FINAL SITE WIDE SAFETY AND HEALTH PLAN

REMEDIAL INVESTIGATION PART 1
FORMER PLUM BROOK ORDNANCE WORKS
SANDUSKY, OHIO

Prepared for:

DEPARTMENT OF THE ARMY
NASHVILLE DISTRICT, CORPS OF ENGINEERS
NASHVILLE, TENNESSEE
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COMPLETION OF INDEPENDENT TECHNICAL REVIEW

Jacobs Engineering Group, Inc. has completed the **Site-wide Safety and Health Plan** for the **Remedial Investigation Part 1: Site Characterization at the Former Plum Brook Ordnance Works, Sandusky, Ohio.** Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project, as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing Corps policy.

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HSE Manager 5/5/04
(Signature) (Discipline) (Date)
JE Site Wide Safety and Health Plan Author

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows (Describe the major technical concerns, possible impact, and resolution):

Comment: All items have been addressed and incorporated into the final document as appropriate. Refer to Appendix II for the complete response to comments.

All concerns resulting from independent technical review of the project have been considered.

Virgil W Jansen (Signature) 5/5/04 (Date)

(Project Manager)

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Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
BZ	Breathing zone
CFR	Code of Federal Regulations
CHSM	Corporate Health and Safety Manager
CPR	Cardiopulmonary resuscitation
CTD	Cumulative trauma disorder
dBA	Decibels "A" Weighted
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
FTL	Field Team Lead
g	Gram
HSE	Health, Safety and Environment
HSEP	JE Health, Safety and Environment Procedure
HSM	Health, Safety and Environment Manager
HST	Health and Safety Technician
JE	Jacobs Engineering Group Inc.
mg/m^3	Milligrams per cubic meter
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
OMC	Occupational Medical Consultant
OSHA	Occupational Safety and Health Administration
PEL	Permissible exposure limit
PM	Project Manager
PPE	Personal protective equipment
PPM	Part per million, by volume
PSM	JE Process Safety Manual
STEL	Short Term Exposure Limit (ACGIH)
SWSHP	Site-wide Safety and Health Plan
TLV	Threshold limit value
TWA	Time weighted average
USACE	U.S. Army Corps of Engineers

1.0 INTRODUCTION

This Site-wide Safety and Health Plan (SWSHP) addresses field activity conducted by Jacobs Engineering Group at the Plum Brook Ordnance Works (PBOW), Sandusky, Ohio. This SWSHP is a facility-wide document applicable to all sites at the PBOW. Information and procedures applicable to particular sites where investigations or remediation will be performed will be included as addenda to this SWSHP.

1.1 Scope and Applicability

The purpose of this SWSHP is to identify, evaluate, and control health and safety hazards, and provide for emergency response for hazardous waste operations at the PBOW during field activities. This plan applies to all Jacobs Engineering Group employees and their subcontractors.

The Nashville District, U.S. Army Corps of Engineers (USACE)-Nashville has retained Jacobs Engineering Group, Inc. (JE) to conduct a site investigation at the former Plum Brook Ordnance Works (PBOW) in Sandusky, Ohio. This SWSHP is being prepared in support of the activities and will be used in conjunction with the field sampling plan (FSP) and quality assurance project plan (QAPP).

This SWSHP establishes the work practices necessary to ensure the protection of JE personnel and their subcontractors during field activities.

The objective of this plan is to provide a mechanism for the establishment of safe working conditions at the site. Specific hazard control methodologies have been evaluated and selected in an effort to minimize the potential of accident or injury.

All site operations will be performed in accordance with applicable state, local, and corporate regulations and procedures, Occupational Safety and Health Administration (OSHA) requirements, and USACE guidelines contained within EM385-1-1. All JE employees and JE subcontractors must comply with the requirements of this plan and site specific addenda. This SWSHP covers the following potential remedial activities:

Perform multi-media chemical sampling and analysis for compounds,
Contaminated soil excavation and debris removal activities,
Geophysical and topographic survey activities,
Community education, public involvement, public affairs activities, and participation on partnering teams,
Boring, sampling, and analysis for geotechnical parameters,
Hydrogeological investigations and data analysis,
Well installation and development,
Survey and mapping,
Investigation Derived Waste Management
Emergency spills.

All personnel on-site shall be informed of the site emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation. This SWSHP summarizes those hazards and defines protective measures planned for the site, and must be reviewed by all personnel prior to working at PBOW sites.

Field work will be performed to comply with:

Federal Acquisition Regulation (FAR) Clause "Accident Prevention" (52.236-13)
OSHA Standards 29 CFR 1910 and 29 CFR 1926 especially 29 CFR 1926.65, "Hazardous Waste Operations and Emergency Response"
USACE Safety and Health Requirements Manual, EM 385-1-1
USACE Health and Safety Documents for HTRW, EM 385-1-92
NIOSH/OSHA/USCG/EPA Document, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," October 1985 DHHS #85-115
Other relevant federal, state and local regulations

1.2 Site Description

The former PBOW is located approximately 4 miles south of Sandusky, Ohio and is specifically located in the Perkins, Milan, Huron, and Oxford Townships. The site is bounded on the north by Bogart Road, on the south by Mason Road, on the east by U.S. Highway 250, and on the west by County Road 43. The former PBOW site consists of approximately 9,000 acres and lies in an area that is primarily rural and agricultural with low population density. The National Aeronautics and Space Administration (NASA) currently owns 6,400 acres of the original site.

Previous activities conducted at the site in the early 1940s included manufacturing trinitrotoluene (TNT), dinitrotoluene (DNT), pentolite, nitric acid, and sulfuric acid. In 1945, manufacturing operations ceased and decontamination of TNT, acid, pentolite, and DNT manufacturing lines was completed. NASA acquired PBOW in 1963 and is presently using the site to conduct space research. Over the years, several thousand acres of the original PBOW have been sold off by NASA. The details of these sales are listed in the site management plan and can be found at the NASA Plum Brook Station (PBS).

Specific site descriptions will be included in site-specific addenda prepared for each site and will be attached to this SWSHP as addendum.

2.0 RESPONSIBILITIES

2.1 All Personnel

Each person is responsible for their own safety, for completing tasks in a safe manner, and reporting any unsafe acts or conditions to their supervisor utilizing the JE Safety Observation Report (SOR) process. All personnel are responsible for continuous adherence to applicable HSE procedures during the performance of their work. No person may work in a manner that conflicts with this SWSHP, site specific addenda or the JE Health, Safety and Environment Procedures.

Jacobs employees and subcontractors are subject to progressive discipline and may be terminated for serious infractions or continued violations. All on-site personnel will be trained in accordance with associated OSHA and JE requirements.

2.2 Project Manager: Virgil Jansen

The project manager is ultimately responsible for ensuring that all project activities are completed in accordance with requirements set forth in this plan. The PM is responsible for the following:

- Verifying that the project is performed in a manner consistent with the SWSHP and associated site specific addenda.
- Coordinating with the JE Health and Safety Manager on relevant matters.
- Suspending field activities if an uncontrolled hazard exists, reinstating activities once any uncontrolled hazards have been resolved.
- Reporting all infractions of the SWSHP and site-specific addenda to the Health and Safety Manager.

2.3 Health, Safety and Environment (HSE) Manager: Sean Healey

The HSE manager for this project is responsible for developing and coordinating the SWSHP and site-specific addenda as required. The HSE manager is the contact for regulatory agencies on matters of safety and health. Other HSE manager responsibilities include:

- Conducting initial site-specific training.
- Visiting the site as needed to audit the effectiveness of the site-specific safety and health plan.
- Being available for emergencies.
- Providing on-site consultation as needed to verify the site-specific safety and health plan is fully implemented.
- Coordinating any modifications to the site-specific safety and health plan with the site manager, the SSHO, and the Contracting Officer's Representative.

- Providing continued support for upgrading or downgrading the level of personal protection.
- Evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE.
- Reviewing accident reports and results of daily inspections.
- Serving as a member of the quality control staff.

2.4 Site Manager: Al Hardesty

Is responsible for implementing the SWSHP and site-specific addenda, has the authority to direct work to be performed under the contract and verify compliance with the contract documents. Provides appropriate direction to field personnel, including subcontractors, on the requirements set forth in this plan and site specific addenda.

2.5 Site Safety and Health Officer: Sean Healey, Al Hardesty

A JE employee will serve as Site Safety and Health Officer (SSHO) as required during designated field activities. The SSHO has the following responsibilities:

- Assisting and representing the Safety and Health Manager in on-site training and the day to day on-site implementation and enforcement of the accepted site-specific safety and health plan.
- Being assigned to the site on a full time basis for the duration of intrusive field activities or other activities requiring a significant health and safety field presence. If operations are performed during more than one work shift per day, a Site Safety and Health Officer shall be present for each shift.
- Having the knowledge and authority to verify and maintain site compliance with specified safety and health requirements, Federal, state and OSHA regulations and all aspects of the site-specific safety and health plan. These responsibilities include, among others: activity hazard analyses; air monitoring; use of PPE; decontamination; site control; standard operating procedures used to minimize hazards; safe use of engineering controls; the emergency response plan; confined space entry procedures; spill containment program; and documentation of activities by completing an HSE Daily Report.
- Having the authority to stop work if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.
- Coordinating modifications to the site-specific safety and health plan with the Health and Safety Manager (HSM) and Contracting Officer's Representative.
- Serving as a member of the Contractor's quality control staff on matters relating to safety and health.

- Supporting site management in conducting accident investigations, preparing accident reports and submitting them to the HSM and other parties as required.

- Reviewing Safety Observation Reports and other noted safety and health discrepancies and recommending corrective actions for identified deficiencies.

2.6 Occupational Physician: Mitch Zavon

A JE employee will serve as the Occupational Physician for the duration of the field activities. The Occupational Physician is responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910, Section .120 (f) and 29 CFR 1926, Section .65 (f) and paragraph medical Surveillance.

2.7 Persons Certified in CPR and First Aid

At least two persons currently certified in first aid and CPR by the American Red Cross shall be on-site at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens standard of 29 CFR 1910, Section 1030.

The JE Site Manager and the SSHO shall be certified in first aid and CPR. At least one individual of the fieldwork subcontractor will also have these certifications.

2.8 On-Site Personnel and Visitors

All on-site personnel and visitors are required to comply with the provisions of this SWSHP, site specific addenda and all applicable federal, state, local, and USACE regulations. On-site personnel and visitors will receive an appropriate level of health and safety orientation prior to being granted access to work areas. Upon completion of their orientation all personnel will be required to sign their acknowledgement and understanding of the health and safety plan.

Each person is responsible for their own safety and health and for completing tasks in a safe manner. All on-site personnel will report any unsafe acts or conditions to their supervisor or the JE representative.

3.0 SAFETY PROGRAM AND PROCEDURES

3.1 General Practices

The following work practices will be observed during all site activities.

- At least one copy of this plan and associated addenda shall be available at the project site, in a location readily available to all personnel, including visitors.
- All assigned site personnel will receive a site specific health and safety orientation prior to beginning field work. The orientation will cover applicable sections of this SWSHP and site specific addenda.
- All assigned site personnel will provide the SSHO or Site Manager proof of appropriate levels of training as outlined in 29 CFR 1910.120. In addition to general HAZWOPER training, evidence of other applicable training will be required. These may include respirator training and fit-testing; confined space entry, CPR/First Aid, lock-out/tag-out and fall protection. Other training items may apply depending on the specific field activity.
- All assigned site personnel must provide evidence they are enrolled in a medical monitoring program. If they expect to wear respiratory protection on site, their medical monitoring information must include a statement regarding their ability to wear a respirator.
- Each work crew must have a means of emergency communication (radio, cell phone), one first aid/CPR trained individual and appropriate emergency equipment.
- As a minimum, hard hats, safety glasses and steel-toe boots will be worn in work areas.
- All personnel must sign-in upon arriving at the site and sign out upon departing.
- All personnel on site will participate in a tailgate meeting each day or review the appropriate tailgate paperwork and sign-off designating they have read and understood the safety topics for the day.
- All work crews will develop a Safe Plan of Action (SPA) for each activity they are performing. If the activity is the same each day, the SPA must be reviewed and signed by each crew member associated with that task on a daily basis. Work activities must stop when circumstances identified on the SPA change.
- The HSM will develop baseline SPAs for each task identified. These baseline SPAs will be included in the SWSHP Addendum. The work crew must customize the baseline SPA to suit the circumstances of their activity as necessary.
- Any visitors to a work area should request to review the SPA from the crew lead. Upon review, the visitor should sign off that they understand the SPA and will comply with the requirements.
- All crew personnel on site shall use the buddy system (working in pairs or teams). If protective equipment or noise levels impair communications, prearranged hand signals shall be used for communication. Visual contact shall be maintained between crew members at

all times, and crew members must observe each other for signs of chemical exposure, heat stress or other conditions. Indication of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration
- Changes in coordination
- Changes in demeanor
- Changes in speech pattern.

