3394 can be found at:

http://www.hnd.usace.army.mil/engrdir/organization/systems-eng/Safety/safety2.htm

This form must be routed through the appropriate Director's office for review and signature prior to submitting to the Safety Office.

6. On the original ENG Form 3394, if block 11b is checked "Yes," the job/activity hazard analysis for the task/activity being performed at the time of the accident must be submitted as an attachment. If the block is checked "No," and the accident is on a project/activity for which EM 385-1-1, Corps Safety Manual is applicable, an activity hazard analysis must be developed and submitted to the CEHNC Safety Office for review and acceptance prior to resuming the specific work activity being performed at the time of the accident. The CEHNC Safety Office will assess the adequacy of the investigation as described in the ENG Form 3394 along with all submitted analyses to determine whether the information provided is acceptable. If the investigation report is found acceptable, the Safety Office will notify the supervisor or GDA that the specific work activity may resume.

7. For government civilian claims, all Class A through C accidents require the submission of a Department of Labor (DOL) Form CA-1 (injury), CA-2 (illness/disease/stress) or CA-6 (fatality) in addition to the ENG Form 3394. Please note that a CA-1 or CA-2 is a mandatory submission if medical expenses are incurred. The employee is responsible for completing and submitting the appropriate form to their immediate supervisor for processing. The supervisor is responsible for reviewing, signing and delivering the form to the CEHNC Safety Office for processing. The CA-1 and CA-2 forms are time sensitive and must be submitted within 15 working days from the date of the accident. A timely submission will ensure the forms reach the Office of Workers' Compensation Program (OWCP) administrator as required and expedites the judicious payment of expenses incurred. In the unlikely event a fatality should occur, please call the Safety Office immediately.

8. If assistance is needed in reporting or investigating accidents, please contact the undersigned at 256-895-1583 or Greg Bayuga, 256-895-1596. Completed sample forms are available in the Safety Office.

/s/
CHARLES R. (RAY) WAITS, JR.
Chief, Safety and Occupational
Health Office

DISTRIBUTION:

A & B (Branch Level)
CEHNC-SO (Williams, Bayuga, Plyler, Taylor, Griffin, Sawyers)

Attachment A-15
Forms and Checklists

Accident Report Follow-up Form

ACCIDENT REPORT FOLLOW-UP FORM

To be used to supplement the online Parsons Accident Reporting Tool. Maintain a copy of this record in the project files in the Parsons field office.

Employee: ____________________ Date of Injury or Illness: ___________________

ANALYSIS – What caused the accident. Why did it happen:
Primary Cause:

____
____
____
____
____

Contributing Factors:

____
____
____
____
____

PREVENTIVE/CORRECTIVE ACTION – State what will be done to prevent reoccurrence:
Immediate Action:

____
____
____
____
____

Who is responsible: ____________________________ Completion Date(s): _________________________

Long-Term Action:

____
____
____
____
____

Who is responsible: ____________________________ Completion Date(s): _________________________

Closed by: ____
Facility Health and Safety Representative *Date*

Attachment A-15
Forms and Checklists

Respirator Qualitative Fit-Test Form

RESPIRATOR FIT TEST LOG

Maintain a copy of this record in the project files in the Parsons field office.

Employee: ______________________ Date of Test: _________________________

Fit Test
Administrator: ___________________ Date of Last Physical: __________________

RESPIRATOR

Manufacturer: ___________________ Model: ______________________________

Size: __________________________ I.D. Number: _________________________

TEST RESULTS

Test Protocol

Pressure fit check:

_________ positive

_________ negative

Test atmosphere:

_________ isoamyl acetate

_________ stannic oxychloride

Comfort

comfortable _________________________

intolerable __________________________

needs prescription inserts: _____________

____

_________ fit ___________ no fit

Date of next fit test: __________________

Remarks:

____

____

____

____

____

____

____

Attachment A-15
Forms and Checklists

Pre-drilling/Subsurface Checklist for Intrusive Fieldwork

PREDRILLING/SUBSURFACE CHECKLIST FOR INTRUSIVE FIELDWORK

Site Name: ______________________ **Job Number:** ____________
Site Phone Number: ______________________
Site Address: ______________________ **County:** ____________
Client Proj. Mgr.: ______________________ **Phone:** ____________
Site Manager Contacted Date: ______________________ **By:** ____________
Site Drawings (yes / no / NA) ________ (please attach) **Historical Drawings (yes / no / NA)** ________
Third Party Construction/Redevelopment Plans (Yes/No/NA)

***ATTACH SITE FIGURE WITH PROPOSED BORING LOCATIONS

Subcontractor's (drillers, concrete, etc…) **Company** ______________________
Subcontractor's Contact Person ______________________ **Phone** ____________
Meeting / Start Date ______________________ **Time** ____________

1) **Health and Safety Signoff Form Completed? (Yes/No)** **Date** ____________

2) **Utility Protection Services (Minimum 48 Hrs. Advance Notice, State Specific Notification Period Supercedes)**
Called: Date ________ **Time** ____________ **Initials** ________
Reference # ______________________
Proposed Drilling Locations Premarked for Locating Service. Y / N

3) **Private or In-House Utility Locating Service Performed?** Y / N ________
Called: Date ________ **Time** ____________ **Initials** ________
Name of Locating Service: ______________________
Telephone #/ contact: ______________________
Name of Supplier Locating Technician: ______________________
Type of sensing equipment used: ______________________
Proposed Drilling Locations Premarked Y / N

4) **Other Potential Underground Structures**
Name of City Engineer/Utility Representative: ______________________
Telephone #: ______________________
Date Notified ______________________ **Maps:** Y / N
Cleared: Y / N

5) **COMPLETED SITE WALKOVER W/ SITE MANAGER/DESIGNEE OR OWNER/TENANT REP.** Y / N
Name of Site Manager: ______________________
Name of Property Owner/Tenant Representative:______________________
Cleared: Yes / No
Building Utility Service Line Connections Identified: Y / N
(Hand sketch on site map w/proposed boring locations and most likely utility trench locations)

6) **Utility Inventory:** Y / N

Utility	Name	Depth (ft) (If Available)	Phone	Notified - Date		Marked
Above Ground Services						
Electric		NA		Y / N		Y / N
Telephone		NA		Y / N		Y / N
Cable		NA		Y / N		Y / N
Overhead Supports		NA		Y / N		Y / N
Traffic light cables		NA		Y / N		Y / N

PREDRILLING/SUBSURFACE CHECKLIST FOR INTRUSIVE FIELDWORK

6) Utility Inventory Continued:

Below Ground Services:

Electric				**Y / N**		**Y / N**
Telephone				**Y / N**		**Y / N**
Cable				**Y / N**		**Y / N**
Gas				**Y / N**		**Y / N**
Water				**Y / N**		**Y / N**
UST System				**Y / N**		**Y / N**
Storm				**Y / N**		**Y / N**
Sanitary				**Y / N**		**Y / N**
Steam				**Y / N**		**Y / N**
Pipeline Companies				**Y / N**		**Y / N**

Other:

				Y / N		**Y / N**
				Y / N		**Y / N**
				Y / N		**Y / N**

7) Site-Specific Emergency Contingency Plan Incorporated in Health & Safety Plan **Y / N**

8) Drilling Locations Approved by Client Project Manager Named Above? **Y / N**

9) Signature of Parsons' Project Mgr. (required to begin fieldwork):

Name of Project Manager | **Signature of Project Manager**

Name of Parsons Field Personnel | **Signature of Field Personnel**

(This document to be included with the site H&S Plan and should be available upon request.)

ADDITIONAL COMMENTS / NOTES:

Attachment A-15
Forms and Checklists

Site-Specific Training Checklist

Site-Specific Training
Non-Intrusive/Mobilization
Seneca Army Depot Activity
Romulus, New York

Topics Covered:	**Completed/Initials**
Personnel responsible for health and safety • – Site Safety&Health Officer • – CEHNC On Site Safety • – USA SUXOS (for sites with UXO hazards) • – RSO • – Project Manager • – Site Manager	____________
Heat Injuries • Heat Stress • Exhaustion • Stroke	____________
Slips, trips, falls • Animal Burrows • Steep Inclines • Partially buried fencing/barbed wire • Muddy/Wet Surfaces	____________
Health and safety procedures	____________
Safe work practices • Equipment Spotters • Recognized hand signals	____________
Engineering controls	_____________
Emergency procedures/Rally Point • Emergency Signal (3-5sec blasts) • Rally Point (Site Compound)	_____________
Biological Hazards • Poison Ivy/Oak/Sumac • Snakes (Rattlers) • Bees/Wasps • Bloodborne Pathogens	_____________
Radios/GPS • Channel Frequency (USA Environmental) • GPS (loaded with proper Sectors) • Communications Checks (Twice all site elements)	_____________

Topics Covered:	**Completed/Initials**
Vehicle/Heavy Equip traffic • Use of Seat Belts • Sound Horn prior to backing vehicles without warning device • Vehicle speeds on the roads	____________
MSDS Logs/Records • Located at Operations	_____________
Personnel Protective Equipment • Safety Glasses • Leather Work Gloves • First Aid Kit (per vehicle) • Fire Extinguisher (per vehicle) • Maps and Grid Sheets • Remote Operations/First Aid Handout	_____________
Hospital/Routes • **<u>All Site Related Injuries</u>** Team will transport to closest Medical Facility List those facilities/phone numbers/provide maps • **After Hours – Site personnel will go to XXXX**	_____________
Today's operations (-Site Manager's)	_____________

____

SHSO's Signature/Date

Maintain a copy of this record in the project files in the Parsons field office.

Attachment A-15
Forms and Checklists

Site-Specific Training Form

Site Specific Training Form

Instructions: This form is to be completed by each person to work on the subject project work site and returned to the safety manager.

I have attended and been briefed on the Site Specific Training for the following project:

Site Location: Seneca Army Depot, Romulus, New York

Contract Number:

Print Name: ______________________________

Company: ______________________________

Signature: ______________________________

Date: ____________________

Return to:

On Site Health and Safety Officer

To be maintained in the project files in the Parsons field office.

Attachment A-15
Forms and Checklists

Worker's Compensation Information

When You Are Injured At Work

This fact sheet provides an overview of the workers' compensation system. It includes general information about workers' compensation benefits if you are injured on the job.

If you need additional information, your Workers' Compensation Analysis is available to answer your specific questions and concerns.

Your Workers' Compensation Analyst is Donna Miller and may be reached at (626) 440-2950 or Donna.Miller@parsons.com

Once Parsons reports your injury to the insurance claim administrator, AIG, a claim representative will also be available to help answer your questions.

WHAT IS WORKERS COMPENSATION?

Workers' compensation is a system that provides benefits to cover specific economic loss as a result of an injury while you are performing your job, regardless of who may be at fault. These benefits are dictated by the laws of your State. Benefits may include medical benefits, income benefits, rehabilitation benefits, and death benefits. The system is designed to provide prompt benefits with assistance from people qualified to answer questions and concerns about your injury and injury benefits.

WHAT'S COVERED?

The workers' compensation (WC) laws in your state dictate the benefits you may receive. In general, the benefits may include:

- Medical Benefits. WC pays all reasonable and necessary medical costs if you have a job-related injury or illness. Medical costs are paid directly to the treating medical provider by Parsons through our company's claim administrator, AIG. Some of the medical providers who treat your injury may specialize in occupational medicine. These medical specialists are experienced specifically in work-related injuries. In addition to providing medical care, they are qualified to evaluate the extent of your disability and your abilities in terms of the kind of work that they believe is medically suitable for your return to work.

- Income benefits. In your State, there may be a waiting period of day(s) or week(s) before income benefits are payable under the WC system.

There are four classifications of income benefits, depending on the nature of your injury. These include temporary total, permanent total, temporary partial, and permanent partial. Most cases involve temporary total disability (TTD). In these cases, an employee is totally disabled for a period of time but is expected to recover and return to work; the disability is temporary in nature. Some injuries are referred to as "scheduled" and have specific benefits. In your State, income benefits for a TTD injury may be based on:

X % of wages (subject to your State specific statutes)
Minimum weekly amount (subject to your State specific statutes)
Maximum weekly amount (subject to your State specific statutes)

Once the classification of your injury is determined, your claim representative can answer more specific questions about your income benefits under your State's WC system. Your Workers' Compensation Analyst is also available to help your questions answered, either directly, or through your State WC Commission.

- Rehabilitation Benefits. WC may also provide benefits for the rehabilitation of injured employees. Your claim representative can tell you what is provided and any special provisions regarding these benefits.

- Death Benefits. In the event of death, states specify qualifications and restrictions regarding survivor benefits. Your claim representative or Workers' Compensation Analyst can tell you more about those benefits.

WHAT ARE MY RESPONSIBILITIES?

If you are injured on the job, make sure your supervisor knows this immediately so you can get the attention you need and the benefits process can begin, where applicable.

You also have a responsibility to help in your own recovery. The following are some things you can do to help your recovery:

- Keep in touch with your supervisor. In addition, your Workers' Compensation Analyst is available to answer your questions.
- Keep all appointments made for you.
- Follow your doctor's treatment plan.
- Avoid activities that may slow or stop your recovery.
- Cooperate with people helping you return to work.
- Remember a lot of people care about you and your recovery.

It is a criminal offense to knowingly make false statement or to materially misrepresent your injury for the purpose of receiving workers' compensation benefits. Those convicted of fraud may have to repay benefits. Be honest. Your injury affects everyone, including your co-workers.

DO I NEED TO HIRE A LAWYER TO COLLECT BENEFITS?

While it is your decision whether or not to seek a lawyer, you do not need one to file a claim or to collect benefits. Your workers' compensation law describes and defines the benefits to which you may be entitled. Your Workers' Compensation Analyst and claim representative can help answer any questions about the process and your benefits. Feel free to ask them any questions you have about your benefits. Additionally, in some cases, a nursing professional may be assigned to help ensure that you get the medical care and treatment needed.

WHAT IF I HAVE A PROBLEM?

Misunderstandings and mistakes can happen. If you think there is a problem, you can contact your Workers' Compensation Analyst at work or your claim representative. If you are still not satisfied with their responses, you can contact your State's Workers' Compensation Commission. The Commission includes a staff qualified to advise you about your rights and benefits under the law. In addition, some States have Ombudsmen Programs. Ombudsmen representatives are specially trained to work with you and your employer on specific concerns and problems. Your Workers' Compensation Analyst can tell you if your State has an Ombudsmen Program and provide you with the program's telephone number.

Attachment A-16

Munitions and Explosives of Concern (MEC) Support During Hazardous, Toxic, and Radioactive Waste (HTRW) and Basic Safety Concepts and Considerations for Ordnance and Explosives Operations

US Army Corps
of Engineers®

EP 75-1-2
01 August 2004

MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION ACTIVITIES

ENGINEER PAMPHLET

AVAILABILITY

Electronic copies of this and other U.S. Army Corps of Engineers publications are available on the Internet at http://www.hnd.usace.army.mil/techinfo/engpubs.htm. This site is the only repository for all official USACE engineer regulations, circulars, manuals, and other documents originating from HQUSACE. Publications are provided in portable document format (pdf).

CEMP-CE

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

EP 75-1-2

Pamphlet
No. 75-1-2

01 August 2004

Explosives
MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION ACTIVITIES

1. Purpose. This pamphlet provides U.S. Army Corps of Engineers (USACE) personnel with procedural guidance, technical specifications, personnel and training requirements, and health and safety criteria for Munitions and Explosives of Concern (MEC) support during HTRW and construction activities.

2. Applicability. This pamphlet applies to all Headquarters, U.S. Army Corps of Engineers (HQUSACE) elements, USACE Major Subordinate Commands (MSCs), USACE geographic districts, and field operating activities having responsibilities for civil works and/or military programs with HTRW-related and construction projects that have the potential for encountering MEC. The MEC support requirements presented in this pamphlet are applicable to anomaly avoidance activities conducted during HTRW activities, standby MEC support during construction activities, and subsurface removal of MEC during construction activities. Guidance presented in this pamphlet is consistent with policy in ER 385-1-95. Contact the Military Munitions Center of Expertise (MM CX) for additional information.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References. Required and related references are at Appendix A.

5. Explanation of Acronyms and Terms. Acronyms and special terms used in this pamphlet are explained in the glossary.

FOR THE COMMANDER:

3 Appendices
(See Table of Contents)

JOHN R. McMAHON
Colonel, Corps of Engineers
Chief of Staff

This pamphlet supersedes EP 75-1-2, dated 20 November 2000.

CEMP-CE

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

EP 75-1-2

Pamphlet
No. 75-1-2

01 August 2004

Explosives
MUNITIONS AND EXPLOSIVES OF CONCERN (MEC) SUPPORT DURING HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW) AND CONSTRUCTION ACTIVITIES

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CHAPTER 1

Introduction

1-1. General. This Engineer Pamphlet (EP) presents procedures for providing Munitions and Explosives of Concern (MEC) support during Hazardous, Toxic, and Radioactive Waste (HTRW) and construction activities. MEC support activities include: anomaly avoidance activities conducted during HTRW activities; standby MEC support during construction activities; and subsurface removal of MEC during construction activities.

a. During the investigative/design phase of any project on a site known or suspected to contain MEC, provisions for MEC support will be included. MEC support refers to anomaly avoidance techniques implemented to avoid any potential surface MEC and any subsurface anomalies. The U.S. Army Corps of Engineers (USACE) primarily implements anomaly avoidance procedures on HTRW sites. Intrusive anomaly investigation is not authorized during anomaly avoidance activities. Although the examples of anomaly avoidance techniques in this EP pertain to HTRW-related activities, the procedures may be modified to address other types of activities, as appropriate. For additional information on anomaly avoidance techniques, contact the Military Munitions Center of Expertise (MM CX). See Chapter 5 for a discussion on anomaly avoidance procedures to be used during HTRW activities and Chapter 6 for MEC support during construction activities.

b. MEC support during construction activities, including the remediation phase of an HTRW project, on a site with known or suspected MEC may include only MEC standby support or may require a subsurface removal response. As described in Chapter 12 of DOD 6055.9 STD, the level of MEC support required during construction activities is dependent on the probability of encountering MEC. Contact the MM CX for guidance and assistance in determining the level of support.

(1) If the probability of encountering MEC is low (e.g., current or previous land use leads to an initial determination that MEC may be present), only MEC standby support will be required. MEC standby support is discussed in paragraph 6-6 of this document.

(2) When a determination is made that the probability of encountering MEC is moderate to high (e.g., current or previous land use leads to a determination that MEC was employed or disposed of in the area of concern), Unexploded Ordnance- (UXO-) qualified personnel must conduct a subsurface removal for the known construction footprint and remove all discovered MEC.

(3) The level of effort for construction support is site/task-specific and will be determined on a case-by-case basis by the project delivery team (PDT).

c. If MEC is encountered after initiation of an HTRW or construction project where MEC support has not been instituted, the procedures published in this EP will apply.

d. The MM CX will determine procedures for sampling and cleanup of Munitions Constituents (MC) contaminated with primary explosives on a case-by-case basis. The HTRW Design District is responsible for the design and removal or remedial action to clean up soils contaminated with secondary explosives. Refer to ER 1110-1-8153 for definitions of primary and secondary explosives. Contact the MM CX for the latest procedures to be used for MC sampling.

1-2. Responsibilities.

a. All USACE personnel involved with the Military Munitions Response Program are responsible for safely executing military munitions response projects, including MEC support during HTRW and construction activities, in accordance with applicable laws, regulations, and policies. A detailed discussion of USACE organizational responsibilities for military munitions response projects is presented in ER 1110-1-8153. Safety and health requirements, responsibilities, and procedures for MEC operations (response actions and any other MEC activity) are defined in ER 385-1-95.

b. All USACE organizations will ensure that all personnel with authorized access to the site for MEC support during HTRW and construction activities are familiar with, and have access to, copies of the accepted Work Plan and Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP). In addition, each organization will ensure that such personnel receive the appropriate training, medical surveillance, and personal protective equipment (PPE) required by the safety plan, contract specifications, Occupational Safety and Health Administration Standards, USACE regulations, and applicable Department of Defense (DOD) and Department of the Army (DA) regulations.

1-3. Functional Roles. The following section provides a description of the functional roles for MEC support activities. A more comprehensive description of the functional roles for the organizations discussed below is also provided in ER 1110-1-8153.

a. Headquarters, U.S. Army Corps of Engineers (HQUSACE). If an Explosives Safety Submission (ESS) is required for MEC support activities, it will be reviewed and approved by the MM CX acting for HQUSACE.

b. Major Subordinate Command (MSC). If an ESS is required for MEC support activities, it will be monitored by an MSC in accordance with ER 1110-1-8153.

c. District. A district will:

(1) Execute MEC support activities.

(2) Assign a Project Manager (PM) to lead the PDT, coordinate all project activities, serve as a liaison with other stakeholders, and review/approve project documents as required.

(3) Conduct MEC support activities with either in-house resources or by contract.

(4) Coordinate the MEC support project with the MM CX.

(5) Prepare a project-specific Statement of Work (SOW) and Independent Government Estimates (IGE) for MEC support activities.

(6) Submit plans developed for MEC support activities to the MM CX. All MEC concerns will be addressed before initiating any on-site activities.

(7) If an ESS is required, review the ESS and provide comments and written concurrence or nonconcurrence.

(8) Supervise the fieldwork. MEC operations will be supervised by UXO-qualified personnel as defined in ER 385-1-95.

(9) Conduct appropriate quality verification activities.

(10) Coordinate requests for explosives ordnance disposal (EOD) support from the 52nd Ordnance Group (EOD) with the MM CX.

(11) Coordinate with the appropriate Military Munitions Design Center (MM DC), as necessary.

d. MM DC. If an ESS is required for planned MEC support activities at a site, the appropriate MM DC will ensure its proper planning and preparation. The MM DC provides construction support/MEC support as defined by the district.

e. MM CX. The MM CX will:

(1) Review and provide comments and written concurrence or nonconcurrence on MEC support-related products (e.g., SOW, Work Plan, and ESS) to ensure compliance with Federal, DOD, DA, and USACE MEC safety and environmental regulations.

(2) Provide MEC technical support to any USACE office conducting construction and/or HTRW operations in areas where MEC is suspected or known to exist.

(3) Develop and/or approve MEC-specific contract requirements, including military munitions response contractor personnel qualifications and work standards, for contract acquisition.

(4) Assimilate and analyze lessons learned from MEC support projects and provide them to the HTRW CX for inclusion in the USACE lessons learned database.

(5) Coordinate support with the 52nd Ordnance Group (EOD) in accordance with the Memorandum of Agreement between the U.S. Army Engineering and Support Center, Huntsville (USAESCH) and the 52nd Ordnance Group (EOD).

(6) Coordinate the review and approval of an ESS (if required) with the U.S. Army Technical Center for Explosives Safety, and the Department of Defense Explosives Safety Board (DDESB).

(7) Provide construction support/MEC avoidance to districts as requested.

f. OE Safety Specialist. If a subsurface removal response is being conducted in support of construction activities, an OE Safety Specialist will be present to provide safety oversight. Otherwise, an OE Safety Specialist is generally not required on-site. Additional information on the requirements for when an OE Safety Specialist is required on site is available in ER 385-1-95.

CHAPTER 2

Statement of Work/Independent Government Estimates

2-1. Introduction. This chapter provides guidance on preparing an SOW and IGE for MEC support during HTRW and construction activities. The district is responsible for executing the SOW and IGE for MEC support activities.

2-2. SOW.

a. General. Safety and health are overriding concerns during MEC support project design and execution. The MM CX safety personnel are points-of-contact (POCs) for MEC safety issues and have particular, specialized expertise in identifying, interpreting, and implementing applicable safety requirements for military munitions response to MEC projects. Each SOW for MEC support activities must be closely coordinated with these personnel.

b. Preparation.

(1) The PM along with the PDT is responsible for preparing the SOW required for MEC support activities in conjunction with HTRW or construction activities. The MM CX may be consulted to provide the appropriate statements or paragraphs concerning background and authority for the task order or contract award.

(2) Appendix B provides an example SOW for anomaly avoidance during HTRW activities on sites with known or suspected MEC. Appendix C provides an example SOW for MEC support during construction activities on sites with known or suspected MEC. The appropriate MEC support SOW may be used as an addendum to a larger SOW for an existing project. If the intrusive investigation of anomalies is deemed necessary, the SOW for MEC support during construction activities should be used.

(3) The examples provided in Appendices B and C should be followed to ensure that the applicable requirements (i.e., site visit, Work Plan preparation, MEC support procedures, quality control, reporting, and public affairs assistance) are included. The MM CX should assist in the drafting of SOW verbiage when MEC support is required for HTRW activities not specifically referenced in Appendix B or when construction activities other than those presented in Appendix C are proposed and MEC support is required.

(4) Neither of these examples contains provisions for a records search by the contractor to determine what types of MEC might be encountered. Districts should consider completing a records search to determine the probability for contact with MEC and the potential types and quantities before using the SOW in Appendix B or C.

c. Review Process. Following the preparation of the SOW by the PDT, the PM will submit copies to the MM CX for review. The MM CX will provide comments and written concurrence or nonconcurrence for the decision/approval authority. The MM CX will be allowed 15 calendar days from receipt of the SOW for this review. If no comments are received within this time frame, concurrence may be assumed by the executing agency.

2-3. Preparation of the IGE. Once the SOW is prepared, an IGE for anomaly avoidance during HTRW or construction activities is prepared. The structure of the cost estimate will vary depending on the contract type. The recommended USACE software programs to be used in preparing cost estimates are the Micro Computer-Aided Cost Engineering System (MCACES), Gold Version 5.3; MCACES for Windows; Lotus 123™ spreadsheets; or Excel™ spreadsheets. The cost estimator or project engineer may develop crew and productivity sheets for the various field activities or tasks in the SOW to determine the duration or number of hours for the various labor categories needed to support each task. The labor rates are burdened rates and reflect all contractor mark-ups. Materials, travel, and per diem are duration driven and are totaled separately from the labor. The materials estimated can be purchased, rented, or allocated to overhead.

CHAPTER 3

Planning Considerations for MEC Support

3-1. Introduction. This chapter discusses the requirements that must be addressed prior to initiating MEC support activities during HTRW and construction activities on sites known or suspected to contain MEC. The objective of MEC support activities is to conduct safe and efficient operations while limiting potential exposure to a minimum number of personnel for a minimum time and to the minimum amount of MEC.

3-2. Planning Documents. Site-specific planning documents that detail the methodologies that will be used during the MEC support project will be prepared. For anomaly avoidance activities, the planning document is the HTRW Work Plan. For MEC support during construction activities, the planning documents include the Work Plan and appropriate subplans and appendices (and an ESS, if required). For range construction projects (including target maintenance), the planning documents include plans and specifications (an ESS is not required). The planning documents will be prepared in accordance with the project SOW and contract requirements. The PDT will ensure that these documents are consistent with each other.

3-3. MEC Support Work Plan.

a. For anomaly avoidance and construction activities, a MEC Support Work Plan will be prepared to supplement the prime contractor's or USACE's Work Plan/Site Plan. The MEC Support Work Plan will be prepared in accordance with the project SOW and contract requirements.

b. Content. The MEC Support Work Plan does not need to be comprehensive, as it is a supplement to the overall site Work Plan. The MEC Support Work Plan will detail the management approach and operational procedures that will be used to complete the MEC support activity. The MEC Support Work Plan will indicate the specific geophysical instrument that the UXO team intends to use. The MEC Support Work Plan will include an APP/SSHP that specifically addresses MEC operations. The PDT will ensure that the MEC Support Work Plan and all appropriate subplans (e.g., APP/SSHP, ESS, etc.) are consistent.

c. The MEC Support Work Plan will be submitted by the contractor to the PM for review and comment by the PDT. The PM will then forward one copy to the MM CX. The MM CX will review and provide comments and written concurrence or nonconcurrence on the planning documents containing MEC support provisions. The MM CX will be allocated 15 calendar days from the date of receipt for this review. If no comments are received from the MM CX within this time frame, concurrence will be assumed by the executing agency.

d. The accepted MEC Support Work Plan will serve as the contractual basis for all subsequent MEC activities. Current copies of the MEC Support Work Plan will be kept for reference by the PM, the contractor's senior site representative or safety manager, the UXO team, and the OE Safety Specialist (if required onsite). The accepted MEC Support Work Plan will be maintained in the district office.

e. For those sites where subsurface removal in support of construction activities is required, the MEC Support Work Plan will contain the appropriate subplans and appendices from the following list, based on the MEC support project requirements and information already contained in the overall Work Plan:

(1) Technical Management Plan.

