APPENDIX B

HEALTH AND SAFETY PLAN
Health and Safety Plan

Prepared for

Paseo Del Mar Landslide
White Point Nature Preserve
1600 W. Paseo Del Mar
San Pedro, California
Drilling Exploration Program

In an Emergency Dial: 911
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INTRODUCTION

General

This Site-Specific Health & Safety Plan (HASP) has been prepared for Shannon & Wilson personnel performing project-specific activities associated with the Paseo Del Mar Landslide Exploration Program, referred to herein as the “project”. The project is located along the south-central portion of the abandoned White Point Military Reservation and current White Point Nature Preserve conservation area.

This plan addresses specific health and safety requirements for the area to be explored, and the work to be performed during the project. All field staff must understand and adhere to the requirements of this HASP. Acknowledgement that personnel are aware of this plan and its contents will be documented by signing the HASP Acknowledgement Form located in Appendix A.

Scope of Explorations

Shannon &Wilson plans to perform a geotechnical investigation, including field explorations, laboratory testing, and geotechnical engineering studies for the proposed project to provide detailed geotechnical recommendations for use in the stabilization of the existing Paseo Del Mar landslide. The exploration program has been based on the following assumptions:

- The Field Exploration Program will consist of approximately 9 borings completed throughout the project limits. Three borings will be completed using bucket-auger methods, and six borings will use the mud rotary coring method. The drilling program is anticipated to last 15 – 20 working days.

- Hazardous and toxic wastes may be encountered in this exploration program. If contaminated soils are encountered, drill and test pit cuttings must be isolated from the environment, contained and analyzed to ensure proper disposal. If hazardous or toxic wastes are identified, drilling activities are to stop until Shannon &Wilson and the City of LA jointly conclude that it is reasonable to proceed.
ORGANIZATION AND RESPONSIBILITIES

Shannon & Wilson expects its employees and subcontractor employees to follow the policies and procedures set forth in this document and in the Shannon & Wilson company health and safety program. Employees at all levels of the organization are covered by this requirement and shall not disregard and/or alter policies or procedures herein. In certain cases, deviations to a policy or procedure may be appropriate, but any changes must be justifiable and documented. Changes to this document and Shannon & Wilson’s health and safety program will only be made with prior approval of the Site Safety Officer (SSO).

The health and safety goal on this project, as on all Shannon & Wilson projects, is to experience zero injuries and to remain in full compliance with applicable federal, state, and local health and safety requirements. Accountability for employee health and safety on this project is defined in the following sections.

Project Manager

The Project Manager (PM) has the ultimate responsibility to ensure that the project conforms to contract specifications and that all project activities are conducted safely. The PM can order field activities to be suspended if he/she feels that the project may be jeopardized by not doing so. The PM has the responsibility of coordinating the work with THE CITY OF LA.

Site Safety Officer/Field Representative

The Site Safety Officer (SSO), who may also be Shannon & Wilson’s field representative on site, is responsible for implementing the HASP during the project field tasks. Items that may be implemented for this project include verifying health and safety qualifications of site personnel; obtaining and maintaining documentation of training, monitoring, and site safety notes; enforcing the requirements of the HASP; and conducting site safety meetings. The SSO can order field activities be suspended due to health and safety deficiencies or concerns.

Health and Safety Officer

The Shannon & Wilson Health and Safety Officer (HSO) is responsible for reviewing and approving this plan to ensure it meets the regulatory requirements prior to the commencement of the project, and is consistent with field exploratory guidelines. The HSO also serves as the advisor on health and safety issues to the PM and is a resource to field staff. The HSO will perform regular field inspections during the course of the program to ensure the policies and
procedures outlined in the HASP have been implemented and that project staff are adhering to them.

If conditions change or unexpected events occur during the project, the HSO must approve any proposed changes to the HASP or modification of any procedures that will affect the health and safety of the field staff prior to their implementation in the field. The HSO also has the authority to suspend field activities due to health and safety deficiencies.

Subcontractors

Only trained, experienced drilling and backhoe subcontractors and associated field staff will be used for this project. All personnel on-site will be required to review and understand this HASP. Daily safety meetings will be held in which health and safety issues, such as site access and physical hazards, will be discussed. Topics discussed and attendees at the safety meeting will be documented in the “Daily Meeting Log” form copies of which are located in Appendix B. Subcontractors shall abide by the HASP and direction from the SSO on health and safety matters.

HAZARD EVALUATION ANALYSIS

General

Because this is a geotechnical project, the primary hazards associated with the fieldwork are physical hazards. However, there is some potential for exposure to contaminated sediments and other buried material. Although this exposure potential is considered to be low, this HASP does address the potential chemical hazards that may be encountered on site. The primary physical hazards associated with this project are related to drilling operations. Anticipated physical and chemical hazards associated with this project are summarized in Table 1, Hazard Evaluation Analysis and discussed further in this HASP. Specific hazards associated with confined space entry are discussed further in Appendix E. Many hazards common to each task to be conducted during the project and are addressed in STANDARD OPERATING PROCEDURES section.
<table>
<thead>
<tr>
<th>Description of Task</th>
<th>Potential Hazard</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drilling</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Crushed feet from equipment.</td>
<td>▪ Use steel-toed boots. ▪ Stand in areas outside of auger placement.</td>
<td></td>
</tr>
<tr>
<td>2. Head injury</td>
<td></td>
<td>▪ Wear hard hat. ▪ Watch for overhead objects including augers and swing equipment. ▪ Stay out of fall zone.</td>
</tr>
<tr>
<td>3. Buried utilities</td>
<td></td>
<td>▪ Call Dig Alert and verify with the City of LA personnel. ▪ Verify locations of markings. ▪ Proceed slowing within upper portion of borehole. ▪ Note pavement cuts, drains and location of surface utilities</td>
</tr>
<tr>
<td>4. Noise</td>
<td></td>
<td>▪ Use of ear protection when working within 20 feet of rig.</td>
</tr>
<tr>
<td><strong>Landslide mapping</strong></td>
<td>1. Side wall/graben collapse</td>
<td>▪ Stay out of areas of potential collapse.</td>
</tr>
<tr>
<td>2. Dust</td>
<td></td>
<td>▪ Wear dust mask or half mask with particulate filter if necessary.</td>
</tr>
<tr>
<td><strong>Sampling</strong></td>
<td>1. Finger pinch</td>
<td>▪ Wear protective gloves when handling drive sampler and using tools.</td>
</tr>
<tr>
<td><strong>Surface Logging</strong></td>
<td>1. Vapor Inhalation</td>
<td>▪ Monitor breathing space with PID and 4-gas meter.</td>
</tr>
<tr>
<td>2. Dermatitis &amp; skin irritation</td>
<td>▪ Use protective gloves and clothing, including Nitrile-based, when handling samples.</td>
<td></td>
</tr>
<tr>
<td><strong>Lifting</strong></td>
<td>1. Back Strain</td>
<td>▪ Use proper lifting techniques. ▪ Stretch previous to starting work shift. ▪ Wear back brace to promote proper posture. ▪ Lift with legs. ▪ Ask for help if the load is beyond capabilities or heavier than 50 lbs.</td>
</tr>
<tr>
<td><strong>Description of Task</strong></td>
<td><strong>Potential Hazard</strong></td>
<td><strong>Prevention</strong></td>
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</table>
| Work Zone Movements    | 1. Vehicle Traffic  | ▪ Observe traffic patterns prior to work. Set up cones to create safe zone around equipment.*  
▪ Walk on sidewalk side of equipment if possible.  |
|                        | 2. Slip, Trip, Fall | ▪ Complete initial site walk noting obstructions near bore holes. |

*Establishment and demarcation of a safe work zone shall be coordinated with City of LA.

**Physical Hazards**

Major hazards associated with this project include working on or near operating drill rigs and slip/trip/fall during geologic mapping. Operating drill rigs expose workers to high noise levels, heavy objects and moving machinery. Geologic mapping will require traversing over uneven terrain near vertical and unstable slopes. Workers may also be exposed to falling objects; tripping hazards, exposure to hot or cold weather and the need to lift and carry heavy objects. Workers involved in drilling and trenching in areas of developed properties should also be aware of the possible presence of buried utility lines. The physical risks are listed below:

▪ Crush Hazard  
▪ Pinching Hazard  
▪ Moving Machinery  
▪ Buried Utilities  
▪ Traffic  
▪ Falling Objects  
▪ Slip, Trip, Fall  
▪ Noise  
▪ Weather  

Many of these hazards are discussed below in greater detail. At a minimum, all Shannon & Wilson employees and their subcontractors shall wear modified Level D PPE while on site.

**Noise**

The primary noise source will be the drill rig used during boring activities. Noise exposure is anticipated to be greatest for the persons operating and helping with the drill rig operations. However, all employees working in the vicinity of the equipment (defined as a 20-foot radius) may be exposed to noise in excess of permissible levels. **Hearing protection will be required at all times for personnel working within the 20-foot radius when the drill rig is operational.**
Utilities and Electricity

Electrical safety will be of concern for those above ground activities using equipment or instrumentation that is powered by electricity or that is near the location of overhead electrical lines while drilling. Electrical cords or plugs will be equipped with a ground-fault circuit interrupter. The drill rig mast/derrick must be kept a minimum of 15 feet from overhead electrical lines at all times. Further details regarding standard procedures for work around electric lines are located in the STANDARD OPERATING PROCEDURES section.

For subsurface work, underground utilities/cables must be identified and marked, if applicable, by site personnel knowledgeable about the existence of such utilities prior to the commencement of drilling or other subsurface exploratory work. At a minimum, Dig Alert must be contacted at least 48 hours prior to the beginning of work out side of the street.

Slips/Trips/Falls

While working, care must be taken when moving about the project site. It is likely that there are changes in elevation such as ruts or holes in the ground, broken pavement, berms, edges, etc. Site personnel should be aware of their surroundings on-site to reduce the potential for slip, trip, and fall hazards. One way to increase awareness of any potential trip and fall hazards may be to mark them with a bright flag or marker.

Lifting

The use of some field equipment may involve heavy lifting. To assure personnel safety, the following lifting guidelines will be employed at the site:

- Use two individuals to lift heavy objects.
- Assure steady footing when lifting the load.
- Remind workers to spread their feet no wider than the width of their shoulders when lifting.
- Use only one person to give commands when teams are lifting.
- Lift with legs rather than the back.