- Employees shall inform their partners or fellow team members of any recognized effects of chemical exposure, heat stress or other conditions. The symptoms of such exposure may include:

  - Headaches
  - Dizziness
  - Nausea
  - Blurred vision
  - Cramps
  - Irritation of eyes, skin, or respiratory tract.

- Legible and understandable precautionary labels that comply with the hazard communication standard shall be affixed prominently to all containers of contaminated scrap, waste, debris, and clothing.

- Personnel shall not eat, drink or smoke outside of designated break areas.

- Visitors to the site shall receive an appropriate level of orientation and will remain with a JE escort for the duration of their visit. If visitors are to remain outside of designated work areas and exclusion zones it is not necessary to provide evidence of training and medical monitoring. All visitors will be expected to provide their own and wear necessary personal protective equipment for the areas they intend to visit. As a minimum, this will include hard hats, safety glasses and steel toe boots.

3.2 Accident Prevention

The SWSHP and addenda make up the Site Specific Safety and Health Plan (SSHP). These documents and the JE Corporate Health and Safety Procedures serve as the Accident Prevention Plan. The SWSHP and SSHP will be maintained on-site at all times associated work occurs in the field.

Primary aspects of the Accident Prevention Plan are:

- Site management has the responsibility and obligation to implement site specific and corporate health and safety procedures for all activities occurring on the site.

- The Site Safety and Health Officer (SSHO) has administrative responsibilities for effecting the site accident prevention plan and will provide oversight to ensure the proper implementation of the plans and procedures.

- The Site Manager will coordinate daily with those performing all investigation and remediation work.

- Site management and the SSHO will hold daily safety meetings.
- A Safe Plan of Action (SPA) will be developed and reviewed daily for each task occurring on the site.
- Site personnel will utilize the JE Safety Observation Report (SOR) to identify and document unsafe acts and unsafe conditions occurring on the site.
- All JE personnel will monitor the job site to verify that no unauthorized personnel enter.
- All site personnel should be briefed on the emergency procedures during their site specific safety orientations.
- The Site Manager or SSHO will continuously inspect the work areas for infractions of the SWSHP and applicable site-specific addenda.
- Site management, with support from the SSHO, will investigate all accidents and promptly complete an Accident Investigation Report.

- The Project Manager, Site Manager or SSHO will notify the Contracting Officer's Representative and report all accidents.

4.0 HAZARD ANALYSIS

4.1 Scope of Work

JE will conduct investigations at several sites at PBOW, which may include the following activities:

- Geophysical survey
- Land survey
- Soil boring
- Monitoring well installation
- Groundwater sampling
- Slug testing
- Soil screening
- Surface/subsurface soil sampling
- Disposal of investigation-derived waste (IDW)
- Exploratory trenching
- Surface water and sediment sampling

4.2 Job Hazard Analysis by Task

The hazard analysis identifies potential safety, health, and environmental hazards and provides for the protection of personnel, the community, and the environment. The JE Safe Plan of Action (SPA) is used to document the hazard analysis and identify resources necessary to mitigate identified hazards. All field personnel including subcontractors will utilize the JE SPA prior to undertaking field activities. It is particularly important to utilize a continuous improvement process on the developed SPAs and update as conditions change or new activities are implemented.

Because of the complexity and constant change of investigation/projects, supervisors must routinely inspect the work site to identify hazards that may harm site personnel, the community, or the environment. The PM, Site Manager, and SSHO must be aware of these changing conditions and discuss them with the HSE manager. The HSE manager or SSHO will write addenda to modify job hazard analyses as necessary. Detailed activity hazard analyses by task will be provided in the site specific addenda as they are developed.

4.3 Physical Hazards

The primary physical hazards for this project are associated with the use of drilling equipment, drilling support vehicles, operation of heavy equipment, exploratory trenching, collection of soil and water samples and surveying.

4.3.1 Drilling and Heavy Equipment Hazards

Physical hazards specific to drilling and heavy equipment usage are listed in the following paragraphs. All drill rigs will be subject to an inspection following the protocol outlined JE Health Safety and Environment Procedure (HSEP) 8.10 prior to beginning work on site. The inspection will be performed by the rig operator with a JE representative observing the process. After the initial rig inspection, all rigs will be inspected monthly using the same protocol as the initial inspection.

Heavy equipment will be inspected daily, or in the event of multiple shifts, at the beginning of each shift. Documented inspections must be maintained in the machine. Any discrepancies noted that would inhibit the safe operation of the equipment must be resolved prior to beginning work for that day.

Pinch Points

Pinch points can vary considerably depending on the type of equipment utilized. Some of the more common pinch points are: stacked pipe/auger flights, between joints on pipe, between moving/stationary equipment and between drop hammers and rods. Only properly trained personnel will be allowed to work on or handle drill rigs and heavy equipment. The operator and JE representative will be responsible for controlling the work area around the equipment to prevent untrained personnel from entering potentially hazardous areas. All work areas shall be properly marked with visible hazard warnings such as caution tape prior to starting work. Proper work gloves should be worn by all personnel handling pipe, augers and other equipment where pinch point hazards exist.

Rotating and Moving Equipment

Drive shafts, belts, pulleys, pipe and auger are all examples of common potentially hazardous rotating equipment. Whenever possible, all rotating equipment shall be guarded to prevent accidental contact. In the event guards are to be removed to perform repairs or maintenance, the equipment shall be reduced to a zero mechanical energy state and properly locked/tagged out to prevent inadvertent restart.

Some equipment, such as rotating augers and pipe cannot be guarded by conventional machine guarding means. This equipment shall be properly identified to all personnel working on or around the rig and whenever possible shall be properly marked designating the associated danger areas.

Properly functioning emergency shut off switches shall be available on all drill rigs. The location of these switches shall be clearly marked with appropriate signs and colors. All personnel working on or around the rig shall be shown the location of the emergency shut-off switches and shown how to properly activate the switch.

Equipment operation shall only be performed from designated control areas. Under no circumstances are operators to reach into cabs or into control areas to operate or adjust equipment. Prior to departing heavy equipment, the operator must properly ground all buckets, blades, etc. and either place the equipment in park or shut the equipment off.

All personnel on site operating heavy equipment or drill rigs must be designated competent by the site manager or equivalent level of management. Their name and specific equipment they are competent to operate should be submitted prior to beginning field activities, this list should be maintained on the site by the Site Manager.

Noise

It is generally established that all drill rigs generate levels of noise that exceed permissible exposure limits outlined in 29 CFR 1910.95 and 1926.52. All employees working on or around operating drilling equipment or support machinery such as generators and pumps will wear proper hearing protection.

Open cab bulldozers and Grade-Alls are two examples of heavy equipment which commonly require the operator to wear hearing protection. Most other common types of closed cab equipment such as excavators and loaders do not require hearing protection during normal use.

Task specific Safe Plans of Action will address noise reduction ratings (NRR) of hearing protection for activities involving exposure to noise levels in excess of 90 decibels A weighted (dBA). Regardless of activity, noise reduction ratings of hearing protection must be high enough to reduce levels to an 8-hour time weighted average of 85 dBA with a 7 dB safety factor. For example, exposure to noise levels of 100 dBA would require hearing protection having an NRR value of 22 dB.

Slips, Trips and Falls

The rig floor is the working surface for most tasks performed in well drilling operations. The surface is frequently wet from circulating fluid and/or water used to wash it down. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All spills of lubricants, fuels, hydraulic fluid and other chemicals shall be properly controlled and cleaned. These spills shall also be reported to the on site JE representative.

Areas that have been cleared of vegetation to provide site access can pose significant trip potential from roots, stumps and uneven ground. Steps to minimize these types of trip hazards should be undertaken during site preparation and set-up.

Access to the rig deck shall be provided by approved means such as ladders, ramps or stairs. These shall be secured to prevent displacement during their use or as a result of rig movement/vibration. Heavy equipment operators must access equipment utilizing the established ladders and walking surfaces.

Overhead/eye hazards

There are significant and persistent overhead and eye hazards on drilling equipment. All personnel outside of their vehicles in a work area where a drill rig is set-up, whether or not it is operating, shall wear ANSI approved hard hats.

Due to the nature of drilling equipment, eye hazards are continually present, even when active drilling is not underway. Examples of these are pressurized lines, soil particulates, wire rope, and power tools. All personnel outside of their vehicles on a drill site shall wear ANSI approved eye protection with permanent side shields. Those workers directly involved in grinding, wire wheel or welding operations shall also wear proper face protection in addition to safety glasses.

Utility Hazards

Proper procedures must be undertaken to eliminate the possibility of contacting overhead or underground utilities during drilling operations. An offset of a minimum of 1 mast lengths for 0-50 KV and 1.5 mast lengths for 50 KV+ shall be maintained between drill rigs and all overhead utilities. Heavy equipment must remain a minimum of 20' from 0-50 KV power lines with an increase of 4 inches for each additional 10 KV. Care must be taken during site set-up to prevent support equipment from working beneath overhead utilities as well. Distance variances must be approved by the JE Project Manager and Health and Safety Manager prior to site set-up.

Proper underground utility avoidance procedures will be followed. As a minimum, appropriate dig permits, utility clearances and adherence to JE Health, Safety and Environment Procedure (HSEP) 7.3.3 shall be followed. This includes hand auguring 120% of the proposed boring

diameter to 7 feet bgs. Variances to this procedure must be approved by the JE Project Manager and Health and Safety Manager.

Materials Handling
Heavy tools, equipment and supplies are commonly used during drilling and heavy equipment activities. Rolling stock can shift and/or fall from racks, tools can be dropped and other materials can move unexpectedly as a result of rig vibration and movement. All workers shall wear ANSI approved steel toe boots at all times while on site and wear proper work gloves during any material handling tasks.

Electrical Equipment Hazards
Electrical generators and associated equipment used on site must be properly positioned, set up and maintained. Since the grounding of most portable generators is accomplished through the equipment frame being in contact with the ground, all generators must be set up on the ground and will not be operated from the backs of pick-up trucks and other vehicles. Outlets will require ground fault circuit interrupters which should be checked for proper operation prior to use. Properly rated extension cords with three prong plugs are required and must not display any signs physical damage such as broken or cut insulation. Cords will not be placed where they may be run over by vehicles or create trip hazards.

Ordnance and Explosives (OE) Hazards
There are no indications that OE will be present in quantity or reactivity in anticipated work areas. It is also anticipated that TNT, DNT and other explosive, reactive and combustible by-products of the manufacturing process are not present in sufficient quantities to create an explosion or fire hazard to workers during planned activities.

Workers will be advised of the chemical characteristics of these materials for awareness purposes. If unusual deposits of materials are recognized, work will stop and the PM and HSM will be notified. Work will not resume until the suspect material has been identified and appropriate precautions taken.

