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SUBMITTAL: 0004.0

JOB NO.: 2979

October 16, 2002
Sent By: Overnight
Originator: C. Overaa & Co.

San Francisco Bay Area Rapid Transit District
1000 Broadway
Ste. 620
Oakland, CA
94612
Attention: Bill O'Hair

Alameda County
NOV 07 2002
Environmental Health

2nd 10/17

Date Due: 11/15/02

Reference: BART Fruitvale Parking Structure
Subject: Safety, Health and Emergency Response Plan
Specification Section:

The items listed below are being submitted for approval. In order to maintain schedule, please review and return this submittal on or before the due date indicated above.

Specific enclosures are as follows:

Quantity	Description
5 Each	Safety, Health and Emergency Response Plan (SHERP)

Neither review nor approval of any aspect of Contractor's work supplied under this contract shall in any way relieve Contractor of any of its obligations with respect to the performance of work under the contract.

☐ (1) APPROVED

☐ (2) APPROVED FOR FABRICATION AS MARKED REVISED DRAWING REQUIRED.

☐ (3) NOT APPROVED. REVISED DRAWING REQUIRED.

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Date_____ By_____

VENDOR PRINT NUMBER:
0191-110 - 100 - 04 REV 0

Please return 2 copies of reviewed submittals.

By: _____

Donald Stock
Project Manager

SITE SAFETY PLAN

FRUITVALE BART STATION

PARKING STRUCTURE

Oakland, California

Prepared for:

OVERAA CONSTRUCTION

200 Parr Boulevard

Richmond, California 94801

Prepared by:

RGA Environmental, Inc.

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SUBMITTAL NO: 4

C. OVERAA & CO.

BY: DD DATE: 10/16/02

October 15, 2002

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1. INTRODUCTION

1.1 BACKGROUND

The project is identified as the Fruitvale BART Station Parking Structure, and is also referred to as the BART Fruitvale Parking Structure. The project consists of the excavation of soil impacted by lead, arsenic, and petroleum hydrocarbons in areas identified as A and B located within the future parking structure in Area 1 of the subject site, and the 50-foot wide former railroad property running from Fruitvale Avenue to 33rd Avenue. This Site Safety Plan (SSP) applies to the areas of impacted soil excavation only. An Area Map is attached as Appendix E, and a Site Map is attached as Appendix F. A map showing the area between Fruitvale Avenue and 33rd Avenue is attached in Appendix H. This SSP is intended to be used in conjunction with the existing Overaa SSP for the site.

Review of a letter dated September 10, 2002 and associated attachments from Bay Area Rapid Transit (BART) to C. Overaa & Co. (Overaa) that transmitted analytical test results used for obtaining contaminated soil disposal site acceptance identified the following contaminants at concentrations of concern.

- Metals
  - lead
  - arsenic
- Petroleum Hydrocarbons
  - Diesel
  - Motor Oil

A copy of the September 10, 2002 letter, a table titled, "Summary of Selected Soils Analytical Results" and a map showing the sample collection locations are attached as Appendix H. Overaa contracted RGA Environmental, Inc. (RGA) to develop for the property a SSP that will provide Overaa field personnel and subcontractors with an understanding of the potential chemical/substance and physical hazards that exist or may arise while the tasks of this project associated with the contaminated soil in the future parking structure are performed. This SSP is applicable to all locations of this Project with impacted soil as defined above. The starting and sequence of each location of work will depend on the needs of the project and the general contractor.

All operations where personnel or equipment may come into contact with contaminated soil at the site in the work areas defined above will be performed in accordance with California Code of Regulations (CCR) Title 8, Section 5192, Hazardous Waste Operations and Emergency Response (HAZWOPER). A copy of 8 CCR 5192 is attached as Appendix J. HAZWOPER requirements and the following actions will be necessary for all workers at the site until all

potential for worker exposure to contaminated soil has been eliminated.

- Representative initial and periodic personal air monitoring for lead, arsenic, and dust.
- HAZWOPER, lead awareness training and hazard communication for lead, arsenic, and petroleum hydrocarbons (diesel and oil) for all site workers, who encounter impacted soil including supervisory personnel.
- Dust control to reduce or eliminate worker respiratory exposure hazards.
- Use of personal protective equipment to eliminate exposure to soil, including gloves, Tyvek suits, and boot covers for all workers who may come into contact with soil at the site.
- No eating, smoking, or applying cosmetics on the site.
- Decontamination of workers and equipment prior to leaving the site.
- Worker personal hygiene practices of washing hands and face prior to eating or leaving the site.