Drilling Operations

Heavy equipment, such as drill rigs, present significant hazards to site personnel. The subcontractor responsible for drilling must enforce a safety program providing specific safety
procedures. Site personnel and visitors must be aware of the various hazards associated with the operation of the drill rig. Specifically, personnel should never stand beside, or to the rear of equipment, and should make sure to remain in the line-of-sight of the operator. Also, personnel should stay clear of any rotating equipment or swing zones. Additional analysis of the specific hazards associated with this operation is outlined in Table 2 in PERSONAL EXPOSURE AND PERIMETER MONITORING section.

Chemical Hazards

The soil borings may be located in and near areas associated with fills, landfills and associated wastes. Therefore, it is possible, that some contaminants may be encountered during explorations. Areas on the site may have been used for disposal of waste related to military operations. This may include wood, cement, steel, paint, and solvents. The more volatile portions of paint and solvents are responsible for nervous system effects and skin and eye irritation.

There is a possibility that an inhalation hazard or direct contact hazard may exist with respect to waste on site. It is also possible that contaminated sediments may be collected during drilling and sampling activities during the exploration program. The hazards are reduced by limiting dust-generating activities and by protecting against skin contact with product or contaminated sediment. Thus, personnel will wear modified Level D PPE to reduce contact with potential contaminants. Based on the time of the year this project will occur, exposure via dust generation is considered to be low.

Heavy Metals

Heavy metals can produce a wide variety of harmful effects and symptoms in the human body. Based on the field activities that are planned for this project, there is little likelihood of elevated, airborne, heavy metals concentrations. Heavy metals may be transported via dust particles. Whenever possible, personnel will position themselves upwind of the exploratory activities as an extra precautionary measure. It is possible that skin contact will present a slight health threat. Therefore, personnel will be protected from skin contact with potentially contaminated sediments by wearing Nitrile work gloves.
Volatile Organic Compounds

Historic activities within the studio have involved the use of chemicals or products that contain volatile organic compounds (VOCs). Many VOCs can cause central nervous system depression, irritation, and some are known or suspected carcinogens.

Although the potential for exposure to VOC vapors is considered low, past activities in the project area suggest that an inhalation health threat or direct contact threat may exist with respect to VOC-contaminated sediments during the exploration activities. Routine air monitoring will be performed during the field exploration program, and workers should be aware of the potential hazard and alert to suspicious odors in soil samples. If suspicious odors are noted, workers should move upwind of the drilling operations, notify the SSO or HSO and note air monitoring results with the photoionization detector (PID) and four gas meter. Field staff will wear modified Level D PPE to prevent skin or eye contact with potential contaminants.

Semi-Volatile Organic Compounds (SVOCs)

Historic activities may have used chemicals or products that contain SVOCs, such as solvents or solvent-based products, petroleum hydrocarbons, thinners, and degreasers. SVOCs, which include carcinogenic and non-carcinogenic, polynuclear aromatic hydrocarbons (PAHs), have been associated with increased risk of lung and skin cancers.

Although considered to be low, the primary risk of exposure on this project is through skin contact with contaminated sediments. Nitrile work gloves will be worn to prevent skin contact with potential SVOC contaminants. The likelihood of elevated levels of airborne SVOCs is low, as most SVOCs have a low volatility. However, routine air monitoring will be conducted. If suspicious odors are noted, workers should move upwind of the drilling operations, notify the SSO or HSO and begin air monitoring with a PID. Field staff will wear modified Level D PPE to prevent skin or eye contact with potential contaminants.

GENERAL HEALTH AND SAFETY REQUIREMENTS

Employee Clearance and Site Safety Meetings

Each Shannon & Wilson employee assigned field work described in this HASP must be:

(1) given a personal copy of this HASP by the HSO;
(2) briefed on the health and safety requirements of this HASP by the SSO; and
(3) must acknowledge receipt of and willingness to comply with the provisions of the HASP by signing the attached acknowledgement agreement. Individuals refusing to sign the agreement will not be permitted to conduct field work for this project.

Completed agreements shall be provided to the HSO. Completing the above three items provides an employee with the necessary clearance to perform field work for the project.

Regular daily briefings (tail-gate safety sessions) will be conducted by the SSO or their designated representative. The tailgate sessions will review the safety requirements set forth in this HASP. The session will also provide a forum for field personnel to discuss any additional safety issues and provide recommendations for changes in procedures and updating this HASP. Each tailgate session shall be documented using the form provided in Appendix B.

**Incident Reporting**

If an incident relating to worker health and safety, such as an accident, illness, or unexpected chemical exposure occurs at the project, the Project Manager (PM) or SSO must report the incident to the Corporate Health and Safety Officer using the accident/incident form, (see Appendix C). This form defines the types of incidents which must be reported and the time frame within which these reports must be made. The SSO or HSO shall immediately contact the City of LA in the event of any accident or health and safety incident.

**Prohibited On-site Activities**

The following are prohibited on-site activities:

- Operating motor vehicles without a valid driver’s license;
- Operating a motor vehicle after consuming alcohol or other controlled substance; and
- Smoking while operating equipment, within a 10 foot radius of the borehole, or anytime hazardous vapors are suspected.

**SITE SPECIFIC HEALTH AND SAFETY REQUIREMENTS**

**Special Medical Tests**

Special medical tests will not be required for any of the work activities proposed in this HASP other than those required for respirator use.
Special Training

Field personnel involved in collecting samples for environmental analysis will have a current 40-hour Hazardous Materials Safety Course Certificate [OSHA 1910.120(e)(8)]. Heavy Equipment Operators will be required to submit to the City of LA any applicable training documentation relative to their area of operational expertise. This may include Cal/OSHA 10 Hour training certificates.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

To protect personnel from potential site-health and safety hazards, minimum PPE requirements have been established. These requirements do not preclude the need to conduct air monitoring, nor do they preclude the need to amend PPE requirements as conditions warrant. Any amendment to the minimum PPE requirements must first be approved by the HSO. Site personnel, at their own discretion, may increase, but not decrease, the degree of respiratory protection and PPE used.

Personal Protective Equipment Designations

The minimum PPE requirements depend on the specific type of activity being performed. These PPE requirements are identified using designations similar to those defined by the Environmental Protection Agency (EPA) as EPA Level A, EPA Level B, EPA Level C, and EPA Level D. EPA Level A, B, or C is not anticipated for the current scope of work. A slight deviation from EPA's Level D will be used during drilling and sampling activities; therefore, the term "modified" shall be used. PPE shall meet the current American National Standards Institute (ANSI) standards.

Modified Level D PPE Requirements

- Work uniform or at a minimum long pants and long sleeve shirt shall be worn by field staff
- Steel-toed boots
- Work gloves
- Hearing protection (when required)
- Hard-hat
- Safety glasses
- High visibility traffic vest
As indicated previously, there is a potential for exposure to hazardous waste/materials during the course of this project. The primary hazards associated with the drilling operations are potential contaminant exposure, and various physical hazards. With the use of appropriate PPE, air monitoring equipment, awareness, and first aid/emergency response equipment, these hazards should be kept to a minimum.

**Task-Specific Personal Protective Equipment Requirements**

Based on the location and conditions of the site, modified Level D PPE will provide adequate protection for surface drilling and test pit activities and general site entry as discussed above. For down-hole logging procedures, the activities will require the use of Level B PPE per the request of the City of LA. This will primarily consist of Level D PPE plus the use of a supplied air respirator as outlined below.

- Positive pressure, full-face supplied air respirator with escape SCBA (NIOSH approved)
- Coveralls
- Gloves
- Boots
- Hard hat
- Eye Protection

**Drilling and Soil Sampling Activities**

Drilling and soil sampling activities will be performed with a minimum PPE requirement of Modified Level D. Should suspicious odors be detected during drilling and sampling activities, the SSO must be contacted and air monitoring should be verified with a PID. If PID measurements indicate readings above the **action levels specified in Table 2**, an upgrade to Modified Level C may be required. Appropriate decontamination of equipment, tools, and personnel prior to leaving the Exclusion Zone will be performed to reduce the potential for cross-contamination. In the event that unusual soil or waste material is identified during drilling or actionable atmospheric monitoring concentrations are detected, the City of LA shall be notified and work is to stop until the City of LA and the SSO determine it's safe and appropriate to proceed. In the event drilling activities are not completed at shift's end, the boring will be covered with a traffic-rated steel plate or ¾” plywood sheet with the bucket or auger placed on the cover to prevent removal. Removal of the plate should be performed with non-sparking attachment devices if the presence of gas or other combustibles is suspected.
Site Visit/Site Survey

A minimum of modified Level D PPE will be required for any personnel in the work areas during site visits.

Decontamination Activities

The minimum level of PPE required for personnel performing decontamination activities is Level D. If a change in site conditions warrants personnel to don higher than Level D PPE, the same level of PPE will be donned during decontamination activities.

PERSONAL EXPOSURE AND PERIMETER MONITORING

Perimeter Air Monitoring

Perimeter and location-specific (over the borehole) monitoring will be routinely performed during the drilling activities on with the boundaries of the abandoned military base, due to the potential for airborne vapor hazards. The air monitoring equipment shall be calibrated in accordance with the manufacturer's guidelines on a daily basis prior to the start of that day's field activities.

Monitoring of the air within the work zone should be performed at 5-foot depth intervals during above ground drilling activities. However, if at any time airborne concentrations are detected above the action levels, monitoring frequency will be increased. If sustained elevated levels are detected by the meter(s), workers will either evacuate the area for a sufficient period of time to allow the concentrations to return to normal, or the decision to upgrade the level of PPE will be made. If actionable concentrations of monitored gases are identified and do not return to normal concentrations within a reasonable amount of time, evacuate and secure the area, call 911 and notify the HSO or PM, and the City of LA immediately.

There is a low potential that contaminants present in the sediments could pose an airborne particulate concern, however, efforts will be taken to minimize the visible dust generated during the project. As long as there is no visible dust present, perimeter dust monitoring will not be performed.

Personal Exposure Monitoring

No personal exposure monitoring will be performed during the drilling and sampling activities on this project. If new information concerning the presence of contamination is discovered
during these activities, the HASP will be revised, and depending on the type and frequency of contaminants identified, personal exposure monitoring may be implemented.