(2) Explosives Management Plan.

(3) Explosives Siting Plan (ESP).

(4) Geophysical Prove-out Plan and Report.

(5) Geophysical Investigation Plan.

(6) Geospatial Information and Electronic Submittals.

(7) Work, Data, and Cost Management Plan.

(8) Property Management Plan.

(9) Quality Control (QC) Plan.

(10) Environmental Protection Plan.

(11) Investigative Derived Waste (IDW) Plan.

(12) Appendix – Task Order SOW.

(13) Appendix – Site Maps.

(14) Appendix – Local POCs.

(15) Appendix – APP/SSHP.

(16) Appendix – Munitions Constituents Sampling and Analysis Plan.

(17) Appendix – Contractor Forms.

(18) Appendix – Minimum Separation Distance (MSD) Calculation Sheets.

(19) Appendix – Resumes.

f. Modifications. Changes may be required to the MEC Support Work Plan and/or APP/SSHP after approval by the Contracting Officer. A modification that affects any MEC subsurface removal operational and/or safety procedure may also require a revision to and re-approval of the ESP and/or ESS.

3-4. ESP.

a. General.

(1) An ESP, a component of the MEC Support Work Plan, is prepared only for MEC support during construction activities where MEC removal is planned. The ESP will provide explosives safety criteria for planning and siting explosive operations. The ESP discusses the proposed MSDs for unintentional detonations, intentional detonations, and siting of critical project components. The ESP will describe the basis of design, all design calculations, and proposed hazard mitigation measures to be implemented to protect the public, non-project personnel, and site workers from explosive hazards. The ESP will be reviewed by the PDT to ensure that the appropriate MSD criteria have been applied.

(2) The ESP will discuss the following explosive operations: Munitions Response Areas (MRAs), explosives storage magazines, and planned or established demolition areas. The location of these explosives operations will be sited on a map with a scale of 1 inch equals 400 feet. A larger scale may be used if available and if a map using such a scale is not too large to be included in the Work Plan. A smaller scale is acceptable if distances can be accurately shown. If an unscaled map is used, the map must have labeled distances. The MSDs calculated for the operation will be discussed in the text of the plan and Quantity-Distance (Q-D) arcs for the above-listed project elements will be drawn on the map.

(3) Q-D. Explosives safety distance tables prescribe the necessary separations and specify the maximum quantities for various classes of explosives permitted in any one location. The Q-D tables provided in DOD 6055.9-STD reflect the acceptable minimum criteria for the storage and handling of various classes and amounts of explosives. These distances will be used for siting storage locations. The project will site Open Burn/Open Detonation areas in accordance with EP 1110-1-17.

b. MRAs. During intrusive operations (i.e., operations that involve or result in the penetration of the ground surface at an area known or suspected to contain MEC. See EP 1110-1-18 for additional details), the MSD will be determined using two sets of criteria. The first set of criteria has been established for unintentional detonations (i.e., not planned in advance), and the second set of criteria has been established for intentional detonations (i.e., planned, controlled detonations). Details on calculating MSDs are published in EM 1110-1-4009.

(1) Unintentional Detonations. For an unintentional detonation, the applicable MSDs are the MSDs for unintentional detonations and the team separation distance (TSD). The MSD for unintentional detonations is the minimum distance that non-essential personnel and the public must be separated from intrusive operations. The TSD is the minimum distance that project teams must be separated during intrusive operations.

(2) Intentional Detonations. The MSD for intentional detonations is the distance that both project personnel and the public must be from the intentional detonation.

c. Explosives Storage Magazines.

(1) The ESP will provide the following information on explosives storage magazines:

(a) Type(s) of magazines used (e.g., Bureau of Alcohol, Tobacco, and Firearms (ATF) classification, portable, commercial, above ground, shed, earth covered, etc.). See DOD 6055.9-STD for further information and definitions on the types of magazines to be used for explosives storage.

(b) Net Explosive Weight (NEW) and hazard division to be stored in each magazine. Generally, recovered MEC is considered Hazard Division 1.1. See 6055.9-STD for further information and definitions on Hazard Divisions.

(c) Q-D criteria used to site the magazine.

(d) Design criteria for any proposed engineering controls to be used to mitigate exposures to the public when Q-D criteria cannot be met.

(2) Magazines must also be properly placarded, and the property must be secured. DOD magazines storing explosives must have the appropriate fire fighting symbol or locally required DOD Hazard Classification assigned. Additional details on how explosives must be stored and secured are published in EP 1110-1-18.

d. Planned or Established Demolition Areas. The MSDs for these areas will be based on the MSD criteria for intentional detonations.

e. Footprint Areas. The following footprint areas will be discussed in the ESP: blow-in-place, collection points, and in-grid consolidated shots. These areas, however, do not have to be shown on the site map. The MSDs for these footprint areas are described in the following paragraphs.

(1) Blow-in-Place. Blow-in-place is the preferred method for disposal of MEC. Blow-in-place occurs when a MEC is prepared for detonation and detonated in-place. The MSD for blow-in-place areas will be determined using the MSD criteria for intentional detonations.

(2) Collection Points. Collection points are areas where recovered MEC that is acceptable to move is temporarily accumulated within a search grid pending relocation to another area for storage or destruction. Collection points will be limited to the amount of explosives such that the K50 total of the rounds to be destroyed will not exceed the MSD. (The K value is the safety factor used in determining the MSD for unintentional detonations. See DOD 6055.9-STD for additional details on the establishment of K values.) The MSD for collection points will be determined using the MSD criteria for unintentional detonations.

(3) In-Grid Consolidated Shots. In-grid consolidated shots occur when recovered MEC that is acceptable to be relocated is collected and destroyed within a search grid. In contrast to an established demolition ground, consolidated shots occur within a search grid rather than in a separate area. The procedures for in-grid consolidated shots are presented in the USAESCH document titled "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on OE Sites."

f. Exceptions. The calculated MSDs for unintentional detonations specified above are considered minimums for execution of normal operations. When site conditions exist that make it impossible or impractical to comply with these minimums, the PM may request consideration of a possible reduction. Any request for a reduction of these MSDs will be staffed through the MM CX for calculation. This information will be forwarded to the PM, who will forward it to the District Safety Office for a decision concerning the reduction of the exclusion area. For any requested reduction to the specified MSDs for unintentional detonations, a detailed hazard analysis, which explains why these reductions are necessary and acceptable, must be documented.

3-5. Conventional ESS.

a. ESS.

(1) The purpose of the ESS is to ensure that all applicable DOD and DA regulations regarding safe and secure handling of military munitions are followed.

(2) Intrusive activities cannot commence until the DDESB approves the ESS and the contractor has been directed to incorporate changes resulting from ESS approval into the MEC Support Work Plan. A copy of the approved ESS will be maintained at the project site. All operations will be executed in accordance with the approved ESS.

(3) Detailed guidance on the preparation and approval process associated with the ESS may be found in EP 385-1-95b and DDESB's "Memorandum Guidance for Clearance Plans."

b. Construction support involving removal of MEC in the construction footprint will require submittal and approval of an ESS. An ESS is not required for standby construction support or anomaly avoidance. The ESS will be tailored to meet site-specific requirements.

c. When an element of the approved ESS changes, the ESS must be changed. The contractor shall prepare the proposed change and forward it to the PM, who will forward it to the MM CX for review. The MM CX will forward the proposed changes to the appropriate agency for approval. For a change that specifies less restrictive requirements (e.g., reduction in the exclusion zone), the contractor shall comply with the accepted ESS until the change is approved. When the proposed changes would result in more restrictive requirements (e.g., increase in the exclusion zone), the contractor shall apply the more restrictive measures immediately during the ESS change approval process.

3-6. Personnel Qualifications and Work Standards. USACE has set forth personnel standards applicable to all UXO personnel working for USACE. These qualifications and standards, which detail the educational and experience requirements for UXO personnel, are available in EP 1110-1-18.

3-7. Training. USACE and contractor personnel shall be in compliance with training requirements prior to conducting MEC support activities. Training requirements are published in EP 1110-1-18. The training topics included in EP 1110-1-18 pertain to 29 CFR 1910, 29 CFR 1926, Initial Training, Refresher Training, Cardiopulmonary Resuscitation (CPR)/First Aid, Medical Surveillance, Visitor Training, and Blood Borne Pathogen training. Additional training information is contained in ER 385-1-95.

3-8. Explosives Safety. There are no "safe" methods for dealing with MEC, merely procedures and process controls that are designed to reduce potential hazards. Maximum safety in conducting any MEC operations can be achieved through adherence to applicable safety precautions, a planned approach, intensive supervision, and MEC safety oversight. UXO-qualified personnel will conduct a site safety briefing prior to commencing operational activities each workday. All activities with potential exposure to MEC will be reviewed to identify the associated risks and appropriate mitigation procedures. Operations within areas suspected of containing MEC must be conducted in a manner that exposes a minimum number of people to the smallest quantity of explosives for the shortest period of time.

a. General Safety Considerations.

(1) General safety considerations applicable to personnel, both essential and non-essential, at project sites where MEC may be encountered include:

(a) Do not carry fire or spark-producing devices.

(b) Do not conduct explosive or explosive-related operations, without approved procedures, proper supervision, and MEC standby support.

(c) Do not become careless by reason of familiarity with MEC or the reported probability level of MEC.

(d) Do not conduct explosive or potentially explosive operations during inclement weather.

(e) Avoid contact with MEC except during MEC removal conducted during construction activities.

(f) Conduct MEC-related operations during daylight hours only.

(g) Employ the "buddy system" at all times.

(2) EP 385-1-95a provides additional considerations for safety at project sites where MEC may be encountered.

b. Activity Hazard Analysis.

(1) Activity Hazard Analyses will be performed in accordance with EM 385-1-1. Activity Hazard Analyses will be conducted by personnel who are knowledgeable with respect to MEC safety standards and requirements. These personnel must understand the specific operational requirements and hazard analysis methodologies. A hazard analysis will be performed for each activity to determine the significance of any potential explosive-related hazards. For example, residual explosives from ordnance fillers may be exposed during an HTRW sampling activity. Explosive residues may be in the form of powder or various granular and powder-based pellets. These contaminants can enter the body through the skin or by ingestion if proper personal hygiene practices are not followed. Explosive fillers such as white phosphorus are dangerously reactive in air and acute exposure can result in serious injury to the skin, eyes, and mucous membranes. They are also a fire hazard.

(2) Safety requirements (or alternatives) that will either eliminate the identified hazards or control them to reduce the associated risks to an acceptable level will be developed. The adequacy of the operational and support procedures that will be implemented to eliminate, control, or abate identified hazards or risks will then be evaluated and a second risk assessment completed to verify that a satisfactory safety level has been achieved.

c. Hazards of Electromagnetic Radiation to Ordnance.

(1) Some ordnance items and other electro-explosive devices (EEDs) are particularly susceptible to electromagnetic radiation (EMR) in the radio frequency (RF) range originating from devices such as radio, radar, and television transmitters. The presence of antennas and communication and radar devices will be noted on initial site visits and/or preliminary assessments of eligibility. In addition, active and passive subsurface detection devices emit EMR/RF. Each type of equipment producing EMR/RF must be reviewed and a hazard analysis completed. The level of EMR/RF susceptibility and potential hazard is a result of the design and type of MEC or EED that may be present. Therefore, a knowledge of what MEC is normally unsafe in the presence of EMR/RF is important so that preventive steps can be taken if such MEC is encountered. The MM CX will be consulted when geophysical investigations are planned in areas potentially containing electric-fuzed ordnance.

(2) As part of the hazard analysis, the MSD between an EMR/RF emitting device and potential EEDs will be calculated. This calculation is based on the characteristics of the transmitting device and the potential EEDs. The important characteristics of the EMR/RF source device include:

(a) The transmitter frequency (f, in MHz).

(b) The peak envelope transmitting power (Pt, in W).

(c) The transmitter gain (GdB).

(3) Minimum safe distances from EMR/RF sources are listed in Tables 2-2, 2-3, and 2-4 of TM 9-1375-213-12.

3-9. PPE.

a. All UXO team members will be trained in the use of, medically qualified for, and physically able to wear the prescribed PPE. PPE for MEC support operations will be determined by site-specific and task-specific analyses, documented in the APP/SSHP, and worn as indicated in the plans. Specific requirements for PPE are described in the following paragraphs.

(1) PPE will comply with the most stringent requirements of EM 385-1-1 and the applicable portions of 29 CFR 1910 Subpart I or 29 CFR 1926 Subpart E.

(2) Footwear. In addition to the applicable requirements in the references cited above, shoes or boots with high traction soles and ankle protection will be used. During geophysical detection activities, UXO personnel will not wear safety shoes or other footwear that would cause interference with instrument operations.

(3) Clothing. Short sleeve shirts and long pants are considered the minimum clothing suitable for MEC operations and will be worn at all work sites, unless variations are described, analyzed, and documented in the accepted APP/SSHP.

(4) Head Protection. Personnel working in or visiting designated hardhat areas will be required to wear head protection meeting ANSI Z89.1 standards. Hardhat areas for MEC operations will not be designated unless the activity hazard analysis shows a possible overhead hazard.

b. UXO personnel using PPE will be knowledgeable of the limitations of the selected PPE as well as the reduced performance levels the equipment might impose on them when they are conducting assigned tasks.

3-10. Fire Prevention.

a. Fire prevention awareness is especially important in areas with known or suspected MEC. Smoking will be permitted only in controlled areas where all combustibles (e.g., vegetation, fuel cans, sampling supplies) have been removed or sufficient firebreaks have been established. Personnel may attempt to extinguish minor fires with fire extinguishers if they are trained to do so safely without endangering themselves or others within the vicinity of the fire.

b. If a fire becomes uncontrollable or extends into areas that may contain MEC, all personnel must immediately suspend any fire fighting efforts and retreat to a safe distance, which is at least the maximum fragment distance of the military munition with the greatest fragmentation distance (MGFD), (i.e., the military munition with the greatest fragmentation distance that might be recovered as a result of previous training activities based on historical information). Personnel will retreat upwind of the fire. The senior UXO-qualified person present will then lead an immediate evacuation of the area using available resources to ensure the safety of all personnel.

3-11. Emergency Procedures. MEC operations may result in accidents or incidents, regardless of the safeguards implemented. The APP/SSHP will describe site-specific emergency response procedures, including identification of all appropriate POCs. All personnel must be briefed on the emergency response procedures and protocols discussed in the APP/SSHP.

a. Contingency Plan. A contingency plan will be developed if anomaly avoidance is going to be conducted, to detail the procedures that will be used in the event that munitions with unknown fillers and/or Recovered Chemical Warfare Materiel (RCWM), unusual odors, or discolored soil are encountered. The contingency plan will be initiated if munitions with unknown fillers and/or RCWM, unusual odors, or discolored soil is encountered or site personnel exhibit symptoms attributable to a chemical exposure (i.e., respiratory irritation and/or skin irritation).

b. Emergency Response. In the event of a MEC-related emergency on-site during anomaly avoidance, the senior UXO-qualified person present will direct the course of action until the local POC designated in the Work Plan has been notified. In the event of a MEC-related emergency on-site during construction support, the Senior UXO Supervisor (SUXOS) will direct the course of action until the local POC designated in the Work Plan has been notified. It may be necessary for other on-site personnel to provide assistance. If an emergency response rescue operation is required, no one will reenter the accident area until the hazards of the situation have been assessed by the responsible individual (see above), and all required resources are on-hand to complete the rescue without jeopardizing the safety of rescue personnel.

c. Emergency Rescue. The senior UXO-qualified person or the local POC, as applicable, will direct any MEC-related emergency response rescue operation. Response considerations include the following elements:

(1) Designation of an emergency response vehicle(s) to remain on-site during rescue operations.

(2) Determination of existing hazards, as well as the potential for additional hazards.

(3) Notification of local officials.

(4) Coordination with USACE in the review of the need to alert the local community and/or subsequent coordination with installation or other customer's Public Affairs Office.

(5) Assessment of the situation and condition of any victims.

(6) Determination of the resources needed for victim stabilization and transport and additional emergency support.

(7) Enforcement of the "buddy system". No one will be permitted to enter a rescue area alone.

(8) Oversight of the removal of injured personnel from the area.

(9) Consultation with on-site safety officers to establish decontamination protocols. Decontamination of injured parties will be accomplished after stabilization of their medical conditions. Decontamination need not be accomplished if the victim's condition is poor and if the decontamination process may cause an immediate threat or additional injury to the victim. If contamination is suspected, the victim will be wrapped in material that will prevent the spread of contamination during extraction and transport. Emergency medical personnel will be advised of potential injuries, as well as potential contamination, of the patient as early

as possible. The patient will not be transported to a medical facility without prior notification of, and coordination with, the receiving facility regarding potential contamination.

d. Mishap Reporting and Investigation Requirements. The following information provides guidelines to be followed for reporting explosive mishaps on MEC support projects. Site-specific reporting and investigation procedures, including identification of appropriate POCs, will be included in the APP/SSHP.

(1) Reporting Requirements. All mishaps shall be investigated by the contractor and reported to the Contracting Officer and OE Safety Specialist or to the government authority cited in the SOW. Notification and reporting of mishaps will be in accordance with USACE Supplement 1 to AR 385-40 and EM 385-1-1. Any mishap will be reported on ENG Form 3394, Accident Investigation Report.

(a) For anomaly avoidance and standby support projects on Formerly Used Defense Sites (FUDS), the senior UXO-qualified person on-site is responsible for mishap reporting. For subsurface removal projects in support of construction activities at FUDS, the contractor's UXO Safety Officer (UXOSO) is responsible for mishap reporting. For contracts under the supervision of the district, mishaps will be reported to the district safety office. An information copy of the accident report will be forwarded to the MM CX. USACE district personnel will report through command channels to the HQUSACE Safety and Occupational Health Office.

(b) On active installations, the installation safety officer is responsible for reporting any explosive mishaps.

(c) RCWM Incidents. Chemical event reports are required to be submitted in accordance with AR 50-6. Reporting requirements are identified in EP 75-1-3. A site-specific POC will be identified and documented in accordance with the reporting requirements listed above.

(2) Investigation Requirements. In the event of a mishap, the contractor shall implement emergency procedures and secure the scene to keep unauthorized persons away for their protection and to preserve the evidence for the subsequent mishap investigation. On active installations, the U.S. Army Safety Center (USASC) maintains the prerogative to investigate Class A or Class B explosive mishaps (as defined in AR 385-40). If USASC chooses to investigate, it is the lead agency. If USASC chooses not to investigate, then the district is the lead agency.

3-12. Hazardous Waste Manifest.

a A hazardous waste manifest (EPA Form 8700-22) is required when transporting MEC over pubic roads. Information guidance on the hazardous waste manifest is provided in 49 CFR 172.205 and 40 CFR 262.20.

b Government personnel who are tasked to certify MEC on hazardous waste manifests will be trained in accordance with the requirements of DOD 4500.0-R, Defense Transportation Regulation, Part II, Cargo Movement, Chapter 204, Paragraph D.1.b. or D.1.e.

c The MM CX is available to assist with the proper identification of MEC on the hazardous waste manifest. In addition to the MM CX, the following personnel, based on their knowledge and training, may assist with proper identification; any USACE OE Safety Specialist; contractor UXO Technician, or Military EOD Technician.

CHAPTER 4

Geophysical Detection Equipment

4-1. Introduction. This chapter presents an overview of available geophysical detection systems, their capabilities and limitations. There are many techniques beyond those mentioned in this chapter that have application to the detection of surface MEC and subsurface anomalies. No single detection system can effectively detect all types of military munitions at all locations and depths.

4-2. Factors to Consider.

a. When selecting a geophysical survey instrument for the detection of subsurface anomalies, it is necessary to consider the maximum possible depth of MEC. If MEC is intentionally buried, the factors affecting burial depth may include the type of soil, mechanical versus hand excavation, depth of the water table, etc. If the military munition was fired or dropped, then the depth of penetration can be estimated by considering the soil type, military munition type and weight, and impact velocity. There are many cases where UXO can penetrate deeper than geophysical instruments can currently reliably detect. On such sites, it is possible that undetected UXO remains deeper than it can be detected from the existing ground surface.

b. Geophysical detection equipment used to locate subsurface MEC for avoidance or removal is seldom 100 percent effective. In many cases, military munitions may simply be located too deep, may be too small to be detected, or may be constructed of a material difficult to detect. Since the total number of subsurface MEC at a site is almost never known, complete detection cannot be documented. In addition, most commonly used geophysical survey systems will not detect subsurface bulk explosives. These factors must be considered when designing and implementing MEC support. If subsurface bulk explosives are anticipated based on archival data, then special avoidance techniques must be developed and increased safety precautions employed. Contact the MM CX for additional information. The limitations of detection capabilities must be conveyed to all on-site personnel so that there is a common understanding of expectations.

c. Data collection capability typically depends on the complexity and type of the geophysical instrument used. For instance, most handheld magnetometers cannot record the data produced. However, more complex systems are capable of collecting the data for downloading and processing. Requiring an instrument with the capacity to collect data is activity-dependent. Anomaly avoidance procedures generally do not require data collection. However, removal operations in support of construction activities generally require the area to be mapped and, therefore, require instruments that are capable of downloading information.

4-3. Types of Instrumentation. The most successful geophysical detection systems for MEC rely on one of two technologies, magnetometry or electromagnetics. Magnetometers are limited to detecting ferrous items. Electromagnetic detectors can detect any conductive metal.

a. Magnetometry.

(1) Magnetometers were one of the first tools used for locating buried military munitions and remain one of the best. Most bombs and gun shells contain iron that causes a disturbance in the earth's geomagnetic field. A magnetic survey measures differences from the earth's normal magnetic field that can be attributed to the presence of ferrous objects. Some magnetometers, which are called gradiometers, use two magnetic sensors configured to measure the difference over a fixed distance of the magnetic field (gradient), rather than the absolute magnetic field. Magnetometers are extremely sensitive and capable of identifying small anomalies. They respond only to ferro-magnetic metals. In addition, magnetometers are sensitive to iron-bearing minerals contained in soils and rock.

(2) Magnetometry will not detect subsurface bulk explosives. If subsurface bulk explosives are anticipated based on the site's history, increased safety precautions and special techniques will be employed. Contact the MM CX for additional information.

(3) Two types of magnetometers and gradiometers are most often used to detect buried military munitions, fluxgate magnetometers and optically pumped magnetometers.

(a) Fluxgate Magnetometers. Fluxgate magnetometers measure the magnetic field component along the axis of the core of the fluxgate. They are inexpensive, reliable, rugged, and have low energy consumption. Fluxgate magnetometers have long been a standard tool of EOD teams, used for a quick, inexpensive field reconnaissance of a site containing ferrous military munitions. However, most fluxgate magnetometers provide analog rather than digital output, which makes it difficult to apply computer enhancement techniques. Fluxgate magnetometers are the instruments typically used for downhole geophysics for anomaly avoidance.

(b) Optically Pumped Magnetometers. Optically pumped magnetometers (traditionally cesium-vapor or potassium-vapor magnetometers) measure the local absolute total magnetic field. They utilize digital technology and are more expensive to purchase than fluxgate instruments. However, their high sensitivity, speed of operation, and high quality digital signal output make them a good choice for situations where data or digital post-processing is required.

b. Electromagnetic Detectors.

(1) Electromagnetic induction geophysical instruments are also extensively used to detect buried military munitions. They differ from magnetometers in that they are not limited to detecting ferrous items; they can detect any conductive metal. In addition, electromagnetic detectors are not affected by most of the iron-bearing rocks and soil that adversely affect magnetometers.

(2) There are numerous types of conductivity meters available. However, two types are most commonly used in the search for military munitions- frequency-domain electromagnetics and time-domain electromagnetic conductivity.

(a) Frequency-Domain Electromagnetics. Frequency-domain electromagnetic (FDEM) instruments can be useful to detect large buried caches of military munitions and detecting disturbed earth associated with pits and trenches. In addition, some types of FDEM instruments are the best geophysical tools available for detecting very small, very close objects such as the metal firing pins in plastic land mines buried just beneath the ground surface. However, since the resolution ability decreases dramatically with depth, frequency-domain conductivity meters are not optimum for detecting individual, deeply buried military munitions. Most commercial coin detectors are frequency-domain conductivity meters.

(b) Time-Domain Conductivity Electromagnetics. Time-domain conductivity electromagnetic (TDEM) instruments provide an excellent compromise between detection depth and resolution. These instruments provide a capability to locate all types of metallic military munitions and will see typical intact military munitions to depths of between 1 to 2 meters depending upon site-specific conditions.

4-4. <u>Geophysical Investigation Performance</u>.

a. General. The performance of military munitions detection instruments varies as a result of different site characteristics such as soil type, moisture content, depth to groundwater, vegetation, and type of military munition. Environmental and military munitions factors affecting the performance of detection instruments are so numerous that a prove-out of potential detection instruments for removal operations will be performed on the site to determine which instrument performs the best.

b. Data Quality Objectives/Performance Goals. Geophysical investigation data quality objectives and performance goals will be included in the contractor's SOW. The contractor may propose and document alternative objectives and goals for the Contracting Officer's consideration.

c. Horizontal Accuracy. Horizontally, 95 percent of all reacquired anomaly locations must lie within a 1 meter radius of their original surface location as marked on the dig sheet. Horizontally, 95 percent of all excavated items must lie within a 35-centimeter radius of their mapped surface location as marked in the field after reacquisition.

d. False Positives. If there are more than 15 percent "false positives" (anomalies reacquired by the contractor that result in no detectable metallic material recovered during excavations, calculated as a running average for the sector), a re-evaluation of the data, detection methods being utilized, and overall project QC will be performed at no cost to the government. A written response explaining the reason for the excessive false positive results and a Corrective Action Plan, if appropriate, will be submitted to the Contracting Officer within 10 days of identification of the situation.

4-5. <u>Geophysical Prove-Out (GPO)</u>. Before geophysical surveys for buried military munitions can begin on a site, the proposed survey methods and techniques must be tested and evaluated. The purpose of the GPO is to demonstrate and document the site-specific capabilities of the proposed survey platform, sensors, navigation equipment, data analysis, data management and associated equipment and personnel to operate as an integrated system capable of meeting data quality objectives necessary to achieve project performance goals. The results of the GPO will identify realistic capabilities and limitations of applying geophysics at a particular site and aid in determining proper post-processing procedures for the geophysical data. Additionally, a prove-out demonstration offers the client an opportunity to observe the contractor's methods and to evaluate the contractor's ability to meet data quality objectives and compliance with project requirements. A prove-out must be constructed so that it is representative of the project site and the specific buried military munition items known or suspected to exist. The objective of the GPO is mainly to establish and maintain high levels of QC throughout this phase of the project. EM 1110-1-4009 provides a detailed list of general objectives for a GPO. The specific project objectives will be described in the GPO Work Plan. A GPO is needed for removal actions, but is not required for anomaly avoidance. Only a daily geophysical instrument function test is required for anomaly avoidance.

4-6. Equipment Standardization and QC Tests. Geophysical instruments have a number of standardization tests that need to be performed in order to ensure that they are functioning properly. For this discussion we will focus on the EM61 and GEM-3 (trade names of specific geophysical survey instruments) to identify some specific tests to be conducted.

a. Out-of-Box Equipment Tests. Past experience has shown that, too often, non-functioning equipment arrives at the site, causing delays in surveying, producing unreliable data, and increasing false alarms or missing buried military munitions. For this reason, the following out-of-box equipment tests are mandated to ensure that all instruments are operating correctly:

(1) Inventory and inspect all components.

(2) Assemble the instrument and power up.

(3) Test the instrument's cable connectors for shorts using the cable shake test.

