

SITE-SPECIFIC HEALTH AND SAFETY PLAN

**TUCSON INTERNATIONAL AIRPORT SUPERFUND SITE
TUCSON, ARIZONA**

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this site-specific health and safety plan (HASP) is to provide specific guidelines and establish procedures for the protection of personnel performing the activities at the Tucon International Airport Authority (TIAA) Three Hangers Area Site. The information in this HASP has been developed in accordance with applicable standards and is, to the extent possible, based on information available to date. The HASP is also a living document in that it must continually evolve as site conditions and knowledge of the site work activities develop.

A vital element of the Health and Safety Policies and Procedures is the implementation of a site-specific HASP for field activities. This HASP, as applicable to this project, includes the following measures:

- Communicate the contents of this HASP to site personnel.
- Eliminate unsafe conditions. Efforts must be initiated to identify conditions that can contribute to an accident and to remove exposure to these conditions.
- Reduce unsafe acts. Personnel shall make a conscious effort to work safely. A high degree of safety awareness must be maintained so that safety factors involved in a task become an integral part of the task.
- Inspect frequently. Regular safety inspections of the work site, materials, and equipment by qualified persons ensure early detection of unsafe conditions. Safety and health deficiencies shall be corrected as soon as possible, or project activities shall be suspended. **Documentation of daily inspections and corrective actions should be kept with the project files.**

1.2 STOP WORK AUTHORITY

All project participants are empowered and expected to stop the work of co-workers, subcontractors, client employees, or other contractors if any person's safety or the environment are at risk. NO repercussions will result from this action.

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the removal of site personnel from that area and reevaluation of the hazard and the levels of protection.

1.3 PERSONNEL REQUIREMENTS

All personnel conducting activities on site must conduct their activities in compliance with all applicable Safety and Health legislation in the United States including, but not limited to, the Occupational Safety and Health Administration (OSHA) 29 CFR 1910, 29 CFR 1926, Tucson Airport Authority (TAA) rules and regulations, and polices and procedures. **Project personnel must also be familiar with the procedures and requirements of this HASP.** In the event of conflicting safety procedures/requirements, personnel must implement those safety practices, which afford the highest level of safety and protection.

1.4 PROJECT MANAGEMENT AND SAFETY RESPONSIBILITIES

Personel Safety Responsibility

All personnel are responsible for their own safety as well as the safety of those around them. Personnel shall use any equipment provided in a safe and responsible manner, and as directed.

All personnel are directed to take the following actions when appropriate:

- Suspend any operations which may cause an imminent health hazard to employees, subcontractors, or others.
- Inspect tools and other equipment before each use or as manufacturer and/or OSHA dictates.
- Correct job site hazards when possible to do so, without endangering life or health.
- Report safety and health concerns to the SS or Site Supervisor (Jon Mainhagu, SWES Dept. University of Arizona; 520-626-4191 or 520-576-0626).

All personnel are required to act in a safe and responsible manner including:

- Think about how to avoid potential hazards associated with every action that you or others may be involed in (before beginning that activity).
- Use caution and follow traffic requirements when driving to (and at) the site.
- Work with other team members when at the site to support the data collection activities at all times, and be aware and ready to make observations.
- Communicate with others (including the SS) any time you plan to leave the sample collection area to use the rest room (treatment system control room) or get some food/water.

- Communicate with others (and help to train coworkers) about work roles/responsibilities to maintain consistent work flow and transitions between shifts of teams with standardized sampling procedures and note taking.
- Try to work in an organized manner while maintaining a clean working environment. If you have any free time, try to make sure the working area is clean.
- Field clothing should include long pants, long-sleeved shirt (if possible), and composite-toe or steel-toed boots.
- Use proper personal protection equipment (ppe) for your specific tasks when working at the site, and use decontamination when leaving the sample collection area.
- Hard-hats, safety glasses, and reflective vests should be worn in the vehicle and near the drilling operation. Safety glasses and nitrile gloves should be worn at all times when sampling, transporting, or handling site materials.
- Do not drink or eat within the sample collection area. We will have a water/rest station outside of the Three Hangers area. However, do not wander away from the sampling area and area south of the Three Hangers.
- Communicate with others and the SS if you have any problems or issues, and please be on time to your work shifts.

Equipment Operators - All equipment operators are responsible for the safe operation of heavy equipment. Operators are responsible for inspecting their equipment on a daily basis to ensure safe performance. Brakes, hydraulic lines, backup alarms, and fire extinguishers must be inspected routinely throughout the project. Documentation of daily inspections will be required. Equipment will be taken out of service if an unsafe condition occurs.

Authorized Visitors - Shall be provided with all known information with respect to the site operations and hazards as applicable to the purpose of their visit.

1.5 TRAINING REQUIREMENTS

1.5.1 SITE-SPECIFIC TRAINING

Prior to working at this site, an initial site-specific training session or briefing shall be conducted prior to commencement of work activities. During this initial training session, employees shall be instructed on the following topics:

- Personnel responsibilities;

- Content and implementation of the HASP;
- Description of assigned tasks/scope of work;
- Site hazards and controls;
- Site-specific hazardous procedures (e.g., lining activities, etc.);
- Coordination of Site activities;
- Training requirements;
- PPE requirements;
- Emergency information, including local emergency response team phone numbers, route to nearest hospital, accident reporting procedures, evacuation routes and procedures, location of assembly points, and emergency response procedures;
- Instruction in the completion of required inspections and forms; and
- Location of safety equipment (e.g., portable eyewash, first aid kit, fire extinguishers, etc.).

The various components of the project HASP will be presented followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel will not be permitted to enter or work in potentially contaminated areas of the Site until they have completed the Site-specific training session.

In addition to the initial site briefing conducted at the commencement of the project, supplemental brief safety meetings shall be conducted by the Site Supervisor to discuss potential health and safety hazards associated with upcoming tasks, and necessary precautions to be taken.

1.5.2 SAFETY MEETING/HEALTH AND SAFETY PLAN REVIEW

"Tailgate" safety meetings will take place each day prior to beginning the day's work. All Site personnel will attend these safety meetings, which may be contracted personnel, subcontractor personnel, or personnel from contractors working directly for the TAA. The safety meetings will cover specific health and safety issues, Site activities, changes in Site conditions, and a review of topics covered in the Site-specific pre-entry briefing.

2.0 SITE OPERATIONS

Site operations will be conducted to address concentrations of chemical contaminants at the Site.

Figures 1 and 2 (see appendix) present the Site location and Site Plan, respectively.

The Site is located at 900 South Susana Street just east of Old Nogales Highway. Access to the Site can be made by traveling south from the University of Arizona on Park Avenue with a left turn just south of the Three Hanger facility.

Emergency evacuation to Kino Hospital:

2800 E Ajo Way
Tucson, AZ 85713
520-294-4471

is by traveling north from the Site along Park (or Nogales Highway), turning right onto Ajo Way, and turning right into the hospital.

2.1 SCOPE OF WORK

This HASP covers the specific site activities that will be conducted by site personnel and their subcontractors. These activities are as follows:

1. Mobilization and demobilization of personnel, materials, and equipment to the Site. This will involve the movement of necessary equipment, personnel and materials to the project Site and the setup of temporary Site facilities. This may include the setup of staging/laydown areas, and any Site restoration activities.
2. Soil vapor extraction system operation and data collection.
3. Soil gas sample collection. May involve the injection of a tracer gas, TRIFLUOROBROMOMETHANE (MSDS in appendix)
4. Discrete pressure measures.

For the pressure measure, a double packer straddle system will be lowered inside the monitoring well using a portable secured brake winch. The measuring protocol is as follows:

- Set up the holding structure and verify integrity
- Install the brake winch and the tubing wheel
- Assemble the straddle packer system and check connectivity for the transducer

- Attach the straddle packer system to the holding steel cable from the winch and control the carabiner
- Manually lower the straddle packer system inside the well
- Operate the winch to the proper depth
 - Heavy equipment manual handled need to be done while respecting the Health And Safety Procedure described in this document (section 3.2.1)

3.0 HAZARD EVALUATION

This section identifies and evaluates the potential chemical, physical, and biological hazards, which may be encountered during the completion of this project.

3.1 CHEMICAL HAZARDS

The chemical hazards associated with conducting site operations include the potential exposure to on-site contaminants encountered during field activities, such as chlorinated hydrocarbon products, and support products such as fuel. The potential routes of exposure from these products during normal use may occur through inhalation of vapors/dusts or direct contact or absorption with the materials.

3.1.1 CHEMICAL HAZARD CONTROLS

Exposure to potential on-site chemicals, such as those listed in **Appendix A - MSDSs**

- Air Monitoring - Prior to entering the exclusion zone work area (or any other recognized hazardous area which includes confined spaces, excavations, etc.), air monitoring shall be conducted in the breathing zone with a photoionization detector and/or a four gas monitor capable of measuring for toxic gases, oxygen, combustible gas, carbon monoxide, and hydrogen sulfide.
- Dust control measures, such as wetting the immediate area, shall be employed when visible dust is generated in active work areas.
- Using respiratory protection as appropriate, in areas known to have concentrations above the specified action level for each chemical.

3.1.2 SKIN CONTACT AND ABSORPTION CONTAMINANTS

Skin contact with chemicals (solvents, injection chemicals, cement, etc.) may be controlled by use of the proper PPE and good housekeeping procedures. The proper PPE (e.g., Tyvek, gloves) as described in Section 4.0 shall be worn for all activities where contact with potentially harmful media or materials is anticipated. Utilize manufacturer data on permeation and degradation to minimize skin contact potential (See Section 4.2.1 for additional information).

3.1.3 HAZARD COMMUNICATION

Personnel required to handle or use hazardous materials as part of their job duties will be trained and educated in accordance with the Hazard Communication standard as applicable. The training shall include instruction on the safe usage and handling procedures of hazardous materials, how to read and access Material Safety Data Sheets (MSDSs), and the proper labeling requirements.

The MSDSs with the appropriate MSDS for the chemicals in use at the site will be available to project personnel. A list of all MSDSs will be provided in **Appendix A**. Appropriate labels shall be maintained on all chemicals. All hazards for materials to be brought on site and constituents expected to be encountered during the course of project activities will be identified by the program manager. At the end of the project, all hazardous materials brought on site will be taken off site.

3.1.4 FLAMMABLE AND COMBUSTIBLE LIQUIDS

The storage, dispensing, and handling of flammable and combustible liquids must be in accordance with OSHA 29 CFR 1910.106, and NFPA guidelines and requires prior approval of the TAA Fire Department. The specific flammable or combustible liquids used at the site may include gasoline, diesel, kerosene, oils, and solvents.

Flammable and combustible liquids are classified according to flash point. This is the temperature at which the liquid gives off sufficient vapors to readily ignite. Flammable liquids have flash points below 100°F. (37.8°C). Combustible liquids have flash points above 100°F (37.8°C) and below 200°F (93.3°C).

Storage

Many flammables can ignite at temperatures at or below room temperature. They are far more dangerous than combustibles when they are heated. As a result, these products must be handled very carefully. At normal temperatures, these liquids can release vapors that are explosive and hazardous to employee health. Exposure to heat can cause some of these liquids to break down into acids, corrosives, or toxic gases.

For this reason, flammable/combustible liquids should be stored in cool, well ventilated areas away from any source of ignition. Always consult the MSDS of the product for specific information.

Flammable and combustible liquids must be stored in designated areas. Such areas must be isolated from equipment and work activity, which may produce flames, sparks, heat or any form of ignition, including smoking. The most practical method is the use of one or more approved (commercially available) flammable/combustible liquid storage cabinets.

