
FINAL
Site-Specific Safety and Health Plan
Stabilization, Excavation and Disposal of Contaminated Soil
Plum Brook Ordnance Works
Sandusky, Ohio

Contract No. DACW69-00-D-0021
Work Order No. 020

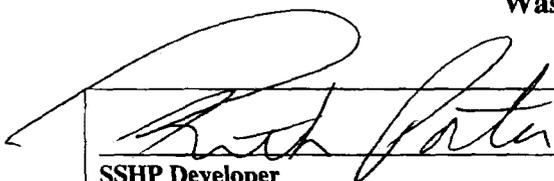
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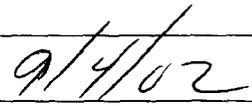
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SSHP Developer


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Definitions and Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
CFR	Code of Federal Regulations
COC	Constituents of Concern
CPR	Cardiopulmonary Resuscitation
DNT	Dinitrotoluene
EPA	United States Environmental Protection Agency
GSA	General Service Administration
HASP	Health and Safety Planner
HAZWOPER	Hazardous Waste Operations and Emergency Response
HTF	Hypersonic Tunnel Facility
HTRW	Hazardous, Toxic, and Radioactive Waste
IQCT	Independent Quality Control Team
IDLH	Immediately Dangerous to Life and Health
IDW	Investigation Derived Waste
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety & Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PBOW	Plum Brook Ordnance Works
PBS	Plum Brook Station
PCBs	Polychlorinated Biphenyls

PEL	Permissible Exposure Limit
POC	Point of Contact – technical point of contact for the U.S. Army Corps of Engineers
PPE	Personal Protective Equipment
PRGs	Preliminary Remediation Goals
QA	Quality Assurance
QC	Quality Control
QAP	Quality Assurance Plan
QCP	Quality Control Plan
REIC	Research Environmental and Industrial Consultants
SOW	Scope of Work
SSHO	Site Safety and Health Officer
SSHP	Site-Specific Safety and Health Plan
USACE	United States Army Corps of Engineers
TCLP	Toxicity Characteristic Leaching Procedure
TNT	Trinitrotoluene
TWA	Time Weighted Average

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this site-specific safety and health plan (SSHP) is to establish mandatory safety practices and procedures for all work conducted for the U. S. Army Corps of Engineers (USACE). Applicability extends to all employees, subcontractors, and visitors. This plan assigns responsibilities and establishes standard operating procedures for field personnel working on this project. During development of this plan, consideration was given to safety standards as defined by the Occupational Safety and Health Administration (OSHA), the National Institute for Occupational Safety and Health (NIOSH), and the USACE Manual (EM 385-1-1, September 1996 Edition).

1.2 Visitors

WasteTron personnel, the USACE and NASA points of contacts listed in Section 4.1 of this plan, personnel from Severson, and the Site-Specific Safety and Health Officer (SSHO) are not considered visitors, they are considered project personnel who have the necessary safety training (Hazardous Waste Operations and Emergency Response (HAZWOPER) training) to enter a potentially contaminated area. Also, the surveyors (Mountain State) and the companies performing transportation services (Barnes Nursery, Dart Trucking, Mesenburg Brothers, and Enviro-Clean) are considered project personnel. However, they are limited to performing non-intrusive activities that are not likely to result in exposure; therefore, they are not required to have HAZWOPER training. All project personnel are required to review this SSHP. All others will be considered visitors to the site. All visitors entering the work area at the site will be required to sign in with the site safety and health officer (SSHO) or the Project Manager and review this site specific safety and health plan. Appendix C contains a copy of the visitor log form to be used on-site. Visitors that do not meet the training requirements of 29 CFR 1910.120 will not be allowed to perform intrusive activities. In the event that a visitor does not adhere to the provisions of this plan, that person will be asked to leave the work area.

1.3 Safety Policy Enforcement

WasteTron field personnel and subcontractors are required to familiarize themselves with this plan so that they may adhere to its safety provisions. The provisions of this site specific safety policy will be enforced. Failure to comply will be grounds for disciplinary action for employees, and non-compliant visitors will be required to leave the work zone. A copy of the WasteTron general safety policy is included in Appendix F.

Pursuant to the Scope of Work, coordination with Plum brook Station (PBS) personnel will be conducted by USACE to ensure that WasteTron is allowed access to/from the site to perform all activities during this removal action. WasteTron and its subcontractors shall be required to enter/exit through the PBS security gate and to adhere to the PBS security and safety regulations. WasteTron personnel and subcontractors are required by NASA to review a safety video and orientation prior to performing any on-site activities. WasteTron is responsible for ensuring that WasteTron employees and subcontractors follow all rules set forth by the PBS personnel. Security and safety requirements, as set forth by PBS, shall not be compromised. A pre-construction meeting between WasteTron personnel, WasteTron subcontractors, USACE personnel, and NASA personnel shall be held prior to beginning field work.

2.0 PROJECT DESCRIPTION

2.1 Introduction and Site History

The site of the former Plum Brook Ordnance Works (PBO) is located approximately 4 miles south of Sandusky, Ohio and 59 miles west of Cleveland, Ohio. Although primarily in Perkins and Oxford Townships, the eastern edge of the site extends into Huron and Milan Townships. PBO is bounded on the north by Bogart Road, on the south by Mason Road, on the west by County Road 43, and on the east by U.S. Highway 250. The surrounding area is mostly agricultural and residential.

The 9,009-acre PBO site was built in early 1941 as a manufacturing plant for 2,4,6-trinitrotoluene (TNT), dinitrotoluene (DNT), and pentolite. Production of explosives at PBO began in December 1941 and continued until 1945. It is estimated that more than 1 billion pounds of nitroaromatic explosives were manufactured during the 4-year operating period. The three explosive manufacturing areas were designated TNT Area A (TNTA), TNT Area B (TNTB), and TNT area C (TNTC). Twelve process lines were used in the manufacture of TNT, four lines at TNTA, three lines at TNTB, and five lines at TNTC. The work to be performed under this project deals primarily with the TNTB area.

The TNTB manufacturing site consisted of widely scattered buildings of wood frame construction with asbestos and sheet metal coverings. It also included a series of buried and/or overhead flumes and pipes used to transport various liquids associated with the manufacturing process. After plant operations ceased, TNT B's manufacturing lines were decontaminated by the War Department in late 1945. After decontamination all structures, equipment, and manufacturing debris were either removed and salvaged or removed and burned by the War Department in 1945. The property was decontamination of the property was initially transferred

to the Ordnance Department, then to the War Assets Administration after it was certified by the U.S. Army to be decontaminated. In 1949, PBOW was transferred to the General Services Administration (GSA). In 1955, the GSA completed further decontamination of TNTB. This effort supposedly focused on surface contamination detected by visual inspection. It is unknown whether the underground flumes were addressed by this decontamination effort.

The National Aeronautics and Space Administration (NASA) acquired the property on March 15, 1963 and currently utilizes the site. GSA performed further decontamination efforts during the 1963 transfer. The decontamination process included removing contaminated surface soils above the drain tiles, flumes, etc., destruction of all buildings by fire, the removal of all soil debris, sumps, and concrete foundations. All materials, including the soil in those areas, were flashed. The area was then rough graded. The decontamination process also included the burning of excavated nitroaromatic filled flumes.