**TABLE 2 - ACTION LEVELS**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Action Level</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂S “Hydrogen Sulfide” (4 Gas Meter)</td>
<td>10 ppm</td>
<td>Clear Drilling Area by 10 feet minimum. Retest site after 2 minutes.</td>
</tr>
<tr>
<td>O₂ “Oxygen” (4 Gas Meter)</td>
<td>Below 19.8% in breathing zone</td>
<td>Clear Drilling Area by 10 feet minimum. Retest site after 2 minutes.</td>
</tr>
<tr>
<td>CO “Carbon Monoxide” (4 Gas Meter)</td>
<td>35 ppm in breathing zone</td>
<td>Clear Drilling Area by 10 feet minimum. Retest site after 2 minutes.</td>
</tr>
<tr>
<td>Combustibles (4 Gas Meter)</td>
<td>10% of Lower Explosive Limit (LEL)</td>
<td>Clear Drilling Area by 10 feet and turn off motor. Retest site after 2 minutes.</td>
</tr>
<tr>
<td>Volatiles (PID)</td>
<td>50 ppm</td>
<td>Clear Drilling Area by 10 feet minimum. Retest site after 2 minutes.</td>
</tr>
</tbody>
</table>

**STANDARD OPERATING PROCEDURES**

The standard operating procedures (SOPs) in this section describe the required actions common to the project. These SOPs describe precautions or procedures that are required of personnel involved in any of the field activities.

**Site Guidelines**

The following are general guidelines, which shall be followed during all on-site field activities:

- If the 4-gas/PID meter detects elevated levels of methane, hydrogen sulfide, or VOC gas during the field activities, the work shall stop and all field staff will move up wind of the location until either the levels have decreased to normal (relative to the background reading obtained prior to the start of the project) or alternative engineering or administrative controls have been implemented to lower the levels.
- Maintain line-of-sight with the drill rig operator during drilling operations.
- Personnel shall be properly trained in accordance with federal and state regulations and copies of the applicable training certificates should be present at the job site.
- Personnel shall wear the proper PPE selected for each work task.
- All PPE shall be inspected prior to and after wearing. Any defective or damaged PPE shall be tagged as prohibited for use and removed from the site for either repair by an authorized person or destroyed.
- No contaminated tools or sampling equipment are allowed outside the immediate work area.
- No eating, drinking, chewing of tobacco, or smoking in areas that are suspected of being contaminated.
- In the event PPE is ripped or torn, remove the damaged PPE from the site and replace as soon as possible.
- Be alert to any unusual changes in your own condition; never ignore warning signs.
- IMMEDIATELY notify the PM or HSO of any accidents or near misses.
- Be familiar with the site's emergency response procedures and routes of escape.
- Always note the wind direction. Personnel shall remain upwind whenever possible during on-site activities.
- Never climb over or under obstacles that would endanger you or others.
- Hands and face should be thoroughly washed before eating, drinking, or using the restrooms.

Confined Space Entry

The planned work activities for this project will involve entry into confined spaces. A complete Confined Space Entry Plan relative to the proposed scope of work is attached in Appendix E.

Fall Protection

The planned work activities for this project will not require the use of fall protection equipment or a written plan other than that outlined in the Confined Space Entry Plan.

Electrical Safety

Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if personnel or equipment contact them during site operations. Utility locate activities, electrical equipment used on site, and lightning may also pose a hazard to site personnel. The following procedures have been developed to reduce these potential electrical hazards.
- Low-voltage equipment with ground-fault circuit interrupters and water-tight, corrosion-resistant connecting cable should be used on site.
- Electrical cords should be inspected for wear daily.
- Electrical cords should be placed so that heavy equipment or repetitive wear is avoided.
- Weather conditions should be monitored and work should be suspended during electrical storms. Equipment operation should be halted and personnel are to maintain at least a 20-foot distance from equipment in the event of a lightning storm.
- During drilling and trenching activities, the equipment will be separated by at least 15 feet from any overhead power transmission lines.
- To prevent contact with buried utility lines, the PM or his/her designee must contact local representatives of the telephone, electric, gas companies and other buried utilities to have buried lines located and marked. All contact with utility representatives must be documented.

**Illumination**

Night work is not anticipated during this project. However, the following procedures should be implemented if work is extended into the night. The work area and support zones shall be illuminated with a minimum of 5 foot-candles of artificial light. Locker rooms, restrooms, and changing areas shall have a minimum of 10 foot-candles of light.

**Motorized Equipment**

Motorized equipment includes drill rigs, backhoes, trucks, and automobiles. It is important to remember that the load being handled, dusty conditions, complicated terrain or other equipment may obscure the operator's visibility. The following procedures have been developed to reduce and/or eliminate these potential hazards.

- Site personnel must make their presence known.
- Back-up alarms are required on all equipment, per OSHA requirements in 29 Code of Federal Regulations (CFR) 1926.602(a) (9).
- Operators must stay in moving equipment and wait until it stops before getting off.
- Personnel must be aware of rotating equipment. Do not wear loose clothing or jewelry. Tie long hair back.
- Observe traffic patterns and stay out of the way (minimum of 3-foot distance from the perimeter of the traffic control zone must be maintained at all times). Drill rigs and employee vehicles should be marked with orange traffic cones.
Assure equipment is in working order. Equipment will be checked daily as per OSHA requirements in 29 CFR 1926.601(b) (14).

Pedestrian Traffic Control

Because the work covered by this HASP will take place in a public park low-volume pedestrian traffic is anticipated. Staff should be aware of persons approaching the rig. Safety tape should be erected around rig working area when working outside of fenced area.

DECONTAMINATION

Direct contact with pure contaminants or hazardous materials/waste is not anticipated. Therefore, decontamination of site personnel or equipment is not anticipated. If contact with contaminants or hazardous materials/wastes does occur, the following decontamination steps should be followed.

- Step 1: Scrub boots with soap and water, or remove outer boot covers.
- Step 2: Remove hard-hat and wipe clean.
- Step 3: Remove gloves or any other clothing that was in contact with the contaminated media, place inside doubled, heavy-duty garbage bags or steel drums for proper disposal.
- Step 4: Depart the work area.
- Step 5: Wash hands, face, and neck before breaks and lunch.

EMERGENCY RESPONSE AND ACCIDENT PREVENTION

In the event of an emergency, personnel shall move to an area clear of the drilling rig. The SSO will evaluate the nature of the injury or emergency and will determine the appropriate actions to take. As soon as possible, the HSO/PM will be notified. First aid treatment other than for minor cuts or abrasions should be administered by the medical staff located at the nearest hospital shown in Appendix D or by emergency response personnel. See Appendix D for a map showing the locations of the nearest hospitals in the project area. Police, fire, or medical assistance can be summoned by calling 911. Each Shannon & Wilson employee shall have a cellular phone on their person while working on site.
Emergency Equipment

Emergency equipment including first aid kits will be located in the employee’s vehicle. The equipment will be readily available in the event of an accident and all site personnel will be aware of its location prior to the start of work.

- First aid kit with enough supplies adequate for the number of site personnel.
- A mobile telephone.

Contacts

The personnel listed in Table 3 are the primary points of contact for health and safety related matters at the site. These personnel are also the points of contact to be notified in the event of an accident or incident.

<table>
<thead>
<tr>
<th>Contact</th>
<th>Name</th>
<th>Telephone</th>
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<tr>
<td>City of Los Angeles Contact</td>
<td>Craig Kunesh</td>
<td>213-847-0504</td>
</tr>
<tr>
<td>Project Engineer (PM)</td>
<td>Travis Deane</td>
<td>818-539-8409</td>
</tr>
<tr>
<td>Health and Safety Officer (HSO)</td>
<td>Dean Francuch</td>
<td>818-237-6604</td>
</tr>
</tbody>
</table>

Accident/Incident Reporting

Accidents and/or near-miss incidents shall be reported, treated, investigated, and mitigated as soon as possible. Accidents or near-miss incidents that occur on site will be reported immediately to the PM/HSO. The HSO will investigate the accident or near-miss incident and complete the Accident/Incident Field Report Form located in Appendix C. The cause shall be removed from site or isolated/demarcated to reduce the hazard(s) and the chance of a re-occurring accident or near-miss incident. The HSO will notify the PM within 24 hours of an accident or near-miss incident.

TRAINING

It is Shannon & Wilson’s policy to require all personnel on site to have completed the applicable training for the tasks to be performed as required by the applicable OSHA Regulations. All personnel entering the site shall receive site-specific Hazard Communication training and shall be familiar with this HASP. Site-specific training shall include at least:
• the description of chemical and physical hazards associated with the project;
• site control, monitoring, and standard operating procedures that are applicable to the project;
• location of emergency response equipment;
• accident/incident procedures; and
• the location of the nearest hospital.

Acknowledgement of these requirements shall be documented by signing the Acknowledgement Form located in Appendix A. Personnel operating heavy equipment (drill rig) shall be properly trained and shall provide proof of this training, if requested and records are available. Training requirements for site personnel will be reviewed by the PM/HSO to assure compliance with this HASP.

An initial (pre-entry) safety meeting will be held prior to the start of on-site work. This safety meeting will be documented (see Appendix A), and any questions about the HASP will be answered. In addition, the pre-entry safety meeting will review site safety rules and prohibitions, the location of emergency equipment such as eye wash stations and fire extinguishers, escape routes, accident reporting, directions to the nearest medical facilities, how to summon medical assistance, and PPE requirements for the specific tasks. This safety training should enable site personnel to perform their work in a safe manner.

Safety meetings will be held daily at the beginning of each shift. These meetings are conducted to review pertinent aspects of site operations and to establish safe working procedures for those operations. All field staff will be required to sign the Daily Safety Meeting Log in Appendix B or in the field logbook. If determined necessary, additional safety meetings will be held to address deficiencies noted or procedural improvements that could be made based on the previous day’s activities. All safety meetings will be documented.