Cabinets must be labeled "Flammable - Keep Fire Away". Doors must be kept closed and labeled accordingly. Containers must be kept in the cabinet when not in use.

General Requirements

- Keep containers of flammable/combustible liquids closed when not in use.
- Keep flammable/combustible liquids in designated areas and approved cabinets.
- Do not allow use of unapproved containers for transfer or storage. Use only approved safety cans (5-gallon maximum) with a spring closing lid and spout cover, designated to safely relieve internal pressure when exposed to heat or fire.
- Use only approved self-closing spigots, faucets, and manual pumps when drawing flammable/combustible liquids from larger containers/barrels.
- Use only approved metal waste cans with lids for disposal of shop towels/oily rags.
- Designate "Smoking" and "No Smoking" areas.
- Designate fueling areas.
- Observe all signs indicating "No Smoking," "No Flames," "No Ignition."

Transferring Flammable/Combustible Liquids

- This seemingly routine task can be hazardous if certain precautions are not followed. Grounding and bonding must be observed at all times to prevent the accumulation of static electricity when transferring contents of containers/barrels one to another.

- Drums should be grounded (#4 copper conductor) to a grounding rod.
- Bonding is necessary between conductive containers (e.g., a barrel and a 5-gallon container).

3.2 PHYSICAL HAZARDS

Physical hazards that may be present during project work include: proximity to heavy equipment, noise, overhead or under ground utilities, excavations, use of hand and power tools, hot work (e.g. welding, cutting, and open flame), slip/trip/hit/fall injuries, electrical energy, stored energy (lockout/tagout), material handling, vehicle traffic, heavy lifting, biological hazards, heat stress, and other potential adverse weather conditions. In addition, personnel must be aware that the protective equipment worn may limit dexterity and visibility and may increase the difficulty of performing some tasks.

3.2.1 HEAVY EQUIPMENT SAFETY AND DRILLING SAFETY

Heavy Equipment

The following practices shall be adhered to by personnel operating heavy equipment (such as backhoes) and personnel working in the vicinity of heavy equipment:

- Heavy equipment is to be inspected when equipment is initially mobilized, delivered to a job Site, or after it is repaired and returned to service, to ensure that it meets all manufacturer and OSHA specifications (e.g., fire extinguishers, backup alarms, etc.).
- Heavy equipment is to be inspected on a daily basis. Documentation of this daily pre-operational inspection is to be filed with the project files.
- Heavy equipment is only to be operated by authorized, competent operators.
- Seat belts are to be provided on heavy equipment that is not designed for stand-up operation.
- Equipment/vehicles whose payload is loaded by crane, excavator, loader, etc. will have a cab shield and/or canopy to protect the operator.
- Personnel will not be raised/lowered in buckets.
- Personnel will not ride on fender steps or any place outside the cab.
- Before leaving the equipment controls, ensure that the equipment is in its safe resting position. For a backhoe, apply the parking brake, put the front loader bucket down on the ground level, and ensure that the rear excavator bucket is locked in the

travel position. Bulldozers and scraper blades, loader buckets, dump bodies, and similar equipment will be fully lowered or blocked when not in use.

- Before raising any booms, buckets, etc., check for overhead obstructions.
- Employees involved in the operation shall not wear any loose-fitting clothing, as it has the potential to be caught in moving machinery.
- Personnel shall wear high visibility safety vests, steel toed shoes, safety glasses, hearing protection, and hard hats during heavy equipment operations.
- When moving heavy equipment or when working within 10 feet of a stationary object or in tight quarters, a spotter will be used.

Drilling Equipment

The following practices shall be adhered to by drilling personnel:

- Equipment should be inspected daily by the operator to ensure that there are no operational problems.
- The kill switch will be function-checked and verified to be operational during the documented daily equipment check.
- Personnel shall be instructed in the location and use of the emergency kill switch on the drill rig.
- Employees involved in the operation shall not wear any loose-fitting clothing, including untied shoe/boot laces, draw strings, etc., which have the potential to be caught in moving machinery.
- Before leaving the controls, shift the transmission controlling the rotary drive into neutral and place the feed lever in neutral. Before leaving the vicinity of the drill, shut down the drill engine.
- Before raising the mast, check for overhead obstructions.
- Before the mast of a drill rig is raised, the drill rig must first be leveled and stabilized with leveling jacks and/or cribbing. Re-level the drill rig if it settles after initial setup. Lower the mast only when the leveling jacks are down, and do not raise the leveling jack pads until the mast is lowered completely.
- During freezing weather, do not touch any metal parts of the drill rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- Personnel shall wear steel toed shoes, safety glasses, hearing protection, and hard hats during drilling operations.
- The area shall be roped off, marked, or posted to keep the area clear of pedestrian traffic or spectators.

3.2.2 **NOISE**

Project activities, such as use of power tools and material handling equipment, that generate noise levels exceeding the decibel range (85dBA) will require the use of hearing protection with a Noise Reduction Rating (NRR) of at least 20 when noise levels exceed 85 dBA. Hearing protection (earplugs/muffs) will be available to personnel and visitors that would require entry into these areas.

When it is difficult to hear a coworker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All Site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss as part of their Corporate Hearing Conservation Program. If necessary, project noise level surveys will be conducted by the SS.

3.2.3 **UTILITY CLEARANCES**

Elevated superstructures (e.g., drill rigs, backhoes, scaffolding, ladders, cranes) shall remain a minimum distance of 10 feet away from utility lines (<50 kV) and 20 feet away from power lines. Underground utilities, if present, shall be clearly marked and identified prior to commencement of work. Follow local/state regulations with regards to utility locating requirements (i.e., Bluestake, TEP Overhead, etc.).

Personnel involved in intrusive work shall:

- Contact the Tucson Airport Authority Construction Services Administrator (Mark Staszak 520-573-8014) prior to conducting any intrusive activities.
- Be able to determine the minimum distance from marked utilities which work can be conducted with the assistance of the locator line service.

Under no circumstances shall excavation or any other intrusive work be conducted within a Runway Safety Area (i.e., 500 feet wide) without prior written approval.

3.2.4 VEHICLE TRAFFIC AND CONTROL

Vehicle activity at the Site will be kept to a minimum level of activity. The following safety measures are to be taken by personnel that have the potential to be exposed to vehicle or heavy equipment traffic:

- **A high visibility safety vest meeting ANSI Class II garment requirements is to be worn at all times.**
- **Employees will work using the "buddy system".**
- **Cones, etc. will be used to demarcate a safe work zone around the work area and to control and maintain the Site Traffic Control Plan.**

Employees driving within the secure zone at the airport shall take the Vehicle Driver's Training/Runway Incursion Prevention Course provided by the TAA and obtain a badge authorizing driving privileges at the airport prior to operating a motor vehicle in the secure zone.

3.2.5 MATERIAL HANDLING

Material handling operations to be conducted at the project site include manual lifting of materials and the use of hoisting and rigging equipment. As a rule, use mechanical means for lifting heavy loads whenever possible. Section 3.2.6 address back safety procedures for use when handling heavy objects.

Hoisting and Rigging

Wire ropes, chains, ropes, and other rigging equipment will be inspected prior to each use and as necessary during use to assure their safety. Defective rigging equipment will be immediately removed from service.

Rigging will not be used unless the weight of the load falls within the rigging's safe work operating range. This must be verified by the authorized rigger prior to any "pick" or lifting operation.

Only personnel trained in safe rigging procedures will be authorized to engage in rigging procedures. Additionally, the rigger must understand and use recognized crane signals.

Job or shop hooks and links and other makeshift fasteners **will not** be used. When U-bolts are used for eye splices, the U-bolt will be applied so the "U" section is in contact with the dead end of the rope.

Wire ropes, chains, ropes, and other rigging equipment will be stored where they will remain clean, dry, and protected from the weather and corrosive fumes.

The proper length of rope or chain slings will be used to avoid wide angle lifts and dangerous slack. Knotted ropes or lengths of ropes reduced by bolts, knots, or other keepers will not be used.

Special precautions for hazardous or incompatible materials storage

Generally, materials are considered hazardous if they are ignitable, corrosive, reactive, or toxic. Manufacturers and suppliers of these materials must provide the recipient with MSDSs, which describe their hazardous characteristics, and give instructions for their safe handling and storage.

Many hazardous materials are incompatible, which means they form mixtures that may have hazardous characteristics not described on the individual MSDSs. The following special precautions shall be followed regarding the storage of hazardous materials:

- Based on the information available on the MSDSs, incompatible materials shall be kept in separate storage areas.
- Warning signs shall be conspicuously posted, as needed, in areas where hazardous materials are stored.

3.2.6 HEAVY LIFTING METHOD

When lifting objects, use the following proper lifting techniques:

- Feet must be parted, with one foot alongside the object being lifted and one foot behind. When the feet are comfortably spread, a more stable lift can occur and the rear foot is in a better position for the upward thrust of the lift.
- Use the squat position and keep the back straight - but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the guts that can cause a hernia.
- Grip is one of the most important elements of correct lifting. The fingers and the hand are extended around the object you're going to lift - using the full palm. Fingers have very little power - use the strength of your entire hand.
- The load must be drawn close, and the arms and elbows must be tucked into the side of the body. Holding the arms away from the body increases the strain on the arms and elbows. Keeping the arms tucked in helps keep the body weight centered.

The body must be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. Start the lift with a thrust of the rear foot. Do not twist.

3.2.7 HAND AND POWER TOOLS

Hand Tools

- Hand tools must meet the manufacturer's safety standards.
- Hand tools must be inspected prior to each use.
- Hand tools must not be altered in any way.
- At a minimum, eye protection must be used when working with hand tools.
- Wrenches (including adjustable, pipe, end, and socket wrenches) must not be used when jaws are sprung to the point that slippage occurs.
- Impact tools (such as drift pins, wedges, and chisels) must be kept free of mushroom heads.
- Wooden handles must be free of splinters or cracks and secured tightly to the tool.

3.2.8 EXCAVATIONS

Each employer conducting trenching and excavating activities must develop a trenching and excavating procedure complying with the requirements in 29 CFR 1926, Subpart P, and is to be included with their Site-specific HASP. A trenching and excavating procedure is required for safe work practices during excavation and trenching operations. This procedure is intended to assure compliance with the OSHA standards for these activities (29 CFR 1926, Subpart P).

All excavation and trenching operations, for which employees shall enter, will be observed by a designated competent person. The competent person shall be responsible for evaluating and inspecting excavation and trenching operations to prevent possible cave-in and entrapment, and to avoid other hazards presented by excavation activities.

Each employee in an excavation shall be protected from cave-ins by one of three systems:

1. Sloping and benching systems.
2. Shoring.
3. Shielding systems.

All excavation and trenching operations shall be conducted in accordance to and in compliance with OSHA's Standards for the Construction Industry, specifically, Subpart P - Excavation, 29 CFR 1926.650-652. At a minimum, the following safety guidelines shall be adhered to while conducting excavation and trenching activities:

- Excavation and trenching operations require pre-planning to determine whether sloping or shoring systems are required, and to develop appropriate designs for such systems. Also, the estimated location of all underground installations must be determined before digging/drilling begins. Necessary clearances must be observed.
- If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.
- Excavations may not go below the base of footings, foundations, or retaining walls, unless they are adequately supported or a person who is registered as a Professional Engineer (PE) has determined that they will not be affected by the soil removal. OSHA recommends using civil engineers or those with licenses in a related discipline and experience in the design and use of slopping and shoring systems. PE qualifications must be documented in writing.