Sanitation
In the event standard restroom facilities are not readily available on site, temporary facilities will be provided during all field activities. One portable toilet is required for every 10 workers on site. Regular cleaning should be coordinated with the supplier to ensure facilities are maintained in a reasonably sanitary condition. Hand washing facilities must also be provided at decontamination areas and near toilet facilities.

Hot Work Activities
Prior to beginning any open flame, welding or grinding activities on site, a hot work permit must be issued by the local fire prevention authorities or appropriate JE representative. If a multi-day permit is issued, requirements of the permit must be reviewed prior to each days hot work activities. In addition to the local authorities, the Site Manager or SSHO must approve all hot work activity.

4.3.2 High-Pressure Water Jetting Operation Hazards

The use of high-pressure water jetting equipment for decontamination and equipment cleaning may result in lacerations from accidental water spray, and slips, trips, and falls. Accidents can occur as a result of improper operation of the high-pressure water jetting equipment, failing to adequately isolate the work area from other activities, use of faulty or damaged equipment, and improper use of adequate PPE. Personal protective equipment shall as a minimum include proper eye and face protection. In the event of decon operations, proper chemical protection must be worn as well.

4.3.3 Sampling Hazards

Field sampling operations consist of the collection of soil, water, and sediment samples for subsequent analysis. The physical hazards of this operation are associated with the sample collection methods and procedures utilized.

The primary hazards are associated with repetitive stress injuries from equipment such as hand auger operation and general strains from hand digging and materials movement. An adequate number of workers and proper equipment shall be utilized during sampling operations to minimize the likelihood of causing stress or strain type injuries.

4.3.4 Surveying Hazards

Some of the most common type of surveying hazards are those associated with motor vehicle traffic and slips, trips and falls. In addition, surveyors may be required to work through wooded areas which pose eye and head hazards. All site personnel conducting surveying operations shall wear hard hats, safety glasses, high visibility vests and proper work boots.

4.4 Chemical Hazards

The primary contaminants of concern at Plum Brook are constituents of the TNT manufacturing process. The analytical results from previous investigations indicate the following contaminants may be present at the site. The majority of these contaminants were found in relatively minute concentrations and pose minimal occupational exposure potential:

4.4.1 Nitroaromatics and Nitramines:

Dinitrobenzene (all isomers)

Route of Entry:	Inhalation, skin or eye contact (dust)
Target Organs:	Eyes, skin, blood, liver, cardiovascular system, central nervous system
Hazard:	Toxic, combustible solid
PEL:	1 mg/m^3
TLV:	0.15 ppm
IDLH:	50 mg/m^3
IP	N/A

Pale white or yellow solid. Symptoms of exposure include anoxia, cyanosis; visual disturbance, central scotomas; bad taste, burning mouth, dry throat, thirst; yellowing hair, eyes, skin; anemia; liver damage.

Dinitrotoluene

Route of Entry:	Inhalation, skin absorption, ingestion, skin and/or eye contact
Target Organs:	Blood, liver, cardiovascular system, reproductive system
Hazard:	Toxic, combustible solid (difficult to ignite)
PEL:	1.5 mg/m^3
TLV:	0.2 mg/m^3
IDLH:	50 mg/m^3
IP	N/A

Orange-yellow crystalline solid with a characteristic odor. Symptoms of exposure include anoxia, cyanosis; anemia, jaundice; reproductive effects; [potential occupational carcinogen].

Nitrobenzene

Route of Entry:	Inhalation, skin absorption, ingestion, skin and/or eye contact
Target Organs:	Eyes, skin, blood, liver, kidneys, cardiovascular system, reproductive system
Hazard:	Toxic, Class IIIA combustible liquid
PEL:	1 ppm
TLV:	5 ppm
IDLH:	200 ppm
IP	9.92

Yellow, oily liquid with a pungent odor like paste shoe polish. Symptoms of exposure include irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects.

Nitrotoluene (ortho and meta isomers)

Route of Entry:	Inhalation, skin absorption, ingestion, skin and/or eye contact
Target Organs:	Blood, central nervous system, cardiovascular system, skin, gastrointestinal tract
Hazard:	Toxic, Class IIIB combustible liquid
PEL:	5 ppm
TLV:	2 ppm
IDLH:	200 ppm
IP	9.43

Yellow liquid with a weak, aromatic odor. Symptoms of exposure include anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting.

Nitrotoluene (para isomer)

Route of Entry:	Inhalation, skin absorption, ingestion, skin and/or eye contact
Target Organs:	Blood, central nervous system, cardiovascular system, skin, gastrointestinal tract
Hazard:	Toxic, combustible solid
PEL:	5 ppm
TLV:	2 ppm
IDLH:	200 ppm

IP	9.50

Crystalline solid with a weak, aromatic odor. Symptoms of exposure include anoxia, cyanosis; headache, lassitude (weakness, exhaustion), dizziness; ataxia; dyspnea (breathing difficulty); tachycardia; nausea, vomiting.

2,4,6-Trinitrotoluene

Route of Entry:	Inhalation, skin absorption, ingestion, skin and/or eye contact
Target Organs:	Eyes, skin, respiratory system, blood, liver, cardiovascular system, central nervous system, kidneys
Hazard:	Toxic, combustible solid (Class A explosive)
PEL:	0.5 mg/m^3
TLV:	0.1 mg/m^3
IDLH:	500 mg/m^3
IP	10.59

Colorless to pale-yellow, odorless solid or crushed flakes. Symptoms of exposure include irritation to skin, mucous membrane; liver damage, jaundice; cyanosis; sneezing; cough, sore throat; peripheral neuropathy, muscle pain; kidney damage; cataract; sensitization dermatitis; leukocytosis (increased blood leukocytes); anemia; cardiac irregularities.

4.4.2 Metals

Aluminum

Route of Entry:	Inhalation, skin and/or eye contact
Target Organs:	Eyes, skin, respiratory system
Hazard:	Combustible solid, low toxicity
PEL:	15 mg/m^3
TLV:	10 mg/m^3
IDLH:	not listed
IP	not listed

Silvery-white, malleable, ductile, odorless metal. Symptoms of exposure include Irritation to eyes, skin and respiratory system.

Arsenic

Route of Entry:	Inhalation, skin absorption, skin and/or eye contact ingestion
Target Organs:	Liver, kidneys, skin, lungs, lymphatic system
Hazard:	Toxic, reactive with hydrogen gas to form highly toxic arsine
PEL:	0.002 mg/m^3
TLV:	0.01 mg/m^3
IDLH:	5.0 mg/m^3
IP	N/A

Silver-gray or tin-white, brittle, odorless solid. Symptoms of exposure include ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyper-pigmentation of skin, [potential occupational carcinogen].

Beryllium

Route of Entry:	Inhalation, skin and/or eye contact
Target Organs:	Eyes, skin, respiratory system
Hazard:	Toxic, known human carcinogen (ACGIH A1)
PEL:	0.002 mg/m^3
TLV:	0.002 mg/m^3
IDLH:	4.0 mg/m^3
IP	N/A

Hard, brittle, gray-white solid. Symptoms of exposure include berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen].

Iron

Route of Entry:	Inhalation
Target Organs:	Respiratory system
Hazard:	Low toxicity
PEL:	10 mg/m^3
TLV:	5 mg/m^3
IDLH:	2,500 mg/m^3
IP	

Reddish-brown solid. Benign pneumoconiosis with X-ray shadows indistinguishable from fibrotic pneumoconiosis (siderosis).

Lead

Route of Entry:	Inhalation, ingestion, skin and/or eye contact
Target Organs:	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue
Hazard:	Toxicity
PEL:	0.05 mg/m^3
TLV:	0.05 mg/m^3
IDLH:	100 mg/m^3
IP	N/A

Heavy, ductile, soft, gray solid. Symptoms of exposure include lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension.

Manganese

Route of Entry:	Inhalation, ingestion
Target Organs:	Respiratory system, central nervous system, blood, kidneys
Hazard:	Toxicity, combustible solid
PEL:	5.0 mg/m^3
TLV:	0.2 mg/m^3
IDLH:	500 mg/m^3

IP	N/A

Lustrous, brittle, silvery solid. Symptoms of exposure include Parkinson's; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage.

Thallium

Route of Entry:	Inhalation, skin absorption, ingestion, skin and/or eye contact
Target Organs:	Eyes, respiratory system, central nervous system, liver, kidneys, gastrointestinal tract, body hair
Hazard:	Toxic
PEL:	0.1 mg/m^3
TLV:	0.1 mg/m^3
IDLH:	15 mg/m^3
IP	N/A

Appearance varies depending on the specific compounds. Symptoms of exposure include nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; perineuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs

4.4.3 Polycyclic Aromatic Hydrocarbons

Benzo (a) anthracene

Route of Entry:	Inhalation, skin, ingestion
Target Organs:	Lungs, other possible but not currently established
Hazard:	Possible human carcinogen, combustible powder
PEL:	Not established
TLV:	Not established
IDLH:	Not established
IP	N/A

Colorless to yellow-brown fluorescent flakes or powder. Symptoms of acute or chronic exposure not well established.

Benzo (b) fluoroanthene

Route of Entry:	Inhalation, skin
Target Organs:	Lungs, other possible but not currently established
Hazard:	Possible human carcinogen
PEL:	Not established
TLV:	Not established
IDLH:	Not established
IP	N/A

Colorless crystals. Possible mutagen. Other symptoms of acute or chronic exposure are not established.

4.4.4 Pesticides/PCBs

Aroclor 1242, 1254, 1260

Route of Entry:	Inhalation, skin absorption, ingestion, skin and/or eye contact
Target Organs:	Skin, eyes, liver, reproductive system
Hazard:	Toxic, potential human carcinogen
PEL:	1.0 mg/m^3
TLV:	0.5 mg/m^3
IDLH:	5.0 mg/m^3
IP	Unknown

Colorless to light-colored, viscous liquid with a mild, hydrocarbon odor. Symptoms of exposure include irritation eyes; chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

4.5 Biological and Environmental Hazards

4.5.1 Snakes

Workers at the site have slight potential for encountering poisonous snakes native to northern Ohio. These include the northern copperhead, eastern Massasauga and timber rattlesnake. If a snake bite occurs, the victim must be immediately transported to the nearest medical facility. In addition, the snake should be identified if possible by noting color, markings and size. Interim first aid can be provided by applying ice to the bite area and keeping the victim calm.

4.5.2 Insects

All personnel and subcontractors should be aware of the potential presence of deer ticks in wooded areas during the months of April through October. Precautionary methods include familiarity with the signs/symptoms and potential health hazards of Lyme disease, and the proper implementation of appropriate work practices.

During the months of April through October, particular caution must be exercised to prevent being bitten by ticks and potentially contracting Lyme disease, Rocky Mountain Fever, and other tick-borne diseases. Specific precautions include:

- Wearing hooded coveralls to cover your body as much as possible. Light color clothing makes spotting of ticks easier.

- Eliminating possible paths by which the deer tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles.) If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized.

- Conducting periodic and frequent (e.g., hourly) surveys of your clothing for the presence of ticks. Remove any ticks/insects that become attached to clothing.

- Using insect/tick repellents. Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF and Maximum Strength OFF. Check the ingredients of the repellent.

Field personnel should check with the PM to ensure use of insect repellents will not interfere with sample collection procedures.

Yellow jackets, wasps and similar insects may be present in our work areas. Work areas should be checked for the presence of nests/hives prior to setting up the site. Any workers known to be allergic to these insects should relay this information to the site manager, SSHO and associated crew members. If the employee carries an epinephrine pen to counteract stings, they should instruct their counterparts on the proper use of the device in the event they become incapacitated and cannot self administer the injection.

4.5.3 Poisonous Plants

If work sites are located in areas where poisonous plants such as poison ivy, poison sumac, and poison oak may be encountered, personnel should wear long pants, long sleeves, and gloves to minimize the possibility of exposure. In some areas, the use of a Tyvek or other protective suits may be advisable. In any case, workers should avoid contacting the plants directly or having equipment contact the plants. If equipment is known to have contacted plants containing urushiol, the active ingredient in these types of plants, they must be properly cleaned and decontaminated to prevent future contact.