NASA currently operates the Plum Brook Station (PBS) of the John Glenn Research Center at Lewis Field. Most of the aerospace testing facilities built in the 1960's at the site are in standby or inactive status. On April 18, 1978, NASA declared approximately 2,152 acres of PBOW as excess. The Perkins Township Board of Education acquired 46 acres of the excess acreage and uses this area as a bus transportation area. GSA retains ownership of the remaining of the excess acreage and currently has a use agreement with Ohio National Guard for 604 acres of the land. NASA presently controls approximately 6,400 acres and is using the site to conduct space research as a satellite operation of the John Glenn Research Center at Lewis Field.

TNTB consists of an area of approximately 55 acres at the south-central portion of PBOW immediately north of West Sheid Road. Significant evidence of former PBOW facilities exists at TNTB in form of roads, hydrants, and ditches. All the buildings that had been present during the TNT manufacturing were demolished and removed. Two NASA facilities are present at the site and are currently active, the Hypersonic Tunnel Facility (HTF) and Nitrogen Dewar Tanks. The HTF is located in the northwest portion of TNTB and consists of a single building, above and below-ground piping and utilities, and paved parking areas. The Nitrogen Dewar Tanks are located in the center of TNTB with aboveground piping and underground utilities leading to the northwest towards the HTF and to the northeast offsite.

2.2 Proposed Action Description

Remedial Investigation (RI) fieldwork was conducted in 1998 in order to provide a basis for taking an action at this site. As part of the RI, 391 soil samples were collected and field screened for nitroaromatics. Additionally, 40 confirmation soil samples were collected to supplement the on-site screening analysis for standard laboratory analysis using SW-846 Method 8330 with second column confirmation. A human health risk assessment was conducted for TNTB. Thirteen constituents of concern (COC) were identified in surface and subsurface soil. Six of the COCs are nitroaromatics {2-amino-4,6-dinitrotoluene (DNT); 4-amino-2,6-DNT; 2,6-DNT; 2,4-DNT; 2-nitrotoluene; and 2,4,6-trinitrotoluene (TNT)}. The remaining seven COCs are polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs). The PCBs

detected on-site are Aroclor 1254 and Aroclor 1260. The PAHs detected on-site are benzo (a) anthracene, benzo (a) pyrene, benzo (a) fluoranthene, dibenzo (a,h) anthracene, and indeno (1,2,3-cd) pyrene. Lead, which was not listed as one of the COCs, was also found at various levels, and if encountered at values exceeding regulatory levels, it will need to be disposed of in accordance with applicable state and federal regulations. Soil with lead levels equal to or greater than 5 mg/l as determined by the toxicity characteristic leaching procedure (TCLP) is defined by the Resource Conservation and Recovery Act as hazardous waste. MAECTITE® will be used to treat hazardous lead contaminated soil to reduce the lead levels below 5 mg/l prior to disposal in a non-hazardous landfill. Excavation areas where lead is known to be present will have the soil from the walls and floor analyzed for total lead. Acceptable levels of total lead in the excavation pits will be 400 mg/kg or less.

The proposed approach for this removal action is to excavate all the areas in which the concentration of the COCs in soil exceeds the preliminary remediation goals (PRGs). Refer to the Table 1 below for the PRGs for this site.

Table 1--Chemicals of Concern

Chemical of Concern	PRGs (mg/kg)
Nitroaromatics	
2-amino-4,6-DNT	0.40
4-amino-2,6-DNT	0.40
2,4-DNT	7.50
2,6-DNT	2.75
2-nitrotoluene	74
2,4,6-TNT	3.36
PCBs	
Aroclor 1254	0.16
Aroclor 1260	2.87
PAHs	
Benzo (a) anthracene	5.43
Benzo (a) pyrene	0.54
Benzo (a) fluoranthene	5.43
Dibenz (a,h) anthracene	0.65
Indeno (1,2,3-cd) pyrene	5.43

The estimated volume of contaminated soil from all areas of the TNTB is 3,300 cubic yards. Pursuant to the Scope of Work, representative soil samples from each excavated area will be analyzed for toxicity characteristic leaching procedure (TCLP) volatiles, semi-volatiles, and metals. Using existing soil data, the estimated volume of excavated soil that may be classified as hazardous waste based on 2,4-DNT concentrations is approximately 560 cubic yards. An additional 400 cubic yards of material might be identified as a hazardous waste due to the high levels of lead. For disposal purposes, TCLP lead analysis will be performed and compared to the RCRA level of 5 mg/l. Any soil identified as hazardous waste shall be treated (i.e. stabilized) to achieve “special” waste classification prior to land disposal in a non-hazardous waste landfill.

2.3 Tasks

The following tasks are required to be performed under this Scope of Work:

- Task 1** Preparation and submission of a Site Specific Safety and Health Plan.
- Task 2** Preparation and submission of a Quality Control Plan.
- Task 3** Preparation and submission of a Plan of Operations, which shall include information on the disposal of Investigation Derived Waste, Erosion Control Plan, Spill Containment Plan, Sampling and Analysis Plan, Environmental Protection Plan and a Materials Handling Plan.
- Task 4** Notification/ scheduling of field activities and coordination of utility marking with NASA officials prior to site mobilization.
- Task 5** Site surveying is necessary for identifying limits of excavation.
- Task 6** Excavation of Contaminated Material (removal of approximately 3,300 cubic yards of contaminated material from 30 areas in the vicinity of the former TNT Area B site).
- Task 7** Chemical stabilization of excavated soils classified as hazardous waste and subsequent testing of mixed soils prior to disposal.
- Task 8** Disposal of Investigation Derived Waste (IDW).
- Task 9** Confirmation sampling of each of the excavation pits.
- Task 10** Preparation and submission of the Draft and Final Remedial Action Report..
- Task 11** Public meeting support will be provided to the USACE for the work defined by this delivery order.

2.4 Summary of Field Activities

In accordance with contract requirements, WasteTron will notify the USACE POC and provide a schedule of events prior to beginning field activities. WasteTron has retained Mountain State Company to perform surveying of the 30 areas to be excavated. After Mountain State performs the surveys, WasteTron will submit the survey information with digging permit forms to the NASA Plum Brook Station (PBS) Point of Contact (POC). WasteTron will not perform excavation activities until NASA issues digging permits. WasteTron will mobilize to the site and perform clearing and grubbing operations as necessary after USACE and NASA approval. Cleared and grubbed material will be placed in windrows on the site for wildlife habitats. Only a small amount of clearing and grubbing is expected to be necessary.