Access and Egress

Personnel access and egress from trench and/or excavations are as follows:

- A stairway, ladder, ramp, or other means of egress must be provided in trenches greater than 4 feet deep and for every 25 feet of lateral travel.
- All ladders shall extend 3 feet above the top of the excavation.
- Structural ramps to be used by employees for access and egress must be designed by a competent person.

Structural ramps used for access or egress of equipment will be designed by a competent person, qualified in structural design or by a licensed professional engineer.

Atmosphere Monitoring and Testing

There are three parameters by which air quality is measured: 1) oxygen concentration, 2) flammability, and 3) the presence of hazardous substances.

Employees should not be exposed to atmospheres containing less than 19.5 percent oxygen, or having a lower flammable limit greater than 10 percent; and, employees should not be exposed to hazardous levels of atmospheric contaminants.

Whenever potentially hazardous atmospheres are suspected in excavations and trenches, the atmosphere shall be tested by a competent person. Detector tubes, gas monitors, and explosion meters are examples of monitoring equipment that may be used.

In the event that an unusual odor or liquid is suspected in excavations and trenches, the competent person shall stop work on the site, and arrange for air quality assessment and mitigation, if necessary.

Atmospheric testing and monitoring shall be performed in excavations in or adjacent to landfill areas, in areas where hazardous materials are/were stored, or in areas where the presence of hazardous materials is suspected.

Daily Inspections

The competent person shall perform daily inspections of excavations, the adjacent areas, and all protective systems for situations that could potentially result in slope failure.

Additionally, the competent person shall be aware of the potential for confined space situations and other hazardous work conditions.

The competent person shall inspect, evaluate, and complete the excavation checklist at the following intervals:

- Prior to the start of work, after each extended halt in work, and as needed throughout the shift as new sections of the excavation or trench are opened.
- After every rainstorm and other natural or man-made event that may increase the load on the walls of the excavation, or otherwise affect their stability.

The competent person shall stop the work and instruct all employees to leave the excavation or trench when any potential hazards are detected. The competent person has the authority to immediately suspend work, if any unsafe condition is detected.

3.2.9 FALL HAZARDS

Personnel that will use ladders or have the potential hazard of working on elevated surfaces of 6 feet or greater during project activities shall follow specific guidelines for portable ladders are outlined below.

3.2.10 SLIP/TRIP/HIT/FALL

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

- spot check the work area to identify hazards;
- establish and utilize a pathway which is most free of slip and trip hazards;
- beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain;
- carry only loads which you can see over;
- keep work areas clean and free of clutter, especially in storage rooms and walkways;
- communicate hazards to on-site personnel;
- secure all loose clothing, ties, and remove jewelry while around machinery;
- report and/or remove hazards; and
- keep a safe buffer zone between workers using equipment and tools.

3.2.11 HEAT STRESS

Recognition and Symptoms

Temperature stress is one of the most common illnesses that project personnel face when working during periods when temperatures and/or humidity are elevated. Acclimatization and frequent rest periods must be established for conducting activities where temperature stress may occur. Below are listed signs and symptoms of heat stress. Personnel should follow appropriate guidelines if any personnel exhibit these symptoms:

Heat Rash Redness of skin. Frequent rest and change of clothing.

Heat Cramps Painful muscle spasms in hands, feet, and/or abdomen. Administer lightly-salted water by mouth, unless there are medical restrictions.

Heat Exhaustion Clammy, moist, pale skin, along with dizziness, nausea, rapid pulse, fainting. Remove to cooler area and administer fluids.

Heat Stroke Hot dry skin; red, spotted or bluish; high body temperature of 104°F, mental confusion, loss of consciousness, convulsions, or coma. Immediately cool victim by immersion in cool water. Wrap with wet sheet while fanning, sponge with cool liquid while fanning; treat for shock. **DO NOT DELAY TREATMENT. COOL BODY WHILE AWAITING AMBULANCE.**

Work Practices

The following procedures will be carried out to reduce heat stress:

- heat stress monitoring;
- acclimatization;
- work/rest regimes;
- liquids that replace electrolytes/salty foods available during rest; and
- use of buddy system.

Acclimatization

The level of heat stress at which excessive heat strain will result depends on the heat tolerance capabilities of the worker. Each worker has an upper limit for heat stress beyond which the resulting heat strain can cause the worker to become a heat casualty. In most workers, appropriate repeated exposure to elevated heat stress causes a series of physiologic adaptations called acclimatization, whereby the body becomes more efficient in coping with the heat stress. Work/rest regimes will be partially determined by the degree of acclimatization provided.

Worker Information and Training

All new and current employees who work in areas where there is a reasonable likelihood of heat injury or illness should be kept informed through continuing education programs:

- Heat stress hazards.
- Predisposing factors and relevant signs and symptoms of heat injury and illness.
- Potential health effects of excessive heat stress and first aid procedures.
- Proper precautions for work in heat stress areas.
- Worker responsibilities for following proper work practices and control procedures to help protect the health and safety of themselves and their fellow workers,

- including instruction to immediately report to the employer the development of signs or symptoms of heat stress overexposure.
- The effects of therapeutic drugs, over-the-counter medications, or social drugs may increase the risk of heat injury or illness by reducing heat tolerance.

Sun Exposure

Overexposure to sunlight is a common concern when field activities occur during warm weather conditions. Overexposure can occur on clear, sunny days as well as on overcast and cloudy days. Ultraviolet (UV) rays from the sun can cause skin damage or sunburn, but can also result in vision problems, allergic reactions, and other skin concerns. Two types of UV rays are emitted from the sun: UVA and UVB rays.

UVB rays cause sunburn, skin cancer, and premature aging of the skin. UVB rays stimulate tanning but are also linked to other problems such as impaired vision, skin rashes, and some allergic and other reactions to certain drugs. Extra care should be taken if activities are to be conducted on or near water. Sunlight reflected off the surface of the water is intensified resulting in accelerated effects. The following steps should be taken to protect against overexposure to sunlight:

- **Always Use Sunscreen:** Apply a broad spectrum sunscreen with Sun Protection Factor (SPF) of at least 15 or higher liberally on exposed skin. Reapply every 2 hours or more. Even waterproof sunscreen can come off when you towel off or sweat.
- **Cover Up:** Wearing tightly woven, loose-fitting, and full-length clothing is a good way to protect your skin from UV rays.
- **Wear a Hat:** A hat with a wide brim offers good sun protection to your eyes, ears, face, and the back of your neck – areas particularly prone to overexposure to the sun.
- **Wear Sunglasses That Block 99 to 100 Percent of UV Radiation:** Sunglasses that provide 99 to 100 percent UVA and UVB protection will greatly reduce sun exposure that can lead to cataracts and other eye damage. Check the label when buying sunglasses.
- **Seek Shade:** Shade is a good source of protection, but keep in mind that shade structures (e.g., trees, umbrellas, canopies) do not offer complete sun protection.
- **Limit Time in the Midday Sun:** The sun's rays are strongest between 10 a.m. and 4 p.m. Whenever possible, limit exposure to the sun during these hours.

3.2.12 COLD STRESS

Cold stress is similar to heat stress in that it is caused by a number of interacting factors including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Fatal exposures to cold have been

reported in employees failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F (37°C), can be life threatening. A drop in core temperature to 95°F (35°C) or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind-chill must be considered as it contributes to the effective temperature and insulating capabilities of clothing. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the body's core temperature.

The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly, and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from snow, and possible skin burns from contact with cold metal.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 95°F (35°C). This must be taken as a sign of danger to the employees on site, and cold exposures should be immediately terminated for any employee when severe

shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Predisposing Factors for Cold Stress

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the SS to monitor an individual, if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

- **Dehydration:** The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.

- **Fatigue During Physical Activity:** Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.
- **Age:** Some older and very young individuals may have an impaired ability to sense cold.
- **Poor Circulation:** Vasoconstriction of peripheral vessels reduces blood flow to the skin surface.
- **Heavy Work Load:** Heavy work loads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur.
- **The Use of PPE:** PPE usage that traps sweat inside the PPE may increase an individual's susceptibility to cold stress.
- **Lack of Acclimatization:** Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions.
- **History of Cold Injury:** Previous injury from cold exposures may result in increased cold sensitivity.

Prevention of Cold Stress

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and employee education.

- **Acclimatization:** Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However, the physiological changes are usually minor and require repeated uncomfortably cold exposures to induce them.
- **Fluid and Electrolyte Replenishment:** Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks and soup are good sources to replenish body fluids.
- **Eating a Well Balanced Diet:** Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy foods throughout the day.

- **Warm Clothing:** It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.

The parts of the body most important to keep warm are the feet, hands, head, and face. As much as 40 percent of body heat can be lost when the head is exposed.

Recommended cold weather procedures include:

- Inner layers (t-shirts, shorts, socks) should be of a thin, thermal insulating material.
- Wool or thermal trousers. Denim is not a good protective fabric.
- Felt-lined, rubber-bottomed, leather-upper boots with a removable felt insole is preferred. Change socks when wet.
- Wool shirts/sweaters should be worn over inner layer.
- A wool cap is good head protection. Use a liner under a hard hat.
- Mittens are better insulators than gloves.
- Face masks or scarves are good protection against wind.
- Tyvek/poly-coated Tyvek provides good wind protection.
- Wear loose fitting clothing, especially footwear.
- Carry extra clothing in your vehicle.
- Shelters with heaters should be provided for the employees' rest periods, if possible. Sitting in a heated vehicle is a viable option. Care should be taken that the exhaust is not blocked and that windows are partially open to provide ventilation.
- At temperatures of 30°F (-1°C) or lower, cover metal tool handles with thermal insulating material if possible.
- Schedule work during the warmest part of the day if possible, rotate personnel and adjust the work/rest schedule to enable employees to recover from the effects of cold stress.

3.2.13 ADVERSE WEATHER CONDITIONS

The Safety Supervisor shall decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms, tornado warnings, and strong winds (approximately 40 mph) are examples of conditions that would call for the discontinuation of work and evacuation of site.

In addition, no work with elevated super structures (e.g., drilling, crane operations, etc.) will be permitted during any type of electrical storm or during wind events that have wind speeds exceeding 40 mph.

3.2.14 HOT WORK HAZARDS

Welding and cutting operations will be conducted in accordance with the regulations specified in 29 CFR 1926 - Subpart J. Personnel conducting hot work, including burning, pipe welding, cutting, brazing, grinding, or other activities capable of producing ignition sources, or personnel working in the vicinity of hot work, must adhere to the following practices:

- A hot work procedure and permit is required for hot work activities such as burning, welding, cutting, and grinding. **This permit will be issued by the TAA Fire Department each day and can be obtained by calling 520-573-8182..**
- Requirements identified on the Cutting & Welding permit must be strictly adhered to.
- No open flames will be used without prior approval by Client Representative.
- Torches will be equipped with anti-flashback devices.
- Where electrode holders are left unattended, electrodes will be removed and the holders will be replaced so they cannot make electrical contact.
- All arc welding and cutting cables will be completely insulated. There will be no repairs or splices within 10 feet of the electrode holder, except where splices are insulated equal to the insulation of the original cable. Defective cable will be repaired or replaced.
- No welding, cutting or hot work will be conducted on used drums, tanks, or containers until they have been cleaned and purged.
- Only employees with documented training and work experience in these activities shall conduct hot work.
- At a minimum, a 20-pound ABC-type fire extinguisher and a first-aid kit must be available. When hot work is underway, and for an agreed upon period afterwards, a fire watch must be maintained.
- Employees involved in the operation shall wear appropriate personal protective equipment specific to the task, such as a welders helmet with an appropriate eye shade, leather or heavy duty cloth gloves and coveralls or a long-sleeved shirt and pants to prevent skin exposure, steel toe safety shoes, hearing protection, etc.

