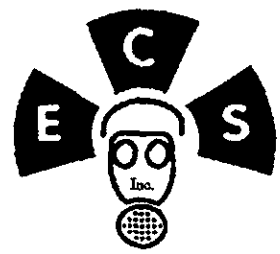
MASTER HEALTH & SAFETY PLAN

PREPARED FOR

ARONSON ENGINEERING, INC.

PREPARED BY:



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Revision History

October 13, 1994 Rev 0

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ATTACHMENTS

POLICY STATEMENT

It is the policy of Aronson Engineering Inc., to provide a safe and healthy working environment for all personnel through observation, guidance, and adherence to safety codes and standards. All work is to be done in a safe manner. Safety is a primary management responsibility and must be the concern of each and every employee and subcontractor. To prevent injuries, illness, accidental fires and property damage, all supervisory personnel must demonstrate the ability to recognize hazards and take necessary steps to eliminate existing and potential hazards. All supervisors and employees should perform their duties in compliance with this Health and Safety Plan and all applicable safety codes and standards.

REQUIREMENTS FOR SUBCONTRACTORS

All personnel employed on this tank removal project including all subcontractor and sub-subcontractor personnel, shall comply with the requirements of this Safety, Accident Prevention, and Fire Protection Plan and such condition shall be included as a provision of all subcontracts and purchase orders issued for the project. All subcontractors shall acknowledge receipt of a copy of this Safety, Accident Prevention and Fire Protection Plan and their specific agreement to comply with its prescriptions must be signified by completing and signing "Subcontractor Safety, and Site Rules Check List" (refer to Attachment A).

Prepared by:_____ _____

Environmental Compliance Services, Inc. Dated

Charles Holder VP./Industrial Hygienist

Approved by:_____ _____

Tom Murray Date

Aronson Engineering, Inc.

Approved by:_____ _____

Dale Miller Civil Eng. Registration # C19390 Date

1.0 INTRODUCTION

This Safety, Accident Prevention and Fire Protection Plan has been specifically prepared by Environmental Compliance Services Inc. (ECS Inc.) for Aronson Engineering, Inc., and all other contractors doing work on the Tank Removal Project at Parks Reserve Forces Training Area Dublin, California

The Plan is structured in Two parts: First, the Master Health and Safety Plan. Second the Site-specific Health and Safety Plan.

Site-specific Health and Safety Plan highlights health and safety issues and accident prevention procedures of specific concern on this project and incorporates the Corp. Of Engineers Safety requirements. However, it incorporates, by reference, all of the applicable requirements of the Master Health and Safety Plan. The applicable requirements of the Master Health and Safety Plan apply whether or not they are specifically mentioned in the site-specific Plan. Also all NIOSH / OSHA / EPA requirements are to be adhered to on this project.

1.1 Consolidation of Health and Safely Regulations

All work for this project is subject to the safety, accident prevention and fire protection requirements of Federal, State and local laws and regulations as well as Aronson Engineering, Inc.(s) Project-specific Plan, Master Health and Safety Plan and IIPP.

LIMITATIONS: THIS SITE SAFETY PLAN WAS DEVELOPED IN ACCORDANCE WITH GENERALLY ACCEPTED STANDARDS OF OSHA, CAL EPA, US ARMY FIELD SAFETY MANUAL EM 385-1-1 ALONG WITH OTHER EXISTING REGULATIONS AND GUIDELINES. TERMS OF THIS PLAN SHOULD NOT BE CONSIDERED VALID FOR OTHER PROJECTS BECAUSE OF THE CHANGING REGULATION IN ENVIRONMENTAL, SAFETY PRACTICES AND CHANGES DUE TO SITE CONDITIONS. EACH PLAN NEEDS TO BE SPECIFIC TO THE PROJECT.

ECS, INC. IS NOT ABLE TO ELIMINATE THE RISKS ASSOCIATED WITH ENVIRONMENTAL AND HAZARDOUS WASTE OR TOXIC SITES. NO OTHER REPRESENTATION AND NO GUARANTEES OR WARRANTS, EXPRESS OR IMPLIED, ARE PROVIDED BY OR WITH THIS PLAN.

2.0 PURPOSE

This Master Health and Safety Plan has been prepared for all personnel working on this Tank Removal Project. To recognize the need to minimize possible causes of accidents. This Master Health and Safety Plan sets forth minimum requirements and procedures. Implementation of this Plan by Aronson Engineering, Inc. employees should provide safe working conditions, including those that apply to handling of hazardous materials and operations for work performed on sites that are waste sites or sites which may contain hazardous or toxic waste materials. It assigns personnel responsibilities, prescribes mandatory operating procedures and establishes personal protective equipment requirements for most work conditions including those where hazardous and or toxic materials may be encountered.

Worker safety and the protection of health are major concerns during project design as well as during implementation of the work and should not be compromised. This Master Plan describes the responsibilities and requirements of Aronson Engineering, Inc. its staff and all subcontractors, Vendors, Visitors Consultants, etc. Work conditions can be expected to vary from location to location within the prescribed work area. These conditions may require modification of some of the provisions of this Master Plan. Conditions may also change as work progresses at a particular location. Thus, as appropriate, the Master Plan may be modified only through issuance of addenda to accommodate the site and project-specific conditions. All such modifications must be reviewed and approved by Aronson Engineering, Inc., ECS Inc. and the designated Army Corp. of Engineers Representative before issuance and implementation of the modifications. No changes to this Master Health and Safety Plan are allowed without prior consultation and written approval by Environmental Compliance Services, Inc. and the Army Corp. of Engineers.

This Master Health and Safety Plan is a general plan. All of its provisions may not be applicable to every project site and work on some projects may pose specific hazards that cannot be adequately addressed by standard policies and procedural requirements. It is therefore mandatory that a Site-specific Health and Safety Plan be prepared for each project where workers may be exposed to hazardous or toxic materials outside the scope already addressed.

The Site-specific Plan shall address all unique site conditions in addition to all applicable provisions of this Master Health and Safety Plan. Site-specific Plans shall be prepared in accordance with the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" and the US Army Corp. of Engineers Safety and Health requirements manual EM 385-1-1 if workers are expected to be exposed to hazardous or toxic chemicals and/or situations.

3.0 SAFETY RESPONSIBILITIES

Although management has primary responsibility for safety, every site worker must exercise primary care to protect his or her own safety and be concerned for the safety of co-workers and others present on the job site. Every employee shall perform his or her duties in compliance with safe working practice and be at all times alert to conditions that might be the cause of an accident or a danger to health. All employees must be ready at all times to correct and report unsafe conditions to their supervisors.

3.1 Assignments of Responsibilities

The assignments of responsibility for implementing site health and safety policy, the requirements this Master Plan and the provisions of each Site-specific Health and Safety Plan are defined as follows. (See Site Specific Plan for list of personnel for this tank removal project).

3.1.1 Project Manager

The Project Manager will have prime responsibility for directing the preparation and implementation of the Site-specific Health and Safety Plan. This will include communicating all health and safety requirements to all site personnel and subcontractors. The Site-specific Health and Safety Plan should be reviewed by the Corporate Health and Safety Officer.

The Project Manager is responsible for directing the implementation of procedures for safe working conditions according to recommendations made by the Project Safety Officer. The Project Manager shall also confirm that any necessary revisions to the Site-specific Health and Safety Plan are promptly made.

3.1.2 Project Site Safety Officer / Assistant Safety Officer

The Project Safety Officer will be responsible for development and coordination of the site-specific health and safety plan. Such plans shall comply with the Master Health and Safety Plan and the guidelines set forth in the NIOSH / OSHA /USCG / EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities if workers may be exposed to hazardous or toxic chemicals or materials. At a minimum, the elements of a Site-specific Health and Safety Plan include, as appropriate, a site description and summary of scope of work, project organization, coordination and responsibilities, on-site control measures, hazard evaluation, personal protective equipment requirements, general and special medical surveillance requirements, general and special training requirements, decontamination procedures, environmental and personnel monitoring, communications and emergency procedures. Under the mandate of the Project Manager, the Site Safety Officer will also be responsible for field implementation of the Site-specific Health and Safety Plan and safety audits.

The purpose of safety audits is to assist project management in implementing Health and Safety requirements. The Project Safety Officer is responsible for checking and for eliminating possible hazardous conditions on the job site. Project Safety Officer or his designate will make daily safety inspections of the entire job and a record of this inspection will be made available at the job site. The Project Safety Officer is responsible for conducting safety meetings and for the constant training of personnel. All personnel must be trained to become aware of unsafe conditions and correct them. Any unsafe conditions must be immediately corrected or referred to management when corrective action is needed. The Project Safety Officer will make a report of all accidents to Aronson Engineering, Inc.(s) General Manager and the Army Corp. of Engineers. Liaisons with client representatives and regulatory agencies on matters relating to health and safety will be handled by the Project Safety Officer or the Project Manager, as appropriate. The Site Safety and Health Officer shall be on site full time during field operations. Additionally the Site Safety Officer shall have no other duties other than safety and health and shall have the authority to stop all work if unacceptable health and safety conditions exists, and take necessary actions to re-establish and maintain safe working conditions. The site safety officer must brief all employees, subcontractors and visitors. See Site Safety Briefing Log (Attachment "K") and Visitors Log (Attachment "B")

3.1.3 A Field Superintendent

The Field Superintendent will be the first line supervisor responsible for helping ensure compliance with the Site-specific Health and Safety Plan by all personnel on site including subcontractors. All Field personnel in a supervisory role will be First Aid and CPR Trained.

3.1.3 B Safety and Health Technicians

All technicians will be trained as per section 4.0; subsection 4.1.1 minimum requirements, only trained Health and Safety Technicians will work with Hazardous waste on this project.

NOTE: All Site personnel will use Cordova Medical Group, Dr. Knoot (See Section 5.0, page 11 of this Plan).

3.1.4 Operators, Technicians and Subcontractors.

Operators, technicians, subcontractors and other personnel on site will be responsible for understanding and complying with this Master Health and Safety Plan and any project specific requirements. All required safety equipment for employees, if not provided by individual employees as a condition of employment, will be supplied by Aronson Engineering, Inc. Subcontractors are required to provide their employees with equivalent safety and protective equipment.

3.1.5 Medical Emergency Personnel

This project requires 2 personnel to be currently trained and certified in First Aid/CPR Safety Techniques by an accredited and accepted organization. A CPR/First Aid qualified person must be on site at all times in which work is being performed.

3.2 Requirements for Subcontractors

All subcontractor personnel performing work under contract with Aronson Engineering, shall as a minimum, comply with the applicable requirements of this master health and safety plan and all of the requirements of the site-specific health and safety plan that controls work on the project for which the subcontract is being performed.

When any subcontractor is hired for work in an area where hazardous or toxic materials may be present, a "Subcontractor Safety & Site Rules Check List" shall be completed. This form must be filled out, signed and dated prior to any work being performed by the subcontractor. A sample of this form is provided as Attachment A.

As a minimum when any subcontractor is hired to work in an area where hazardous or toxic materials may be present, the subcontractor's employees shall have completed all of the requisite medical surveillance examinations, received equivalent training as specified herein and shall be provided by the subcontractor with equivalent safety and protective equipment and clothing. The likelihood of conditions requiring specific hazardous waste operations and medical surveillance are high. However, Hazardous or toxic exposure are possible on this project, therefore, hazardous waste operation and applicable rules and regulations must be followed and appropriate screening and monitoring will be required for the duration of this project.

4.0 HEALTH AND SAFETY TRAINING

4.1 Basic Training Requirements

4.1.1 Site workers

Basic training for Site Personnel who may be exposed to hazardous or toxic materials shall consist of the following, according to their job responsibilities if required. This determination will be made by the Site Safety Officer

- Successful completion of 40 hours of CERCLA/SARA Health and Safety Training pursuant to 29 CFR 1910.120. (Note: If the employee has not received this training prior to employment by it shall be provided as soon as practicable following the start of employment. Until the training has been provided no employee shall work in areas where he or she may be exposed to hazardous or toxic materials as defined by 29 CFR 1910.120)

- A minimum of eight hours of training per year to refresh the employee's knowledge of the basic CERCLA/SARA 40-hour training program. Employees who have not received either basic or refresher training within a period of one year prior to assignment to project work in the field will not be permitted to enter areas where they may be exposed to hazardous or toxic materials.

- A minimum of 8 hours of a competent persons course for those companies excavating materials.

- A Confined Space Safety course is required for anyone working in or around confined space area's.

- All Project Managers, Project Superintendents, and Project Safety officers or any other person delegated the responsibility to provide health and safety, shall have successfully completed eight hours of CERCLA/SARA Supervisory Training,, pursuant to 29 CFR 1910.120. This training shall be in addition to the basic 40 hours of CERCLA/SARA training.

4.1.2 Subcontractor Personnel

All subcontractor personnel involved in work with hazardous or toxic materials or working in areas where they may be exposed to hazardous or toxic materials, shall be trained according to the requirements of 29 CFR 1910.120. This requirement includes the requirements for additional training supervisory training for on-site supervisory personnel, if required or requested by the Site Safety Officer.

4.2 Other Training Requirements

In addition to the basic training requirements presented in Section 4.1.1, the following requirements shall apply to all personnel employed or in the designated hazardous work area. This includes all Site employees and subcontractor personnel or other persons present on the site except that at the discretion of the Project Manager or Superintendent, specific requirements may be waived in the case of visitors or other persons, such as delivery vehicle drivers not directly involved in the work, who are present on the site only for short periods, and who are unlikely to be exposed to the hazards of the work. No waiver of any training requirement can be made in the case of persons who may be exposed to hazardous waste or hazardous chemicals or who must enter regulated areas as they are defined in this Plan (see Section 8.0).

- All site personnel including visitors and subcontractor employees must have access to and be familiar with this Master health and Safety Plan and the Site-specific Health and Safety Plan.

- All personnel operating construction, earth moving or other industrial equipment such as forklifts, backhoes, dozers, cranes, drill rigs, hydroblasters, and mobile and skid-mounted process equipment, etc., shall have successfully completed training in the safe operation of such equipment.

- All personnel involved in a chemical treatment operation shall have been trained in the potential hazards and problems that might be encountered during the chemical treatment operations. (as in Decon procedures or Soils Encapsulation) Personnel shall be properly informed on the necessary countermeasures that would be required during upset conditions.

- All personnel equipped with personal protective equipment shall be trained in its use and care and be familiar with the protection it provides and the limitations of that protection. (see Attachment P)

- All persons using Self-contained Breathing Apparatus (SCBA's) or air-purifying respirators shall be individually fitted with the equipment and be trained in its use. (see Attachment P)

- Only personnel trained to render first aid and certified in resuscitation will administer such aid and resuscitation. ,except that anyone may render aid until such time as trained personnel arrives at the scene. Trained personnel shall be immediately summoned for help.

- A Four Hour (4) Pre-Entry Briefing must be completed prior to the job starting, this briefing will cover the scope of work Hazards to be encountered and Safety & Health in place to deal with problems along with other issues. The briefing will be held by the Site Safety Officer.

5.0 MEDICAL PROGRAM

5.1 Medical Screening Program

All Site personnel who may be exposed to hazardous or toxic materials during field operations shall have successfully completed a Base Line Physical if required or requested by the Site Safety Officer. Before employment in the field. Thereafter, all Site personnel shall successfully pass an annual screening examination. Any employee who exhibits any symptoms or illness that might be attributed to his employment or might affect his or her ability to work safely, shall immediately undergo a physical examination to evaluate whether or not his or her health has been affected by exposure to hazardous or toxic materials. The scope of this examination shall be at the discretion of a medical physician experienced in occupational health. In addition to the standard Baseline Physicals employees who may encounter or be exposed to Lead will have specific blood and urine tests for Heavy Metals (e.g. Lead, Arsenic, Cadmium, and etc.). Upon termination of employment all employees are to be afforded the opportunity and are to be required to take a post-employment physical examination. All medical examinations and medical screening reports shall comply with the requirements of 29 CFR 1910.120. The Following occupational medical groups provided medical examinations for the project personnel.

Cordova Medical Group
11000 Olsen Drive
Suite 100
Rancho Cordova, CA. 95670
Telephone (916) 635-4120

Industrial And Occupational Health
Certificate # C16631
DEA # AK2017742
AME # 13680

NOTE: If other Doctors are used please provide this information to the Site Safety Officer and Corp. of Engineers representative.

Site medical surveillance program includes a medical examination consisting of a medical and work history; physical examination that includes vital signs and an evaluation of all major organ systems including skin, audiogram, vision screening, chest x-ray composite blood chemistry (CBC) SMAC 24 biochemical profile (additional blood chemistry) urinalysis to evaluate kidney/liver functions and pulmonary function tests, which include forced expiratory capacity at 1 second (FE-VI) and a forced vital capacity (FVC). The entire examination is repeated annually, with the exception of the chest x-ray or upon employee termination, whichever occurs first. In addition, if a worker has been exposed to a known or suspected release, he/she will undergo immediate additional testing at the direction of the project manger.

All sub contractor personnel involved in operations where they may be exposed to hazardous or toxic materials shall have successfully completed screening medical examinations if required or requested by the Site Safety Officer. This medical surveillance shall be the responsibility of the subcontractor.

5.2 Emergency Medical Treatment

In the case of an accident involving personal injury or other medical emergency the following procedures apply.

- For emergencies requiring fire fighting, police, or ambulance (medic) services, procedures for contacting the emergency services will be established prior to project startup. Appropriate telephone numbers shall be posted.

- Hospital locations and telephone numbers shall be identified prior to project startup. They will be posted on-site.

- Adequate numbers of first aid kits (at least one, regardless of project size) shall be available at known locations on the job site and shall be readily accessible to all employees.

- If an injury or illness clearly requires only first aid procedures, treatment can be limited to that level. All incidents not obviously limited to first aid treatment levels require the activation of the appropriate resources to provide more definitive medical care.

- Any injury or illness will require the completion of a employee injury report. This report when completed by the employee's supervisor, shall be forwarded to the Safety Officer who in turn shall forward it to the Corporate Health and safety officer.

- In addition to the above requirements, any injury or illness not limited to first aid care will require that the immediate supervisor contract the Project Safety Officer. This will allow coordination of internal resources to advise the treating physician of the circumstances of the injury and of any circumstances related to the case. It will also permit a timely accident investigation to determine underling causes so that appropriate corrective and preventive steps may be taken to prevent recurrence.

- If any injury or illness is the result of an exposure to a chemical or a hazardous waste, a supervisor shall promptly initiate the steps necessary to identify the chemical(s) involved. Such information shall be made available to the treating physician and the Project Safety Officer. The MSDS sheet shall be given to medical facility providing care.

5.3 Symptomatic Monitoring

On projects where there is risk of exposure to hazardous or toxic materials, all personnel shall be instructed to monitor themselves and their coworkers for any sign of toxic exposure. If any of the following symptoms are detected, they shall be immediately reported to the worker's supervisor:

- Changes in complexion and skin discoloration.
- Changes in coordination.
- Changes in demeanor.
- Excessive salivation and abnormal pupillary response.
- Changes in speech pattern.
- Headaches.

- Dizziness.
- Nausea
- Blurred vision.
- Cramps.
- Irritation of eyes, skin, or respiratory tract
- Any other abnormal physiological function

5.4 Heat Stress

Adverse climatic conditions -- heat and cold -- are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury and increased accident probability. Heat stress is of particular concern while wearing impermeable garments, because these garments prevent evaporative body cooling and this is of particular concern on projects involving hazardous wastes where employees may be equipped with extensive personal protective equipment.

5.4.1 Heat Stress Control Measures

One or more of the following control measures can be used to minimize heat stress:

- Ingestion of adequate liquids to replace lost body fluids. Workers must replace water and salt lost from sweating. Workers must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement Electrolyte replacement fluids such as Gatorade or Quik-Kick or a combination of these with fresh water should be available for use. Workers should be encouraged to increase their sodium intake (Administering salt tablets is prohibited).

- Establishment of a work regime that provides adequate rest periods for cooling down. This may require additional shifts of workers. Heat stress measurements shall be compared to the American Conference of Governmental Industrial Hygienists (ACGIH) Heat Exposure for threshold Limit Values (TLVs) for work regimens.

- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.

- All work breaks should be taken in a cool rest area (77 F is best) or at the minimum in a shaded area.

- Employees shall remove impermeable protective garments during rest periods.

- Employees shall not be assigned other tasks during rest periods.

- All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress.

- Work rest schedules will be designated by the site safety officer. Determination will be based on temperature, tasks being performed, wind factors, personal protective posture along with other factors which must be addressed based on daily site conditions. (see Attachment Q)

6.0 HAZARD ASSESSMENT

6.1 Assessments Required Prior to Commencement of Work

The principal hazards, particularly special or unusual hazards associated with the implementation of each project shall be evaluated and identified in the Site-specific Health and Safety Plan. For projects involving handling of or exposure to hazardous or toxic materials, the hazards shall be assessed, where possible by a person with a minimum of three years of experience with construction or remediation work with hazards similar to those anticipated on the subject project. For projects involving general construction activities (trenching, grading, earthwork, deep excavations, demolition etc..) the hazards shall be assessed by a person with a minimum of three years of experience with construction work with hazards similar to those anticipated on the subject project.

For work involving hazardous or toxic chemicals for which Level C or a higher level of personal protective equipment is necessary (see Section 7.0 for definitions), the hazard assessment and the specification of personal protective equipment and safe working procedures shall be made by a Industrial Hygienist. Such personnel are defined as persons that have documented training in occupational safety and health, a sound working knowledge of pertinent State and Federal regulations and have a minimum of three years of experience in the assessment of hazards and the preparation of health and safety plans for work involving risks to health and safety similar to those that apply to the subject project. In preparing the hazard's assessment, the IH shall consult with professional engineers or other technical specialists as necessary to properly evaluate and design systems and procedures to mitigate the hazards that may be encountered under the site-specific conditions.

6.2 Periodic Hazards Assessment

At the beginning of each project shift, and as often as necessary to ensure safety, a supervisor shall conduct an area survey to locate workplace hazards and assess appropriate control measures. The Project Safety Officer shall personally inspect the whole of the Project Sites at least weekly to evaluate observable hazards that may be present and to take action to control them. The results of the Project Safety Officer's observations shall be documented. All health and safety actions taken on the project site as the result of the findings of any routine or special review, or in response to any accident or unanticipated hazardous condition, shall also be documented in a record maintained on the project site and forwarded to central project files when the project is complete.

6.3 Monitoring Records

Data from programs designed to monitor air, soil, water and waste streams, in addition to daily work records, are to be entered into permanent log books. When complete, all logs are to be forwarded to Aronson Engineering, Inc. central project files and the Army Corps of Engineers. All monitoring and exposure records shall be available to any employee's or other site personnel upon there request, this request must be in writhing and kept for review.

7.0 PERSONAL PROTECTIVE EQUIPMENT

On any project where personnel may be exposed to hazardous or toxic chemicals and/or materials, the Site-specific Health and Safety Plan shall specify Personal Protective Equipment (PPE) according to the hazards or potential hazards to which personnel may be exposed. The equipment to be used shall be selected from the appropriate Protective Level (A, B, C, or D) defined below unless some other form or combination of equipment would be more appropriate. Selection of alternative equipment combinations must be based on the specific hazards and work to be performed, as they are defined following a site-specific evaluation.

If during the progress of the work, any condition is found that poses a greater hazard than that contemplated when the Protection Level was selected or a potential hazard of unknown characteristics is encountered, the Protection Level shall be immediately upgraded to a higher level commensurate with the risk to health and safety.

All protective equipment and clothing shall meet or exceed the minimum specifications set forth by applicable Federal or State standards organizations. All personnel required to use Level A, B, or C personal protective equipment shall be instructed in its use according to OSHA/NIOSH regulations.

7.1 Level A Protection

7.1.1 Characteristics of Hazard

The hazardous substance has been identified and requires the highest level of protection for skin, eyes and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates, or

- The site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin.

- Substances with a high degree of hazard to the skin are known or suspected to be present and skin contact is possible.

- Operations conducted in confined, poorly ventilated areas and the absence of conditions requiring Level A has not yet been determined.

7.1.2 Equipment

➢Self-contained Breathing Apparatus (SCBA).

➢Total encapsulating chemical-resistant suit with or without cooling vest.

➢Inner gloves (surgical).

➢Chemical-resistant outer gloves.

➢Chemical-resistant boots with steel toes.

➢Non-conductive hard hat.

➢Two-way radio worn inside suit.

7.2 Level B Protection

7.2.1 Characteristics of Hazard

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection than that required to meet the protection standards of Level A. This includes atmospheres with IDLH (Immediately Dangerous to Life or Health) concentrations of specific substances that do not represent a severe skin hazard or that do not meet the criteria for use of air-purifying respirators.

- The atmosphere contains less than 19.5 percent oxygen.

- The presence of incompletely identified vapors or gases is indicated by a direct reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

7.2.2 Equipment

➢SCBA or positive pressure supplied air.

➢Hooded chemical-resistant suit one or two piece with or without cooling vest.

➢Inner gloves (surgical).

➢Chemical-resistant outer gloves.

➢Chemical-resistant boots with steel toes.

➢Non-conductive hard hat.

➢Two-way radio worn inside suit.

7.3 Level C Protection

7.3.1 Characteristics of Hazard

- The atmospheric contaminants, liquid splashes or other direct contact will not adversely affect or be absorbed through any exposed skin.

- The type of air contaminants have been identified, concentrations measured and an air-purifying respirator is available that can remove the contaminants.

- All criteria for the use of air-purifying respirators are met.

7.3.2 Equipment

➢Full-face or half mask air purifying respirator with appropriate cartridges.

➢Chemical-resistant overalls or two-piece suit (Tyvek or equivalent).

➢Chemical-resistant outer gloves (inner gloves are optional).

➢Chemical-resistant boots with steel toes or disposable chemical booties worn over standard steel-toed boots.

➢Face shield and chemical splash-resistant goggles.

➢Non-conductive hard hat.

➢Hearing protection if needed.