Personnel will prepare a staging area/storage area utilizing 3 layers of 6-mil plastic and concrete barriers. WasteTron intends to have clean backfill material brought to the site and stored until needed for backfilling the excavations. Excavated materials will be taken to a central location for sampling and treatment, if necessary, prior to disposal. WasteTron will ensure that the excavated materials remain segregated into soil piles containing nitroaromatics and soil piles containing nitroaromatics and lead. It should be noted that low levels of polychlorinated biphenyls (PCBs) were detected in some areas of the site; however, pursuant to the SOW, PCBs are not considered a concern during confirmation sampling and disposal due to their low concentrations in the soil. The walls and the floor of each excavation will be field tested to determine if excavation has been sufficient to remove the contaminated nitroaromatics and lead prior to sending confirmation samples to the laboratory. A mixing pad constructed of 3 layers of 6-mil plastic surrounded with concrete barriers will be prepared for the treatment of the lead containing soil using the MAECTITE® process. Lead contaminated soil will be treated with MAECTITE® to chemically fixate the lead. Each excavated area will have confirmation soil samples collected and sent to the laboratory in accordance with the Scope of Work and the Plan of Operations. Excavated areas will be backfilled with clean soil after confirmation sampling indicates that the contaminants were detected at levels less than the PRGs. Backfilled areas will be seeded and mulched in accordance with the Plan of Operations. Soil samples will be collected of all stockpiled soils for waste characterization purposes (full TCLP analysis). Non-hazardous waste from the site will be transported to the Erie County Landfill for subsequent disposal. Hazardous waste, if present, will be transported to Environmental Quality's (EQ) Wayne Disposal Landfill in Michigan for subsequent disposal.

3.0 HAZARD/RISK ANALYSIS

3.1 Activity Hazard Analysis

Appendix A summarizes field activities that may create or contribute to a hazard and the actions that can be taken to eliminate or minimize hazards at the site. A nuclear reactor is located at PBS. This reactor is currently being decommissioned. Exposure to radiation on-site is not expected to be an issue; however, personnel must be cognizant that radioactive material is present at the PBS site and that exposure, while highly unlikely, is possible. Therefore, WasteTron Project Management must ensure that WasteTron personnel and subcontractors work only in the areas designated and that all instructions provided by the PBS security and safety personnel is strictly adhered to. WasteTron personnel and subcontractors are required by NASA to review a safety video prior to performing any on-site activities.

3.2 Chemical Hazards

The primary chemical hazards associated with these investigations are exposure to nitroaromatic compounds, polychlorinated biphenyls, and lead. Also, personnel will be potentially exposed to MAECTITE® which will be used to stabilize the lead in the soil prior to off site disposal. Additionally, personnel will be potentially exposed to products brought on the site by WasteTron. Products that WasteTron might bring on-site include Tornado-50 cleaner, hexane, nitric acid, acetone, lime, and fertilizer. Material safety Data Sheets (MSDS) will be provided

on-site for all chemicals used at PBOW. Sections 3.2.1 through 3.2.13 give specific information concerning the chemicals that may be encountered during this project. The following standard safety precautions shall be adhered to for this project.

- Keep work areas clean and well ventilated.
- Clean up spills quickly and carefully.
- Personnel in the work zone shall not eat, drink, smoke or apply cosmetics.
- Only personnel meeting the training requirements of 29 CFR 1910.120 may perform this work. Personnel shall, at a minimum, be wearing Level D PPE as listed in Section 5.1. If site conditions so warrant, the Project Manager/SSHO shall require personnel to upgrade to a higher level of PPE.
- Any unnecessary contact with potentially contaminated substances shall be avoided.
- No horseplay.
- No matches or lighters shall be used in the work zone.
- During activities that present a risk to personnel, the buddy system as described in Section 6.1 will be implemented.

3.2.1 Dinitrobenzene (all isomers)

Dinitrobenzene presents danger from the formation of methemoglobinemia, which is the oxidation and inactivation of hemoglobin in the blood. Some of the chemical and physical properties of dinitrobenzene are as follows:

- Dinitrobenzene has an approximate molecular weight of 168.1 g/mol.
- Dinitrobenzene is a pale white or yellow crystalline solid.
- Dinitrobenzene has a boiling point of 606 °F.
- Dinitrobenzene has a vapor pressure of less than 1 mm Hg at 68 °F.
- Dinitrobenzene has a solubility of 0.01 to 0.05 grams per 100 grams of water.
- Dinitrobenzene is incompatible with strong oxidizers, caustics, and chemically active metals such as tin or zinc.

Specific routes of exposure are:

- Skin absorption (solid, liquid, and vapor phases are readily absorbed through the skin)
- Eye contact
- Ingestion
- Inhalation

Ingestion of alcohol may cause aggravation of symptoms. Symptoms a worker may exhibit when exposed to dinitrobenzene include, but are not limited to the following:

- Eye and skin irritation
- Cyanosis
- Irritability
- Unpleasant taste or burning sensation in mouth

- Dry throat
- Reduced vision
- Jaundice
- Drowsiness
- Nausea
- Headache
- Shortness of breath
- Weakness
- Dizziness
- Anemia
- Unconsciousness

The target organs affected are:

- Eye
- Skin
- Blood
- Liver
- Central nervous system
- Cardiovascular system

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eye lids occasionally.
- Get medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If dinitrobenzene has penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Get medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Get medical attention immediately.

Ingestion

- If conscious, give affected person large quantities of water immediately. Induce vomiting after water consumption for conscious persons. (*Do not induce vomiting if affected person loses consciousness.*)
- Get medical attention immediately.

3.2.2 Nitrobenzene

Nitrobenzene presents danger from the formation of methemoglobinemia, which is the oxidation and inactivation of hemoglobin in the blood. Some of the chemical and physical properties of nitrobenzene are as follows:

- Nitrobenzene has a molecular weight of 123.1 g/mol.
- Nitrobenzene is a yellow, oily liquid with a pungent shoe polish odor.
- Nitrobenzene has a boiling point of 411 °F.
- Nitrobenzene has a vapor pressure of less than 1 mm Hg at 68 °F.
- Nitrobenzene has a solubility of 0.19 grams per 100 grams of water.
- Nitrobenzene is incompatible with concentrated nitric acid, nitrogen tetroxide, caustics, phosphorus pentachloride, and chemically active metals such as tin or zinc.

Specific routes of exposure are:

- Skin absorption
- Eye contact
- Ingestion
- Inhalation

Ingestion of alcohol may cause aggravation of symptoms. Symptoms a worker may exhibit when exposed to nitrobenzene include, but are not limited to the following:

- Eye and skin irritation
- Cyanosis
- Irritability
- Drowsiness
- Nausea
- Headache
- Shortness of breath
- Weakness
- Dizziness
- Unconsciousness

The target organs affected are:

- Eye
- Skin
- Blood
- Reproductive system
- Liver
- Kidneys
- Cardiovascular system

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eye lids occasionally.
- Get medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If Nitrobenzene has penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Get medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Get medical attention immediately.

Ingestion

- If conscious, give affected person large quantities of water immediately. Induce vomiting after water consumption for conscious persons. (*Do not induce vomiting if affected person loses consciousness.*)
- Get medical attention immediately.

3.2.3 Nitrotoluene (all isomers)

Nitrotoluene presents danger from the formation of methemoglobinemia, which is the oxidation and inactivation of hemoglobin in the blood. Some of the chemical and physical properties of nitrotoluene are as follows:

- Nitrotoluene has a molecular weight of 137.1 g/mol.
- Nitrotoluene is a yellow liquid or solid with a weak aromatic odor.
- Nitrotoluene has a boiling point of 432 °F.
- Nitrotoluene has a vapor pressure of 0.12 to 0.15 mm Hg at 68 °F.
- Nitrotoluene has a solubility of 0.04 to 0.06 grams per 100 grams of water.
- Nitrotoluene is incompatible with strong oxidizers, and sulfuric acid.