Soil will only be disturbed in those areas where excavation and grading is required, and dust suppression controls will be used until impacted excavated or exposed soil is removed from the site or capped with concrete. Additional special attention will be made to monitor and control worker and general public exposure to hazardous materials that may be encountered during the work. These materials include lead, arsenic, and petroleum hydrocarbons.

Any newly discovered materials will be sampled and tested prior to handling. The decision to sample will be based on discoverable conditions, i.e.: discoloration, oily residues, odor, etc, and on the need for possible further waste characterization. Sampling results will be reviewed by the Project Manager and the Health and Safety Manager and then included into this SSP. Further action may be required based on the review. Any additional procedures will be documented, included into the SSP, and then reviewed with all workers.

This SSP describes the procedures to be followed to reduce employee and public exposure to potential health hazards that may be present on the project site. The emergency response procedures necessary to respond to such hazards are also described within this SSP. The SSP is primarily designed to guide project personnel on how to respond to normal and extreme conditions that may arise during the project execution.

1.2 OBJECTIVE

The primary objective is to ensure the well being of observers, field personnel and the community surrounding the subject property. To do this, project staff, client personnel and approved subcontractors shall acknowledge and adhere to the policies and procedures established herein. Accordingly, all personnel assigned to this project who may encounter

impacted soil shall read this SSP and sign the Agreements and Acknowledgment Statement (Appendix A) to certify that they have read, understood and agreed to abide by this SSP and its provisions.

Information contained in the SSP will be presented to all personnel and visitors who may encounter impacted soil at a pre-entry safety briefing. Additional safety information that becomes pertinent over the course of the project will be conveyed to Overaa and subcontractor personnel through "tool-box safety meetings" and, if necessary, addenda to the SSP will be transmitted to pertinent subcontractors. In addition, project personnel listed in Section 8 will continuously exercise daily supervision and control of site activities as a part of their everyday practice. Safety issues will be addressed immediately and discussed with involved Overaa or subcontractor personnel on a one-to-one basis.

Overaa personnel have the authority to stop work activities and evacuate the area. The chart in Section 8 showing the "chain of command" shows who has the authority to stop work activities based on safety issues, beginning with the Project Manager.

Activities are to be consistent with the requirements of the following.

- Title 8, CCR 5192 HAZWOPER standard,
- NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Site Activities, October 1985, DHHS (NIOSH) Publ. No. 85-115.

1.3 AMENDMENTS

Any changes in the scope of work of this project and/or site condition must be amended in writing on the Site Safety Plan Amendment Sheet (Appendix B) and approved by the Health and Safety Manager.

2. HAZARD EVALUATION

2.1 SITE CONDITIONS

General site conditions impacted in areas A and B within the footprint of the future parking structure include lead, arsenic, and petroleum hydrocarbons. Known subsurface contaminants are incorporated into this Site Specific Health and Safety Plan. Maximum contaminant levels (in milligrams per kilogram) encountered in samples are indicated in the following table.

Contaminant	Maximum Concentration Encountered (mg/kg)
Lead	310
Arsenic	160
Petroleum Hydrocarbons	
Diesel Fuel	15
Motor Oil	110

It is possible that the exposure levels will reach Permissible Exposure. Should a "Change In Conditions" occur, as perceived by project personnel (see section 8), Overaa will notify the project manager and await further direction. If the nature of materials changes (i.e. irritating odors, soil discoloration), respiratory protective devices may be needed and will be made available to those persons working in or around these specific areas.

2.2 SITE TASKS

The field tasks at this site may include:

- Excavation for foundation footings and underground utilities
- General site grading
- Sampling for testing purposes if "Change in Conditions" occurs

2.3 PROJECT TASK HAZARDS

All field task hazards are site specific. The following hazards may be encountered:

Contamination: Contact with contaminated surface or surfaces suspected of being contaminated should be avoided. This includes working through, kneeling or placing equipment in puddles, mud, discolored surfaces or on drums and other containers. Eating,

smoking, drinking and/or the application of cosmetics is prohibited on this site in the immediate work area. Washing hands and face prior to eating and prior to leaving the site for the day is mandatory.

Falling or Flying Objects: Hard-hats and safety glasses must be worn by all project staff and observers whenever construction activity is taking place.

Vehicle Traffic: Project staff and observers will be required to wear a fluorescent safety vest at all times when their work encroaches on active nearby roadways. In addition, use flags, tapes, barricades and cones to designate restricted areas and control traffic flow.