7.4 Level D Protection/Modified Level D

7.4.1 Characteristics of Hazards

- The atmosphere contains no known hazard.
- Work functions preclude splashing, immersion or the potential for unexpected Inhalation of, or contact with, hazardous concentrations of any chemicals.

7.4.2 Equipment

➢Cotton or cotton blend coveralls or work uniform.

➢Work gloves.

➢Standard steel-toed boots leather, Gortex TM, or rubber).

➢Safety glasses.

➢Non-conductive hard hat.

➢Dust mask. If needed.

➢Hearing protection. If needed.

7.4.3 Modified Level D.

Same as Level D with the following additions:

(1) Saranex-or Polyethylene-coated Tyvek (or equivalent) coveralls with hood (when handling or in contact with contaminated materials).

(2) Nitrile, Neoprene, Viton, or natural rubber over boots (when handling or in contact with contaminated materials).

(3) Nitrile, Neoprene, Viton, natural rubber, or other chemical resistant gloves (when handling or in contact with contaminated materials).

7.5 Other Personal Protective Equipment Requirements

Many construction operations, in addition to those involving hazardous or toxic chemicals, require use of protective clothing and/or equipment. No work shall be undertaken by any person not equipped with and trained in the use of the appropriate personal protective equipment.

7.5.1 Minimum Requirements

Except when resting in designated safe areas or in offices or other designated accommodations, all project personnel shall wear a non-conductive hard hat and steel-toed boots or shoes. Pants, shirts, coveralls, overcoats and weatherproof outer garments shall be selected that provide protection from sunburn, heat stroke, heat loss and inclement weather and shall be appropriate to the work being undertaken, industrial gloves shall be available to protect the hands when performing tasks that expose the hands to abrasion or contamination. These requirements are minimal and do not substitute for personal protective equipment specified in the Site-specific Health and Safety Plan and selected according to the criteria stated in Sections 7.1 through 7.5.

The Project Safety Officer shall have the authority to prescribe minimum protective clothing and equipment requirements according to the task being performed and the prevailing weather or other environmental conditions.

7.5.2 Eye Protection

Eye protection is required when engaging in any of the following activities:

- Drilling, chipping, grinding, wire brushing.
- Handling caustics and acids.
- Breaking bricks or concrete.
- Hammering chisels, drift pins, nails, etc.
- Cutting torch or welding.
- Other operations which create a possible eye hazard, e.g., use of chemicals, steam-cleaning, pressure washing, etc.

7.5.3 Hearing Protection

At any time noise levels exceed the safe limits (85db) established by Federal or State regulations, all affected personnel shall wear earplugs, ear muffs or other equipment adequate to safeguard their hearing. For any project where noise hazard, due either to the noise level or the duration of exposure, can be identified prior to mobilization for the work, the noise hazard must be addressed in the Site-specific Health and Safety Plan. Protection from noise hazards is to be provided by engineered controls unless such controls are impracticable. If engineering controls are impracticable or would be insufficient to fully safeguard hearing, the requisite hearing protection equipment and procedures shall be specified in the Site-specific Health and Safety Plan.

Regardless of whether or not noise levels exceed regulatory standards, all site personnel working with or around construction equipment or other noise-generating machinery shall wear plug or muff-type hearing protectors unless wearing hearing protectors could cause greater risk. This determination will be made by the site safety officer. If deemed necessary by the site safety officer a noise dosimeter may be utilized to help establish Time Weighted Averages (TWA) for any particular area of the site.

8.0 REGULATED AREAS

8.1 General Regulation of Access to Project Sites

All areas within the boundaries of the Project Site shall be considered regulated with respect to access. No persons shall be admitted to the Site unless they are project personnel or visitors with legitimate business related to the work. Children, including minors under the age of 18 years, are prohibited from all sites where hazardous or toxic chemicals or materials may be present.

8.2 Visitors

Upon arrival all visitors to the project site shall report immediately to the Project Superintendent or his designee. All visitors shall comply with the requirements of the Site-specific Health and Safety Plan including the requirements for personal protective equipment, unless the Project Safety Officer and Army Corp. representatives waives specific requirements according to the provisions of this Master Plan or the more restrictive provisions, if any, of the Site-specific Health and Safety Plan. All visitors must sign into the site, see Attachment "B" (Visitors Log)

8.3 Public Access

There shall be no public access to the project site unless such is provided under the terms of the contract with the client or such is necessary to maintain traffic flow along a public right-of-way. If public access to a project site is required, the publicly accessible areas or rights-of-way shall be clearly demarcated and protected in such a manner as to reduce the hazards of the site that might affect the public to a practical minimum.

8.4 Hazardous Areas

On project sites where hazardous wastes are present or the work involves exposure or potential exposure to toxic or hazardous chemicals and/or materials, the Site-specific Health and Safety Plan shall establish regulated areas to control exposure of personnel to the hazard and to control the spread of hazardous or toxic materials from the affected area. The characteristics of the hazards and the work to be performed will determine the specific requirements for regulated areas and the personal protective equipment and work rules that will apply within them.

The boundaries of all regulated areas (other than the perimeter of the Clean or Low Hazard area see Section 8.4.3) shall be clearly marked by yellow caution tape securely mounted at a height of three feet, or by such other means as will segregate one regulated area from another as prescribed by the Site-specific Health and Safety Plan. If required or necessary a chain link fence will be erected around all areas where additional control may be needed.

8.4.1 High Hazard Area (Exclusion Zone, EZ)

This regulated area includes the area where deep trenches/excavations, toxic or hazardous chemicals and/or materials are present or is the area containing and immediately surrounding the source of the hazard. This zone has the highest inhalation exposure or potential and presents a high probability of skin contact with hazardous materials or injury. The whole of this area shall be adequately lighted when work is being performed during the hours of darkness.

8.4.2 Hazard Barrier Area (Contamination Reduction Zone, CRZ)

This regulated area includes any areas immediately surrounding the high hazard areas where there is a secondary potential inhalation hazard or injury in the event of a release, cave-in or ect. The probability of skin contact or inhalation of toxic or hazardous materials in this area should be low. The boundaries of this area must be adequately lighted when work is being performed during the hours of darkness. The decon station will be placed in this area within the Contamination Reduction Corridor (CRC)

8.4.3 Clean or Low Hazard Area (Support Zone, SZ)

This area includes all areas of the project site outside the Hazard-barrier Areas and/or/the High Hazard Areas. Adverse exposure to hazardous materials or injury related conditions is less likely is in this area. This area is regulated according to the provisions of Section 8.1.

8.5 Soils Storage/Waste Refuge Area

Site employees should not enter soil storage or waste refuge areas of the site without permission and knowledge of the management or operators in charge, these areas will be designated and marked by the project manager or site safety officer based on site conditions.

9.0 DECONTAMINATION

For projects involving hazardous or toxic chemicals and/or materials, procedures for decontaminating personnel, personal protective equipment, tools and machinery shall be established by the Site-specific Health and Safety Plan. When the Site-specific Health and Safety Plan requires a decontamination area or unit to be established, it shall be set up in a demarcated area within the Contamination-reduction Area (see Section 8.4.2).

The safe working procedures for the decontamination area and procedures for management of contaminated clothing, equipment, tools or machinery shall be established by the Site specific Health and Safety Plan and shall include the following requirements as appropriate:

- A clean step-off area shall be established just inside the hazard-barrier area.

- All persons entering or leaving the hazard-barrier area shall pass through the Decontamination Area to don or doff their protective equipment.

- Persons entering the hazard-barrier area from the Clean Area shall be equipped with disposal boot covers if required or requested by the Site Safety Officer.

- Contaminated protective equipment shall not be removed from the Decontamination Area until it has been cleaned and properly packaged and labeled.

- Personnel shall not be permitted to exit the Decontamination Area until contaminated clothing and equipment have been removed and employees have washed their hands and face with soap and water or Decon Wipes as determined by the Site Safety Officer.

- Decon Log must be completed prior to personnel departing the Decon area (See Attachment "C").

- Removal of materials from protective clothing or equipment by blowing, shaking, or any other means which may disperse materials into the air is prohibited. The exception to this will be debris and soil removal of low level contaminates for trucks, tractors and heavy equipment by brushing or brooming etc..

- Portable or fixed emergency shower and eyewash stations) shall be strategically located in the Decontamination Area wherever there is a hazard to the skin or eyes or risk of absorption of toxic materials through the skin.

- A deluge shower or hose and nozzle shall be available in the Decontamination Area to wash down heavily contaminated personnel before doffing protective clothing, if required by the safety officer based on site conditions set for that day.

- When an inhalation hazard that is immediately dangerous to life and health (IDLH) is present, an inhalation and resuscitation unit shall be available in the Decontamination Area. This equipment is to be used only by CPR-trained personnel. In addition, each person directly exposed to IDLH inhalation hazards shall be equipped with his or her personal inhalator and resuscitator that shall be available for immediate use. This condition is not expected on this tank removal project, but should be addressed if the potential arises at a future date.

- Eating, drinking, smoking and application of cosmetics shall be restricted to the Clean Area.

- All employees shall be required to wash their face and hands with soap and water or decon wipes before eating, drinking, smoking or applying cosmetics.

- Unless the risk of significant residual contamination is slight, as determined by a site-specific evaluation, change rooms and shower facilities shall be provided for the use of employees working within the Contaminated Area or the Contamination-reduction Area, if required by the Site Safety Officer.

- When necessary to safeguard health, all personnel shall be required to shower at the end of their shift before leaving the job site or immediately upon arrival at there home. Based on the hazard evaluation made by the Site Safety Officer.

10.0 SAFE WORK PRACTICES

All work shall be performed in a safe manner according to established procedures and in compliance with all applicable manufacturer's instructions, equipment operating instructions, equipment safety instructions, the Site-specific Health and Safety Plan (including this Master Health and Safety Plan) applicable Federal, State and local laws, regulations, guidelines and contractual conditions. Additionally all personnel must follow procedures set forth in Aronson Engineering, Inc. and subcontractors IIPP(s) as appropriately based on the tasks being performed.

The following subsections address the requirements for safe working as they relate to several operations commonly encountered in construction and remediation work. The subjects addressed do not constitute an exhaustive list. Any hazardous procedure not specifically addressed in this section or elsewhere in this Plan shall be addressed in the Site-specific Health and Safety Plan, or if not anticipated in the latter, it should be the subject of case-by-case directives by the Project Safety Officer.

10.1 Confined Space Entry

10.1.1 Definition

Confined spaces include storage tanks, bins, sewers, in-ground vaults, degreasers, boilers, vessels, trenches, shafts, tunnels, manholes, pits or any enclosed or partially enclosed space that:

- Is large enough and laid out in such a way that a worker could enter and perform work.
- Has limited means of entry and exit (e.g., a storage bin, trench, vault, pit or diked area).
- Is not designed for continuous occupancy by the worker.
- Contains or **may** contain a hazardous atmosphere.

- Contains the **potential** for engulfment by loose particles, mists, liquid, gases ect.
- Has an internal layout such that someone entering could be trapped or asphyxiated by inwardly converging walls or a floor which slopes downward and tapers to a smaller cross-section .

- Contains any other recognized serious safety or health hazard.

These enclosures because of inadequate ventilation and/or the presence or introduction of hazardous gases and vapors may present conditions that could produce asphyxiation or injury due to inhalation of toxic materials.

10.1.2 Safety Procedures and Notifications

The Project Safety Officer. must approve any Confined Space work prior to entry. When work is to take place in a confined space which may become hazardous because of atmospheric contamination, oxygen deficiency and/or limited means for entry and exit into the work area, the tests and inspections required by OSHA/NIOSH Safety Procedures must be performed and an approved "Confined Space Entry Permit" form (see Attachment O of this Plan) must be completed before the space is entered. The permit form must be completed, reviewed, updated, signed and dated by the personnel in charge of the work at the site and checked, approved and signed by the Project Safety Officer. Executed copies of the form must be displayed at the work site and copies retained by the subcontractor and/or the Project Safety officer.

Before approving a Confined Space Entry Permit the Project Safety Officer will review the completed permit and its checklist for compliance with safe entry requirements which include:

10.1.2.1 Removal of Contents

Confined spaces must be clean, free of hazardous materials or chemicals and where necessary, purged by water or other equivalent means.

10.1.2.2 Isolation

All piping or utility lines which discharge into or connect to the confined space shall be disconnected and capped or isolated. The use of a single in-line valve shutoff as the sole means of isolating the confined space from any input lines is prohibited. However, the use of a double in-line valve arrangement with a vent in between the two valves is acceptable provided that dangerous air contaminants are not introduced by such venting. Utility services (e.g. electricity for lighting) to the confined space provided by way of systems specifically designed to operate safely when the space is entered, and which have been properly maintained and that are undamaged, may be permitted if a greater hazard would be created by cutting them off.

10.1.2.3 Electrical Lockout

Where electrical devices located within the confined space (motors, switches, etc.) are to be repaired or worked on, the line disconnect switches supplying the power must be tagged and locked in the "OFF" position. The lock key is to be kept by the person performing the job and only this person is authorized to unlock the switch and remove the tag upon completion of the job. Where more than one person is working on the line each must place a lock on the switch and retain his own key. Line disconnect switches supplying power to any mechanical apparatus that normally operates in the confined space (pumps, compressors, conveyors etc. as found in lift stations) must also be tagged and locked in the "OFF" position. This must be done for any entry, even though work will not be performed on the apparatus itself.

10.1.2.4 Securing of Covers

All manhole and clean out covers shall be removed and the openings maintained clear of any obstructions. When hinged doors or lids are provided, they shall be secured so they cannot be closed. (See Section 10.5.3 for required barricades.)

10.1.2.5 Testing of Atmosphere

A qualified person shall make appropriate tests of the atmosphere in the confined space to ensure the following:

- Combustible gas and vapor concentrations do not exceed 10 percent of the Lower Explosive Limit (LEL).

- Oxygen content is no less than 19.5 percent and no greater than 23.5 percent.

- Appropriate respiratory protective equipment and other appropriate Personal Protective Equipment have been provided for all employees when concentrations of toxic materials exceed established threshold limit values (TLVs).

10.1.2.6 Continuous Monitoring

If the nature of the work to be performed introduces or has the potential to introduce harmful air contaminants, continuous monitoring of the atmosphere is required. If tests indicate evidence of dangerous air contaminants and/or the oxygen content drops below 19.5 percent all personnel shall evacuate the confined space immediately.

10.1.2.7 Ventilation

All confined spaces found to be unsafe must be ventilated by means of a positive mechanical exhaust system so arranged as to avoid re-circulating contaminated air.

10.1.2.8 Buddy System

At least one standby person shall be stationed just outside the access opening of any confined space while such space is occupied. This person shall:

- Maintain continuous awareness of the activities and well-being of the worker(s) in the confined space.

- Be able to maintain verbal communication with the workers(s) in the confined space at all times.

- Be alert and fully capable of quickly summoning help.

- The Standby person shall not be assigned any other duties or responsibilities except to attend to the confined space entrants

- Be physically able and equipped to assist in the rescue of an occupant from a confined space under emergency conditions.

10.1.3 Safety Gear and Personal Protective Equipment

All personnel (including standby personnel) involved with work in a confined space must be instructed in accordance with the applicable OSHA/NIOSH regulations regarding safety gear and personal protective equipment required for the work. Such instructions shall be provided by the Project Safety Officer or a qualified representative of a subcontractor and received by the employee before entering any confined space.

NOTE: Confined Space work is not expected to be utilized on this tank removal project at the Parks Reserve Training Area.

10.2 Compressed Gas Cylinders

The following procedures shall apply in the use of all gas cylinders. (Note: Refer also to Section 10.3.3, Oxygen/Acetylene Welding and Cutting.)

- Caution shall be taken to avoid gas cylinders being dropped or struck.

- Valve protection caps shall be in place when compressed gas cylinders are transported, moved or stored.

- Cylinders shall be stored away from sources of heat.

- When stored in the open, cylinders must be protected from continuous sunlight.

- Cylinders will never be lifted by machinery unless they are in a safety stand or cradle or are otherwise positively secured against failing or being dropped.

- Special arrangements must be made to secure cylinders while they are being transported. Carrying them loose on the back of a truck or in a pickup is prohibited.

- Caps must be firmly screwed onto cylinders except when the cylinders are connected to a regulator during use.

- Gas cylinders must be kept free from oil or grease. Use of oil or grease as a lubricant for valves or attachments is prohibited.

- Smoking or flame is prohibited near gas cylinders or outlets.

- Mixing gases in cylinders, refilling cylinders or using cylinders for any use except their original purpose is prohibited.

- Hoses must never be hung from regulators, other equipment or the cylinder tops.

- Cylinder valves shall be closed when work is finished and when cylinders are empty or are moved.

- Compressed gas cylinders shall be secured (roped or chained) in an upright position at all times, except when cylinders are actually being hoisted or carried.

- Pressure regulators shall be in proper working order while in use.

- Field adjustment or repair of gauges, valves, accessories or safety devices is prohibited.

- If a leak develops in a gas cylinder, it shall be immediately removed to a safe location in the open air. If the leak cannot be corrected, it shall be reported to the Project Safety Officer.

- Cylinders shall be permanently marked or stenciled to identify the type of gas in the cylinder.

- All empty cylinders shall be tagged and stored separated from full cylinders.

10.3 Welding and Cutting.

10.3.1 General

- Only trained employees whose regular duties as assigned by their supervisors include welding and cutting will perform this work.
- Only standard approved equipment will be used.
- Fire extinguishers will be easily accessible to all employees performing welding or cutting operations.
- Screens or shields will be provided for the protection of persons or combustible material exposed to sparks or falling objects where necessary a fire-watch will be posted and an adequate extinguisher and signaling device will be available at the work site.
- When working on lead, zinc galvanized steel or other material that could generate harmful fumes, adequate ventilation and exhaust devices will be provided. When ventilation is not practical or feasible, respiratory protection will be used.
- A qualified supervisor will inspect the work site before any use of welding or cutting equipment to ensure that all combustibles in the work area have been removed or otherwise protected from the welding or cutting work. He or she will also assure that a current Hot Work Permit (see Attachment "E" of this Plan) is in effect at the designated job site.

10.3.2 Arc Welding

- Frames of welding machines operated from electric power sources must be properly grounded.

- When welding employees must wear adequate masks or hoods with proper eye protection, gloves and leather aprons as minimum protection. These will be supplemented with hard hats, safety shoes and other protective gear when warranted.

- All employees and passersby near the welding area will be protected from eye flash-burns by use of partitions, screens or other appropriate methods.

- Welding cables, cords and leads must be neatly secured so as not to cause tripping.

- Electrode stubs will immediately be disposed of in a safe container.

10.3.3 Oxygen/Acetylene Welding and Cutting

- The safety procedures for use of gas cylinders specified in Section 10.2 apply.

- Oxygen cylinders must be stored at least 20 feet away from those containing any fuel gas.

- Where stored inside, oxygen cylinders must be separated from those containing fuel gases by a 5-foot high, non combustible barrier with a fire rating of at least one half hour, or they must be separated by a 20-foot distance.

- Acetylene will not be used for welding or cutting at pressures exceeding 15 psig.

- Acetylene cylinder valves will not be opened more than one full turn and the wrench will be left on the valve stem so that the valve can be closed quickly if necessary.

- When in use, oxygen cylinder valves will be opened fully and made hand-tight against the back seat. This takes the high-range cylinder pressure off the packing.

- It is permissible to close torch valves alone only when work is briefly suspended and the operator is nearby. Any other interruption of use (e.g. if one cylinder becomes empty) necessitates closing the cylinder valves, followed promptly by opening the torch valves to purge lead-hoses and releasing the regulator screw.

10.4 Electrical Safety

10.4.1 Design, Construction and Use of Electrical Equipment.

All electrical equipment shall be installed by qualified technicians according to established standards or application-specific designs prepared by professional electrical engineers. The following safety rules shall apply.

- All electrical equipment shall comply with NFPA70 National Electrical Code and applicable local codes and regulations.

- All electrical equipment shall be operated according to manufacturer's instructions.

- The non-current carrying metal parts of fixed, portable or plug-connected equipment shall be grounded. Portable tools and appliances protected by an approved system of double insulation need not be grounded.

- Extension cords shall be the three-wire type for grounded tools (two-wire is permissible for double insulated tools) and shall be protected from damage.

- Cords shall not be fastened with staples or extend across an aisle way or walkway. Worn or frayed cords shall not be used. Cords shall not be run through doorways where the door could cut or damage it.

- Splices in all electrical cable shall have insulation equal to that of the cable.

- Exposed bulbs on temporary lights shall be guarded to prevent accidental contact, except where bulbs are deeply recessed in the reflectors. Temporary lights shall not be suspended by their electric cords unless designed for this use.

- Receptacles for attachment plugs shall be of the approved, concealed, contact type. Where different voltages, frequencies or types of current are supplied, receptacles shall be of such design that attachment plugs are not interchangeable.

10.4.2 Work Around Overhead Conductors

All overhead electrical conductors or other cables, wires or obstructions shall be carefully noted before work begins on a project site. Their locations shall be pointed out during Tailgate Safety Meetings. Cranes, drilling rigs, earth moving equipment or any other equipment that could come in contact with or could approach close to such overhead lines shall not be operated within thirty feet of the lines except as specifically directed by the Project Safety Officer following an evaluation of the hazards involved and prescription of rules by which the work can be safety performed.

If there is any doubt that work in close proximity to overhead electrical lines can be performed safely, power to the lines must be cut off for the duration of the work.

10.4.3 Excavation Around Buried Electrical Cables

Safety rules for excavation around buried electrical cables are specified in Section 10.5.2. (Additionally see Attachment "M")

10.5 Excavation, Trenching, Drilling

The following minimum safety standards shall apply to pile driving, excavation, and trenching.

10.5.1 Excavation Work and Shoring

- All excavation, trenching, shoring and backfilling will be in accordance with the prescriptive requirements of 29 CFR 1926, Subpart P. Shoring, as a minimum, will meet the requirements of Table P-2 of 29 CFR 1926 Subpart P. Variations from the prescriptive requirements of 29 CFR 1926 will be permitted only when shoring or benching and/or sloping of the excavation is constructed according to the recommendations of a Registered Civil Engineer. Additionally regulations will be followed as set fourth in The Army Corps specifications or which ever is more stringent.

- To avoid collapse of the walls of excavations during inclement weather, trenches and pits shall be excavated so that insofar as practicable, the surrounding area drains surface water away from the excavation. If surface water drainage flows onto or through the area to be excavated it shall be diverted so as to avoid risk of flooding the excavation or endangering the stability of the excavation due to the action of water.

- Trenches or other excavations in excess of 5 feet deep (or shallower if there is any evidence of accumulation of asphyxiating or toxic vapors, gases or fumes in the excavation) shall be considered to be a confined space. Before any personnel enter an excavation, the Project Safety Officer shall evaluate any hazards posed by entering the excavation and direct the use of the appropriate elements of the safe work practices for Confined Space Entry prescribed in Section 10.1 of this Plan. Note: Unless otherwise directed by the Project Safety Officer, work in trenches less than five (5) feet will not require issuance of a Confined Space Entry Permit. For work in excavations deeper than 5 feet, the required safety procedures will include, as a minimum:

- Testing to determine that the oxygen content of the air at all points in the excavation is not less than 19.5 percent and no greater than 23.5 percent

- That the "Buddy System" of working be used

- Daily inspections of excavations shall be made by the Project Safety Officer. If there is evidence of possible cave-in or slides, all work in the excavation shall cease until the necessary safeguards have been taken.

- Trenches entered by personnel and more than four feet deep shall have ladders or steps located so as to require no more than 25 feet of lateral travel from the work site to a means of egress from the trench.

- All excavations shall be backfilled as soon as practical after work is completed and all associated equipment removed.

- Any excavation to be backfilled must be carefully observed before work begins.

10.5.2 Excavation Around Buried Utilities

The following procedures shall be used for excavating around buried utilities:

- Where trench excavation is to be performed around, beneath or in close proximity to buried pipelines or electrical conduits, the locations of the pipelines or conduits, to the extent that they are known, shall be marked by ground painting or by stakes labeled as to the type of hazard.

- All trench excavation in close proximity to underground utilities shall be by hand.

- Except by authorization of the Project Safety Officer and only when necessitated by conditions of the work or contract, power shall be cut off from all underground electrical power lines within or in close proximity to excavations or trenches when excavation or backfilling work is in progress.

- Except by authorization of the Project Safety Officer and only when necessitated by conditions of the work or contract, all gas lines within or in close proximity to trenches shall be shut off before excavation commences and not opened to gas flow until backfilling is complete.

- Wherever possible, all water mains or other underground utility piping carrying fluids that pass through or in close proximity to trenches shall be shut off for the duration of the excavation and backfilling work, or bypass will be installed if it is necessary to maintain operations,

- All valves and switches that are either closed or opened for the purpose of compliance, with the above requirements shall be labeled with a notice stating that they shall not be operated without the authorization of the Project Safety Officer.

- Any bypass pumps installed will be rated equal to or exceed flow rate requirements for that section of pipe.

- Trenches of four feet or deeper shall have a means of escape every 25 feet. All ladders shall extend out of trenches by minimum of 3 feet and be secured to prevent movement.

10.5.3 Barricades

- All excavations shall be completely barricaded on all sides. Barricades shall be positioned a minimum of two feet from the edges of the excavation.

- Excavation barricades shall consist of wooden or metal stakes or stand type spaced no further apart than 20 feet. Such barricades shall be not less than 36 inches high when erected. Caution tape will be tied to the stakes enclosing the hazard area.

- Temporary fencing will be used in all areas where greater security is needed or required as per the Army Corp. of Engineers.

- Barricades used around excavations that remain open during hours of darkness shall be equipped with yellow flashing lights 8-inches in diameter.

- Chain link fencing may be required for barricading or blocking off of area's where the hazard potential is higher or additional site control and security is necessary.

- Barricades shall be positioned as according to Bid specifications or as follows, whichever is more stringent.

- A minimum of two barricades shall be used at the corners of an excavation, one along either side of the opening.

- At least one barricade shall be used where vehicular traffic approach excavations at right angles.