Specific routes of exposure are:

- Skin absorption
- Eye contact
- Ingestion
- Inhalation

Symptoms a worker may exhibit when exposed to nitrotoluene include, but are not limited to the following:

- Skin irritation
- Cyanosis
- Irritability
- Drowsiness
- Nausea
- Rapid pulse
- Headache
- Shortness of breath
- Heart irregularities
- Weakness
- Dizziness
- Unconsciousness

The target organs affected are:

- Skin
- Blood
- Cardiovascular system
- Central nervous system
- Gastrointestinal tract

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eye lids occasionally.
- Get medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If nitrotoluene has penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Get medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Get medical attention immediately.

Ingestion

- If conscious, give affected person large quantities of water immediately. Induce vomiting after water consumption for conscious persons. (*Do not induce vomiting if affected person loses consciousness.*)
- Get medical attention immediately.

3.2.4 Dinitrotoluene (DNT)

Dinitrotoluene presents danger from the formation of methemoglobinemia, which is the oxidation and inactivation of hemoglobin in the blood. Dinitrotoluene has been shown to be a carcinogen and neoplastigens in laboratory experiments with animals. Some of the chemical and physical properties of DNT are as follows:

- DNT has a molecular weight of 182.2 g/mol.
- DNT is an orange-yellow crystalline solid.
- DNT has a boiling point of 572 °F.
- DNT has a vapor pressure of 1 mm Hg at 68 °F.
- DNT has a solubility of 0.03 grams per 100 grams of water.
- DNT is incompatible with strong oxidizers, caustics, and metals such as tin and zinc.

Specific routes of exposure are:

- Skin absorption
- Eye contact
- Ingestion
- Inhalation

Symptoms a worker may exhibit when exposed to DNT include, but are not limited to the following:

- Skin irritation
- Cyanosis
- Irritability
- Drowsiness
- Nausea
- Rapid pulse
- Headache
- Shortness of breath
- Heart irregularities
- Weakness
- Dizziness
- Unconsciousness

The target organs affected are:

- Skin
- Blood
- Cardiovascular system
- Liver
- Reproductive system

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eye lids occasionally.
- Get medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If DNT has penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Get medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Get medical attention immediately.

Ingestion

- If conscious, give affected person large quantities of water immediately. Induce vomiting after water consumption for conscious persons. (*Do not induce vomiting if affected person loses consciousness.*)
- Get medical attention immediately.

3.2.5 2,4,6-Trinitrotoluene (TNT)

TNT presents danger from the formation of methemoglobinemia, which is the oxidation and inactivation of hemoglobin in the blood. Some of the chemical and physical properties of trinitrotoluene (TNT) are as follows:

- TNT has a molecular weight of 227.1 g/mol.
- TNT is a colorless to pale yellow, odorless solid.
- TNT has a boiling point (it explodes) of 464 °F.
- TNT has a vapor pressure of 0.053 mm Hg at 68 °F.
- TNT has a solubility of 0.013 grams per 100 grams of water.
- TNT is a Class A explosive. Rapid heating may cause an explosion.
- TNT may affect the ability of blood to carry oxygen.
- TNT is incompatible with strong oxidizers, ammonia, strong alkalies, and combustible materials.

Specific routes of exposure are:

- Skin absorption
- Eye contact
- Ingestion
- Inhalation

Symptoms a worker may exhibit when exposed to TNT include, but are not limited to the following:

- Skin irritation
- Irritation to the eyes, throat, and nose
- Jaundice (skin, hair, and nails)
- Cyanosis
- Sneezing
- Coughing
- Sore throat
- Muscular pain

- Weakness
- Drowsiness
- Shortness of breath
- Heart irregularities
- Unconsciousness
- Cataracts

The target organs affected are:

- Skin
- Eyes
- Respiratory system
- Blood
- Cardiovascular system
- Liver
- Kidneys
- Central nervous system

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eye lids occasionally.
- Get medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If contaminant has penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Get medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Get medical attention immediately.

Ingestion

- If conscious, give affected person large quantities of water immediately. Induce vomiting after water consumption for conscious persons. (*Do not induce vomiting if affected person loses consciousness.*)
- Get medical attention immediately.

3.2.6 Lead

Some of the chemical and physical properties of lead are as follows:

- Lead has a molecular weight of 207.2 and a molecular formula of Pb.
- Lead is a heavy, gray solid, which is ductile and soft.
- Lead begins to melt at 621 °F.
- Lead is incompatible and/or reactive with strong oxidizers, hydrogen peroxide and acids.

Specific routes of exposure to lead are:

- Inhalation
- Ingestion
- Skin contact

Symptoms a worker may exhibit when exposed to lead include, but are not limited to the following:

- Eye irritation
- Insomnia
- Nausea
- Malnutrition
- Constipation
- Colic
- Anemia
- Tremors
- Abdominal pain
- Hypotension
- Paralysis of wrist and/or ankles
- Pallor
- Gingival lead line
- Encephalopathy
- Will severely aggravate pre-existing conditions of gout

The target organs affected by lead are:

- Eyes
- Gastrointestinal tract
- Central nervous system
- Kidneys
- Blood
- Gingival tissue

Lead can cause diseases of the central and peripheral nervous system, the kidney and the blood. The OSHA PEL is 0.050 milligrams per cubic meter (mg/m^3) or $50 \text{ ug}/\text{m}^3$.

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eyelids occasionally.
- Seek medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- Seek medical attention immediately.

3.2.7 Hexane

Hexane will be used for decontamination of sampling equipment. Some of the chemical and physical properties of hexane are as follows:

- Hexane is a colorless liquid with a gasoline like odor.
- Hexane has a molecular weight of 86.2.
- Hexane is a flammable liquid. It has a lower explosive limit of 1.1% and an upper explosive limit of 7.5%.

The specific routes of exposure for hexane are:

- Inhalation
- Skin absorption
- Ingestion
- Skin and/or eye contact

Symptoms a worker may exhibit when exposed to hexane include, but are not limited to the following:

- Dermatitis
- Respiratory irritation
- Muscle weakness
- Dizziness
- Headache
- Drowsiness
- Eye irritation

The target organs affected by hexane are:

- Eyes
- Skin
- Respiratory System
- Central Nervous System
- Peripheral Nervous System

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eye lids occasionally.
- Seek medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If methanol have penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- Seek medical attention immediately.

3.2.8 Tornado-50 Cleaner

Tornado-50 cleaner is a heavy-duty multi-purpose biodegradable, alkaline cleaner that will be used to clean the equipment. Some of the chemical and physical properties of Tornado-50 cleaner are as follows:

- Tornado-50 cleaner is a green-yellow liquid.
- Tornado-50 cleaner has a boiling point of 180 °F.
- Tornado-50 cleaner is incompatible and/or reactive with acids.

Specific routes of exposure to Tornado-50 cleaner is:

- Inhalation
- Dermal absorption
- Ingestion (Do not induce vomiting, if swallowed)

Symptoms a worker may exhibit when exposed to Tornado-50 cleaner include, but are not limited to the following:

- Eye and skin irritation
- Throat and nose irritation
- Skin redness
- Dizziness

The target organs affected by Tornado-50 cleaner are:

- Eyes
- Skin
- Respiratory system

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eyelids occasionally.
- Seek medical attention immediately.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- Seek medical attention immediately.