- Appropriate activity segregation equipment, such as welding screens for welding operations, should be erected whenever practical to isolate the hot work from the remainder of the site activities and site personnel.
- The area should be cleared of any flammable and combustible materials before hot work begins.

3.3 BIOLOGICAL HAZARDS

3.3.1 POISONOUS PLANTS

Common *Poison Ivy* (*Rhus radicans*) grows as a small plant, a vine, and a shrub. Poison Ivy occurs in every state. The leaves always consist of three glossy leaflets. *Poison Sumac* (*Rhus vernix*) grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause a mild to severe allergic reaction, referred to as "contact dermatitis".

Dermatitis, in Rhus-sensitive persons, may result from contact with the milky sap found in the roots, stems, leaves, and fruit, and may be carried by contacted animals, equipment or apparel.

The best form of prevention is to avoid contact. Wearing long sleeves and gloves, and disposable clothing, such as Tyvek®, is recommended in high-risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

3.3.2 INSECTS

Mosquitoes

Mosquitoes are common pests that can be found in any state and any work environment where warm, humid conditions exist. They belong to the order Diptera and are distinguished from flies by the scales along their wings. Mosquitoes principally feed on nectar and other similar sugar sources. However, females require a blood meal for egg production, hence the contact with human flesh. Mosquitoes can pass along diseases such as West Nile virus and Malaria. Several different methods can be used to control adult mosquito populations: repellants such as DEET, mosquito traps, foggers, and vegetation and water management.

Wasps

Wasps belong to the order Hymenoptera. They generally range in size from ½ to 1 ½ inches in length and are reddish-brown in color. They are characterized by two pairs of membranous wings and an ovipositor for laying eggs. Most stinging wasps are predators and scavengers capable of delivering several stings to its prey. Wasp venom releases histamine, which dissolves red blood cells and causes temporary pain and swelling. Some individuals may experience an allergic reaction and require medical attention. Wasp nests may be located along the ground or above ground, and these nests should be professionally removed.

Carpenter Bees

Carpenter Bees (**Xylocopa**) are a large insect with a hairy yellow thorax and a shiny black, sometimes metallic abdomen, and somewhat resembles yellow and black female bumble bees. Carpenter bees bore in wood and make a long tunnel provisioned with pollen and eggs. They prefer to enter unpainted wood and commonly tunnel in redwood and unpainted deck timber. Stings from carpenter bees are rare.

Cicada Killer Wasps

Cicada killers are very large yellow and black relatives of mud daubers; however, they do not look like mud daubers. More than 1 inch long, they look like "monster" yellowjackets. Female Cicada have a stinger and can sting; however, stings are extremely uncommon.

Honey Bees

Honey bees (**Apis mellifera**) are highly social insects and communicate with each other, relaying direction and distance of nectar and pollen sources. A honey bee colony in a house wall can cause major problems. The bees can chew through the wall and fly inside. Their storage of large amounts of honey invites other bees and wasps. Their detritus (e.g., dead bees, shedded larval skins, wax caps from combs, and other material) attracts beetles and moths. When a bee colony is found in a building wall, it must be killed and the nest removed.

Paper Wasps

Paper wasps (Family Polistes) nests are often found near doorways and other human activity areas without occupants being stung. Colonies can become problems, but when they do, Paper wasps can be controlled easily. When attracted to fallen ripe fruit, these wasps sting people who venture into the same area. Colonies in trees, out buildings,

hollow fence posts, and other protected places are not as easy to control as those are from nests on structures.

Mud Dauber Wasps

Mud Dauber wasps (**Family Sphecidae**) are slender; shiny black or brown, orange or yellow, with black markings. Many have long slender thread waists. They are not aggressive and will not sting unless pressed or handled. Mud Daubers place their mud nests (long clay tubes or large lumps) in protected places like electric motors, sheds, attics, against house siding, and under porch ceilings.

The **Giant Hornet** is reddish-brown and yellow and almost an inch long. It builds its nest mainly in hollow trees, and in wall voids of barns, sheds and sometimes houses. An open window or door is an invitation to hornet workers, and they frequent buildings under construction. They will sting humans, and the sting is painful.

The **Yellowjacket**, or stinging wasp, has primarily yellow bands cover a dark abdomen. These species are in the genus *Vespula*. Some yellowjacket nests hang in trees and shrubs, and some are developed underground. Most yellowjackets have very slightly barbed stingers that often sticks in the skin and when the insect is slapped off, the stinger may remain. Yellowjackets are sometimes responsible for injections of anerobic bacteria (organisms that cause blood poisoning). When yellowjackets frequent wet manure and sewage they pick up the bacteria on their abdomens and stingers. In essence, the stinger becomes a hypodermic needle. A contaminated stinger can inject the bacteria beneath the victim's skin. Blood poisoning should be kept in mind when yellowjacket stings are encountered.

Fire Ants

Fire ants are reddish-brown in color and range from 1/8 inch to 3/8 inch in length. Colonies generally consist of queens, males, and workers. When a fire ant stings an individual, the individual is rarely only stung once. Most fire ant stings result in a raised welt with a white pustule. If stung by a fire ant, continue to observe the welt and try to prevent secondary infection by keeping the welt in tact. However, some individuals may have an allergic reaction to a fire ant sting and require immediate medical attention. Fire ants generally nest in the soil and create protruding mounds along the landscape, but they may also nest along building foundations and foundation cracks. Pesticides and even hot water can be used to kill fire ant colonies.

Poisonous Spiders

Black widow spiders (genus *Latrodectus*) are not usually deadly (especially to adults) and only the female is venomous. The female spider is shiny black, usually with a reddish hourglass shape on the underside of her spherical abdomen. Her body is about 1.5 inches long while the adult male's is approximately half that. The spider's span ranges between 1-3 inches. The adult males are harmless, have longer legs and usually have yellow and red bands and spots over their back and the young black widows are colored orange and white. The bite of a black widow is often not painful and may go unnoticed. However, the poison injected by the spider's bite can cause severe reactions in certain individuals. Symptoms that may be experienced include abdominal pain, profuse sweating, swelling of the eyelids, pains to muscles or the soles of the feet, salivation and dry-mouth (alternating), and paralysis of the diaphragm. If a person is bitten, they should seek immediate medical attention. Clean the area of the bite with soap and water. Apply a cool compress to the bite location. Keep affected limb elevated to about heart level. Ask doctor if Tylenol or aspirin can be taken to relieve minor symptoms. Additional information can be obtained from the Poison Center (1-800-222-1222).

Brown recluse spiders are usually light brown in color, but in some instances, they may be darker. The brown recluse can vary in size, but some can obtain bodies of 5/8 inches in length with a leg span of 1 ½ inches in diameter. They can be identified by their three pairs of eyes along the head area and their fiddle shaped markings on the back. Most brown recluse bites are defensive rather than offensive. They generally only bite when they feel threatened. If bitten by a brown recluse, an individual may experience open, ulcerated sores, which when left untreated may become infected and cause tissue necrosis. If an individual believes a spider has bitten them, they need to seek medical attention as soon as possible. In order to minimize the occurrence of brown recluse bites, individuals should shake their clothing and shoes thoroughly, eliminate the presence of cluttered areas, and spray the building perimeters with pesticides.

3.3.3 RODENTS

Rodentia: (rats, mice, beavers, squirrels, guinea pigs, capybaras, coypu)

Rodents, or Rodentia, are the most abundant order of mammals. There are hundreds of species of Rats; the most common being the black and brown rat.

The **Brown Rat** (*Rattus norvegicus*) has small ears, blunt nose, and short hair. It is approximately 14 to 18 inches long (with tail). They frequently infest slaughterhouses,

domestic dwellings, warehouses, shops, supermarkets, in fact anywhere there is an easy meal and potential nesting sites.

The **Black Rat** (*Rattus rattus*) can be identified by its tail, which is always longer than the combined length of the head and body. It is also slimmer and more agile than the Norwegian or Brown rat. Its size varies according to its environment and food supply.

The **House Mouse** (*Mus musculus*) has the amazing ability to adapt and it now occurs more or less in human dwellings. In buildings, mice will live anywhere and they are very difficult to keep out. Mice are also totally omnivorous; in other words they will eat anything.

Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations, or their food source is changed.

There are six major problems caused by rats and mice:

1. They eat food and contaminate it with urine and excrement.
2. They gnaw into materials such as paper, books, wood, or upholstery, which they use as nest material. They also gnaw plastic, cinder blocks, soft metals such as lead and aluminum, and wiring which may cause a fire hazard.
3. Rats occasionally bite people and may kill small animals.
4. They, or the parasites they carry, (such as fleas, mites, and worms) spread many diseases such as: salmonella, trichinosis, rat bite fever, Hantavirus, Weils disease, and the bubonic plaque.
5. Rats can damage ornamental plants by burrowing among the roots, or feeding on new growth or twigs. They also eat some garden vegetables, such as corn and squash.
6. Rats and mice are socially unacceptable. These rodents have been a problem for centuries, chiefly because they have an incredible ability to survive and are so difficult to eliminate. In addition, they are extremely compatible with human behavior and needs.

3.3.4 SNAKES

Rattlesnakes, copperheads, and cottonmouths (water moccasins) are included in the pit viper family. Members of this family have a depression or "pit" located between the eye

and nostril on each side of the head. Each pit contains heat-sensitive nerve endings which enable the snake to detect warm-blooded prey, even at night. Venom of pit vipers is primarily *hematoxic* because it acts upon the victim's blood system. This venom breaks down blood cells and blood vessels and affects heart action. Bite victims experience severe burning pain, localized swelling, and discoloration for the first 3 to 30 minutes, followed by nausea, vomiting, and occasional diarrhea and usually shock.

Copperheads (*Agkistrodon contortrix*) are found in wet wooded areas, high areas in swamps, and mountainous habitats, although they may be encountered occasionally in most terrestrial habitats. Adults usually are 2 to 3 feet long. Their general appearance is light brown or pinkish with darker, saddle-shaped crossbands. The head is solid brown. Their leaf-pattern camouflage permits copperheads to be sit-and-wait predators, concealed not only from their prey but also from their enemies. Copperheads feed on mice, small birds, lizards, snakes, amphibians, and insects, especially cicadas. Like young cottonmouths, baby copperheads have a bright yellow tail that is used to lure small prey animals.

The **Canebrake and Timber Rattlesnake** (*Crotalus horridus*) occupies a wide diversity of terrestrial habitats, but is found most frequently in deciduous forests and high ground in swamps. Heavy-bodied adults are usually 3 to 4, and occasionally 5 feet long. Their basic color is gray with black crossbands that usually are chevron-shaped. Timber rattlesnakes feed on various rodents, rabbits, and occasionally birds. These rattlesnakes are generally passive if not disturbed or pestered in some way. When a rattlesnake is encountered, the safest reaction is to back away--it will not try to attack you if you leave it alone.