- Where trenches parallel roadways, distance between barricades shall not exceed 40 feet unless this requirement conflicts with the above stated requirements and additional units are required.

- All lighted barricade units shall be checked at regular intervals and serviced as necessary to ensure that the lights are working,.

- The space between barricades shall be spanned by at least 1 and 1/2-inch wide plastic yellow and black striped tape. The tape shall be stretched securely between barricades.

- Walkways and/or bridges with standard guard rails shall be provided at all public pedestrian crossing points except that when trench width is 2 feet or less an AUSI D6.1 Type I barricade straddling the trench on either side of the walkway may be used.

- All surfaces of barricades or walkways which a person could reasonably contact should be free of splinters, nails or protrusions which may cause injury.

- Except as required for implementation of the work, no person shall approach closer than 10 feet to an open excavation, unless space limitations dictate otherwise, and the hazards have been addressed.

10.6 Scaffolding

The following requirements will apply to scaffolding:

- All scaffolding will conform to 29 CFR 1926.451 (Federal OSHA Construction Safety Standards) and applicable state and local codes.

- All job site supervisors and foremen shall be advised of their responsibility for the safety of their personnel when assigning personnel to work on or off scaffolding.

- The Project Safety Officer will make a safety review of all scaffolding before use and at least weekly thereafter. Written records of such inspections will be maintained.

- Shift supervisors will make a safety review of all scaffolding at the beginning of each work shift. Any corrective action required shall be taken before workers are admitted onto the scaffolding.

- If several crafts are using sections of the scaffolding simultaneously, it may be necessary for supervisors to review the scaffolding more frequently than specified above, especially if other crafts are removing, brackets, bracing, tie-wires planking or other components to get equipment or materials into place.

- Scaffolding review will include but not be limited to: base plates, sills, bracing, tie-ins, planking, access ladders to working levels, guardrails (handrail, midrail, and toeboard), anchorage to building structure and plumb scaffold.

10.7 Required Use of Safely Belts and Harnesses

Safety belts and harnesses must be used in all situations where there is risk of falling or in situations where an unconscious or injured person may have to be rapidly removed from an inaccessible or hazardous area and such removal would threaten the safety of rescue workers. Such situations include:

- Safety harnesses must be worn when working above six (6) feet on straight or extension ladders when the work involves pushing, pulling or action which may dislodge the person from the ladder.

- Safety harnesses are also required on swinging or portable scaffolds mounted ten feet or more above ground or floor level where handrails and toe guards are not provided.

- Safety harnesses and lifelines are required on all work in confined spaces where an oxygen deficiency or toxic vapors may exist (refer to Section 10.1.1).

- Safety harnesses and lifelines must be worn on roof tops where there are no guard rails and the work is within ten feet of the edge.

- All lifelines shall be safely secured to stable and adequate supports, capable of supporting a minimum dead weight of 5,400 LB's person.

- Fall protection equipment must be designed, constructed and used according to the provisions of 29 CFR 1926.104 and 29 CFR 1910.

10.8 Floor Openings

The following shall apply to openings in all floors or elevated platforms:

- Floor openings shall be guarded by substantial barriers, railings and/or covering material substantial enough to sustain twice the load of pedestrians or vehicular traffic.

- Where a danger of falling exists for personnel, the perimeter of elevated floor areas and any uncovered openings must be provided with guard rails. In addition, toe boards shall be provided when the possibility of objects falling and striking personnel below exists.

10.9 Ladders

The following safety rules apply to the use of ladders.

- No personnel may use a ladder that is defective or does not meet OSHA requirements.
- Wooden ladders will not be painted. They may be treated with linseed oil.
- Splicing of ladders is prohibited.
- Work will be arranged so that employees are able to face ladders and use both hands while climbing.
- The use of ladders to transport heavy or awkward shaped items is prohibited.
- Ladders must not be placed adjacent to doors unless the door is locked or guarded.
- Metal ladders shall not be used in proximity to electrical conductors.
- Step ladders must never be used as straight ladders. They must be fully opened at all times except when in storage. Personnel will not be allowed to stand on the top step or end cap of step ladders.
- Ladders must be tied off and extend over 3 feet above the landing surface.

10.10 Chemicals and Hazardous Materials

On projects involving hazardous or toxic chemicals and/or materials, the Site-specific Health and Safety Plan shall address the special requirements for the safe implementation of the work. However, hazardous chemicals and materials are routinely encountered in construction work other than those involving chemical engineering construction or clean-up of hazardous wastes. The following safety requirements will apply to the use of hazardous materials and chemicals in construction and for which special provisions have not been made in the Site-specific Health and Safety Plan.

10.10.1 General Requirements

- While handling hazardous or toxic chemicals and/or materials, personnel will follow directions and comply with any warnings or cautions affixed to the containers. Any questions concerning the use of such chemicals and personal protective equipment required will be directed to the Project Safety Officer.

- The Project Safety Officer will maintain on site Material Safety Data Sheets (MSDS) for all chemicals, flammables, solvents, paints and other hazardous products used on the project. Exceptions may be made in the case of common fuels (e.g., diesel, kerosene, gasohol or gasoline) or common paints, solvents or adhesive products used in small quantities and that are adequately labeled as to contents and safe use on the container supplied by the manufacturer.

- All chemicals shall be stored in safe and clearly labeled containers and in accordance with manufacturer's instructions.

10.10.2 Solvents and Paints

When solvents and paints are being used, care shall be taken to avoid injury due to inhalation of toxic materials, adsorption of toxics through the skin, adverse skin reaction or damage to the eyes and to prevent fire. The following minimum requirements apply:

- Adequate ventilation must be maintained at all times when paints or solvents are used.

- Personnel shall use respiratory protection and protective clothing as necessary to protect them from any toxic effects of the materials in use.

- Flammable solvents and paints shall not be used near potential sources of ignition.

- Flammable paints and solvents must be stored in an approved (Factory Mutual or Underwriters Laboratories) flammable liquids storage cabinet when storage is required inside buildings. If an approved cabinet is not available, paints and solvents must be removed from buildings when not in use and no quantity in excess of that needed to meet the immediate requirements of the job shall be stockpiled in buildings.

- Flammable solvents must be dispensed in safety cans with flash arresters bearing a Factory Mutual or Underwriters approval. These containers must be clearly identified as to their contents.

10.10.3 Airborne Pollutants

All project personnel shall be alert for airborne pollution due to sand-blasting dust, smoke, fibers or blown soil and shall report such conditions to his or her supervisor so that action can be taken for its suppression.

10.10.4 Asbestos

If asbestos in any form is encountered on a project site, the affected area shall immediately be covered and sealed off until the Project Safety Officer has developed a specific plan for safe control of the asbestos hazard.

If asbestos material is to be removed, the work shall be performed by qualified asbestos removal subcontractors according to a complete Site-specific Health and Safety Plan, prepared either as an original plan or as an amended and extended plan if the asbestos is unexpectedly discovered during the progress of the work. The Plan will be developed in consultation with an Industrial Hygienist experienced in the management of asbestos waste. The asbestos removal work shall be performed only by properly trained and equipped subcontractor personnel and the Site-specific Plan shall provide for safe control of the asbestos from the time it is first encountered until it is disposed as waste in the prescribed manner at a permitted facility.

10.11 Machinery and Equipment

The following safety rules apply to the use of machinery and equipment.

10.11.1 Heavy Equipment

- Unless it is part of their regular duties for which they have had adequate training no personnel may operate machinery or equipment without specific instructions and guidance.

- Operators must examine their equipment before starting and observe it carefully during use.

- Operators are responsible for immediately reporting to supervisors any apparent or latent unsafe conditions of the equipment being operated. Defective equipment shall not be used until proper repairs are made. Job site records will be maintained as required under 29 CFR 1926 and Federal OSHA Construction Safety Standards, and EM385-1-1 Army Corps of Engineers Safety and Health Requirements Manual..

- All equipment shall be serviced and maintained according to manufacturer's instructions.
- The need for equipment servicing or repairs must be reported to the supervisor.
- No repairs or adjustments shall be made on units when they are operating.
- No lubrication shall be performed on units during operation except where the manufacturer has installed safeguards specifically for the protection of the person performing the lubrication.
- Machinery and equipment shall be adequately secured against accidental or unauthorized starting or movement when not in use.
- Working under suspended loads is forbidden.
- Employees are prohibited from riding booms, loads, slings, hooks or lift-truck forks or platforms.
- Audible alarms will be installed and maintained on all heavy equipment and vehicles as specified in OSHA 1926.602.
- Caution must be taken to make sure that no one is below when equipment is used near tops of cuts, banks or inclines.
- Special care and an observer(s) with whom effective communication has been set up must be used where there is a possibility of overturning equipment (for example near tops of cuts, banks, inclines, deep fills or soft or muddy terrain).
- Keys will be removed from all heavy equipment at the end of the work day and placed in a secure place designated by the Project Safety Officer.

- All hydraulically controlled booms, lifts, blades, buckets, arms etc. shall be lowered to a rest position at the end of the work day.

10.11.2 Power, Air, and Explosive Actuated Tools

- All power tools shall be maintained in good repair and operated in compliance with manufacturer's instructions by personnel trained or experienced in their use.

- No guard, safety device or appliance may be removed from tools or equipment except for the purpose of making repairs. Such removal will only be done by persons qualified to make the repair after the tools or equipment have been taken to a safe area and shut off from sources of power.

- Power actuated tools shall never be left unattended in a place where they would be available to persons not authorized to use them.

- Air hoses must not be disconnected until they are bled and pressure is securely turned off at its source. All air hoses will meet the requirements of 29 CFR 1926.302h (Federal OSHA Construction Safety Standards).

- Explosive actuated fastening tools shall meet the design requirements in "American National Standard Safety Requirements for Explosive Actuated Fastening Tools" (ASTI A10.3-1970). A tool which does not meet these design standards shall not be used.

- Guards required on power tools will be used at all times. Constant-pressure switches or controls will be used on all powered hand tools. Switch locking devices will be removed. Power grinders will have protective shields.

- Power or explosive actuated tools shall not be used in explosive or flammable atmospheres.

- Air actuated nail drivers shall be operated in strict compliance with manufacturer's instructions. When not in use they shall be disconnected from the air supply.

- The electrical safety requirements of Section 10.4 shall apply to the use of all electrically powered tools.

10.11.3 Hand Tools

- All hand tools, whether employee-owned or company furnished, will be maintained in safe condition. Unsafe tools will not be used until repaired.

- All gasoline or diesel powered tools and equipment will be stopped and shut off during refueling.

- The electrical safety requirements of Section 10.4 shall apply to the use of all electrically powered hand tools.

10.12 Housekeeping

The project site including all work, storage and administrative areas, shall be kept in a clean and organized manner. Specifically:

- All materials shall be carefully stacked and located so that they do not block aisles, doors, fixed ladders or any passageway. All passageways must be left unobstructed so as not to interfere with emergency crews wearing SCBA'S and carrying emergency equipment such as fire extinguishers and stretchers.

- Nails protruding from boards or other lumber must be removed or bent over before the lumber is discarded.

- Scrap lumber and all other debris shall be kept clear of all work areas.

- Combustible scrap, waste materials and debris shall be removed at regular and frequent intervals.

- Containers or designated storage areas shall be provided for the collection and separation by type of refuse.

- Covers shall be provided on containers used for- flammable, combustible or harmful substances.

- Overhead storage of debris, tools, equipment, pipes etc., is prohibited.

- All hazardous materials shall be stored in properly designed containers and in designated storage areas constructed and equipped according to applicable Federal, State and Local regulations.

10.13 Vehicles

Note: Refer also to Section 10.11.1, Heavy Equipment.

- All bridges intended for vehicular traffic shall be constructed to withstand twice the load of the heaviest vehicle anticipated.

- Only licensed operators may operate vehicles for which an operator's license is required by state law.

- Operators will inspect vehicles daily before beginning work and at the end of the shift, reporting any obvious areas of possible malfunction (such as brakes or tires). Repairs will be made promptly. Defective vehicles will not be used until repairs are made. All vehicles shall be regularly serviced and maintained according to manufacturer's instructions.

- No guard, safety device or appliance may be removed from vehicles except for the purpose of making repairs. Such removal will only be done by persons qualified to make the repair.

- Floors and decks of vehicles must be kept clean and free of anything that might cause slipping, tripping or a failing hazard.

- The driver and all passengers riding in vehicles shall use the seat belts provided. All vehicles shall be equipped with seat belts and passive restraint equipment as required by law.

- Personnel are prohibited from riding, standing or sitting on moving vehicles unless they are secured in a seat with an industry-approved safety belt.

- No vehicle will be operated in a reckless or careless manner or at a speed that is not safe or prudent under the prevalent conditions of weather, traffic, ground surface, visibility, load or type of vehicle.

- Personnel will not operate vehicles outside of the scope of their regular duty except with specific instructions from their supervisors.

- All vehicles shall be adequately secured against accidental or unauthorized starting or movement when not in use.

- Keys will be removed from vehicles at the end of the workday and placed in a secure area designated by the Project Safety Officer.

10.14 Traffic Control

Traffic routes and control will be established on all major project sites and where such are provided, shall comply with the construction drawings, specifications or conditions of contract. Company or subcontractor vehicles or equipment when not in use shall be parked in designated areas on-site that are well clear of ongoing operations, and such that they will not interfere with the work or hinder response to any emergency.

Personal vehicles shall be parked off the construction site or where no off-site parking is available and on-site space is provided, personal vehicles shall be parked in designated areas well clear of working areas and according to the directions of the Project Safety Officer and according to any client requirements.

All diversion of traffic on public highways, streets or other rights-of-way shall be in compliance with the requirements of local police or appropriate traffic control authorities.

All signs required for the safe direction of traffic shall be provided and obeyed. If control of traffic by flagging is required, personnel performing the duty shall be trained or experienced in traffic control and wear an orange vest according to the requirements of state or local and Park Reserve Authorities.

All areas where traffic is re-directed from its normal flow shall be properly posted and as necessary, lighted so that traffic can pass safely at night. Personnel directing traffic at night shall be equipped with reflective clothing, lights and lighted signals according to state or local regulations and shall be stationed in a fully lighted area. Additional guidance on traffic control maybe supplied by the Corps representative on site.

All area's which require closure requires 21 day's notice before start date. All closures notices are to be addressed with the Corp. of Engineers representative on site.

10.14.1 Site Speed Limit

Other than on paved roads or designated hallways where a higher speed is permitted by law or local regulation and a higher speed can safely be used, no vehicle or equipment shall exceed 10 miles per hour within the limits of the project site regardless of conditions. If vehicle or equipment characteristics or loading, or prevailing conditions of traffic, site congestion, or weather adversely affect operating conditions, the maximum speed permitted shall be that compatible with safety.

10.15 Use of Alcohol, Drugs and Firearms

No Alcoholic beverages, Illegal drugs or Narcotics, Guns or Ammunition are permitted on the Project Site. **No** person under the Influence of Alcohol, Stimulants, Tranquilizers, Barbiturates or other drug not prescribed by a doctor of **Medicine** (Veterinarians not included) will be permitted on the project site. Any site personnel found in violation of this regulation is subject to dismissal from employment following an inquiry into the circumstances of the case that will be conducted under the direction of the Site Safety Officer and/or Aronson Engineering, Inc.(s) management.

11.0 FIRE PREVENTION

Fire prevention procedures shall be addressed in the Site-specific Health and Safety Plan for any project where the risk of fire is greater than that normally encountered in routine construction work. The minimum requirements for any project shall include those specified below.

11.1 Hot Work Operation

An Approved Hot Work Permit is required for all hot work operations. Hot work operations include cutting, welding, brazing, soldering, thermal spraying or any similar activity involving use of an open flame or other potential sources of ignition. A copy of a Hot Work Permit is included as Attachment "E" to this Plan.

11.2 Heaters and Equipment That Produces a Flame

The following requirements apply to the use of heaters and equipment that produce flame.

- An approved Hot Work Permit (see Attachment "E") is required for use of equipment that produces a flame.
- All space heaters or other equipment that uses an open flame or electrically powered radiant heat sources shall be of a Factory Mutual or Underwriters approved type.
- The equipment must be used in strict compliance with manufacturer's instructions.
- The equipment shall be located such that there is no risk that combustible materials will be ignited.
- The equipment shall be located and guarded as necessary so as to protect it from being overturned.
- No equipment that produces an open flame may be used where flammable liquids, gases or highly combustible materials are stored, handled or processed.

11.3 Tarpaulins and Sheeting

Tarpaulins and sheeting used to deflect sparks, dust, paint drippings etc., or used as security barriers, must be constructed from fire-resistant materials and maintained in good condition.

11.4 Storage of Flammable Liquids

All liquid fuels (gasoline, diesel, gasohol, etc.) or other dangerously flammable liquids must be stored in and dispensed from safety cans with flash arresters approved by Factory Mutual or Underwriters Laboratories. These containers must be clearly identified as to their contents.

11.5 Smoking or Use of an open Flame

Smoking or use of an open flame is prohibited at or in the vicinity of hazardous operations or combustible or flammable materials. "No Smoking" signs will be posted in these areas and must be strictly complied with. Smoking will be allowed only in designated areas. Where smoking is permitted, safe receptacles will be provided for smoking materials.

11.6 Waste Disposal

Accumulations of combustible waste material, dust and debris will be removed from work areas at the end of each work shift, or more frequently if necessary for safe operations. Good housekeeping must be practiced according to Section 10.12 of this Plan. Portable dumpsters for waste disposal and storage area for combustible salvage must be located at least 25 feet from any structure. Any soils identified for off site disposal shall be stockpiled in a safe area, covered and clearly marked. Further guidance on areas to stockpile soils for disposal or encapsulation can be retrieved from the Army Corps representative or Aronson Engineering, Inc. project manager.

11.7 Electrical Sources

All electrical equipment shall comply with the requirements of Section 10.4 of this Plan.

11.8 Fire Alarm Reporting

Instructions will be issued to notify the fire department immediately in case of fire. The Site-specific Health and Safety Plan shall identify the location of a telephone or telephones to be used to call the local fire department. The local fire department number will be conspicuously posted near each telephone.

11.9 Access for Fire Fighting

Access routes for fire fighting equipment will be maintained clear at all times. Fire hydrants will be kept clear of any obstructions.

11.10 Fire Extinguishers

Fire extinguishers will be located on or adjacent to:

- Storage sites of combustibles,
- Fuel dispensing vehicles.
- Sites of hot work operations.
- All company owned and subcontractor owned vehicles.
- All offices or other site accommodations.
- When work is being performed in buildings (either existing or under construction) at least one approved extinguisher will be provided in plain sight on each floor at each usable stairway where combustible material could accumulate.
- Extinguishers will be placed within structures so that the maximum travel distance to an extinguisher is no more than 50 feet.
- The project safety officer shall check all extinguishers weekly to ensure that they are of the type appropriate for the usage's, current and charged properly.

12.0 SANITATION AND INDUSTRIAL HYGIENE

Sanitation and industrial hygiene requirements for work involving the handling of hazardous or toxic chemicals and/or materials will be specified in the Site-specific Health and Safety Plan according to the requirements defined in Sections: 5.0 Medical Program; 6.0 Hazards Assessment; 7.0 Personal Protective Equipment; 8.0 Regulated Areas; and 9.0 Decontamination, of this Master Plan. For other work, the following minimum requirements will apply:

- All project employees will wear clothing appropriate to the work being performed and to the prevailing weather conditions, and that can be readily cleaned of dirt and dust. Each person's clothing and equipment shall comply with the minimum requirements specified in Section 7.5.1 of this Master Plan. The Project Safety Officer shall have the authority to determine whether or not any worker's clothing and equipment meets minimum requirements.

- Toilet facilities will be provided at the work site. (Note: Portable toilet facilities need not be provided at temporary work sites where five or fewer personnel are engaged for three days or less and adequate toilet and clean-up facilities are available within a reasonable distance from the site (5 minutes). In these situations, all personnel will be provided adequate time to use available facilities during the work day and at the end of each shift.)

- Bottled drinking water and disposable cups will be provided at all work sites together with a container for the disposal of used cups.

- Proper ventilation will be maintained in order to avoid possible harmful buildup in areas where toxic fumes, dust, vapors or gases may be produced. Respiratory protection will be supplied when adequate ventilation cannot be provided. (See also Section 6.0 Hazards Assessment; Section 7.0 Personal Protective Equipment; and Section 10.1 Confined Space Entry.)

- No one will be permitted to work while his or her ability or alertness is impaired by illness, fatigue, medication or other causes.

13.0 ACCIDENT REPORTING

Accident reporting is an individual responsibility. All individuals who are injured must immediately report the accident, however minor, to their supervisors. Supervisors will obtain all pertinent information so that proper forms can be completed in the required number and forwarded to the Project Safety Officer within two working days.

Any accident involving bodily injury that requires medical treatment beyond that which can be adequately and safely rendered on the project site must be reported to Aronson Engineering, Inc., the Project manager, Site Safety Officer and Corps of Engineers immediately.

The Project Safety Officer will keep an accident log at the job site. Upon completion of the project, this log will be made part of Aronson Engineering, Inc.(s) central personnel files. (Accident Report Form 3394, see Attachment "G")

Any accident, whether or not injury to personnel is involved shall be investigated by the Project Safety Officer and measures promptly taken to avoid recurrence. If the accident is of a character that, except for circumstances, it may have been immediately dangerous to life or health (IDLH), it shall be reported to Aronson Engineering, Inc. (s) project manager and Safety Officer immediately. Accident reports shall be submitted to Federal, State and Local authorities in compliance with applicable regulations and to the client or other interested parties according to the conditions of the contract and using the Corp. of Engineers Guide CESPD-P-385-1-3.

NOTE: Accident reporting and investigation can be time consuming and create hardships. However it has been proven time and time again that it saves lives, time and money. Remember "Safety Pays'.

SITE SPECIFIC HEALTH & SAFETY AND WORK PLAN FOR: TANK REMOVAL PROJECT PARK RESERVE FORCES TRAINING AREA, DUBLIN, CALIFORNIA

PREPARED FOR

ARONSON ENGINEERING, INC.

PROJECT NO. SF0102

PREPARED BY:

ENVIRONMENTAL COMPLIANCE SERVICES, INC.

3678 OMEC CIRCLE, SUITE A
RANCHO CORDOVA, CA. 95742
(961) 631-1710 ◆ Fax (916) 631-1710

Revision History

October 13, 1994 Rev 0

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TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

Client Name: US ARMY CORPS. OF ENGINEERS
Project Location: PARK RESERVE FORCES TRAINING AREA

EMERGENCY INFORMATION

	Phone	Location
Ambulance Normal Response Time to Site Less than 10 minutes	**911** Mobile Phone Only (510) 828-9909	**ARM** 6465 Clark Ave. Dublin, CA.
Fire Control Normal Response Time to Site Less than 10 minutes	**911** Mobile Phone Only (510) 828-2750	Building 636
Police Normal Response Time to Site Less than 10 minutes	**911** Mobile Phone Only (510) 828-6819	Building 180
San Ramon Genertal Hospital Normal Driving Time Less than 10 minutes	**911** Mobile Phone Only (510) 275-9200	6001 Norris Canyon San Ramon, CA.

Poison Control Center 1-800-662-9886

National Spill Response Center 1-800-424-8802

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Client Name: US ARMY CORPS. OF ENGINEERS
Project Location: Park Reserve Forces Training Area, Dublin, CA.

EMERGENCY INFORMATION

EMERGENCY CONTACTS

	WORK #	PAGER	MOBILE
PROJECT MANAGER Tom Murray	(916) 381-1600	(916) 328-8112	(916) 296-6997
SITE SUPERVISOR Paul Demontigny	(916) 381-1600	NONE	NONE
HEALTH & SAFETY OFFICER Paul Demontigny	(916) 381-1600	NONE	NONE
NATIONAL RESPONSE	1-800-424-8802		
CHEMTREC	1-800-424-9300		
USA	1-800-642-2444		
CAL-OSHA	(916) 445-7090		
UNDERGROUND ALERT	1-800-424-0165		
Army Corps. of Engineers Camp Parks Reserve Mark Pheatt	(916) 557-6688		

A. PROJECT SUPERINTENDENT - Paul Demontigny

See master Health and Safety Plan page 4 for roles and lines of authority.

B. PROJECT SAFETY OFFICER - Paul Demontigny

Industrial Hygienist, Environmental Compliance Services, Inc. See master Health and Safety Plan page 5 for roles and line of authority.

C. ASSISTANT SAFETY OFFICER - Tom Murray

Employed by Environmental Compliance Services, Inc.

D. FIELD SUPERVISOR /PROJECT MANAGER

Reference page 6 of the master Health and Safety plan for duties.

E. OPERATORS AND TECHNICIANS: (one or all may be present on site)

1) **Bob Miller**
2) **Mike Burke**
3) **Gary Fryer**

See page 6 of master Health and Safety plan for duties.

SUB-CONTRACTORS EXPECTED ON THIS SITE

TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

SUB CONTRACTORS NAME AND ADDRESS	PURPOSE
ERICKSON 255 Parr Blvd. Richmond, CA. (510) 235-1393	TRANSPORT & DISPOSE OF TANKS

Site Description

Site Access	To be designated by Project Manager and Crop. of Engineers. Access will be restrict to those personnel performing specific tasks.
Parking Areas	Designated parking only. To be designated by Project Manager based on availability of space and restriction for given areas.
Water Availability	In areas where water is not available portable water will be utilized.
Electrical Availability	NONE. If electrical power is needed a portable power unit will be utilized.
Topography	Generally flat level roadways with standard drainage
Population Centers	This project lies within the bondries of the Park Reserve Training area in Dublin, CA. All sites are in remote areas.
Work Hours	7 AM until 5 PM Monday through Friday unless specified by the Project Manager. Work hours may vary as weather or site conditions dictate.
Noise Abatement Requirements	See specifications and City and ordnances. Personal ear protection will be worn while working near heavy equipment or in all posted or designated areas.