(4) Null instrument (Electromagnetic (EM) only). The EM instrument will be nulled prior to conducting the following tests. Standard EM61 backpacks are provided with potentiometers for the top and bottom coils, which can be adjusted to null (zero) the instrument.

(a) Static Test. Establish an area for these tests that offers convenient access, is free of metal (surface and subsurface), and is sufficiently far from roads and power lines, transmitters, etc., to avoid these sources of noise. This same point may be used throughout the duration of the project for the daily static (background) test and response tests and for nulling instruments. Collect readings for a minimum of 3 minutes after instrument warm-up. Data collected during static tests will be retained for documentation.

(b) Instrument Response Test. The Instrument Response Test quantifies the response of the instrument to a standard test item. A steel trailer ball is a preferred test item that is easily acquired and transported. Leaving the instrument in the same position as used in the Static Test, place the test item below the sensor, then collect data for a minimum 3-minute period. The test will document the amplitude of response to the test item and instrument drift. To pass the Instrument Response Test, the value of the response must vary less than 20 percent from test to test.

b. Initial Geophysical Instrument Checks. Initial geophysical instrument checks will be performed on the first day of the survey. These tests include the following:

EP 385-1-95a
29 June 2001

US Army Corps
of Engineers®

SAFETY

BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR ORDNANCE AND EXPLOSIVES OPERATIONS

ENGINEER PAMPHLET

"Approved for public release; distribution is unlimited."

AVAILABILITY

Electronic copies of this and other U.S. Army Corps of Engineers publications are available on the Internet at http://www.usace.army.mil/inet/usace-docs/. This site is the only repository for all official USACE engineer regulations, circulars, manuals, and other documents originating from HQUSACE. Publications are provided in portable document format (PDF).

CESO

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

EP 385-1-95a

Pamphlet
No. 385-1-95a

29 June 2001

Safety
BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR ORDNANCE AND EXPLOSIVES OPERATIONS

1. Purpose. This pamphlet establishes U.S. Army Corps of Engineers (USACE) operating procedures for dealing with ordnance and explosives (OE) items at Formerly Used Defense Sites (FUDS), Base Realignment and Closure, and Installation Restoration projects. There are no absolutely safe procedures for dealing with OE items, merely procedures considered to be least dangerous; therefore, it is essential that a planned and systematic approach to dealing with such items be established.

2. Applicability. This pamphlet applies to all Headquarters, U.S. Army Corps of Engineers elements and all USACE Commands having responsibility for performing OE response activities.

3. Distribution Statement. Approved for public release; distribution is unlimited.

4. References.

a. 27 CFR 55, Commerce in Explosives.

b. 29 CFR 1926, Subpart P, Excavations.

c. DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards.

d. AR 385-64, U.S. Army Explosives Safety Program.

e. DA Pam 385-64, Ammunition and Explosives Safety Standards.

f. TM 60A-1-1-31, Explosive Ordnance Disposal Procedures: General Information on EOD Disposal Procedures.

g. TB 700-2, Department of Defense Ammunition and Explosives Hazard Classification Procedures.

h. ER 5-1-11, Program and Project Management.

i. ER 1110-1-12, Quality Management.

j. EP 1110-1-17, Establishing a Temporary Open Burn and Open Detonation Site for Conventional Ordnance and Explosives Projects.

k. EP 1110-1-18, Ordnance and Explosives Response.

l. EM 385-1-1, Safety and Health Requirements Manual.

m. HNC-ED-CS-S-98-1, Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives, January 1998. This document is available on the Internet at http://www.hnd.usace.army.mil/.

n. HNC-ED-CS-S-98-2, Method for Calculating Ranges to No More Than One Hazardous Fragment per 600 Square Feet, January 1998. This document is available on the Internet at http://www.hnd.usace.army.mil/.

o. Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, U.S. Army Engineering and Support Center, Huntsville, August 1998. This document is available on the Internet at http://www.hnd.usace.army.mil/.

p. AFM 91-201, Explosives Safety Standards.

q. NAVSEA OP5, Ammunition and Explosives Ashore Safety Regulations for Handling, Storing, Production, Renovation, and Shipping.

r. NFPA 780, Standard for the Installation of Lightning Protection Systems.

5. Explanation of Abbreviations and Terms. Abbreviations/acronyms and special terms used in this document are explained in the glossary.

6. Policy. The policy of USACE is to produce products and services that fully meet customers' expectations of quality, timeliness, and cost effectiveness, within the bounds of legal responsibility. An acceptable level of quality does not imply perfection; however, there should be no compromise of functional, health, or safety requirements. Adherence to the principles outlined in ER 5-1-11 and ER 1110-1-12 will contribute to achieving this goal. OE response procedures must be formulated to ensure harmony with the USACE Strategic Vision and should be executed in concert with activities presented in other USACE guidance.

7. Responsibilities. USACE and contractor personnel involved with OE response projects are responsible for safely executing response actions in accordance with (IAW) the approved Site Safety and Health Plan, approved Work Plan, and all applicable laws, regulations, and policies.

8. General Safety Concerns and Procedures.

a. As a general rule, all fuzed unexploded ordnance (UXO) will be detonated in the original position found. This is the safest method to effect final disposition of munitions.

b. OE operations will not be conducted until all applicable plans for the site in question are prepared and approved. These plans will be based upon the concept of limiting exposure to the minimum number of personnel, for the minimum amount of time, to the minimum amount of OE consistent with safe and efficient operations.

c. Only UXO-qualified personnel will perform OE procedures. As an exception, a UXO Technician I may assist in the performance of OE procedures when under the supervision of a UXO Technician III or a UXO-qualified individual of higher rank than UXO Technician III. Non-UXO-qualified personnel who have been determined to be essential for the operations being performed may be utilized to perform OE-related procedures when supervised by a UXO Technician III or a UXO-qualified individual of higher rank than UXO Technician III. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III or a UXO-qualified individual of higher rank than UXO Technician III.

d. Personnel who will be handling OE items will not wear outer or inner garments having static-electricity-generating characteristics. Materials made of 100-percent polyester, nylon, silk, and wool are highly static producing. Refer to DA Pam 385-64 for more information regarding nonstatic-producing clothing.

e. Prior to any action being performed on an ordnance item, all fuzing will be definitively identified. This identification will consist of fuze type by function and condition (armed or unarmed) and the physical state/condition of the fuze, i.e., burned, broken, parts exposed/ sheared, etc.

f. OE operations will be conducted only during daylight hours.

9. OE Safety Precautions.

a. Every effort will be made to identify a suspect OE item. Under no circumstances will any fuzed UXO be moved in an attempt to make a definitive identification. The OE item will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown OE item is encountered, the onsite USACE representative will be notified immediately. If there is no onsite USACE representative, the USACE district or the U.S. Army Engineering and Support Center, Huntsville (USAESCH) OE Safety Group will be notified as soon as possible. If research of documentation is required, it will be initiated by USAESCH. Following is additional guidance for the safe handling of OE items:

(1) Projectiles containing base-detonating fuzes are to be considered armed if the round is fired.

(2) Arming wires and popout pins on unarmed fuzes should be secured prior to moving OE items.

(3) Do not depress plungers, turn vanes, or rotate spindles, levers, setting rings, or other external fittings on OE items. Such actions may arm or activate the items.

(4) Do not attempt to remove any fuze(s) from OE items. Do not dismantle or strip components from any OE items.

(5) UXO personnel are not authorized to render inert any OE items found onsite.

(6) OE items will not be taken from the site as souvenirs/training aids.

(7) Civil War ordnance will be treated in the same manner as any other OE items.

b. Prior to entering areas/ranges contaminated with Improved Conventional Munitions (ICMs) or submunitions, a Department of the Army (DA) waiver must be obtained by the affected installation or for FUDS properties, the executing Corps district. If an ICM or submunition is found at a site not previously known to contain ICMs or submunitions, work will cease. The discovered item will be identified, then properly disposed of (including guarding the item if disposition is to be delayed). Work will resume only when an ICM waiver has been obtained. For guidance on the preparation of waiver requests, contact the OE Mandatory Center of Expertise.

c. Any time suspect chemical warfare materiel is encountered during conventional OE site activities, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area.

(1) On FUDS properties, the UXO team will notify the local point of contact (POC) designated in the Work Plan. The local POC will facilitate explosive ordnance disposal (EOD) response, and two personnel will secure the site until the EOD unit's arrival. If the local POC

designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery if necessary. The EOD unit will notify the Technical Escort Unit (TEU) and secure the area until TEU's arrival. After notifying the local law enforcement agency (when necessary), the local POC will notify the USAESCH OE Safety Group of the actions taken.

(2) On active installations, the UXO team will normally notify the Range Control Officer, the Facility Engineer, post headquarters, or the POC designated in the Work Plan.

d. Avoid inhalation of and skin contact with smoke, fumes, and vapors of explosives and related hazardous materials.

e. Consider OE items which may have been exposed to fire and detonation as extremely hazardous. Chemical and physical changes may have occurred to an item's contents, which may have rendered the item more sensitive than in its original state.

f. Do not rely on the color coding of OE items for definitive identification. Munitions having incomplete or improper color codes have been encountered.

g. Avoid approaching the forward area of an OE item until it can be determined whether or not the item contains a shaped charge. The explosive jet, which is formed during detonation, can be lethal at great distances. Assume that all shaped-charge munitions contain a piezoelectric (PZ) fuzing system until investigation proves otherwise. PZ fuzing is extremely sensitive. It can function at the slightest physical change and can remain hazardous for an indefinite period of time.

h. Approach an unfired rocket motor from the rear at a 45-degree angle. Accidental ignition can cause a missile hazard and hot exhaust.

i. Do not expose unfired rocket motors to any electromagnetic radiation (EMR) sources. See DA Pam 385-64 for safe separation distances from various sources of EMR.

j. Consider an emplaced landmine to be armed until proven otherwise. It may be intentionally boobytrapped to deceive.

(1) Many training mines contain spotting charges capable of inflicting serious injury.

(2) Exercise extreme care with wooden mines that have been buried for long periods of time. Certain soil conditions can cause the wood to deteriorate, and any inadvertent movement or pressure can initiate the fuze.

k. Assume that a practice OE item contains a live charge until investigation proves otherwise. Expended pyrotechnic and practice devices can contain red or white phosphorus (WP) residue. Due to incomplete combustion, this residue may re-ignite spontaneously if the crust is broken and exposed to air.

l. Do not approach a smoking WP munition. Burning WP may detonate the explosive burster charge at any time.

m. Foreign ordnance was shipped to the United States for exploitation and subsequent disposal. Every effort will be made to research all applicable documentation prior to commencement of a project involving foreign ordnance.

10. OE Storage. During OE projects, explosives storage falls into two categories, on Department of Defense (DOD) installations and off DOD installations.

a. On DOD installations, DOD 6055.9-STD and Service requirements (Army – AR 385-64; Navy – NAVSEA OP5; Air Force – AFM 91-201) will be met. For the remainder of this pamphlet, reference to DOD standards (i.e., DOD 6055.9-STD) also implies that Service explosives safety publications will be adhered to. Generally, the installation will have an existing explosives storage facility that meets DOD standards. If not, the contractor will establish a temporary storage facility. The compatibility of explosives defined in chapter 3, DOD 6055.9-STD, will be followed. Recovered OE items awaiting final disposition will not be stored with serviceable explosives. Commercial explosives will be assigned a DOD hazard classification (i.e., 1.1, 1.2, etc.) and storage compatibility grouping by the U.S. Army Technical Center for Explosives Safety prior to being stored on a military installation.

b. Off DOD installations, the contractor will be responsible for establishing a temporary explosives storage facility. This temporary storage facility will meet local, state, 27 CFR 55, AR 385-64, and DOD 6055.9-STD requirements to the greatest extent practicable.

(1) In cases where the facility cannot meet the intermagazine, inhabited building, and public traffic route quantity-distance requirements specified in DA Pam 385-64 and DOD 6055.9-STD, a barricading plan or other engineering controls to protect the public from accidental detonation must be submitted to and approved by the USAESCH Directorate of Engineering.

(2) Magazines must meet the requirements of 27 CFR 55, and each magazine must have a Net Explosive Weight and hazard classification established for the explosives to be stored.

(3) Each magazine must be provided lightning protection IAW DA Pam 385-64. The provisions of NFPA 780, which are consistent with Army guidance, may be used to supplement Army guidance where necessary.

(4) A physical security survey will be conducted to determine if fencing or guards are required. This survey will be coordinated through local law enforcement agencies. Generally, a fence around the magazine is not needed, IAW 27 CFR 55. However, the contractor is responsible for providing the degree of protection needed to prevent the theft of OE items.

c. A fire plan for either an on- or off-installation explosives storage facility will be prepared and coordinated with the local fire department. Placarding of magazines will be IAW local rules and regulations.

11. <u>OE Transportation, Offsite.</u> In the event that OE items must be transported offsite, the provisions of chapter 15, EP 1110-1-18, will be followed. In addition, USACE contractors are prohibited from transporting UXO offsite for destruction until the provisions of paragraph 1-9, TB 700-2, have been met.

12. <u>OE Transportation, Onsite.</u> The following safety procedures will be followed for the transportation of OE items onsite:

a. Do not transport WP munitions unless they are immersed in water, mud, or wet sand.

b. If loose pyrotechnic, tracer, flare, or similar mixtures are to be transported, they will be placed in No. 10 mineral oil or equivalent to minimize the fire and explosion hazards.

c. Incendiary-loaded munitions should be placed on a bed of sand and covered with sand to help control the burn if a fire should start.

d. If an unfired rocket motor must be transported, it will be positioned in the vehicle parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.

e. If a base-ejection projectile must be transported to a disposal facility, the base will be oriented in the vehicle such that it is parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.

f. OE items with exposed hazardous fillers, such as High Explosive, will be placed in appropriate containers with packing material to prevent migration of the hazardous fillers. Padding should be added to protect the exposed filler from heat, shock, and friction.

13. <u>Exclusion Zone Operations.</u> On OE project sites, it is the responsibility of the contractor's Unexploded Ordnance Safety Officer (UXOSO) to establish the exclusion zone for each UXO work area.

a. The purpose of the exclusion zone is to protect nonessential personnel from blast overpressure and fragmentation hazards. Calculating exclusion zones with respect to intentional and unintentional detonations is discussed below.

(1) Intentional Detonations. The minimum separation distances specified in DOD 6055.9-STD, chapter 5, paragraph C5.5.4, will be used unless lesser distances have been calculated using HNC-ED-CS-S-98-1.

(2) Unintentional Detonations. If the identity of OE items on a site is unknown, the minimum separation distance specified in DOD 6055.9-STD, chapter 5, paragraph C5.5.4, will be used to establish the exclusion zones. When the identity of OE items is known, the USAESCH Directorate of Engineering will use HNC-ED-CS-S-98-1 and HNC-ED-CS-S-98-2 to determine the criteria for establishing the exclusion zones.

b. When multiple teams are working onsite, a team separation distance (TSD) will be established. The minimum TSD will be the greater of 200 feet or the K50 (0.9 pounds per square inch) overpressure distance.

c. While OE procedures are being conducted, only personnel essential for the operation will be allowed in the exclusion zone. When nonessential personnel enter the exclusion zone, all OE operations will cease. In addition to this work stoppage, the following actions will be taken:

(1) The individual(s) must receive a safety briefing and sign the visitors log prior to entering the zone.

(2) The individual(s) will be escorted by a UXO-qualified individual.

d. All personnel working within the exclusion zone will comply with the following:

(1) There will be no smoking within the exclusion zone, except in areas designated by the UXOSO.

(2) There will be no open fires for heating or cooking (gas stoves, grills, etc.) within the exclusion zone, except where authorized by the UXOSO.

(3) During geophysical detection operations, personnel will not wear any metal that would interfere with instrument operations.

14. OE Excavation Operations.

a. Hand excavation is the most reliable method for uncovering an OE item. However, hand excavation exposes personnel to the hazard of detonation . Therefore, only UXO-qualified personnel will be used to perform this task.

b. Earth-moving machinery (EMM) may be used to excavate overburden from suspected OE items. EMM will not be used to excavate within 12 inches of a suspected OE item. Once the EMM is within 12 inches of the suspected OE item, the excavation will be completed by hand excavation methods. Personnel who are not UXO qualified may operate EMM only when supervised by a UXO Technician III or a UXO-qualified individual of higher rank than UXO Technician III.

(1) If more than one earth-moving machine is to be used onsite, the same minimum separation distances required for multiple work teams apply.

(2) EMM operations will be conducted within the guidelines of EM 385-1-1 and 29 CFR 1926, subpart P.

c. Excavation operations, whether by hand or EMM, will employ a stepdown or offset access method. Under no circumstances will any excavation be made directly over suspected OE items.

15. OE Disposal Operations. All disposal operations will be conducted IAW TM 60A-1-1-31, EP 1110-1-17, and the unnumbered USAESCH publication entitled Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites.

a. As a general rule, all disposal operations will be accomplished by electrical means to ensure maximum safety. There are exceptions to this requirement in situations where static electricity or EMR hazards are present. Unintentional detonations can occur because of these induced currents (or lightning). The following precautions from DA Pam 385-64 are to be followed:

(1) Premature detonation of electric blasting caps by induced current from radio frequency signals is possible. Refer to DA Pam 385-64 for minimum safe distance with respect to transmitter power and indication of distance beyond which it is safe to conduct electric blasting even under the most adverse conditions.

(2) Lightning is a hazard with respect to both electric and nonelectric blasting caps. A direct hit or a nearby miss is almost certain to initiate either type of cap or other sensitive explosive elements such as caps in delay detonators. Lightning strikes, even at distant locations, may cause extremely high local earth currents that may initiate electrical firing circuits. Effects

of remote lightning strikes are multiplied by their proximity to conducting elements such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduits. The only safe procedure is to suspend all blasting activities when an electrical storm approaches to within 10 miles of the site.

(3) Electric power lines also pose a hazard with respect to electric initiating systems. It is recommended that any disposal operation closer than 155 meters to electric power lines be done with a nonelectric system.

b. The only acceptable disposal method is the one stated in the appropriate TM 60 Series manual for specific ordnance types. Any commercial explosives being used will be equivalent to the military explosive required for the disposal operation.

c. If justified by the situation, protective measures to reduce shock, blast over-pressure, and fragmentation will be taken. The USAESCH Directorate of Engineering will assist in any design work and will review for approval all proposed protective measures.

d. Minimum separations distances for personnel during OE disposal will be IAW DOD 6055.9-STD, chapter 5.

e. During open detonation operations, lifting lugs, strong backs, base plates, etc., will be oriented away from personnel locations.

f. Once disposal operations are completed, a thorough search of the immediate area will be conducted with a magnetometer to ensure that a complete disposal was accomplished.

g. Inert ordnance will not be disposed of as scrap until the internal tillers/voids have been exposed and unconfined.

FOR THE COMMANDER:

ROBERT L. DAVIS
Colonel, Corps of Engineers
Chief of Staff

GLOSSARY

Section I
Abbreviations

AFM .... Air Force Manual

AR .... Army Regulation

CFR .... Code of Federal Regulations

DA .... Department of the Army

DA Pam .... Department of the Army Pamphlet

DOD .... Department of Defense

EMM .... Earth-Moving Machinery

EMR .... Electromagnetic Radiation

EOD .... Explosive Ordnance Disposal

FUDS .... Formerly Used Defense Sites

IAW .... In Accordance With

ICM .... Improved Conventional Munition

NAVSEA OP .... Naval Sea Systems Command Ordnance Pamphlet

NFPA .... National Fire Protection Association

OE .... Ordnance and Explosives

POC .... Point of Contact

PZ .... Piezoelectric

STD .... Standard

TB .... Technical Bulletin

TEU .... Technical Escort Unit

TSD .... Team Separation Distance

USACE .... U.S. Army Corps of Engineers

USAESCH .... U.S. Army Engineering and Support Center, Huntsville

UXO .... Unexploded Ordnance

UXOSO .... Unexploded Ordnance Safety Officer

WP .... White Phosphorus

Section II
Terms

OE Procedures
Procedures which include, but are not limited to, the following actions performed by a UXO-qualified individual:

a. Gaining access to (manual excavation) and identifying subsurface anomalies and assessing the condition of buried OE.

b. Identifying and assessing the condition of surface OE.

c. Recovering and making final disposal of all OE.

OE-Related Procedures
Procedures which include, but are not limited to, the following actions which may be performed by a non-UXO-qualified individual:

a. Locating and marking subsurface anomalies.

b. Locating and marking suspected surface OE.

c. Transporting and storing recovered OE.

d. Utilizing EMM to excavate overburden from suspected OE.

Ordnance and Explosives (OE)
Consists of (1) military munitions that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, or buried, (2) UXO, (3) soil presenting explosion hazards, and (4) buildings with explosives residues that present explosion hazards.

Unexploded Ordnance (UXO)
Military munitions that have been primed, fuzed, armed, or otherwise prepared for action and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material and remain unexploded either by malfunction, design, or any other cause.

UXO-Qualified Personnel
Personnel meeting the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and Senior UXO Supervisor. For qualification requirements, refer to EP 1110-1-18.

APPENDIX B QUALIFICATIONS

EDWARD C. BISHOP, Ph.D., P.E., CIH
Vice President
Manager, Safety, Health, Quality and Risk

Experience Summary

Thirty-two years of experience as an industrial hygienist and environmental engineer. Experience includes program development, program management, technical consulting, and policy development in the areas of chemical warfare material, ordnance and explosives, environmental compliance, remedial investigations, hazardous waste minimization, wastewater treatment, industrial process evaluation, pollution prevention, industrial hygiene, risk assessment, and radiation protection. Broad education and experience provide basis to evaluate impact of actions on workers, community, and the environment and recommend cost effective mitigations.

Years of Experience:

32

Years with Parsons:

12

Education

B.S., Chemistry, June 1972, United States Air Force Academy, Colorado Springs, Colorado

M.S., Engineering, June 1974, University of California, Los Angeles, California

Ph.D., Environmental Health Sciences, December 1980, University of California, Berkeley, California

Primary Experience

August 1992 – Date. Parsons Corporation.

- Manager, Safety, Health, Quality, and Risk, Parsons Infrastructure and Technology Group. . Responsible for implementing and monitoring health and safety policies and programs, including activity hazard assessments for 4,000 employees. Responsible for implementing Client Survey and monitoring results. Reviews all internal and external audit reports. Responsible for reviewing all projects for safety, health, quality, and risk issues and ensuring corrective actions are implemented.
- Manager, Project Controls, Parsons Infrastructure and Technology Group. Responsible for policy and staffing of estimating, scheduling, and cost engineering for over 800 projects. Currently developing and implementing an enterprise-wide project controls system integrating project management with business management. Developed and implemented Company-wide reporting system that generates business data from day-to-day project management activities.
- Manager, Fairfax Regional Office. Leads all aspects of this 130 person office to include personnel management, profit and loss, and business development in all business sectors and market areas.
- Senior Project Manager. Provides direction and management of major programs. Assembles project teams to provide expertise to meet client's needs. Ensures technical excellence in all products using all available tools, including total quality management. Specific accomplishments include:
- Program Manager, $100M, 5 year, HQ Air Combat Command Environmental Compliance and Analysis Services, contract. Consistently receives 4.5/5.0 client evaluations.
- Manager, Environmental Health and Information Systems Department. This department focuses on relational data base management systems development and maintenance, geographic information systems, data validation, ergonomics, and

other industrial hygiene services for internal and external clients.

- Project Manager for US Army Corps of Engineers Spring Valley Project, Washington, DC. This $8.5M remedial investigation of unexploded ordnance (UXO) and potentially chemical warfare material contaminated soil also included an engineering evaluation/cost analysis (EE/CA) to remove potential UXO and contaminated soil from World War I bunkers.
- Project Manager for ergonomics survey at 21 Air Combat command installations world-wide. Developed risk screening methodology to focus resources on those workplaces with the greatest ergonomic hazards.
- Project Manager for respiratory protection program evaluation for the US Air Force. Includes developing criteria for including personnel on the respiratory protection program and preparing a return on investment for the evaluation.
- Project Manager for water system Safe Drinking Water Act compliance analysis and requirements evaluation. Included preparation of DD Form 1391s.
- Project Manager for development and fielding of an automated system to define environmental compliance sampling requirements, budget estimating, sample scheduling, and analysis results tracking and trend analysis. Also includes a geographic information system interface.
- Technical Director for industrial wastewater pretreatment evaluation at seven locations. Included sampling and evaluation of existing pretreatment devices and recommendations for pollution prevention and operational changes to minimize industrial discharges.
- Project Manager/technical director for development and implementation of the Department of Defense Relative Risk Site Evaluation Program for all active US Air Force Installations, Air Force Base Realignment and Closure (BRAC) installations, and US Army Corps of Engineers Formerly Used Defense Sites (FUDS)
- Technical Director, Technical Information System (TIS) and Risk Assessment Interface for the US Air Force Aeronautical Systems Center (ASC). The TIS is the integration of all applicable data bases for the installation restoration program and development of graphical user interfaces to ease data retrieval tasks for users.
- Technical Director for pollution prevention process evaluations, process ranking, and economic analyses for Hill Air Force Base, UT.
- Technical Director for manufacturing and maintenance process module (M2PM) life cycle cost analysis model for the US Air Force Human Systems Center. M2PM will evaluate all costs associated with manufacturing and maintenance (e.g., training, procurement, operational, maintenance, environmental, health, safety, etc.)
- Author or approval authority for site health and safety plans for hazardous waste investigations and remediations.
- Contributing author to *Protecting Personnel at Hazardous* Waste *Sites,* 2 Ed, 1994.

Other Experience

Jan. 1991 - June1992 Greenhorne & O'Mara, Greenbelt, Maryland. **Part Time Employee**, **Corporate Health and Safety Officer/Consultant.** Developed comprehensive corporate health and safety plan. Evaluated and recommended occupational medicine services for employees. Reviewed toxicological data for materials at hazardous waste sites.

Sept. 1986 - July 1992 Office of the Air Force Surgeon General, Bolling AFB, Washington, D.C. **Senior Bioenvironmental Engineering Program Manager.** Developed and managed occupational health, industrial hygiene, and environmental protection programs worldwide. Negotiated Air Force policies with the DoD, Congress, the National Academy of Sciences, and federal agencies, including EPA and OSHA. Developed and advocated large multi-disciplinary programs and policies including an $80M budget to ensure Air Force compliance with EPA monitoring requirements for RCRA, Clean Air, Water, and Safe Drinking Water Acts, storm water runoff, and NPDES permits. Senior program manager for: $2.5M, 135 installation, radon assessment and mitigation program; hazardous material identification and tracking aspects of the Air Force pollution prevention program; hazardous materials transportation risk assessments; hazard communication program for 350,000 employees; OSHA chemical laboratory safety implementation; hazardous waste operation implementation and energy response trading, 29CFR1910.120; and computerization of occupational health functions Air Force-wide. Performed Indoor Air Quality Survey of U.S. Air Force Services Executive Offices in the Pentagon. Organized and co-chaired two national conferences on the environmental and occupational health concerns of advanced composite materials.

August 1983 August 1986 Environmental Health Laboratory, US Air Force, Europe. **Chief, Industrial Hygiene Engineering**. Managed staff of Air Force officers, civilians, and technicians responsible for providing industrial hygiene and environmental protection consultation to Air Force installations in Europe. Consultations encompassed evaluating potentially contaminated water supplies and recommending protective measures, including an incidence of potential hydrazine contamination of a German domestic water supply; developing the protocol for evaluating diesel and jet engine exhaust contaminants during aircraft maintenance operations in aircraft shelters; air monitoring for fallout from the Chernobyl nuclear accident; and evaluating waste anesthetic gases during surgical procedures and ethylene oxide from gas sterilizers. Interfaced with European corporations, governments, professionals, and standard setting organizations.