4.5.4 Cold Stress

Cold and/or wet environmental conditions can place workers at risk of a cold-related illness. Hypothermia can occur whenever temperatures are below 45 degrees Fahrenheit, and is most common during wet, windy conditions. The principal cause of hypothermia in these conditions is loss of insulating properties of clothing due to moisture, coupled with heat loss due to wind and evaporation of moisture on the skin.

Frostbite, the other illness associated with cold exposure, is the freezing of body tissue, which ranges from superficial freezing of surface skin layers to deep freezing of underlying tissue. Frostbite will occur only when ambient temperatures are below 32°F. The risk of frostbite increases as the temperature drops and wind speed increases.

4.5.5 Heat Stress

Wearing PPE can put site personnel at considerable risk of heat stress. Heat stress effects range from transient heat fatigue to heat stroke which can result in serious illness and death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is one of the most common and potentially serious illnesses during field activities, preventive measures and alertness to the symptoms are vital.

Heat stress monitoring shall commence when personnel are wearing PPE, including Tyvek coveralls, and the ambient temperature exceeds 70°F. If impermeable garments are not worn, heat stress monitoring shall commence at 85°F.

4.5.5.1 Environmental Heat Stress Monitoring

*Note: This section is to be used only for those employees **not** wearing chemical protective clothing. For those workers wearing chemical protective clothing, refer to section 4.5.5.2*

Monitoring will consist of the wet bulb globe temperature (WBGT) using the following approach as outlined in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values.

- With direct exposure to sunlight: $WBGT_{out} = 0.7\ T_{nwb} + 0.2\ T_g + 0.1\ T_{db}$
- Without direct exposure to sunlight: $WBGT = 0.7\ T_{nwb} + 0.3\ T_g$

If conditions warrant, a work rest regimen will be implemented to decrease the risk of personnel from developing heat related conditions. Work rest cycles vary based on the wet bulb globe temperature reading, the type of work being performed and the acclimatization level of workers. The following table provides general guidance for work/rest regimens under heat stress conditions when impermeable chemical protective clothing is **not** being worn:

	Acclimatized (°F)				Unacclimatized (°F)			
Work Demands	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
100% work	85	82	79		82	77	73	
75% work/hour	87	83	82		84	80	76.1	
50% work/hour	89	85	83	82	86	82	80	77
25% work/hour	91	88	86	85	88	84	82	80

4.5.5.2 Physiological Heat Stress Monitoring

In the event workers are required to wear impermeable clothing, such as chemical protective suits, physiological monitoring must be performed to ensure workers are not progressing toward heat related ailments.

An individual's exposure to heat stress must be discontinued when any of the following occur:

- Sustained heart rate in excess of 180 beats per minute (bpm), minus the individuals age, (e.g. 40 year old worker would be 140 bpm), or;
- Body core temperature greater than 101.3 °F for acclimatized personnel or 100.4 °F for unacclimatized personnel, or;
- Heart rate in excess of 110 bpm one minute after a peak work activity, or;
- Symptoms of sudden and severe fatigue, nausea, dizziness or lightheadedness.

Frequent physiological monitoring is necessary to be effective. As a minimum, workers should annotate their resting pulse and temperature as they suit up to enter an exclusion zone and again after they exit an exclusion zone.

Workers wearing impermeable chemical protective clothing should be provided breaks based on WBGT readings at intervals no greater than the following.

Note: Physiological monitoring takes precedence on work/rest cycles.

	Acclimatized (°F)				Unacclimatized (°F)			
Work Demands	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
100% work								
75% work/hour	80	76	75		77	73	70	
50% work/hour	82	78	76	70	79	75	73	
25% work/hour	84	81	79	78	81	77	75	70

4.5.5.3 Heat Stress Conditions

Any individual exhibiting signs of heat stress conditions must be provided appropriate treatment immediately.
The following is a brief description of common heat related ailments and their treatment:

Heat Fatigue: Symptoms of heat fatigue include impaired performance of skilled, sensorimotor, mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the stress and insure adequate hydration before a more serious heat-related condition develops. It may be necessary in some cases of heat fatigue to remove the worker from strenuous activity for the entire day since symptoms may return more rapidly and with increased severity when heat exposure continues.

Heat Exhaustion: Symptoms include headache, nausea, vertigo and weakness. This condition responds readily to prompt treatment such as cooling and rehydration. Workers suffering from heat exhaustion should be removed from the hot environment and provided fluids and adequate rest. Any worker suffering from signs of heat exhaustion must be removed from strenuous work activity for the day.

Heat Stroke: Heat stroke is a MEDICAL EMERGENCY. It occurs when the body's system of temperature regulation fails and body temperature rises to critical levels. The primary signs and symptoms of heat stroke are confusion and irrational behavior, loss of consciousness, convulsions, hot, dry skin and an abnormally high temperature.
Any worker exhibiting these signs should be immediately removed from their protective clothing without regard to chemical decontamination, (419) 621-3222 must be called and the worker cooled to the extent possible under the conditions until emergency response personnel arrive. Workers having suffered this ailment must have medical clearance from a physician prior to returning to work.

4.5.6 Inclement Weather

Several sources will be used to track weather conditions that may affect field operations. Resources that are monitored include:

- Doppler radar reports from the Internet;
- On site thermometer for ambient temperature conditions; and
- On site National Weather Service radio reports.

Adverse weather conditions requiring a prompt systematic shut down of field activities are defined as:

- Thunderstorm watches and warnings, as the situation warrants, will be used as an alert to potential electrical activity. ***Lightning is cause for immediate termination of all outdoor activities;***
- Sustained wind speeds of 25mph or wind gusts of 35mph for high profile work where wind chill is not a factor, i.e. >60°F;
- Sustained wind speeds of 40mph or wind gusts of 45mph for non-high profile work;
- Moderate rain and/or snow fall of 0.11 to 0.3 inches per hour during hoisting activities. Freezing rain is also cause for suspension of hoisting activities;
- A tornado warning for the area will suffice in requiring a general work stoppage;

In the event of adverse weather conditions, the Site Manager or SSHO will determine whether work can continue without compromising the health and safety of site personnel. The Site Manager and SSHO will direct the implementation of precautions necessary to ensure the health and safety of site personnel.

Note: The following procedures can be taken to minimize risk during electrical storms:

- Seek shelter away from trees, power poles, bodies of water, etc.;
- Seek shelter in hard top vehicles. (With the windows rolled up);

A lightening strike in the immediate area may be imminent if the hair on the arm or the back of neck stands on end. If this occurs, immediately place your hands over your ears and squat down with your feet flat on the ground and close together. Always attempt to make yourself lower than the highest object around you. Do not lie on the ground.

4.6 General Task Hazard Analysis Summary

The following table summarizes the general hazards anticipated to be encountered during field activities and outlines the *basic* controls to be utilized. Site specific addenda will further develop the general task hazard analysis by completing the global Safe Plans of Action (SPA).

Global SPAs will be adjusted in the field to address the specific circumstances regarding work areas, environmental conditions, equipment types and activities, and as a minimum will refine the basic controls listed in the table. Once the al SPAs have been adjusted to suit the existing conditions and circumstances, all personnel directly involved in the activity and all visitors to the site will be briefed on the SPA. After the SPA briefing, personnel will sign the SPA acknowledging their understanding of the site specific requirements.

Activity	Potential Hazard	Applicable JE Health, Safety and Environment Procedures (HSEP) & Basic Controls
Field mobilization and demobilization	Vehicle operation	HSEPs 5.2, 21.1, 21.2 Licensed operators only. All occupants wear seat belts. Use a defensive driving approach.
	Manual material handling	HSEP 8.6 Try out the load first. If it is too bulky or heavy, get help. Keep the back straight, bend at the knees and lift with the legs. Lift slowly and carefully and do not jerk the load. Keep the load as close to the body as possible. Do not twist or turn the spine while lifting or carrying the load. Remember that lowering the load can be more stressful than lifting it.
	Chemical and flammable storage	HSEPs 11.7, 16.1 - 16.5 Utilize proper containers, safety cans and storage cabinets. Segregate incompatible materials. Install appropriate warning signs and labels. Install adequate number and type of fire extinguishers, smoke and heat detectors. Create appropriate spill kits and stage as necessary. Provide proper personal protective equipment, eyewashes and showers as necessary.
Surveying	Vehicle operation	HSEPs 5.2, 21.1, 21.2 Licensed operators only. All occupants wear seat belts. Use a defensive driving approach.
	Motor vehicle traffic	HSEP 5.2 Set-up appropriate traffic markers. Utilize high visibility vests and attire. Work during daylight hours. Park vehicles well off the roadways, access vehicles from the passenger side.

Activity	Potential Hazard	Applicable JE Health, Safety and Environment Procedures (HSEP) & Basic Controls
Soil boring and monitoring well installation	Pinch points	HSEPs 7.3.2, 7.3.5, 8.6, 13.4 Proper equipment training. Site control and hazard markings. Proper PPE such as leather gloves.
	Rotating, Moving Equipment	HSEPs 8.10, 15.1 Proper machine guarding. Proper hazard markings and labeling. Utilization of lock-out, tag-out procedures. Site control. Proper body positioning.
	Noise	HSEP 11.6 Utilization of proper hearing protection. Effective site set-up with placement of equipment away from work areas.
	Slips, Trips and Falls	HSEPs 13.8, 18.3 Proper equipment set-up. Utilization of proper railings, ladders and stairs on rigs. Identification and marking of obvious trip hazards in the work area.
	Overhead, eye and face hazards	HSEPs 8.10, 11.9.4, 13.2, 13.3, 13.6 Wear ANSI approved hard hats and safety glasses. Utilize face protection during any grinding, wire wheel or welding activity. Utilize proper whip checks on pressurized lines. Control the work area.
	Underground and overhead utilities	HSEPs 7.3.3, 8.10 Obtain proper utility clearance. Obtain proper dig permits. Hand auger to 7' bgs 120% of proposed boring size. Maintain proper offsets from overhead utilities per 7.3.3. Obtain PM and HSM approval for deviations.

Activity	Potential Hazard	Applicable JE Health, Safety and Environment Procedures (HSEP) & Basic Controls
	Materials handling	HSEPs 7.3.5, 8.3, 8.6, 17.1, 17.2 Utilize only properly inspected and certified cranes (boom trucks) on site. Insure all operators are properly qualified and certified to operate designated equipment. Insure all rigging is adequately rated and properly inspected prior to lifts. Develop appropriate lift plans and if applicable, critical lift plans for anticipated lifts. Utilize tag lines on all lifts. Maintain site control during all lifts, do not allow personnel to walk under lifts. Designate one person to provide signals to equipment operator.
	Chemical hazards	HSEPs 8.9, 12.1, 12.2, 13.2, 13.9 Perform proper hazard analysis for proposed work areas. Utilize adequate chemical protective clothing and respiratory protection when conditions warrant. Conduct appropriate air monitoring and evaluate results with established action levels. Establish proper EZ, CRZ and SZ areas, maintain control of these areas. Install proper hazard markings and signage.
	Electrical equipment hazards	HSEPs 19.1 – 19.3 Properly set-up portable generators on dry, solid ground. Ensure all electrical outlets have functioning GFCIs installed. Use only extension cords with three prong plugs and with no signs of physical damage. Utilize only qualified electricians to perform electrical work.
Soil, groundwater sampling	Vehicle operation	HSEPs 5.2, 21.1, 21.2 Licensed operators only. All occupants wear seat belts. Use a defensive driving approach.