Site Description (Continued)

Security Requirements	Access to the site will remain restricted during the entire project where contaminated soil or open trenches and excavations exists.
Prevailing Wind Conditions	Anticipated from the northwest during work from 10 to 20 miles per hour, slight wind changes can be expected at night and early morning hours. Wind speed at night and early morning should be between 0 to 5 miles per hour. Should wind conditions present a hazard to site operations or personnel, operations shall be halted and appropriate safety requirements enacted by the Site Safety Officer before work proceed. (source U.S. weather service)
Expected Climatic Conditions	Variable: Moderate to hot mid-day temperatures during the summer months. Early morning temperatures during the winter months can be cold and icy.
Additional Information.	Minimum site studies are not available for review on this project concerning existing soil contamination if any. Care must be taken to address this with site personnel, this will allow all site personnel to be aware of potential problems and pay closer attention to site conditions which could cause a problem.
Excavation Areas.	As designated on contract specifications
Stockpile Areas.	Designated in the Corps. Spec's, if alternate area's need to be utilized for soil storage, Mr. Pheatt will be notified.

Scope of Work

Summary

The removal of (3) existing 500 gallon underground diesel storage tanks (UST's), appurtenance and associated piping and (1) above ground storage tank (AST). The excavation will be cordoned off for the protection of all personnel. The fuel tank will be pumped empty and the product lines will be flushed back to tank. The residual diesel left in the tank will be disposed of under manifest, in accordance with applicable regulations. The tank will then be triple rinsed, cleaned and the rinseate disposed of under manifest in accordance with applicable regulations. The tank will be uncovered down to the top of tank. The soils over the tank will be stockpiled on and covered by visqueen. During the project, the excavation, trenches, and stockpile areas will be secured with barricades, and temporary chain link fence. Once the tank is uncovered, all lines, fittings and attachments will be removed. Plugs will be placed in all openings, one plug will have a 1/8" bleed hole, to allow for vapor dispersal. The tanks will be rendered inert by inserting a minimum of 20 pounds of dry ice per 1,000 gallons of tank volume. After the dry ice has been introduced a minimum of one hour will lapse to allow for oxygen displacement which will be checked using a lower explosion limit (LEL) and oxygen meter, manufactured by Gastech. Once the LEL is at or below 10% and the oxygen level is at or below 6% and verified by the on-site representatives of the Alameda County Environmental Health Department and U.S. Army Corp. of Engineers, and the approvals are given the tank will be removed from the excavation with the appropriate lifting equipment, and loaded onto a truck provided by the Erickson, Inc. for proper transportation and disposal. Aronson Engineering will assist the Erickson, Inc., under the direction of the Alameda County Environmental Health Department in taking samples. The samples will be analyzed at a lab provided for by the environmental company. After the results are known with the approval of the Alameda County Environmental Health Department and the owner the excavation will be backfilled.

Decontamination Requirements

Level C & D site, basic decontamination procedures for this site. Decon procedures may vary according to Hazards addressed by the Site Safety Officer and by site conditions. The following area basic procedures are to be used for equipment and personnel decon.(see Decon Log, Attachment "C")

Equipment Decon

Step 1

Insure that wind conditions won't present a hazard by allowing dust to leave the decon zones.

Step 2

The excavation, loading equipment, trucks and hand tools will be decontaminated by dry broom or brush cleaning prior to there removal or departure from the site, all equipment and vehicles will be deconed on 6 mill. visqueen sheeting. All Hazardous Waste debris brushed off the equipment and vehicles will be placed in appropriate containers, labeled and stored for latter disposal.

NOTE: If heavier contamination is identified or unknown wastes are incountered, slurry pits may have to be engineered for heavy equipment decon so as to catch all decon reinsate in a controlled manner. No contaminated equipment will leave the site without prior approval from the site safety officer.

Personnel Decon

Step 1	Check wind conditions and direction
Step 2	Remove gross contamination within the hazard area (Exclusion Zone). By brushing, wiping ect.
Step 3	If wearing heavy duty suits instead of disposables, scrub suit with decon solution A, followed with a rinse with clean water, collect all decon water for latter testing and disposal, i.e.(wading pool).
Step 4	Remove outer protective suit. First followed by removal of gloves and deposit into receptacle specified by the site safety coordinator.
Step 5	Wipe off respirator with decon wipes, then wipe off hands, remove respirator and place on visqueen covered table for further decon and latter use.
NOTE:	**Respirater to be removed last**
Step 6	Wash hands <u>then</u> face with soap and water or decon wipes prior to leaving the work zone (CRZ).
Step 7	Showers are not expected to be utilized on this project. However they will be made available if so required by the site safety officer.
NOTE:	**Emergency showers will be available while working with and/ or around caustic materials.**

Permit Requirements None Required

Waste Disposal Requirements At a legal point of disposal.

Communications

Phone# (916) 381-1600 Office Sacramento
(916) 296-6997 Mobile

Location: Job Site Office
Dublin, CA.
Park Reserve Training Area

Standand Hand Signals

and Gripping Throat:	Out of Air, Can't Breathe.
Grip Partner's Wrist:	Leave Area Immediately.
Both Hands on Waist:	Leave area Immediately.
Hand on Top of Head:	Need Assistance.
Thumbs Down:	No; Negative; Don't Understand.
Open Hand, Palm Down Drawn Across Throat:	Stop
Other hand signals will be addressed by the	Site Safety Officer

Emergency Site Signal

Single Long Air Horn Blast:

Stop all Operations, evacuate the immediate **restricted work area (EZ)** to a predetermined location upwind (area determined based on site conditions). A head count will be taken in this area.

Repeated Short Blasts:

Stop all operations, **Everyone** on site will evacuate to a safe predetermine location for a head count and briefing (upwind, of site, or as directed by the Site Safety Officer).

Chemical Hazard Assessment

Hazardous/Toxic Materials Known or Suspected to be on Site.

Substance	Site Concentration mg/kg soils	IDLH Conc.	PEL TLV	Where Expected to be found	Possible Entry Routes	Tab Number
• **Diesel Fuel**	UNK	10,000	100 ppm	In Pipes, Tanks and soils	Inhalation/ Ingestion Skin/eye	1

See Attachment "R" for Generic MSDS Guide Sheets
Ref: US Coast Guard, Chriss Manual
UNK=Unknown NE=None Expected
Cal/OSHA Standards (PEL)

Personnel Protective Equipment

Level C protection, on the Park Reserve Forces, Tank Removal Project will include (but not be limited to) the following:

- Air Purifying Respirator.
- Chemical-Resistant Disposable Coveralls.
- Chemical-Resistant Boots with Steel Toes. (type, PVC, Manufacture Vallen Industrial)
- Chemical-Resistant Outer Gloves.
- Nonconductive Hard Hat.
- Safety Glasses.

Level C protection, will be worn until Analytical Results are reviewed by the Industrial Hygienist from the personal and other air monitors, approximately 1day. Once the lab results are received a determination will be made as to personal protection levels for the site. If possible personnel will be down graded to level D protection. This process is required for all areas of suspected contaminates including confined space.

Level D protection, the standard work uniform on this project will include (but not be limited to) the following:

- Standard Steel-Toed Work Boots.
- Work Gloves
- Nonconductive Hard Hat.
- Safety Glasses
- Safety Vests
- Hearing Protection (Ear Plugs or Approved Ear Muffs)

CHEMICAL COMPATIBILITY CHART

EXPLANATION

THE SOURCES OF INFORMATION FOR COMPILING THIS CHART CAME FROM THE FOLLOWING SOURCES:

COAST GUARD (Study, August 1980)

Materials Tested:
- BUTYL RUBBER
- POLYCARBONATE

The compatibility of butyl rubber and polycarbonate with the chemicals was determined from a literature search.

Symbols Used:

Y	YES (compatible)
N	NO (non-compatible)

EASTWIND (Specification #200)

Materials Tested:
- POLYVINYL CHLORIDE
- NEOPRENE
- BUTYL

Symbols Used:

R	RECOMMENDED
L	LIMITED RESISTANCE
N	NOT RECOMMENDED (N used instead of NR)
*	INFO NOT AVALABLE

ILC DOVER CHEMICAL COMPATIBILITY CHART

Materials Tested:
- CPE (CHLORINATED POLYETHYLENE),
- PVC (POLYVINYL CHLORIDE)
- BUTYL

Symbols Used:

A	RECOMMENDED (LITTLE OR NO EFFECT)
B	MINOR TO MODERATE EFFECT
C	CONDITIONAL (VARIES FROM MODERATE TO SEVERE UNDER DIFFERENT CONDITIONS)
X	NOT RECOMMENDED (SEVERE EFFECT)
I	INSUFFICIENT DATA TO RATE

SERVICE TEMPERATURE 140 DEGREES MAXIMUM

CHEMICAL COMPATIBILITY CHART

CHEMICAL NAME	BUTYL.	PC..	CPE.	NBR...	NEO...	PVC...	VIT.
cyclopropane	Y	Y					
cymene (p)	YX -	Y	X	- X	U X	X	A A
DDD	Y	Y					
DDT	YA	Y	B			B	
decaborane	Y N	Y			N	*	
decahydronaphthalene	Y	N					
decaldehyde	Y	N					
decane	X -		B	B B	U B	C	A A
decene (1)	Y	Y					
decyl alcohol	Y	Y					
degreasing fluids	N				N	*	
demeton	Y	Y					
denatured alcohol	A A		A	A A	A A	B	A A
detergent solutions	A A		A	A A	A B	B	A A
developing fluids	B B		A	A A	A A	A	A A
diacetone	A			-	-		U
diacetone alcohol	YARA	Y	A	U X	AR B	*C	- I
diazinon	Y	Y					
dibenzoyl peroxide	Y	Y					
dibenzyl ether	BLB		C	U X	BL C	*C	- I
diborane	N				N	*	
dibromochloropropane	I		X			X	
dibutyl amine	X U		A	U B	U B	B	U X
dibutyl ether	C C		A	C X	C C	X	C C
dibutyl phthalate	YCLB	N	C	U gX	UNfX	NXn	B B
dibutyl sebacate	B B		B	U X	U X	X	B B
dichlorobenzene (o)	NX*U		X	U X	UN X	NX	A A
dichlorobenzene (p)	Y	Y					
dichlorobutene							
dichlorodifluoromethane	Y	Y					
dichloroethane (1,1)	N N				N	*	
dichloroethylene	YI	N	C			X	
dichloroethylether	N						
dichloromethane	YX	N	C			X	
dichlolophenol (2,4)	Y	Y					
dichlolophenoxyaceticacid	Y	Y					
dichloropropane (1,2)	Y	N					
dichloropropene	Y N	N			N	*	
dicyclopentadiene	Y	Y					
dieldrin	YB	Y	C			C	
diesel oil	XNU		A	A A	BR B	RA	A
diethanolamine	Y R	N			R	*	
diethylamine	YBLB	N	B	C fC	CLpC	NBn	U
diethylbenzene	Y U	N		U	U		A
diethyl carbonate	Y	Y					
diethylene glycol	YA A	Y	A	A A	AI A	B	A
diethylenetriamine	Y	N					
diethyl ether	X U		A	U X	C C	C	U
diethyltriamine	L				L	*	
difluoroethane (1,1)	Y	Y					

On-site Control Measures

Hazard Reduction Zone

All decontamination (Hand and Face Wash or Wipe, equipment brushed off) shall be completed while traversing this zone. See page 5 (Decontamination Requirements)

Command Post /Staging Area

The on-site Command Post will be a minimum of 20 feet from the excavation staging areas will be established at the site based on site condition at the discretion of the site safety officer. The command post will be Aronson engineering(s) job truck.

The prevailing wind conditions are from the North to Northwest 15-30 miles per hour. Wind speed decreases at night and early morning Hours.

Control Boundaries

Control Boundaries have been established and the High Hazard Zone, (ES.) Hazard reduction zone (CRZ) and the safe zone are designated as follows: These boundaries will be identified by the Site Safety Officer. The control boundaries will be posted and briefed on daily, work progress.

Boundary set up Minimums:

Exclusion Zone (EZ) - A Minimum of 10 feet from excavation area's of the tank, piping and stockpiled soils.

Reduction Zone (CRZ) - A Minimum of 5 feet from the Exclusion Zone

Support Zone (SZ) - All area's outside of the Reduction Zone, and designated by the Site Safety Officer.

Physical Hazard Assessment

Heat Stress
Generally this will not be a problem at this site, but heat stress can affect people in personal protective equipment,. even if the ambient temperature is moderate. Heat Stress can cause loss of efficiently, personal injury and increase the probability of accidents. The following recommendations will help reduce the risk of heat stress problems:

- Provide plenty of fresh, clean water to replace loss of body fluids.
- Establish a work schedule that will provide appropriate rest periods. (Based on temperature and task)
- Provide adequate training on the causes and symptoms of heat stress.
- Work during cooler hours when possible.

Cold Stress
This is not normally a problem in Sacramento, CA. However, the potential does still exists during cold/inclement weather. The following procedures will be followed.

- Frequent breaks allow workers to warm there hands and feet.
- Warm place will be provided to all site personnel.
- Warm non-alcoholic liquids will be provided to all site personnel.
- All site personnel shall be monitored for sign and systems of cold stress.

Noise
On-site personnel may be exposed to occupational noise from heavy equipment. Hearing protection (ear plugs or ear muffs) will be utilized in high noise areas. These areas will be designated and posted by the site safety officer.

Slip, Trip and Fall
Entire Site Hazard- construction debris, pot holes, trenches and excavations.

Striking Injuries
All personnel will be required to wear a hard hat , unless otherwise posted or permitted by Site Safety Officer in accordance with OSHA regulations. The hat must be properly worn and not altered in any way. All hard hats must be stamped with the proper approving authority ANSI standard 289.1.
Note: Approximately 30% of the hard hats are not approved. Fines can be costly.
Eye protection is required to prevent eye injuries caused by contact with chemical or physical agents. Where proper safety glasses, goggles.

Fire and Explosion (Minimal at this site)
Fire and explosion hazard are possible during excavating, removal and decommissioning of pipes and tanks. A minimum of three (3) fire extinguishers of the 20 pound chemical type shall be kept within easy access of working areas. The main hazards for fire and explosions will be from methane, Fuels, and other possible flammables due to these sites still being active. Use care and keep areas clearly posted to help reduce this potential hazard.

Burns From Dry Ice
Workers will wear gloves when handling dry ice.

Special Requirements

Training

The Site Safety Officer shall conduct initial safety orientation and instruction with each Sub-contractors Site Supervisor. All workers shall be advised by their supervisor at weekly safety meetings and as necessary prior to the commencement of new operations concerning the kind and degree of hazard associated with the operations and the safety precautions required. Any subcontractors or persons employed after initiation of operations shall also be oriented and instructed on said safety hazards and precautions. All personnel preforming work on these sites must have access to and be familiar with this plan.

Medical Surveillance

Formal Medical Surveillance may be required, based on toxicity or special hazards addressed in the master Site Safety Plan, Non Haz work areas are exempt from Base Line Physical Assessments.
On site surveillance for the affects of heat stress, chemical overexposure and physical injury. Personnal air monitoring in need to access the potential inhalation hazards for this site, this will be done using personal air sample pumps within the breathing zone. See attached MSDS sheet concerning systems of over exposure to the suspected contaminates.
Care must be taken to insure that exposures are minimized. Exposures to dust as in Total Dust Concentrations (TD) can not exceed 3 milligrams per cubic meter (mg/m3) of air.

Decontamination Procedures

All personnel shall wash hands and face with soap and water or decon wipes prior to eating, drinking or leaving the site. All personnel will follow procedures as set forth on page 5 of Site Specific Plan. along with provision set forth in the Master Plan or as designated by the Site Safety Officer.

Environmental Monitoring Equipment

Type of Equipment	When Recorded	Where Recorded	When Calibrated	Action Level
Combustible Gas Meter	Once Per Hour and More often if Needed	All restricted or Confined Confined Space Areas i.e., Tanks, Excavations ect.	Daily	10% LEL
Oxygen Meter	Once Per Hour and More often if Needed	All restricted or Confined Space Areas i.e., Tanks, Excavations ect.	Daily	19.5-23.5%
Noise Meter	As Required or Requested by Site Safety Officer			

SEE: Attachment "F" (Air Monitoring Log)

AIR MONITORING

General:

Monitoring for this site will require upwind and downwind dust dispersion monitoring during excavation and gross decontamination. The frequency of monitoring will be based on the speed of excavation and/or as deemed necessary by the site safety officer.
Use of a mini-ram may be required if directed by the Site Safety Officer in order to insure the migration of soils out of the Hazard Area is kept to a minimum.

Personnel:

No individual monitoring is required for this site other than medical monitoring

Eye Wash Stations:

A portable eye wash will be on site in the decontamination reduction zone within close proximity to the work being performed.

First Aid:

First Aid kits and other emergency medical equipment will be in the job vehicles and in the decon zone within close proximity to the work being performed.

Dust Control:

Should be addressed in all subcontractors work plans. However as a minimum fugitive dust will be controlled Through use of appropriate engineer controls. Prior to excavation of soils a water trucks may be used to help minimize dust releases, if evidence shows soils will become a dust hazard. Care must be taken so as not to create a run off problem or impact the environment.

NOTE: At the end of the work shift a water truck or other water applications may be used to leave a crust seal on the surface so as to minimize potential releases to the air. If required by the Site Safety Officer

Waste Fluids

Ground Water:

If ground water is encountered during excavation care must be taken to contain and dewater the trenches or excavations so as to maintain soil integrity. Dewatering will be accomplished using a trash pump or centrifuge. All purged waters will be placed into tight sealed drums or tanks as appropriate.

Decon Solutions:

All decon solutions when used will be collected and placed into drums or tanks as specified above for testing and disposal determination.
Care must be taken so as not to allow runoff of decon solutions when used (e.g. wading pools).
All ground water and decon solutions will be placed in a secure area and visibly marked as to there contents.
Disposal of waste water will be as appropriate based on quantities generated, available storage areas.

ARONSON ENGINEERING, INC.

EMERGENCY PLAN

A. Emergency Warning Systems: Several warning systems may be utilized, depending on the work site conditions or emergency involved, including:

Verbal communications
Portable hand-held radios
Vehicle horns
Portable hand-held compressed gas horns

One long blast is used to signify emergency evacuation of the immediate restricted work area to predetermined location, upwind, where a head count will be taken and further instructions given. The predetermined location, will be addressed at daily safety briefings. A pre-emergency planning meeting will be held prior to getting started on the project, additionally Emergency Planning will be discussed at the daily job start up Safety Briefing,

Repeated short blasts will be used to signify evacuation of all personnel from the site to a predetermined location, upwind, where further instructions will be given after a head count is taken.

Emergency Conditions: During the site specific training, workers will be trained in the provisions of this emergency response plan. In addition, emergency response plan details will be discussed, as necessary, at the daily safety briefings.

Emergency include accidental releases of gases, chemical spills, fires, explosions, and personal injuries. time is a critical factor in an emergency. Personnel must try to remain calm in an emergency to ensure clear thoughts for appropriate decision making.

During the site specific training and daily safety meetings, site workers will be trained in, and reminded of, provisions of this emergency response plan, the communication systems, and evacuation routes. Regular Drills will be held, dealing with Emergency Plan Implementation.

Emergency Procedures:

General: The on-site Safety Officer and Army Corp. Representative shall be notified immediately of all emergencies.

The on-site Safety Officer has the responsibility for responding to and correcting emergency situations. This may include taking appropriate measures to protect the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the area. The on-site Safety Officer is additionally responsible for monitoring that appropriate persons are notified, corrective measures are being implemented, and follow-up reports completed.

Upon hearing an alarm, all non-emergency communications will cease. Crew members will proceed to give all pertinent information to the project Safety Officer in a systematic and orderly manner.

Power equipment will be shut down and operators will stand-by for instructions. Individuals not assigned specific contingency response duties will proceed immediately to pre-designated safe site.

Upon arrival at the safe site, a complete head count will be given to the project Safety Officer. Individuals will stay at the safe site until the contingency is secured or further instructions given.

One 20-lb. ABC-type dry chemical fire extinguisher shall be provided at the work area and one extinguisher shall be stationed in each Aronson Engineering, vehicle. Heavy equipment shall be equipped with an appropriate size and type fire extinguisher as requested by OSHA.

Accidental Release of a Gas:

Notify all personnel within the immediate area of the release.

Evacuate the area if the release of the gas cannot be secured safely.

Notification of immediate supervisor is required.

The on-site Safety Officer will take the appropriate actions.

Chemical Spill:

Notify all personnel within the immediate area of the spill.

Evacuate the area if the spill cannot be contained or cleaned up safely.

Notify immediate supervisor.

HAZARD CATEGORIZATION RECORD

Job No. _____

Sample No. _____

Container Information
Describe shape, type, size, etc.

_____

_____

_____

Label Information

_____

_____

_____

_____

Material Color

_____

Test Date _____

Analyst's Name _____

Test Result
Quantitative Results

PH _____

Flammability (GX-3) _____

Other (draeger tubes, HNU, etc.)

Test	Results	Units

Qualitative Results - refer to complete flow chart path on back of the page.

Categorization

Proper shipping name _____ Label (s) _____

Hazard Class _____ UN/NA# _____

Remarks

_____

_____

_____

_____

_____

The on-site Safety Officer will take the appropriate actions.

Fires:

Notify all personnel within the immediate area of the fire.

Evacuate the area in the event the fire cannot be extinguished safely.

Go directly to the closest Mobile Phone and summon the Fire Department by dialing 911.

Notify the on-site Safety Officer.

Explosions:

If uninjured, report to the trailer for a head count or as directed by the Site Safety Officer.

Stand by for further assignment from on-site Safety Officer.

Personal Injuries:

All personal injuries must be reported to the individual's immediate Supervisor.

Supervisors must report all worker personal injuries to the on-site Safety Officer.

First-aid trained personnel should administer first-aid to the injured party. Medical attention may be required beyond first-aid treatment. Refer to Attachment "H" location of the nearby hospital. First Aid/CPR trained personnel for this site is Tom Murray and Paul Demontigny.

Transport/move injured only if the injuries will permit.

Medical Emergency:

In the event of a medical emergency, apply first aid as necessary. Depending on the severity of the condition, the person requiring attention may be transported to the hospital (Attachment "H") or an ambulance may be summoned by dialing 911 on Mobile Phone.

Attachment A

SUBCONTRACTOR SAFETY & SITE RULES CHECK LIST

The following check list must be reviewed and signed by the sub-contractor and the Site Safety Officer prior to the scheduled start of a job

HEALTH & SAFETY PLAN

- ☐ Sub-contractor agrees to comply with the requirements of Aronson Engineering Master Health & Safety Plan.
- ☐ Sub-contractor has received a copy of the Site-Specific Health & Safety Plan and agrees to comply with its requirements.
- ☐ Sub-contractor agrees to have there own Site Safety Plan specific to the tasks being performed on site, a copy of this plan must be submitted prior to job start.

GENERAL

- ☐ All vehicles entering the job site must observe a maximum speed of 10 MPH, unless otherwise posted. Seatbelts must be worn at all times.
- ☐ Hard hats and steel-toed boots are required at all times except in designated areas.
- ☐ Smoking or eating is permitted in designated areas only.
- ☐ The sub-contractor is to maintain good housekeeping during the duration of work. Daily trash pick up is required. At the end of the job site in at least as good appearance and condition as it was found.
- ☐ The sub-contractor has reviewed with the Site Safety Officer the emergency evacuation route and telephone numbers, in case of emergency, call 911and notify the Site Safety Officer.
- ☐ Aronson Engineering, Inc.(s) job site rules prohibit
  1. Possession or consumption of intoxicants or illegal drugs.
  2. Violation of Federal and State safety regulations
  3. Possession and/or use of firearms
  4. Fighting, horseplay or practical jokes
  5. Sabotage or pilfering
  6. Running except in an emergency (Brisk Walk)
- ☐ All accidents (personal injury or property damage) must be reported to the Site Safety Officer as soon as emergency conditions no longer exits. The person involved must make a written accident report prior to leaving the site, unless prevented by emergency conditions, e.g. injury.
- ☐ Personnel not directly engaged in the work are not permitted on the site without Aronson Engineering, Inc.(s) approval.

Aronson Engineering, Inc. By: _____ Date: _____

Subcontractor: _____ By: _____ Date: _____

Environmental Compliance Services, Inc.

Site-Specific Health and Safety plan for

ARONSON ENGINEERING, INC.

TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

VISITORS BRIEFING LOG

NAME & FIRM	DATE	ENTRY TIME	EXIT TIME	SIGNATURE

VISITORS:

IT IS ARONSON ENGINEERING, INC.(S) POLICY THAT VISITORS MUST FURNISH HIS/HER OWN PERSONAL PROTECTIVE EQUIPMENT. ALL VISITORS ARE REQUIRED TO SIGN THE VISITOR LOG AND COMPLY WITH THE SAFETY PLAN REQUIREMENTS. IF THE VISITOR REPRESENTS A REGULATORY AGENCY CONCERNED WITH THE SITE HEALTH AND SAFETY ISSUES, THE SAFETY OFFICERS OR PROJECT MANAGER SHALL BE IMMEDIATELY NOTIFIED.

Environmental Compliance Services, Inc.

Site-Specific Health and Safety plan for

ARONSON ENGINEERING, INC.

TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

DATE: _____ JOB # _____ Pg. _____ Of _____

LOCATION: _____

CUSTOMER: _____ CUSTOMER ADDRESS: _____

NATURE OF MATERIAL: _____

DESCRIPTION OF WORK CONDUCTED: _____

DECONTAMINATION SOLUTION SPECIFIED: _____

PERSONNEL ENTRY DATA:

LAST NAMES	TIME IN	TIME OUT	TIME IN	TIME OUT	TIME IN	TIME OUT

FIELD NOTES: _____

ATTACHMENT D

Environmental Compliance Services, Inc.

GENERAL PURPOSE DECONTAMINATION SOLUTIONS

ARONSON ENGINEERING, INC.