Sept. 1980 - July 1983 Air Force Occupational and Environmental Health Laboratory, Brooks AFB, Texas. **Bioenvironmental Engineering Consultant**. Oversight of engineers and technicians responsible for bioenvironmental engineering consultative support to Air Force bases world-wide. Primary emphasis on risk and exposure assessments for organic compounds. Recognized Air Force expert on health effects, sampling, and analysis of distillate hydrocarbon fuels. Developed the risk assessment for exposure to jet fuel vapor. Special expertise in direct reading instruments for hazardous waste site operations and general workplace monitoring. Developed the sampling protocol and performed initial surveys for fuel and oxidizer propellants during Titan II missile deactivation and hydrogen chloride aerosol and vapor during space shuttle launches.

Dec. 1975 - August 1976 USAF Hospital, Robins AFB, Georgia. **Chief, Bioenvironmental Engineering Services**. Directed a staff of technicians responsible for programs in environmental pollution monitoring, industrial hygiene, radiation protection (ionizing and non-ionizing), and drinking water surveillance. The installation contained over 300 industrial work areas and approximately 17,000 workers involved with aircraft reconditioning and maintenance. Activities included: polychlorinated biphenyl transformer spill cleanup and disposal; redesign of industrial waste treatment plant from contractor proposed ozonation to activated carbon treatment to treat phenolic wastes; evaluation of process wastestreams; and base radiation protection.

July 1974 - May 1975 Air Force Rocket Propulsion Laboratory, Edwards AFB, California. **Project Officer**. Technical and fiscal responsibility for $100K in contracts involving basic research in liquid rocket propellant technology. Research contracts included long-term storability corrosion tests of nitrogen tetroxide oxidizer and material compatibility of hydrazine fuels produced from different chemical processes. Interfaced with EPA on the disposal of waste stream associated with the manufacture of unsymmetrical dimethyl hydrazine (UDMH) rocket propellant.

Professional Affiliations

American Board of Industrial Hygiene, Certified in Comprehensive Practice, No. 1648, 1979

American Academy of Industrial Hygiene

American Conference of Governmental Industrial Hygienists

American Industrial Hygiene Association

Adjunct Assistant Professor of Preventive Medicine/Biometrics, Uniformed Services University of the Health Sciences, 1987-1991

Honorary Affiliations

Bernard S. Tebbens Award for Outstanding Student at UC Berkeley School of Public Health, 1980

Air Force Meritorious Service Award, 1983, 1986, 1992

Air Force Commendation Medal, 1976

Air Force Achievement Medal, 1984

Papers and Publications

"Air Monitoring At Hazardous Waste Sites," *Protecting Personnel at Hazardous Waste Sites*, Butterworth-Heinemann Boston, 1994 (coauthor W.F. Martin and S.P. Levine).

"Occupational and Environmental Air Monitoring at Hazardous Waste Sites," Professional Development Course Instructor, American Industrial Hygiene Conference and Exposition, 1992.

"Operation and Selection of Portable Combustible and Organic Vapor Instruments and Fixed Continuous-Monitoring Systems," Professional Development Course Instructor, American Industrial Hygiene Conference and Exposition, 1982 - present.

"Industrial Hygiene Laboratory: Measurement Techniques for Air Quality and Ventilation," Harvard School of Public Health, 1990 - 1991.

"Conference on Advanced Composites," Co-Chair, American Conference of Governmental Industrial Hygienists, San Diego, California, 1991.

"The Air Force Approach - Emergency Response," presented at the Chemical Risk Assessment in the DoD: Science, Policy, and Practice Symposium, Dayton, Ohio, 1991.

"Conference on the Occupational Health Aspects of Advanced Composite Technology in the Aerospace Industry," Co-organizer, Department of the Air Force, Dayton, Ohio, 1989.

"Implementation of the OSHA Laboratory Standard," presented at the R&D Laboratory Safety Symposium, USAF Academy, Colorado, 1988.

"Army Expert Field Medical Badge (EFMB) Enhances Air Force Medical Readiness," Military Medicine, 1987 (coauthor E. L. Fieg, et al).

"Waste Anesthetic Gas Survey," USAF Europe Environmental Health Laboratory Technical Report 85-22, 1985.

"Field Comparison Between Two Nitrous Oxide (N2O) Passive Monitors and Conventional Sampling Methods," American Industrial Hygiene Journal, 1984 (coauthor M. Hossain).

"International Symposium on Health and Safety Issues Associated With the Operational Use of

Hardened Aircraft Shelters," Symposium Chairman, Wiesbaden, Germany, 1984.

"Quality Control Requirements for Gaseous and Liquid Breathing Air and Oxygen," USAF Europe Environmental Health Laboratory Technical Report 84-13, 1984.

"Industrial Hygiene Survey of F-111 Integrated Combat Turns," USAF Europe Environmental Health Laboratory Technical Report 84-07, 1984.

"Protocol for Industrial Hygiene Surveys in Hardened Aircraft Shelters," USAF Europe Environmental Health Laboratory Technical Report 84-27, 1984.

"Recommendations for Monitoring Waste Anesthetic Gases," USAF Europe Environmental Health Laboratory Technical Report 84-28, 1984.

Industrial Hygiene Survey of Ethylene Oxide Sterilizer Central Supply," USAF Europe Environmental Health Laboratory Technical Report 84-49, 1984.

"Industrial Hygiene Survey of RF-4C Operations in TAB-VEE Shelters," USAF Europe Environmental Health Laboratory Technical Report 84-46, 1984.

"Industrial Hygiene Survey of F-111 Hardened Aircraft Shelter Operations During Exercise Conditions," USAF Europe Environmental Health Laboratory Technical Report 84-36, 1984.

"Combustible Gas Meters for Use in Atmospheres Above the Upper Explosive Limit," USAF Occupational and Environmental Health Laboratory Report, 83-063EH118MFB, 1983.

"Industrial Hygiene Survey of Titan II Deactivation Fuel Propellant Operations, Site 571-6," USAF Occupational and Environmental Health Laboratory Report 83-113EA047BFB, 1983.

"Rationale for a threshold Limit Value (TLV)\ for JP-4/Jet B Wide Cut Aviation Turbine Fuel," USAF Occupational and Environmental Health Laboratory Report 83-128EH111DGA, 1983.

"Fuel Propellants and NDMA Survey of Deactivated Titan II Sites," USAF Occupational and Environmental Health Laboratory Report 83-184EH047EFB, 1983.

Background Levels of Hydrazine, UDMH, and NDMA at Titan II Complexes," USAF Occupational and Environmental Health Laboratory Report 83-213EH047GFB, 1983.

"Industrial Hygiene Survey of Fuel Propellants and NDMA During Titan III, Agena, and Associated Operations," USAF Occupational and Environmental Health Laboratory Report 83-232EH195JGA, 1983.

"Industrial Hygiene Survey of F-16 Integrated Combat Turns," USAF Europe Environmental Health Laboratory Technical Report 83-31-W, 1983.

"Predicting Relative Vapor Ratios for Organic Solvent Mixtures," *American Industrial Hygiene Journal*, 1982 (coauthor W. Popendorf, et al).

"Field Evaluation of Passive Monitors for Waste Anesthetic Gases," USAF Occupational and Environmental Health Laboratory TR 82-4, 1982.

"Evaluation of Portable Instruments for JP-9 and JP-10 Detection," USAF Occupational and Environmental Health Laboratory Report 82-013EH111GSA, 1982.

"Evaluating Health Hazards Associated with Aircraft Fuel Cell Maintenance," presented at the Environmental Toxicology Conference, Dayton, Ohio, 1981.

"Evaluation of Aircraft Touch-up Painting," USAF Occupational and Environmental Health Laboratory TR 81-41, 1981.

"Review of Respiratory Protection Requirements During Aircraft Fuel Cell Maintenance," USAF Occupational and Environmental Health Laboratory TR 81-35, 1981.

"The Statistics of Sampling," presented at the Bioenvironmental Engineering Symposium, Brooks AFB, Texas, 1978.

"Paint Stripping Wastewater Characteristics, Robins AFB, Georgia," USAF Occupational and Environmental Health Laboratory, 1978.

"Industrial Hygiene Review of the Preparation and Coating of Concrete Flooring with Chemical Resistant Urethane Coating," USAF Hospital Robins, 1976.

WILLIAM L. BRADFORD
Supervising Toxicologist

Experience Summary

Mr. Bradford is the Health and Safety (H&S) Manager for 75 workers in the Syracuse Parsons office, and is the H&S Coordinator for the nationwide Parsons BP Program. He is a supervising toxicologist on major projects for industrial and governmental clients. He has served as the lead human health risk assessor on numerous hazardous waste site projects. He has extensive experience working for and negotiating with regulatory agencies. He was the lead toxicologist for the risk assessment of pesticides used in the Gulf War for the DoD Deployment Health Support Directorate (DHSD).

Experience:

General experience: 28 years

Specific experience: 22 years in the areas of health & safety, toxicology, and risk assessment.

Years with Parsons:

17

Education

M.S. in Biology (Insecticide Toxicology), 1981, State University of New York College of Environmental Science and Forestry (SUNY ESF) and Syracuse University, Syracuse, New York.

B.S. in Biology (Zoology), 1978, SUNY ESF and Syracuse University, Syracuse, New York.

Primary Experience

January 1988-Date: Parsons, **Supervising Toxicologist** on major projects for industrial and governmental clients. Mr. Bradford is the H&S Manager responsible for 75 employees in the Syracuse Parsons office, and is the H&S Coordinator for the nationwide Parsons BP Program. Project H&S Officer for Honeywell, Wyeth, DoD, and other investigation and remedial construction projects.

Since May 1997, Mr. Bradford has been contracted to Northrop Grumman Mission Systems and assigned to DoD DHSD as part of a team based in Falls Church, VA, originally investigating the potential causes of Persian Gulf War Illnesses, and now monitoring health issues for many past and present deployments. He held the lead role in conducting a comprehensive risk assessment of pesticide exposures to US forces during the 1990-1991 Operations Desert Shield and Desert Storm. The risk assessment was retrospective, incorporating thousands of veteran interviews, military records, toxicological data, and epidemiological data. The risk assessment comprised a major portion of the Pesticides Environmental Exposure Report published on www.GulfLINK.osd.mil in April 2003. This high-profile and sensitive project necessitated close cooperation with or review by physicians and scientists from many agencies, including USEPA Office of Pesticide Programs. Mr. Bradford is also assisting the Boston Environmental Hazards Center with an epidemiologic study of veterans exposed to neurotoxicants.

He previously served as the lead risk assessor for site-specific projects across the US. These were mainly CERCLA-type RI/FS projects, and typically included the quantification of baseline risks, determination of cleanup levels, and the quantification of the risks associated with each of the remedial alternatives. Examples of human health evaluations include manufactured gas plant (MGP) sites for National Fuel Gas, Niagara Mohawk Power Corporation, Philadelphia Electric Company, Public Service of New Hampshire, and EnergyNorth; cement kiln dust landfill for Southdown Inc.; numerous DoD/DoE sites including Griffiss AFB; Savannah River; Charleston AFB; Fort Leonard Wood; Fort Irwin; Eglin AFB; Eielson AFB; Wright-Patterson AFB; Volk Field ANGB; Escanaba Defense Fuel Supply Point; sites throughout New York for NYS Dept of Environmental Conservation (NYSDEC), including Napanoch Paper Mill, Schatz Plant Site, and Lehigh; and an aircraft products manufacturing site in Ohio for TRW.

Mr. Bradford also conducted numerous small risk assessment projects for Bristol-Myers Squibb, Lederle, Chevron, BP Oil Company, Shell Oil Co., UNOCAL, and Greyhound. He assisted in the creation of a risk assessment guidance document for the Air Force Center for Environmental Excellence (AFCEE). He provided technical support to USEPA in revising federal risk assessment guidance.

He has extensive experience negotiating the application and interpretation of risk assessment guidance with regulatory agencies, including USEPA, NYSDEC, Ohio EPA, Ohio Bureau of Underground Storage Tank Regulation, New Jersey DEPE, Michigan DNR, California EPA, Pennsylvania DEP, South Carolina DHEC, as well as state and county departments of health.

June 1987-January 1988 Syracuse Research Corporation, Syracuse, New York. **Toxicologist**. Responsible for the preparation of USEPA Technical Support Documents used for test rule development under TSCA, as well as the compilation of a computer data base for USEPA Office of Pesticide Programs (OPP). Prepared sections on the health effects of potentially toxic chemicals including aryl phosphates, aliphatic monocarboxylic acids, and pesticide "inerts."

April 1982-January 1985: FMC Corporation, Princeton, New Jersey, **Biochemical Toxicologist** (Laboratory Supervisor). Conducted research aimed at identifying new insect biochemical targets for insecticides.

April 1981-October 1981: Syracuse Research Corporation, Syracuse, New York. **Research Assistant**. Assisted in research on the pharmacokinetics of chemicals under grants from NIH.

September 1978-April 1981: SUNY ESF, Syracuse, New York. **Research Assistant**. Performed research in biochemical toxicology under grant from NIH.

May 1977-August 1978: SUNY ESF, **Research Technician**. General laboratory support.

Other Experience

August 1985-June 1987: **Free Lance Writer**.

Affiliations & Training

The Society for Risk Analysis

HAZWOPER Training

DOT Training

First Aid/CPR Training

Publications and Presentations

"Pesticide Exposure and Gulf War Illnesses," Poster presented at U.S. Army Force Health Protection Conference, August 2001.

"Perfusion Analysis of Periportal and Centrilobular Metabolism of Paraoxon in the Rat Liver," *Pesticide Biochemistry and Physiology*, 1982 (coauthor T. Nakatsugawa).

"Hepatic Disposition of Parathion: Uptake by Isolated Hepatocytes and Chromatographic Translobular Migration," *Pesticide Biochemistry and Physiology*, 1980 (coauthors T. Nakatsugawa, K. Usui).

J. DANIEL DOUGLASS
Senior Scientist/Industrial Hygienist

Experience Summary

Mr. Douglass manages asbestos and lead-based paint issues, along with other Industrial Hygiene concerns, in the Syracuse, NY office. He has worked on dozens of projects for the U.S. Air Force with Parsons and other firms, domestically and abroad. He has worked as Project Manager, investigated Indoor Air Quality problems, monitored worker exposure, provided contractor and safety oversight, and conducted training among other facets of Industrial Hygiene, to a variety of clients. In addition, he has performed site investigations for and drafted Storm Water Pollution Prevention Plans and compiled Emergency Response Plans for several facilities of a federal agency.

Years of Experience:

12

Years with Parsons:

3

Education

B.S. in Environmental Studies, State University of New York College of Environmental Science and Forestry, Syracuse, NY.

A.A.S. in Business Administration, Corning Community College, Corning, NY.

Certifications

OSHA 40-Hour HAZWOPER Certification

EPA Lead Risk Assessor

New York State Asbestos Building Inspector

New York State Asbestos Project Monitor

Memberships

American Industrial Hygiene Association (AIHA).

Primary Experience

June 2002 – Date: **Senior Scientist / Industrial Hygienist**, Parsons, Liverpool, NY. Manages asbestos, lead-based paint (LBP) and other Industrial Hygiene issues. Has prepared Storm Water Pollution Prevention Plans and Emergency Response Plans, assisted in compiling Spill Prevention, Control and Countermeasure plans, contract documents including work plans, health and safety plans, work specifications, sampling plans, O&M plans, and project reports. Provided field oversight of contractors and for health and safety at various client work sites. Also:

- Managing asbestos issues for industrial multi-building demolition project
- Coordinating and monitoring contractor activities for several clients
- LBP survey and risk assessment for USAF
- Revise Storm Water Pollution Prevention plans and prepare safety training materials for DNSC
- Oversight during construction / repair of USAF pollution control trenches, lagoons
- Updating facility asbestos surveys and O&M plans (for the U.S. Army and industrial facilities)
- Performing pre-demolition asbestos surveys for various clients
- Supporting radiation characterization survey for U.S. Army

- Assisting groundwater sampling and monitoring projects.

May 2000 – May 2002. **Project Manager**, Colden Corporation, East Syracuse, NY. Developed and managed projects for clients of a regional consulting firm. Worked with architect and engineering firms, manufacturers, hospitals, schools, governmental agencies and other concerns. Co-developed a plan to abate lead contamination from a school's HVAC system and crawlspaces; helped to resolve mold and moisture problems in homes for a housing authority. Performed a variety of services that included:

- Investigating Indoor Air Quality issues; survey buildings for asbestos and lead
- Testing for mold and bacteriological contamination
- Perform workplace personal and area air monitoring for contaminants and assess worker exposure
- Interpret regulations from OSHA, EPA and other federal and state standards
- Conduct ventilation surveys
- Develop and deliver training classes and monitor for noise exposure
- Provide contractor safety oversight
- Study and analyze survey and sampling results, and recommend corrective or remedial actions
- Development of contract specifications and work plans for lead and asbestos projects
- Compose budgets, proposals and written reports issued to clients
- Operate a variety of testing equipment including photoionization detectors (PID), summa canisters, dosimeters, anemometers, balometers, various sampling pumps, and other devices.

Familiar with OSHA, state, local and other regulations relating to safety, heat stress, communications, PPE, fall protection, asbestos, lead, hazardous wastes, and occupational health and safety issues. Additional duties included asbestos Project Monitoring and Air Monitoring, and assisting in designing asbestos abatement projects.

March 1993 – May 2000. **Industrial Hygienist / Team Leader**, ENSR Consulting (formerly Galson Corporation), East Syracuse, NY. Senior Field Manager for up to twenty workers performing asbestos and lead-based paint surveys and risk assessments conducted for the U.S. Air Force throughout the U.S., Korea and Japan. Trained to use Niton XRF analyzer. Work included:

- Ensuring Quality Control
- Completing projects within time and budgetary constraints while training, scheduling and supervising field personnel
- Learning, teaching and trouble-shooting unique corporate software
- Assisted in stack testing
- Drafted Standard Operating Procedures for various tasks, contributed to the preparation of budgets and final reports for various projects.
- Performed personal and area exposure monitoring.
- Performed asbestos and lead monitoring and consulting, and numerous other Industrial Hygiene duties.

Other Experience

Management, Retail: 1980 – 1990.

NEIL W. FEIST
UXO SAFETY/QC Manager

Experience Summary

Mr. Feist provides review and approval of safety and quality control functions; assists in staffing, scheduling, and cost issues related to UXO personnel; and interfaces with contractors in creation and implementation of OE Sector policies and procedures. He is a member of the American Society of Quality, 2002.

Years of Experience:

20

Years with Parsons:

4

Education/Training

Basic EOD School, 1985

EOD Refresher, July 1990

1348-2 Transportation of Hazardous Materials, 1991

PROFESSIONAL CERTIFICATIONS

HAZWOPER 40 Hours, January 1994

HAZWOPER 8-Hour Refresher, 1996, ‘97, ‘98, ‘99, 2000, ‘01

HAZWOPER 8-Hour Supervisor, 1995

Member, American Society for Quality

Primary Experience

PARSONS

Jun 01 – Present Parsons. **UXO QC Manager, OE Sector**. Responsible for establishment, incorporation, and periodic review of quality control policies and procedures. Liaison between contractor, Parsons P.M. and Parsons QA Manager.

Deputy OE Operations Manager, OE Sector; Assist in review and approval of all OE Sector documents. Assist P.M.s in staffing, scheduling and cost issues related to UXO personnel. Interface with contractors and Parsons P.M.s. Assist in creation and implementation of OE Sector policies and procedures.

Operations Manager, Huntsville CEA Program. Responsible for day to day operations and management of Parsons personnel and assets within the Iraq CEA Integrated Operations Center (IOC). Duties include providing strategic direction in providing logistics support to over 2,300 personnel performing collection and destruction of captured enemy ammunition in Iraq. Implements and oversees the Parsons-Huntsville safety and health program.

Oct 00 – Jun 01 Parsons. **UXO Safety Officer**, Fort Ord , CA

Oversee daily field operations and demolition operations to ensure compliance with state and federal OSHA regulations. Monitor and schedule HAZWOPER and annual OSHA physicals. Incorporate plans and policies into Field operations.

OTHER EXPERIENCE

Nov 99 – Oct 00 USA Environmental, Inc., Fort Ord, CA. **Site Safety and Health Officer.**

Oversee daily field operations and demolition operations to ensure compliance with state and federal OSHA regulations. Monitor and schedule HAZWOPER and annual OSHA physicals.

Aug 95 – Oct 99 CMS Environmental, Inc.,/USA Environmental, Inc., Fort Ord, CA. **UXO Supervisor.**

Sweep team supervisor, responsible for locating and identifying unexploded ordnance and OEW. Team leader of the demolition team. Responsible for daily disposal operations of hazardous munitions items located by sweep teams. Supervise heavy equipment operations. Fill in Site Safety and Health Officer.

Apr 94 – Aug 95 Environmental Chemical Corporation, Camp Elliot (Mission Trails) Ordnance Removal Project, San Diego, CA. **UXO Supervisor**.

Performs the detection and removal of surface and sub-surface UXOs and OEW from Mission Trails

Regional Park. Performs duties as brush crew supervisor and conducts UXO identification training class for brush crews and UXO sweep teams.

Feb 92 – Mar 93 Explosives Ordnance Disposal World Services, Inc., Ft. Walton Beach, FL. **UXO Specialist/Supervisor.**

Employed under a subcontract to Conventional Munitions Systems, Inc., clearing unexploded ordnance, mines, military vehicles, and equipment left by the Iraqi Army and coalition forces in the U.S. Sector of Kuwait. Conducted and supervised large land area ground sweeps. performed mapping and navigation using Trimble Global Positioning System (Basic and Pro model of GPS). Functioning as team member and supervised laborers and heavy equipment operators during ammunition supply point clean-up and bunker downloading. Instrumental in the location and disposal of over 12,000 tons of hazardous munitions.

1990 – 1991 554th Air Base Operability Squadron, Nellis AFB, NV. **EOD Technician.**

Planned, scheduled, and conducted disposal of hazardous munitions and munitions waste. Provided monthly reports to the Environmental Protection Agency. Functional as an EOD team member on annual clearances of aircraft bombing and gunnery ranges.

1987 – 1990 50th EOD Flight, Hahn AB, Germany. **EOD Specialist.**

Explosives custodian accountant. Participated in clearance of Army gunnery ranges in Hohenfels, Germany.

1986 – 1987 6405th EOD Flight, Kunsan AB, Korea. **EOD Specialist.**

Provided training for Korean counterparts in the operation of EOD tools and techniques. Cleared Army gunnery ranges and aircraft bombing ranges with ROKAF EOD teams. Participated in the clearance of UXOs from WWII off of Lily Hill at Clark Air Base, Philippines.

John R. Hackett, PE
Environmental Engineer

EXPERIENCE SUMMARY

Background in environmental engineering and environmental health physics. Provides office and field support for radiological remediation and site closure efforts using MARSSIM, risk assessment, and data analysis. Experienced with using computer applications to simulate and evaluate laboratory and field data. Skilled at statistical interpretation, technical writing, and report preparation.

YEARS OF EXPERIENCE:

6

YEARS WITH PARSONS:

5

EDUCATION

B.S. in Environmental Engineering, June 1996, Northwestern University, Evanston, Illinois

M.S. in Environmental Engineering, December 1999, Clemson University, Clemson, South Carolina. Emphasis in radioactive waste management and environmental health physics.

REGISTRATIONS

Registered Professional Engineer: Colorado, 2004, No. 38434.

SPECIAL TRAINING

OSHA 40-hour health and safety training for work at hazardous waste sites with annual refreshers

OSHA 8-hour Site Supervisor Training

Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Workshop, conducted by Argonne National Laboratory, Geneva, NY, October 17-19, 2000.

40-hour Radiation Safety Officer Training, conducted by Rad-Ware, Inc., Las Vegas, NV, March 8-12, 2004.

PROFESSIONAL AFFILIATIONS

Health Physics Society, 2000 – present

Associate Member of American Academy of Health Physics (AAHP), 2004 – present

EXPERIENCE

2000-Present. Parsons. **Engineer**. Responsibilities include field and office health physics support, risk assessment, and statistical support. Specific assignments have included:

- *Denver Radium Sites*- Project Health Physicist and site Radiation Safety Officer (RSO) for remediation and final surveys of 11th Avenue, Marion Street, Humboldt Street, and Lafayette Street sections of Operable Unit 7. Developed MARSSIM-based sampling plan. Provided instrument and radiation safety training to site personnel. Responsible for maintenance of field instrumentation and air monitoring equipment. Conducted gamma spectroscopy analyses of soil samples. RSO responsible for fulfilling requirements of Colorado Radioactive Materials License (No. 1054.01).
- *Seneca Army Depot, New York.* Project Health Physicist for SEAD-48 (Pitchblende Ore Igloo) radiological surveys. Served as site Radiation Safety Officer for SEAD-48 surveys. Technical lead for effort to terminate NRC license SUC-1275. Field Health Physicist for SEAD-12 radiological building surveys and NRC license termination surveys. Co-author of MARSSIM-based survey design for the investigation of depleted uranium and pitchblende ore contamination. Developed database of survey data to streamline data entry, analysis, and reporting tasks. Performed instrument operational checks and maintenance. Served as site Health and Safety Officer during field work. Assisted in design and implementation of in-situ gamma

spectroscopy sampling protocols at SEAD-12 and SEAD-48. Determined soil and building remediation guidelines using RESRAD radiological risk assessment software. Performed radiological risk assessment for several receptors at Seneca Army Depot using RESRAD and U.S. Environmental Protection Agency (USEPA) guidelines. Conducted statistical analysis of survey data using MARSSIM guidelines.

- *Various CONUS Sites.* Health Physicist for characterization and waste reduction survey for low-level radioactive and low-level mixed wastes at several Air Force sites.
- *Dugway Proving Ground, Utah.* Developed MARSSIM-based work plan for characterization of suspected radioactive waste burial site. Reviewed Dugway and NRC radioactive licensing records to assess applicability to current 10 CFR 20 site closure standards.
- *Kaho'olawe Bombing Range, Hawaii.* Field Health Physicist for investigation, remediation, and characterization (using gamma spectroscopy) of radioactive materials associated with target vehicles. Conducted radiological characterization surveys of several airplane crash sites potentially contaminated with radium.
- *Grissom Air Reserve Base, Indiana.* Field Health Physicist for excavation and MARSSIM-based final status survey of site contaminated with depleted uranium, enriched uranium, and thorium alloys. Co-author and task manager for Final Status Survey Report.
- *McClellan Air Force Base, CA.* Task manager for release of Final Status Survey Report. Performed as low as reasonably achievable (ALARA) cost-benefit analyses and an indistinguishability from background study per NUREGs-1505, -1507, and DG-4006 of radiological cleanup at Building 1080, McClellan AFB, California.
- *Risk Assessment.* Performed human health and ecological risk assessments for Solid Waste Management Units (SWMUs) at Dugway Proving Ground (DPG) Utah, and Lawrence Berkeley National Laboratory (LBNL), California. Primary author of the site-attribution analysis for DPG SWMU reports. Performed site-to-background comparisons, data usability studies, virtual remediation, and summary statistics for several sites, including DPG, LBNL, the Los Angeles Unified School District, and F.E. Warren AFB, Wyoming. Conducted risk-based modeling of volatilization associated with excavated soil at the Former Stapleton Airport, Denver, Colorado.

1997-1999. Clemson University – Department of Environmental Engineering and Science, Clemson, South Carolina. **Research Assistant**. Member of research group working under contract from Idaho National Engineering and Environmental Laboratory. Designed and conducted soil column experiments to measure retardation of microcurie quantities of radioactive tracers (U-234, Pu-239, Np-237, Am-241, Th-230, and H-3). Prepared progress reports and presentations. Managed radionuclide inventory and waste logs.

1999. Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho. **Summer Intern**. Designed experimental setup and performed computer modeling for uranium soil column studies.

AWARDS

1998-99 Applied Health Physics Fellowship, Oak Ridge Institute for Science Education / Department of Energy.

PUBLICATIONS AND PRESENTATIONS

"The Effects of Aging and Groundwater Chemistry on the Mobilities of Selected Actinides in Sedimentary Interbed from the Snake River Plain," M.S. Thesis, Clemson University, 1999, 75 pp.

"A Case Study of a MARSSIM-Based Final Status Survey for Buildings," Poster presented at Health Physics Society 47th Annual Conference, Tampa, Florida, June 2002.