Activity	Potential Hazard	Applicable JE Health, Safety and Environment Procedures (HSEP) & Basic Controls
	Manual material handling	HSEP 8.6 Try out the load first. If it is too bulky or heavy, get help. Keep the back straight, bend at the knees and lift with the legs. Lift slowly and carefully and do not jerk the load. Keep the load as close to the body as possible. Do not twist or turn the spine while lifting or carrying the load. Remember that lowering the load can be more stressful than lifting it.
	Chemical hazards	HSEPs 8.9, 12.1, 12.2, 13.2, 13.9 Perform proper hazard analysis for proposed work areas. Utilize adequate chemical protective clothing and respiratory protection when conditions warrant. Conduct appropriate air monitoring and evaluate results with established action levels. Establish proper EZ, CRZ and SZ areas, maintain control of these areas. Install proper hazard markings and signage.
	Electrical equipment hazards	HSEPs 19.1 – 19.3 Properly set-up portable generators on dry, solid ground. Ensure all electrical outlets have functioning GFCIs installed. Use only extension cords with three prong plugs and with no signs of physical damage. Utilize only qualified electricians to perform electrical work.
Excavation, trenching and sampling	Rotating, Moving Equipment	HSEPs 8.10, 15.1 Proper machine guarding. Proper hazard markings and labeling. Utilization of lock-out, tag-out procedures. Site control. Proper body positioning.

Activity	Potential Hazard	Applicable JE Health, Safety and Environment Procedures (HSEP) & Basic Controls
	Excavation cave-in	HSEP 8.4 Personnel are not to enter excavations. Properly position equipment, materials and personnel away from sidewalls. Backfill excavations as soon as possible, any unattended open excavations must be properly identified and protected with high visibility fencing. The site manager and/or SSHO will perform daily inspections of all open excavations. Contact the HSM in the event excavation entry becomes necessary.
	Underground and overhead utilities	HSEPs 7.3.3, 8.10 Obtain proper utility clearance. Obtain proper dig permits. Hand dig around identified utilities. Maintain proper offsets from overhead utilities per 7.3.3. Obtain PM and HSM approval for deviations.
	Chemical hazards	HSEPs 8.9, 12.1, 12.2, 13.2, 13.9 Perform proper hazard analysis for proposed work areas. Utilize adequate chemical protective clothing and respiratory protection when conditions warrant. Conduct appropriate air monitoring and evaluate results with established action levels. Establish proper EZ, CRZ and SZ areas, maintain control of these areas. Install proper hazard markings and signage.
Handling and disposal of investigation-derived waste (IDW)	Manual material handling	HSEP 8.6 Try out the load first. If it is too bulky or heavy, get help. Keep the back straight, bend at the knees and lift with the legs. Lift slowly and carefully and do not jerk the load. Keep the load as close to the body as possible. Do not twist or turn the spine while lifting or carrying the load. Remember that lowering the load can be more stressful than lifting it.

Activity	Potential Hazard	Applicable JE Health, Safety and Environment Procedures (HSEP) & Basic Controls
	Chemical hazards	HSEPs 8.9, 12.1, 12.2, 13.2, 13.9 Properly label and secure all IDW containers. Perform proper hazard analysis for proposed work areas. Utilize adequate chemical protective clothing and respiratory protection when conditions warrant. Conduct appropriate air monitoring and evaluate results with established action levels. Establish proper EZ, CRZ and SZ areas, maintain control of these areas. Install proper hazard markings and signage.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The PPE outlined in this chapter has been selected according to the site characterization and analysis, job tasks, site hazards, intended use, and duration of potential employee exposures. Maintenance and storage of PPE, decontamination, donning and doffing procedures, inspection and monitoring of effectiveness, and PPE limitations are outlined in this chapter.

5.1 Respiratory Protection Program

A corporate level respiratory protection program, HSEP 13.9, has been established by JE and is required in all locations where use of such equipment is intended to lessen the potential for adverse health affects to any employee. In the event that respiratory protection is anticipated to be used at specific site, a site specific respiratory protection plan will be developed utilizing the template found in HSEP 13.9 F1

As part of the respiratory training program, each employee is instructed in the following elements:

- Nature of the respiratory hazard on the work site and the appraisal of potential consequences if the respiratory protection is not utilized
- Use and proper fitting of the respirator
- Cleaning, disinfecting, inspection, maintenance, and storage of the respirator
- Proper selection, capabilities, and limitations.

Respiratory protection equipment will be inspected, cleaned, and disinfected daily to help assure proper hygienic practices. An inspection of this equipment will include the following:

- Examine the head straps for breaks, loss of elasticity, broken or malfunctioning buckles and other attachments.
- Examine the face piece for excessive dirt, cracks, tears, distortion, holes, or inflexibility.
- Examine the exhalation and inhalation valves for any foreign material, cracks, tears, or distortion in the valve. Additional checks will be made to inspect for proper insertion, defective valve covers, or improper installation.
- Examine the air purifying elements for correct cartridge, expired shelf life of the cartridge, cracks or dents in the cartridge or cartridge-holder.
- Examine for proper insertion of the cartridges into the face-piece and a check of the gaskets inside the cartridge holder.
- Examine air cylinders for adequate air volume. Only Grade D air will be utilized for breathing air.

When Level C protection is required, respirator cartridges will be changed based on the site specific respiratory protection plan. Considerations in calculating useful life of a respirator

cartridge includes the type and concentration of chemicals present, environmental conditions and the expected rate of respiration. Cartridges also will be changed when any odor is noticed inside the mask or if increased breathing resistance is detected.

5.2 Levels of Protection

The level of protection used in the exclusion zone (EZ) is based on site-specific information. In addition, the specific types of equipment to be used will be identified in the site specific addenda.

Specific levels of protection will be changed whenever site conditions warrant a need to do so. If the site manager requests a downgrade in levels of protection, he must contact the JE HSE manager and PM. If the need arises to upgrade PPE levels, activities must be suspended and reevaluated by the HSE manager, PM and SSHO.

5.2.1 Level A Protection

Level A protection is not required.

5.2.2 Level B Protection

Level B protection is not required.

5.2.3 Level C Protection

Level C protection will not be used unless air monitoring indicates the need for an upgrade. Action levels for PPE upgrades are established at 1.0 ppm sustained breathing zone levels for PID/FID readings and 1.0 mg/m^3 above background for total dust concentrations. Exceptions to PPE upgrade may be considered if contaminant specific monitoring is conducted and levels of specific contaminants present do not exceed their action levels.

5.2.4 Level D-Modified Protection

This level of protection will be used for those activities where potential skin contact exists to contaminated materials, but air monitoring indicates airborne levels do not require respiratory protection.

5.2.5 Level D Protection

The minimal level of protection that will be required of JE personnel and subcontractors at the site will be Level D. The following equipment will be used for Level D protection:

- Coveralls or work clothing
- Steel-toe work boots
- Safety glasses with permanent side shields
- Hard hat
- Reflective vests
- Hearing protection (when working near/adjacent to operating equipment).

5.2.6 Selection of PPE

The selection of specific types of PPE will be conducted after a thorough evaluation of the potential hazards involved for each task. Site specific addenda will evaluate the planned tasks, potential chemical hazards, nature of environmental conditions and other factors when determining specific types of PPE to be used. The initial levels of PPE are as follows:

Task	Initial PPE Levels
Site Set-Up	Level D
Surveying	Level D
Surface/subsurface soil sampling	Modified Level D
Soil boring	Modified Level D
Monitoring well installation	Modified Level D
Groundwater sampling	Level D[1]
Slug testing	Level D[1]
Soil screening	Modified Level D
Disposal of investigation-derived waste (IDW)	Level D[1]
1. Personnel will also wear chemical protective gloves.	

5.3 Using PPE

All personnel entering the EZ will don the required PPE according to established procedures in this plan to minimize exposure potential. When leaving the EZ, PPE will be removed according to the established procedures to minimize the spread of contamination. Reusable PPE will be properly deconned and stored. Decon and exclusion zone egress procedures outlined in section 7 will be followed by all personnel exiting designated work areas.

6.0 SITE CONTROL

6.1 Authorization to Enter

Access to work areas where field activities are conducted is regulated and limited to authorized personnel. Only persons who have completed the following training and medical requirements will be allowed to enter in designated contamination reduction zones, exclusion zones or any areas where potential chemical hazards associated with the site exist.:

- Completion of 40 hours of hazardous waste operations training per the requirements of 29 CFR 1910.120 or 29 CFR 1926.65
- Completion of an 8-hour hazardous waste operations refresher as defined under 29 CFR 1910.120 or 29 CFR 1926.65
- Completion of 8-hour Supervisors Course per the requirements of 29 CFR 1910.120 or 29 CFR 1926.65 (Supervisory personnel only)
- Certification by a physician of fitness for hazardous waste operations within the last 12 months per the requirements of 29 CFR 1910.120 or 29 CFR 1926.65.
- Certification in First Aid and CPR. At least two employees current in first aid/cardiopulmonary resuscitation (CPR) will be assigned to each work crew and will be on the site during any field activity. Training is required annually for CPR and every three years for first aid.

Personnel not meeting these requirements may enter the designated support zone only. The Site Manager or SSHO will maintain a list of persons authorized to enter contaminated work areas, and only personnel on the authorized persons list will be allowed within the work zone.

6.2 Site-Specific Orientation

No person shall be allowed on any field site without first being given a site-specific H&S orientation. This orientation will provide training on the potential H&S hazards and procedures specific to the site, and will discuss the provisions of the SWSHP and site specific addenda. All personnel will acknowledge their attendance by signing the SWSHP Acknowledgement Form. JE subcontractors must also receive site specific orientation and sign the Acknowledgement Form.

The following items will be discussed at the initial site specific orientation and subsequent training sessions as applicable

SUBJECT	INITIAL SESSION	PERIODIC SESSION
Organization and Lines of Authority	X	
Site Description	X	
Task to be Performed and Schedule	X	X
Activity Hazard Analysis (Safe Plan of Action)	X	X

SUBJECT	INITIAL SESSION	PERIODIC SESSION
Physical Hazards	X	X
Chemical Hazards	X	X
Biological Hazards	X	X
Symptoms of Overexposure	X	
Engineering Controls and Work Practices	X	X
Medical Surveillance	X	
Site Control and Zones	X	X
PPE	X	X
Air Monitoring	X	X
Contamination / Decontamination	X	X
Emergency Response	X	X
Spill Containment	X	
Hazard Communication	X	
Accident Investigation	X	X
Machinery / Equipment	X	
Utility Clearance	X	
Respiratory Protection	X	
SSHP Changes	X	X
Confined Space Entry	X	

6.3 Entry Log

The site manager shall keep a daily roster of all on-site personnel and record the time of entry into and exit from the site for each person.

6.4 Tailgate Safety Meetings

The site manager and SSHO shall conduct a tailgate safety meeting at the beginning of each shift or whenever new employees arrive at the job site once the job commences. The topics discussed at the tailgate safety meeting will include H&S considerations for the day's activities, necessary protective equipment, potential for encountering site hazards and problems encountered from the previous day. The SPA will also be reviewed and adjusted as necessary to suit the conditions and locations for the days activities. All personnel on site, including visitors must review the daily tailgate and SPA and sign-off on these documents prior to entering work areas. Attendance records and meeting notes will be maintained with the project files.

6.5 Subcontractor Requirements

The goal of an accident free job site can only be achieved through a cooperative effort by all contractors and employees on the entire project. It is expected that all JE subcontractors will utilize a proactive approach in addressing safety and health concerns by actively seeking out and correcting problems as they arise.

6.5.1 Documentation and Reporting Requirements

The Subcontractor has the choice of adopting this site SWSHP or developing a similar plan that is, at a minimum, equally protective and compliant. Subcontractor site personnel shall read and

acknowledge by signature that they will comply with the applicable SWSHP and site specific addenda. A project-specific Hazard Assessment Safety Action Plan (HASAP) must be generated by each Subcontractor prior to mobilizing on the project. This plan will be submitted to the Contractor Site/Project Management and Client for review and approval before mobilization.

The plan must include a project specific "Emergency Response Action Plan" in accordance with Contractor, Client, State and Federal requirements.