	TYPE OF HAZARD SUSPECTED	DECON SOLUTION	MIXTURE
1.	INORGANIC ACIDS, METAL PROCESSING WASTES	A	TO 10 GALLON OF WATER, ADD 4 LBS SODIUM CARBONATE AND 4 LBS OF TRISODIUM PHOSPHATE. STIR TILL EVENLY MIXED.
2.	HEAVY METALS: MERCURY, LEAD, CADMIUM, ETC.	A	
3.	PESTICIDES, FUNGICIDES, CHLORINATED PHENOLS, DIOXINS, AND PCB'S	B	TO 10 GALLONS OF WATER, ADD 8 LBS CALCIUM HYPOCHLORITE. STIR WITH WOODEN OR PLASTIC STIRRER UNTIL EVENLY MIXED
4.	CYANIDES, AMMONIA, AND OTHER NON-ACIDIC INORGANIC WASTES	B	
5	SOLVENTS AND ORGANIC COMPOUNDS, SUCH AS TRICHLOROETHYLENE, CHLOROFORM, AND TOLUENE	C (OR A)	TO 10 GALLONS OF WATER, ADD 4 LBS TRISODIUM PHOSPHATE. STIR UNTIL EVENLY MIXED.
6	PBB'S AND PCB'S	C (OR A)	SAME AS #5 ABOVE
7	OILY, GREASY UNSPECIFIED WASTES	C	SAME AS #5 ABOVE
8	INORGANIC BASES, ALKALI, AND CAUSTIC WASTE	D	TO 10 GALLONS OF WATER, ADD 1 PINT CONC. HYDROCHLORIC ACID. STIR WITH WOODEN OR PLASTIC STIRRER.

SOURCE -

E.P.A. TRAINING MANNING MANUALS

Environmental Compliance Services, Inc.

Site-Specific Health and Safety plan for

ARONSON ENGINEERING, INC.

TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

HOT WORK PERMIT

Site Location: _____ **Date:** _____ **Contract No.** _____

Anticipated Weather Conditions: _____
Temperature

Wind: _____ **General:** _____

Specific Area: _____

_____

Safety Precautions: _____

_____

_____

_____

_____

Fire Watch Personnel: _____

_____

and/or _____ **and/or** _____

Additional Comments: _____

_____

_____

_____ _____
Safety officer **Project Manager**

Environmental Compliance Services, Inc.

Site-Specific Health and Safety plan for

ARONSON ENGINEERING, INC.

TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

CALIBRATION CHECK:

RE-CALIBRATION:

PID		OXY		LEL	
IN	OUT	IN	OUT	IN	OUT
YES	NO	YES	NO	YES	NO

SAFETY MONITORING RESULTS

LOCATION	TIME	OXY	LEL	PID	LEAD IN AIR	LEAD SOLID	TEMP	OTHER

NAME: _____ DATE: _____

ATTACHMENT G

ACCIDENT REPORT

DATE _____

EMPLOYEE		EMPLOYEE No.	DEPARTMENT	
INJURY DATE	TIME	DATE REPORTED	TIME	
LAST DAY WORKED		DATE RETURNED TO WORK		
INVESTIGATOR		TITLE	DATE OF INVISTIGATION	

LOCATION OF ACCIDENT

WHAT WAS EMPLOYEE DOING AT TIME OF ACCIDENT?

MACHINES/EQUIPMENT BEING USED

DID MACHINE/EQUIPMENT MALFUNCTION? EXPLAIN.

ANY UNSAFE CONDITIONS CONTRIBUTE TO THE ACCIDENT? EXPLAIN.

INJURY

WAS THERE A MEDICAL EXAMINATION? ☐YES ☐ NO	IF YES, LIST NAMES AND ADDRESSES OF PERSON(S) CONSULTED

WITNESSES

WHAT ACTION HAS BEEN TAKEN TO PREVENT THIS FROM RECURRING?

OTHER RECOMMENDATIONS

SIGNATURE _____ DATE _____

HAZARD MITIGATION

ATTACHMENT J

Identify procedures to mitigate all hazards listed in each task section by placing the task number next to the appropriate mitigating measure. Listing of standard procedures is not inclusive. A specific procedure must be entered to mitigate each hazard identified. Scope of work and time frame is listed at the beginning of this Attachment.

Activity List Number	A. Mechanical Hazards
_____	Do not stand near backhoe buckets, drill rigs and earth moving equipment.
_____	Verify that all equipment is in good condition.
_____	Do not stand or walk under elevated loads or ladders.
_____	Do not stand near unguarded excavation and trenches.
_____	Do not enter excavation or trenches over 5 ft. deep that are not properly guarded, shored or sloped.
_____	Consult SSO if any other mechanical hazards exist.
_____	Refer to and fill out site clearance check list in Attachment "M" prior to demo work or excavation.

B. Electrical Hazards

_____	Locate and mark buried utilities before drilling, demo work (or) excavation.
_____	Utilities located by:_____ on _____ .
_____	Maintain at least 10 ft. clearance from overhead power lines.
_____	Contact utility company for minimum clearance from high voltage power lines.
_____	If unavoidable close to buried off, with circuit breader locked and tagged.
_____	Properly grounded all electrical equipment.
_____	Avoid standing in or near water when operating electrical equipment.
_____	If equipment must be connected by splicing wires, make sure all connections are properly taped.

Be familiar with specific operating instructions for each piece of equipment.

Refer to and fill out site clearance checklist in Attachment M.

C. Chemical Hazards

Use personal protective equipment indicated in the Master and Site Specific Plans.

Conduct direct reading air monitoring to evaluate respiratory and explosion hazards (list instrument, action level, monitoring location, and action to be taken on Attachment F (Air Monitoring Form).

Perform a hazard evaluation specific to that site.

D. Temperature Hazards

1. Heat Stress

If temperature exceeds 70 degrees F, take frequent breaks in shaded areas. Unzip or remove coveralls during breads. Have cool water or electrolyte replenishment solution available. Drink small amounts frequently to avoid dehydration. Count the pulse rate for 30 seconds as early as possible in the rest period. If the pulse rate exceeds 110 beats per minute at the beginning of the rest period, shorten the work cycle by one-third.

If raining, avoid slipping or wet surfaces or cease operations.

2. Cold Stress

When Applicable

Wear multilayer cold weather outfits.
The outer layer should be of wind resistant fabric.

0 degrees to -30 degrees F total work time is 4 hours. Alternate 1hour in and 1 hour out of the low-temperature area. Below -30 degrees F, consult industrial hygienist.

Drink warm fluid. Provide warm shelter for resting. Use buddy system. Avoid heavy sweating.

E. Acoustical Hazards

Use earplugs or earmuffs when noise level prevents conversation in normal voice at a distance of 3 feet or exceeds 85 dba.

F. Oxygen Deficiency - Confined Space Hazards

Confined spaces include trenches, pits, sumps, elevator shafts, tunnels or any other area where circulation of fresh air is restricted or ability to readily escape form the area is restricted. The SSO, Health and Safety Plan and procedures identified in Attachment O must be consulted prior to entering confined space.

Obtain permit for confined space entry.

Monitor Oxygen and organic vapors before entering. If following values are exceeded, do not enter:

* Oxygen less than 19.5% or greater than 23%.
* Total hydrocarbons greater than 5 ppm above background, if all air contaminants have not been identified.
* Concentrations of specific contaminants exceeding action levels on page 10-11 if all air contaminants are identified.

Monitor Oxygen and organic vapors continuously while inside confined space. If values cited above are exceeded, evacuate immediately. Record instrument readings.

At least one person must be on standby outside the confined space who is capable of pulling workers from confined space in an emergency. Standby person must not enter unless there is another standby person.

Use portable fans or blowers to introduce fresh air to confined spaces whenever use of respiratory protection is required.

Work involving the use of flame, arc, spark, or other source of ignition is prohibited within a confined space.

G. Radiation Hazards

If radiation meter indicates 2 mR/hr. or more, leave the area and consult SSO.

If a radiation hazard is suspected no personnel shall be allowed access.

HAZARD MITIGATION (CONTINUED)

H. Biohazards

_____	Poison oak, poison ivy -identify and avoid contact
_____	Infectious waste, use proper PPE and decon procedures identified in the Health and Safety Plan.
_____	Rabid animals - avoid contact notify Base Authorities.
_____	Ticks, mosquitoes, and other insects (disease carriers or poisonous). Avoid breathing dust in dry desert or central valley areas (valley fever).
_____	Be able to identify black widow and brown recluse spiders and rattle snakes.
_____	Waste sludge and raw sewage - care must be taken to utilize appropriate PPE and decon procedures while working with or around sewage and other industrial waste waters. Infectious disease caring bacteria cannot be seen. Therefore, all site personnel will decon prior to eating, drinking, smoking or taking breaks. Do not lift the respirator to scratch, avoid touching the face prior to going through decon.

Decon Procedures (If Applicable):

a) Minimum procedures as specified on pages 7-8 of the site Specific Health & Safety Plan. Zone set up is identified on the map in this section.

Emergency Procedures:

a) All site personnel will follow procedures specified on pages 20-23 of the Site Specific Health & Safety Plan.

NE = NOT EXPECTED

HAZARD ANALYSIS

Activity Number: _____

Job Task:

Mechanical:

Electrical:

Chemical:

Temperature:

Accoustical (Noise):

Oxygen Deficiency-Confined Apace:

Radioactive:

BioHazard:

NE = NOT EXPECTED

Environmental Compliance Services, Inc.

Site-Specific Health and Safety plan for

TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

TAILGATE SAFETY MEETING

DIVISION/SUBSIDIARY: _____ **FACILITY:** _____

DATE: _____ **TIME:** _____ **JOB NUMBER:** _____

CUSTOMER: _____ **ADDRESS:** _____

TYPE OF WORK: _____

CHEMICALS USED: _____

SAFETY TOPICS PRESENTED

PROTECTIVE CLOTHING/EQUIPMENT: _____

_____

CHEMICAL HAZARDS: _____

_____

PHYSICAL HAZARDS: _____

_____

EMERGENCY PROCEDURES: _____

_____

HOSPITAL/CLINIC: _____ **PHONE:** ( ) _____

PARAMEDIC PHONE: ( ) _____

HOSPITAL ADDRESS: _____

SPECIAL EQUIPMENT: _____

_____

OTHER: _____

_____

Environmental Compliance Services, Inc.

Site-Specific Health and Safety plan for

ARONSON ENGINEERING, INC.

TANK REMOVAL PROJECT
PARK RESERVE FORCES, DUBLIN, CA.

TAILGATE SAFETY MEETING ATTENDEES

	NAME PRINTED	SIGNATURE
1)		
2)		
3)		
4)		
5)		
6)		
7)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		
16)		
17)		
18)		
19)		
20)		

MEETING CONDUCTED BY:

NAME PRINTED	SIGNATURE

SITE CLEARANCE CHECKLIST FOR WELL DRILLING OR SOIL BORING

Well or Boring No._____ **CHECKLIST DISTRIBUTION**

Location_____ **Project Manager**_____

Start - Date_____ **Drilling Supervisor**_____

Contact_____

Phone_____

CLEARED BY (INITIAL)	ITEM

1. UTILITIES

MAP INSPECTION
(IN AREA)

a. _____	G-1	Water main
b. _____	G-2	Sanitary sewer
c. _____	G-3	Drainage
d. _____	G-3	Industrial sewer
e. _____	G-4	Electrical
f. _____	G-5	Steam lines
g. _____	G-5.1	Gal lines
h. _____	G-7	Liquid fuel
i. _____	G-9	Compressed air
j. _____		Gray water

FIELD VERIFICATION
(INITIALS & DATE)

a. _____	G-1	Water main
b. _____	G-2	Sanitary sewer
c. _____	G-3	Drainage
d. _____	G-3	Industrial sewer
e. _____	G-4	Electrical
f. _____	G-5	Steam lines
g. _____	G-5.1	Gal lines
h. _____	G-7	Liquid fuel
i. _____	G-9	Compressed air
		Gray water
		Power lines

CLEARED BY (INITIAL)	ITEM	
2. FIRE CLEARANCE		
a. _____	Obtain welding and torch cutting clearance	
b. _____	Site clearance requirements (specify below)_____	
	_____	
	_____	
c. _____	Hydrant use approved	
d. _____	List other instructions_____	
	_____	
	_____	
3. TRANSPORTATION		
a. _____	Access routes	Preferred on base transportation routes for waste handling, heavy equipment, and passenger vehicles will be confirmed with area supervisor.
b. _____	Overhead clearance restrictions_____	
	_____	
	_____	
4. CONSTRUCTION		
a. _____	Construction of excavations for utility vaults and grading for concrete pads may be required.	
5. OTHER CLEARANCES (SPECIFY)		
a. _____	_____	
	_____	
b. _____	_____	
	_____	
6. FIELD NOTES (Attach maps as needed)		
a. _____		

Utility Clearance

1. Locating Equipment Available

- Metrotech A10 pipe location
- Metrotech 880 magnetometer
- Witching sticks

2 Procedures for Site Clearance

A. CALL UNDERGROUND SERVICE ALERT 48 HOURS PRIOR TO BREAKING GROUND. ITS THE LAW!!

- For Northern California Locations (800) 642-2444
- From southern California for Southern California Locations (800) 422-4133
- From Northern California for Southern California Locations (714) 956-5230

B. OBTAIN UTILITY DRAWINGS

- From city or county
- From contract coordinator
- From site facilities department

C. SITE INVESTIGATION

Purpose: Verify location of identified utilities and survey area for unidentified utilities.

(1) Always check the following utilities:

- Electricity (check overhead clearance> 20')
- Natural gas
- Water
- Sewer
- Storm sewer
- Telephone

(2) Check for the following on a site by site basis:

- Tanks and fuel lines
- Cable TV
- Compressed air
- Steam lines
- Process piping

D. DOCUMENTATION

(1) Prepare site utilities map indicating locations that are clear of utilities.

(2) Prepare sheet of specific instructions for drilling or excavating if warranted.

(3) Note potential hazards on the above instructions and also on the ground at the site.

(4) See example documentation.

CONFINED SPACE REGULATIONS

Reprint of Title 8 CCR GISO 5156, 5157 and 5158

State of California – Pete Wilson, Governor
Department of Industrial Relations – Lloyd W. Aubry Jr, Director
Division of Occupational Safety & Health

CONSULTATION CAL OSHA SERVICE

February 1994

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CONFINED SPACE REGULATIONS

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§ 5156. Scope, Application and Definitions.

(a) Scope. This Article prescribes minimum standards for preventing employee exposure to confined space hazards as defined by Section 5156(b), within such spaces as silos, tanks, vats, vessels, boilers, compartments, ducts, sewers, pipelines, vaults, bins, tubs, and pits.

NOTE: This Article does not apply to underwater operations conducted in diving bells or other underwater devices or to supervised hyperbaric facilities.

(b) Application and definitions.

(1) For operations and industries not identified in subsection (b)(2), the confined space definition along with other definitions and requirements of section 5157, Permit-Required Confined Spaces shall apply.

(2) The confined space definition along with other definitions and requirements of section 5158, Other Confined Space Operations shall apply to:

(A) Construction operations regulated by section 1502;
(B) Agriculture operations (including cotton gins) defined by section 3437;
(C) Marine terminal operations defined in section 3460;
(D) Shipyard operations regulated by section 8437;
(E) Telecommunication manholes and unvented vaults regulated by section 8616;
(F) Grain handling facilities regulated by section 5178.
(G) Natural gas utility operation within distribution and transmission facility vaults defined in Title 49 Code of Federal Regulations Parts 191, 192 and 193; or
(H) Electric utility operations within underground vaults. See section 2700 for a definition of vault.

Note: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

§5157. Permit-Required Confined Spaces.

(a) Scope and application. This section contains requirements for practices and procedures to protect employees from the hazards of entry into permit-required confined spaces. This section applies to employers, as specified in section 5156(b)(1).

(b) Definitions.

Acceptable entry conditions means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Attendant means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized entrant means an employee who is authorized by the employer to enter a permit space.

Blanking or blinding means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined space means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

Double block and bleed means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency means any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry permit (permit) means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in subsection (f).

Entry supervisor means the person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

(2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose is published in Group 14 for Radiation and Radioactivity or a permissible exposure limit is published in section 5155 for Airborne contaminants and which could result in employee exposure in excess of its dose or permissible exposure limit;

NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

(5) Any other atmospheric condition that is immediately dangerous to life or health.

NOTE: For air contaminants for which a dose is not published in Group 14 for Radiation and Radioactivity or a permissible exposure limit is not published in section 5155 for Airborne contaminants, other sources of information such as: Material Safety Data Sheets that comply with section 5194, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Hot work permit means the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately dangerous to life or health (IDLH) means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

NOTE: Some materials -- hydrogen fluoride gas and cadmium vapor, for example -- may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

Inerting means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

NOTE: This procedure produces an IDLH oxygen-deficient atmosphere.

Isolation means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Line breaking means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Non-permit confined space means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Oxygen deficient atmosphere means an atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen enriched atmosphere means an atmosphere containing more than 23.5 percent oxygen by volume.

Permit-required confined space (permit space) means a confined space that has one or more of the following characteristics:

(1) Contains or has a potential to contain a hazardous atmosphere;

(2) Contains a material that has the potential for engulfing an entrant;

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

(4) Contains any other recognized serious safety or health hazard.

Permit-required confined space program (permit space program) means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Permit system means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Prohibited condition means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

Rescue service means the personnel designated to rescue employees from permit spaces.

Retrieval system means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

NOTE: Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

(c) General requirements.

(1) The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces.

NOTE: Proper application of the decision flow chart in Appendix A would facilitate compliance with this requirement.

(2) If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces.

NOTE: A sign reading "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or using other similar language would satisfy the requirement for a sign.

(3) If the employer decides that its employees will not enter permit spaces, the employer shall take effective measures to prevent its employees from entering the permit spaces and shall comply with subsections (c)(1), (c)(2), (c)(6), and (c)(8).

(4) If the employer decides that its employees will enter permit spaces, the employer shall develop and implement a written permit space program that complies with this section. The written program shall be available for inspection by employees and their authorized representatives.

(5) An employer may use the alternate procedures specified in subsection (c)(5)(B) for entering a permit space under the conditions set forth in subsection (c)(5)(A).

(A) An employer whose employees enter a permit space need not comply with subsections (d) through (f) and (h) through (k), provided that:

1. The employer can demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;
2. The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry;
3. The employer develops monitoring and inspection data that supports the demonstrations required by subsections (c)(5)(A)1. and 2.;
4. If an initial entry of the permit space is necessary to obtain the data required by subsection (c)(5)(A)3., the entry is performed in compliance with subsections (d) through (k);
5. The determinations and supporting data required by subsections (c)(5)(A)1., 2. and 3. are documented by the employer and are made available to each employee who enters the permit space under the terms of subsection (c)(5); and
6. Entry into the permit space under the terms of subsection (c)(5)(A) is performed in accordance with the requirements of subsection (c)(5)(B).

NOTE: See subsection (c)(7) for reclassification of a permit space after all hazards within the space have been eliminated.

(B) The following requirements apply to entry into permit spaces that meet the conditions set forth in subsection (c)(5)(A).

1. Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
2. When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
3. Before an employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument, for the following conditions in the order given:
   a. Oxygen content,
   b. Flammable gases and vapors, and
   c. Potential toxic air contaminants.
4. There may be no hazardous atmosphere within the space whenever any employee is inside the space.
5. Continuous forced air ventilation shall be used, as follows:
   a. An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;
   b. The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space;
   c. The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
6. The atmosphere within the space shall be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.
7. If a hazardous atmosphere is detected during entry:
   a. Each employee shall leave the space immediately;
   b. The space shall be evaluated to determine how the hazardous atmosphere developed; and
   c. Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
8. The employer shall verify that the space is safe for entry and that the pre-entry measures required by subsection (c)(5)(B) have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification shall be made before entry and shall be made available to each employee entering the space.

(6) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

(7) A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

(A) If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

(B) If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed under subsections (d) through (k). If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

NOTE: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. Subsection (c)(5) covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

(C) The employer shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space.

(D) If hazards arise within a permit space that has been declassified to a non-permit space under subsection (c)(7), each employee in the space shall exit the space. The employer shall then reevaluate the space and determine whether it must be reclassified as a permit space, in accordance with other applicable provisions of this section.

(8) When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall:

(A) Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section;

(B) Apprise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space;

(C) Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;

(D) Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by subsection (d)(11); and

(E) Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

(9) In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall:

(A) Obtain any available information regarding permit space hazards and entry operations from the host employer;

(B) Coordinate entry operations with the host employer, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by subsection (d)(11); and

(C) Inform the host employer of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operation.

(d) **Permit-required confined space program (permit space program).** Under the permit-required confined space program required by subsection (c)(4), the employer shall:

(1) Implement the measures necessary to prevent unauthorized entry;

(2) Identify and evaluate the hazards of permit spaces before employees enter them;

(3) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:

(A) Specifying acceptable entry conditions;

(B) Isolating the permit space;

(C) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;

(D) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and

(E) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry.

(4) Provide the following equipment (specified in subsections (A) through (I), below) at no cost to employees, maintain that equipment properly, and ensure that employees use that equipment properly:

(A) Testing and monitoring equipment needed to comply with subsection (d)(5);

(B) Ventilating equipment needed to obtain acceptable entry conditions;

(C) Communications equipment necessary for compliance with subsections (h)(3) and (i)(5);(D) Personal protective equipment insofar as feasible engineering and work practice controls do not adequately protect employees;

(E) Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency;

(F) Barriers and shields as required by subsection (d)(3)(D);

(G) Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;

(H) Rescue and emergency equipment needed to comply with subsection (d)(9), except to the extent that the equipment is provided by rescue services; and

(I) Any other equipment necessary for safe entry into and rescue from permit spaces.

(5) Evaluate permit space conditions as follows when entry operations are conducted:

(A) Test conditions in the permit space to determine if acceptable entry conditions exist before entry is authorized to begin, except that, if isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), pre-entry testing shall be performed to the extent feasible before entry is authorized and, if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entrants are working;

(B) Test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained during the course of entry operations; and

(C) When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors.

NOTE: Atmospheric testing conducted in accordance with Appendix B would be considered as satisfying the requirements of this subsection. For permit space operations in sewers, atmospheric testing conducted in accordance with Appendix B, as supplemented by Appendix E, would be considered as satisfying the requirements of this subsection.

(6) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations;

NOTE: Attendants may be assigned to monitor more than one permit space provided the duties described in subsection (i) can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in subsection (i) can be effectively performed for each permit space that is monitored.

(7) If multiple spaces are to be monitored by a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces being monitored without distraction from the attendant's responsibilities under subsection (i);

(8) Designate the persons who are to have active roles (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the training required by subsection (g);

(9) Develop and implement procedures for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, for summoning additional rescue and emergency services, and for preventing unauthorized personnel from attempting a rescue;

(10) Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this section;

(11) Develop and implement procedures to coordinate entry operations when employees of more than one employer are working simultaneously as authorized entrants in a permit space, so that employees of one employer do not endanger the employees of any other employer;

(12) Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed;

(13) Review entry operations when the employer has reason to believe that the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and

NOTE: Examples of circumstances requiring the review of the permit space program are: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

(14) Review the permit space program, using the canceled permits retained under subsection (e)(6) within 1 year after each entry and revise the program as necessary, to ensure that employees participating in entry operations are protected from permit space hazards.

NOTE: Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.

Appendix C presents examples of permit space programs that are considered to comply with the requirements of subsection (d).

(e) Permit system.

(1) Before entry is authorized, the employer shall document the completion of measures required by subsection (d)(3) by preparing an entry permit.

NOTE: Appendix D presents examples of permits whose elements are considered to comply with the requirements of this section.

(2) Before entry begins, the entry supervisor identified on the permit shall sign the entry permit to authorize entry.

(3) The completed permit shall be made available at the time of entry to all authorized entrants, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.

(4) The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit in accordance with subsection (f)(2).

(5) The entry supervisor shall terminate entry and cancel the entry permit when:

(A) The entry operations covered by the entry permit have been completed; or

(B) A condition that is not allowed under the entry permit arises in or near the permit space.

(6) The employer shall retain each canceled entry permit for at least 1 year to facilitate the review of the permit space program required by subsection (d)(14). Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

(f) Entry permit. The entry permit that documents compliance with this section and authorizes entry to a permit space shall identify:

(1) The permit space to be entered;

(2) The purpose of the entry;

(3) The date and the authorized duration of the entry permit;

(4) The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space;

NOTE: This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

(5) The personnel, by name, currently serving as attendants;

(6) The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;

(7) The hazards of the permit space to be entered;

(8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

NOTE: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

(9) The acceptable entry conditions;

(10) The results of initial and periodic tests performed under subsection (d)(5), accompanied by the names or initials of the testers and by an indication of when the tests were performed;

(11) The rescue and emergency services that can be provided on-site and additional services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;

(12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

(13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;

(14) Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and

(15) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

(g) Training.

(1) The employer shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this section.

(2) Training shall be provided to each affected employee:

(A) Before the employee is first assigned duties under this section;

(B) Before there is a change in assigned duties;

(C) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;

(D) Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by subsection (d)(3) or that there are inadequacies in the employee's knowledge or use of these procedures.

(3) The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this section.

(4) The employer shall certify that the training required by subsections (g)(1) through (g)(3) has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

(h) **Duties of authorized entrants.** The employer shall ensure that all authorized entrants:

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(2) Properly use equipment as required by subsection (d)(4);

(3) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by subsection (i)(6);

(4) Alert the attendant whenever:

(A) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or

(B) The entrant detects a prohibited condition; and

(5) Exit from the permit space as quickly as possible whenever:

(A) An order to evacuate is given by the attendant or the entry supervisor,

(B) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,

(C) The entrant detects a prohibited condition, or

(D) An evacuation alarm is activated.

(i) **Duties of attendants.** The employer shall ensure that each attendant:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(2) Is aware of possible behavioral effects of hazard exposure in authorized entrants;

(3) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under subsection (f)(4) accurately identifies who is in the permit space;

(4) Remains outside the permit space during entry operations until relieved by another attendant;

NOTE: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by subsection (k)(1) and if they have been relieved as required by subsection (i)(4).