**MEDICAL SURVEILLANCE AND RECORDKEEPING**

The tasks to be performed during this project are not anticipated to encounter or generate airborne contaminants that are in excess of established permissible exposure limits (PELs) or that will be toxic to human health. However, should air monitoring data or environmental data provided by others indicate concentrations of airborne contaminants above established PELs, workers experience symptoms of over-exposure, or site workers are required to don Level C...
PPE, then medical surveillance requirements (as outlined by CAL OSHA) will be implemented and this HASP will require modification prior to additional work being initiated.

The safety and health-related records or logs that are required to be maintained at the site or verified prior to personnel working at the site include:

- Pertinent training records for all personnel.
- Accident/Incident reports.
- Employee/visitor register (may be part of logbook).
- SSO field and safety meeting notes and site inspection records.
- Environmental and employee exposure monitoring records (if required).

As required, these records will be maintained on site during work hours.

Questions regarding this Health and Safety Plan should be referred to Dean Francuch at 818-539-8410 or 818-237-6604.

SHANNON & WILSON, INC.

Dean G. Francuch, C.E.G.
Health and Safety Officer
DGF:JL/ady
APPENDIX A

SITE-SPECIFIC HEALTH & SAFETY ACKNOWLEDGEMENT FORM
I have read the Site-Specific Health & Safety Plan and understand the hazards, precautions required, and responsibilities involved in working at this site.

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APPENDIX B

DAILY MEETING LOG
**DAILY MEETING LOG**

**Project Name:** __________________________________________ **Date:** ____________

**Field Representative(s):** ________________________________

**Work Site Location:** ______________________________________

**Physical Hazards:** ________________________________________

__________________________________________________________

**Chemical Hazards:** ______________________________________

__________________________________________________________

**Safety Equipment on Site:** ________________________________

**Personal Protection Levels and Specific Equipment:**

__________________________________________________________

**Nearest Medical Facility:** ________________________________

**First Aid Location:** ________________________________

**Fire Suppression Device:** ________________________________

**Spill Kit:** ________________________________

**Emergency Phone Numbers:** ________________________________

**Emergency Evacuation Route:** ________________________________

The above hazards and controls have been adequately explained to me.

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**Site Safety Officer:** ________________________________ **Project Manager:** ________________________________

**Checked By:** ________________________________ **Date:** ________________________________
DAILY MEETING LOG

Project Name: ___________________________ Date: __________
Field Representative(s) ___________________________
Work Site Location ___________________________
Physical Hazards ___________________________

Chemical Hazards ___________________________

Safety Equipment on Site ___________________________
Personal Protection Levels and Specific Equipment ___________________________

Nearest Medical Facility ___________________________
First Aid Location ___________________________
Fire Suppression Device ___________________________
Spill Kit ___________________________
Emergency Phone Numbers ___________________________
Emergency Evacuation Route ___________________________

The above hazards and controls have been adequately explained to me.

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Site Safety Officer: __________________ Project Manager ___________________________

Checked By: __________________ Date __________________
DAILY MEETING LOG

Project Name: ____________________________ Date: ____________
Field Representative(s) ________________________________________
Work Site Location ____________________________________________
Physical Hazards ______________________________________________
__________________________
__________________________
__________________________
Chemical Hazards

Safety Equipment on Site ________________________________________
Personal Protection Levels and Specific Equipment __________________

Nearest Medical Facility ________________________________________
First Aid Location ______________________________________________
Fire Suppression Device _________________________________________
Spill Kit ______________________________________________________
Emergency Phone Numbers ________________________________________
Emergency Evacuation Route ______________________________________

The above hazards and controls have been adequately explained to me.

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Site Safety Officer: __________________ Project Manager ___________________

Checked By: __________________ Date __________________
APPENDIX C

ACCIDENT/INCIDENT FIELD REPORT FORM
ACCIDENT/INCIDENT REPORT FORM
(Filled out by Project Manager or employee, given to HSO/SSO, filed in employee's H&S record file)

Person notified
(Ex: Site Mgr, HSO, SSO, or Project Manager)
Name of ill or injured person: _____________________________________________________
Date:__________ Time:____________ Supervisor: ____________________________________
Site Name and Location: _________________________________________________________
Weather (clear, rain, snow, etc.): ___________________________________________________
Nature of illness/injury: __________________________________________________________
______________________________________________________________________________
Symptoms:____________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
Action Taken: Time off ________ First Aid________ Medical _______ Oxygen________
________________________
Transported by: ________________________________________________________________
Witnessed by: _________________________________________________________________
Facility treating (Hospital's name): _________________________________________________
Treatment: ____________________________________________________________________
Comments: ____________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
What was the person doing at the time of the accident/incident? __________________________
______________________________________________________________________________
Personal protection clothing worn and equipment used: _________________________________
______________________________________________________________________________
Cause of accident/incident: _______________________________________________________
______________________________________________________________________________
What immediate action was taken to prevent reoccurrence? _____________________________
______________________________________________________________________________
Additional comments: ___________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
Reporting Employee's Signature  Date   Supervisor's Signature   Date
APPENDIX D

HOSPITAL ROUTE MAP
<table>
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<tbody>
<tr>
<td>1.</td>
<td>Head <strong>west</strong> on W Paseo Del Mar toward <strong>Kay Fiorentino</strong>&lt;br&gt;This road is temporarily closed</td>
</tr>
<tr>
<td></td>
<td>go 0.4 mi&lt;br&gt;total 0.4 mi</td>
</tr>
<tr>
<td>2.</td>
<td>Continue onto <strong>S Western Ave</strong>&lt;br&gt;About 2 mins</td>
</tr>
<tr>
<td></td>
<td>go 1.0 mi&lt;br&gt;total 1.4 mi</td>
</tr>
<tr>
<td>3.</td>
<td>Turn right onto <strong>S Dodson Ave</strong>&lt;br&gt;About 2 mins</td>
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<tr>
<td></td>
<td>go 0.6 mi&lt;br&gt;total 2.0 mi</td>
</tr>
<tr>
<td>4.</td>
<td>Continue onto <strong>W 7th St</strong>&lt;br&gt;Destination will be on the left&lt;br&gt;About 1 min</td>
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<td>go 0.3 mi&lt;br&gt;total 2.4 mi</td>
</tr>
<tr>
<td></td>
<td>1300 W 7th St, Los Angeles, CA 90732</td>
</tr>
</tbody>
</table>

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2011 Google

Directions weren’t right? Please find your route on maps.google.com and click “Report a problem” at the bottom left.
APPENDIX E

CONFINED SPACE ENTRY PLAN
Health and Safety Document
Confined Space Entry Plan

Prepared for

Paseo Del Mar Landslide
White Point Nature Preserve
1600 W. Paseo Del Mar
San Pedro, California
Drilling Exploration Program
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1.0 INTRODUCTION

The hazards encountered and associated with entering and working in confined spaces are capable of causing bodily injury, illness, and death to the worker. Accidents occur among workers because of failure to recognize the potential hazards that are present in confined spaces. It should therefore be considered that the most unfavorable situation is possible whenever entry occurs and that the danger of engulfment, entrapment and the development of a hazardous atmosphere are present at the onset of entry.

The Federal Occupational Safety and Health Administration (OSHA) and the California Occupational Safety and Health Administration (Cal-OSHA) have developed special confined space regulations. These regulations are contained within the Code of Federal Regulations (CFR), Title 29, Sections 1910.146, 1926.552, and 1926.650-52 of the Safety and Health Regulations for Construction, and the more stringent California Code of Regulations (CCR), Title 8, Section 5158 of the General Industry Safety Orders. Additional regulations promulgated by Cal-OSHA are described in Title 8 CCR Sections 1539-1542 of the Construction Safety Orders. These sections of the Title 8 regulations include provisions for entry into excavations and exploration shafts (confined spaces) by geotechnical specialists [e.g., Section 1542(d)].

This Confined Space Entry document has been written specifically for downhole bucket auger drilling and test pit logging activities, which are typically conducted for geotechnical studies on hillside developments in southern California. This training document and confined space entry training and other emergency training activities (e.g., first aid, CPR, etc.) comprise the Confined Space Entry Program for the project.

2.0 PURPOSE AND SCOPE OF WORK

The proposed scope of work for this project includes confined space entry into exploration shafts and excavations for the purpose of gathering geotechnical information. Prior to each project phase that includes an entry into an excavation or exploration shaft considered a confined space, the project team will confirm that all pertinent workers have completed Confined Space Entry Training. Confined space entry will be performed by trained and authorized personnel only and in accordance with all applicable Cal-OSHA regulations.

The purpose of this document is to identify all confined spaces specific to the project, and to develop and implement in a written format, a Confined Space Entry Training so that all employees who perform confined space entry work acquire the understanding, knowledge, and skills necessary for the safe performance of assigned duties.

This plan is intended to supplement the Confined Space Entry Program (CSEP). Employees, subcontractors, site visitors, and other authorized personnel who enter the work areas are subject to the provisions of the training. Training shall be provided to each employee before first assigned duties and whenever there is a change in permit space operations or duties that presents a hazard for which an employee has not previously been trained. Additionally, training will be provided whenever the employer has reason to believe either that there will be deviations from
the standard permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.

Completion of this training shall establish employee proficiency in the duties required and shall introduce new or revised procedures, as necessary. Certification of employee training shall be available for inspection by employees and their authorized representatives and shall contain each employee's name, the signatures or initials of the trainers, and the dates of training.

3.0 GLOSSARY OF TERMS

The following definitions provide additional information regarding trenching and exploration shafts to supplement confined space definitions provided in the Confined Space Entry Program.

Accepted engineering practices - those requirements which are compatible with standards of practice required by a registered professional engineer.

Air-purifying respirator (APR) - a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Aluminum hydraulic shoring - a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole - a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system) - a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Bucket auger - a tool used to drill a large-diameter borehole, typically 18-30 in. (460-760mm) in diameter, in which cuttings accumulate in a hollow, cylindrical bucket and are brought to the ground surface by lifting the drill tools out of the hole. Bucket-auger borings are large enough to permit geologists or geotechnical specialists to enter the borehole, on a plate or in a cage suspended from a cable operated from the drill, for direct observation of subsurface conditions exposed in the borehole wall.

Cave-in - the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Crossbraces - the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.
Dangerous air contamination - an atmosphere presenting a threat of causing death, injury, acute illness, or disablement due to the presence of flammable and/or explosive, toxic, or otherwise injurious or incapacitating substances.