3.2.9 Lime

Lime may be applied during re-seeding activities. Some of the chemical and physical properties of agricultural lime are as follows:

- Lime is a white powder with little if any odor.
- Lime does not have a flash point.
- Lime is incompatible and/or reactive with boric oxide, acids, fluorine, and many organic materials
- Hydrated lime is a strongly alkaline material

The specific routes of exposure for lime are:

- Inhalation
- Skin and/or eye contact
- Ingestion

Symptoms a worker may exhibit when exposed to lime include, but are not limited to the following:

- Eye and skin irritation
- Burns to the skin
- Chemical pneumonitis (if inhaled)
- Respiratory irritation
- Irritation to the digestive tract (if ingested)
- Will severely aggravate pre-existing conditions of bronchitis, emphysema and asthma

The target organs affected by lime are:

- Eyes
- Skin
- Gastrointestinal tract
- Respiratory tract

Lime does not pose any fire hazards. The OSHA permissible exposure limit (PEL) for lime is 5 mg/m³. The American Conference of Government Industrial Hygienists (ACGIH) threshold limit values (TLV) for lime is 5 mg/m³.

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eyelids occasionally. Wash eyes for a minimum of 15 minutes.
- Seek medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin with large amounts of water.
- Remove any contaminated clothing.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- Dilute by giving 2 glasses of milk or water to drink, followed by fruit juices or dilute vinegar to neutralize the alkali.
- Seek medical attention immediately.

3.2.10 Fertilizer

Fertilizer may be applied during re-seeding operations. Some of the chemical and physical properties of fertilizer are as follows:

- Fertilizer is a multi-colored granular substance with an ammonia odor.
- Fertilizer does not have a flash point.
- Fertilizer is incompatible and/or reactive with nitrates, strong alkalis, reducing agents, and active metals (such as aluminum & magnesium).

The specific routes of exposure for fertilizer are:

- Inhalation
- Skin and/or eye contact
- Ingestion

Symptoms a worker may exhibit when exposed to fertilizer include, but are not limited to the following:

- Eye and skin irritation
- Respiratory irritation
- Dermatitis
- Coughing
- Headaches
- Muscular weakness
- Irritation to the digestive tract (if ingested)
- Cyanosis
- Depression
- Inhalation of dust may aggravate existing respiratory conditions like asthma

The target organs affected by fertilizer are:

- Eyes
- Skin
- Gastrointestinal tract
- Respiratory tract
- Kidneys

Fertilizer itself is not flammable. However, fertilizer is comprised of materials, which are oxidizers in their pure, unmixed forms. Therefore, fertilizer will not burn but can provide oxygen for existing fires. OSHA has not set a permissible exposure limits (PELs) for fertilizer. The American Conference of Government Industrial Hygienists (ACGIH) has not set threshold limit values (TLV) for fertilizer.

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eyelids occasionally. Wash eyes for a minimum of 15 minutes.
- Seek medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin with soap and large amounts of water.
- Remove any contaminated clothing.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- Have conscious person drink 1-2 glasses of water, and then induce repeated vomit until vomit is clear. Seek medical attention immediately.
- Seek medical attention immediately.

3.2.11 MAECTITE®

MAECTITE® is the material that will be used in the chemical fixation of the lead contaminated soil. Its composition is a trade secret (exemption referenced to 29 CFR 1910.1200) held by Severson Environmental Services, Incorporated. Some of the chemical and physical properties of it are as follows:

- MAECTITE® is an amber viscous liquid mixture with an acrid odor.
- MAECTITE® has a boiling point of 275°F and a vapor pressure of 16 mm Hg.

- MAECTITE® (1 % aqueous solution) has a pH of 2.1 and is a powerful dehydrating agent.
- MAECTITE® is reactive or incompatible with bases. This material is corrosive to common metals such as mild steel, copper, brass, and bronze. It may generate flammable hydrogen gas as a result of this reaction.

The specific routes of exposure are:

- Inhalation
- Skin and/or eye contact
- Ingestion

Symptoms a worker may exhibit when exposed to MAECTITE® include, but are not limited to the following:

- Severe burns
- Eye and skin irritation
- Respiratory irritation
- Dermatitis
- Coughing
- Irritation to the digestive tract (if ingested)

The target organs affected are:

- Eyes
- Skin
- Gastrointestinal tract
- Respiratory tract

Emergency First Aid procedures are:

Eye Contact

- Seek medical attention immediately.
- Wash eyes immediately with large amounts of water, lifting the lower and upper eyelids occasionally. Wash eyes for a minimum of 15 minutes.
- **Do not** attempt to neutralize with chemical agents. Oils or ointments shall **not** be used. Continue the flushing for an additional 15 minutes if the physician is not immediately available.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin with soap and large amounts of water for a minimum of 15 minutes.
- **Do not** attempt to neutralize with chemical agents.
- Remove any contaminated clothing.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- **Do not** induce vomiting. Immediately give large quantities of water. If vomiting does occur, give fluids again.
- Seek medical attention immediately.

3.2.12 Acetone

Acetone will be used to extract the soil samples for the field-testing of nitroaromatics. Some of the chemical and physical properties of acetone are as follows:

- Acetone is a colorless liquid with a mint-like odor.
- Acetone has a molecular weight of 58.08.
- Acetone is a flammable liquid. It has a vapor density of 2.0 (air =1.0).
- Acetone is incompatible or reactive with concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, and acids.

The specific routes of exposure for acetone are:

- Inhalation
- Skin absorption
- Ingestion
- Skin and/or eye contact

Symptoms a worker may exhibit when exposed to acetone include, but are not limited to the following:

- Dermatitis
- Respiratory irritation

- Dullness
- Dizziness
- Headache
- Eye irritation
- Unconsciousness
- Abdominal pain
- Nausea

The target organs affected by acetone are:

- Eyes
- Skin
- Respiratory System
- Central Nervous System
- Peripheral Nervous System

The OSHA PEL for acetone is 1000 ppm. The ACGHI threshold limit value for acetone is 500 ppm (TWA) and 750 STEL.

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eye lids occasionally.
- Seek medical attention immediately.
- Contact lenses shall not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If acetone has penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- If swallowed, vomiting may occur spontaneously, but **DO NOT INDUCE** vomiting. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
- Seek medical attention immediately.

3.2.13 Nitric Acid

A dilute nitric acid solution will be used to extract lead from the soil when using the lead field test kit. Some of the chemical and physical properties of nitric acid are:

- Nitric acid is a clear to light yellow liquid.
- Nitric acid has an acrid suffocating odor.
- Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.
- Nitric acid is incompatible and/or reactive with bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

Specific routes of exposure to nitric acid are:

- Inhalation
- Dermal absorption
- Ingestion (Do not induce vomiting, if swallowed)

Symptoms a worker may exhibit when exposed to nitric acid include, but are not limited to the following:

- Eye irritation
- Skin irritation
- Throat irritation
- Nose irritation
- Skin redness
- Dizziness
- Coughing
- Choking
- Redness, pain, and severe skin burns
- Lung damage

The target organs affected by nitric acid are:

- Eyes
- Skin
- Respiratory system

The OSHA PEL for nitric acid is 2 ppm and/or 5 mg/m³.

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eyelids occasionally.
- Seek medical attention immediately.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- If conscious, give large volumes of water and/or milk. DO NOT INDUCE vomiting.
- Seek medical attention immediately.