The **Eastern Diamondback Rattlesnake** (*Crotalus adamanteus*) is found in both wet and dry terrestrial habitats including palmetto stands, pine woods, and swamp margins. Adults are frequently 3 to 5 feet long and occasionally are more than 6 feet. Their basic color is light to dark brown with distinct diamonds of a combination of brown and yellow; the tip of the tail is solid black with rattles. Eastern diamondbacks feed on rabbits, rats, and squirrels. This snake, because of its huge size and potent venom, is considered by some to be the most dangerous snake in the United States.

Pigmy Rattlesnakes (*Sistrurus miliarius*) may occur in association with wet areas in wooded habitats or swamps, scrub oak-longleaf pine forest habitats, or other wooded sites. Individuals are heavy-bodied, but usually are only slightly more than 1 foot long. The general color of this snake is dull gray with dark gray or brown blotches on the back and sides. The small size of the pigmy's rattles make the "buzz" difficult to hear. This species is so small and well camouflaged that people seldom see pigmy rattlers that are

coiled atop pine straw or dead leaves. This snake feeds on mice, lizards, snakes, and frogs.

Massasauga Rattlesnakes (*Sistrurus Catenatus*) has a row of dark brown blotches that run down the length of its back and is usually 18 to 39 inches long. It also has three small rows of lighter colored blotches along each side. Unlike other rattlers, it has 9 enlarged scales on top of its head. Its habitat ranges from dry woodlands to rocky hillsides to bogs and swamps and it eats small rodents, lizards, and frogs.

Cottonmouths (*Agkistrodon piscivorus*) are found in association with every type of wetland habitat including estuaries, tidal creeks, and salt marshes; this species often wanders overland in search of food. Adults reach lengths of 3 to 4 feet and often are heavy-bodied. The color pattern is variable, but the backs of adults are usually drab brown or olive with darker crossbands. The belly is a combination of dull yellow and brown and the underside of the tail usually is black. This species is unquestionably the most common venomous snake found in wet-land habitat types. However, the harmless brown water snake, which is very common in aquatic areas frequented by humans, is often mistaken for the venomous cottonmouth. If disturbed, the cottonmouth will often stand its ground and give an open-mouthed threat display. Brown water snakes, when disturbed, will drop from overhanging tree limbs and flee.

Eastern Coral Snakes (*Micrurus fulvius*) are found in association with a wide variety of terrestrial habitats including wooded areas, fields, and margins of aquatic areas. Adults reach about 2 feet in length. Red, yellow, and black rings encircle the body. The narrow yellow rings touch the red rings, a pattern distinguishing this species from the scarlet kingsnake and the scarlet snake. The nose is always black, followed by a wide yellow band. This snake feeds on small snakes and lizards. Coral snakes, which belong to the same family as Old World cobras and kraits, have short, fixed fangs in the front of the mouth. The potential seriousness of a bite from this species warrants a universal warning not to pick up a snake in this region of the country--no matter how pretty--without being certain of its identity.

Coral Snake

The coral snake venom apparatus is comprised of a pair of small, fixed, hollow fangs in the anterior aspect of the mouth through which the snake conducts venom via a chewing motion. Unlike pit vipers such as rattlesnakes, copperheads, and cottonmouths, which strike quickly, coral snakes must hang on for a brief period to achieve significant envenomation in humans.

Coral snake venoms tend to have significant neurotoxicity, inducing neuromuscular dysfunction. They have little enzymatic activity or necrotic potential compared to most vipers and pit vipers. These venoms tend to be some of the most potent found in snakes, yet the venom yield per animal is less than that of most vipers or pit vipers. Because of the relatively primitive venom delivery apparatus, as many as 60 percent of those bitten by North American coral snakes may not be envenomed.

- Onset of symptoms may be delayed up to 10 to 12 hours but may then be rapidly progressive.
- Paucity of local complaints.
- Local paresthesias (may be painful).
- Soft tissue swelling (usually very mild).
- Alteration of mental status.
- Complaints related to cranial nerve dysfunction (e.g., difficulty swallowing).

Preventing Snake Bites

Watching where you step, put your hands, or sit down is one of the best ways to prevent snake bites. Poisonous snakes live on or near the ground and often like rocks, wood piles, and other spots that offer both a place to sun and a place to hide. Snakes avoid your huge body, but will definitely bite if stepped on or otherwise trapped. Most bites occur in and around the ankle. About 99 percent of all bites occur below the knee, except when someone accidentally picks up or falls on the snake.

The fangs of venomous snakes, though long and sharp, are relatively fragile and easily deflective or broken. These fangs usually don't penetrate canvas tennis shoes and almost never penetrate leather shoes or boots. Watching where you step and wearing boots in tall grass can prevent most snake bites.

Snakes are not something to be feared, but rather a creature to be respected as a fascinating member of the outdoors.

Emergency First Aid for Poisonous Snakebite

Although it is important to obtain medical aid immediately, emergency first aid can slow the spread of poison from the bite. Remain calm and avoid unnecessary movement, especially if someone is with you. The rate of venom distribution throughout your body will be slower if you are still and quiet. *Do not* use home remedies, and *do not* drink alcoholic beverages.

In addition, learn the following procedures so you do not waste time before getting medical attention.

1. If less than 60 minutes is required to reach a hospital or other medical aid, follow this procedure:
 - a. Apply a constricting band 2 to 4 inches on each side of the bite. The band should be loose enough to slip your finger under without difficulty, so that you do not cut off circulation completely. Properly applied, the constricting band can be left safely in place for 1 hour without adjustment.
 - b. If ice is available, place some in a towel, shirt, or other piece of cloth and apply it to the bite area. Do not bind it to the bite, but keep it loosely in place. Do not use the ice pack for more than *1 hour*. The objective is to cool the venom and slow its action, but not to freeze the tissue.
 - c. The primary function of the constricting band and ice pack is to slow the spread of venom through your body. Remove them slowly so there will not be a sudden rush of venom through your blood stream.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.1 GENERAL

This section shall cover the applicable personal protective equipment (PPE) requirements, which shall include eye, face, head, foot, and respiratory protection.

The purpose of PPE is to shield or isolate individuals from the chemical and physical hazards that may be encountered during work activities.

4.2 TYPES OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

If required for a task, the following types of PPE will be available for use at the project site: Hard hat, life vests or buoyant work vests, safety glasses (with permanently affixed side shields), goggles, face shield, steel toed rubber boots, gloves (nitrile, cotton, leather, butyl rubber, neoprene), full face respirators and cartridges, protective clothing (Tyvek® coveralls), ear plugs, ear muffs, and reflective safety vests.

4.2.1 TYPES OF PROTECTIVE MATERIAL

Protective clothing is constructed of a variety of different materials for protection against exposure to specific chemicals. No universal protective material exists. All will decompose, be permeated, or otherwise fail to protect under certain circumstances.

Fortunately most manufacturers list guidelines for the use of their products. These guidelines usually concern gloves or coveralls and, generally, only measure rate of degradation (failure to maintain structure). It should be noted that a protective material may not necessarily degrade but may allow a particular chemical to permeate its surface. For this reason, guidelines must be used with caution. When permeation tables are available, they should be used in conjunction with degradation tables.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all Site personnel using PPE:

1. When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift.
2. Inspect all clothing, gloves, and boots both prior to and during use for:
 - imperfect seams;
 - non-uniform coatings;
 - tears; and
 - poorly functioning closures.
3. Inspect reusable garments, boots, and gloves both prior to and during use for:
 - visible signs of chemical permeation;
 - swelling;
 - discoloration;
 - stiffness;
 - brittleness;
 - cracks;
 - any sign of puncture; and
 - Any sign of abrasion.

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of chemicals will not be reused.

4.3 RESPIRATORY PROTECTION

Respiratory protection may be worn by personnel during project activities. Personnel required to work in these areas will wear an air-purifying respirator and follow the procedures and guidelines as described below.

All personnel required to use this equipment shall first be instructed in how to properly fit a respirator to achieve the required face-piece-to-face seal for respiratory protective purposes. Conditions, which could affect this face seal, are the presence of beards, sideburns, eyeglasses, and the absence of upper or lower dentures.

The air-purifying respirator cartridges selected for use during project work at this site will be dependent upon the nature of the chemical hazard and will be selected by the RSHM and SS. The selected cartridges will have the ability to protect against the known contaminant concentrations. It is anticipated that the appropriate air purifying respirator cartridge to be used at the Site is a combination organic vapor and P-100 particulate cartridge. The cartridge used must be of the same manufacturer as the respiratory face piece.

All cartridges will be changed prior to breakthrough or at a minimum daily. Changes will also be made when personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property.

4.3.1 RESPIRATOR CLEANING

Respiratory equipment and other non-disposable equipment will be fully decontaminated and then placed in a clean storage area. Respirator decontamination will be conducted at a minimum once daily. Face pieces will be disassembled, the cartridges thrown away, and all other parts placed in a cleansing solution. After an appropriate amount of time in the solution, the parts will be removed and re-seated with tap water.

Face pieces will be allowed to air dry before being placed in sanitized bags, and then stored in a clean area.

4.4 LEVELS OF PROTECTION

The level of protection must correspond to the level of hazard known, or suspected, in the specific work area. PPE has been selected with specific considerations to the hazards associated with site activities.

- All PPE will be disposed of and/or decontaminated at the conclusion of each workday as described below.
- All disposable equipment shall be removed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work.
- Eating, drinking, chewing gum or tobacco, and smoking are prohibited while working in area where the potential for chemical and/or explosive hazards may be present. Personnel must wash thoroughly before initiating any of the aforementioned activities.

4.4.1 REASSESSMENT OF PROTECTION LEVELS

Protection levels provided by PPE selection shall be upgraded or downgraded based upon a change in Site conditions or the review of the results of air monitoring or the initial exposure assessment monitoring program, if one was conducted.

When a significant change occurs, the hazards shall be reassessed. Some indicators of the need for reassessment are:

- commencement of a new work phase;
- change in job tasks during a work phase;
- change of season/ weather;
- when temperature extremes or individual medical considerations limit the effectiveness of PPE;
- chemicals other than those expected to be encountered are identified;
- change in ambient levels of chemicals; and
- change in work scope which effects the degree of contact with areas of potentially elevated chemical presence.

All proposed changes to protection levels and PPE requirements will be reviewed and approved prior to their implementation by the SS.

5.0 AIR MONITORING PROGRAM

Inhalation hazards are caused from the intake of vapors and contaminated dust. Air monitoring shall be performed prior to initiating any intrusive activities that possess the potential for chemical exposure to detect the presence and relative level of those air contaminants which are inhalation hazards. The purpose of air monitoring is to identify and quantify airborne contaminants in order to determine the level of worker protection needed. Initial screening for identification is often qualitative, but the determination of its concentration (quantification) must await subsequent testing.

The data collected throughout the monitoring effort shall be used to determine the appropriate levels of protection.

5.1 EXPOSURE MONITORING

Air monitoring equipment to be used during site activities shall consist of a photoionization (PID) monitor (only where potential for VOCs exist) and a four gas monitor equipped with oxygen, combustible gas, carbon monoxide, and hydrogen sulfide sensors (for use where confined space is required).

5.1.1 PHOTOIONIZATION DETECTOR

Exposure to volatile organic compounds (VOCs) shall be monitored with a photoionization detector (PID) with a 11.7 or greater eV lamp. The PID has the ability to detect organic vapor concentrations from 1 part per million (ppm) to 2,000 ppm. All PID monitoring shall be conducted in the breathing zone.