Excavation - any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or sidewalls - the vertical or inclined earth surfaces formed as a result of excavation work.

Failure - the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Full body harness - a harness that is constructed in such a way that a person wearing it can be lifted upright from the shaft in an emergency situation. It is connected to a safety lanyard which is attached to the load line.

Geotechnical specialist - a person registered by the State as a Certified Engineering Geologist, or a Registered Civil Engineer trained in soil mechanics, or an engineering geologist or civil engineer with a minimum of 3 years applicable experience working under the direct supervision of either a Certified Engineering Geologist or Registered Civil Engineer.

Hazardous atmosphere - an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kickout - the accidental release or failure of a cross brace.

Multi-gas monitor - a monitoring device used to perform atmospheric tests measuring combustible, flammable, and toxic gas concentrations as well as for oxygen concentrations within a confined space.

PEL - Permissible Exposure Limit.

Personnel cage - an enclosed structure which is used to convey personnel into and out of drilled shaft excavations.

Protective system - a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp - an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered professional engineer - a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any
state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

**Supplied-air respirator (SAR or airline respirator)** - a purified atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

**Seepage zones** - isolated zones observed within the sidewalls of an excavation or shaft where subsurface water is observed.

**Sheeting** - the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

**Shield (Shield system)** - a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with Section 1541.1(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

**Shoring (Shoring system)** - a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

**Sidewalls** - see "Faces."

**Sloping (Sloping system)** - a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

**Spalling** - chipping, fragmentation, or flaking from a piece of stone or ore.

**Squeezing** - the inward movement of the sidewalls of a borehole, usually associated with soft saturated silts and clays.

**Stable rock** - natural, solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

**STEL** - Short Term Exposure Limits.

**Structural ramp** - a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

**Support system** - a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.
Tabulated data - tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation) - a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box - see "Shield."

Trench shield - see "Shield."

TWA - Time Weighted Average

Uprights - the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

Wales - horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

4.0 IDENTIFICATION OF CONFINED SPACES

On the project, exploration shafts and trenches are identified as confined spaces and only geotechnical specialists, either registered geotechnical engineers or certified engineering geologists are permitted to enter. Prior to their excavation, Cal-OSHA will be notified in accordance with Title 8 CCR Section 341.

All exploration shafts and trenches will be considered "high-hazard" confined spaces at all times, regardless of the atmospheric testing results. A confined space entry form will be required to record that appropriate safety checks and continuous atmospheric monitoring is performed.

5.0 CONFINED SPACE HAZARDS

Two primary types of hazards within confined spaces are described in the Health and Safety Plan are atmospheric hazards and physical hazards.

This section describes in greater detail how work performed in trench excavations and exploration shafts can expose workers to these hazards, and explains how to minimize these hazards.
5.1 Atmospheric Hazards

The presence of dangerous air contamination or an atmosphere lacking adequate oxygen is a serious hazard for workers in confined spaces. Controls in minimizing this hazard include purging the confined air space, atmospheric testing and observing and monitoring of both the confined space and the confined space worker.

5.1.1 Purging the Confined Air Space

All borehole shafts shall be purged of hazardous or potentially hazardous air prior to entry. All shafts shall be thoroughly and continuously ventilated by use of fans, blowers or vacuums, which will produce a continuous movement of uncontaminated air through the confined space. This may be accomplished by blowing fresh air in to the space or by drawing air out of the space. Typically for bucket auger boreholes purging is accomplished by vacuum methods by placing a two-inch diameter hose with the opening near the bottom of the borehole and drawing air by use of an industrial grade air pump.

5.1.2 Atmospheric Testing

Before entering a confined space, initial atmospheric monitoring must be performed to confirm the space adequately satisfies standards of worker safety. The Confined Space Entry Program discusses the hazards associated with oxygen depletion/enrichment, and the presence of toxic and flammable and/or explosive gasses and are applicable to this section. Prior to field work, it is important to research the site for utility location, geologic reports, environmental issues and any previous logs of borings. This research will provide an idea of the type of atmospheric hazards one may encounter. The following gives the Permissible Exposure Limits or PEL's for some of the more common atmospheric contaminants that are encountered during drilling and excavation activities.

<table>
<thead>
<tr>
<th>Test</th>
<th>Permissible Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>19.5% to 23.5%</td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>Under 25 ppm</td>
</tr>
<tr>
<td>Lower Flammable (Explosive) Limit (LFL/LEL)</td>
<td>Under 10% of LEL/LFL</td>
</tr>
<tr>
<td>Hydrogen Sulfide (H₂S)</td>
<td>Under 10 ppm</td>
</tr>
<tr>
<td>Aromatic Hydrocarbon</td>
<td>Under 5 ppm</td>
</tr>
</tbody>
</table>
It is important to note that if any of the listed contaminants is suspected to be present at the site, the multi-gas monitoring instrument should be able to read that specific contaminant. Atmospheric testing is usually performed with a multi-gas monitoring instrument such as a Rae Systems Multi-Rae Plus or an RKI Instruments GX-2009 (shown in Figure 5-1). Typically, these instruments monitor for atmospheric oxygen levels, combustible gasses such as methane, and the toxic gasses carbon monoxide and hydrogen sulfide. Some instruments have a built-in photo-ionization detector that can detect volatile organic compounds as well. These instruments can however, be calibrated to test for other specified contaminants. This is typically not done in the field but rather prior to field work with specialized calibration gas. Prior to field work, a current record of calibration should be obtained and workers should become familiar with operating the chosen instrument.

![Multi-Gas Monitoring Instruments](image)

**Figure 5-1: Examples of Multi-Gas Monitoring Instruments**

Prior to entry into a confined space the space should be tested throughout the entire space, both laterally and with depth. For exploration shafts this can be accomplished by attaching the monitor onto the personnel cage and lowering it to the bottom of the borehole. The instrument contains a data-logger and will record and recall the highest and lowest levels encountered during the exposure period. Additionally, pre-set alarms will sound if exceeded, typically these are set for short-term exposure limits (STEL) or for time-weighted average (TWA) levels. Prior to field work, check to see that these are set appropriately.

After initial testing, continuous monitoring will be performed during confined space work and recorded on the Confined Space Entry Form.

**5.1.3 Observation and Monitoring**

In addition to initial testing and monitoring it is very important that the role of the confined space attendant is well understood. The attendant should have a sharp awareness of the site conditions and the physical status of the entrant. The attendant should also keep frequent communication with the entrant before, during and immediately after entry for monitoring purposes. The entrant should be able to answer the following questions:

- How did the entrant feel prior to entry? Did he/she have a headache? Was he/she properly hydrated? Was he/she tired? Alert?
- What were the excavation cuttings like? Was there fresh or unoxidized cuttings that could potentially deplete oxygen in the confined space?
- Was there an abundance of organic material in the cuttings?
- Are there pipelines or any hazardous substances in the vicinity? Were there odorous soils during the excavation?
- Is the entrant taking longer than usual?
- Is the entrant communicating often enough?
- Is the entrant's behavior changing?
- How does the entrant feel during entry? After entry?
- Were lifeline connections properly connected?

The following contaminants are discussed in the Confined Space Entry Program and are reemphasized here to reiterate the symptoms that may develop and may be an indication of an atmospheric hazard.

*Carbon monoxide* is one of the most common asphyxiants. Produced by the incomplete combustion of carbon fuels, carbon monoxide kills by chemically combining with the hemoglobin in red blood cells. This greatly reduces the ability of the blood to carry oxygen to body tissues and brain cells.

<table>
<thead>
<tr>
<th>Concentration (ppm)</th>
<th>Physical Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>Permissible Exposure Limit during an eight-hour shift.</td>
</tr>
<tr>
<td>500</td>
<td>Slight headache.</td>
</tr>
<tr>
<td>1000</td>
<td>Confusion, nausea, discomfort.</td>
</tr>
<tr>
<td>2000</td>
<td>Tendency to stagger.</td>
</tr>
<tr>
<td>2500</td>
<td>Unconsciousness after a 30-minute exposure.</td>
</tr>
<tr>
<td>4000</td>
<td>Fatal in less than one hour.</td>
</tr>
</tbody>
</table>

Some of the symptoms listed above can appear quite normal, and the worker regarded as simply having an off day, not feeling great or a bit clumsy. This is why it is important to pay attention to any changes in behavior or wellness.

*Hydrogen sulfide* is even more toxic than carbon monoxide. It is produced through the decay of organisms and natural materials. This colorless gas has a characteristic rotten egg odor at first; however, within a short time the gas paralyzes the olfactory nerve, which controls the sense of smell. A worker may be lulled into a false sense of security because they no longer smell the substance, yet it is causing serious bodily harm (higher concentrations).
Table 3 - HYDROGEN SULFIDE EXPOSURE EFFECTS

<table>
<thead>
<tr>
<th>Concentration (ppm)</th>
<th>Physical Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Permissible Exposure Limit during an eight-hour shift.</td>
</tr>
<tr>
<td>50-100</td>
<td>Mild eye and respiratory irritation.</td>
</tr>
<tr>
<td>200-300</td>
<td>Marked increase in eye and lung irritation.</td>
</tr>
<tr>
<td>500-700</td>
<td>Unconsciousness or death after a 30-minute exposure.</td>
</tr>
<tr>
<td>1000+</td>
<td>Death within minutes.</td>
</tr>
</tbody>
</table>

5.2 Physical Hazards

5.2.1 Engulfment and Entrapment

There are many physical hazards that endanger life and health within the confines of an exploration shaft or trench excavation. Many of the hazards can be minimized with good housekeeping and operational procedures, however, two of the most dangerous hazards of confined space entry work rely heavily on the confined space worker's ability to identify problematic conditions. These extremely dangerous and potentially life-threatening situations are entrapment and engulfment caused by cave-ins within a borehole or trench. This section will help the confined space worker to more easily identify some of the most common problematic conditions (See Figure 5-3) and to develop a system of characterizing the geologic conditions with respect to hazards.

Literature Review - Review any available reports, maps and logs pertaining to the project site. You will likely be able to find information on local geology and faults, however, you may also find previous reports containing boring or trench logs.