3.2.14 Polychlorinated Biphenyls (PCBs)

PCBs are a series of synthetic chemicals that contain 209 individual compounds with varying toxicity. Commercial formulations of PCBs enter the environment as mixtures consisting of a variety of PCBs and impurities. Some PCBs are known in the United States by their industrial trade name, Aroclor. The chemical and physical properties of two of the more common PCBs (Aroclor® 1242 and Aroclor® 1254) are as follows:

- Aroclor® 1242 has an approximate molecular weight of 258 g/mol. Aroclor® 1254 has an approximate molecular weight of 326 g/mol.

- Aroclor® 1242 is a colorless to light-colored, viscous liquid with a mild hydrocarbon odor. Aroclor® 1254 is a colorless to pale yellow, viscous liquid or solid (below 50 °F) with a mild hydrocarbon odor.
- Aroclor® 1242 has an approximate boiling point of 617 to 691 °F. Aroclor® 1254 has an approximate boiling point of 689 to 734 °F.
- Aroclor® 1242 has a vapor pressure of 0.001 mm @ 68 °F. Aroclor® 1254 has a vapor pressure of 0.00006 mm @ 68°F.
- Aroclor® 1242 and Aroclor® 1254 are incompatible and/or reactive with strong oxidizers.

Specific routes of exposure are:

- Inhalation
- Dermal absorption
- Ingestion

Symptoms a worker may exhibit when exposed to these PCB isomers include, but are not limited to the following:

- Eye and skin irritation
- Nausea
- Vomiting
- Loss of weight
- Jaundice
- Edema
- Abdominal pain
- Chloracne

The target organs affected are:

- Eyes
- Skin
- Respiratory system
- Liver

Aroclor® 1242 has a permissible exposure limit (PEL) of 1 mg/m³ and Aroclor® 1254 has a PEL of 0.5 mg/m³. Both isomers have an immediately dangerous to life and health (IDLH) value of 5 mg/m³.

Emergency First Aid procedures are:

Eye Contact

- Wash eyes immediately with large amounts of water, lifting the lower and upper eyelids occasionally.
- Seek medical attention immediately.

- Contact lenses should not be worn when working with this chemical.

Skin Absorption

- Promptly wash contaminated skin using soap or a mild detergent and water.
- If PCBs have penetrated through clothing, remove the clothing immediately and wash the skin with soap and water.
- Seek medical attention immediately.

Inhalation

- Immediately move exposed person to fresh air.
- If breathing has stopped, perform artificial respiration.
- Keep the affected person warm and at rest.
- Seek medical attention immediately.

Ingestion

- Seek medical attention immediately.

OSHA Permissible Exposure Limits

Table 1 contains a list of the potential chemical contaminants and their applicable OSHA permissible exposure limits (PELs). PELs are time weighted average (TWA) concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek. An 8-hour time weighted average concentration is calculated by taking the concentration of an air contaminant and multiplying it by the duration in hours of exposure and then dividing it by 8 hours. PEL concentrations were developed for normal healthy workers exposed on the job to air contaminants. Exposures in excess of a PEL value trigger certain requirements (emission and exposure controls), depending on the particular OSHA standard being exceeded. OSHA ceiling concentrations, designated by a “C” preceding the concentration value, must not be exceeded during any part of the workday. When instantaneous monitoring is not feasible, the ceiling limit may be assessed as a 15-minute TWA exposure. PEL and ceiling concentration standards are legally enforceable air contaminant concentration limits. An acceptable peak concentration is the acceptable maximum concentration above the established ceiling concentration that is allowed during an 8-hour shift.

An Immediately Dangerous to Life and Health (IDLH) exposure condition is defined by NIOSH as a situation “that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevents escape from such an environment.” OSHA has established IDLH exposure concentrations for over 300 substances. OSHA’s purpose in establishing IDLH values was to ensure that a worker could escape without injury or irreversible health effects from an IDLH exposure in the event of the failure of respiratory protection.

Table 2--Exposure Limits

Compound	PEL¹	IDLH¹
o-Dinitrobenzene	1 mg/m ³	200 mg/m ³
m-Dinitrobenzene	1 mg/m ³	200 mg/m ³
p-Dinitrobenzene	1 mg/m ³	200 mg/m ³
Nitrobenzene	1 ppm	200 ppm
Nitrotoluene	5 ppm	200 ppm
Dinitrotoluene	1.5 mg/m ³	200 mg/m ³
o-Dinitrotoluene	2 ppm	200 ppm
p-Dinitrotoluene	2 ppm	200 ppm
2,4,6-Trinitrotoluene	1.5 mg/m ³ (skin)	500 mg/m ³
Lead	50 ug/m ³	N/A ³
Hexane	500 ppm	1100 ppm
Tornado-50 cleaner	N/A ²	N/A ²
Lime	5 mg/m ³	N/A ²
Fertilizer	N/A ²	N/A ²
Acetone	1000 ppm	N/A ²
Nitric Acid	2 ppm	N/A ²
Aroclor® 1242	1 mg/m ³	5 mg/m ³
Aroclor® 1254	0.5 mg/m ³	5 mg/m ³

¹PEL and IDLH values were taken from the NIOSH Pocket Guide to Chemical Hazards, June 1997.

²N/A=not applicable, there is not OSHA PEL or IDLH value for this compound

3.3 Physical Hazards

Activities performed during the project present dangers from physical hazards such as strains from lifting activities, hazards from walking and working surfaces, heat stress, harmful plants/animals/insects, excavation hazards, utility hazards, noise hazards, cuts, and injury from heavy equipment use. Employee training and experience in the use of field equipment and their awareness of potential hazards will reduce risk.

3.3.1 Heavy Equipment Hazards

Heavy equipment (trucks, dozers, backhoe, end loader, etc.) operations present inherent safety hazards. Safeguards to follow when working around heavy equipment include, but are not limited to the following:

- Excavation cannot proceed until NASA PBS has issued a digging permit.
- Only qualified personnel will operate heavy machinery.
- Getting on or off of any equipment while it is in motion is prohibited.
- Machinery shall be operated in accordance with the manufacturer's recommendations.
- The use of headphones for entertainment purposes (such as radio or cassette) while operating equipment is prohibited.

- All machinery shall be inspected daily (when in use) by a competent and knowledgeable person to ensure safe operating conditions.
- Personnel shall not operate heavy equipment in areas where the utilities have not been properly marked.
- All heavy equipment shall be equipped with working audible reverse signal alarms or motion alarms.
- Personnel shall wear hearing protection when working near heavy equipment.
- Personnel shall wear safety belts and only equipment with roll over protection will be used.

Physical hazards associated with heavy equipment operations that may be encountered on this project include, but are not limited to the following:

- Sharp objects may cause cuts or punctures.
- Falls from uneven terrain or slippery surfaces may occur.
- Sprains and strains from lifting activities are possible.
- Moving vehicles may injure personnel.
- Electrical shock/electrocution hazard exist if underground or aboveground power lines are encountered.
- Noise levels may be high which are both a health hazard and a hindrance to communication.
- Field ground personnel shall not perform work near moving heavy equipment. The heavy equipment operator shall ensure that other personnel are not performing work in the area where excavation work is occurring.