(5) Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under subsection (i)(6);

(6) Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions;

(A) If the attendant detects a prohibited condition;

(B) If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;

(C) If the attendant detects a situation outside the space that could endanger the authorized entrants; or

(D) If the attendant cannot effectively and safely perform all the duties required under subsection (i);

(7) Initiate on-site rescue procedures and, if necessary, summon additional rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

(8) Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

(A) Warn the unauthorized persons that they must stay away from the permit space;

(B) Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

(C) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

(9) Performs non-entry rescues or other rescue services as part of the employer's on-site rescue procedure; and

(10) Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

(j) **Duties of entry supervisors.** The employer shall ensure that each entry supervisor:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(2) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

(3) Terminates the entry and cancels the permit as required by subsection (e)(5);

(4) Verifies that rescue services are available and that the means for summoning additional services are operable;

(5) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

(6) Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

(k) Rescue and emergency services. The employer shall ensure that at least one standby person at the site is trained and immediately available to perform rescue and emergency services.

(1) The following requirements apply to employers who have employees enter permit spaces to perform rescue services.

(A) The employer shall ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from permit spaces.

(B) Each member of the rescue service shall be trained to perform the assigned rescue duties. Each member of the rescue service shall also receive the training required of authorized entrants under subsection (g).

(C) Each member of the rescue service shall practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

(D) Each member of the rescue service shall be trained in basic first-aid and in cardiopulmonary resuscitation (CPR). At least one member of the rescue service holding current certification in first aid and in CPR shall be available.

(2) When an employer (host employer) arranges to have persons other than the host employer's employees perform permit space rescue, the host employer shall:

(A) Inform the rescue service of the hazards they may confront when called on to perform rescue at the host employer's facility, and

(B) Provide the rescue service with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

(3) To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

(A) Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at a suitable point so that when rescued, the entrant presents the smallest possible profile (for example at the center of the entrant's back near shoulder level, or above the entrant's head). Wristlets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

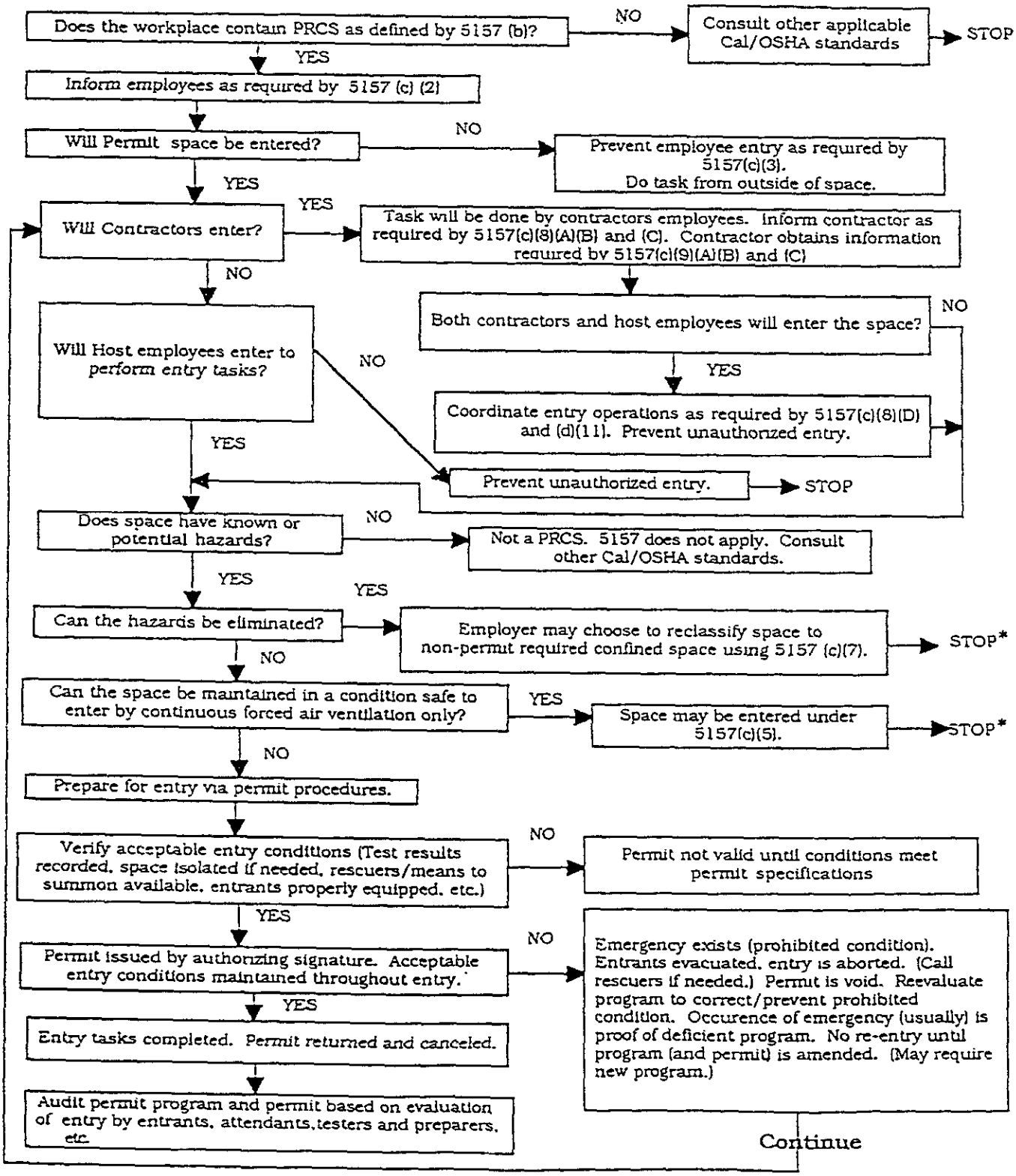
(B) The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

(4) If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

APPENDICES. Appendices A through E serve to provide information and non-mandatory guidelines to assist employers and employees in complying with the appropriate requirements of this section.

Appendix A. Permit - Required Confined Space (PRCS) Decision Flow Chart



* Spaces may have to be evacuated and re-evaluated if hazards arise during entry.

Appendix B – Procedures for Atmospheric Testing.

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

(1) Evaluation testing. The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, should be done by, or reviewed by, a technically qualified professional (e.g., Cal/OSHA consultation service, or certified industrial hygienist, registered safety engineer, certified safety professional, certified marine chemist, etc.) based on evaluation of all serious hazards.

(2) Verification testing. The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

(3) Duration of testing. Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

(4) Testing stratified atmospheres. When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

(5) Order of testing. A test for oxygen is performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere. Combustible gases are tested for next because the threat of fire or explosion is both more immediate and more life theratening, in most cases, than exposure to toxic gases and vapors. If tests for toxic gases and vapors are necessary, they are performed last.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

Appendix C - Examples of Permit-required Confined Space Programs.

Example 1.

Workplace. Sewer entry.

Potential hazards. The employees could be exposed to the following:

Engulfment.

Presence of toxic gases. Equal to or more than 10 ppm hydrogen sulfide as measured as an 8-hour time weighted average. If the presence of other toxic contaminants is suspected, specific monitoring programs will be developed.

Presence of explosive/flammable gases. Equal to or greater than 10% of the lower flammable limit (LFL).

Oxygen Deficiency. A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume.

A. ENTRY WITHOUT PERMIT/ATTENDANT

Certification. Confined spaces may be entered without the need for a written permit or attendant provided that the space can be maintained in a safe condition for entry by mechanical ventilation alone as provided in Section 5157(c)(5). All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter an enclosed/confined space shall have successfully completed, as a minimum, the training as required by the following sections of these procedures. A written copy of operating and rescue procedures as required by these procedures shall be at the work site for the duration of the job. The Confined Space Pre-Entry Check List must be completed by the LEAD WORKER before entry into a confined space. This list verifies completion of items listed below. This check list shall be kept at the job site for duration of the job. If circumstances dictate an interruption in the work, the permit space must be re-evaluated and a new check list must be completed.

Control of atmospheric and engulfment hazards.

Pumps and Lines. All pumps and lines which may reasonably cause contaminants to flow into the space shall be disconnected, blinded and locked out, or effectively isolated by other means to prevent development of dangerous air contamination or engulfment. Not all laterals to sewers or storm drains require blocking. However, where experience or knowledge of industrial use indicates there is a reasonable potential for contamination of air or engulfment into an occupied sewer, then all affected laterals shall be blocked. If blocking and/or isolation requires entry into the space the provisions for entry into a permit-required confined space must be implemented.

Surveillance. The surrounding area shall be surveyed to avoid hazards such as drifting vapors from the tanks, piping, or sewers.

Testing. The atmosphere within the space will be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. Detector tubes, alarm only type gas monitors and explosion meters are examples of equipment that may be used to test permit space atmospheres. Testing shall be performed by the LEAD WORKER who has successfully completed the Gas Detector training for the monitors he will use. The minimum parameters to be monitored are oxygen deficiency, LFL, and hydrogen sulfide concentration. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. The supervisor will certify in writing, based upon the results of the pre-entry testing, that all hazards have been eliminated. Affected employees shall be able to review the testing results. The most hazardous conditions shall govern when work is being performed in two adjoining, connecting spaces.

Entry Procedures. If there are no non-atmospheric hazards present and if the pre-entry tests show there is no dangerous air contamination and/or oxygen deficiency within the space and there is no reason to believe that any is likely to develop, entry into and work within may proceed. Continuous testing of the atmosphere in the immediate vicinity of the workers within the space shall be accomplished. The workers will immediately leave the permit space when any of the gas monitor alarm set points are reached as defined. Workers will not return to the area until a SUPERVISOR who has completed the gas detector training has used a direct reading gas detector to evaluate the situation and has determined that it is safe to enter.

Rescue. Arrangements for rescue services are not required where there is no attendant. See the rescue portion of section B., below, for instructions regarding rescue planning where an entry permit is required.

B. ENTRY PERMIT REQUIRED

Permits. Confined Space Entry Permit. All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter a permit-required confined space shall have successfully completed, as a minimum, the training as required by the following sections of these procedures. A written copy of operating and rescue procedures as required by these procedures shall be at the work site for the duration of the job. The Confined Space Entry Permit must be completed before approval can be given to enter a permit-required confined space. This permit verifies completion of items listed below. This permit shall be kept at the job site for the duration of the job. If circumstances cause an interruption in the work or a change in the alarm conditions for which entry was approved, a new Confined Space Entry Permit must be completed.

Control of atmospheric and engulfment hazards.

Surveillance. The surrounding area shall be surveyed to avoid hazards such as drifting vapors from tanks, piping or sewers.

Testing. The confined space atmosphere shall be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. A direct reading gas monitor shall be used. Testing shall be performed by the SUPERVISOR who has successfully completed the gas detector training for the monitor he will use. The minimum parameters to be monitored are oxygen deficiency, LFL and hydrogen sulfide concentration. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. Affected employees shall be able to review the testing results. The most hazardous conditions shall govern when work is being performed in two adjoining, connected spaces.

Space Ventilation. Mechanical ventilation systems, where applicable, shall be set at 100% outside air. Where possible, open additional manholes to increase air circulation. Use portable blowers to augment natural circulation if needed. After a suitable ventilating period, repeat the testing. Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated.

Entry Procedures. The following procedure shall be observed under any of the following conditions:

1.) Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels;

2.) The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop;

3.) It is not feasible to provide for ready exit from spaces equipped with automatic fire suppression systems and it is not practical or safe to deactivate such systems; or

4.) An emergency exists and it is not feasible to wait for pre-entry procedures to take effect.

All personnel must be trained. A self contained breathing apparatus shall be worn by any person entering the space. At least one worker shall stand by the outside of the space ready to give assistance in case of emergency. The standby worker shall have a self contained breathing apparatus available for immediate use. There shall be at least one additional worker within sight or call of the standby worker. Continuous powered communications shall be maintained between the worker within the confined space and standby personnel.

If at any time there is any questionable action or non-movement by the worker inside, a verbal check will be made. If there is no response, the worker will be moved immediately. Exception: If the worker is disabled due to falling or impact, he/she shall not be removed from the confined space unless there is immediate danger to his/her life. Local fire department rescue personnel shall be notified immediately. The standby worker may only enter the confined space in case of an emergency (wearing the self contained breathing apparatus) and only after being relieved by another worker. Safety belt or harness with attached lifeline shall be used by all workers entering the space with the free end of the line secured outside the entry opening. The standby worker shall attempt to remove a disabled worker via his lifeline before entering the space.

When practical, these spaces shall be entered through side openings -- those within 3 ½ feet (1.07 m) of the bottom. When entry must be through a top opening, the safety belt shall be of the harness type that suspends a person upright and a hoisting device or similar apparatus shall be available for lifting workers out of the space.

In any situation where their use may endanger the worker, use of a hoisting device or safety belt and attached lifeline may be discontinued.

When dangerous air contamination is attributable to flammable and/or explosive substances, lighting and electrical equipment shall be Class 1, Division 1 rated per National Electrical Code and no ignition sources shall be introduced into the area.

Continuous gas monitoring shall be performed during all confined space operations. If alarm conditions change adversely, entry personnel shall exit the confined space and a new confined space permit issued.

Rescue. Call the fire department services for rescue. Where immediate hazards to injured personnel are present, workers at the site shall implement emergency procedures to fit the situation.

Example 2.

Workplace. Meat and poultry rendering plants.

Cookers and dryers are either batch or continuous in their operation. Multiple batch cookers are operated in parallel. When one unit of a multiple set is shut down for repairs, means are available to isolate that unit from the others which remain in operation.

Cookers and dryers are horizontal, cylindrical vessels equipped with a center, rotating shaft and agitator paddles or discs. If the inner shell is jacketed, it is usually heated with steam at pressures up to 150 psig (1034.25 kPa). The rotating shaft assembly of the continuous cooker or dryer is also steam heated.

Potential Hazards. The recognized hazards associated with cookers and dryers are the risk that employees could be:

1. Struck or caught by rotating agitator;
2. Engulfed in raw material or hot, recycled fat;
3. Burned by steam from leaks into the cooker/dryer steam jacket or the condenser duct system if steam valves are not properly closed and locked out;
4. Burned by contact with hot metal surfaces, such as the agitator shaft assembly, or inner shell of the cooker/dryer;
5. Heat stress caused by warm atmosphere inside cooker/dryer;
6. Slipping and falling on grease in the cooker/dryer;
7. Electrically shocked by faulty equipment taken into the cooker/dryer;
8. Burned or overcome by fire or products of combustion; or
9. Overcome by fumes generated by welding or cutting done on grease covered surfaces.

Permits. The supervisor in this case is always present at the cooker/dryer or other permit entry confined space when entry is made. The supervisor must follow the pre-entry isolation procedures described in the entry permit in preparing for entry, and ensure that the protective clothing, ventilating equipment and any other equipment required by the permit are at the entry site.

Control of hazards.

Mechanical. Lock out main power switch to agitator motor at main power panel. Affix tag to the lock to inform others that a permit entry confined space entry is in progress.

Engulfment. Close all valves in the raw material blow line. Secure each valve in its closed position using chain and lock. Attach a tag to the valve and chain warning that a permit entry confined space entry is in progress. The same procedure shall be used for securing the fat recycle valve.

Burns and heat stress. Close steam supply valves to jacket and secure with chains and tags. Insert solid blank at flange in cooker vent line to condenser manifold duct system. Vent cooker/dryer by opening access door at discharge end and top center door to allow natural ventilation throughout the entry. If faster cooling is needed, use a portable ventilation fan to increase ventilation. Cooling water may be circulated through the jacket to reduce both outer and inner surface temperatures of cooker/dryers faster. Check air and inner surface temperatures in cooker/dryer to assure they are within acceptable limits before entering, or use proper protective clothing.

Fire and fume hazards. Careful site preparation, such as cleaning the area within 4 inches (10.16 cm) of all welding or torch cutting operations, and proper ventilation are the preferred controls. All welding and cutting operations shall be done in accordance with the requirements of California Code of Regulations, Title 8, welding standards. Proper ventilation may be achieved by local exhaust ventilation, or the use of portable ventilation fans, or a combination of the two practices.

Electrical shock. Electrical equipment used in cooker/dryers shall be in serviceable condition.

Slips and falls. Remove residual grease before entering cooker/dryer.

Attendant. The supervisor shall be the attendant for employees entering cooker/dryers.

Permit. The permit shall specify how isolation shall be done and any other preparations needed before making entry. This is especially important in parallel arrangements of cooker/dryers so that the entire operation need not be shut down to allow safe entry into one unit.

Rescue. When necessary, the attendant shall call the fire department as previously arranged.

Example 3.

Workplace. Workplaces where tank cars, trucks, and trailers, dry bulk tanks and trailers, railroad tank cars, and similar portable tanks are fabricated or serviced.

A. During fabrication. These tanks and dry-bulk carriers are entered repeatedly throughout the fabrication process. These products are not configured identically, but the manufacturing processes by which they are made are very similar.

Sources of hazards. In addition to the mechanical hazards arising from the risks that an entrant would be injured due to contact with components of the tank or the tools being used, there is also the risk that a worker could be injured by breathing fumes from welding materials or mists or vapors from materials used to coat the tank interior. In addition, many of these vapors and mists are flammable, so the failure to properly ventilate a tank could lead to a fire or explosion.

Control of hazards.

Welding. Local exhaust ventilation shall be used to remove welding fumes once the tank or carrier is completed to the point that workers may enter and exit only through a manhole. (Follow the requirements of California Code of Regulations, Title 8, welding standards at all times.) Welding gas tanks may never be brought into a tank or carrier that is a permit entry confined space.

Application of interior coatings/linings. Atmospheric hazards shall be controlled by forced air ventilation sufficient to keep the atmospheric concentration of flammable materials below 10% of the lower flammable limit (LFL) (or lower explosive limit (LEL), whichever term is used locally). The appropriate respirators are provided and shall be used in addition to providing forced ventilation if the forced ventilation does not maintain acceptable respiratory conditions.

Permits. Because of the repetitive nature of the entries in these operations, an "Area Entry Permit" will be issued for a 1 month period to cover those production areas where tanks are fabricated to the point that entry and exit are made using manholes.

Authorization. Only the area supervisor may authorize an employee to enter a tank within the permit area. The area supervisor must determine that conditions in the tank trailer, dry bulk trailer or truck, etc. meet permit requirements before authorizing entry.

Attendant. The area supervisor shall designate an employee to maintain communication by employer specified means with employees working in tanks to ensure their safety. The attendant may not enter any permit entry confined space to rescue an entrant or for any other reason, unless authorized by the rescue procedure and, and even then, only after calling the rescue team and being relieved by as attendant by another worker.

Communications and observation. Communications between attendant and entrant(s) shall be maintained throughout entry. Methods of communication that may be specified by the permit include voice, voice powered radio, tapping or rapping codes on tank walls, signalling tugs on a rope, and the attendant's observation that work activities such as chipping, grinding, welding, spraying, etc., which require deliberate operator control continue normally. These activities often generate so much noise that the necessary hearing protection makes communication by voice difficult.

Rescue procedures. Acceptable rescue procedures include entry by a team of employee-rescuers, use of public emergency services, and procedures for breaching the tank. The area permit specifies which procedures are available, but the area supervisor makes the final decision based on circumstances. (Certain injuries may make it necessary to breach the tank to remove a person rather than risk additional injury by removal through an existing manhole. However, the supervisor must ensure that no breaching procedure used for rescue would violate terms of the entry permit. For instance, if the tank must be breached by cutting with a torch, the tank surfaces to be cut must be free of volatile or combustible coatings within 4 inches (10.16 cm) of the cutting line and the atmosphere within the tank must be below the LFL.

Retrieval line and harnesses. The retrieval lines and harnesses generally required under this standard are usually impractical for use in tanks because the internal configuration of the tanks and their interior baffles and other structures would prevent rescuers from hauling out injured entrants. However, unless the rescue procedure calls for breaching the tank for rescue, the rescue team shall be trained in the use of retrieval lines and harnesses for removing injured employees through manholes.

B. Repair or service of "used" tanks and bulk trailers.

Sources of hazards. In addition to facing the potential hazards encountered in fabrication or manufacturing, tanks or trailers which have been in service may contain residues of dangerous materials, whether left over from the transportation of hazardous cargoes or generated by chemical or bacterial action on residues of non-hazardous cargoes.

Control of atmospheric hazards. A "used" tank shall be brought into areas where tank entry is authorized only after the tank has been emptied, cleansed (without employee entry) of any residues, and purged of any potential atmospheric hazards.

Welding. In addition to tank cleaning for control of atmospheric hazards, coating and surface materials shall be removed 4 inches (10.16 cm) or more from any surface area where welding or other torch work will be done and care taken that the atmosphere within the tank remains well below the LFL. (Follow the requirements of California Code of Regulations, Title 8, welding standards, at all times.)

Permits. An entry permit valid for up to 1 year shall be issued prior to authorization of entry into used tank trailers, dry bulk trailers or trucks. In addition to the pre-entry cleaning requirement, this permit shall require the employee safeguards specified for new tank fabrication or construction permit areas.

Authorization. Only the area supervisor may authorize an employee to enter a tank trailer, dry bulk trailer or truck within the permit area. The area supervisor must determine that the entry permit requirements have been met before authorizing entry.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

Appendix D - 1 Confined Space Entry Permit

Confined Space Entry Permit

Date and Time Issued:_____
Job Site/Space ID _____
Equipment to be worked on:_____
Standby personnel:_____

Date and Time Expires:_____

Job supervisor:_____

Work to be performed:_____

1. Atmospheric Checks: Time ____
   Oxygen____% Explosive ____% L.F.L.
   Toxic _____ PPM
2. Tester's signature:_____
3. Source isolation (No Entry):

	N/A	Yes	No
Pumps or lines blinded.	( )	( )	( )
disconnected, or blocked	( )	( )	( )

4. Ventilation Modification:

	N/A	Yes	No
Mechanical	( )	( )	( )
Natural Ventilation only	( )	( )	( )

5. Atmospheric check after isolation and Ventilation:

Oxygen_____%	≥	19.5 %
Explosive____% L.P.L.	≤	10 %
Toxic____ PPM	≤	10 PPM H_2S

   Time _____
   Tester's Signature _____
6. Communications Procedures:
7. Rescue Procedures:

8. *Entry, Standby, and back up persons:*

	Yes	No
Successfully completed required training?	( )	( )
Is it current?	( )	( )

9. Equipment:

	N/A	Yes	No
direct reading gas monitor tested	( )	( )	( )
Safety harnesses and lifelines for entry and standby persons	( )	( )	( )
Hoisting equipment	( )	( )	( )
Powered communications	( )	( )	( )
SCBA's for entry and standby persons	( )	( )	( )
Protective Clothing	( )	( )	( )
All electric equipment listed Class I, Division I, Group D and Non-sparking tools	( )	( )	( )

10. Periodic atmospheric tests:
    *Oxygen:*_____ % Time: ____
    Explosive: ___ % Time: _____
    Toxic: _____ppm Time: _____

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any items 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) : (printed name & signature)

_____

This permit to be kept at job site. Return job site copy to Safety office following job completion.
Copies: White Original (Safety Office) Yellow (Unit Supervisor) Hard (Job site):

Appendix D - 2 Entry Permit

ENTRY PERMIT

PERMIT VALID FOR 8 HOURS ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED
DATE:_____ SITE LOCATION and DESCRIPTION_____
PURPOSE OF ENTRY _____
SUPERVISOR(S) in charge of crews Type of Crew Phone #_____
Communication Procedures: _____
Rescue Procedures (phone # at bottom) :_____
* BOLD DENOTES MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY*

REQUIREMENTS COMPLETED	DATE	TIME	REQUIREMENTS COMPLETED	DATE	TIME
Lock Out/De-energize/Try-out	___	___	Full Body Harness w/"D" ring	___	___
Line(s) Broken-Capped-Blanked		___	___ Emergency Escape Retrieval Equip.	___	___
Purge-Flush and Vent	___	___	Lifelines	___	___
Ventilation	___	___	Fire Extinguishers	___	___
Secure area (Post and Flag)	___	___	Lighting (Explosive Proof)	___	___
Breathing Apparatus	___	___	Protective Clothing	___	___
Resuscitator - Inhalator	___	___	Respirator(s) (Air Purifying)	___	___
Standby Safety Personnel		___	___ Burning and Welding Permit	___	___

Note: Items that do not apply enter N/A in the blank.

** RECORD CONTINUOUS MONITORING RESULTS EVERY 2 HOURS **

CONTINUOUS MONITORING TEST(S) TO BE TAKEN	PERMISSIBLE ENTRY LEVEL	MONITORING RESULTS EVERY 2 HOURS
PERCENT OF OXYGEN	19.5% to 23.5%	___ ___ ___ ___ ___ ___ ___ ___
LOWER FLAMMABLE LIMIT	Under 10%	___ ___ ___ ___ ___ ___ ___ ___
CARBON MONOXIDE	35 PPM	___ ___ ___ ___ ___ ___ ___ ___
Aromatic Hydrocarbon	1 ppm - 5 ppm	___ ___ ___ ___ ___ ___ ___ ___
Hydrogen Cyanide	4.7 ppm (S)	___ ___ ___ ___ ___ ___ ___ ___
Hydrogen Sulphide	10 ppm+ 15 ppm*	___ ___ ___ ___ ___ ___ ___ ___
Sulphur Dioxide	2 ppm+ 5 ppm*	___ ___ ___ ___ ___ ___ ___ ___
Ammonia	25 ppm+ 35 ppm*	___ ___ ___ ___ ___ ___ ___ ___

* Short-term exposure limit: Employee can work in the area up to 15 minutes.
+ 8 hr. Time Weighted Avg.: Employee can work in are 8 hrs (longer with appropriate respiratory protection).
REMARKS: _____

GAS TESTER NAME & CHECK #	INSTRUMENT(S) USED	MODEL &/OR TYPE	SERIAL &/OR UNIT #
_____	_____	_____	_____
_____	_____	_____	_____

SAFETY STANDBY PERSON IS REQUIRED FOR ALL CONFINED SPACE WORK

SAFETY STANDBY PERSON(S)	CHECK #	CONFINED SPACE ENTRANT	CHECK #
_____	____	_____	_____
_____	____	_____	_____

SUPERVISOR AUTHORIZATION - AMBULANCE# _____ FIRE# _____
ALL CONDITIONS SATISFIED _____ Safety Off# _____ Gas Coordinator# _____
DEPARTMENT _____ Phone _____

Appendix E -- Sewer System Entry.