Timothy S. Mustard, C.I.H.
Industrial Hygienist

EXPERIENCE SUMMARY

Certified industrial hygienist (C.I.H.) responsible for development and implementation of site-specific safety procedures and employee exposure monitoring. Also responsible for development and implementation of hazardous waste site health and safety plans to protect workers and the general public. Served as safety manager on numerous highly hazardous field projects involving drummed wastes, military chemical agents, chemical agent byproducts, and unexploded ordnance. Serves as Parsons Corporate Training Coordinator for hazardous waste site health and safety courses and Corporate Technical Director for asbestos projects. Maintains health and safety records, including medical monitoring and training records. Serves as an adjunct professor, teaching OSHA health and safety courses for hazardous waste site workers at a Denver college.

YEARS OF EXPERIENCE:

26

YEARS WITH PARSONS:

17

EDUCATION

B.S., Botany, 1976, Michigan State University, East Lansing, Michigan

M.S., Plant Systematics, 1979, Michigan State University, East Lansing, Michigan

PROFESSIONAL CERTIFICATIONS AND AFFILIATIONS

American Board of Industrial Hygiene, Certified in Comprehensive Practice, 1995

American Industrial Hygiene Association

EXPERIENCE

1985-Date. Parsons. **Industrial Hygienist.** Develops and implements site health and safety plans, conducts health and safety field audits, and conducts health and safety training courses for company personnel. Assisted in preparation of corporate health and safety policy manual and training manual.

CIH/Health and Safety Manager, **Remediation of Former Stapleton Airport.** This project involved multiple subcontractors and teams of workers (totaling up to 60 workers per day at times). Project hazards included ground personnel working in proximity to heavy construction equipment, excavations in jet fuel-contaminated soil, asbestos-wrapped piping systems, and underground utilities and accrued more than 1,400 days with over 350,000 man hours without a lost time incident. Mr. Mustard managed all safety aspects; including preparation of the SSHP, establishment of an air monitoring program and selection of PPE levels. Mandated and conducted daily safety meetings; tracked personnel training and medical health monitoring. Conducted daily safety inspections during excavation and remediation activities.

CIH/Health and Safety Manager, Denver Radium Streets Project. Involved demolition and restoration of city streets, and removal of low level radioactive (radium) contamination. This was a fast-track project successfully conducted from June to November 2003 before the winter season set in. The project consisted of removal of more than 6,000 tons of radium-contaminated road base and asphalt material, and, included transportation and disposal of waste at a licensed facility, and reconstruction of the street to its original design condition. Project hazards included radioactive materials, automobile traffic, heavy equipment working in very confined work areas, excavations, and heat stress. This project involved multiple subcontractors and engineering and environmental specialists from Parsons. Approximately 24,000 man-hours were spent with no lost time incidents.

Has prepared industrial hygiene and safety procedures for various construction and environmental remediation projects. Some of these included:

- Remediation of fuel-contaminated soils at the former Stapleton International Airport in Denver, CO. Over 320,000 man-hours were incurred at this site with no lost-time injuries.
- Scientific Advisor for I-25 Transportation Expansion (T-REX) project, Denver, CO.
- Ambient air and employee exposure monitoring to support the construction of three hazardous waste storage tanks at the Rocky Mountain Arsenal (RMA). Over 50,000 man-hours were spent on this project with no lost-time injuries. Managed other air monitoring projects at RMA to support water treatment plant retrofits and construction of a new containment basin around existing vapona (pesticide) storage tanks. Also managed preparation of the RMA emergency contingency and response plan.
- Development of safety and industrial hygiene program plans and procedures for the National Energy Technology Laboratory (NETL) in Pennsylvania and West Virginia.
- Development of a fall protection procedure for Parsons' employees and subcontractors at McClellan Air Force Base (AFB), California. Provided fall protection training for employees.
- Development of industrial hygiene program plans and procedures for environmental restoration and waste management at the Rocky Flats Environmental Technology Site (RFETS) in Colorado. Also assisted in preparation of the program health and safety plan (HASP).
- Development of administrative recordkeeping, medical monitoring, and respiratory protection procedures for site remediation at the RMI facility, Ashtabula, Ohio.
- Preparation of a safety and environmental training needs matrix for over 400 personnel at a steel mill in Texas.

Representative examples of asbestos projects:

Task manager for asbestos and lead-based paint (LBP) inspection at Altus Air Force Base (AFB) in Oklahoma and Tyndall AFB in Florida. The inspections encompassed all non-housing facilities on the bases and a representative 10 percent of military family housing units. Bulk asbestos and paint chip samples were collected for laboratory analyses. Additionally, x-ray fluorescence (XRF) surveys of suspected LBP were conducted in the facilities. Field data were loaded into a computerized data management system along with previously collected sampling data. The results are being used to plan repair, renovation, and demolition projects; rank health risks; and plan responses to emergency situations.

Project manager for three contracts to provide asbestos management services at Fitzsimons Army Medical Center near Denver, Colorado. Tasks include asbestos inspections and sampling, and preparation of design drawings and specifications for asbestos removal. Projects have involved asbestos management in several wings of Building 500, a major hospital, and Building 205, an office facility.

Project manager for hazardous waste, asbestos, noise, lead-based paint, and air quality services for the redesign of a congested Denver highway intersection. Managed a detailed investigation and inventory of asbestos and lead in a commercial multistory building scheduled for either remodeling or removal. The findings of this survey played an important role in negotiating the fair market value of the structure and associated land. The project also included estimating unit prices and total costs, including permit acquisition and other planning requirements, to remove and clean up asbestos-containing materials.

Task manager for an asbestos and radon gas inventory and assessment of two buildings at Bear Creek Lake Park in Lakewood, Colorado. The buildings were being considered for ownership transfer with subsequent restoration, remodeling, or demolition. Samples were collected to determine asbestos and/or radon presence and concentrations. The regulatory implications of sample concentrations were used to determine whether the city should assume ownership of the structures from the current owner. Costs for asbestos cleanup and construction management were provided as part of a technical task report

Project manager for the preparation of asbestos management plans and associated cost estimates for approximately 40 buildings at NASA's Goldstone Deep Space Communications Complex in southern California. Prepared preliminary engineering reports, asbestos abatement specifications, and cost estimates for each building. The project was complicated by the fact that millions of dollars worth of computers and satellite tracking equipment had to be protected and remain operational while abatement occurred.

Project manager for a base-wide asbestos management plan to address management and reporting requirements for asbestos in more than 500 buildings at Hill Air Force Base in Utah. The buildings encompass approximately 6.5 million square feet of space. Also prepared an operating plan which provided directives and guidance for maintenance personnel, in-house asbestos removal teams, and outside contractors to handle the removal and disposal of asbestos in the buildings.

Project manager for asbestos management services for three major buildings at the Air Force Academy. Surveyed and sampled each building, and prepared summary reports, including cost estimates for removal and replacement. Then managed the preparation of bid packages and detailed plans and specifications for asbestos removal and material replacement. For Mitchell Hall, which contained the cadet main dining hall and kitchen, asbestos removal was design to keep these facilities functional throughout the removal process. The design was particularly complicated by the presence of a large open plenum above the dining hall.

Project manager for asbestos sampling and removal at a large commercial bakery in Denver, Colorado. ACM included transite duct panels located at the ceiling and insulation on pipes under the transite panels. Then managed the preparation of detailed removal plans and specifications, developed bid packages, provided services during bidding, and assisted in contractor selection. The design was complicated by the need to keep the facility operational at all times. During the removal phase, managed contractor oversight, air monitoring, and project close-out.

Responsible for design and management of worker exposure air monitoring and industrial safety projects, including:

- Evaluation of workplace protection factors (WPFs) for the use of a loose-fitting supplied-air respirator in an aircraft hangar spray painting operation at Tinker AFB, Oklahoma.
- Evaluation of the effectiveness of a new technology ventilation system at an aircraft hangar spray booth at Hill AFB, Utah.
- Measurement of worker exposure at a bus maintenance facility, Denver, Colorado.

Served as industrial hygienist for hazardous waste projects at numerous Department of Defense (DoD) facilities, most of which involved safety considerations for radioactive materials, military chemical agents, agent byproducts, and/or unexploded ordnance. Some of these included:

- Ordnance and explosive cleanup at the former Ft. Ord, California.
- Engineering Evaluation and Cost Analysis (EE/CA) for The Badlands Bombing Range, South Dakota.
- Ordnance and Explosives Engineering Evaluation and Cost Analysis (EE/CA) for Amchitka Island, Alaska.
- Radiation survey of 11 buildings at the U.S. Army Garrison, Fitzsimons near Denver to support NRC license termination;
- Lead dust abatement at 4 U.S. Army Reserve indoor firing ranges in the midwestern U.S.

- Characterization of 31 hazardous waste sites at the Fort Irwin National Training Center in California;
- Several hazardous waste projects at the Dugway Proving Ground in Utah, including characterization of 130 potential hazardous waste sites;
- Multiple construction, characterization, and remediation projects at the Rocky Mountain Arsenal in Colorado, including the highly successful hot gas decontamination demonstration for a building contaminated with mustard agent;
- Design of asbestos removal at the U.S. Air Force Academy in Colorado Springs; and
- Removal of approximately 800 drums, some of which contained military chemical agent, from Landfill 4 at Eielson Air Force Base, Alaska.

Also managed health and safety services at U.S. Department of Energy (DOE) facilities. Projects have included hazardous waste site investigations and remedial design at the 12-acre Solar Evaporation Ponds (OU4) at the Rocky Flats Environmental Technology Site (RFETS), a former nuclear weapons production facility near Denver, and groundwater remediation at the 881 Hillside (OU1).

Other projects have included characterization and cleanup of the Micronutrients CERCLA site in Utah; environmental baseline survey for the Spokane Satellite Tracking Station in Washington; site characterization and damage assessments at the Eagle Mine and the Yak Tunnel/California Gulch NPL sites in Colorado; numerous underground storage tank (UST) projects for Burlington Northern Railroad and Public Service Company of Colorado; a study of innovative technology at the Woodland Township, New Jersey NPL site; and hazardous waste investigations at the Leyden Street NPL site OU1 in Colorado and at a former pesticide-formulating plant in Arizona.

1979-1985. Camp Dresser & McKee, Inc. Denver, Colorado. **Hazardous Waste Site Technician (1981-1995)**. Served as field investigator, site health and safety officer, and decontamination supervisor for hazardous waste site investigations in Washington and Oregon. Was among the first in the country to receive certification to conduct Superfund hazardous waste site activities. Assisted in the preparation of three RCRA Part B applications as well as numerous hazardous waste site work plans, project operation plans, and health and safety plans.

Plant Ecologist (1979-1980). Chief field botanist for site selection surveys for electric utilities in Michigan and Wisconsin, and environmental resources inventories of underground coal mine sites in Indiana. Other responsibilities included report and proposal writing, and assisting in bird, mammal, herpetofaunal, and benthic macroinvertebrate field and laboratory studies.

1979. Michigan Department of Natural Resources. Lansing, Michigan. **Private Consultant.** Conducted studies of distribution, abundance, habitat requirements, and management considerations of a threatened plant species occurring at a burial site for livestock contaminated with polybrominated biphenyl (PBB).

Special Training

EPA - Accredited (AHERA) Building Inspector Course (2004)

EPA - Accredited (AHERA) Asbestos Management Planning Course (2002)

OSHA 40-hour and 8-hour Training for Hazardous Waste Workers and Supervisors' Training (teaches these courses)

Practices and Procedures in Asbestos Control and Abatement (1986)

Red Cross CPR and First Aid Certifications (2000)

MSA Air Mask Maintenance Certification (1985)

EPA Response Decision-Making Workshop (1985)

Basic Principals of Hazardous Waste Site Investigation (1984)

PUBLICATIONS

Denver Radium Streets Project. Proceedings of the American Industrial Hygiene Conference and Exposition (AIHCE), Atlanta, GA. May 2004. (Coauthor A. Sogue).

Use Of Personal Digital Assistants (PDAs) on Ordnance Projects. Proceedings of the American Industrial Hygiene Conference and Exposition (AIHCE), Dallas, TX. May 2003.

Safety Procedures for Operations in Remote Locations. Proceeding of the American Industrial Hygiene Conference and Exposition (AIHCE), San Diego, CA. June 2002.

Safety and Health Considerations for the Emerging Older Workforce. Proceeding of the American Industrial Hygiene Conference and Exposition (AIHCE), San Diego, CA. June 2002. (Coauthor M.J. Loshak).

Telecommuting Safely. *Occupational Hazards*. April 2001. pp. 38-39.

"Workplace Protection Factors - Supplied Air Hood." American Industrial Hygiene Association Journal (AIHAJ). Jan/Feb. 2001. pp. 96-99. (Coauthors T.J. Nelson and T.H Wheeler).

Site Communications. *Occupational Health and Safety*. December 2000. pp.38-41. (Coauthor J.A. Blakemore).

Use of the Global Positioning System in Environmental and Hazardous Waste Operations. *Occupational Hazards*. September 2000. (Coauthor R. Stankoff).

"Emergency Drum Removal Action". Proceedings of the American Industrial Hygiene Conference and Exposition (AIHCE), Toronto, Canada. June 1999.

“Unexploded Ordnance Detonation Incident,” Proceedings of the American Industrial Hygiene Conference and Exposition (AIHCE), Atlanta, GA, May 1998.

“Better Methods for Locating Underground Utilities,” Proceedings of the American Industrial Conference and Exposition (AIHCE), Atlanta, GA, May 1998 (coauthor M.J. Loshak).

“Military Chemical Agent Industrial Hygiene Issues,” Proceedings of the Hazardous Materials Control Resources Inst. (HMCRI) Federal Environmental Restoration IV and Defense Cleanup Southeast Conference, Atlanta, GA, March 1995 (coauthor W.M. Perrin).

"Direct-Reading Instruments Have Advantages, Limitations at Hazwaste Sites," *HAZMAT WORLD*, June 1992, pp.46-48 (coauthor M.J. Loshak).

"OSHA Proposes Accreditation Rules for HAZWOPER Training Providers," *Occupational Health and Safety*. September 1991. pp. 44-46 (coauthor M.J. Loshak).

"Remote Detection of Ground Water Contamination Using Soil Gas Surveys," AICHE Summer National Meeting, Denver, Colorado, August 1988 (Coauthors T.C. Shangraw and D.P. Michaud).

Name:	Bradley Olson
Title:	Unexploded Ordnance Safety Officer (UXOSO)
Parsons GBU:	Parsons Infrastructure & Technology, Pasadena, CA
Years Experience:	Total: 23 Current GBU: 4
Education:	▪ Basic Explosive Ordnance Disposal (Chemical Phase) United States Navy Explosive Ordnance Disposal School ▪ Basic Explosive Ordnance Disposal (Surface Phase) United States Navy Explosive Ordnance Disposal School ▪ Basic Explosive Ordnance Disposal (Nuclear Phase) United States Navy Explosive Ordnance Disposal School ▪ Commercial Explosives Handling and Disposal, Department of Treasury, Bureau of Alcohol, Tobacco and Firearms ▪ Basic Nuclear Concepts and Nuclear Weapon Hazards, Department of Energy, Sandia National Laboratories ▪ United States Army Ammunition Specialist Primary Technical Course ▪ United States Army Logistics Management College Defense Hazardous Materials Handling Course ▪ Introduction to Environmental Sampling
Professional Registration:	
Professional Certification:	▪ HAZWOPER ▪ California Commercial Drivers License (Class A) with Hazardous Materials Endorsement
Other Professional Qualifications:	
Summary:	▪

Professional Experience:	**Project Title and Location** Former Fort Ord Military Munitions Response Program (MMRP), Monterey County, CA
	Client Information U.S. Army Corps of Engineers, Sacramento District Monterey Project Office 2850 5th Avenue Marina, CA 93933 Juan Koponen, Project Manager Phone: (831) 884-9925 x-233 Fax: (831) 884-9030 Email: juan.koponen@usace.army.mil

	Year Completed ■ Professional Services: current ■ Construction: N?A
	Performed with Current Firm? Yes
	Brief Description and Role ■ UXOSO. Enforce Site Safety Health Plan (SSHP), and verify and document compliance with applicable safety and health requirements. ■ Analyze UXO and explosives operational risks, hazards, and safety requirements. ■ Establish and ensure compliance with all site specific safety requirements for UXO and explosives operations ■ Enforce personnel limits and safety exclusion zones for UXO clearance operations and UXO and explosives transportation, storage, and destruction. ■ Conduct UXO recognition and familiarization training for new personnel and site visitors. ■ Monitor and schedule HAZWOPER and annual OSHA physicals.

Professional Experience:	**Project Title and Location** Former Fort Ord MMRP, Monterey County, CA
	Client Information U.S. Army Corps of Engineers, Sacramento District Monterey Project Office 2850 5th Avenue Marina, CA 93933 Juan Koponen, Project Manager Phone: (831) 884-9925 x-233 Fax: (831) 884-9030 Email: juan.koponen@usace.army.mil
	Year Completed ■ Professional Services: 2001 ■ Construction: N?A
	Performed with Current Firm? Yes
	Brief Description and Role ■ Unexploded Ordnance Technician II. Performed duties as an UXO Sweep Team member. ■ Detected, located, excavated and destroyed surface and subsurface military munitions. ■ Escorted non-UXO qualified personnel. ■ Performed temporary duties as an UXO Technician III, as needed. ■ Augmented survey team, as necessary.

Professional Experience:	**Project Title and Location** Emergency Rapid Response to flooding of Red River, Grand Forks ND
	Client Information Environmental Chemical Corporation
	Year Completed ■ Professional Services: 1997 ■ Construction: N/A
	Performed with Current Firm? Yes
	Brief Description and Role ■ Hazardous Materials Foreman. Supervised hazardous materials teams during the U.S. Environmental Protection Agency (EPA) due to the flooding of the Red River. ■ Coordinated multiple daily team assignments, special equipment needs for spill containment, unique packaging and transportation requirements. ■ Assessed work quality and provided estimated completions to the EPA-OSC. ■ Transported hazardous materials as needed. ■ Established coordination with local law enforcement for the disposal of ammunition and fireworks.

Professional Experience:	**Project Title and Location** UXO Clearance for Ranges 59 and 74, Fort Lewis WA
	Client Information Environmental Chemical Corporation
	Year Completed ■ Professional Services: 1997 ■ Construction: N?A
	Performed with Current Firm? No
	Brief Description and Role ■ UXO Quality Control Officer. Ensured UXO clearance for Ranges 59 and 74 met or exceeded approved work plan requirements and applicable guidelines. ■ Used Trimble GPS to mark positions of all live military munitions and marked complex grid systems for sweep operations. ■ Prepared daily QC reports and addressed equipment issues.

Professional Experience:	
	Project Title and Location Multi-purpose Training Range Clearance, Yakima Firing Center, WA
	Client Information Environmental Chemical Corporation
	Year Completed ■ Professional Services: 1997 ■ Construction: N?A
	Performed with Current Firm? No
	Brief Description and Role ■ Supervisor; Unexploded Ordnance Technician III. Supervised UXO sweep team during the detection, location, excavation and disposal of surface and subsurface military munitions during the clearance at the multi-purpose training range.

Professional Experience:	
	Project Title and Location Carrizo Impact Area Range Clearance, El Centro, CA
	Client Information
	Year Completed ■ Professional Services: 1996 ■ Construction: N?A
	Performed with Current Firm? No
	Brief Description and Role ■ Site Safety Health Officer/UXO Technician III. Performed dual role during range clearance activities..

Professional Experience:	
	Project Title and Location Former Camp Elliott UXO Clearance, San Diego, CA
	Client Information Environmental Chemical Corporation for U.S. Army Corps of Engineers
	Year Completed ■ Professional Services: 1995 ■ Construction: N?A

	Performed with Current Firm? No
	Brief Description and Role ■ Supervised UXO sweep team during the detection, location, excavation and disposal of subsurface military munitions. ■ Ensured safety compliance with both federal and state regulations governing hazardous waste and quality control and safety compliance for brush removal operations.

Professional Experience:	**Project Title and Location** United States Army Ordnance, Missile, Munitions Center and School, Redstone Arsenal, AL
	Client Information
	Year Completed ■ Professional Services: 1992 ■ Construction: N?A
	Performed with Current Firm? No
	Brief Description and Role ■ Worked at project office for U.S. EOD tools and equipment, including all ordnance detection equipment. ■ Documented doctrinal and equipment deficiencies with recommendations to correct those deficiencies and meet specific requirements. Equipment included self-contained toxicological outfit..

Professional Experience:	**Project Title and Location** Korea EOD Response, Republic of Korea
	Client Information
	Year Completed ■ Professional Services: 1992 ■ Construction: N?A
	Performed with Current Firm? No
	Brief Description and Role ■ Explosive Ordnance Team Supervisor. Supervised three-man EOD response

	team for ordnance related accidents and incidents within the Republic of Korea. ■ Successfully planned and executed EOD support of de-tanking, inspection, and refueling of all Lance missiles required for scheduled maintenance. ■ Operation involved liquid fuels and oxidizers requiring level-A protection and full decontamination of all personnel and equipment. ■ Additionally performed duties of Maintenance Noncommissioned Officer, which included supervising scheduled maintenance for organizational Nuclear, Biological and Chemical equipment, vehicles, and all tools. ■ Member of nuclear work party responsible for rendering disassembly, packaging and preparing for shipment all supported nuclear weapons systems and components. ■ Trained all vehicle and equipment operators. ■ Operated heavy equipment for range construction project.

Professional Experience:	**Project Title and Location** Korea EOD Response, Republic of Korea
	Client Information
	Year Completed ■ Professional Services: 1992 ■ Construction: N?A
	Performed with Current Firm? No
	Brief Description and Role ■ Explosive Ordnance Team Supervisor. Supervised three-man EOD response team for ordnance related accidents and incidents within the Republic of Korea. ■ Successfully planned and executed EOD support of de-tanking, inspection, and refueling of all Lance missiles required for scheduled maintenance. ■ Operation involved liquid fuels and oxidizers requiring level-A protection and full decontamination of all personnel and equipment. ■ Additionally performed duties of Maintenance Noncommissioned Officer, which included supervising scheduled maintenance for organizational Nuclear, Biological and Chemical equipment, vehicles, and all tools. ■ Member of nuclear work party responsible for rendering disassembly, packaging and preparing for shipment all supported nuclear weapons systems and components. ■ Trained all vehicle and equipment operators. ■ Operated heavy equipment for range construction project.

Professional Experience:	**Project Title and Location** United States Army 51st Ordnance Detachment, Fort Sheridan, IL
	Client Information

	Year Completed ■ Professional Services: 1986 ■ Construction: N?A
	Performed with Current Firm? No
	Brief Description and Role ■ Explosive Ordnance Disposal Team Supervisor and Team Member. Member of both the nuclear and chemical work parties responsible for rendering safe packaging and decontamination and, prepared for shipment all nuclear and chemical components as required. ■ Hotline supervisor responsible for processing all personnel, equipment, classified and/or hazardous materiel through the contamination reduction zone across the contamination control line. ■ Unit Supply NCO responsible for requisition all supplies, property accountability and forecasting annual fiscal requirements.

Security Clearances:

JIM L. OWEN, CSHM

Corporate Manager PI&T

Experience Summary

Provide in-depth in house services to reduce cost of risk, analyze loss history to identify gaps in safety management process. Coordinate and facilitate review meetings to ensure managers are proactively working to resolve issues. Develop and implement audit processes to measure program success. Supervise and support safety professionals through out Parsons Infrastructure & Technology.

EXPERIENCE

Parsons
2003 Present
Dick Corporation
1994 - 2003
Brown & Root
1973 - 1990

CERTIFICATIONS & SPECIAL TRAINING

- OSHA 40-Hour Health and Safety Training (29 CFR 1910.120)
- 8-Hour Supervisory Training
- 60-Hour Health and Safety Management (OSHA 501)
- 60-Hour Health and Safety Supervisor (OSHA 501)
- 8-Hour Scaffold Regulations
- 10-Hour Crane and Rigging Qualified Crane Operator Instructor OSHA 500, 10 Hour and 30 Hour
- CCO Instructor

PROFESSIONAL AFFILIATIONS

- American Society Safety Engineers
- Institute for Safety and Health Management
- Governors Committee for Safety Management

TECHNICAL SPECIALTIES

- Construction Health and Safety
- Asbestos Abatement
- Safety Training & Instruction
- Crane Operations

EDUCATION

University of Houston (South Texas)
Harris County Community College

Joined Construction Industry in 1973 within the marine and petrochemical markets. Primary functions as Corporate Manager, Safety and Health, Parsons Infrastructure & Technology including the planning and implementation of accident and fire protection programs, maintaining compliance with safety program standards, and supervision of project safety personnel.

Duties include review of contract documents with business unit estimators prior to bid to determine potential safety issues which may impact the project, conduct pre-project planning sessions with project team members to develop “site specific” safety plans, coordinate the corporate return-to-work program with the manager of claims administration, and assist in the preparation of all pre-bid qualifications with regard to experience modification and incident rates as well as handling questions regarding corporate field safety programs.

Representative Projects

- Regional Manager Dick Corporation overseeing the construction of the North Coast Superaquaduct, including water treatment plants, reservoirs, tanks and pipelines.
- Corps of Engineers responsible for the construction and maintenance of facilities in Ceiba, Puerto Rico working under EM-385-1-1.
- Bechara Channel Corp project San Juan, developed safety manual under the FAR and EM 385.
- Responsible for multi story construction of hotels, military/private hospitals, federal prisons, and bridge & highway projects.
- Maintained Safety requirements of EM 385 on 23 NMCI Corp projects though out the U.S.
- Project Safety Manager for the demolition and reconstruction of Birmingham steel mill.

- Write Safety Program and oversee Safety Requirements for Nellis Air Force base construction of Explosive Ordnance Facility.
- Audit construction safety of BEQ'S and family housing Pearl Harbor area bases.
- ENSR Remediation and Construction
  Sun Oil Middle Creek Abatement Project, Marcus Hook, Site Safety Supervisor for night turn multi-million dollar remediation project on a multi-contractor site with over 250 employees.
- Temple Associates Simpson Paper Rebuild Project, Pasadena, TX. Site Safety Manager for the complete rebuild of #49 machine.
- Brown & Root Shell West Hollow Research Center, Houston, TX. Site Safety Supervisor for maintenance project.
- Saline Water Conversion Corporation
  Jeddah, Saudi Arabia
  Manager, Safety Inspection for Easter Providence with over 500 employees. Responsibilities included inspection of plants; 150 miles of pipelines for pump stations, three fire brigades, and eleven safety specialists.
- Ford, Bacon and Davis
  Temple Inland, Evedale, TX
  Site Safety Manager on rebuild of paper machine, including structural steel, concrete work, machine work and heavy crane operations
- Brown & Root
  Middle East, Manama, Bahrain
  Barge Foreman, off shore construction of oil facilities and pipelines. Responsibilities included training, record keeping and compliance with all regulations including U.S. Coast Guard, with over 400 employees in all aspects of construction, both on and off shore.

APPENDIX C PARSONS ACCIDENT REPORTING INSTRUCTIONS PARSONS ACCIDENT REPORT FORM

On-Line Safety Reporting System

Policy Requirements

- Initial incident reports for all incidents, including near misses, shall be reported within 4 hours.
- Detail incident reports are required within 24 hours.
- Reporting is done via on-line (PWeb) incident report form.
- Injuries with Days Away from Work - immediate supervisor and PM must teleconference with GBU President within 4 hours.
- Projects enter hours via on-line form by FIRST Friday of new period.

Reporting Incidents

Corporate policy requires that all employees report safety incidents to their supervisor immediately. Supervisors must report all incidents to the appropriate Project Manager (Department Manager if the incident is not related to a project), who must officially report the incident to the GBU within four hours. This official reporting is done via the PWeb, unless PWeb is unavailable, in which case the incident can be reported by email, fax or telephone.

"Incidents" include work related injuries, work related illness, accidents with property damage only and near misses. "Near misses" are any unplanned event that had the potential to (but did not) result in injury or property damage.