Only employees with proper training and experience are permitted to operate heavy equipment.

3.3.2 Utility Lines

A digging permit must be obtained from NASA PBS for all 30 areas where subsurface intrusive work will be performed. Under no circumstances will intrusive work be performed in areas not pre-approved by NASA PBS. Work will not proceed until all utilities have been marked or identified by NASA PBS. Work will stop immediately if any underground utilities are detected and the NASA POC will be notified immediately.

3.3.3 Slips, Trips, and Falls

Due to the locations of this project, the walking and working surfaces present inherent dangers. Personnel will adhere to the following safety rules concerning walking and working surfaces:

- When possible, personnel will avoid walking through or working in water or mud.
- Personnel will avoid climbing over site debris or over equipment.
- Personnel shall ensure that equipment not in use will be put in a place where it will not create a tripping hazard.

- Personnel will not walk on or attempt to crawl over stockpiles.
- Personnel will not walk or stand near the edges of the excavation areas.
- Personnel will be careful when walking in heavily vegetated areas. They will avoid traveling in the heavily vegetated areas whenever possible.

3.3.4 Lifting Techniques

Lifting and moving equipment improperly can place a great deal of stress on the back possibly resulting in severe injury. Lifting objects is inherent in performing field investigations; therefore, it is important to use good lifting techniques. Personnel shall adhere to the following basic rules when performing work that requires lifting:

- If a load is heavy or bulky, get help
- Remember to lift with your legs and keep your back straight.
- Keep the load as close to your body as you can.
- Do not jerk the load. Lift slowly and carefully.
- Make sure the area you will be carrying the load through is clear of obstacles.
- Do not twist or turn your spine when lifting or carrying the load.
- Be sure to have a good grip on your load at all times.
- Be careful when lowering your load (get help, if necessary).

Proper lifting techniques and back injury prevention techniques are addressed during annual safety training for WasteTron personnel. Field personnel shall review the above rules for proper lifting prior to beginning fieldwork.

3.3.5 Inclement Weather Conditions

Work shall not be scheduled when inclement weather (heavy rains, strong winds, tornado, floods, extreme temperatures, and so forth) is predicted that could cause or contribute to an accident or exposure incident. If a change in the weather poses a health or environmental threat, the site shall be secured, and work shall cease. Extremes in temperature can pose serious physical hazards to personnel. Personnel shall be aware of appropriate steps that can be taken to minimize the effects of temperature extremes.

3.3.5.1 Heat Stress

Personnel who work outdoors during the summer to early fall months may be subject to heat stress. Heat stress may occur when protective clothing decreases natural body ventilation and/or when working in areas having elevated temperatures. The heat stress work/rest standards as outlined in the heat stress section of the 1996 ACGIH Threshold Limit Values (TLV) & Biological Exposure Indices (BEI) Handbook, and Section 6 of the EM 385-1-1 Safety and Health Requirement Manual will be followed.

Heat stress is any series of conditions where the body is under stress from overheating. It can include heat cramps, heat exhaustion, heat rash, or heat stroke. The victim often overlooks the signs of heat stress. The employee may at first be confused or unable to concentrate. Heat stress can produce bodily symptoms, which may include profuse sweating, dizziness, cessation of sweating, and collapse. Refer to the following table for common forms of heat stress.

Table 3--Heat Stress

Condition	Signs/Symptoms	First Aid
Heat cramps	Heavy sweating Painful muscle spasms	Sport drink intake (Gatorade) Rest in cool environment Salt water intake (0.5% solution)
Heat Syncope	Brief fainting Blurred vision	Water intake Lie down in cool environment
Dehydration	Fatigue and reduced movement	Fluid and salted food intake
Heat Exhaustion	Pale and clammy skin, possible fainting, weakness, fatigue, nausea, dizziness, heavy sweating, blurred vision, body temperature slightly elevated	Lie down in cool environment, water intake, loosen clothing
Heat Stroke	Skin hot and dry, red face, high body temperature, unconsciousness, collapse, convulsions, confusion or erratic behavior	Immediate total cooling Transport to hospital

The following precautions will be taken to prevent injury from heat stress:

- The work schedule will be adjusted, if possible, to schedule heavy work during the cooler part of the day.
- The work will be paced to include adequate rest periods. Five to fifteen minute rest periods will be scheduled hourly or every 2 hours depending upon the workload, temperature, and relative humidity. The frequency and time of rest periods will be increased, if the SSOH believes that it is necessary to protect the workers' safety.
- Drinking water and ice will be provided in the clean zone. Personnel will be encouraged to drink plenty of water.
- The weather conditions shall be monitored and work halted if the temperature (including humidity) rises to levels that present a danger to worker safety.

3.3.6 Noise

Noise may be generated when heavy equipment (trucks, backhoes, and so forth) is used. Hearing protection is mandatory when working in areas where the noise levels exceed 85-dBA steady state or 120-dBA impulse.

3.3.7 Harmful Plants, Animals, and Insects

Personnel working in the field must be aware of the physical hazards posed by coming into contact with harmful plants, animals, and insects. Of the potential exposures to plants presented by this group, field personnel are likely to be most affected by exposure to poison ivy and poison oak, which are very common in this area. Both of these plants have greenish white flowers with berries that grow in clusters. The leaves are composed of three (3) leaflets each. These plants can cause a severe rash, which is characterized by redness, blisters, swelling, intense burning and itching. If these plants are required to be removed from the work area, precautions shall be taken and appropriate clothing shall be worn to prevent inspectors from dermal contact with these plants.

Copperheads (Northern Copperhead) and rattlesnakes (Eastern Massasauga) are the predominant poisonous species of snakes in Ohio. Rattlesnakes have horny sheaths towards the end of the tail, which make a rattling sound. Copperheads are brown in color with a V-shaped head characteristic of poisonous snakes.

Mosquitoes, ticks, chiggers, and bees are likely to be encountered during the work being performed under this SOW. Personnel shall take care to avoid these stinging/biting insects. The following steps shall be considered in preventing these hazards.

- Field personnel are required on this project to wear personal protective equipment (PPE) at all times while in the work zone. This should be helpful in limiting skin exposure to harmful plants and insects.
- Insect repellants may not be used when sampling for nitroaromatics because they can interfere and cause false hits in subsequent analysis.
- A 16-unit first aid kit shall be available at the site and shall contain a variety of ointments for skin afflictions.
- Water and soap shall be provided on-site for personnel to wash affected skin areas.
- Personnel shall report all known allergies to plants, insects, and medication to the Project Manager and SSHO prior to work.

3.3.8 Excavation Hazards

WasteTron will be performing excavation in thirty areas. A long reach excavator will be used to excavate the contaminated soil. The following safety precautions shall be adhered for excavation activities:

- Areas being excavated to a depth of 4 feet or more required sloped sides of 1:1.5, if personnel will be entering the excavation. WasteTron does not anticipate entering the excavation pits. Samples of the walls and floor of all of the pits will be collected out of the backhoe bucket, which will be swung around away from the excavation area to prevent personnel from accidentally falling into the pit.
- Equipment shall not be parked or operated within 10 feet of any excavation. Additionally, soil or debris will not be stockpiled within 10 feet of the perimeter of the excavation area.