Pre-Entry Stability Assessment - Only authorized personnel will be allowed to enter a geotechnical exploration trench or borehole excavation. Prior to entry, an onsite competent person (i.e. geotechnical specialist) will determine if there is a potential for cave-in and what, if any, protective system is needed. The appropriate protective system based on soil/rock classification will be designed by either sloping, benching and/or shoring the walls to achieve a safe trench or borehole based on the soil classification or rock type (see CCR 1541 Appendices A-F).

All exploration shafts will be classified as high-hazard confined spaces and only a geotechnical specialist shall be permitted to enter without lagging, spiling or casing for the purpose of down-hole logging (see Title 8 CCR Section 1542 as noted below). Only geotechnical specialist shall be permitted to enter an exploration shaft without lagging, spiling or casing for the purpose of subsurface investigations under the following conditions:

(1) Initial Inspection. The type of materials and stability characteristics of the exploration shaft shall be personally observed and recorded by the geotechnical
specialist during the drilling operation. Drilling conditions that may indicate areas of concern within the borehole will be discussed by the drill crew and geotechnical specialist and will be carefully considered prior to entry. Potentially unsafe exploration shafts shall not be entered.

(2) **Surface Casing.** The upper portion of the exploration shaft shall be equipped with a surface ring-collar to provide casing support of the material within the upper 4 feet of the exploration shaft. The ring-collar shall extend at least 1-foot above the ground surface.

(3) **Gas Tests.** Prior to entry into exploration shafts, tests and/or procedures shall be instituted to assure that the atmosphere within the shaft does not contain dangerous air contamination or oxygen deficiency. These tests and/or procedures shall be maintained while working within the shaft to assure that dangerous air contamination or oxygen deficiency will not occur.

(4) **Unstable Local Conditions.** The geotechnical specialist shall not descend below any portion of any exploration shaft where caving or groundwater seepage is noted or suspected.

(5) **Ladder and Cable Descents.** A ladder may be used to inspect exploration shafts 20 feet or less in depth. In deeper exploration shafts, properly maintained mechanical hoisting devices with a safety factor of at least 6 shall be provided and used. Such devices shall be under positive control of the operator being positive powered up and down with fail-safe brakes.

(6) **Emergency Stand-by Employees.** A minimum of three emergency standby employees shall be positioned at the surface near the exploration shaft opening whenever a geotechnical specialist is inside the shaft. The emergency stand-by employees are part of the Confined Space Entry team that is trained in technical rescue operations.

(7) **Communication.** A two-way, electrically-operated communication system shall be in operation between the standby employee and the geotechnical specialist whenever boring inspections are being made in exploration shafts over 20 feet in depth or when ambient noise levels make communication difficult.

(8) **Safety Equipment.** The following safety equipment shall be used to protect the geotechnical specialist:

- An approved safety harness which will suspend a person upright and that is securely attached to the hoist cable and upper portion of cage.
- An 18 to 22-inch diameter aluminum or stainless steel “cage” or platform with deflector that is attached to the hoist cable.
• A hoist cable having a minimum diameter of 5/16 inches. The cable must be load tested annually and prior to be placed into service.
• ANSI approved hard hat head protection.
• A supplied air respirator may be used by the entrant during all down-hole procedures.
• Coveralls.

(9) Electrical Devices. All electrical devices used within the exploration shaft by the geotechnical specialist shall be approved for hazardous locations.

(10) Surface Hazards. The storage and use of flammable or other dangerous materials shall be controlled at the surface to prevent them from entering the exploration shaft.
Figure 5-2: Composite of Potential Hazards during Down-Hole Logging
**Stability Inspection** - The pre-entry stability assessment will result in a trench that is designed appropriately with proper shoring for the observed lithologic classification and the upper 4 feet of all exploratory boreholes should be cased. A stability inspection should then be performed before detailed logging of trenches or boreholes commences. This is accomplished by:

1. **Exposing the sidewalls** - For boreholes the authorized entrant should attempt to chop out a swath down the entire hole on one side with a geology pick or mattock to expose the geologic conditions. The drilling process will result in a layer of smeared or caked soil that can mask faults, fractures, seepage zones and landslide surfaces. It is therefore, very important to clear the sidewalls and inspect them for these features that need to be clearly defined and monitored. Do not rush the inspection process.

2. **Keep in continuous contact** with the attendant at the top of the hole, who should repeat all information called up to him or her.

3. **Carefully check caving** and seepage zones and do not descend below significant ones.

4. **Observe groundwater** in the borehole and monitor the rate at which groundwater is rising. Minimize time spent near the groundwater surface, as areas that are saturated are more susceptible to caving. For this reason, maintaining a distance is important.

Although the description above describes the inspection process for exploratory boreholes, similarly trench excavations should be inspected for problematic conditions that could potentially result in a cave-in.

### 5.3 Other External Hazards

The following precautionary measures to protect authorized entrants from external hazards will be taken:

- The Confined Space Entry work area will be delineated with cones, caution tape, or fencing and proper signage posted to prevent unauthorized personnel to enter. Barriers will provide some protection from pedestrian, vehicular and other external or surficial hazards.

- The ground surface surrounding the borehole or excavation should be cleared of loose rocks and soil, tools, containers of liquids, and flammable and hazardous materials.

- Vehicle exhaust encroaching into or near the confined space opening will be eliminated.

- For exploration shafts, the upper portion of the shaft shall be equipped with a surface ring-collar to provide casing support of the material within the upper 4 feet of the exploration shaft. The ring-collar shall extend at least 1-foot above the ground surface. This will protect the entrant from objects that could accidentally fall into the borehole.
• The work area will be monitored closely to prevent insects or animals such as snakes and rodents from entering the shaft

6.0 STATE PERMITTING AND NOTIFICATION

In accordance with Title 8, Section 341 of the California Code of Regulations (CCR), work activities that include the construction of trenches or excavations 5 feet or deeper into which any person is required to descend must not proceed before:

• Obtaining either an Annual or Project Permit for Excavations and Trenches from the Division of Occupational Safety and Health and;
• For holders of Annual Permits, notifying the Division each time permit-required activity at a new site begins.

An Annual Permit is issued to a qualifying employer to conduct specified permit-required activity at any jobsite for a period of one year.

A Project Permit is issued to a contractor or employer to conduct permit-required activity at the specific location(s) named in the permit. No permit-required work shall commence until a Project Permit is issued. Only one project permit is required per project given the holder of the permit continues to act as the Project Administrator.

An "Activity Notification Form for Holders of Annual Permits" is included in Appendix A of this document and should be completed and faxed to the nearest Division of Occupational Safety and Health office, prior to commencement of field work by the drilling contractor or representative.

Please note that although these actions satisfy State requirements, site-specific City and/or County requirements for excavations and trenches may also apply and should be individually reviewed and observed.

7.0 CONFINED SPACE ENTRY FORM

Before entry is made into a high hazard confined space, the pre-entry procedures specified below in Section 9 will be completed. The Confined Space Entry Form, found in Appendix E-B, is completed and signed by the entry supervisor. It is prepared prior to entry so that appropriate hazard evaluations, safeguards, and monitoring are in place prior to and for the duration of confined space entry. The completed form will be made available for entrants to review at the time of entry into the confined space. The entry form is canceled by the entry supervisor once entry into the confined space is no longer necessary or available. The entry supervisor will also evacuate a confined space and cancel the confined space work if a hazardous condition arises during entry. Once the entry work is canceled, the confined space will be backfilled to the existing ground surface.
Confined Space Entry Forms will be retained for at least one year to facilitate review of the confined space entry program. Any problems encountered during entry are noted on the form and action is taken to improve entry procedures and/or safeguards for the confined space.

8.0 RESPONSIBILITIES/TRAINING

It is important to mention that confined space entry sites for the project will be multiple-employer sites. Subcontractors, confined space workers, environmental and cultural monitors and occasional site visitors may be present at the work site. The Confined Space Entry Program describes the detailed roles and responsibilities for confined space workers. This document will give additional guidance in coordinating these roles on an active multiple-employer site.

8.1 Exploratory Borehole Sites

**Attendant** - The attendant's role is to monitor the borehole conditions, the surface conditions and the status of the authorized entrant. The attendant must be focused and be ready to act to mitigate any hazard that could potentially harm the entrant or compromise the stability of the borehole. The attendant is to maintain constant communication with the entrant and is not to leave the borehole under any circumstances unless another trained and briefed attendant is available to replace the original attendant. It is also very important that the attendant is focused on the mental and physical status of the entrant before, during and after entry work. The attendant’s role will be fulfilled by a member of the Confined Space Entry Rescue Team.

**Entrant - Geotechnical Specialist** - The entrant's role is to characterize the lithologic conditions of the borehole. Although characterization is the objective, it is also the key factor in assessing the confined space hazard. Prior to confined space entry the entrant should review background information about the site, and should carefully observe the soil cuttings and communicate with the drill operator to obtain any information that materializes. The entrant should be very aware of hazards and perform a stability inspection of the borehole prior to detailed logging. Additionally, California regulations specify that personnel performing downhole logging shall be a Geotechnical Specialist, defined as someone who has completed downhole logging training under the guidance of a Certified Engineering Geologist or Registered Civil Engineer with geotechnical experience. Downhole logging training should include field experience, and review and understanding of 8 CCR Section 1542 (d).

**Entry Supervisor** - The entry supervisor provides management and oversight combined with experience in confined space entry work. The supervisor regulates work activity on the site, enforces safety protocols and ensures proper procedures are followed. The entry supervisor can serve as both the entry supervisor and the attendant. The supervisor’s role will be fulfilled by a member of the Confined Space Entry Rescue Team.

**Field Oversight Crew** - There may be additional geotechnical specialists present onsite to coordinate and manage field activity. These crew members are trained for confined space work and are experienced in confined space entry work. They often provide support and can, for example serve as a stand-in attendant, a second entrant, and even a back up entry supervisor.
Drill Operator and Crew - The role of the drill operator and crew is to excavate the borehole and to operate entry and retrieval systems. Each member of the drill crew is trained with regard to confined space hazards, and operating and rescue procedures. They provide valuable information to entrants regarding subsurface conditions gleaned from the drilling process, and similar to an attendant, are in constant communication with the entrant. Additionally, they are most knowledgeable and experienced in the use of rig safety equipment and retrieval systems.