Sewer entry differs in three vital respects from other permit entries; first, there rarely exists any way to completely isolate the space (a section of a continuous system) to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer, and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

(1) Adherence to procedure. The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

(2) Atmospheric monitoring. Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions is encountered: oxygen concentration less than 19.5 percent; flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above their permissible exposure limit (PEL) (10 ppm or 35 ppm, respectively, measured as an 8-hour time weighted average (TWA)). Atmospheric monitoring equipment needs to be calibrated according to the manufacturer's instructions. Substance specific devices should be used whenever actual contaminants have been identified. The instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrants' direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

(3) Surge flow and flooding. Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

(4) Special Equipment. Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBA) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

§5158. Other Confined Space Operations.

(a) Scope. For industries and operations specified in section 5156(b)(2) this section prescribes minimum standards for preventing employee exposure to dangerous air contamination and/or oxygen deficiency in confined spaces, as defined in subsection (b).

(b) Definitions.

(1) Confined Space. A space defined by the concurrent existence of the following conditions:

(A) Existing ventilation is insufficient to remove dangerous air contamination and/or oxygen deficiency which may exist or develop.

(B) Ready access or egress for the removal of a suddenly disabled employee is difficult due to the location and/or size of the opening(s).

(2) 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.

(A) Dangerous air contamination due to the flammability of a gas or vapor is defined as an atmosphere containing the gas or vapor at a concentration greater than 20 percent of its lower explosive (lower flammable) limit.

(B) Dangerous air contamination due to a combustible particulate is defined as a concentration greater than 20 percent of the minimum explosive concentration of the particulate.

(C) Dangerous air contamination due to the toxicity of a substance is defined as the atmospheric concentration immediately hazardous to life or health.

NOTE: This definition of dangerous air contamination due to the toxicity of a substance does not preclude the requirement to control harmful exposures, under the provisions of Article 107, to toxic substances at concentrations less than those immediately hazardous to life or health.

(3) Oxygen Deficiency. An atmosphere containing oxygen at a concentration of less than 19.5 percent by volume.

(c) Operating Procedures and Employee Training. The employer shall implement the provisions of this subsection before any employee is permitted to enter a confined space.

(1) Operating Procedures.

(A) Written, understandable operating and rescue procedures shall be developed and shall be provided to affected employees.

(B) Operating procedures shall conform to the applicable requirements of this section and shall include provision for the surveillance of the surrounding area to avoid hazards such as drifting vapors from tanks, piping and sewers.

(2) Employee Training. Employees, including standby persons required by subsection (e)(1)(D), shall be trained in the operating and rescue procedures, including instructions as to the hazards they may encounter.

(d) Pre-entry. The applicable provisions of this subsection shall be implemented before entry into a confined space.

(1) Lines which may convey flammable, injurious, or incapacitating substances into the space shall be disconnected, blinded, or blocked off by other positive means to prevent the development of dangerous air contamination and/or oxygen deficiency within the space. The disconnection or blind shall be so located or done in such a manner that inadvertent reconnection of the line or removal of the blind are effectively prevented.

EXCEPTION: This subsection does not apply to public utility gas distribution systems.

NOTE: This subsection does not require blocking of all laterals to sewers or storm drains. Where experience or knowledge of industrial use indicates materials resulting in dangerous air contamination may be dumped into an occupied sewer, all such laterals shall be blocked.

(2) The space shall be emptied, flushed, or otherwise purged of flammable, injurious or incapacitating substances to the extent feasible.

(3) The air shall be tested with an appropriate device or method to determine whether dangerous air contamination and/or an oxygen deficiency exists and a written record of such testing results shall be made and kept at the work site for the duration of the work. Affected employees and/or their representative shall be afforded an opportunity to review and record the testing results.

(4) Where interconnected spaces are blinded off as a unit, each space shall be tested and the results recorded, in accordance with subsection (d)(3), and the most hazardous condition so found shall govern procedures to be followed.

(5) If dangerous air contamination and/or oxygen deficiency does not exist within the space, as demonstrated by tests performed in accordance with subsection (d)(3), entry into and work within the space may proceed subject to the following provisions:

(A) Testing, in accordance with subsection (d)(3), shall be conducted with sufficient frequency to ensure that the development of dangerous air contamination and/or oxygen deficiency does not occur during the performance of any operation.

(B) If the development of dangerous air contamination and/or an oxygen deficiency is imminent, the requirements prescribed by subsection (e) shall also apply.

(6) Where the existence of dangerous air contamination and/or oxygen deficiency is demonstrated by tests performed in accordance with subsection (d)(3), existing ventilation shall be augmented by appropriate means.

(7) When additional ventilation provided in accordance with subsection (d)(6) has removed dangerous air contamination and/or oxygen deficiency as demonstrated by additional testing conducted (and recorded) in accordance with subsection (d)(3), entry into and work within the space may proceed subject to the provisions of subsection (d)(5).

(8) No source of ignition shall be introduced until the implementation of appropriate provisions of this section have ensured that dangerous air contamination due to flammable and/or explosive substances does not exist.

(9) Whenever oxygen-consuming equipment such as salamanders, plumbers' torches or furnaces, and the like, are to be used, measures shall be taken to ensure adequate combustion air and exhaust gas venting.

(10) To the extent feasible, provision shall be made to permit ready entry and exit.

(11) Where it is not feasible to provide for ready exit from spaces equipped with automatic fire suppression systems employing harmful design concentrations of toxic or oxygen-displacing gases, or total foam flooding, such systems shall be deactivated. Where it is not practical or safe to deactivate such systems, the provisions of subsection (e) related to the use of respiratory protective equipment shall apply during entry into and work within such spaces.

(e) Confined Space Operations.

(1) Entry Into and Work Within Confined Spaces. The requirements of this subsection apply to entry into and work within a confined space: whenever an atmosphere free of dangerous air contamination and/or oxygen deficiency cannot be ensured through the implementation of the applicable provisions of subsection (d), or whenever, due to the existence of an emergency, it is not feasible to ensure the removal of dangerous air contamination and/or an oxygen deficiency through the implementation of the applicable provisions of subsection (d).

(A) Tanks, vessels, or other confined spaces with side and top openings shall be entered from side openings when practicable.

NOTE: For the purposes of this Order, side openings are those within $3^1/_2$ feet of the bottom.

(B) Appropriate, approved respiratory protective equipment, in accordance with Section 5144, shall be provided and worn.

(C) An approved safety belt with an attached line shall be used. The free end of the line shall be secured outside the entry opening. The line shall be at least $^1/_2$-inch diameter and 2,000-pounds test.

EXCEPTION: Where it can be shown that a safety belt and attached line would further endanger the life of the employee.

(D) At least one employee shall stand by on the outside of the confined space ready to give assistance in case of emergency. At least one additional employee who may have other duties shall be within sight or call of the standby employee(s).

1. The standby employee shall have appropriate, approved, respiratory protective equipment, including an independent source of breathing air which conforms with Section 5144(e), available for immediate use.

2. A standby employee (or employees) protected as prescribed by subsection (e)(1)(D)1. may enter the confined space but only in case of emergency and only after alerting at least one additional employee outside of the confined space of the existence of an emergency and of the standby employee's intent to enter the confined space.

(E) When entry must be made through a top opening, the following requirements shall also apply.

1. The safety belt shall be of the harness type that suspends a person in an upright position.

2. A hoisting device or other effective means shall be provided for lifting employees out of the space.

(F) Work involving the use of flame, arc, spark, or other source of ignition is prohibited within a confined space (or any adjacent space having common walls, floor, or ceiling with the confined space) which contains, or is likely to develop, dangerous air contamination due to flammable and/explosive substances.

(G) Whenever gases such as nitrogen are used to provide an inert atmosphere for preventing the ignition of flammable gases or vapors, no flame, arc, spark, or other source of ignition shall be permitted unless the oxygen concentration is maintained at less than 20 percent of the concentration which will support combustion.

1. Testing of the oxygen content shall be conducted with sufficient frequency to ensure conformance with this paragraph.

2. A written record of the results of such testing shall be made and kept at the work site for the duration of the work.

3. Affected employees and/or their representative shall be provided an opportunity to review and record the testing results.

(H) Only approved lighting and electrical equipment, in accordance with the Low-Voltage Electrical Safety Orders, shall be used in confined spaces subject to dangerous air contamination by flammable and/or explosive substances.

(I) Employees working in confined spaces which have last contained substances corrosive to the skin or substances which can be absorbed through the skin shall be provided with, and shall be required to wear, appropriate personal protective clothing or devices in accordance with Article 10.

(2) Precautions for Emergencies Involving Work in Confined Spaces.

(A) At least one person trained in first aid and cardiopulmonary resuscitation (CPR) shall be immediately available whenever the use of respiratory protective equipment is required subsection (e)(1). Standards for CPR training shall follow the principles of the American Heart Association or the American Red Cross.

(B) An effective means of communication between employees inside a confined space and a standby employee shall be provided and used whenever the provisions of subsection (e)(1) require the use of respiratory protective equipment or whenever employees inside a confined space are out of sight of the standby employee(s). All affected employees shall be trained in the use of such communication system and the system shall be tested before each use to confirm its effective operation.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

CONFINED SPACE

ENTRY

PROCEDURES

SUBJECT:
Permit Required Confined Space Entry Original Issue Date_____
SECTION:
Safety/Environmental Revisions:_____

ARONSON ENGINEERING, INC.

STANDARD OPERATING PROCEDURE

PERMIT REQUIRED CONFINED SPACE ENTRY

PREPARED BY:

ENVIRONMENTAL COMPLIANCE SERVICES, INC.

3678 OMEC CIRCLE, SUITE A
RANCHO CORDOVA, CA. 95742

SUBJECT:
Permit Required Confined Space Entry **Original Issue Date:**_____
SECTION:
Safety/Environmental **Revisions:**_____

PERMIT REQUIRED CONFINED SPACES

A. PURPOSE

To establish procedures and minimum requirements for the safety and health of employees who work in, about, and in connection with permit required confined spaces.

B. REFERENCES

1. Title 8, Article 108, California Administrative Code; Cal-OSHA.
2. American National Standards Institute, ANZI 117.1-1989.
3. American Petroleum Institute, API 2015, "Safe Entry and Cleaning of Petroleum Storage Tanks"
4. Federal Register / Vol. 54, No. 106/ Monday, June 5, 1989/ Proposed Rules for "Permit Required Confined Spaces".
5. National institute of Occupational Safety and Health, (NIOSH) " A Guide to Safety in Confined Spaces".
6. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response.
7. EM 385-1-1 Army Corp. of Engineers Safety and Health Requirements.

C. FORMS

1. Aronson Engineering. - Standby Attendant Safety Procedures.
2. Aronson Engineering. - Permit for Entry into Confined Spaces.

D. DEFINITIONS

For the purpose of this document, the following definitions are used:

PERMIT REQUIRED CONFINED SPACE - is a space which has any one or combination of the following characteristics:

- Limited openings for entry and exit.
- Unfavorable natural ventilation.
- Not designed for continuous worker occupancy

HAZARDOUS ATMOSPHERE - any atmosphere which can result in 1) and oxygen-deficiency, 2) flammable atmosphere, and/or 3) a toxic atmosphere.

ATMOSPHERE - Refers to the gases, vapors, mists, fumes, and dusts within a confined space.

CONTAMINANT - Any organic or inorganic substance, dust, fume, mist, vapor, or gas which is harmful or hazardous to humans when present in air.

HOT WORK - Any work involving burning, welding, riveting, or similar fire producing operations, as well as work which produces a potential source of ignition, such as drilling, abrasive blasting and space heating.

INERTING - Displacement of the atmosphere by a non-reactive gas (such as nitrogen) to such an extent that the resulting atmosphere is non-combustible.

ISOLATION - A process whereby the confined space is removed from service and completely protected against the inadvertent release of materials by the following means: inserting a suitable full-pressure blank (skillet type metal blank between flanges) in all lines, miss aligning sections of lines and pipes, or valve-chain lockout of lines; and lockout all sources of electrical power, and blocking or disconnecting all mechanical linkages.

HEAVY METAL - Refers to the potential for exposure to heavy metals in sump/lift stations which have been used for petroleum and other industrial waste materials. Since these sumps will contain residual lead of varying concentrations, they must be regarded as dangerous and requiring the use of respirator protection (fresh air gear), whole body skin protection, and thorough decontamination as well as personal sanitary procedures throughout the cleaning process. These tanks shall not be considered hazard-free until proven so by wipe sample and analysis.

LEL (LOWER EXPLOSIVE LIMIT) - The minimum concentration of a combustible gas or vapor in air (usually expressed in percent by volume at sea level) which will ignite in the presence of an ignition source.

PERMISSIBLE EXPOSURE LIMIT (PEL) - Exposure level without regard to respiratory protection under Title 8 CCR. Equivalent to an 8 hour time weighted average.

OXYGEN DEFICIENCY - Refers to an atmosphere with a partial pressure of oxygen of less than 19.5%. Normal air contains approximately 21% oxygen. For the purpose of this document, any atmosphere containing less than 19.5% oxygen shall be considered oxygen deficiency and Immediately Dangerous to Life and Health (IDLH). A condition of Oxygen Deficiency requires that all requirements for work in a confined space use approved respiratory protection consisting of not less than either a positive pressure self contained breathing apparatus or supplied air line with 5 minute egress bottle.

QUALIFIED PERSON - A person designated by Aronson Engineering, Inc. as capable (by education, experience and/or specialized training) of anticipating, recognizing and evaluating employee exposure to toxic substances or other unsafe conditions in a confined space. Training in the evaluation of employee exposure to toxic substances and in the use of atmospheric testing instruments is required, plus knowledge or experience in specifying the necessary precautions to be taken for the protection of employees under applicable conditions.

STANDBY ATTENDANT - Individual physically capable of rescuing by use of hoist, lifeline and harness, or by entry into a confined space and who has current training in:

- **a)** Cardiopulmonary resuscitation (CPR)
- **b)** First Aid
- **c)** Air-supplied respiratory protective equipment w/5 minute egress bottle.
- **d)** Self-contained respiratory protective equipment
- **e)** Personal protective equipment
- **f)** Emergency Extraction Rescue Devices

E. HAZARDS:

The hazards associated with entering and working in confined spaces are capable of causing bodily, engulfment, entrapment, illness, and death to the workers. Confined spaces can become unsafe as a result of:

1. Possible atmospheric contamination by toxic or flammable vapors.

2. Oxygen deficiency or explosive nature.

3. Potential physical hazards such as falling objects, slippery surfaces, agitators or there moving parts within the work area

4. The presence of hazardous residues, or the possibility of liquids, gases or solids being admitted during occupancy.

5. Employee entrapment or engulfment.

6. Physical isolation of employees when in need of rescue.

F. PROCEDURES

The procedures prescribe minimum requirements for safe entry continued work in and exit from tanks or other such confined spaces. They are intended to prevent Aronson Engineering, Inc. employees and subcontractors from accidental exposure to dangerous conditions, air contamination and/or oxygen deficiency.

1. Entry Restrictions

a. Entry into a confined space for any type of work is prohibited when tests indicate the concentration of flammable gases in the atmosphere is greater than 10% of the Lower Explosive Limit (LEL).

b. Once the confined space atmosphere contains 10% LEL or less, personnel wearing approval respiratory equipment and PPE may enter the confined space to work as required.

c. If during the cleaning activity explosive vapor concentration inside the confined space rises above 10% LEL, work inside the space must cease and personnel shall be required to vacate the space. Mechanical ventilation and/or water fogging must be initiated and continue until an LEL reading of 10% LEL or less is obtained from sampling the space vapors, before personnel are permitted to reenter and continue the cleaning process.

d. Entry into a confined space that contains less than 19.5% oxygen, is not permitted without approved respiratory protection. Entry into a confined space with greater than 23% oxygen is not permitted until the oxygen content is reduced below the explosive level.

e. Entry into a confine space containing toxic contaminants in concentrations at or above the PEL of Title 8 CCR shall be permitted only when Personal Protective Equipment (PPE) appropriate for the specific contaminants is provided to all affected employees.

2. **Inspections and Tests**

a. A "qualified person" shall determine the type of product which the confined space previously contained, as well as the indicated amount of sludge, residual product, or other contaminants. The physical conditions of the confined space itself must be determined.

b. A "qualified person" shall make a survey of the surrounding area, including atmospheric testing if appropriate, to determine whether it is safe to enter the area to perform cleaning operations.

c. Entry into a confined space is prohibited until initial testing of the atmosphere has been done from the outside. The tests performed shall include testing for oxygen content, flammability, and toxic contaminants as warranted based upon previous contents. Additional tests shall be selected and performed to the satisfaction of the "qualified person".

d. All test results shall be recorded on Aronson Engineering, Inc. from "Permit for Entry Into Confined Spaces". This form shall be clearly posted on the vessel as near as possible to the point where employees will enter the confined space. After job completion, the form is to be retained with the job file.

e. The confined space shall be tested as often as necessary to ensure the safety of employees, and whenever conditions in the confined space change, such as temporary stoppage of mechanical ventilation, agitation of product by workers, increases in ambient temperature, increase in LEL. etc. The required frequency of re-testing will be in accordance with regulatory rules under Title 8 CCR and 29 CFR.

f. In addition to atmospheric testing, a "qualified person" shall take positive steps to ensure that employees are protected from other physical hazards, which would include, but are not limited to the following:

1) Discharge of steam, high pressure air, water oil, or sewage into the permit required confined space, or against personnel working outside.

2) Structural failure of the vault shell, roof, roof support members, swing line cables or other tank members.

3) Tools or other objects dropping from overhead.

4) Falls through or from the roof, or from scaffolds, stairs, etc.

5) Tripping over hoses, pipes, tools, or equipment.

6) Slipping on wet, oily surfaces or colliding with objects in inadequately lighted interiors.

7) Insufficient or faulty PPE.

8) Insufficient or faulty equipment and tools.

9) Noise in excess of OSHA prescribed levels.

10) Temperature extremes which may require additional protection or shorter work periods.

3. **Isolation**

a. Ignition sources will be controlled before starting operations which may involve the release of vapor from the vaults, lift stations ect. by taking the following precautions:

1) Provide appropriate signs and/or warnings to prevent the unauthorized movement of vehicles or personnel in the area of work.

2) Stop all maintenance or hot work in immediate area which might create an ignition source.

3) Check all electrical equipment or portable lights used at ground level outside the vaults, lift stations ect. to insure they are explosion-proof, vapor proof and do not present a safety hazard.

4) All smoking materials adhere prohibited anywhere in the immediate area (specifically inside barricaded, posted, and areas enclosed by a firewall or dike).

b) Before a method of isolation is selected, a "qualified person" will consider the hazards that may exist regarding to temperature, pressure, flammability, or toxicity of the material in the piping, including reactions with cleaning or purging agents.

c) Before employees are permitted to enter a confined space, the space shall be isolated to prevent the entry of hazardous materials by on or more of the following methods:

1) Removing a valve, spool piece, or expansion joint in piping as close as possible to the confined space, and blanking or capping the open end of the pipe leading to the confined space. Blanks or caps shall be of material that is compatible with the liquid, vapor, or gas with which they are in contact. The material shall also have sufficient strength to withstand the maximum operating pressure, including surges, which can build up in the piping.

2) Inserting a suitable blank in piping between the flanges nearest to the confined space.

3) Closing, locking, and tagging at tagging at least two valves in the piping leading to the confined space, and locking or tagging open to atmosphere a drain valve between the two closed valves, which shall be checked to ensure that it is not plugged.

4) Disconnecting, locking, and tagging of all electrical and mechanical devices which are attached to the confined space to prevent accidental movement or energizing of such systems.

5) De-pressurize the confined space, or any line and devices within the confined space.

4. **Ventilation**

a. Prior to ventilating a confined space, a " qualified person" shall take positive steps to ensure that no pyrophoric materials that will ignite in the presence of air are present in the confined space.

b. All confined spaces shall be mechanically ventilated or abated to prevent accumulation of:

1) Flammables in the atmosphere at concentrations above 10% of the LEL.

2) Concentrations of combustible dusts.

3) Toxic contaminants in the atmosphere above the PEL.

4) Toxic and other contaminants having no rated PEL.

5) Oxygen excess (23%) or deficient (<19.5%) atmospheres.

c. Only air driven air movers shall be used to ventilate confined spaces. **Use of electric powered ventilators is strictly prohibited when explosive vapors are present.**

d. Oxygen shall not be used to power air-driven ventilators.

e. A "Qualified person" shall check periodically to ensure that contaminate air from a confined space is exhausted to a location where it presents no hazard for personnel the environment.

f. Whenever possible, air movers shall be with ducting to increase the efficiency of ventilation in the confined space an to prevent re-circulation of contaminated air due to ventilation "short-circuiting."

g. Mechanical ventilation and/or water fogging shall be continued during the cleaning process and during testing of the excavation.

5. Illumination

When temporary lighting is used in confined spaces, the following requirements shall be met:

a. All lighting shall be approved for use in Class, I Division I, Group D Atmospheres.

b. Extension cords used for temporary lighting shall be equipped with connectors or switches approved for use in a hazardous locations and equipped with Ground Fault Interrupts (GFI).

c. Temporary lighting shall be equipped with metal and explosion/vapor proof guards to prevent accidental contact with the bulb.

d. The lighting shall not be suspended by air lines or electric cords, unless they are designed for the method of suspension.

e. air lines and or electric cords shall be kept clear whenever possible of working spaces and walkways or other locations in which they may be exposed to damage or cause personnel injury by creating a tripping hazard.

f. Pneumatic explosion proof lights will be used where possible.

G. EMPLOYEE TRAINING AND INDOCTRINATION

1. Employees assigned to work in confined spaces shall have completed formal classroom and practical training including the following:

   a. Types of industrial confined spaces.

   b. The chemical and physical hazards involved.

   c. Safe work practices and techniques.

   d. Testing requirements, evaluation and test methods.

   e. Safety equipment proper use and limitations.

      1) Respiratory devices

      2) Personal protective equipment, protective clothing, and other safety gear, e.g.: harnesses, acid suits.....

   f. Procedures for emergency first aid and rescue.

   g. Applicable federal, state and local regulations.

   h. Aronson Engineering, Inc., tank/confined space cleaning policies and procedures.

3. Tailgate Safety Meetings detailing specific hazards of the work to be performed and safety precautions and procedures specific to the job shall be conducted by the Supervisor at the beginning of each shift, for each job, and shall be documented in writing.

4. Retraining - Aronson Engineering, Inc., personnel shall be retrained (subject areas listed in paragraph F), at least annually. Records of training and retraining shall be fully documented in writing and maintained by the corporate office (central files).

H. MECHANICAL AND MONITORING EQUIPMENT

Mechanical equipment such as pumps and drives, vacuum trucks, educators and compressors should all be in good condition. The following list of items apply:

1. Air operated equipment is preferred. Electric driven equipment may be permitted only if the switches, connectors and drive powered meters are explosion proof. Electric driven equipment will never be used within a confined space.

2. Equipment used in the sewer, sump and other potentially flammable cleaning area shall properly bonded/grounded.

3. All hose connections shall be of non-sparking material. Hose and electrical connections shall preferably not be located within the sump fire wall or diked area. In no case shall a final electrical connection be made or broken within the diked areas.

4. As a minimum, the following equipment is required:

   a. Approved dry chemical extinguishers.

   b. Explosion-proof lamps/flashlights, not to exceed 24 volts.

   c. Shovels, brooms, scrapers, squeegees, buckets, etc., for cleaning.

   d. Rags or drying compound.

   e. First aid Kit

   f. Monitoring Equipment - The following properly calibrated monitoring equipment is required:

      1) Oxygen analyzer.

      2) Combustible gas indicator.

3) Other appropriate monitoring equipment as necessary such as Hydrogen Sulfide indicator in areas where Hydrogen Sulfide may be present, or heavy metals analyzer kit (if lift station contained heavy metal sludge or was not previously waste free).

I. PERSONAL PROTECTIVE MEASURES AND EQUIPMENT

1. Employees entering the confined space shall be equipped with either positive pressure hose-line supplied air respirators with egress bottles, or positive pressure self contained breathing apparatus (SCBA). Use of Air Purifying respirator (Full Face) is not authorized on initial entry. Use of Air Purifying respirators must be approved by the Site Safety Officer only after the confined space is certified to contain at least 19.5% oxygen and not to contain toxic concentrations which may be dangerous to life and health.

2. Employees entering the confined space shall be equipped with body harness and lifelines as required below:

   a. A Class I (belt type) or II shoulder type) harness may be used for side entry (openings not greater than three and one half feet from ground level) where there is no vertical fall hazard. A quick release lanyard shall be used which permits escape in case of lifeline fouling.

   b. When entry must be made through a top opening the harness shall be a Class III full body parachute type that will suspend a person in an upright position. A man-rated hoisting device shall also be provided for lifting employees out of the space.

      1). All employees shall use applicable protective equipment, such as head and eye protection, gloves, boots, and impervious clothing as required by the nature of the residues to be removed and the atmospheric contaminants.

      2) Other physical hazards or stresses such as temperature extremes and excessive noise may require the use of specialized safety equipment in any confined space.

c. No food or beverages will be permitted in the vicinity of a waste cleaning operations until all hazards have been eliminated and the area has been declared vapor and contaminant free. An area certified to be contaminate free will be set up for consumption of food stuffs. Sufficient hygiene facilities will be available so employees can wash their hands and faces before eating, drinking or smoking.

J. STANDBY ATTENDANT (HOLE WATCH) PROCEDURES

Whenever supplied-air respiratory equipment, lifelines, and harness are required, at least one standby attendant will be present. The standby attendant shall standby on the outside of the confined space ready to give assistance in case of emergency. One additional employee, who may have other duties, or a radio will be available to call for emergency assistance. at least three employees are required for all supplied air entries into confined spaces when toxic concentration are higher than the STEL (Short Term Exposure Limit).