Incident reports should reflect the best available information at the time. Where exact information is not known (recordability, days away from work, etc.) the PM's best judgment should be used when completing the initial incident report. This information can be subsequently revised when the detail incident report is submitted.

When in doubt, submit an initial report or contact the GBU Safety Manager.

On-line Reporting System

The on-line reporting system can be found on the PI&T Safety Page on PWeb. To locate the system, follow these steps:

1. From the Corporate PWeb Homepage, select PI&T from the Org Units menu
2. Locate and select "Safety" from the list of pages in the right hand column
3. Select the "Incident Reporting Form" link

To create and submit a new incident report, select the orange "Add" button from the main page of the reporting system. To update and existing incident report or complete the Detail Incident page, locate and select the appropriate incident from the list.

Creating or Updating Incidents

The Initial Incident page of the report must be completed within four hours of the incident occurring. This page includes basic information needed for the first notification to our insurance carriers. If possible, all of the fields should be completed in the initial report. A list is provided at the end of this document describing all fields contained on the initial incident page.

Incident Detail Reports

Within 24 hours of the incident occurring, the Incident Detail page of the on-line report must be completed. This page includes detailed information about the injured party, the nature and extent of injuries, medical treatment provided, corrective actions taken, and witness statements. In the event of property damage, this page also includes descriptive information on the property owner. Finally, the page includes a section to include electronic attachments. These might include photographs, signed witness statements, etc.

Monthly Reporting of Hours

Hours must be entered into the on-line reporting system no later than the first Friday of the new period. If an accurate accounting of hours is not available, estimated hours are submitted into the system. The estimated hours can be revised later in the month, or the following month, when accurate data is available.

From the “Hours” page, select the GBU and the period (month and year) that is being reported. The system only allows hours to be entered for the period selected. MTD and PTD figures are calculated totals based on the sum of all monthly entries. To enter or correct a prior period entry, simply select that month from the drop-down box and correct the figures for that month.

Be sure to select the correct month and year when entering hours.

Hours must be entered for each (as applicable) of six different labor categories. The categories are as follows:

- Contractor (Field/Craft)
- Contractor (Office/Admin)
- JV Partner (Field/Craft)
- JV Partner (Office/Admin)
- Parsons Employee (Field/Craft)
- Parsons Employee (Office/Admin)

Monthly Statistics Summary Reports

The on-line reporting system automatically calculates incident rates based on incidents and hours entered into the system. To view the statistics, select the “Reports” page from the on-line system. Select “Parsons Safety Statistics Summary”, the appropriate GBU, and the appropriate period. (NOTE: The system does not yet provide reports at the Division and Sector level. That enhancement is pending.) Use the checkboxes to select the labor categories desired.

Contact Rick McAlpin or Jim Owen for Assistance

Initial Incident Report Fields

1. GBU – Select the GBU from the drop down box. Incidents are reported primarily by project, and the GBU should reflect the unit responsible for the project. This may be different from the GBU that employees the person injured.
2. Field Project Name, Office Location or Other – If the applicable project is listed in the "Field Project" list, select from that box. If not, and if the incident occurred in a Parsons corporate office, select the office from the drop box. Otherwise, type in the name of the responsible organizational unit in the "Other" field. The GBU must be selected BEFORE attempting to select a Project/Office. Do NOT select both a field project AND an Office Location (or Other). If the appropriate Project or Office name can not be found, manually enter it into the "Other" field.
3. Job and WBS Numbers – These fields should reflect the charge number responsible for the incident. In general, that will be the number that the employee was charging at the time of the incident. Projects are responsible for visitors, regardless of what charge number they use while visiting the job. For example, if the Division Manager is injured while visiting Project X, the project number is entered, not the division overhead account.
4. Near Miss – Check this box if the report is for a near miss only (no injury or property damage occurred).
5. Emergency Response Notified – Check this box if fire, police or ambulance was called as a result of the incident.
6. Three or More Employees Hospitalized – Check this box if three or more employees were injured as the result of a single incident. In this case, the GBU or Corporate Safety Manager must also be immediately notified by telephone.
7. Extent of Injury – Select the appropriate radio button. First aid cases are as defined by OSHA 1904 criteria. All other injuries are considered recordable.
8. Restricted Duty (# of days) – If the injured person was limited (by a physician) to less than normal work duration or duties, enter the number of days. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury.
9. Days Away From Work (# of days) – If the injured person was ordered by a physician not to return to work, enter the number of days missed. Estimate the days if unknown, and correct the number later. NOTE: this is the number of CALENDAR days (not scheduled work days), and it does NOT include the day of the injury. Injuries with Days Away From Work require a phone call to the GBU President within 4 hours.
10. Fatality (Date of Death) – In the event of a work related fatality, enter the date of death here. NOTE: Fatalities require immediate phone notification of the Division Manager, GBU President, GBU Safety Manager, and Corporate Safety Manager.
11. Property Damage – Check the appropriate boxes if applicable.
12. Place – Describe the exact location that incident occurred. For example, "in the north stairwell of building 21, between the second and third floor."
13. Date – This field reflects the date the incident occurred, not necessarily the date it was reported. If the exact date is not known, an estimate should be used.
14. Time – This field reflects the time of day that the incident occurred. If the exact time is not known, an estimate should be used.
15. Incident Description – Provide a detailed description of the incident. This is a memo field and text will scroll down the window as it is entered. Use as much space as needed to accurately describe the incident and the resulting injuries.

16. Reported by – This field defaults to the employee login ID that was used to access PWeb. However, the field can be over-written if needed.
17. Name – First and last name of the injured party.
18. Status – Select the most appropriate category from the drop box (Employee - Field, Subcontractor - Field, Partner - Field, Employee - Office, Subcontractor - Office, Partner - Office or 3rd Party).
19. Trade/Function – Select the most appropriate category from the drop box.

Parsons Project Incident/Accident Report Form

PLEASE PRINT

Attach all supplemental documentation, including photos, diagrams, witness statements and field reports

PROJECT Information	Project Title		Location	
	Subcontractor			
	Address			
	City, State, Zip			
	Contact Name		Phone Number	

INCIDENT Type	☐ **Worker's Compensation** ☐ Emergency Response Notified (Police, Fire, Medic, etc.) ☐ First-Aid Only ☐ Recordable Injury	☐ **General Liability** ☐ Bodily Injury/Illness ☐ Real Property Damage ☐ Personal Property Damage ☐ Utility Property Damage	☐ **Builder's Risk** ☐ Equipment ☐ Supplies ☐ Machinery ☐ Work

Incident Location	Date of Loss		Time of Loss	
	Place (exact location)			

Incident Description	Detailed Description of Accident

Worker's Comp Or Personal Injury (circle one)	Injured Name			
	Address			
	City, State, Zip			
	Home Phone		Date of Birth	
	Nature of Injury			
	Medical Facility		Work Status	
	Treatment Received			

Property Damage Or Builder's Risk (circle one)	Owner's Name			
	Address			
	City, State, Zip			
	Home Phone		Work Phone	
	Damage Type		Estimated Cost	
	Utility Type		Marked or Unmarked	
	Description of Damage			

WITNESS Information	Name			
	Address			
	City, State, Zip			
	Home Phone		Work Phone	
	Where to contact		Time to contact	

Contractor Subcontractor Action	Describe actions taken

Signature ______________________ Employer ______________________

Print Name ______________________ Date ______________________

Phone No. ______________________ Fax Number ______________________

APPENDIX D ARMY ACCIDENT REPORTING REQUIREMENTS (5 APRIL 2004)

ARMY ACCIDENT REPORT FORM (ENG FORM 3394)

CEHNC-SO (385-10f) 5 April 2004

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Accident Reporting Requirements

1. References:

a. AR 385-40, Accident Reporting, 1 November 1994

b. U.S. Army Corps of Engineer (USACE) Draft Supplement 1 to AR 385-40, 5 October 2000

c. USASC Message, CSSC-Z, 081810Z Jun 01, subject: Clarification of Army Accident Classes

d. CEHNCR 385-1-1, Safety and Occupational Health Program Management, 19 June 1997

e. EM 385-1-1, U.S. Army Corps of Engineers Safety Manual, 03 November 2003

2. Accident Definitions:

a. Class A - Fatality or permanent total disability (Government Civilian, Military Personnel, and/or Contractor), or > $1,000,000 property damage*.

b. Class B - Permanent partial disability or inpatient hospitalization of 3 or more persons (Government Civilian, Military Personnel, and/or Contractor), $200,000 ≤ $1,000,000 property damage*.

c. Class C - Lost Workday (Contractor) or Lost Time (Government Civilian and Military Personnel), $20,000 ≤ $200,000 property damage*.

d. Class D - $2000 ≤ $20,000 property damage*.

*Property damage examples - rental cars, leased items/equipment, GSA property, Huntsville Center (HNC) property, installation property, land owner property.

3. All accidents meeting the definitions above, both contactor and government civilian, are to be reported immediately. Government civilian accidents are to be reported to the first line supervisor; for contractor accidents, either the project manager (PM), contracting officer (KO), contracting officer representative (COR) and/or resident engineer (RE) herein referred to as the "Government Designated Authority (GDA)", who by position is responsible for overseeing, managing, directing, and/or administering the project/activity, operation, material

or person(s) involved at the time of an accident. The supervisor or GDA upon learning of an accident must promptly contact the CEHNC Safety Office and provide a brief summary of the events surrounding the accident. The Safety Office will notify the Command Group.

4. In addition to the accidents described in paragraph 2, the following conditions must also be reported per the guidance outlined in paragraph 3.

a. Army civilian or contractor personnel injured while on duty or on TDY status. Exception: Contractor employee injuries, occupational illnesses, and property damage accidents that occur away from, and involve activities unrelated to, a Corps project/activity for which the contractor is working, are not required to be reported.

b. Accidents or mishaps incident to a Corps project/activity that could cause embarrassment to USACE.

c. Serious near misses.

d. Injuries to CEHNC military personnel, on or off-duty.

e. Medical expenses incurred by government civilians regardless of whether or not the injury meets one of the accident definitions above.

5. For government civilian accidents the supervisor is responsible for investigating the accident. For contractor accidents occurring incident to a CEHNC project/activity, the contractor is responsible for performing the accident investigation in accordance with the contractor's accepted Accident Prevention Plan (APP). The investigation is the supervisor's or contractor's documented internal review, analysis and account of the accident, based on factual information gathered by a thorough and conscientious examination of all causal factors. Its purpose is PREVENTION. Therefore, it is essential for the supervisor or contractor to take positive measures and any necessary corrective actions to prevent future occurrences. At the conclusion of the investigation, the supervisor or contractor must submit a completed original ENG Form 3394, with its instructions to the CEHNC Safety Office for review and processing within 5 working days following the accident. A copy of the ENG Form 3394 can be found at:

http://www.hnd.usace.army.mil/engrdir/organization/systems-eng/Safety/safety2.htm

This form must be routed through the appropriate Director's office for review and signature prior to submitting to the Safety Office.

6. On the original ENG Form 3394, if block 11b is checked "Yes," the job/activity hazard analysis for the task/activity being performed at the time of the accident must be submitted as an attachment. If the block is checked "No," and the accident is on a project/activity for which EM 385-1-1, Corps Safety Manual is applicable, an activity hazard analysis must be developed and submitted to the CEHNC Safety Office for review and acceptance prior to resuming the specific work activity being performed at the time of the accident. The CEHNC Safety Office will assess the adequacy of the investigation as described in the ENG Form 3394 along with all submitted analyses to determine whether the information provided is acceptable. If the investigation report is found acceptable, the Safety Office will notify the supervisor or GDA that the specific work activity may resume.

7. For government civilian claims, all Class A through C accidents require the submission of a Department of Labor (DOL) Form CA-1 (injury), CA-2 (illness/disease/stress) or CA-6 (fatality) in addition to the ENG Form 3394. Please note that a CA-1 or CA-2 is a mandatory submission if medical expenses are incurred. The employee is responsible for completing and submitting the appropriate form to their immediate supervisor for processing. The supervisor is responsible for reviewing, signing and delivering the form to the CEHNC Safety Office for processing. The CA-1 and CA-2 forms are time sensitive and must be submitted within 15 working days from the date of the accident. A timely submission will ensure the forms reach the Office of Workers' Compensation Program (OWCP) administrator as required and expedites the judicious payment of expenses incurred. In the unlikely event a fatality should occur, please call the Safety Office immediately.

8. If assistance is needed in reporting or investigating accidents, please contact the undersigned at 256-895-1583 or Greg Bayuga, 256-895-1596. Completed sample forms are available in the Safety Office.

/s/
CHARLES R. (RAY) WAITS, JR.
Chief, Safety and Occupational
Health Office

DISTRIBUTION:

A & B (Branch Level)
CEHNC-SO (Williams, Bayuga, Plyler, Taylor, Griffin, Sawyers)

(For Safety Staff only)	REPORT NO.	EROC CODE	UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT	h. EMPLOYMENT STATUS AT TIME OF ACCIDENT
	☐ ON DUTY ☐ TDY ☐ OFF DUTY	☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)* ______

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*	b. TIME OF ACCIDENT *(Military time)* hrs	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME (1) PRIME: (2) SUBCONTRACTOR:
e. CONTRACT NUMBER ______ ☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)* ______	f. TYPE OF CONTRACT ☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)* ______	g. HAZARDOUS/TOXIC WASTE ACTIVITY ☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)* ______	

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

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 help menu)*

a. SEVERITY OF ILLNESS/INJURY (CODE) #	B. ESTIMATED DAYS LOST	C. ESTIMATED DAYS HOSPIT-ALIZED	D. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED	g. TYPE AND SOURCE OF INJURY/ILLNESS
PRIMARY ______ (CODE) #	TYPE ______ (CODE) #
SECONDARY ______ (CODE) #	SOURCE ______ (CODE) #
f. NATURE OF ILLNESS / INJURY ______ (CODE) #	

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT (CODE) #	b. PERSONAL FLOATATION DEVICE USED? ☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE	b. TYPE OF COLLISION	c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
☐ PICKUP/VAN ☐ AUTOMOBILE	☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END	(1) FRONT SEAT			
☐ TRUCK ☐ OTHER *(Specify)* ______	☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)* ______	(2) REAR SEAT			

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 help menu)*

a. TYPE OF VESSEI/FLOATING PLANT (CODE) #	b. TYPE OF COLLISION/MISHAP (CODE) #

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)	YES	NO	a. *(CONTINUED)*	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐	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?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐	OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐	SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐	PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐	DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐	b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?		
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐	☐ YES *(If yes, attach a copy.)* ☐ NO		

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(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 COMPLETING REPORT	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL
CORPS ______ CONTRACTOR ______			

16. MANAGEMENT REVIEW *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

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

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE *(Continuation)*

13b. INDIRECT CAUSES *(Continuation)*

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

GENERAL. Complete a separate report for each person who was *injured, caused,* or *contributed* to the accident (excluding uninjured personnel and witnesses). Use of this form for reporting USACE employee first-aid type injuries not submitted to the Office of Workers' Compensation Programs (OWCP) shall be at the descretion of the FOA commander. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16. and 17.

INSTRUCTIONS FOR SECTION 1 — ACCIDENT CLASSIFICATION. *(Mark All Boxes That Are Applicable.)*

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of OWCP Forms CA-1 (injury), CA-2 (illness), or CA-6 (fatality) to OWCP; mark if accident resulted in military personnel lost-time or fatal injury or illness.

(2) PROPERTY DAMAGE — Mark the appropriate box if accident resulted in any damage of $1000 or more to government property (including motor vehicles).

(3) VEHICLE INVOLVED — Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY — Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in any contractor lost-time injury/illness or fatality.

(2) PROPERTY DAMAGE — Mark the appropriate box if accident resulted in any damage of $1000 or more to contractor property (including motor vehicles).

(3) VEHICLE INVOLVED — Mark if accident involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY — Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.

(1) INJURY/ILLNESS/FATALITY — Mark if accident resulted in public fatality or permanent total disability. (The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander).

(2) VOID SPACE — Make no entry.

(3) VEHICLE INVOLVED — Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, *regardless* of whether "INJURY/ILLNESS/FATALITY" is marked.

(4) VOID SPACE — Make no entry.

INSTRUCTIONS FOR SECTION 2 — PERSONAL DATA

a. NAME — (MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS). Enter last name, first name, middle initial of person involved.

b. AGE — Enter age.

c. SEX — Mark appropriate box.

d. SOCIAL SECURITY NUMBER — (FOR GOVERNMENT PERSONNEL ONLY) Enter the social security number (or other personal identification number if no social security number issued).

e. GRADE — (FOR GOVERNMENT PERSONNEL ONLY) Enter pay grade. Example: O-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE — For *government civilian employees* enter the pay plan, full series number, and job title, e.g. GS-0810/Civil Engineer. For *military personnel* enter the primary military occupational specialty (PMOS), e.g., 15A30 or 11G50. For *contractor employees* enter the job title assigned to the injured person, e.g. carpenter, laborer, surveyor, etc.,

g. DUTY STATUS — Mark the appropriate box.

(1) ON DUTY — Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.

(2) TDY - Person was on official business, away from the duty station and with travel orders at time of accident. Line-of-duty investigation required.

(3) OFF DUTY - Person was not on official business at time of accident

h. EMPLOYMENT STATUS — (FOR GOVERNMENT PERSONNEL ONLY) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

INSTRUCTION FOR SECTION 3 — GENERAL INFORMATION

a. DATE OF ACCIDENT — Enter the month, day, and year of accident.

b. TIME OF ACCIDENT — Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).

c. EXACT LOCATION OF ACCIDENT — Enter facts needed to locate the accident scene. (installation/project name, building number, street, direction and distance from closest landmark, etc.,).

d. CONTRACTOR NAME

(1) PRIME — Enter the exact name (title of firm) of the prime contractor.

(2) SUBCONTRACTOR — Enter the name of any subcontractor involved in the accident.

e. CONTRACT NUMBER — Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.

f. TYPE OF CONTRACT — Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

g. HAZARDOUS/TOXIC WASTE ACTIVITY (HTW) — Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (IRP) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (FUDS) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

INSTRUCTIONS FOR SECTION 4 — CONSTRUCTION ACTIVITIES

a. CONSTRUCTION ACTIVITY — Select the *most appropriate* construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

CONSTRUCTION ACTIVITY LIST

1. MOBILIZATION	14. ELECTRICAL
2. SITE PREPARATION	15. SCAFFOLDING/ACCESS
3. EXCAVATION/TRENCHING	16. MECHANICAL
4. GRADING (EARTHWORK)	17. PAINTING
5. PIPING/UTILITIES	18. EQUIPMENT/MAINTENANCE
6. FOUNDATION	19. TUNNELING
7. FORMING	20. WAREHOUSING/STORAGE
8. CONCRETE PLACEMENT	21. PAVING
9. STEEL ERECTION	22. FENCING
10. ROOFING	23. SIGNING
11. FRAMING	24. LANDSCAPING/IRRIGATION
12. MASONRY	25. INSULATION
13. CARPENTRY	26. DEMOLITION

b. TYPE OF CONSTRUCTION EQUIPMENT—Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

CONSTRUCTION EQUIPMENT

1. GRADER
2. DRAGLINE
3. CRANE (ON VESSEL/BARGE)
4. CRANE (TRACKED)
5. CRANE (RUBBER TIRE)
6. CRANE (VEHICLE MOUNTED)
7. CRANE (TOWER)
8. SHOVEL
9. SCRAPER
10. PUMP TRUCK (CONCRETE)
11. TRUCK (CONCRETE/TRANSIT MIXER)
12. DUMP TRUCK (HIGHWAY)
13. DUMP TRUCK (OFF HIGHWAY)
14. TRUCK (OTHER)
15. FORKLIFT
16. BACKHOE
17. FRONT-END LOADER
18. PILE DRIVER
19. TRACTOR (UTILITY)
20. MANLIFT
21. DOZER
22. DRILL RIG
23. COMPACTOR/VIBRATORY ROLLER
24. OTHER

INSTRUCTIONS FOR SECTION 5—INJURY/ILLNESS INFORMATION

a. SEVERITY OF INJURY / ILLNESS - Reference para 2-10 of USACE Suppl 1 to AR 385-40 and enter code and description from list below.

NOI NO INJURY
FAT FATALITY
PTL PERMANENT TOTAL DISABILITY
PPR PERMANENT PARTIAL DISABILITY
LWD LOST WORKDAY CASE INVOLVING DAYS AWAY FROM WORK
NLW RECORDABLE CASE WITHOUT LOST WORKDAYS
RFA RECORDABLE FIRST AID CASE
NRI NON-RECORDABLE INJURY

b. ESTIMATED DAYS LOST—Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED—Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY—Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED—Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

GENERAL BODY AREA	CODE	BODY PART NAME
ARM/WRIST	AB	ARM AND WRIST
	AS	ARM OR WRIST
TRUNK, EXTERNAL MUSCULATURE	B1	SINGLE BREAST
	B2	BOTH BREASTS
	B3	SINGLE TESTICLE
	B4	BOTH TESTICLES
	BA	ABDOMEN
	BC	CHEST
	BL	LOWER BACK
	BP	PENIS
	BS	SIDE
	BU	UPPER BACK
	BW	WAIST
	BZ	TRUNK OTHER
HEAD, INTERNAL	C1	SINGLE EAR INTERNAL
	C2	BOTH EARS INTERNAL
	C3	SINGLE EYE INTERNAL
	C4	BOTH EYES INTERNAL
	CB	BRAIN
	CC	CRANIAL BONES
	CD	TEETH
	CJ	JAW
	CL	THROAT, LARYNX
	CM	MOUTH
	CN	NOSE
	CR	THROAT, OTHER
	CT	TONGUE
	CZ	HEAD OTHER INTERNAL
ELBOW	EB	BOTH ELBOWS
	ES	SINGLE ELBOW
FINGER	F1	FIRST FINGER
	F2	BOTH FIRST FINGERS
	F3	SECOND FINGER
	F4	BOTH SECOND FINGERS
	F5	THIRD FINGER
	F6	BOTH THIRD FINGERS
	F7	FOURTH FINGER
	F8	BOTH FOURTH FINGERS
TOE	G1	GREAT TOE
	G2	BOTH GREAT TOES
	G3	TOE OTHER
	G4	TOES OTHER
HEAD, EXTERNAL	H1	EYE EXTERNAL
	H2	BOTH EYES EXTERNAL
	H3	EAR EXTERNAL
	H4	BOTH EARS EXTERNAL
	HC	CHIN
	HF	FACE
	HK	NECK/THROAT
	HM	MOUTH/LIPS
	HN	NOSE
	HS	SCALP
KNEE	KB	BOTH KNEES
	KS	KNEE
LEG, HIP, ANKLE, BUTTOCK	LB	BOTH LEGS/HIPS/ ANKLES/BUTTOCKS
	LS	SINGLE LEG/HIP ANKLE/BUTTOCK
HAND	MB	BOTH HANDS
	MS	SINGLE HAND
FOOT	PB	BOTH FEET
	PS	SINGLE FOOT
TRUNK, BONES	R1	SINGLE COLLAR BONE
	R2	BOTH COLLAR BONES
	R3	SHOULDER BLADE
	R4	BOTH SHOULDER BLADES
	RB	RIB
	RS	STERNUM (BREAST BONE)
	RV	VERTEBRAE (SPINE; DISC)
	RZ	TRUNK BONES OTHER
SHOULDER	SB	BOTH SHOULDERS
	SS	SINGLE SHOULDER
THUMB	TB	BOTH THUMBS
	TS	SINGLE THUMB
TRUNK, INTERNAL ORGANS	V1	LUNG, SINGLE
	V2	LUNGS, BOTH
	V3	KIDNEY, SINGLE
	V4	KIDNEYS, BOTH
	VH	HEART
	VL	LIVER
	VR	REPRODUCTIVE ORGANS
	VS	STOMACH
	VV	INTESTINES
	VZ	TRUNK, INTERNAL; OTHER

f. NATURE OF INJURY/ILLNESS - Select the most appropriate nature of injury / illness from the list below. This nature of injury / illness shall correspond to the primary body part selected in 5e, above. Enter the nature of injury / illness name on the line and place the corresponding CODE letters in the box provided.

* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
*TRAUMATIC INJURY OR DISABILITY	TA	AMPUTATION
	TB	BACK STRAIN.
	TC	CONTUSION; BRUISE; ABRASION
	TD	DISLOCATION
	TF	FRACTURE
	TH	HERNIA
	TK	CONCUSSION
	TL	LACERATION, CUT
	TP	PUNCTURE
	TS	STRAIN, MULTIPLE
	TU	BURN, SCALD, SUNBURN
	TI	TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS
	TR	TRAUMATIC RESPIRATORY DISEASE
	TQ	TRAUMATIC FOOD POISONING
	TW	TRAUMATIC TUBERCULOSIS
	TX	TRAUMATIC VIROLOGICAL/ INFECTIVE/PARASITIC DISEASE
	T1	TRAUMATIC CEREBRAL VASCULAR CONDITION/STROKE
	T2	TRAUMATIC HEARING LOSS
	T3	TRAUMATIC HEART CONDITION
	T4	TRAUMATIC MENTAL DISORDER; STRESS; NERVOUS CONDITION
	T8	TRAUMATIC INJURY — OTHER (EXCEPT DISEASE, ILLNESS)

**A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which doses not meet the definition of traumatic injury or disability as described above.