Explosion Protection: Explosion-proof equipment will be used in areas where the Site Safety Manager determines there is a potential for explosion.

Excavation or Other Work in Contaminated Areas: Skin and eye contact with contaminated soil may occur during work. Heavy-duty work gloves or butyl nitrile gloves and / or respirators as appropriate, approved safety goggles, Tyvek suits and Tyvek suit covers should be worn when contact with chemicals, contaminated soils and/or splash is possible.

2.3.1 Airborne Contaminants

The generation of potentially hazardous atmospheres may occur during this work. Hazard evaluation will be completed by project personnel (See Section 8). Hazard evaluation methods will include the use of a Photo Ionization Detector, Dräger tubes, combustible gas meter and other direct reading instruments to detect and quantify levels of carbon monoxide, petroleum vapors, explosive atmospheres, oxygen content and other gas and vapor levels when deemed necessary by the Health and Safety Manager due to specific activities on the jobsite.

Hazard reduction includes the use of engineering controls (i.e. wetting methods) and personal protection equipment as necessary. For instance, workers may need personal protective equipment including respirators and Tyvek® or impermeable rain suits during work, depending on the severity of hazardous operations.

2.3.2 Decontamination of Equipment

Skin and eye contact with Alconox detergent, methanol or other cleaning substances can occur while cleaning equipment. This hazard can be reduced with the use of butyl nitrile rubber or neoprene gloves and the use of safety goggles.

2.4 GENERAL CONSTRUCTION HAZARDS

It should be noted that the Cal-OSHA construction safety orders are the basis for much of what is in the Overaa Injury and Illness Prevention Program, and the Cal-OSHA construction safety orders will be adhered to at all times on this project by Overaa and all subcontractors. The following is a list of typical potential hazards and their control. Other controls may be developed as the situation(s) arise and the SSP shall be amended to include updates.

2.4.1 Exposure to Metals

1. Stand up-wind of dust generating operations whenever possible.
2. Wear gloves when in contact with soil or contaminated surfaces.
3. Do not eat, drink, smoke and/or apply cosmetics on the construction site.
4. Utilize appropriate dust suppression techniques.
5. Decontaminate clothing and wash face, hands and exposed skin before leaving the site, eating or drinking.
6. If the airborne concentration of any metal exceeds its OSHA Permissible Exposure Limit (PEL), as identified in Section 5.2, utilize appropriate respiratory protective devices (respirators) to protect against the measured concentrations; alter or increase dust suppression activities; and increase the frequency of airborne dust monitoring.
7. If unknown materials are encountered, call the Project Manager or the Health and Safety Manager.

2.4.2 Exposure to Petroleum Products

1. Stand up-wind of petroleum products whenever possible.
2. Minimize contact and contact time with petroleum products.
3. Avoid walking through discolored areas, puddles, leaning on drums, or contacting anything that is likely to be contaminated.
4. Do not eat, drink, smoke, and/or apply cosmetics on the construction site.
5. Wear gloves when in contact with contaminated surfaces.
6. Safety glasses must be worn at a minimum.
7. Splash goggles must be worn when working with liquids.
8. >50 parts per million (ppm) organic vapors in breathing zone requires upgrade to Level C.
9. >750 ppm organic vapors in breathing zone requires upgrade from Level C to Level B.
10. If unknown materials are encountered, call the Project Manager or the Health and Safety Manager.

2.4.3 Vehicular Traffic

1. Wear traffic safety vest when vehicle hazard exists.
2. Use cones, flags, barricades, and caution tape to define work area.

3. Use vehicle to block work area.
4. Engage police detail for high-traffic situations.

2.4.4 Inclement Weather

Severe weather conditions are not anticipated, however if encountered, perform the following:

1. Stop outdoor work during electrical storms and other extreme weather conditions such as extreme heat or cold temperature.
2. Take cover indoors or in vehicles.
3. Listen to local forecasts for warnings about specific weather hazards such as tornadoes, hurricanes and flash floods.

2.4.5 Noise

All field personnel shall be required to wear hearing protective devices having a Noise Reduction Rating (NRR) of 28 or greater when:

1. Normal communication cannot be understood when field personnel are within three feet from one another.
2. You need to raise your voice above normal conversational speech due to loud noise sources.
3. Equipment such as a drill rig, jackhammer, cut saw, air compressor, blower, or other heavy equipment is operating on site.