1. The standby attendant(s) shall have been trained in rescue procedures and shall wear the same level PPE and respiratory protection of those employees who are inside the confined space.

2. Standby attendants shall be familiar with pertinent types of atmospheric testing, respiratory protection, and the proper use of safety and rescue equipment. They will be equipped with the appropriate safety equipment for the job.

3. Standby attendant and rescuers shall be instructed not to enter a confined space unless at least one other person is notified and standing by in case additional help is required.

4. An effective means of communication between employees inside a confined space and a standby attendant shall be provided and used whenever atmospheric conditions of the confined space require the use of air-supplied respirator protective equipment, lifelines and harnesses, or when employees trained in the use of the standby attendant(s). All affected employees shall be trained in the use of the communication system and the system shall be tested before each shift or use to confirm its effective operation.

5. The standby attendant(s) shall call the worker(s) out of the confined space when:

   a. The standby attendant(s) has to leave the immediate area without a qualified relief for any reason.

b. an emergency signal or alarm is sounded.

c. The standby attendant(s) suspect or detect the presence of a potential hazard or situation dangerous to the worker(s) in the confined space.

6. If personnel are injured, an Aronson Engineering, Inc., Accident Report shall be completed. Other Aronson Engineering, Inc. procedures for injury and illness as appropriate shall be carried out.

7. If emergency personnel are needed they shall be summoned by a designated employee not involved in standby duties or rescue. That employee will be designated in the Tailgate Safety meeting.

EMERGENCY PROCEDURES FOR EXTRACTION OF CONFINED SPACE ENTRANCES.

For permit requirement confined space entries, an in house rescue team shall be available on site whenever a permit required entry is in progress. All members of the rescue team must have training in emergency entrance of the confined space. The in-house rescue team will perform rescue operations to the extent that training and equipment allow. If in house team is unable to perform a safe rescue, outside emergency personnel will be utilized. These personnel will be provided by The City of Dublin and Base Fire Department.

UPON NOTIFICATION OF RESCUE;

A non-entry rescue by the attendant/trained personnel shall be attempted first.

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit required space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrants head.

The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary.

A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

If an injured entrant is exposed to substance for which a Material Data Sheet (MSDS) or other similar written information is required to be kept at the work site, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

If non-entry rescue cannot be accomplished, then entry into the permit space with necessary skin and SCBA protection is authorized only after all confined space entry procedures are completed as previously stated in this section.

* Rescuer will make entry into the permit space with necessary skin and SCBA protection.

Supplied Airline Respirators shall not be used in place of SCBA's for fire fighting or rescue.

UPON THE ALERT FOR RESCUE SERVICES:

Call for an ambulance may be necessary. This will be determined at the point of rescue operations. **Call 911** for ambulatory services.

If the in-house rescue team is unable to accomplish rescue for any reason, then outside services shall be summoned. For outside rescue services, the Dublin or Base Fire Department will be the primary responder. **Dial 911** for response and emergency extraction, assistance using the on site mobile phone.

APPENDIX A

HEAVY METAL HAZARD PROCEDURES

The procedures specify minimum requirements for safe entry, continued work in, and exit from vaults or other confined spaces in which a heavy metal hazard exists or is suspected.

1. **Medical Monitoring**

   a. A baseline analysis will be performed for each employee to determine preexisting "background" levels of heavy metal compounds or other appropriate toxic substances.

   b. Employees will be required to undergo a pre-job lead test if the lead hazard exceeds the Time Weighted Average (TWA).

   c. Employees will undergo post job completion medical testing and analysis to identify any exposure to heavy metal compounds resulting from the heavy metal hazard if at any time the short term exposure limit (STEL) is exceeded.

2. **Additional Entry Restrictions**

   a. Entry into a heavy metal hazard confined space is prohibited when the level of contaminant in air is at or above the immediately dangerous to life and health (IDLH) level. The current IDLH for levels are listed in the hazard analysis list on page 10 of the site specific plan.

   b. Entry into a confined space with concentrations of heavy metal contaminants and tetraethyl lead at or above the respective PEL's shall be permitted only when personal protective equipment appropriate for the specific contaminates is used by all employees effected. The TLV/PEL is listed on page 10 of the site specific plan.

   c. If the risk of respiratory exposure to volatile organic lead or other, heavy metal compounds all at Aronson Engineering, Inc., employees and subcontractors entering the confined space or other standby personnel will be provided with either positive pressure air line respirators with egress bottles, or positive pressure self contained breathing apparatus (SCBA), or as designated by the Site Safety Officer hazard evaluation.

d. Due to the risk of exposures resulting from skin contact with varies heavy metals or other chemical compounds, all Aronson Engineering, Inc., employees and subcontractors entering the confined space, personnel involved in decontamination or other affected standby personnel will be provided with personal protective equipment appropriate for the product and organic lead compounds involved. Specific requirements appropriate for each level of work are listed in the personal protection section of these procedures.

3. Additional Inspections and Tests

a. When appropriate, a "qualified person" or a designated contractor will perform lead in air analysis to insure that the confined space is hazard free or at levels safe enough for entry.

4. Reduction of Lead Hazard

a. A "qualified person" will take appropriate actions to minimize the risk of exposure to organic heavy metal and other chemical compounds. Appropriate actions to minimize the risk of exposure include but are not limited to the following:

1) Use of ventilation
2) Water fog sprays
3) Proprietary chemical cleaning processes
4) Special work procedures
5) Special personal protective equipment
6) Special sump cleaning equipment
7) Other physical and/or engineering controls

5. Personal Protection Against Contaminate Exposure Hazards

a. All Aronson Engineering, Inc., Employees and Sub-Contractors

1) All site personnel will be provided with clean disposable underwear, coveralls (tyvek) and personal protective equipment and the beginning of each shift. Employees will change out of personal clothes and into provided clothes prior to entering the job site.

2) All clothing issued at the beginning of a shift will be disposed of at the site and not returned to company property. Barrels and trash cans will be provided for disposal of clothing.

b. Decontamination Procedures for heavy metal and other contaminates suspected to be on sites.

1) An area will be designated as the "decontamination area" for use by site personnel where they will be assisted in removing and decontaminating personal protective equipment, other equipment used in the confined space and themselves. Decontamination will take place before going to any other area or doing any other task (such as eating, drinking, or smoking),

2) Site personnel will shower and change into clean personal clothing on the job site at the end of each work day.

3) Site personnel who accidentally become exposed to a material posing a lead hazard (i.e.: sludge or other material contacts skin due to a splash or the failure of personal protective equipment) will be removed before they are washed and provided with emergency treatment and/or care as appropriate for the nature of the exposure.

4) Equipment such as lifelines, airlines, assorted tools and hoses used in the lead hazard confined space or coming into contact with contaminated materials will be considered contaminated until cleaned and materials will be considered contaminated until cleaned and decontaminated.

5) All contaminated Aronson Engineering, and sub-contractors equipment will be deposited in the decontamination area, and shall not be used outside of the confined space or decontamination area until thoroughly cleaned.

6) The decontamination area and equipment will be kept clean and ready for operation when not in use.

7) Other appropriate decontamination methods and procedures may be used in addition to those listed above. Refer to the Master Health and Safety Plan (section 9) and the Site Specific Plan (pages 7-8) for additional procedures.

8) Decontamination procedures may be modified by the Site Safety Officer only based on the current hazard analysis and site conditions.

ARONSON ENGINEERING, INC.

STANDBY ATTENDANT SAFETY PROCEDURES

1. Employees working inside a confined space must be under the constant observation of a fully qualified standby attendant. The attendant will be trained in First Aid/CPR in the event a rescue becomes necessary.

2. Before anyone enters the confined space the standby attendant will be instructed by the Site Safety Officer in charge of the following:

   a. Review all work, emergency procedures and confirm that written permits have been obtained.

   b. Confirm the location of the nearest:

      1) Telephone or radio
      2) Water
      3) Fire extinguisher

   c. The attendant must be able to describe the location where entry is taking place for emergency notifications if necessary.

   d. Remain outside the confined space. **UNDER NO CIRCUMSTANCES SHOULD THE ATTENDANT ENTER THE SPACE**. If workers in the space become ill or injured, he will sound the alarm and notify the nearest employee to summon emergency assistance. He must speak clearly and give the details about what has happened and where the emergency is. The message must be repeated back. The notifying employee must do the same when talking to emergency assistance squads and should remain on the phone until released.

3. Every person entering a space for rescue purpose must wear a harness with life line attached and a positive pressure air supplied respirator or self contained positive pressure breathing apparatus (SCBA).

4. If an event occurs in the area of the confined space entry, such as a fire or spill, the attendant must order the workers inside to exit the area immediately until it is safe to return and reentry is authorized.

5. A confined space entry becomes void if any of the following events occur:

   a. The job is interrupted for more than 60 minutes, for any reason.

   b. An employee working in the space becomes ill or injured.

   c. A power failure occurs which renders the lighting, telephone, or radio inoperative.

   d. The condition in or around the confined space changes so as to violate the pre-entry conditions authorized by the "qualified person".

I have read and understand my duties as a Standby Attendant:

	NAME (PRINTED)	SIGNATURE	DATE/TIME
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

ARONSON ENGINEERING, INC.

RESPIRATORY PROGRAM

Evaluation of lung function for respirator qualification.

P. Respiratory Program

INTRODUCTION

Aronson Engineering, Inc. has established a program to provide for the care and cleaning of respirators. The purpose of the program is to assure that all respirators are maintained at their original effectiveness. If they are modified in any way, their Protection Factors may be voided. Aronson Engineering, Inc. has designated the Safety Program Director to be responsible for inspecting, cleaning, repairing, and storing respirators.

The Program includes:

-Inspection (including a leak check) at least quarterly
-Cleaning and disinfecting after each exposure or use
-Repair
-Storage

INSPECTION

Inspect respirators at least quarterly and after each use.

Inspect a respirator that is kept ready for emergency use monthly to assure it will perform satisfactorily.

On air-purifying respirators, thoroughly check all connections for gaskets and "O" rings and for proper tightness. Check the condition of the face-piece and all its parts, connecting air tube, and headbands. Inspect rubber or elastic parts for pliability and signs of deterioration.

Maintain a record for each respirator inspection, including date, inspector, and any unusual conditions or findings.

Maintenance records will be kept by suing the "Personal Safety Kit Checklist and Maintenance Log."

CLEANING AND DISINFECTING

Clean and disinfect respirators as follows:

-Remove all cartridges, canisters, and filters, plus gaskets or seals not affixed to their seats.

-Remove elastic headbands.

-Remove exhalation cover.

-Remove speaking diaphragm or speaking diaphragm-excavation valve assembly.

-Remove inhalation valves.

-Wash face-piece and breathing tube in cleaner/sanitizing powder mixed with warn water preferably at >120 degrees. Wash components separately from the face mask, as necessary. Remove heavy soil from surfaces with a hand brush.

-Remove all parts from the wash water and rinse twice in clean warm water.

-Air dry parts in a designated clean area.

-Wipe face-pieces, valves, and seats with a damp lint-free clothe to remove any remaining soap of other foreign materials.

NOTE: Most respirator manufacturers market their own cleaners/sanitizers as dry mixtures of a bactericidal agents and a mild detergent. One-ounce packets for individual use and bulk packages for quantity use are usually available.

REPAIRS

Only trained personnel with proper tools and replacement parts shall work on respirators. No one shall ever attempt to replace components or to make adjustments or repairs beyond the manufacturer's recommendations. It may be necessary to send high-pressure-side components of SCBA's to an authorized facility for repairs.

Repairs will be made as follows:

-Disassemble and hand clean the pressure-demand and exhalation valve assemble (SCBA's only). Exercise care to avoid damage to the rubber diaphragm.

-Replace all faulty or questionable parts or assemblies. Use parts only specifically designed for the particular respirator.

-Reassemble the entire respirator and visually inspect the completed assembly.

-Insert new filters, cartridges, or canisters, as required. Make sure that gaskets or seals are in place and tightly sealed.

STORAGE

All respirators shall be stored at the main office (whenever possible) in sealed plastic bags and in clean, dry ice chests to shield from exposure to the elements.

-After respirators have been inspected, cleaned, and repaired, store them so to protect against dust, excessive moisture, damaging chemicals, extreme temperatures and direct sunlight.

-Do not store respirators in clothes lockers, bench drawers, or tool boxes.

DONNING RESPIRATORS

1/2 Face Respirators:

1. Remove your protective eyewear (if worn), then grasp the front of the respirator with one hand and the upper strap with the other hand. Then place the portion of the face-piece containing the exhalation valve under the chin.

2. Position the narrow portion of the respirator on the nose bridge and place the cradle suspension system on the head so that the top strap rests across the top of the head and the bottom strap rests above the ears, on the back of the head. Then hook the bottom headband strap behind the neck, below the ears, and adjust the position of the face piece on the face for best fit and comfort.

3. The length of the headband straps are adjustable; tighten or loosen by holding the respirator body or headband yoke with one hand and pulling on the elastic material in the appropriate direction with the other hand. (For a comfortable fit, the headband straps must be adjusted equally on both sides of the respirator).

4. Position the face-piece so that the nose section rests as low on the bridge of the nose as is comfortable, and tighten the upper headband strap on both sides just tight enough so that the respirator doesn't slide down on the noes. Do not over tighten. If the respirator pinches the nose, loosen the upper strap slightly.

5. Tighten the lower headband strap on both sides just tight enough to secure the respirator under the chin. If you previously removed your protective eyewear, put it back on at this time.

Negative Pressure Fit Check:

Place the palms of the hands over the openings in the filter covers or unscrew the air-purifying elements from the respirator and place the palms of the hands over the inhalation connectors, inhale and hold your breath for about 5 seconds. If the face-piece collapses slightly and no air leaks between the face-piece and the face are detected, a good fit has been obtained. If air leaks are detected, reposition the face-piece on the face and/or readjust the tension of the elastic straps and repeat the negative pressure check until a tight seal is obtained.

Positive Pressure Fit Check:

Using the hands to close the openings in the exhalation valve guard, simultaneously exhale. If the face-piece bulges slightly and no air leaks between the face-piece and the face are detected, a tight fit has been obtained. if air is detected to be leaking out between the face-piece and the face, reposition the face-piece on the face and / or readjust the tension of the head harness straps to eliminate the leakage. This check must be repeated until a tight seal of the face-piece to face is obtained.

Banana Oil (isoamyl acetate vapor) Fit Test:

In conducting the Banana Oil test, the respirator wearer will need assistance from a coworker-worker. The respirator must be equipped with a HEPA Filter organic vapor cartridges in order to conduct the Banana Oil test. The person assisting the wearer must unscrew the filter cartridges that may be connected to the respirator and screw on a pair of test cartridges. Check to be sure that each cartridge is tightly sealed against the gasket. The person assisting with the test should take one of the North Respirator Fit Test Ampoules, crush it and move the crushed ampoule around the area where the face piece seals to the face. If no banana odor is detected, a good fit has been obtained.

If banana odor is detected, reposition the face-piece on the face and/or readjust the tension of the head harness straps, and repeat the test until a tight seal is obtained.

Once a tight face-piece-t-face seal has been obtained, the person assisting the respirator wearer with the test must unscrew the test cartridges, if they are not appropriate for the intended use, from the respirator and assemble a pair of appropriate filter and / or cartridges to the respirator.

HEALTH AND SAFETY CARD NO. 4 ATTACHMENT Q
HEAT STRESS (HYPERTHERMIA)

SIGNS AND SYMPTOMS/FIRST AID

Illness	Signs and Symptoms	First Aid	Prevention
ıt Stroke	- Hot dry skin - Red, mottled or cyanotic skin - Lack of sweating - Mental confusion - Loss of consciousness - Convulsions - Coma	- Life threatening medical emergency - Call for emergency medical aid - Provide immediate, rapid cooling (immerse in chilled water; wet skin and fan vigorously; etc.) - Avoid overcooling - Treat for shock	- Medical screening of individuals - Gradual acclimatization to hot environment (10-14 days) - Monitoring of individuals active in a hot environment
Heat Hyperpyrexia (mild form of heat stroke)	- Less severe brain disorders - Some sweating	- Medical emergency - Call for emergency medical aid - Provide cooling - Avoid overcooling - Treat for shock	- Medical screening - Acclimatization - Monitoring (see Heat Stroke above)
Heat Exhaustion	- Fatigue, Fainting - Headache, Nausea - Clammy, moist cool skin - Variable skin appearance (pale, mottled or flush) - Restlessness - Dizziness - Thirst - Rapid, thready pulse	- Remove to cooler environment - Lay down in cool area to rest - Provide fluids - Provide balanced salt/electrolytes intake with fluids - Keep at rest until complete recovery - Treat for shock	- Acclimatization to hot environment - Ample fluids intake - Ample dietary salt/electrolyte intake - Adequate rest breaks in a cooler environment
Heat Syncope	- Fainting (prolonged standing/immobility in hot environment)	- Remove to cooler environment - Rest	- Acclimatization - Intermittent activity
Heat Cramps	- Painful muscle spasms (arms, legs or abdominal)	- Ample salt/electrolyte intake with fluids (dietary and/or supplemental salt/electrolyte)	- Adequate salt/electrolyte intake when replacing lost body fluids
Heat Rash	- Skin eruptions (profuse tiny raised red vesicles) - Pricking sensation during heat exposure	- Wash skin with soap and water - Allow skin to dry	- Personal hygiene - Allow skin to dry between heat exposures.

FIELD SAFETY

Prevention
- Adjust work/rest schedule as needed
- Rotate personnel to minimize overstress
- Work during cooler periods
- Provide shelter, cooler area for rest period
- Maintain fluid levels
- Maintain physical fitness
- Maintain normal weight levels
- Provide cooling devices (eg. showers, cooling vests, suits, etc.)
- Recognize signs/symptoms of heat stress and act immediately

Activity in Hot Environment
- Pace work/activity
- Use buddy system when possible
- Avoid unnecessary exertion
- Recognize personal limits

Restbreaks
- Rest frequently, allow heart rate to return to normal
- Rest in cooler environment (shade, indoors, etc.)
- Sit or lay down (reduce unnecessary stress to cardiovascular system)
- Open clothing to promote air circulation and sweat evaporation

Acclimatization
- One to two weeks
- Gradual increase in exposure/activity in hot environment

Fluid Intake
- Frequent, continuous intake (8 oz. every 20 min.)
- Begin replenishment before sensation of thirst (8 oz. before working)
- Fluids temperature cool, 50°-60°F, (not chilled)

Salt/Electrolyte Replacement
- Adequate dietary intake preferred
- Replace along with fluids

MONITORING(1)

Heart Rate (HR)
- Immediately upon beginning rest
- Count radial pulse for 30 seconds
- If HR >110 bpm, shorten next work cycle by one-third

Oral Temperature (OT)
- Measure at end of work period, BEFORE DRINKING ANY FLUIDS
- If OT >99.6 °F (37.6 °C), shorten next work cycle by one-third
- Do not continue to work if OT >100.6 °F (38.1 °C)

Body Water Loss (BWL)
- Measure using scale accurate to ±0.25 lbs.
- Measure daily at beginning of work (similar clothing, or no clothing)
- BWL should not exceed 1.5% of total body weight loss in a work day

(1) Applies when wearing semipermeable or impermeable chemical protective clothing. (2) Begin monitoring when temp. >70°F.

IMPORTANT FACTS

- Maximum sweat rate: 4 liters/hour (up to 12 liters/24-hour period)
- Body salt loss: 1 - 2 grams/liter of sweat, acclimatized (2 - 4 g/l unacclimatized)
- Thirst may not be experienced until up to 2% of body weight loss from sweating occurs
- Ambient conditions causing hot environments (applies when wearing chemical protective clothing)
  - Ambient temperatures >70°F
  - Relative humidity >70%
- Begin monitoring when ambient conditions exceed these limits
- Heat stroke mortality rate >10% of cases

SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FIT/ACCLIMATIZED WORKERS(1)

Adjusted Temperature(2)	Normal Work Ensemble(3)	Impermeable Ensemble(4)
90°F (32.2°C) or above	After ea. 45 min. of work	After ea. 15 min. of work
87.5°-90°F (30.8°-32.2°C)	After ea. 60 min. of work	After ea. 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After ea. 90 min. of work	After ea. 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After ea. 120 min. of work	After ea. 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After ea. 150 min. of work	After ea. 120 min. of work

(1) Work levels of 250 kilocalories/hour; (2) Calculate adjusted air temp.: Ta °F = T °F + (13 x % sunshine). Measure air temp. (T) with standard mercury-in-glass thermometer, shielded from radiant heat. Estimate percent sunshine. (100 percent sunshine = no cloud cover and sharp, distinct shadow, 0 percent sunshine = no shadows.); (3) A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.; (4) Chemical protective clothing ensemble.

FACTORS INFLUENCING HEAT STRESS

- Poor physical fitness
- Lack of acclimatization
- Alcohol and drug use
- Dehydration, inadequate fluid intake
- Overweight condition (obesity)
- Other (age, infection/illness, sunburn, diarrhea, chronic disease)

HEALTH AND SAFETY CARD NO. 4
COLD STRESS (HYPOTHERMIA)

SIGNS AND SYMPTOMS/FIRST AID

Temperature	Signs[1]	Symptoms[2]	First Aid/Action
98.6 °F	Normal	Normal	Monitor weather, ambient condition, operations and personnel
98 - 95 °F	Slowing of pace Intense shivering Poor muscle coordination	Intense, uncontrollable shivering Impaired ability to perform complex tasks Fatigue Immobile, fumbling hands	- Recognize intense shivering - Prevent further heat loss - Remove from elements (i.e. wind, rain, exposure) - Remove wet clothing and replace with dry clothing - If only mildly impaired, give warm drinks and sweetened foods (carbohydrates)
95 - 90 °F	Stumbling, lurching gait Thick, slow speech Poor judgement Obvious muscle incoordination Inability to use hands Violent shivering	Violent shivering Speech difficulty Sluggish thinking On-set of amnesia Poor articulation Feeling of deep cold, numbness	- Emergency: Victim not able to rewarm oneself - Act immediately (see above) - Call for emergency medical aid - *Provide external warming* (i.e. body to body contact, wrap first aider and victim in blankets, sleeping bag, etc.) - Provide additional warming (heat sources) - *Keep victim awake*
90 - 86 °F	Decreased Shivering *Muscle rigidity* Irratic, jerky movements Irrational, incoherent Memory lapses Loss of contact with environment Hallucination	Decreased Shivering *Disorientation* Stiffness of muscles Exhaustion Inability to move Unclear thinking Amnesia, Confusion	- Medical emergency - *Must act immediately* - Call for emergency medical aid immediately - Attempt to warm victim (see above) - If semiconscious, attempt to keep victim awake - Handle extremities carefully (victim may have no sensation)
86 - 82 °F	Blueness of skin Slow, irregular or weak pulse Pupils dilation Decreased respiratory rate Stupor Severe muscle rigidity Semiconscious Loss of contact with environment	Drowsiness Weakness Blueness of skin Weak, irregular pulse	- Life threatening medical emergency - Call for emergency medical aid immediately - Attempt to warm victim - Attempt to keep victim awake - Handle victim carefully
82-78 °F	Unconscious Non-responsive Most reflexes stop *Heartbeat erratic* Death probable (respiratory and cardiac failure)	(unconscious)	- Imminent life threatening emergency (see above) - Death probable - Call for emergency medical aid immediately - *Attempt to warm victim (see above)*

(1) Observable by others (2) Experienced by victim

WIND CHILL CHART[1]

Wind Speed[2] (in mph)	Actual Temperature (°F)										
	50	40	30	20	10	0	-10	-20	-30	-40	-50
	Equivalent Temperature (°F)										
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132

CAUTION: 50° to -24°F; False sense of security, harmful exposure may occur.
WARNING: -25° to -70°F; Exposed skin may freeze within one minute.
DANGER: -74°F and below; Exposed skin may freeze within 30 seconds.
(1) Cooling power of wind on exposed skin. (2) Wind speeds greater than 40 mph have little additional effect.

FIRST AID TREATMENT

- Act immediately
- Prevent further heat loss
- Call for help
- Remove wet clothing; replace with dry clothing
- Insulate from cold surfaces, ground, etc.
- If conscious, give warm drinks and sweets
- Provide external warming
  DO NOT PLACE VICTIM TOO CLOSE TO ANY HEAT SOURCE (i.e. fire, heater, etc.). Overheating of skin may worsen condition
- *If no external heat source available, provide skin-to-skin warming.* (Wrap first aider and victim in blanket, towels, sleeping bag, etc.)
- If semiconscious, try to keep awake

FIELD SAFETY

Body Heat Gain
- Digestion of food (metabolism)
- Muscular activity (exercise, shivering)
- External sources (hot food or drink, sun, heater, fire, etc.)
- *Constriction of surface blood vessels (reduce skin circulation, increase body core circulation)*

Body Heat Loss
- Respiration (exhale warm air)
- Evaporation (from skin and lungs)
- Conduction (contact with cold surfaces, wet skin or clothing)
- Radiation (significant heat loss; exposed head, neck, hands)
- Convection (heating of air layer next to skin)

Prevention

Avoid Exposure
- *Anticipate cold, wet, windy conditions*
- Dress with layers, avoid cotton, cover head
- Avoid getting wet (excessive perspiration, rain, etc.)
- Begin monitoring at temperatures less than 50° - 60 °F

Terminate Exposure
- Terminate if you cannot stay warm and dry
- Get out of wind and rain conditions
- Terminate exposure early (if in doubt, don't stay out)
- *Conserve energy*
- Drink warm beverages and eat sweets

Detect Exposure Early
- Monitor conditions and personnel whenever cold (<50° - 60°F), wet and/or windy conditions exist
- Continuously observe for signs and symptoms of hypothermia
- Be aware of your own condition
- *Act immediately whenever uncontrolled* shivering occurs
- Believe symptoms, not victim