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
**NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY		
RESPIRATORY DISEASE	RA	ASBESTOSIS
	RB	BRONCHITIS
	RE	EMPHYSEMA
	RP	PNEUMOCONIOSIS
	RS	SILICOSIS
	R9	RESPIRATORY DISEASE, OTHER
VIROLOGICAL, INFECTIVE & PARASITIC DISEASES	VB	BRUCELLOSIS
	VC	COCCIDIOMYCOSIS
	VF	FOOD POISONING
	VH	HEPATITIS
	VM	MALARIA
	VS	STAPHYLOCOCCUS
	VT	TUBERCULOSIS
	V9	VIROLOGICAL/INFECTIVE/ PARASITIC—OTHER
DISABILITY, OCCUPATIONAL	DA	ARTHRITIS, BURSITIS
	DB	BACK STRAIN, BACK SPRAIN
	DC	CEREBRAL VASCULAR CONDITION; STROKE
	DD	ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S)
	DE	EFFECT OF ENVIRONMENTAL CONDITION
	DH	HEARING LOSS
	DK	HEART CONDITION
	DM	MENTAL DISORDER, EMOTIONAL STRESS NERVOUS CONDITION
	DR	RADIATION
	DS	STRAIN, MULTIPLE
	DU	ULCER
	DV	OTHER VASCULAR CONDITIONS
	D9	DISABILITY, OTHER

GENERAL NATURE CATEGORY	CODE	NATURE OF INJURY NAME
SKIN DISEASE OR CONDITION	SB	BIOLOGICAL
	SC	CHEMICAL
	S9	DERMATITIS, UNCLASSIFIED

g. TYPE AND SOURCE OF INJURY/ILLNESS (CAUSE) - Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the initiating source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk.
TYPE: 210 (fell on same level) SOURCE: 0110 (walking/working surface)

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/oak.
TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.
TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle..
TYPE: 800 (traveling in) SOURCE: 0421 (government-owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

CODE	TYPE OF INJURY NAME
	STRUCK
0110	STRUCK BY
0111	STRUCK BY FALLING OBJECT
0120	STRUCK AGAINST
	FELL, SLIPPED, TRIPPED
0210	FELL ON SAME LEVEL
0220	FELL ON DIFFERENT LEVEL
0230	SLIPPED, TRIPPED (NO FALL)
	CAUGHT
0310	CAUGHT ON
0320	CAUGHT IN
0330	CAUGHT BETWEEN
	PUNCTURED, LACERATED
0410	PUNCTURED BY
0420	CUT BY
0430	STUNG BY
0440	BITTEN BY
	CONTACTED
0510	CONTACTED WITH (INJURED PERSON MOVING)
0520	CONTACTED BY (OBJECT WAS MOVING)
	EXERTED
0610	LIFTED, STRAINED BY (SINGLE ACTION)
0620	STRESSED BY (REPEATED ACTION)
	EXPOSED
0710	INHALED
0720	INGESTED
0730	ABSORBED
0740	EXPOSED TO
0800	TRAVELING IN

CODE	SOURCE OF INJURY NAME
0100	BUILDING OR WORKING AREA
0110	WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC)
0120	STAIRS, STEPS
0130	LADDER
0140	FURNITURE, FURNISHINGS, OFFICE EQUIPMENT
0150	BOILER, PRESSURE VESSEL
0160	EQUIPMENT LAYOUT (ERGONOMIC)
0170	WINDOWS, DOORS
0180	ELECTRICITY

CODE	SOURCE OF INJURY NAME
0200	ENVIRONMENTAL CONDITION
0210	TEMPERATURE EXTREME (INDOOR)
0220	WEATHER (ICE, RAIN, HEAT, ETC.)
0230	FIRE, FLAME, SMOKE (NOT TOBACCO)
0240	NOISE
0250	RADIATION
0260	LIGHT
0270	VENTILATION
0271	TOBACCO SMOKE
0280	STRESS (EMOTIONAL)
0290	CONFINED SPACE
0300	MACHINE OR TOOL
0310	HAND TOOL (POWERED: SAW, GRINDER, ETC.)
0320	HAND TOOL (NONPOWERED)
0330	MECHANICAL POWER TRANSMISSION APPARATUS
0340	GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK)
0350	VIDEO DISPLAY TERMINAL
0360	PUMP, COMPRESSOR, AIR PRESSURE TOOL
0370	HEATING EQUIPMENT
0380	WELDING EQUIPMENT
0400	VEHICLE
0411	AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE
0412	AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE
0421	DRIVER OF GOVERNMENT VEHICLE
0422	PASSENGER OF GOVERNMENT VEHICLE
0430	COMMON CARRIER (AIRLINE, BUS, ETC.)
0440	AIRCRAFT (NOT COMMERCIAL)
0450	BOAT, SHIP, BARGE
0500	MATERIAL HANDLING EQUIPMENT
0510	EARTHMOVER (TRACTOR, BACKHOE, ETC.)
0520	CONVEYOR (FOR MATERIAL AND EQUIPMENT)
0530	ELEVATOR, ESCALATOR, PERSONNEL HOIST
0540	HOIST, SLING CHAIN, JACK
0550	CRANE
0551	FORKLIFT
0560	HANDTRUCK, DOLLY
0600	DUST, VAPOR, ETC.
0610	DUST (SILICA, COAL, ETC.)
0620	FIBERS
0621	ASBESTOS
0630	GASES
0631	CARBON MONOXIDE
0640	MIST, STEAM, VAPOR, FUME
0641	WELDING FUMES
0650	PARTICLES (UNIDENTIFIED)
0700	CHEMICAL, PLASTIC, ETC.
0711	DRY CHEMICAL—CORROSIVE
0712	DRY CHEMICAL—TOXIC
0713	DRY CHEMICAL—EXPLOSIVE
0714	DRY CHEMICAL—FLAMMABLE
0721	LIQUID CHEMICAL—CORROSIVE
0722	LIQUID CHEMICAL—TOXIC
0723	LIQUID CHEMICAL—EXPLOSIVE
0724	LIQUID CHEMICAL—FLAMMABLE
0730	PLASTIC
0740	WATER
0750	MEDICINE
0800	INANIMATE OBJECT
0810	BOX, BARREL, ETC.
0820	PAPER
0830	METAL ITEM, MINERAL
0831	NEEDLE
0840	GLASS
0850	SCRAP, TRASH
0860	WOOD
0870	FOOD
0880	CLOTHING, APPAREL, SHOES
0900	ANIMATE OBJECT
0911	DOG
0912	OTHER ANIMAL
0920	PLANT
0930	INSECT
0940	HUMAN (VIOLENCE)
0950	HUMAN (COMMUNICABLE DISEASE)
0960	BACTERIA, VIRUS (NOT HUMAN CONTACT)

CODE	SOURCE OF INJURY NAME
1000	PERSONAL PROTECTIVE EQUIPMENT
1010	PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES
1020	RESPIRATOR, MASK
1021	DIVING EQUIPMENT
1030	SAFETY BELT, HARNESS
1040	PARACHUTE

INSTRUCTIONS FOR SECTION 6 — PUBLIC FATALITY

a. ACTIVITY AT TIME OF ACCIDENT—Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the *most* appropriate primary activity area (water related, non-water related or other activity), the code number for "Other", and write in the activity being performed at the time of the accident.

WATER RELATED RECREATION

1. Sailing
2. Boating—powered
3. Boating—unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (skin diving, scuba, etc.)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

NON-WATER RELATED RECREATION

16. Hiking and walking
17. Climbing (general)
18. Camping/picnicking authorized area
19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (baseball, football, etc.)
24. Sports/winter (skiing, sledding, snowmobiling etc.)
25. Cycling (bicycle, motorcycle, scooter)
26. Gliding
27. Parachuting
28. Other non-water related

OTHER ACTIVITIES

29. Unlawful acts (fights, riots, vandalism, etc.)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. PERSONAL FLOTATION DEVICE USED—If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

INSTRUCTIONS FOR SECTION 7—MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE—Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

b. TYPE OF COLLISION—Mark appropriate box.

c. SEAT BELT—Mark appropriate box.

INSTRUCTIONS FOR SECTION 8—PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM—Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

b. OWNERSHIP—Enter ownership for each item listed. (Enter one of the following: *USACE; OTHER GOVERNMENT; CONTRACTOR; PRIVATE)*

c. $ AMOUNT OF DAMAGE—Enter the total estimated dollar amount of damage (parts and labor), if any.

INSTRUCTIONS FOR SECTION 9—VESSEL/FLOATING PLANT ACCIDENT

a. TYPE OF VESSEL/FLOATING PLANT—Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel/floating plant.

VESSEL/FLOATING PLANTS

1. ROW BOAT
2. SAIL BOAT
3. MOTOR BOAT
4. BARGE
5. DREDGE/HOPPER
6. DREDGE/SIDE CASTING
7. DREDGE/DIPPER
8. DREDGE/CLAMSHELL, BUCKET
9. DREDGE/PIPE LINE
10. DREDGE/DUST PAN
11. TUG BOAT
12. OTHER

b. COLLISION/MISHAP—Select from the list below the object(s) that contributed to the accident or were damaged in the accident.

COLLISION/MISHAP

1. COLLISION W/OTHER VESSEL
2. UPPER GUIDE WALL
3. UPPER LOCK GATES
4. LOCK WALL
5. LOWER LOCK GATES
6. LOWER GUIDE WALL
7. HAULAGE UNIT
8. BREAKING TOW
9. TOW BREAKING UP
10. SWEPT DOWN ON DAM
11. BUOY/DOLPHIN/CELL
12. WHARF OR DOCK
13. OTHER

INSTRUCTIONS FOR SECTION 10—ACCIDENT DESCRIPTION

DESCRIBE ACCIDENT—Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

INSTRUCTIONS FOR SECTION 11—CAUSAL FACTORS

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

(1) DESIGN—Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) INSPECTION/MAINTENANCE—Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?

(3) PERSON'S PHYSICAL CONDITION—Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?

(4) OPERATING PROCEDURES—Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) JOB PRACTICES—Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) HUMAN FACTORS—Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) ENVIRONMENTAL FACTORS—Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

(8) CHEMICAL AND PHYSICAL AGENT FACTORS—Did exposure to chemical agents (either single shift exposure or long-term exposure) such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.,), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) OFFICE FACTORS—Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) SUPPORT FACTORS—Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation, etc?

(11) PERSONAL PROTECTIVE EQUIPMENT—Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) DRUGS/ALCOHOL—Is there any reason to believe the person's mental or physical capabilities, judgement, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS—Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. *If one was performed, attach a copy of the analysis to the report.*

INSTRUCTIONS FOR SECTION 12—TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?—For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

b. TYPE OF TRAINING—Mark the appropriate box that best indicates the type of training; (classroom or on-the-job) that the injured person received before the accident happened.

c. DATE OF MOST RECENT TRAINING—Enter the month, day, and year of the last *formal* training completed that covered the activity-task being performed at the time of the accident.

INSTRUCTIONS FOR SECTION 13—CAUSES

a. DIRECT CAUSES—The direct cause is that single factor which most directly lead to the accident. See examples below.

b. INDIRECT CAUSES—Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

Examples for section 13:

a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: failure to provide fall protection at elevation.
Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (note USACE vehicle was in proper/safe working condition).
Direct cause: failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

INSTRUCTIONS FOR SECTION 14—ACTION TO ELIMINATE CAUSE(S)

DESCRIPTION—Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

INSTRUCTIONS FOR SECTION 15—DATES FOR ACTION

a. BEGIN DATE—Enter the date when the corrective action(s) identified in Section 14 will begin.

b. COMPLETE DATE—Enter the date when the corrective action(s) identified in Section 14 will be completed.

c. TITLE AND SIGNATURE—Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE Supervisor shall also sign the report. Upon entering the information required in 15.d, 15.e and 15.f below, the responsible USACE supervisor shall forward the report for management review as indicated in Section 16.

d. DATE SIGNED—Enter the month, day, and year that the report was signed by the responsible supervisor.

e. ORGANIZATION NAME—For GOVERNMENT employee accidents enter the USACE organization name (Division, Branch, Section, etc.) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15.c. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

f. OFFICE SYMBOL—Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15.e.

INSTRUCTIONS FOR SECTION 16—MANAGEMENT REVIEW (1st)

1ST REVIEW—Each USACE FOA shall determine who will provide 1st management review. The responsible USACE supervisor in section 15.c shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (2nd review) for review and comment.

INSTRUCTIONS FOR SECTION 17—MANAGEMENT REVIEW (2nd)

2ND REVIEW—The FOA Staff Chief (i.e., FOA Chief of Construction, Operations, Engineering, Planning, etc.) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

INSTRUCTIONS FOR SECTION 18—SAFETY AND OCCUPATIONAL HEALTH REVIEW

3RD REVIEW—The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc, are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

INSTRUCTION FOR SECTION 19—COMMAND APPROVAL

4TH REVIEW—The FOA Commander shall (to include the person designated Acting Commander in his absence) review the completed report, comment if required, sign, date, and forward the report to the FOA Safety and Occupational Health Office. Signature authority shall not be delegated.

APPENDIX E PARSONS SAFETY STATISTICS SUMMARY, 2000-2004

PARSONS

2000 - 2004 SAFETY STATISTIC SUMMARY

Parsons Employees – Infrastructure & Technology Group

YEAR	MANHOURS	# REC. INJURIES	RIFR	# LOST WORKDAY CASES	LWCR	# LOST WORKDAYS	SEVERITY RATE
2000	10,375,814	54	1.04	27	0.52	161	3.10
2001	8,712,298	45	1.03	21	0.48	64	1.47
2002	9,577,166	60	1.25	26	0.54	285	5.95
2003	6,796,078	66	1.94	26	0.76	375	11.03
*2004	1,565,005	13	1.66	6	0.77	33	4.22

** Information is current through March 2004.*

PARSONS

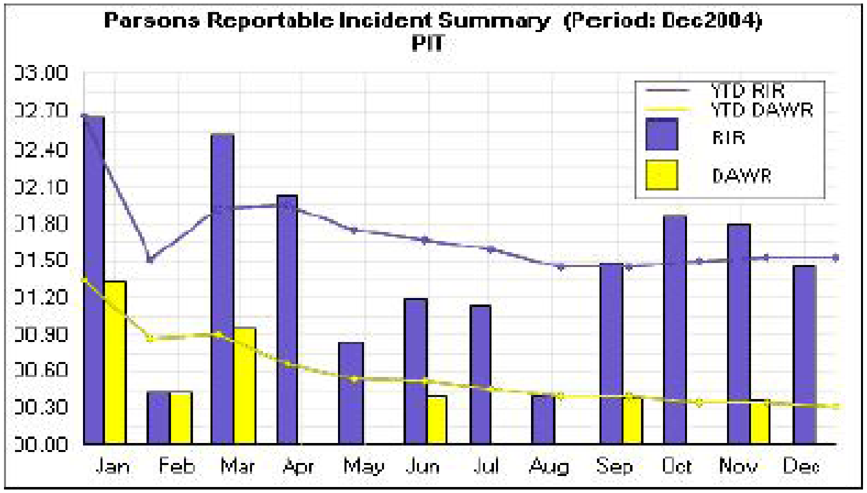
2000 - 2004 SAFETY STATISTIC SUMMARY

Parsons Employees – Overall Corporation

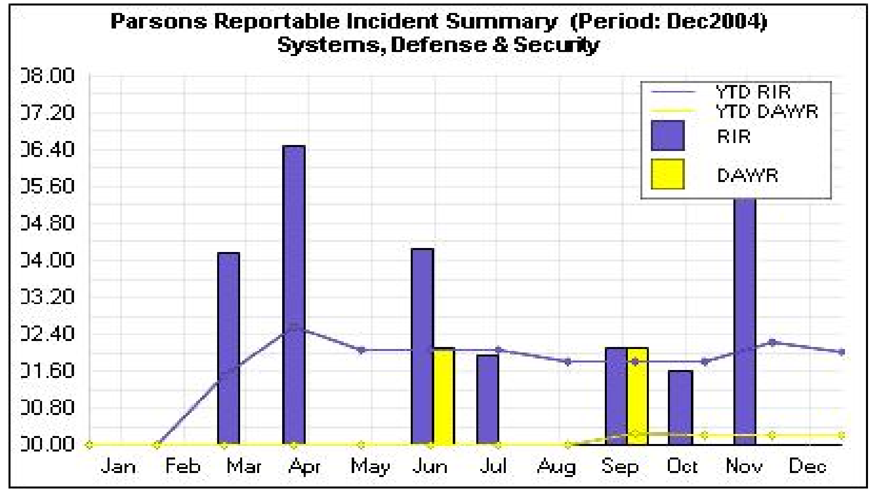
YEAR	MANHOURS	# REC. INJURIES	RIFR	# LOST WORKDAY CASES	LWCR	# LOST WORKDAYS	SEVERITY RATE
2000	27,878,716	211	1.51	93	0.67	960	6.89
2001	25,405,995	166	1.31	71	0.56	385	3.03
2002	18,521,860	141	1.52	65	0.70	618	6.67
2003	17,782,579	123	1.38	46	0.52	729	8.20
*2004	4,279,397	17	0.79	6	0.28	33	1.54

*** Information is current through March 2004.***

APPENDIX F PIT SAFETY PERFORMANCE AND TRENDS



Employees Only - PIT



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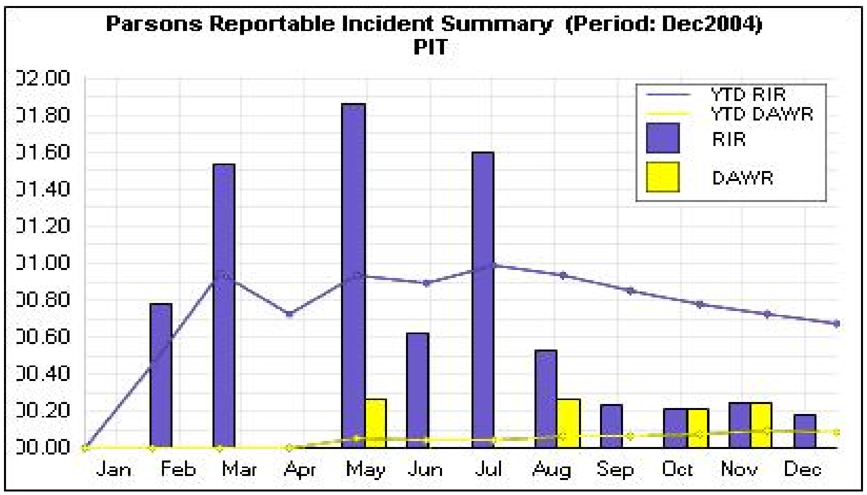
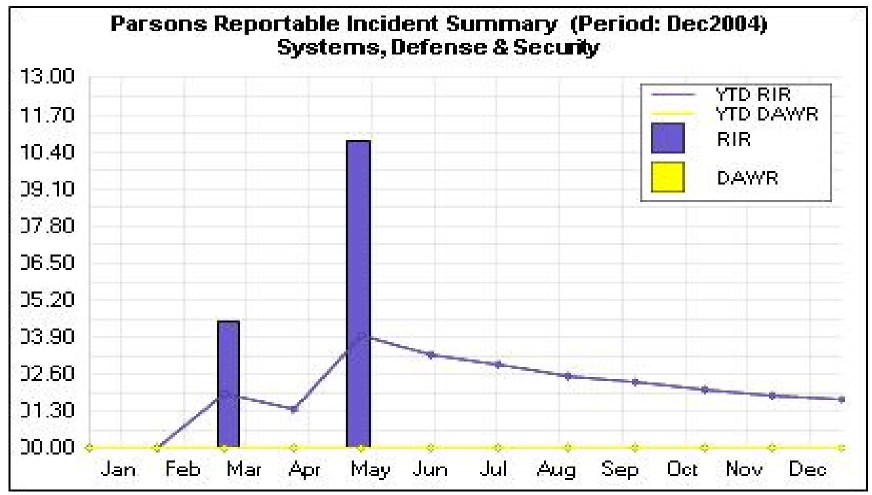


Subcontractors and Others - PIT



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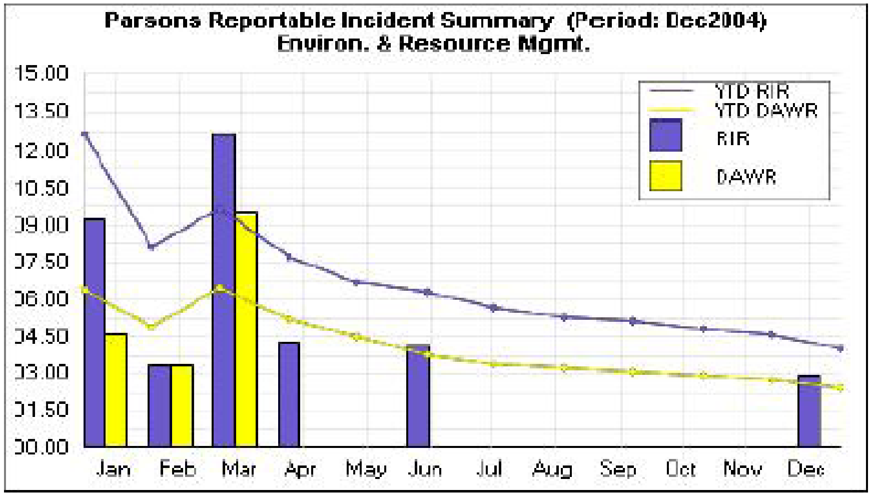
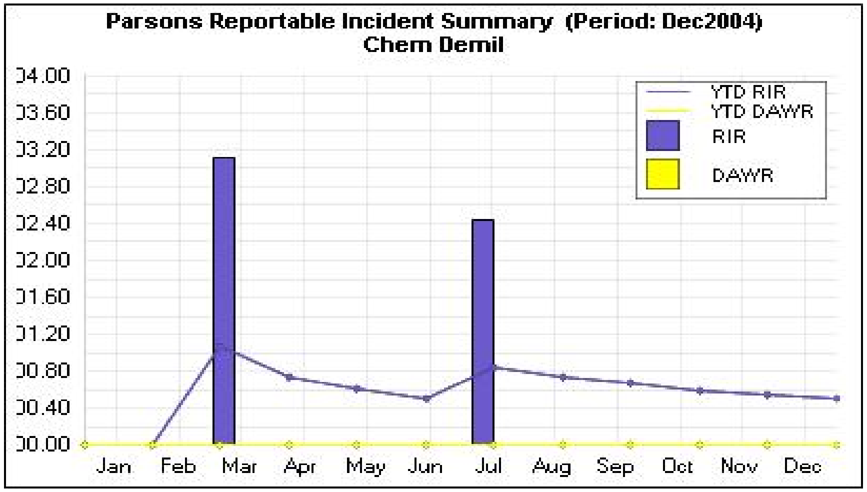
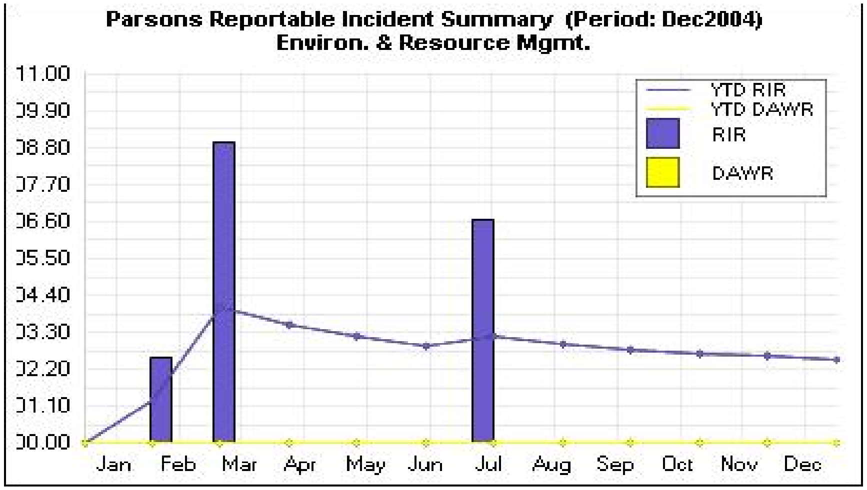