5.1.2 COMBUSTIBLE GAS/OXYGEN/CARBON MONOXIDE/HYDROGEN SULFIDE METERS

The O₂/LEL meter is a combination oxygen and combustible gas indicator, which analyzes the oxygen, and combustible has concentrations in the air simultaneously. When used properly, the portable oxygen indicator will read the percent oxygen in the immediate atmosphere. The normal ambient oxygen concentrations is 20.9 percent at sea level.

Additional sensors can be added to an LEL/O₂ monitor or separate instruments can be obtained to measure for carbon monoxide and hydrogen sulfide. Work activities will cease when hydrogen sulfide levels of 10 ppm or greater and/or carbon monoxide levels of 35 ppm or greater are encountered in the worker's breathing zone.

5.1.3 MONITORING FREQUENCY

Based upon the task and anticipated chemical hazards, the Site Manager will determine the initial monitoring frequency. Monitoring will only be required when warranted based on the task being conducted, as discussed in Section 5.1.

5.1.4 HEALTH AND SAFETY ACTION LEVELS

An action level is a point at which increased protection or cessation of activities is required due to the concentration of contaminants in the work area. All activities shall be initiated in Level D/Modified Level D.

In addition to the action level, an upgrade to Level C is required if:

- any symptoms occur, as described in Section 3.0;
- requested by an individual performing the task; and
- any irritation to eye, nose, throat, or skin occurs.

A work stoppage and evacuation (cease and desist) at the specific work area is required if levels in the breathing zone exceed the protection factor of the respirator.

Realtime instrument action levels for organic vapors to determine the level of respiratory protection necessary during Project activities are based on the concentration of the Site chemicals measured within the breathing zone. A background reading will be established prior to commencing work activities at each active work area.

Monitoring for combustible gases, carbon monoxide, hydrogen sulfide, and oxygen will be conducted prior to initiating intrusive activities, and during other activities where oxygen deficient and/or flammable atmospheres may be encountered (e.g., entry into excavations). The point of activity (borehole, excavation cut, etc.) and the immediate work area around these activities must be monitored to ensure that an adequate level of oxygen is present, and to determine if a flammable atmosphere exists. The SS will determine the monitoring frequency based on the observed Site conditions. All work activity must stop where monitoring indicates the flammable vapor concentration is

20 percent of the lower explosive limit (LEL) at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

If oxygen concentrations < 19.5 percent are obtained in any personnel work area, supplied air respiratory protection will be required and the area will be ventilated.
If any oxygen concentrations \geq 22.5 percent are obtained in any work area, retreat to a safe atmosphere.

Based upon the scope of work involved, oxygen enriched atmospheres are not anticipated. However, it is necessary to be apprised of such readings as they impact LEL readings and vice versa.

LEL Meter Reading: If any readings \geq 10 percent LEL are obtained:	Action Taken: Stop all activities in the area to those that will not generate sparks; wear non-sparking gear and use non-sparking tools.
If any readings \geq 20 percent LEL are obtained:	Cease all activities and retreat to a safe atmosphere.

In addition to combustible gas and oxygen, monitoring for carbon monoxide and hydrogen sulfide will be conducted during all confined space entry activities, including excavation entry.

Carbon Monoxide Meter Reading: If any readings \geq 35 ppm are obtained:	Action Taken: Cease all activities in the area and wait for direction from SS.
Hydrogen Sulfide Meter Reading: If any readings \geq 10 ppm are obtained:	Action Taken: Cease all activities in the area and wait for direction from SS.

6.0 SITE CONTROL

Designated work areas will be set up as appropriate with access only by authorized personnel during the Site field activities, as required. The purpose of these procedures is to limit access to areas with potentially elevated chemical presence, and prevent the migration of potentially hazardous materials into adjacent clean areas. These areas are described in the following:

- i) The Exclusion Zone (EZ) is the area immediately surrounding the active work area where intrusive activities or other potentially hazardous activities are being conducted. Sufficient area will be provided for efficient movement of personnel and equipment as well as chemical control. Boundaries are modifiable depending on operational requirements. The SS will be responsible for maintaining the boundaries of this area. Personnel entering this area are required to wear the PPE as defined previously. A wind direction indication device (i.e., flagging, windsock, etc.) will be mounted in the area of any EZ during Site activities.

In the event that unauthorized personnel enter the EZ, work will stop. Work will not resume until the unauthorized personnel have been removed from the EZ or have been moved to an acceptable on-Site area. A log of all visitors to the Site, including those entering the EZ, will be maintained.

- ii) The Contaminant Reduction Zone (CRZ) will provide a location for removal of PPE which has contacted material with elevated chemical presence and final removal and decontamination of personnel and equipment. Supplemental safety equipment, such as fire extinguishers, portable eyewash, and extra quantities of PPE may be stored in this area. The order in which safety equipment is to be donned is as follows (if required):

- a) Tyvek[®] suit;
- b) rubber boot;
- c) gloves;
- d) respirator; and
- e) hard hat.

The following order applies when removing safety equipment:

- a) wash off boots and outer gloves prior to removal;
 - b) Tyvek[®] suit;
 - c) hard hat;
 - d) respirator; and
 - e) inner gloves.
- iii) The Support Zone (SZ) is situated in clean areas where there is a minimal risk of encountering hazardous materials or conditions. PPE beyond standard construction safety equipment is therefore not required. The purpose of site control is to minimize potential contamination of workers and protect the public from hazards found on site. Site control is especially important in emergency situations. Only authorized personnel will be allowed on the project site.

Site control and work area demarcation will be achieved through posting of signage and placement of barricades. All construction areas will have the appropriate signage posted. Barricades and warning signs will be placed to warn personnel of potential hazards. A standby person (spotter) may be utilized in place of barricades, where appropriate. The following materials may be used to barricade construction areas, demarcate equipment swing radius, control traffic, etc.:

- temporary fence
- high visibility tape, rope, or chains
- traffic cones
- sawhorses
- wood or metal guardrails

6.1 COMMUNICATION

Each member of the site entry team will be able to communicate with another entry team member at all times. Communications may be by way of an air horn, walkie-talkie, telephone, or hand signals.

The primary means for external communication are telephones and radio. If telephone lines are not installed at a site, all team members should:

- know the location of the nearest telephone; and
- have the necessary telephone numbers readily available.

The following standard hand signals will be mandatory for all employees to understand regardless of other means of communication:

- Hand gripping throat – Cannot breathe.
- Hands on top of head – Need assistance.
- Thumbs up – OK, I'm all right, I understand.
- Thumbs down – No, negative.
- Gripping partner's wrist, or gripping both of your own hands on wrist (if partner is out of reach) – Leave area immediately.

6.2 BUDDY SYSTEM

6.2.1 RESPONSIBILITIES

A buddy system shall be implemented when conducting certain hazardous activities on this site. This buddy shall be able to:

- provide his or her partner with assistance;
- observe his or her partner for signs of chemical exposure or temperature stress;
- periodically check the integrity of his or her partner's protective clothing; and
- notify emergency personnel if emergency help is needed.

6.3 SITE SECURITY

Site security is necessary to prevent the exposure of unauthorized, unprotected people to site hazards and to avoid interference with safe working procedures. Security shall be maintained outside of the actual work area(s) so as to prevent unauthorized entry into the work area(s).

6.4 DECONTAMINATION

All equipment that came in contact with potentially contaminated material must be decontaminated within the CRZ or on the decontamination pad by a pressure washer upon exit from the EZ. Decontamination procedures should include: knocking soil/mud from machines; water rinsing using a solution of water and Liquinox; scraping and brushing to remove remaining soils and a final water rinse. Personnel shall wear Level C protection when decontaminating equipment unless a downgrade to Modified D is authorized by the SS. Runoff will be collected and stored until appropriate disposal arrangements are made. Following decontamination and prior to equipment removal from the Site, the SS shall be responsible for ensuring that the equipment has been properly cleaned. This inspection shall be included in the Site log book.

6.4.1 PERSONNEL AND EQUIPMENT DECONTAMINATION PROCEDURES

If necessary, PPE will be disposed of and/or decontaminated at the conclusion of each work day as described below. Decontamination procedures will follow the concept of decontaminating the most contaminated PPE first.

All disposable equipment shall be doffed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work.

Procedures for decontamination must be followed to prevent the spread of contamination and to eliminate the potential for chemical exposure.

Personnel: Decontamination will take place prior to exiting the contaminated work area.

Modified Level D: Remove outer protective wear, wash and rinse gloves, remove gloves. Wash hands and face.

Level C: Wash and rinse outer gloves, boots and suit, and remove, then remove respirator; dispose of cartridges; wash respirator; remove inner gloves and dispose. Wash hands and face.

Handle all clothing inside out when possible.

Equipment: All equipment must be decontaminated with Alconox/Liquinox solution or discarded upon exit from the contaminated area in a well-ventilated area. A temporary decon pad with a low-volume high-pressure washer will be setup on site during drilling operations. All decon materials will be drummed for subsequent disposal.

7.0 EMERGENCY PROCEDURES

7.1 ON-SITE EMERGENCIES

Emergencies can range from minor to serious conditions. Various procedures for responding to site emergencies are listed in this section. The Site Manager is responsible for contacting local emergency services, if necessary, for specific emergency situations. Various individual site characteristics will determine preliminary action to be taken to assure that these entry procedures are successfully implemented in the event of an emergency.

In the event of an emergency, all personnel will gather at their primary rally point for a head count. The rally point location will be determined by the SS and will be communicated to the work crew(s) during the daily toolbox safety meeting.

All emergency response actions will be conducted in accordance with the Tucson Airport Authority (TAA)/Federal Aviation Administration (FAA) emergency response plan, which is incorporated herein by reference. The **TAA Dispatch [(520) 573-8182]** will be **called first** in the event of an emergency.

Prior to commencing construction activities at the Site, an emergency response coordination meeting will be convened with the appropriate TAA emergency responders to finalize and confirm emergency response procedures.

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather.

Emergency information should be posted as appropriate. All emergencies will be reported to the **TAA Dispatch [(520) 573-8182]**. They will provide further direction as to the responsibilities during any emergency situation. It is possible they may wish to take the lead or they may ask the General Contractor or Supervising Contractor to take the lead.

7.1.1 ACCIDENT, INJURY, AND ILLNESS REPORTING AND INVESTIGATION

Any work-related incident, accident, injury, illness, exposure, or property loss must be reported to your supervisor, the SS, and *within 1 hour*. Motor vehicle accidents must also be reported. A report must be filed for the following circumstances:

- accident, injury, illness, or exposure of an employee;
- injury of a subcontractor;
- damage, loss, or theft of property; and/or
- any motor vehicle accident regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the employee is acting in the course of employment.

Occupational accidents resulting in employee injury or illness will be investigated by the SS. This investigation will focus on determining the cause of the accident and modifying future work activities to eliminate the hazard.

All employees have the obligation and right to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If you wish to make such a report, it may be made orally to your supervisor or other member or management, or you may submit your concern in writing, either signed or anonymously.

7.2 EMERGENCY EQUIPMENT/FIRST AID

Safety equipment will be available for use by site personnel, will be located within 30 feet of the work area(s) and maintained at the site. The safety equipment will include, but is not limited to, the following: a 10-unit first aid kit (dependant upon the number of personnel), emergency eyewash, an ABC fire extinguisher (2A/10BC), potable water, anti-bacterial soap, and telephone.

7.3 EMERGENCY PROCEDURES FOR CONTAMINATED PERSONNEL

Whenever possible, personnel should be decontaminated in the contamination reduction zone before administering first aid, without causing further harm to the patient.

Skin Contact: Remove contaminated clothing, wash immediately with water, use soap, if available.