Additionally, noise monitoring shall be performed at the beginning of each phase of the project to assess the actual noise exposure levels of each activity. Such monitoring will include an initial general noise survey with a sound level meter. Following the initial noise survey, those workers conducting operations in areas with peak noise levels above 85 decibels will be monitored by wearing a datalogging noise dosimeter. All employees will wear hearing protective devices unless and until monitoring establishes their typical 8-hour time weighted average noise exposure below 85 decibels. Those sections of the City of Oakland ordinances, which cover nuisance noise, noise pollution and vibration, will be followed.

2.4.6 Electric Shock

In the event that underground or overhead electrical utilities are present during construction activities, perform the following:

1. Maintain appropriate distance from overhead utilities; 20-foot minimum clearance from power lines required; 10 feet minimum clearance from shielded power lines.
2. Use ground-fault circuit interrupts as required.
3. Perform lockout/tagout procedures.
4. Use three-pronged plugs and extension cords.

5. Contact your local underground utility-locating service prior to conducting subsurface excavation or drilling activities.
6. Follow code requirements for electrical installations in hazardous locations.

2.4.7 Physical Injury

1. Wear hard hats and safety glasses when on site.
2. Maintain visual contact with the equipment operator and wear orange, safety vest when heavy equipment is used on site.
3. Avoid loose-fitting clothing or hanging or unfastened straps which may get caught in rotating machinery.
4. Prevent slips, trips, and falls; keep work area uncluttered.
5. Use the buddy system when lifting heavy or awkward objects.
6. Do not twist your body while lifting.

2.4.8 Heat Stress

Heat stress can affect workers performing physically strenuous work whenever they wear heavy protective clothing or equipment or whenever temperatures at the site exceed approximately 70 degrees Fahrenheit. Heavy clothing or protective equipment can hinder the body's natural cooling mechanisms. This can result in development of heat rash, heat cramps, heat exhaustion, heat stroke and death. The Health and Safety Manager will monitor workers for early signs of heat stress.

Heat stress exposure will be evaluated through hourly determination of the Wet Bulb Globe Temperature (WBGT). The WBGT shall be determined by either individual measurement of 1) natural wet bulb temperature, 2) dry bulb temperature, and 3) globe temperature, followed by manual calculation or maintaining a heat stress meter in an area of the work site that is representative of the conditions under which the employees are working. The formula for manual calculation of the WBGT outdoors with a solar load is: 0.7 wet bulb + 0.2 globe + 0.1 dry bulb.

The Heat Stress section of the ACGIH Threshold Limit Values for Chemical Substances and Physical Agents will be followed to give an appropriate work-rest regimen for each task based on the measured WBGT and the established workload, with appropriate correction factors incorporated based on any protective clothing worn by the workers.

To avoid heat stress on the job site, on days when the WBGT exceeds or is expected to exceed 70° F, workers and supervisors will:

1. Increase water intake while working.
2. Increase number of rest breaks and/or rotate workers in shorter work shifts.

3. Watch for signs and symptoms of heat exhaustion and fatigue.
4. Plan work for early morning or evening during hot months.
5. Use ice vests when necessary.
6. Rest in cool, dry areas.
7. In the event of heat stroke, bring the victim to a cool environment and initiate first aid procedures.

2.4.9 Cold Stress

Cold stress is not anticipated, however if encountered, perform the following:

1. Take breaks in heated shelters when working in extremely cold temperatures.
2. Remove the outer layer of clothing and loosen other layers to promote evaporation of perspiration upon entering the shelter.
3. Drink warm liquids to reduce the susceptibility to cold stress.
4. Wear appropriate hand protection and avoid prolonged hand contact with cold objects.

2.4.10 High Crime Areas

1. Be aware of surroundings.
2. Use the buddy system.
3. Request police detail when appropriate.

2.4.11 Insects

Neither excessive numbers of insects nor poisonous insects are expected at the site, however if encountered, perform the following:

1. Tuck pants into socks.
2. Wear long sleeves.
3. Use insect repellent.

2.4.12 Poisonous Plants (such as poison ivy, oak or sumac)

Poisonous plants are not known to exist at the site. If they are encountered, perform the following:

1. Do not enter areas infected with poisonous plants.
2. Immediately wash any area that comes into contact with poisonous plants.

2.4.13 Ladders

1. Make sure ladder rungs are sturdy and free of cracks.
2. Use ladders with secure safety feet.
3. Pitch ladders at a 4:1 ratio.
4. Secure ladders at the top when possible.
5. Do not use ladders for access to air stripper towers.
6. Use non-conductive ladders near electrical wires.