Subcontractors must report the following immediately to the Site Manager:

- **All** potentially work related accidents. Accident investigation reports for all Subcontractor accidents, injuries and work related illnesses shall be forwarded to the Site Management within twenty-four (24) hours of the occurrence.

- Serious injuries, illnesses or any accident involving a third party or a member of the general public.

- Accidents involving potential exposures to hazardous materials and releases or spills of such materials. This includes fuel, oil and hydraulic fluid.

- Any OSHA, EPA or other HSE regulatory agencies' inspections or other actions involving the Subcontractor's work. Jacobs Site/Project Management and the Client will review all correspondence prior to submittal to the requesting agency.

Subcontractors shall be responsible for maintaining required records such as:

- OSHA 300 & 301 logs

- First aid log - All injuries/illnesses that are either reported and/or treated will be entered onto the log, no matter how minor. A copy of this log will be forwarded to the Contractor Site HSE Representative on a monthly basis.

- Accident reports

- Equipment inspection records

- Hazard Communication/ MSDS Sheets available at work site

- HSE training records for their site employees.

Subcontractor employees will be required to participate in documented, daily task specific Safe Plans of Action and Safety Observation Reports.

Signed copies of Subcontractor Weekly Safety Meeting Reports shall be submitted to the Contractor Site/Project Management within twenty-four (24) hours of each meeting.

6.5.2 Safety Adherence

In the unlikely event a JE subcontractor repeatedly fails to meet the expected level of safety and health performance and participation, a progressive series of steps may be taken to reinforce the JE commitment to safety and health.

- Action Level One- Written warnings to include a "Notice of Safety Non-Compliance" or a "Warning Letter for Safety Non-Compliance" to the appropriate level of subcontractor management.

- Action Level Two- The Site Manager will issue a "Written Notice of Temporary Job Suspension" to the subcontractor. The subcontractor's work may not resume until the Company Operations Manager and the subcontractor's Division Manager or equivalent have met and the subcontractor has proposed corrective actions that are acceptable to JE.

- Action Level Three- If Action Levels One and Two do not result in the subcontractor's HSE performance being brought into compliance, subcontract termination will result.

6.6 Jobsite Notices and Posting Requirements

A copy of each notice described below must be posted at the site. The notices shall be prominently displayed, preferably on a bulletin board or at a location that would provide greatest exposure to employees.

- Federal and State Occupational Safety and Health posters

- Emergency Phone Number List

- Summary of Occupational Injuries (OSHA 300A Log) from February 1st to April 30th.

- Access to Employee Exposure and Medical Records

6.7 Additional Training and Work Permits

The following items create additional task specific training, planning, monitoring and permitting requirements. In the event these apply to proposed activities, the SWSHP addenda must appropriately address concerns as outlined in the relevant HSEPs.:

- Crane usage

- Excavations

- Confined space entry

- Fall protection

- Scaffolding

- Asbestos or lead work

- Energized electrical work

7.0 DECONTAMINATION

The project areas will be designated as one of three zones: the exclusion zone (EZ), contamination reduction zone (CRZ) and the support zone. The EZ will be established around the work area using caution tape or equivalent means. The area should be made large enough to accommodate movement and typical activity expected inside the work area without effecting or impinging on areas outside the marked EZ.

Only authorized personnel who have met the requirements of Section 6.1 and who are wearing the required PPE will be allowed within this zone. It is the responsibility of the site manager or designated JE personnel to maintain control over specific work areas on the site.

Immediately adjacent to the EZ, a decontamination area for equipment and personnel will be established. This area will also be delineated with traffic cones and/or barrier tape. Each side of the decontamination zone will be posted.

The remainder of the JE project area will be designated as the support zone. No special markings or warning labels are required for this area.

7.1 Personnel Decontamination

All personnel working in the EZ must undergo personnel decontamination prior to entering the support zone. The personnel decontamination area shall consist of the following stations.

- Station 1. Personnel leaving the EZ will remove the gross contamination from their outer clothing and boots.

- Station 2. Personnel will remove their chemical protective clothing and gloves and deposit them in the lined waste receptacles. Personnel will wipe their respirators (if used), hard hats, and boots with clean, damp cloths and then remove those items. Those items are then hand carried to the next station.

- Station 3. Personnel will thoroughly wash their hands and face before leaving the decontamination zone. Respirators will be sanitized and then placed in a clean plastic sealable bag.

7.2 Equipment Decontamination

Any heavy equipment that has entered the EZ shall be decontaminated prior to leaving the decontamination zone using methods specified in design package drawings.

7.3 PPE Decontamination

Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for possible disposal as hazardous waste. A Material Safety Data Sheet must be present on site for any hazardous chemicals used during decontamination procedures.

Respiratory protective equipment will be wiped with a damp cloth while in the CRZ and bagged. After the respirator has been removed from the CRZ, it will be thoroughly cleaned with soap and water. The respirator face piece will be cleaned at the end of each work shift.

8.0 SITE MONITORING

8.1 Air Monitoring

The primary contaminants of concern at Plum Brook are constituents of the former TNT manufacturing process and disposal activities.

Measurements of airborne VOCs and total dusts will be performed in the breathing zone of employees in each work area. Monitoring will be conducted utilizing a photoionization detector with a 10.2 electron volt lamp, a real time aerosol monitor, a combustible gas indicator and detector tubes as necessary. All air monitoring activities shall be summarized and documented on the JE air monitoring log and will be provided to the site manager for inclusion in the daily reports.

8.1.1 Air Monitoring Frequency

Air monitoring will be conducted initially upon arriving at a site or work area, primarily as a means to establish background levels. Monitoring will then be performed during all intrusive activities. For drilling and other "down-hole" type activities such as ground water sampling, monitoring will be performed at least every thirty minutes until the location and activity are well characterized. For other intrusive activities, monitoring will be performed initially within the first foot of depth, then repeated every 5' of depth or as soil conditions change or other indicators make it apparent that monitoring should be conducted.

Monitoring will be performed during other activities where there is potential contact with contaminated materials. Frequency and type of monitoring will be established in the site specific addenda.

8.1.2 Monitoring Equipment Maintenance and Calibration

All monitoring equipment will be calibrated in accordance with manufacturer procedures. All direct reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. All air monitoring equipment calibrations, end of day calibration checks and maintenance activities shall be documented on the instrument calibration log. A log will be maintained for each piece of equipment and included in appropriate project documentation files.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the SSHO shall be responsible for immediately removing the instrument from service and obtaining a replacement unit. The specific operation for which this equipment is essential shall cease until an appropriate replacement unit is obtained. The SSHO shall be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

8.2 Other Hazardous Conditions

The SSHO will take appropriate action to limit exposures. If unknown chemicals or contamination are encountered, operations will cease until the situation is evaluated. The SSHO will contact the HSE manager to evaluate any potentially hazardous situations, or any situation with

elevated contamination levels. Operations will only be resumed if they can be accomplished in a safe manner.

8.3 Noise Monitoring

Noise monitoring will not be conducted since previous noise monitoring during similar drilling operations has characterized noise levels greater than 85 dBA within a 5-foot radius around the rear end (motor side) of drill rigs. Hearing protection is mandatory for all employees when working near/adjacent to operating drill rigs. Other equipment requiring hearing protection will be identified on the global Safe Plans of Action which will be included in the site specific addenda.

8.4 Monitoring Records

The PM shall ensure that site monitoring records are complete and incorporated into the project file. Any personnel or area monitoring results will be incorporated into the JE HSE files.

8.5 Notification

Within 5 working days after receipt of integrated monitoring results, the HSM will ensure that each employee is informed in writing of the results which represent that employee's exposure.

Whenever the results indicate that the representative employee exposure exceeds the PEL, the notification shall state that the PEL was exceeded and shall provide a description of the corrective action taken to reduce exposure to a level below the PEL.

JE will provide industrial hygiene monitoring results to subcontractor companies if the exposure of subcontractor employees to airborne contaminants is elevated. Notification of subcontractor personnel of industrial hygiene monitoring results is the responsibility of the subcontractor.

Air Monitoring Matrix

Instrument	Frequency	Action Level	ACTION
PID, minimum 10.2 IP Bulb	Drilling: At least every 30 minutes. Other intrusive activities: Initially within the first 1', then every 5' or whenever changes in soil conditions, unusual soil coloring, standing liquid or odor is noticed.	Sustained 1 ppm in the breathing zone.	Upgrade to level C
		Sustained 10 ppm in the breathing zone.	Suspend work, utilize detector tubes in an attempt to identify contaminants present. Verify respiratory protection is adequate for compounds identified.
Personal Data RAM	Every 30 minutes until activity is characterized. Readings should then be taken at least every 60 minutes or more frequently if conditions change causing increased suspension of dust.	Sustained 1 mg/m^3 above background in the breathing zone.	Reevaluate work practices, wet soil if possible, if dust levels cannot be lowered, upgrade to level C
		Sustained 10 mg/m^3 in the breathing zone.	Reevaluate work practices and lower dust levels using appropriate controls. Utilize level C if levels persist above 1 mg/m^3
Combustible gas indicator	Drilling: At least every 30 minutes. Other intrusive activities: Initially within the first 1', then every 5' or whenever changes in soil conditions, unusual soil coloring, standing liquid or odor is noticed.	5% LEL	Suspend work activity and identify the contaminants present. Effort should be made to determine if the readings are a result of methane or other unanticipated soil contaminants. If it is determined that methane is the cause of the elevated readings, proceed with work activity utilizing continuous monitoring. If readings reach 10%, suspend activity and reevaluate. If unknown contaminants are present, it will be necessary to identify them with detector tubes and evaluate adequacy of PPE.
Detector Tubes	As required by PID monitoring, typically when sustained PID readings of 1 ppm have been noted.	Appropriate OSHA and ACGIH action levels will be utilized.	As necessary dependent on contaminants identified.

9.0 MEDICAL SURVEILLANCE PROGRAM

9.1 Physical Examinations

All on-site project personnel shall within the past 12 months have completed a comprehensive medical examination that meets the requirements of OSHA regulations 29 CFR 199.120 and 29 CFR 1926.65.

All employee medical clearance forms are maintained by the Health and Safety Service Center, or for subcontractors at the subcontractor's office. The examining physician provides the employee with a letter summarizing his findings and recommendations. Each employee also has the right to inspect and copy medical records.

The examining physician provides the employer with a letter confirming the worker's fitness for work and ability to wear a respirator. A copy of this letter for all project workers will be kept on site along with copies of the employee's relevant training records.

Subcontractors will verify on the certification form that all their employees have successfully completed an occupational physical examination by a qualified physician. Subcontractors must submit copies of the medical examination summary for each on-site employee.

9.1.1 Baseline Examination

All employees will receive a baseline medical examination prior to assignment to field operations.

9.1.2 Annual Examination

Each year subsequent to the baseline examination, all employees and subcontractors must undergo an annual examination.

9.1.3 Exit Examination

JE employees receive an exit examination upon leaving the company. The employee's immediate supervisor is to notify the Health and Safety Service Center within a reasonable time to allow for the necessary arrangements.

9.2 First-Aid and Medical Treatment

All persons on site must immediately report any incident, accident, injury, or illness to their immediate supervisor. Employees suffering injuries or illnesses requiring medical treatment will be provided an Authorization for Medical Treatment form and will be accompanied to the hospital by a JE site management representative. All injuries must be reported to the PM, HSM and SSHO as soon as possible.

Refer to section 10 for specific emergency planning and accident investigation requirements.

9.3 Medical Restriction

When a medical care provider identifies a need to restrict work activity, the PM and HSM will communicate the restriction to the employee and their supervisor. The terms of the restriction

will be discussed with the employee and their supervisor. Every attempt will be made to keep the employee working, while not violating the terms of the medical restriction. The specific number of days of lost time or restricted duty must be kept and provided to the HSM upon complete recovery of the injured employee or by the end of the calendar year.