Inhalation: Remove victim from contaminated atmosphere. Remove any respiratory protection equipment. Initiate artificial respiration, if necessary. Transport to the hospital.

Ingestion: Remove from contaminated atmosphere. Do not induce vomiting if victim is unconscious. Also never induce vomiting when acids, alkalis, or petroleum products are suspected. Transport to the hospital, if necessary.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them direction to the hospital and a listing of the contaminants of concern to which they may have been exposed.

Any vehicle used to transport contaminated personnel will be cleaned or decontaminated, as necessary.

7.4 SITE EVACUATION

In the event of an emergency situation such as fire, explosion, significant release of toxic gases, etc., an air horn or other appropriate device will be sounded for approximately 10 seconds indicating the initiation of evacuation procedures. Personnel in the field will be notified through established communications to evacuate the area. All personnel in both the restricted and non-restricted area will evacuate and assemble near the primary rally point or other safe area as identified by the SS for a head count. The location of the rally point should be identified and communicated to the work crew(s) prior to beginning operations.

7.5 SPILL AND RELEASE CONTINGENCIES

If a spill has occurred, the first step is personal safety, then controlling the spread of contamination if possible. Personnel will immediately contact the SS (or other site management) to inform them of the spill and activate emergency spill procedures. The SS will immediately contact the **TAA Dispatch (520-573-8182)**, TAA Fire Department, Director of Environmental Services, and the TAA Planning and Development Construction Services Administrator to report the spill.

- After obtaining the proper spill response tools (shovels, booms and pads, absorbent socks, etc.) and PPE, personnel will attempt to contain the spill so that it does not

enter any conveyance (sewer, drainage ditch, etc.) that eventually discharges to surface water.

- Locate and abate the source of the spill.
- Collect the spilled material and place in a secure container. Clean and decontaminate the affected area(s).

All spill material and debris will be managed in a manner that complies with applicable federal, state, and local environmental rules regarding recycling or disposal of wastes.

8.0 RECORDKEEPING

The SS shall establish and maintain records of all necessary and prudent monitoring activities as described below:

- Name and job classification of the employees involved on specific tasks;
- Air monitoring/ sampling results and instrument calibration logs;
- Records of training acknowledgment and daily safety meeting forms;
- Emergency reports describing any incidents or accidents;
- Documentation of Site inspections, results of inspections and corrective actions implemented;
- Records of all OSHA Training Certifications for Site personnel; and
- Records of qualitative fit-testing and physical examination results for Site personnel (as necessary).

APPENDIX A

FORMS

- 1. EMERGENCY CONTACT SHEET**
- 2. Material Safety Data Sheet (MSDS)**
- 3. Figures**

Tucson International Airport

EMERGENCY INFORMATION		
Contact	Phone Number	Miscellaneous
Tucson Airport Authority Dispatch		Notify first in event of any emergency.
TAA Construction Services Administrator		
Local Police		
Fire Department		
Ambulance		
Local Hospital: Kino Community Hospital 2800 East Ajo Way Tucson, Arizona		HOSPITAL DIRECTIONS: From the Site, go north on Nogales Highway (i.e., Hwy 89); turn right, or east on Ajo Way; continue east on Ajo Way past the I-10 and follow the Hospital signs until you come to the Hospital on the right, or south side of Ajo Way. The Emergency Room is on the north side of the Hospital.
National Poison Center		
CRA Safety Hotline		CRA - Accident Reporting System Please call (866) 529-4886 and provide: <ul style="list-style-type: none"> • Name and location of caller • Description of Incident • Name of any injured persons • Description of injuries • Phone numbers for return call
CRA Project Manager (CRA Tucson)		
CRA Regional S&H Manager		
Site Supervisor (CRA Tucson)		
Site Contact (CRA Tucson - Facility)		

* Hospital Route must be field validated before site work commences.

Transport Lab Directory¹

	Email	Office	O. Phone

Current Members	Email	Phone

¹ Updated 02/27/2012

MATERIAL SAFETY DATA SHEETS

TRICHLOROETHYLENE

1. PRODUCT IDENTIFICATION

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride

CAS No.: 79-01-6

Molecular Weight: 131.39

Chemical Formula: C₂HCl₃

Product Codes:

J.T. Baker: 5376, 9454, 9458, 9464, 9473

Mallinckrodt: 8600, 8633

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No	Percent
Hazardous		
-----	-----	-----

Trichloroethylene	79-01-6	100%
Yes		

3. HAZARDS IDENTIFICATION

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER.

Risk of cancer depends on level and duration of exposure.

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

Health Rating: 2 - Moderate (Poison)

Flammability Rating: 1 - Slight

Reactivity Rating: 1 - Slight

Contact Rating: 3 - Severe

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

Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:

Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms

of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.

Ingestion:

Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.

Skin Contact:

Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.

Eye Contact:

Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.

Chronic Exposure:

Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

4. FIRST AID MEASURES

Inhalation:

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

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:

Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

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

Note to Physician:

Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

5. FIRE FIGHTING MEASURES

Fire:

Autoignition temperature: 420C (788F)

Flammable limits in air % by volume:

lcl: 8; ucl: 12.5

Explosion:

A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use water spray to keep fire exposed containers cool. If substance does ignite, use CO₂, dry chemical or

foam.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

6. ACCIDENTAL RELEASE MEASURES

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

7. HANDLING AND STORAGE

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne Exposure Limits:

Trichloroethylene:

-OSHA Permissible Exposure Limit (PEL):

100 ppm (TWA), 200 ppm (Ceiling),

300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):

10 ppm (TWA) 25 ppm (STEL); A2 Suspected Human Carcinogen.

Ventilation System:

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

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.

Eye Protection:

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Clear, colorless liquid.

Odor:

Chloroform-like odor.

Solubility:

Practically insoluble in water. Readily miscible in organic solvents.

Specific Gravity:

1.47 @ 20C/4C

pH:

No information found.

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

100

Boiling Point:

87C (189F)

Melting Point:

-73C (-99F)

Vapor Density (Air=1):

4.5

Vapor Pressure (mm Hg):

57.8 @ 20C (68F)

Evaporation Rate (BuAc=1):

No information found.

10. STABILITY AND REACTIVITY

Stability:

Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.

Hazardous Decomposition Products:

May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.

Conditions to Avoid:

Heat, flame, ignition sources, light, moisture, incompatibles

11. TOXICOLOGICAL INFORMATION

Toxicological Data:

Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:

This material has been linked to mutagenic effects in humans.

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Trichloroethylene (79-01-6)	No	Yes	2A

12. ECOLOGICAL INFORMATION**Environmental Fate:**

When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:

The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION**Domestic (Land, D.O.T.)**

Proper Shipping Name: TRICHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1710

Packing Group: III

Information reported for product/size: 4L

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE

Hazard Class: 6.1

UN/NA: UN1710

Packing Group: III

Information reported for product/size: 4L

15. REGULATORY INFORMATION

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Trichloroethylene (79-01-6)	Yes	Yes	Yes	Yes
-----\Chemical Inventory Status - Part 2\-----				
Ingredient	Korea	DSL	--Canada-- NDSL	Phil.
Trichloroethylene (79-01-6)	Yes	Yes	No	Yes
-----\Federal, State & International Regulations - Part 1\-----				
Ingredient Catg.	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical
Trichloroethylene (79-01-6)	No	No	Yes	No
-----\Federal, State & International Regulations - Part 2\-----				
Ingredient	CERCLA	-RCRA-	-TSCA-	
Trichloroethylene (79-01-6)	100	261.33	8(d)	
		U228	No	

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

WARNING:
 THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE
 CANCER.

Australian Hazchem Code: None allocated.

Poison Schedule: S6

WHMIS:

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

16. OTHER INFORMATION

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

Label Precautions:

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

Do not breathe vapor.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Keep away from heat and flame.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

NITROGEN

Material Safety Data Sheet



Nitrogen

Section 1. Chemical product and company identification

Product name	: Nitrogen
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Product use	: Synthetic/Analytical chemistry. Liquid – cryogenic coolant.
Synonym	: nitrogen (dot); nitrogen gas; Nitrogen NF, LIN, Cryogenic Liquid Nitrogen, Liquid Nitrogen
MSDS #	: 001040
Date of Preparation/Revision	: 1/14/2011.
In case of emergency	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Gas. [NORMALLY A COLORLESS GAS; MAY BE A CLEAR COLORLESS LIQUID AT LOW TEMPERATURES. SOLD AS A COMPRESSED GAS OR LIQUID IN STEEL CYLINDERS.]
Emergency overview	: WARNING! GAS: CONTENTS UNDER PRESURE. Do not puncture or incinerate container. Can cause rapid suffocation. May cause severe frostbite. LIQUID: Extremely cold liquid and gas under pressure. Can cause rapid suffocation. May cause severe frostbite. Do not puncture or incinerate container. Contact with rapidly expanding gases or liquids can cause frostbite.
Routes of entry	: Inhalation
Potential acute health effects	
Eyes	: Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.
Skin	: Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.
Inhalation	: Acts as a simple asphyxiant.
Ingestion	: Ingestion is not a normal route of exposure for gases. Contact with cryogenic liquid can cause frostbite and cryogenic burns.
Medical conditions aggravated by over-exposure	: Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.
See toxicological information (Section 11)	

Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Nitrogen	7727-37-9	100	Oxygen Depletion [Asphyxiant]

TRIFLUOROBROMOMETHANE

=====
===== Product Identification =====

MSDS NAME:TRIFLUOROBROMOMETHANE

NIIN:00N084450

MSDS Number: CGTFB

=== Responsible Party ===

Company:GENIUM PUBLISHING CORP

Address:ONE GENIUM PLAZA

City:SCHENECTADY

State:NY

ZIP:12304-4690

Country:US

Info Phone Num:518-377-8854

Emergency Phone Num:518-377-8854

Preparer's Name:MJ WURTH

CAGE:5Z768

=== Contractor Identification ===

Company:GENIUM PUBLISHING CORPORATION

Address:1145 CATALYN ST

Box:City:SCHENECTADY

State:NY

ZIP:12303-1836

Country:US

Phone:518-377-8854

CAGE:5Z768

=====
===== Composition/Information on Ingredients =====

Name:METHANE, BROMOTRIFLUORO-; (TRIFLUOROBROMOMETHANE) (HALON
1301) (SARA 313) (CERCLA)

CAS:75-63-8

RTECS #:PA5425000

Fraction by Wt: 100%

OSHA PEL:1000 PPM

ACGIH TLV:1000 PPM

Ozone Depleting Chemical:1

=====
===== Hazards Identification =====

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.