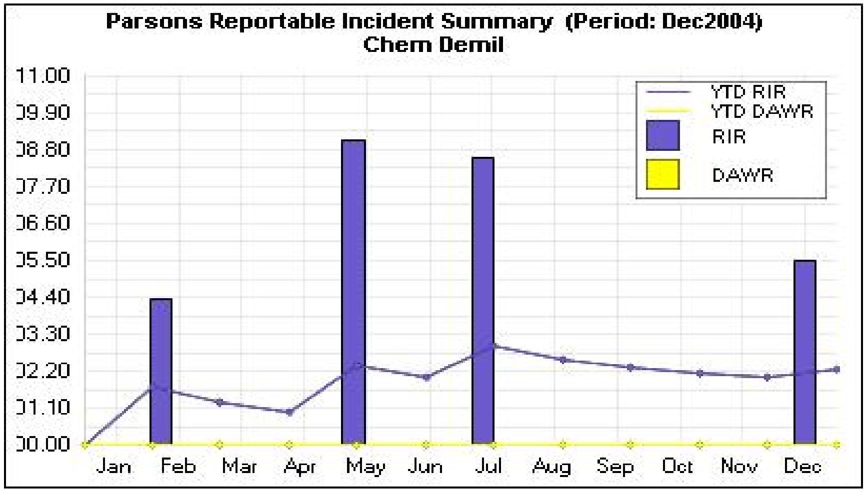
Employees Only - ERM



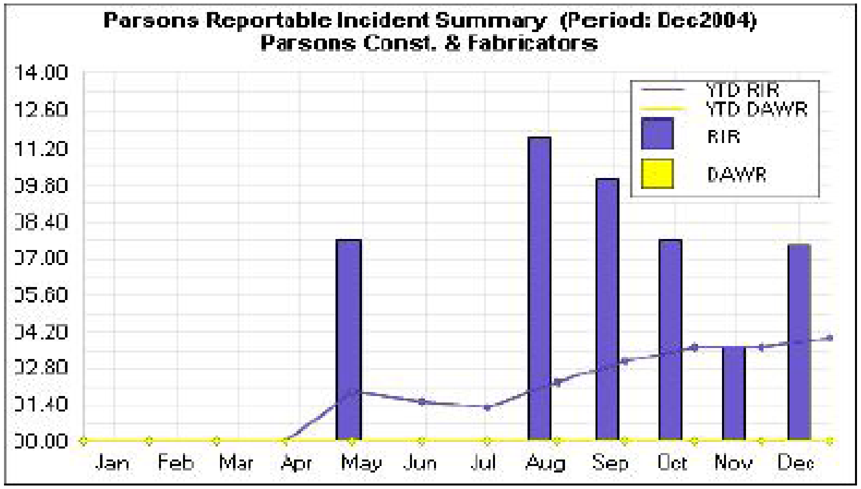
Employees Only - Chem Demil



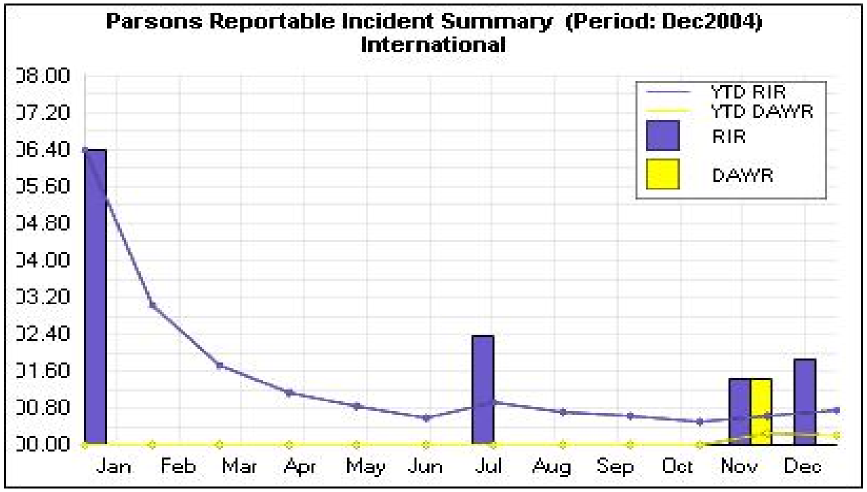
Subcontractors and Others - ERM



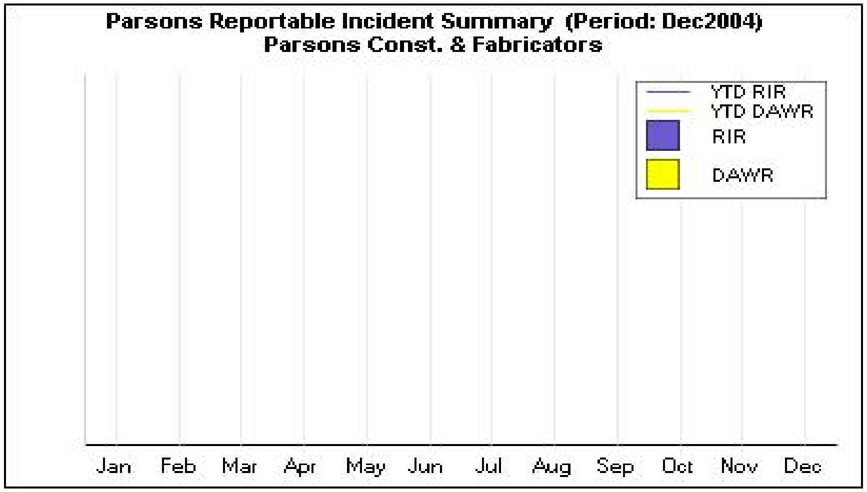
Subcontractors and Others - Chem Demil



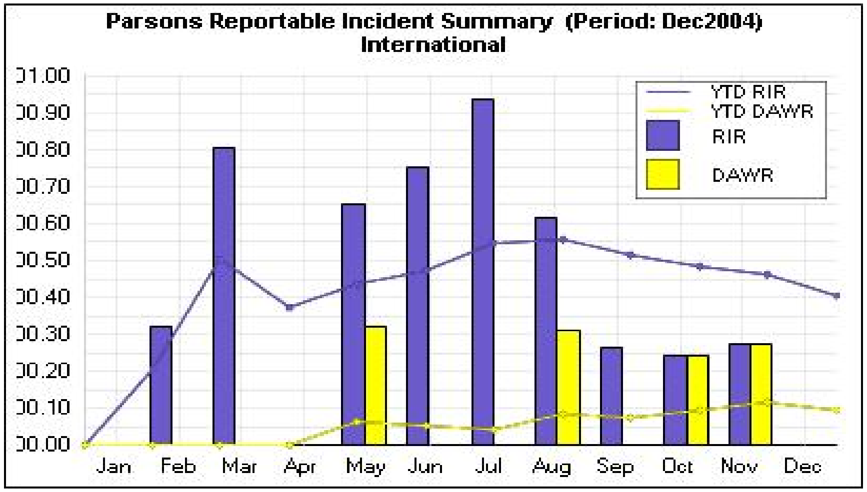
Employees Only - PCFI



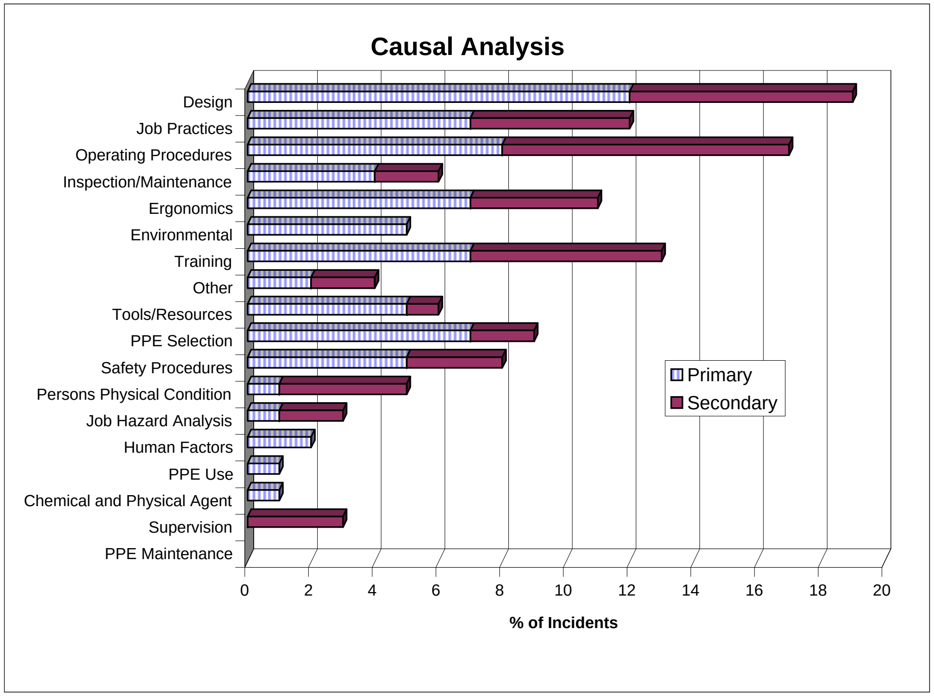
Employees Only - International

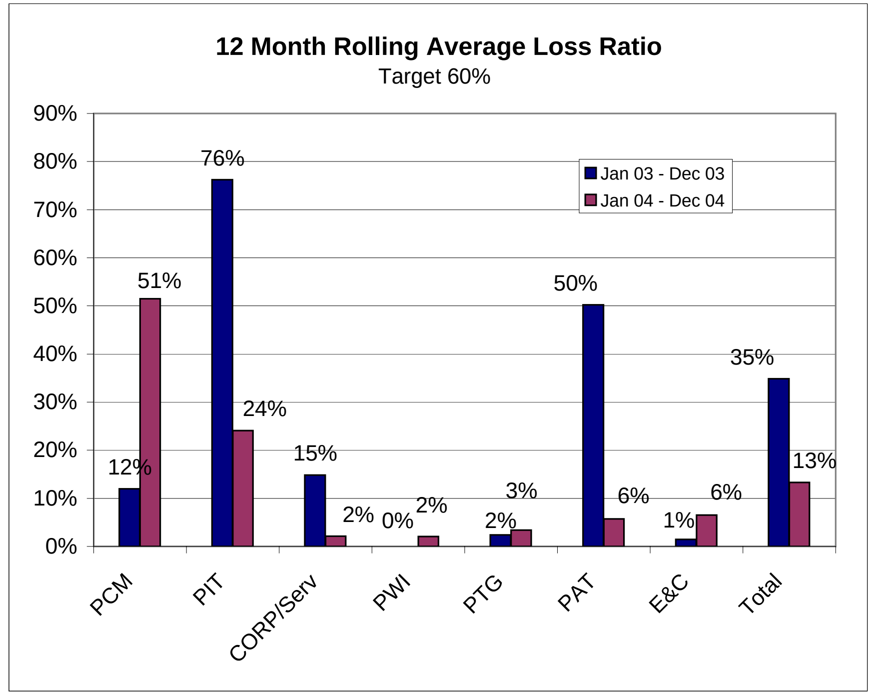


Subcontractors and Others - PCFI



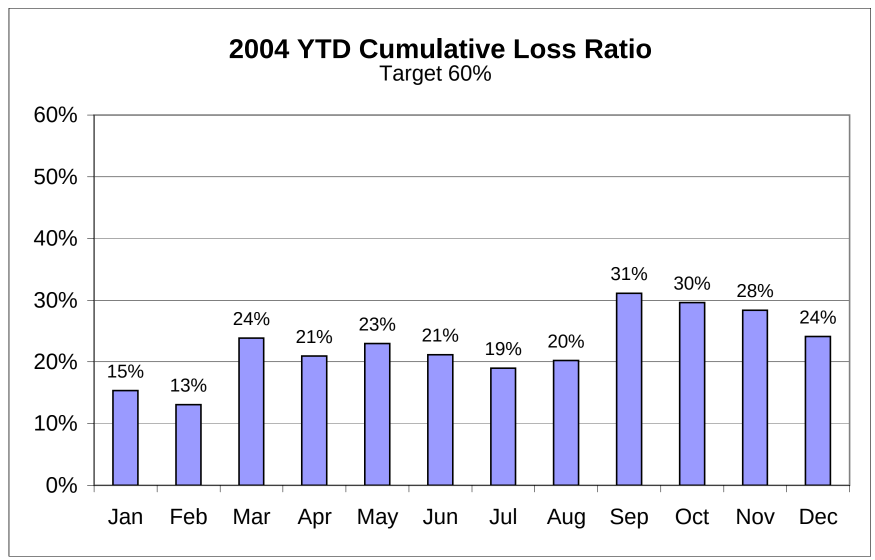
Subcontractors and Others - International

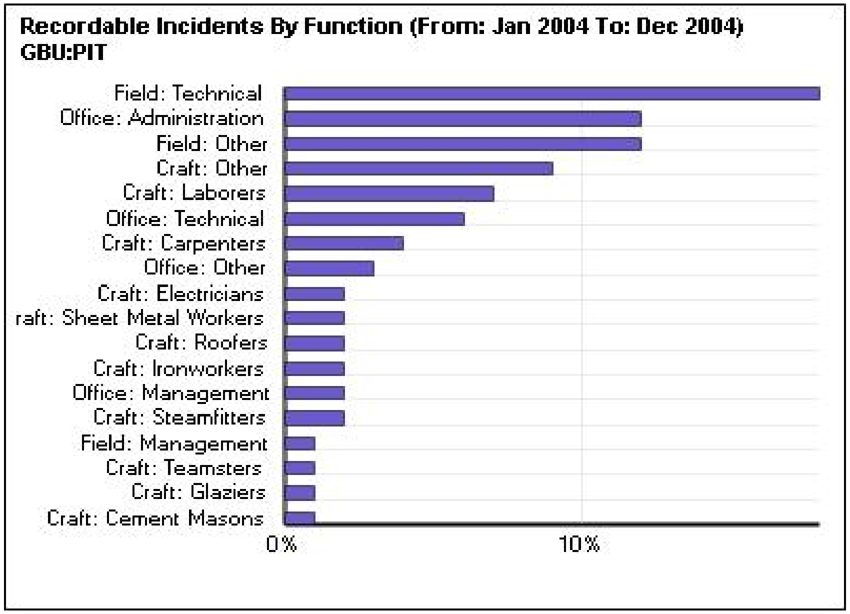


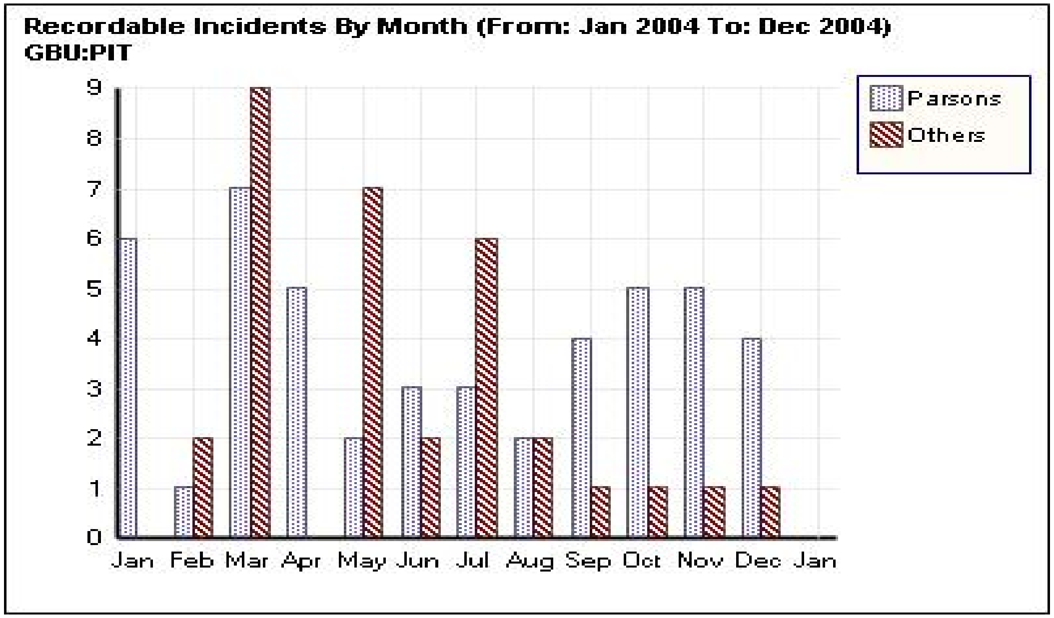


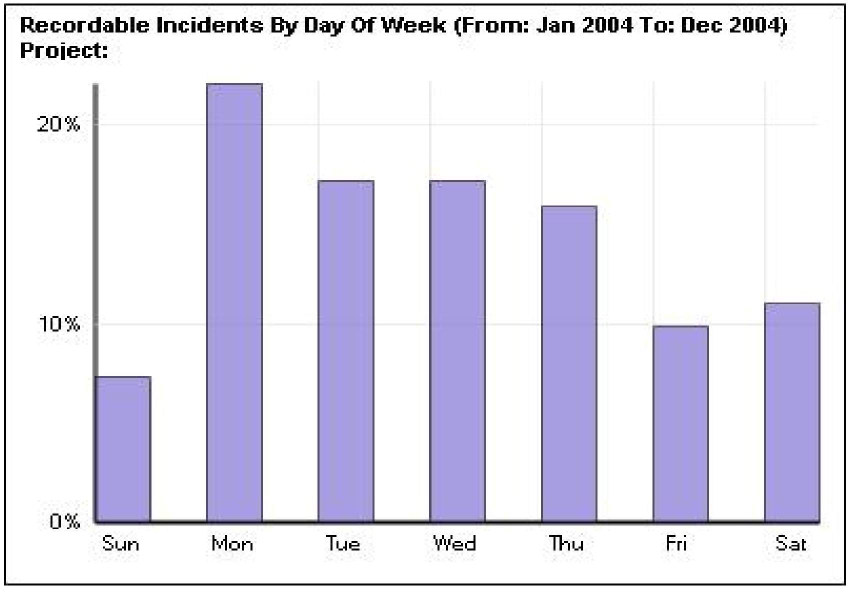
Design - To what degree was the design of facility, workplace, or equipment a factor?
Job Practices - To what degree was the failure to follow job safety/health practices a factor?
Operating Procedures - To what degree were operating procedures a factor?
Safety Procedures - To what degree was the existence or availability of safety procedures a factor?
Environmental - To what degree was heat, cold, sun, glare, etc. a factor?
Ergonomics - To what degree was ergonomics or workplace design a factor?
Tools/Resources - To what degree was inappropriate or inadequate tools or resources a factor?
Training - To what degree was training or the lack thereof a factor?
PPE Selection - To what degree was improper selection of PPE a factor?
Other - What other factors contributed to the incident?
Persons Physical Condition - In your opinion, to what degree was a person's physical condition, such as obesity or limited mobility, a factor?
Inspection/Maintenance - To what degree was Inspection & Maintenance a factor?
Human Factors - To what degree were human factors, such as a person's size or strength, a factor?
Job Hazard Analysis - To what degree was the lack of an adequate activity hazard analysis a factor?
PPE Use - To what degree was improper use of PPE a factor?
Supervision - To what degree was the lack of adequate supervision a factor?
Chemical and Physical Agent - To what degree was exposure to chemical agents, such as dust, fumes, mist, vapors, or physical agents such as noise, radiation, etc. a factor?

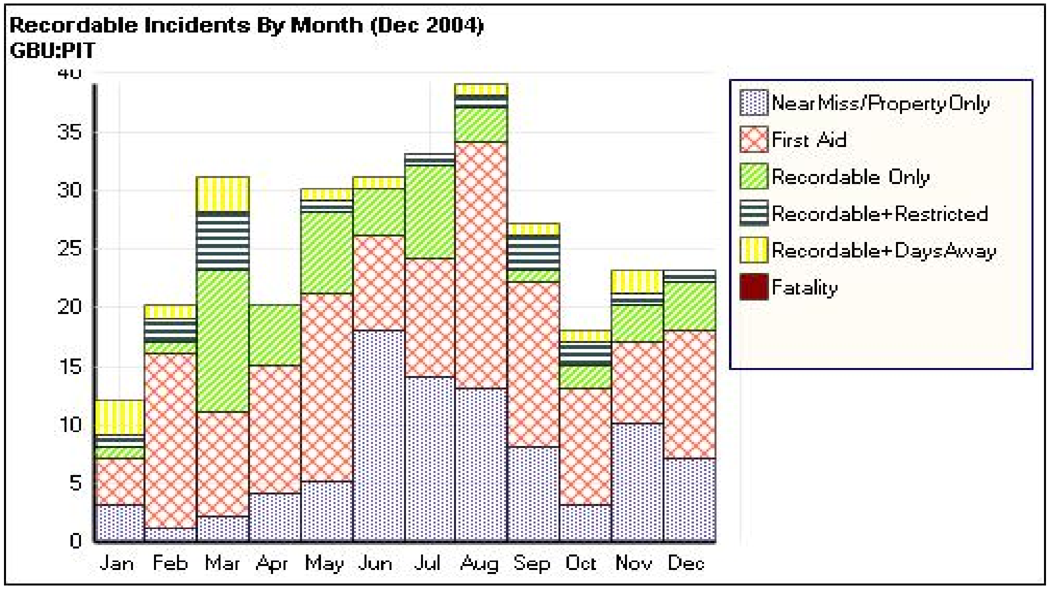
PPE Maintenance - To what degree was improper maintenance of PPE a factor?
Drugs/Alcohol - In your opinion, to what degree were drugs or alcohol a factor?




Recordable Incidents By Function (From: Jan 2004 To: Dec 2004)
GBU:PIT
Field: Technical
Office: Administration
Field: Other
Craft: Other
Craft: Laborers
Office: Technical
Craft: Carpenters
Office: Other
Craft: Electricians
raft: Sheet Metal Workers
Craft: Roofers
Craft: Ironworkers
Office: Management
Craft: Steamfitters
Field: Management
Craft: Teamsters
Craft: Glaziers
Craft: Cement Masons
0%
10%


Recordable Incidents By Month (From: Jan 2004 To: Dec 2004)
GBU:PIT
Parsons
Others
0 1 2 3 4 5 6 7 8 9
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan


Recordable Incidents By Day Of Week (From: Jan 2004 To: Dec 2004)
Project:
0%
10%
20%
Sun Mon Tue Wed Thu Fri Sat


Recordable Incidents By Month (Dec 2004)
GBU:PIT
Near Miss/Property Only
First Aid
Recordable Only
Recordable+Restricted
Recordable+Days Away
Fatality
0 5 10 15 20 25 30 35 40
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Parsons Safety Statistics Summary

Included Statuses: Parsons Employee (Field/Craft), Parsons Employee (Office/Admin)
Included Incident Types: occupational health and safety
Period: December 2004

Project	HOURS WORKED MO.	HOURS WORKED YTD	Recordable Cases Including Lost Time and Fatality Cases MO.	Recordable Cases Including Lost Time and Fatality Cases YTD	Recordable Cases Incident Rate MO.	Recordable Cases Incident Rate YTD	Days Away From Work Cases MO.	Days Away From Work Cases YTD	Days Away From Work Cases Incident Rate MO.	Days Away From Work Cases Incident Rate YTD	Number Of Days Away From Work MO.	Number Of Days Away From Work YTD	Severity Rate MO.	Severity Rate YTD	FATALITIES MO.	FATALITIES YTD
Administration & Office Staff	**177,766**	**2,453,412**	**2**	**14**	**2.25**	**1.14**	**0**	**2**	**0**	**0.16**	**0**	**16**	**0**	**1.3**	**0**	**0**
Division : Chem Demil																
Newport - NECDF (Direct Hire)	68,797	821,961	0	2	0	0.49	0	0	0	0	0	0	0	0	0	0
Totals for Chem Demil	**68,797**	**821,961**	**0**	**2**	**0**	**0.49**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Division : Environ. & Resource Mgmt.																
Huntsville UXO	5,366	104,893	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Ord OE Clean-up	4,964	52,020	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spring Valley	0	2,412	0	1	0	82.92	0	0	0	0	0	0	0	0	0	0
UXB-Kaho'olawe (CLOSED)	0	129,504	0	7	0	10.81	0	6	0	9.27	0	26	0	40.15	0	0
738992 - ACC#2 DY09 RRAD MISC Sites GW Investigation	0	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0
740906 - ACC#2 DY10 RRAD 1025/1027 Invest. (CLOSED)	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
740907 - ACC#2 DY11 RRAD X-1 Investigation	0	2,025	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742529 - ACC#2 DY14 Hays Treatment (CLOSED)	0	432	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742724 - Selfridge UST Remediation (CLOSED)	0	522	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743151 - Grissom AFB (CLOSED)	0	2,021	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743288 - ACC#2 DY17 LSAAP Compliance Monitoring	0	1,023	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743313 Bolling AFB, ENRAC	60	914	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Camp Stanley AOC 55 Removal Action (CLOSED)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Camp Stanley SWMU Closure	470	6,253	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chanute AFB Interim RA LF2 & LF3 (CLOSED)	0	1,556	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COE Buffalo DO-1 Harshaw	0	5,554	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CSSA MW Install, GW Monitor (Camp Stanley Monitoring Wells)	0	4,205	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Everglades Restoration AE SV	17,890	37,687	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RRAD Dual Phase Pilot Study	44	1,742	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(reserved 1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Parsons Safety Statistics Summary

Included Statuses: Parsons Employee (Field/Craft), Parsons Employee (Office/Admin)
Included Incident Types: occupational health and safety
Period: December 2004

	HOURS WORKED		Recordable Cases Including Lost Time and Fatality Cases		Recordable Cases Incident Rate		Days Away From Work Cases		Days Away From Work Cases Incident Rate		Number Of Days Away From Work		Severity Rate		FATALITIES	
Project	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD
(reserved)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(Andrews AFB - Closed)	0	687	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VDMA Diversion Valve	0	169	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFCEE WERC O&M at Tinker AFB	0	4,791	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fernald Services	0	11,252	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Misc. ERM Projects/Field Work	0	92,774	0	2	0	4.31	0	0	0	0	0	0	0	0	0	0
743485 LA AFB SAMS Complex	1,598	4,208	0	0	0	0	0	0	0	0	0	0	0	0	0	0
744255 CSSA SCADA Installation	0	306	0	0	0	0	0	0	0	0	0	0	0	0	0	0
744223 CSSA Construction & Interim Remedial Actions	0	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742220 Maxwell AFB A76 Outsourcing	37,920	41,133	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742340 Navy CAP Support	0	504	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals for Environ. & Resource Mgmt.	**68,312**	**508,772**	**0**	**10**	**0**	**3.93**	**0**	**6**	**0**	**2.36**	**0**	**26**	**0**	**10.22**	**0**	**0**
Division : International																
Iraq - Captured Enemy Ammunition (CEA)	22,851	241,928	0	3	0	2.48	0	1	0	0.83	0	2	0	1.65	0	0
Iraq - Bldgs, Ed & Health DB (743907)	0	259,839	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Russia CTRIC-SLBM	2,792	31,523	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RCWDF	14,607	138,104	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Taji III	2,772	47,904	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Russia CTRIC TORP-52	293	2,657	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Security & Justice DB	25,516	198,018	1	1	7.84	1.01	0	0	0	0	0	0	0	0	0	0
Iraq - PCO Oil North	33,062	102,281	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Water SPMO	0	20,231	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Bechtel/USAID	6,040	37,097	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals for International	**107,933**	**1,079,582**	**1**	**4**	**1.85**	**0.74**	**0**	**1**	**0**	**0.19**	**0**	**2**	**0**	**0.37**	**0**	**0**
Division : Parsons Const. & Fabricators																
Pasco Fabrication Shop	12,057	251,960	0	2	0	1.59	0	0	0	0	0	0	0	0	0	0
Pasco Hanford Fabrication	14,673	54,069	1	4	13.63	14.8	0	0	0	0	0	0	0	0	0	0
Totals for Parsons Const. & Fabricators	**26,730**	**306,029**	**1**	**6**	**7.48**	**3.92**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Division : Systems, Defense & Security																
FAA/TSSC-III Consolidated	57,363	682,583	0	6	0	1.76	0	1	0	0.29	0	2	0	0.59	0	0
NASA-Goddard - Facets	12,032	117,817	0	1	0	1.7	0	0	0	0	0	0	0	0	0	0
Pittsburgh DOE/NETL	11,793	209,644	0	4	0	3.82	0	0	0	0	0	0	0	0	0	0
743591 - LA MATOC Vandenberg GMD	0	35,483	0	1	0	5.64	0	0	0	0	0	0	0	0	0	0
PENREN BERR Project and Master Plan (CLOSED)	0	4,346	0	0	0	0	0	0	0	0	0	0	0	0	0	0
744056 Salt Waste Processing Facility	19,405	135,490	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743926 Glass Waste Storage Building	1,035	16,832	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals for Systems, Defense & Security	**101,628**	**1,202,195**	**0**	**12**	**0**	**2**	**0**	**1**	**0**	**0.17**	**0**	**2**	**0**	**0.33**	**0**	**0**
Totals for GBU	**551,166**	**6,371,951**	**4**	**48**	**1.45**	**1.51**	**0**	**10**	**0**	**0.31**	**0**	**46**	**0**	**1.44**	**0**	**0**

Parsons Safety Statistics Summary

Included Statuses: Contractor (Field/Craft), JV Partner (Field/Craft), Contractor (Office/Admin), JV Partner (Office/Admin)
Included Incident Types: occupational health and safety
Period: December 2004

	HOURS WORKED		Recordable Cases Including Lost Time and Fatality Cases		Recordable Cases Incident Rate		Days Away From Work Cases		Days Away From Work Cases Incident Rate		Number Of Days Away From Work		Severity Rate		FATALITIES	
Project	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD
Administration & Office Staff	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Division : Chem Demil																
Newport - NECDF (Direct Hire)	36,476	542,888	1	6	5.48	2.21	0	0	0	0	0	0	0	0	0	0
Totals for Chem Demil	**36,476**	**542,888**	**1**	**6**	**5.48**	**2.21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Division : Environ. & Resource Mgmt.																
Huntsville UXO	3,684	58,311	0	1	0	3.43	0	0	0	0	0	0	0	0	0	0
Fort Ord OE Clean-up	9,527	159,505	0	4	0	5.02	0	0	0	0	0	0	0	0	0	0
Spring Valley	0	350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UXB-Kaho'olawe (CLOSED)	0	183,662	0	1	0	1.09	0	0	0	0	0	0	0	0	0	0
738992 - ACC#2 DY09 RRAD MISC Sites GW Investigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
740906 - ACC#2 DY10 RRAD 1025/1027 Invest. (CLOSED)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
740907 - ACC#2 DY11 RRAD X-1 Investigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742529 - ACC#2 DY14 Hays Treatment (CLOSED)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742724 - Selfridge UST Remediation (CLOSED)	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743151 - Grissom AFB (CLOSED)	0	246	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743288 - ACC#2 DY17 LSAAP Compliance Monitoring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743313 Bolling AFB, ENRAC	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Camp Stanley AOC 55 Removal Action (CLOSED)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Camp Stanley SWMU Closure	80	2,496	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chanute AFB Interim RA LF2 & LF3 (CLOSED)	0	1,923	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COE Buffalo DO-1 Harshaw	0	4,832	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CSSA MW Install, GW Monitor (Camp Stanley Monitoring Wells)	0	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Everglades Restoration AE SV	2,539	30,136	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RRAD Dual Phase Pilot Study	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(reserved 1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Parsons Safety Statistics Summary

Included Statuses: Contractor (Field/Craft), JV Partner (Field/Craft), Contractor (Office/Admin), JV Partner (Office/Admin)

Included Incident Types: occupational health and safety

Period: December 2004

	HOURS WORKED		Recordable Cases Including Lost Time and Fatality Cases		Recordable Cases Incident Rate		Days Away From Work Cases		Days Away From Work Cases Incident Rate		Number Of Days Away From Work		Severity Rate		FATALITIES	
Project	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD	MO.	YTD
Administration & Office Staff	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
(reserved)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(Andrews AFB - Closed)	0	2,186	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VDMA Diversion Valve	0	114	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AFCEE WERC O&M at Tinker AFB	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fernald Services	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Misc. ERM Projects/Field Work	0	44,200	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743485 LA AFB SAMS Complex	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
744255 CSSA SCADA Installation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
744223 CSSA Construction & Interim Remedial Actions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742220 Maxwell AFB A76 Outsourcing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
742340 Navy CAP Support	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals for Environ. & Resource Mgmt.	**15,830**	**488,166**	**0**	**6**	**0**	**2.46**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Division : International																
Iraq - Captured Enemy Ammunition (CEA)	162,560	1,929,190	0	7	0	0.73	0	1	0	0.1	0	10	0	1.04	0	0
Iraq - Bldgs, Ed & Health DB (743907)	0	532,947	0	1	0	0.38	0	1	0	0.38	0	42	0	15.76	0	0
Russia CTRIC-SLBM	28,258	306,817	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RCWDF	190,506	2,525,223	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Taji II	9,552	1,107,890	0	7	0	1.26	0	0	0	0	0	0	0	0	0	0
Russia CTRIC TORP-52	19,344	287,990	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Security & Justice DB	497,508	946,873	0	2	0	0.42	0	2	0	0.42	0	27	0	5.7	0	0
Iraq - PCO Oil North	15,046	388,615	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Water SPMO	0	76,487	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iraq - Bechtel/USAID	128,304	411,293	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals for International	**1,051,078**	**8,513,325**	**0**	**17**	**0**	**0.4**	**0**	**4**	**0**	**0.09**	**0**	**79**	**0**	**1.86**	**0**	**0**
Division : Parsons Const. & Fabricators																
Pasco Fabrication Shop	1,023	26,848	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasco Hanford Fabrication	2,044	2,188	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals for Parsons Const. & Fabricators	**3,067**	**29,036**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Division : Systems, Defense & Security																
FAA/TSSC-III Consolidated	30,161	361,690	0	2	0	1.11	0	0	0	0	0	0	0	0	0	0
NASA-Goddard - Facets	3,252	48,770	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pittsburgh DOE/NETL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743591 - LA MATOC Vandenberg GMD	0	48,037	0	2	0	8.33	0	0	0	0	0	0	0	0	0	0
PENREN BERR Project and Master Plan (CLOSED)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
744056 Salt Waste Processing Facility	2,291	18,231	0	0	0	0	0	0	0	0	0	0	0	0	0	0
743926 Glass Waste Storage Building	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals for Systems, Defense & Security	**35,704**	**476,728**	**0**	**4**	**0**	**1.68**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Totals for GBU	**1,142,155**	**10,050,143**	**1**	**33**	**0.18**	**0.66**	**0**	**4**	**0**	**0.08**	**0**	**79**	**0**	**1.57**	**0**	**0**