- Personnel are not allowed to work under raised loads.
- Personnel are required to stand away from the equipment being loaded or unloaded.
- Personnel are not to enter any excavation that is 4 feet or more in depth.
- Personnel shall not enter any excavation area that has obvious infiltration of water, regardless of depth.
- Safety fencing will be erected at a minimum distance around the perimeter of the pit at a minimum of ten feet from the edge of the excavation pit.
- Excavation areas shall be inspected daily while personnel are working in the area and then twice weekly until the pits are backfilled. Furthermore, the excavation areas shall be inspected after measurable amounts of rainfall.

3.3.9 Cuts

Materials with sharp edges are likely to be encountered and may pose a potential cutting hazard. Preventative measures shall be taken to prevent cuts and scrapes. Personnel shall wear leather gloves to protect them from potential cuts whenever possible.

A 16-unit first aid kit will be available on-site in the event personnel are cut. Cut areas will be decontaminated and first aid rendered. If personnel are cut, they will be taken to the hospital for a tetanus shot if they have not recently had one.

3.4 Accident Prevention

WasteTron is committed to ensuring the safety of its employees, contractors, and visitors. The company believes that occupational injuries and illnesses can be prevented, that exposures to hazardous materials and hazardous work situations can be controlled, and that prevention of injuries and illnesses are equal in importance to production, quality, cost and morale. For this reason, WasteTron has established a Safety & Health Plan complete with annual refresher training, monthly safety meetings, and "tailgate" safety meetings prior to each job. Before each new phase of a job, a safety meeting is to be held to review the activity hazard analysis for that specific job. The Activity Hazard Analysis for this project can be found in Appendix A. The hazard analysis provides a description of potential hazards and the actions to be taken to eliminate or minimize each of these hazards.

4.0 CONTRACTOR PROJECT ORGANIZATION AND TRAINING

4.1 Project Organization

A project that is properly organized with personnel responsibilities well-delineated results in a successful project conclusion. A listing of functional areas and qualified personnel are given for this project.

- A. Government Technical POC** —This is the technical point of contact (POC) representing the USACE who will serve as a liaison between the USACE and the contractor.

<u>USACE POC</u>	<u>Phone Number</u>
Lisa Humphreys	(304) 529-5953
<i>(cellular phone)</i>	(304) 617-1461

- B. NASA POC**— This is the technical point of contact (POC) representing NASA.

<u>NASA POC</u>	<u>Phone Number</u>
Amy Bower	(419) 621-3233
Robert Lallier	(419) 621-3234

- C. Contractor’s Project Manager** – WasteTron’s Project Manager provides technical insight and provides supervision for the project. The Project Manager has overall responsibility to see that the project is completed in accordance with the Scope of Work.

<u>WasteTron Inc. Project Manager</u>	<u>Phone Number</u>
Steve Arbogast	(304) 755-8448
Cellular phone	(304) 389-9580

- D. On-site Supervisor**—The On-site Supervisor will be in charge of field activities when the Project Manager is away from the site. It is anticipated that the Project Manager will be on-site for the majority of the project.

<u>On-site Supervisor</u>	<u>Phone Number</u>
Malcolm Slone	(304) 755-8448
Cellular phone	(304) 633-2373

- E. Site Safety and Health Officer (SSHO)** – This person is responsible for safety on site. A resume for the SSHO is included in Appendix B with the training certificates. The SSHO is an employee of Pinnacle Environmental, a company specializing in safety and health issues.

<u>SSHO</u>	<u>Phone Number</u>
Andrea Thomas	(304) 757-5204

- F. QC Officer**—This person is responsible for quality control (QC) at the site. This person has the authority to stop the work if QC is not being met. The QC Officer shall be responsible for sampling activities and field screening of samples.

<u>WasteTron QC Officer</u>	<u>Phone Number</u>
Senah Gussler	(304) 755-8448

- G. Field Personnel** – These personnel are responsible for assisting the Project Manager in completing the tasks required under this contract.

<u>WasteTron Field Personnel</u>	<u>Phone Number</u>
Rick Boggs	(304) 755-8448
Travis Engle	
Gary Henry	
Lynn Moles	
Chester Porter	
Malcolm Slone	
Dwayne James	

- H. WasteTron’s Independent Quality Control Team--** An internal quality control team will independently review the work plans and reports to ensure that they meet requirements of the Scope of Work.

<u>WasteTron Independent Quality Control Team</u>	<u>Phone Number</u>
David Beam	(740) 574-6144
Chris Burke	

- I. REIC Laboratory**—Samples will be sent to the following USACE certified laboratory. REIC Laboratory is located in Beaver, West Virginia.

<u>REIC Contact</u>	<u>Phone Number</u>
Grant Wilton	(800) 999-0105

- J. Disposal Facility for Contaminated Soil**— Non-hazardous soil removed from the site will be disposed of at the Erie County Landfill.

<u>Erie County Landfill</u>	<u>Phone Number</u>
Fred Dobbert	(419) 433-3624

- K. Barnes Nursery**—This company may be used for the transportation of any non-hazardous materials removed from the site and may be used to transport clean backfill material to the site.

<u>Barnes Nursery Contact</u>	<u>Phone Number</u>
Leslie Morgan	(800) 421-8722

- L. Mountain State**—Personnel from Mountain State will perform a survey of the 30 areas to be excavated.

<u>Mountain State Contact</u>	<u>Phone Number</u>
Jim Young	(304) 949-4762

M. Dart Trucking— In the event that some of the soil does not pass the TCLP test for disposal at the Erie County Landfill then Dart Trucking will be responsible for the transportation of material to EQ Environmental located in Michigan.

<u>Dart Trucking Contact</u>	<u>Phone Number</u>
Bill McCluskey	(800) 541-8206 Extension 192

N. EQ Environmental—The hazardous disposal facility for hazardous soil and/or IDW is EQ Environmental located in Michigan.

<u>EQ Environmental Contact</u>	<u>Phone Number</u>
Debbie Chamberlain	(800) 592-5489

O. Enviro-Clean Inc.—Non-hazardous investigation derived waste (IDW) containing liquids will be transported to Enviro-Clean Inc. located in Wooster, Ohio for ultimate disposal.

<u>Enviro-Clean Inc.</u>	<u>Phone Number</u>
Robert Jarrett	(330) 264-8080

P. Severson—Personnel from Severson will perform the soil treatment of the lead impacted soils. The Severson Contact is Chuck McPheeters. Mr. McPheeters is not expected to be on-site; however, one or more of the other personnel listed from Severson will be on-site.

<u>Severson Contact</u>	<u>Phone Number</u>
Chuck McPheeters	(812) 988-9930
Rance Sundquist	
William Schilling	
Kurt McAllister	

Q. Eco First—This company will be responsible for the transportation of any hazardous liquid IDW to EQ Environmental for disposal.

<u>Eco First Contact</u>	<u>Phone Number</u>
Dana Tomes	(304) 736-7303

4.2 Training

All field personnel performing soil treatment and/or intrusive work on this project have received forty (40) hour HAZWOPER training. All field personnel performing soil treatment and/or intrusive work meet the training requirements as cited in 29 CFR 1910.120. At least two personnel at each work site will have received first aid and CPR training. Appendix B contains copies of all training certifications and dates of refresher training for employees that may work on this project.

4.2.1 Site Specific Training

All field personnel shall receive training and guidance concerning the provisions of this SSHP.