Visitors - Visitors may be present at an exploration borehole as it is being drilled and logged. Visitors are not assigned Confined Space Entry roles and responsibilities, however, they may receive training with regard to the hazards and operating and rescue procedures required at the site. They are not permitted within the immediate work area and will adhere to all safety and emergency protocols and procedures.

8.2 Trench Excavations

Trench excavations are designed with protective systems to protect confined space workers and are typically less susceptible to poor air ventilation resulting in dangerous air contamination. Confined space entry roles and responsibilities are similar as those outlined for exploration boreholes with the exception of a required attendant. All entrants will be geotechnical specialists.

Competent Person (Geotechnical Specialist) - A competent person is a person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and has the authority to impose prompt corrective measures to eliminate these hazards. Trench excavations are assessed and designed by a competent person, and this person may as well serve as an authorized entrant or an entry supervisor.

9.0 PRE-ENTRY PROCEDURES

Prior to entry into the identified confined spaces, pre-entry procedures must be completed in accordance with Cal-OSHA Title 8 CCR Sections 5156 and 5158 and Sections 1541-1542. CCR Sections 1541 and 1542 describe procedures to be performed depending on whether the confined space is a trench excavation (see CCR Section 1541) or exploration shaft (see CCR Section 1542).

9.1 Tailgate Health and Safety Meeting

A safety briefing (tailgate meeting) will be held before the start of each day's field work in which Shannon & Wilson personnel are directly involved in Confined Space Entry and Emergency Response activities. The briefing will be conducted by the entry supervisor or geotechnical specialist competent person on site. The briefing will discuss general and specific safety and health items pertinent to that day's work. Records of these briefings will be kept with field notes and other safety documentation.
Hazard Evaluation Analysis forms have been completed for common activities performed involving confined space entry and are included in Appendix E-B. They should be utilized by supervisors to train new employees regarding hazards and precautions for each step of a task and should also be reviewed during the tailgate health and safety meeting.

9.2 Initial Stability Assessment

9.2.1 Trench Excavations

Only authorized geotechnical specialist personnel will be allowed to enter a trench excavation. Prior to entry an onsite competent person will determine if there is a potential for cave-in and what, if any, protective system is needed. The appropriate protective system will be designed by either sloping, benching and/or shoring the walls to achieve a safe trench based on the soil classification (see CCR 1541 Appendices A-F).

9.2.2 Exploration Shafts

All exploration shafts will be classified as high-hazard confined spaces and only a geotechnical specialist shall be permitted to enter without lagging, spiling or casing for the purpose of down-hole logging (see Title 8 CCR Section 1542). The type of materials and stability characteristics of the exploration shaft shall be personally observed and recorded by the geotechnical specialist during the drilling operation. Drilling conditions that may indicate areas of concern within the borehole will be discussed by the drill crew and geotechnical specialist and will be carefully considered prior to entry. Potentially unsafe exploration shafts shall not be entered.

9.3 Control of External Hazards

The following precautionary measures to protect authorized entrants from external hazards will be taken:

- The Confined Space Entry work area will be delineated with cones, caution tape, or fencing and proper signage posted to prevent unauthorized personnel to enter. Barriers will provide some protection from pedestrian, vehicular and other external or surficial hazards.
- The ground surface surrounding the borehole or excavation should be cleared of loose rocks and soil, tools, containers of liquids, and flammable and hazardous materials.
- Vehicle exhaust encroaching into the confined space opening will be eliminated.
- For exploration shafts, the upper portion of the shaft shall be equipped with a surface ring-collar to provide casing support of the material within the upper 4 feet of the exploration shaft. The ring-collar shall extend at least 1-foot above the ground surface. This will protect the entrant from objects that could accidentally fall into the borehole.
- For trench excavations, the trench will be designed by a competent person with appropriate sloping, benching and shoring.
The work area will be monitored closely to prevent insects or animals such as snakes and rodents from entering the shaft.

9.4 Control of Internal Hazards

9.4.1 Drilling Observation

After an initial stability assessment is made, appropriate precautionary measures including protective systems for excavation trenches or borehole casing for exploration shafts will be arranged. Additionally, a heightened awareness of potentially hazardous zones observed during the excavation should accompany all confined space work activity.

9.4.2 Purging and Ventilating

All borehole shafts shall be purged of hazardous or potentially hazardous air prior to entry. The shaft shall be thoroughly and continuously ventilated by use of blowers or vacuum pumps by placing a 2” flexible hose near the bottom of the shaft and pulling (e.g. vacuum) fresh surface air into the hole, which will produce a continuous movement of uncontaminated air through the confined space. The pump will be continuously run while the geotechnical specialist is down hole.

9.4.3 Atmospheric Testing

Prior to entering any confined space and before purging of the space, the atmosphere of the space shall be tested by a qualified person using an approved multi-gas monitoring instrument. Tests shall be conducted throughout the entire length of the borehole or excavation to determine if the confined space is oxygen deficient, and if it contains explosive, flammable, or toxic gases. During initial testing, smoking or other sources of ignition shall be prohibited within a radius of twenty (20) feet of the confined space opening.

Initial testing of the atmosphere shall be performed before ventilation begins to determine what precautions are necessary for purging and ventilating the confined space. Entry into confined spaces is prohibited until initial testing of the atmosphere has been done from the outside. The test performed by the qualified person shall be documented in writing using the Confined Space Entry Form, found in Appendix E-A of this CSEP, and shall include tests for oxygen deficiency, combustibility, and toxicity as follows:

9.4.3.1 Oxygen

- Test the confined space for oxygen content throughout the entire depth of the borehole to ensure that safe conditions are present throughout the entire work space.

- The percentage of oxygen for entry shall be no less than 19.5% and no greater than 23.5%. If the level is outside this range, purge and ventilate the space. Entry will not be allowed until oxygen levels are between 19.5% and 23.5%.
9.4.3.2 Combustibility

- The multi-gas meter should then test the confined airspace for the presence of flammable and combustible gasses.
- **If an explosive atmosphere exists as indicated by the combustible gas meter, DO NOT PROCEED.**
- The percent (%) LEL (percent of Lower Explosive Level) must be less than or equal to 10% for entry into the confined space is permitted.

9.4.3.3 Toxic Gases

- Tests shall then be conducted for carbon monoxide (CO) and hydrogen sulfide (H₂S) gases, in addition to any other toxic material as determined by the qualified person. The concentration for H₂S must be below 10 ppm (parts per million) and CO below 25 ppm before entry is permitted.
- If toxic levels are found, personnel shall not enter the confined space until purging has been performed, and the hole space retested.

Atmospheric monitoring of high-hazard confined spaces shall be done on a continuous basis and recorded on the entry form every 2 hours. The atmospheric tests records will be kept onsite and available for personnel to review at any time. Entry into confined spaces on the project will be allowed only if the test results for oxygen deficiency, combustibility, and toxicity are within acceptable levels listed above.

9.5 Safety Equipment Usage

9.5.1 Down-Hole Safety Equipment -

All subcontractors will conduct a daily inspection of their equipment prior to operation and participate in the daily safety briefing. It is critical that safety equipment be in good condition and free from defect. Prior to borehole entry, check that hoisting system connections are secured, and ventilation, communication, monitoring and lighting systems are operating.

The following safety equipment shall be used to protect the geotechnical specialist:

- Borehole surface collar
- Ventilation fan(s)/ air hoses
- Full body harness with lifeline
- Downhole air monitoring equipment suspended near the breathing zone (4 gas meter)
- Standing platform with head protection
- Two-way radio communication
- Explosion-proof lighting
- First aid kit (above ground)
- A 5/16-inch diameter hoist cable
- Fire extinguishers (above ground)
- Non-entry retrieval equipment
- Barricade equipment
- Ladder (if applicable)

9.5.2 Personal Protective Equipment

The following personal protective equipment shall be used to protect confined space entrants:

- Hard hat
- Steel-toed boots
- Safety glasses
- Coveralls
- Gloves
- Supplied Air Respirator

10.0 EMERGENCY AND RESCUE PROCEDURES

10.1 Emergency Provisions

Shannon & Wilson will plan for emergency provisions before starting field activities and hire an outside Confined Space Entry Team in addition to notifying the Los Angeles City Fire Department of the onsite exploration locations.

- Review site specific emergency and contingency plans where applicable.
- Establish nearest cellular phone service reception areas.
- Confirm and post emergency telephone numbers, evacuation routes, and hospital routes and communicates the information to onsite personnel.
- Communicate emergency procedures for confined space emergency rescue.
- Inventory and check site emergency equipment and supplies.
- Supply local branch of the Fire Department with emergency response confined space entry work description, site plans, geographic boring coordinates, access information and arrange site walk with the Fire Department if requested.

10.2 Emergency Response

In the event of a confined space emergency:
Call for help: Call 911 and notify any other appropriate response personnel.

Communicate with entrant: The attendant and Confined Space Entry Team safety personnel will attempt to maintain constant communication with the authorized entrant.

Initiate Rescue: Initiate self and/or non-entry rescue procedures, or prepare for entry rescue provided by emergency services.

Stand by to assist entrant: Standby safety personnel and attendant will be present to assist entrant.

Relay information and facilitate access for emergency services: Remaining safety crew members should confirm the site is readily accessible and flag emergency response personnel to the project site. Any pertinent information should be relayed to emergency response personnel upon arrival.

Emergency Aid: Administer emergency medical aid if needed.

Escort entrant to Hospital: Be prepared to accompany entrant to nearest hospital. Keep the route to the nearest hospital with appropriate phone numbers handy.

Close down drilling operations and evacuate site: When appropriate to do so, shut down drilling operations and evacuate the immediate area.

10.3 Emergency Notification & Access

In an emergency situation, time efficiency is critically important. Stay calm and focus your efforts on two important safety procedures:

Call 911- if an acute threat to safety and health is observed or perceived.

Clearly state to the 911 dispatcher "this is an emergency" and provide the following information;

- State that the location of site and that it may require hillside or remote area rescue. This means the project site is in an area that is not associated with a common street;
- Provide the Thomas Guide Map page and grid for the site, and latitude and longitude coordinates;
- Telephone number from where the call originates;
- Your name;
- What happened; nature of the emergency
- What assistance is needed - rescue by a technical rescue rig;
- Whether help or first aid is being provided.