10.0 EMERGENCY PROCEDURES

10.1 General

This SWSHP has been developed to allow site activities to be conducted without adversely impacting the safety of the workers, the community, and the environment. Procedures included in this section address the action required in the event extraordinary conditions occur at the site.

Within 5 days of arriving on site, the site manager, site health and safety officer or appropriate designee will notify the local emergency response authorities of the nature of work, location of activity and any unusual hazards that may be encountered during an emergency response. As a minimum, the local fire department will be informed of these issues.

10.2 Medical Emergencies

In the event of a work related injury or illness during normal working hours which requires either first aid or outside medical treatment to an employee, the following steps are to be taken:

- If the injury or illness requires First Aid Treatment only, the injured employee should immediately contact their supervisor and/or Manager and have first aid administered as required. First aid supplies are available in each vehicle and offices and qualified designated personnel have been identified to assist with this effort.

- The supervisor should notify Jacobs Health and Safety Department whenever first aid treatment *of any type* is administered.

- If the injury or illness requires outside medical treatment, the injured/ill person(s) should notify their supervisor and their supervisor should coordinate obtaining an authorization for medical treatment from the HSM.

- If an injured person requires the services of outside medical services, such as paramedics, immediately contact (419) 621-3222 and provide the Emergency Medical Service (EMS) personnel with appropriate information. This includes:

  - Your location
  - Extent of injury/illness
  - Treatment provided
  - Other pertinent information

- If the situation is considered life threatening, (419) 621-3222 should be called immediately before any other notifications are made.

- If it is determined that outside emergency medical personnel are not required, but the person still requires medical treatment, then arrangements should be made to transport the person to the local medical facility. Under no circumstances should the injured/ill employees attempt to transport themselves to the medical facility. They should always be accompanied by another Jacobs employee who will also drive the transport vehicle. If injury is the result of a chemical burn/exposure, provide a copy of the MSDS to the medical facility.

- Under no circumstances shall an injured/ill employee be transported in a non-emergency vehicle by non-qualified individuals when the injury includes any of the following:

  - Loss of consciousness
  - Suspected heart attack or heart related condition
  - Any injury or suspected injury to the spinal column, vertebrae, or pelvic, girdle region,
  - Any injury resulting in the loss of a substantial amount of blood

- Whenever any Jacobs employee requires medical treatment, other than first aid, it is the responsibility of the Manager or Supervisor to complete or ensure the following forms are completed within 24 hours of the incident and submitted to the HSM.

  - Authorization for medical treatment. This should be completed by the supervisor and Jacobs SSHO and submitted to the medical facility ASAP. Verbal authorization for medical treatment shall be given to the medical facility when it is not practical or possible to provide the written authorization at the time of the incident
  - Employer's report of occupational injury or illness (E1)
  - Employee's claim for Worker's Compensation Benefits
  - Supervisor's investigation report
  - Witness statement.

- In the event of a work related injury or illness during other than normal business hours which requires first aid or medical treatment to an employee, the same steps still apply with the exception that the Jacobs Health and Safety Office shall be notified. Other than normal business hours is defined as 7:30 a.m. to 5:30 p.m., Monday through Friday. All record keeping requirements must be satisfied and submitted on time regardless of when the incident occurs.

10.3 Hospital Directions

Firelands Regional Medical Center
1101 Decatur Street
Sandusky, Ohio 44870
(419) 626-7455

- Exit from the main gate of Plum Brook Station to Taylor Road
- Turn left onto Columbus Avenue
- Turn left onto Perkins Avenue
- Turn right (west) onto Hayes Avenue
- Travel north on Hayes Avenue to Decatur
- The Firelands Regional Medical Center will be on the left side.

10.4 Emergency Response Supplies

Provisions must be made for site first aid and emergency response supplies. An inventory of these supplies must be maintained and readily available to field personnel. Basic supplies required to be kept at the site trailer include:

- Type III, 16-Unit first aid kit and one pocket mouth piece or CPR barrier,

- Eye wash unit, must deliver at lease .4 gpm for 15 minutes of potable water;
- Blanket and/or stretcher;
- Water gel burn kit (where burn potential exists).

The following emergency equipment supplies are required to be maintained by field crews:

- Eye care kit,
- Type III, 16-Unit first aid kit and one pocket mouth piece or CPR barrier,
- Fire extinguishers,
- 2 way radios or other means for emergency communication,
- Copy of SWSHP and site specific addenda,
- Spill Kit.

Subcontractors are Required to Maintain the Following:

- Copy of SWSHP and addenda,
- Type III, 16-Unit first aid kit and one pocket mouth piece or CPR barrier,
- Eyewash,
- Fire Extinguisher,
- Spill kits are required for crews using heavy equipment, drill rigs, generators and fuel/chemical storage areas. Kits should be sized accordingly.

Supply requirements will vary depending on the hazard potential at individual work locations. The SHSO must evaluate site logistics and hazard potential for each site location to determine supply needs.

10.5 Bloodborne pathogens

The following procedures will be followed if a potential exposure to bloodborne pathogens occurs.

- The SSHO or Site Manager must be notified immediately during the work shift when a first aid incident occurs.
- The SSHO or Site Manager shall follow the required procedures for reporting to the PHSM as listed above.
- The report shall include the names of all first aid providers who rendered assistance, regardless of whether PPE was used, and shall describe the first aid incident, including time, date, and type of PPE used.
- The description must include a determination if, in addition to the presence of blood or other potentially infectious material, an "exposure incident" (as defined by 29 CFR 1910.1030) occurred. This determination is necessary to ensure that the proper post-exposure evaluation, prophylaxis, and follow-up procedures required HSEP 11.2, Bloodborne Pathogen Exposure Control, are made available immediately when there has been an exposure incident.
- A Hepatitis B vaccination must be offered to all employees who have occupational exposure to blood or other potentially infectious materials.
- The report shall be recorded on the First Aid Register.

For additional information, refer to HSEP 11.2.

10.6 Pre-Emergency Planning

During the site-specific orientation and at the daily tailgate safety meetings, all employees will be trained in the provisions of the emergency procedures, the communication systems, evacuation routes and assembly areas. The procedures will be reviewed and revised, if necessary, on a regular basis.

10.7 Emergency Responsibilities

The site manager and SSHO have primary initial responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the area.

The PM and HSM are responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. In the absence of the PM, the site manager shall assume the responsibilities of the PM. All project personnel are responsible for assisting the PM in responding to emergency situations within the capabilities of their skills, equipment, and training.

10.8 Evacuation Signal

Vehicle or portable air horns will be used for evacuation signals with one long, continuous blast: indicating an emergency evacuation of the site is necessary. Evacuation drills should be performed as necessary to ensure all site personnel are aware of their responsibilities.

10.9 Emergency Contact/Notification Listing

In case of any emergency, the PBS Communication Center will be contacted for appropriate services. The PBS Communication Center will coordinate station access and response.

Local, State, and National emergency numbers as follows:

Communications Center Emergency	(419) 621-3222
NASA Guard Station	(419) 621-3226
Police Department	(419) 627-5863
Fire Department	(419) 627-5837
Hospital (Emergency Center)	(419) 626-7455
National Response Center	(800) 424-8802
Poison Control Center	(419) 626-7423
Ohio EPA Emergency Response	(614) 644-2924

Key Project and JE Personnel

Project Manager	Virgil Jansen	(865) 220-4933
Regional HSE Manager	Sid McNair	(865) 220-4829
HSE Manager	Sean Healey	(865) 220-4923
Oak Ridge Office	Reception Desk	(865) 220-4800

NASA Safety Officer	Amy Bower	(419) 621-3233
NASA Environmental Mgr.	Bob Lallier	(419) 621-3234
PBOSG Safety Specialist	Gary Ponikvar	(419) 621-3342

10.10 Evacuation Routes and Procedures

Evacuation routes, assembly points and site specific procedures will be developed by JE upon arrival at the site in coordination with the NASA PBS personnel.

11.0 APPROVALS

Sean Healey, CSP
Health, Safety and Environment Manager
Jacobs Engineering Group

Date 5/5/04

Sid McNair
Regional Health, Safety and Environment Manager
Jacobs Engineering Group

Date 5/5/04

Virgil Jansen, PE
Project Manager
Jacobs Engineering Group, Inc.

Date 5/5/04

APPENDIX I- EMERGENCY INFORMATION

Communications Center Emergency		(419) 621-3222
NASA Guard Station		(419) 621-3226
Police Department		(419) 627-5863
Fire Department		(419) 627-5837
Hospital (Emergency Center)		(419) 626-7455
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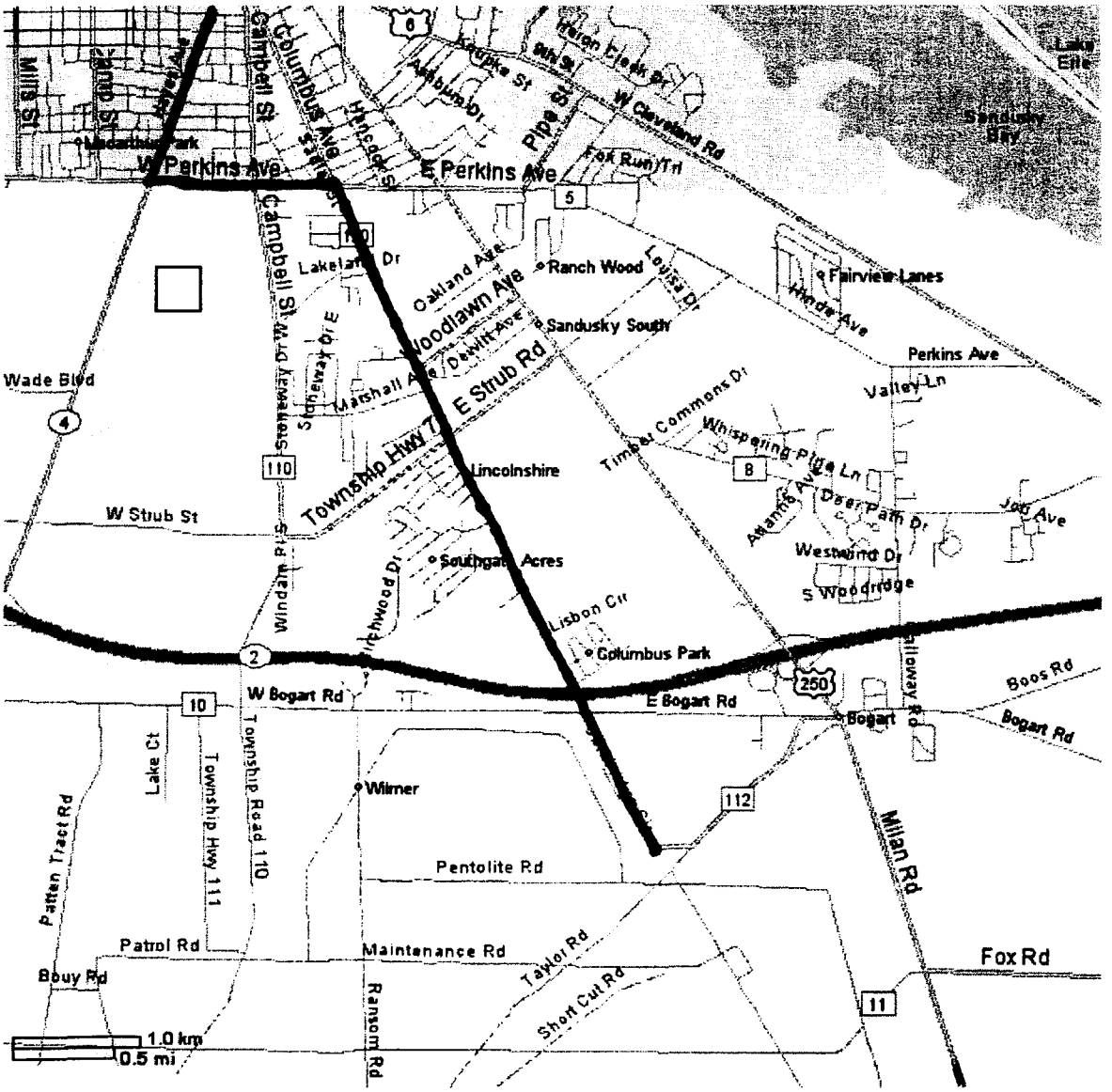
Project Manager	Virgil Jansen	(865) 220-4933
Regional HSE Manager	Sid McNair	(865) 220-4829
HSE Manager	Sean Healey	(865) 220-4923