Routes of Entry: Inhalation:YES Skin:YES Ingestion:NO

Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO

Health Hazards Acute and Chronic:TARGET ORGANS: HEART, CNS. ACUTE:

HDCH, EYE, NOSE & THROAT IRRIT, LT HEAD, MILD EUPHORIA, DECRD

MENTAL PERFORMANCE & TROUBLE CONCENTRATING. EXPOS TO HIGH CONCS

MAY

CAUSE CARD ARRHYTHMIAS, CONFUSN, PUL M IRRIT, TREMORS & RARELY

COMA. HIGH CONCS MAY CAUSE ASPHY BY DILUTION OF AVAIL OXYG. SYMPS INCL AIR HUNGER/FATG/ DECRD VISION/ MOOD DISTURBS/ NUMB OF EXTREMITIES/ HDCH/ CONFUSN/ DECRD COORD & JUDGMEN T/ CYANOSIS (BLUE SKIN DISCOLORATION DUE TO LACK OF OXYG TO TISS) & UNCON. HUMAN EXPOS TO 70,000 PPM FOR 3 MIN SHOWED NO ADVERSE EFT. EXPOS UP TO 100,000 PPM SHOWED LT HEAD, PARESTHESIA (PINS/NEEDLES SENSATION) & DIMINISHED(EFTS OF OVEREXP)

Explanation of Carcinogenicity:NOT RELEVANT

Effects of Overexposure:HLTH HAZ: DIMINISHED PERFORMANCE. AT 150,000 PPM, FEELING OF IMPENDING UNCON DEVELOPED. EXPOS TO THERMAL DECOMP PRODS CAN CAUSE EYE/NOSE/THROAT & RESP TRACT IRRIT; MAY LEAD TO CHEM PNEUMIT/ NONCARDIO GENIC PULM EDEMA. EYE:IRRIT, FROSTBT ON DIRECT CNTCT W/LIQ. SKIN:DEFAT/DERM W/DRYNESS & CRACKING; FROSTBT ON DIRECT CNTCT W/LIQ. INGEST:UNLIKELY SINCE TRIFLUOROBROMOMETHANE IS GAS. CHRONIC EFTS: NONE REPORTED.

Medical Cond Aggravated by Exposure:CARDIOVASCULAR OR RESPIRATORY DISEASE AND CNS DISORDERS.

===== First Aid Measures =====

First Aid:INHAL:REMOVE TO FRESH AIR, MONITOR FOR RESP DISTRESS & ADMIN 100% HUMIDIFIED SUPPLEMENTAL OXYG W/ ASSISTED VENT AS REQD. EYES:IF TISS FROZEN, SEEK MED ATTN IMMED. DO NOT ALLOW VICTIM TO RUB/KEEP EYES T IGH TLY SHUT. GENTLY LIFT LIDS & FLUSH IMMED & CONTINUOUSLY W/FLOODING AMTS OF WATER FOR AT LST 15 MIN & UNTIL TRANSPORTED TO EMER MED FACILITY. CONSULT OPHTHALMOLOGIST IMMED. SKIN:REMOVE CONTAM CLTHG. DO NOT REMOVE FROZEN CLTHG FROM FROSTBT AREAS. IMMERSE EXPOS AREA IN H*2O BATH/CONTINUE REWARMING @ 104-108F(40-42C) UNTIL VASODILATORY FLUSH RETURNS. DO NOT RUB AREA/USE DRY HEAT. CONSULT MD. INGEST :UNLIKELY. IF IT DOES (SUPDAT)

===== Fire Fighting Measures =====

Flash Point:NONFLAMMABLE GAS

Extinguishing Media:USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE SINCE TRIFLUOROBROMOMETHANE IS NONFLAMMABLE.

Fire Fighting Procedures:USE NIOSH APPRVD SCBA & FULL PROT EQUIP . IF FEASIBLE & W/OUT UNDUE RISK, MOVE CYLS FROM HAZ AREA. OTHERWISE, COOL FIRE-EXPOS CYLS UNTIL WELL AFTER FIRE EXTINGUISHED. W/DRAW IMMED IN CASE OF RIS ING SOUND FROM VENTING SFTY DEVICE AS VESSEL RUPTURE MAY BE IMMINENT. DO NOT RELS RUNOFF FROM FIRE CTL METHS TO (SUPDAT)

Unusual Fire/Explosion Hazard:CYLS MAY EXPLODE IN HEAT OF FIRE. HAZ COMBUST PRODS: HYDROGEN FLUORIDE, HYDROGEN BROMIDE, CARBON MONOXIDE, CARBONYL FLUORIDE & OTHER FLUORIDE & BROMIDE GASES.

===== Accidental Release Measures =====

===== Toxicological Information

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Toxicological Information:RESP PROT:

Figures:

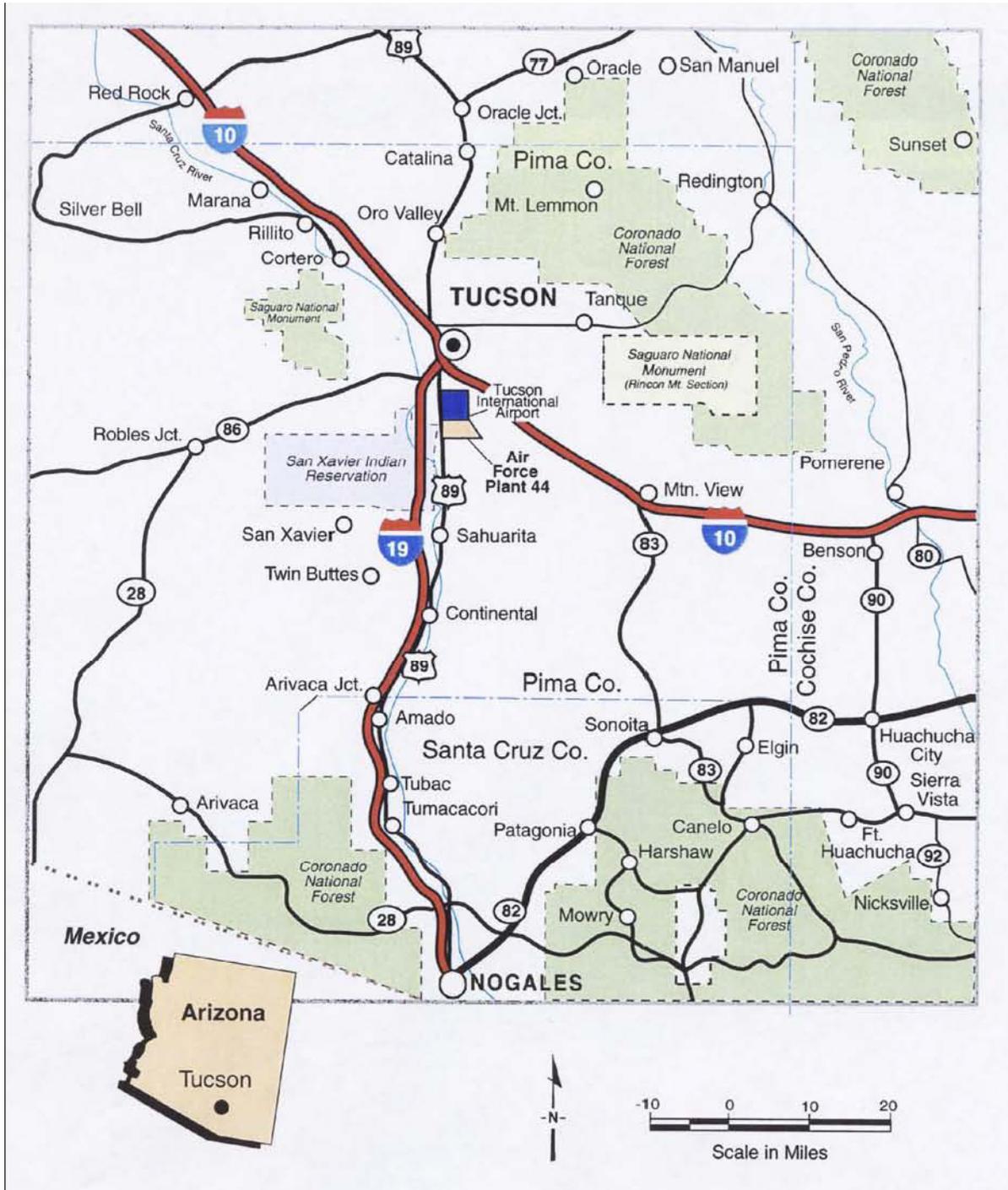


Figure 1. Map of project site location.

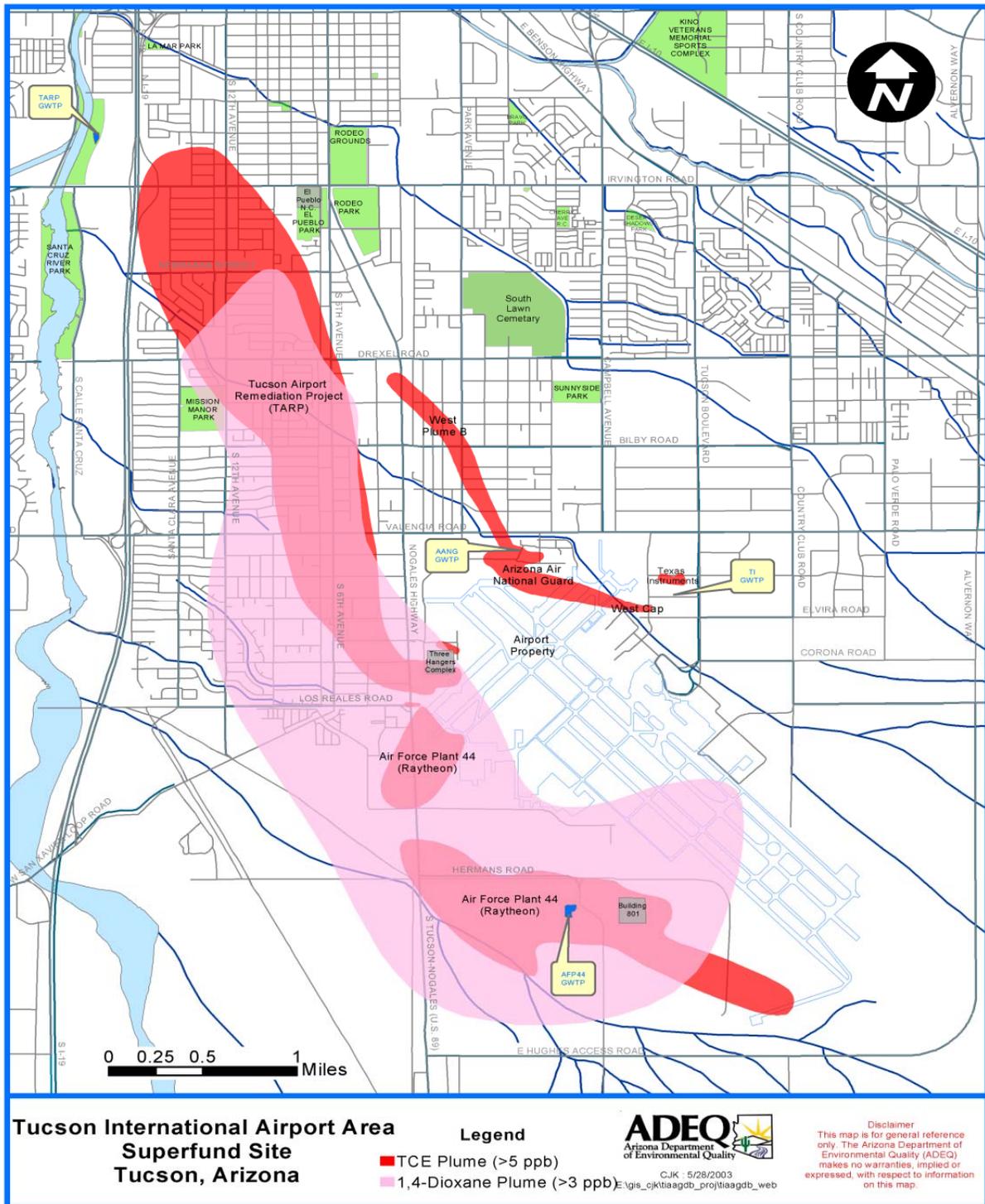


Figure 2. Map of TIAA project site.