DO NOT HANG UP UNTIL INFORMATION IS REPEATED BACK TO YOU AND IS ACCURATE. HANG UP ONLY WHEN ADVISED BY THE PERSON WHO RECEIVED YOUR CALL.

A mobile phone will be available for use at the job site. Shannon & Wilson employees will check for a clear cell signal at the job site prior to work. If a clear signal is unavailable, a search for the closest location with a signal will be identified as well as the location of the nearest land-
On-site personnel will be informed of the location of the clear signal and the location of the nearest land-line during the daily briefing. In the event of an emergency one person will move to the site designated with the clear cell signal or the nearest land-line to make the emergency phone call for medical assistance.

10.4 Facilitate Emergency Assistance

- Station personnel at nearest cross street to guide or flag emergency vehicles to project site.
- Clear the work area of vehicles and equipment to allow access of emergency vehicles and personnel.
- Make sure that locked gates or fences blocking access to the project site have been unlocked and are open.
- Onsite personnel who are not actively engaged in emergency rescue efforts should stay clear of the confined space and surrounding area. This will allow easy unobstructed access to the confined space by rescue personnel and emergency equipment and keep personnel away from potential hazards.
- Relay important information to emergency response personnel

10.5 Relaying Information to Emergency Response Personnel

Emergency response personnel will need to know the following information:

- The number of victims and the location of the emergency;
- How long the victim(s) have been exposed to the hazard or how long the victim(s) have been injured/down; and
- The suspected cause of the accident;
- In addition, emergency response personnel will need to know all information on the Permit-Required Confined Space Entry Form including:
  - Atmospheric test results;
  - Isolation or lock out - tag out (LOTO) procedures (if applicable);
  - Material Safety Data Sheets (MSDS) (if applicable);
  - Hot Work (if applicable); and
  - Any other relevant information.
Emergency Response Procedures

1. Call 911
2. Maintain communication with entrant
3. Can entrant initiate self-rescue? Yes → Standby to assist entrant to perform self-rescue
4. No → Is non-entry rescue a viable option? Yes → Standby Safety Personnel initiates non-entry retrieval procedures
5. No → Facilitate access for emergency services
6. Prepare for emergency entry-rescue
7. Administer emergency medical aid if necessary
8. Accompany entrant to nearest hospital
9. Close down drilling operations and evacuate site
10.6 Emergency Rescue

Entry-rescue is the procedure in which emergency personnel from the Los Angeles City Fire Department or a third party private safety consultant team will enter the space to retrieve the entrant and provide the victim with emergency aid as necessary.

10.6.1 Self Rescue

Self-rescue is the preferred plan. The self-rescue plan provides entrants with the best chance of escaping a space when hazards are detected. Whenever authorized entrants recognize their own symptoms of exposure to dangerous atmosphere or detect a dangerous condition, unaided exit from the confined space will be the most rapid means of escape. Unaided in the case of shafts involves signaling to the drilling operator for an “Emergency Up” response. At this point the driller will raise the occupant at a rapid rate that will not cause additional injury due to scrapping or abrasion of the specialist’s body appendices.

10.6.2 Non-Entry Rescue

Non-entry rescue is the next best approach when self-rescue is not possible. Non-entry rescue can be started right away and prevents additional personnel from being exposed to unidentified and/or uncontrolled confined space hazards. Usually, equipment and other rescue aids, such as a retrieval tripod, are used to remove endangered entrants.

If the entrant is unconscious and there is no cave in the entrant can be pulled to the surface via the cable and cage mechanism. The drilling contractor should raise the entrant slowly verifying by visual methods if possible that the entrant’s legs and arms are free of restrictions and not dragging along the boring walls.

If there has been a cave-in, the first attempt should be to contact the entrant via the two-way radio. If communication is possible, then the team should verify that the entrant is receiving air flow via the SAR. If the entrant is responsive and not injured, the entrant should attempt to clear the debris from around the edge of the cage allowing the debris to fall below the cage. If this isn’t possible the driller should then attempt to loosen the debris trapped above the cage by raising the cage using the cable winch mechanism on the rig. Excessive tension should be applied with great precaution so as to not break or snap the cable mechanism.

10.6.3 Entry Rescue

If the cage cannot be moved, an attempt must be made at clearing the debris from above the cage. This can be accomplished by lowering a second man down the hole between the cable and side wall. Once on the caved-in material then hand shoveling of the material into a container should be attempted assuming that the side walls are safe to second entrant. The caved material should be removed until the cable mechanism can raise the cage and free the entrant.

A second method of rescue would be by drilling an alternate 24 bucket hole adjacent to the first hole down to the depth of the trapped entrant. Once that depth is reached an adit
should be excavated by hand methods to reach the trapped entrant. At all times the rescuer should observe for loose conditions in the second hole that may lead to collapse. If caving conditions are found then casing should be applied to the caving section before attempting any further rescue.

**11.0 REPORTING REQUIREMENTS**

Required documentation for performing work in confined space includes;

- The Health and Safety Plan and all revisions to it;
- Confined Space Entry Form (see Appendix E-A) for all permit-required confined spaces;
- Appropriate Hazard Safety Analysis forms for bucket-auger drilling and downhole logging of exploration shafts (see Appendix E-B);
- Record of training documents for all employees trained in permit-required confined space entry operations and competent person duties (for trench excavations); and,
- Pre-entry checklists for each entry into a non-permit-required confined space

Incidents resulting in personal injury, exposure to toxic substances, illness, or property damage must be reported by the involved individual(s) to their Site Safety Officer immediately. The Site Safety Officer must immediately notify the Entry Supervisor of injuries requiring first aid or medical attention. The Site Safety Officer, the injured employee, and the Entry Supervisor shall complete a written injury report, which should be submitted to the Project Manager, as soon as practicable, but no later than 24 hours after the injury or incident is reported. The Project Manager will be immediately notified of any major accident.

The Project Manager will conduct a follow up investigation and evaluate what corrective actions are needed to prevent the reoccurrence of the accident. The results of this investigation will be reported within four working days to those individuals who received the original report. Based on the information provided, a more thorough investigation or additional corrective actions may be required by the Project Manager.
APPENDIX E-A
CONFINED SPACE ENTRY FORM
Permit-Required Confined Spaces - Confined Space Entry Permit.

Confined Space Entry Permit Date and Time Issued: ______________
Date and Time Expires: ____________
Job site: ___________________________ Job Supervisor: ___________________________
Excavation to be entered: __________ Work to be performed: ___________________________
Stand-by personnel: __________________; __________________; __________________

1. Atmospheric Checks: Time ________
   Oxygen ________% L.F.L.
   Explosive ________% L.F.L.
   CO ________PPM
   H2S ________PPM

2. Tester's signature: _____________________________

3. Source Isolation

<table>
<thead>
<tr>
<th>Source isolation (No Entry if not Accomplished)</th>
<th>N/A</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumps or Lines Blocked</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lines Disconnected or Blocked</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Ventilation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Ventilation Only</td>
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</tr>
</tbody>
</table>

4. Atmospheric check after isolation and ventilation:
   Oxygen ________% > 19.5 %
   Explosive ________% L.F.L < 10 %
   CO ________PPM < 25 PPM
   H2S ________PPM < 10 PPM
   Time: ______________ Testers signature: _____________________________

5. Communication procedures: ________________________________

6. Rescue procedures: ________________________________
7. Entry Procedures:

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry, standby, and back up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>persons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successfully completed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>required training?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is it current?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Equipment:

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct reading gas monitor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tested</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety harnesses and lifelines for entry and standby persons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hoisting equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Equipment - continued.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powered communications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAR or SCBA's for entry and standby persons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective Clothing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All electric equipment listed Class I, Division I, Group D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-sparking tools</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Periodic atmospheric tests:

<table>
<thead>
<tr>
<th></th>
<th>Oxygen%</th>
<th>%/PPM</th>
<th>Time</th>
<th>Explosive % of LEL</th>
<th>%/PPM</th>
<th>Time</th>
<th>CO PPM</th>
<th>%/PPM</th>
<th>Time</th>
<th>H2S PPM</th>
<th>%/PPM</th>
<th>Time</th>
</tr>
</thead>
</table>
We have reviewed the work authorized by this permit and the information contained herein. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Supervisor)______________________________________________
Approved By: (Unit Supervisor)_____________________________________________
Reviewed By (Confined Space Operations Personnel) :__________________________

This permit to be kept at job site. Return job site copy to Health and Safety Officer following job completion.
APPENDIX E-B
HAZARD EVALUATION ANALYSIS
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Movement around general work area</td>
<td>Slip/Trip/Fall</td>
<td>• Watch footing and uneven ground.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Keep equipment off ground where possible and out of zone of common movement.</td>
</tr>
<tr>
<td>2. Heavy lifting</td>
<td>Back strain</td>
<td>• Lift with legs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ask for help for heavier loads (e.g. greater than 50 lbs)</td>
</tr>
<tr>
<td>3. Drilling and swinging overhead loads</td>
<td>Crush, head injury</td>
<td>• Remain clear of overhead loads including bucket.</td>
</tr>
<tr>
<td>4. Sampling</td>
<td>Finger pinch, cut/laceration</td>
<td>• Use of leather gloves when handling sampler.</td>
</tr>
<tr>
<td>5. Downhole logging</td>
<td>Asphyxiation</td>
<td>• Use of 4 Gas meter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ventilation of borehole prior to entry.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use of Supplied Air Respirator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vehicle/drill engine exhaust directed away from borehole.</td>
</tr>
<tr>
<td>6. Downhole logging</td>
<td>Head Injury</td>
<td>• Clean and remove large loose large pebble and cobbles sized clasts before being lowered below hazard.</td>
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<tr>
<td>7.</td>
<td>Downhole logging</td>
<td>Entrapment</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Do not go below sloughing or caving zones.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Determine potential for daylighted wedges.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Do not go below heavily draining perched water zones.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Downhole logging</td>
<td>Drowning</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• Stay above groundwater level in borehole.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Test pit logging</td>
<td>Trench side wall collapse and entrapment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Slope test pit walls back when pits above 5 feet in depth.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Log test pit from surface if unable to slope.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Length of pit should be parallel to maximum slope gradient.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Test pit logging</td>
<td>Dust inhalation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Use of half mask respirator with dust/particulate filter.</td>
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</tbody>
</table>