Route to hospital:

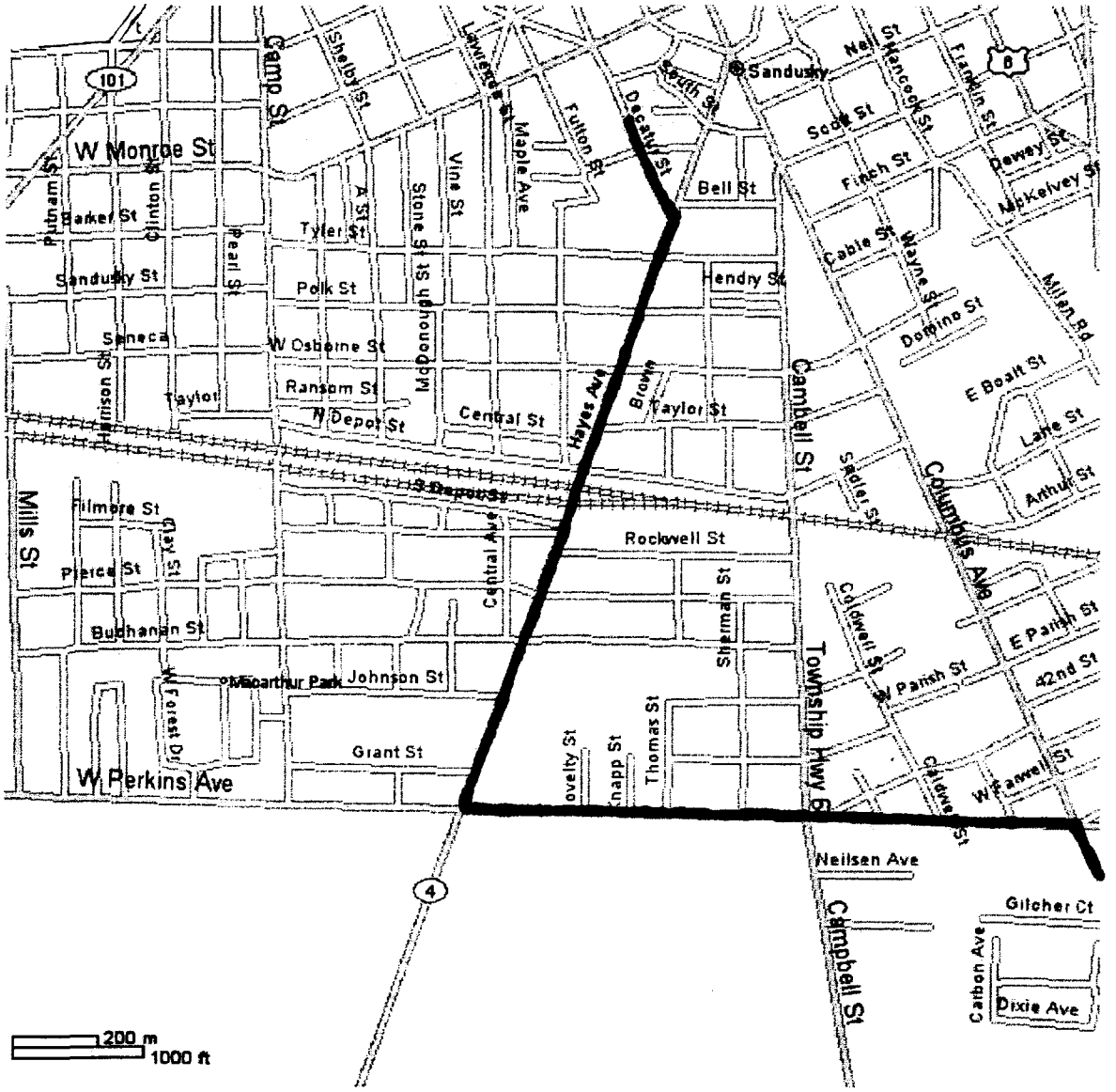
Firelands Regional Medical Center
1101 Decatur Street
Sandusky, Ohio 44870

- Exit from the main gate of Plum Brook Station to Taylor Road
- Turn left onto Columbus Avenue
- Turn left onto Perkins Avenue
- Turn right (west) onto Hayes Avenue
- Travel north on Hayes Avenue to Decatur
- The Firelands Regional Medical Center will be on the left side.

Map from PBOW to Firelands Regional Medical Center



Map from Columbus Ave to Firelands Regional Medical Center



APPENDIX II- RESPONSE TO COMMENTS

Site Wide Health and Safety Plan Comments

Review Number 69035
Date: 5 Mar 04

1. Page 13, Paragraph 3.1 – HAZWOPER Training and Medical Surveillance. The latest version of ER 385-1-92 (1 July 03) encourages districts (and their contractors) to review project tasks and activities for contaminant related exposure and where possible, exclude HAZWOPER training and medical surveillance requirements from the tasks that will not involve contaminant-related exposure. I suggest that LRN and Jacobs review the tasks and where possible, exclude HAZWOPER training and medical surveillance requirements so that Non-HAZWOPER subcontractors can be hired (hopefully for less money) to perform them. Following tasks on page 8 (there may be more if you look for them) where this comment might apply: Geophysical and topographic survey activities; boring, sampling and analysis for geotechnical parameters; community education; survey and mapping.

The SWSHP specifies the HAZWOPER requirements only apply to workers entering "...designated contamination reduction zones, exclusion zones or any areas where potential chemical hazards associated with the site exist". It is anticipated there will be a number of activities performed by personnel not required to meet the training and medical monitoring specified in 29 CFR 1910.120

2. Page 35, Paragraph 5.3.2 and Page 36, Paragraph 5.2.6. Use of generic action levels (paragraph 5.2.3) and generic selection of PPE (paragraph 5.2.6) is very conservative and can easily lead to unnecessary or inappropriate use of PPE and inappropriate or unnecessary employee exposure monitoring. USACE requires hiring a SHM (Sean Healy) with hazardous waste site experience to review work tasks before field work begins to specify appropriate and cost effective monitoring and PPE. Provide some assurance that Mr. Healy (Contract SHM) is involved with selection of PPE, monitoring equipment (and any other health and safety precautions) before work tasks begin.

As these tasks are investigative in nature, conservative action levels have been implemented. If appropriate, action levels and monitoring requirements can be modified as more information is obtained during field activities.

3. Page 42, Paragraph 8.1.2 Monitoring Equipment Maintenance and Calibration. Assure that the instrument-specific action levels account for the different instrument response factors associated with unique VOCs on Page 20.

Sound industrial hygiene practice will be applied to all aspects of personnel monitoring, including air monitoring.

4. Page 46, Section 10.0 Emergency Response. Assure that all current project personnel with emergency response responsibilities have discussed and rehearsed emergency response procedures and agreements with local emergency response providers.

A comment will be added to this section discussing the need to coordinate emergency response planning with the local authorities within 5 days of arriving on site.

Review Dated 17 March 04

1. Cover Page. Remove reference to Reservoir 2 Burning Ground because this is Site Wide plan.

Reference to "Reservoir 2 Burning Ground" will be removed from the cover page.

2. Completion of Independent Technical Review. It might be more appropriate to have Virgil Jansen sign the review page as Project Manager Review, rather than the independent technical review. Also, it may be appropriate to have the author sign with his/her discipline.

Reviewers discipline will be added to the ITR form.

3. General: There needs to be an "easy access" page in this plan, and all other plans that have a map with route clearly marked to the hospital, and emergency contact information. Included in the emergency phone numbers should be the NASA Guard Station 419-621-3226.

A route map to the hospital will be included with the written directions currently present.

4. General Map: Include a map of the facility that shows accessible roads and clearly marked NASA Guard Station, so in an emergency, the on-site workers will know how to exit the facility quickly.

A general area map will be added to the plan.

5. Section 8: Add a section on heat stress and cold stress monitoring, and associated standards for worker safety.

Cold stress and heat stress are already addressed in sections 4.5.4 and 4.5.5 respectively.

6. Section 2.5, 4th bullet: Define HSM.

All acronyms used within the document are defined on page 7 however an additional reference can be incorporated as requested.

7. Section 4.3.1, 2nd sentence: Define JE HSEP. See comment about adding an appendix.

All acronyms used within the document are defined on page 7 however an additional reference can be incorporated as requested.

8. Page 18, Utility Hazards: The JE Health, Safety and Environment Procedure section 7.3.3 is referenced and be included in an appendix. Also, in general for the SHEP, any referenced section should be include in an appendix, and in this SWSHP, the specific appendix should be referenced.

Numerous corporate procedures are referenced throughout the document. It is required that the site health and safety officer have either electronic access to the Jacobs intranet or controlled hard copies of the procedures available on site. A CD containing all of the current JE procedures can be made available as necessary.

9. Section 5 or Section 8: Specifics for hearing protection should be defined. What are the specific type of hearing protection? When are each type of hearing protection needed for which circumstance?

Specific noise reduction rating (NRR) requirements will be added to areas referencing hearing protection. In order to minimize confusion and allow for greatest flexibility, models, types or brands of hearing protection was not specified since any type meeting the minimum NRR value would be acceptable.

10. Section 6: There needs to be a page listing standard site rules, such as buddy system, no eating and drinking in the EZ, no smoking, etc.

A compilation of requirements established throughout the document will be added to section 3. This will also provide an excellent basis for worker orientation.

11. Section 8: Set up a matrix or table with what is being monitored, what action level, frequency of monitoring and with what instrument. For example, LEL meter - continuous monitoring, 10% of LEL means that you need to evacuate the area.

A matrix summarizing air monitoring requirements, action levels and required actions will be added to section 8.

12. Section 10.2: An Automatic External Defibrillator (AED) is not required to be among standard contractor safety equipment. It may be a good idea to find out where NASA has at least one, and list it among safety equipment accessible on-site.

Under consideration.

13. Section 10.4: Instead of a 10-Unit first aid kit, USACE Safety Requirements indicate a Type III, 16-Unit first-aid kit and one pocket mouth piece or CPR barrier shall be in the standard contractor safety equipment.

The first aid kit requirement will be changed to specify a Type III, 16-Unit first-aid kit including one pocket mouth piece or CPR barrier.

14. Section 10.9: Please add the NASA Guard Station 419-621--3226, as an emergency phone number.

The NASA Guard Station, (419) 621-3226, will be added to the emergency phone number list.

Review Dated 14 April 04

1. Page 12, Section 2.8 Please put in a statement that all personnel on site will read and initial the HASP.

The comment will be added to section 2.8.

2. Page 46, Section 10.2 Change 911 to 419-621-3222 in two locations.

The number will be changed.

3. Page 47, Section 10.3 Providence Hospital no longer exists. The nearest hospital is :Firelands Regional Medical Center, 1101 Decatur Street, 419-626-7455
Directions: Main gate to Taylor, left from Taylor to Columbus Ave., left off Columbus to Perkins Ave., right off Perkins (west) to Hayes Ave., north on Hayes Ave. to Decatur, Firelands Regional Medical Center is on left.

The medical facility information will be updated.

4. Page 49, Section 10.9 Include Comm Center Emergency Phone Number: 419-621-3222.
Change Hospital Number to 419-626-7455.
Include the following PBS personnel:

NASA Safety Officer: Amy Bower 419-621-3233
NASA Environmental Manager: Bob Lallier 419-621-3234
PBOSG Safety Specialist: Gary Ponikvar 419-6212-3342

The numbers will be updated.