2.4.14 Fire Control

1. Smoke only in designated areas.
2. Keep flammable liquids in closed containers.
3. Keep site clean; avoid accumulating combustible debris such as paper.
4. Follow Hot Work Safety Procedures when welding or performing other activities requiring an open flame.
5. Isolate flammable and combustible materials from ignition sources.
6. Ensure fire safety integrity of equipment installations according to Hazard Classification Diagram.

2.4.15 Static Electricity

Flammable atmospheres are not anticipated at the work site, however if a risk exists of creating or encountering a flammable atmosphere, perform the following:

1. Do not create static discharge in flammable atmosphere.
2. Electrically bond and ground pumps, transfer vessels, tanks, drums, bailers, and probes when moving liquids.
3. Electrically bond and ground vacuum trucks and the tanks they are emptying.

3. PERSONAL PROTECTIVE EQUIPMENT

3.1 INTRODUCTION

It is important that personal protective equipment and safety requirements be appropriate to protect against the potential hazards at the site. Protective equipment will be selected based on the contaminant type(s), concentrations(s), and routes of entry. In situations where the type of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the personal protective equipment needed.

Field personnel and visitors are required to wear the following clothing and equipment, as a minimum, while on the project.

- Hard Hat (required)
- Work boots (required)
- Safety Glasses with side shields (required)
- Long Sleeved Shirt (as appropriate)
- Traffic safety vest (as appropriate)
- Hearing protection (as appropriate)

3.2 LEVELS OF PROTECTION - GENERAL

Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

- SCBA
- Fully Encapsulating Suit

Level B: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required.

- Air supplied respirator
- Coated Tyvek® suit, such as Saranex
- Butyl nitrile rubber or neoprene gloves
- Inner latex or vinyl gloves
- Work boots
- Outer boots/chemical resistant
- Hard hat
- Traffic safety vest (as appropriate)

- Hearing protection (as appropriate)
- Inner Disposable Gloves (2 pairs recommended)

Level C: Should be selected when the types of airborne substances are known, the concentration is measured, and the criteria for using air-purifying respirators are met.

- Air purifying respirator, NIOSH approved, with HEPA filter or organic vapor cartridges, as appropriate
- Tyvek® suits (if splash hazard is possible, a coated suit must be worn)
- Butyl nitrile rubber or neoprene gloves
- Splash goggles/safety glasses if potential for splash (as appropriate)
- Work boots
- Outer boots/chemical resistant
- Inner disposable gloves (two pairs recommended)
- Hard hat
- Traffic safety vest (as appropriate)
- Hearing protection (as appropriate)

Level D: General work clothing is applicable for most work on this project. Changes in the nature of materials may require the use of additional protective equipment.

- Hard hat (required)
- Work boots (required)
- Heavy-duty work gloves, butyl nitrile rubber or neoprene gloves (as appropriate)
- Splash goggles/safety glasses if potential for splash (as appropriate)
- Traffic safety vest (as appropriate)
- Tyvek suit (as appropriate)
- Hearing protection (as appropriate)
- Fall protection (as appropriate)
- Impermeable gloves for metal dust exposure and handling corrosive materials (as appropriate)

3.3 REQUIRED PROTECTION

Workers involved in activities at the site will use level D protection. It is not anticipated that the majority of work will require protective equipment beyond level D.

The level of protection required throughout the job will be based upon observations and measurements as determined necessary by the Project Personnel (see Section 8). Should a change in the nature of material be detected, Overaa will perform additional analyses. Section 5.2 provides the OSHA PELs to be used to determine the appropriate respiratory protection level. The presence of an airborne concentration of a contaminant which exceeds its PEL will necessitate upgrading the required PPE to Level C. If the measured concentrations exceed the maximum use concentration (MUC) for the respirators employed for a given task, the PPE will be upgraded to Level B.

Overaa will provide its employees with appropriate personal protective equipment as required. If respirators are deemed necessary, only NIOSH certified respiratory protective equipment will be utilized.

3.3.1 Fit Testing Respirators

OSHA requires that respirators be fit-tested at least once every twelve months and that they be fit-tested properly for the facepiece-to-face seal. There are currently two methods acceptable for conducting these tests: Qualitative and Quantitative Fit-Testing. The Qualitative method is a fast, easily conducted test that can be performed almost anywhere, while the quantitative method requires the use of bulky test chambers and very expensive electronic equipment. Refer to 29 CFR 1910.134 for exact instructions on fit testing protocol and requirements.

Fit-testing must be repeated immediately if the employee has (a) an obvious change in body weight, (b) significant facial scaring in the area of the facepiece seal, (c) significant dental changes, or (d) reconstructive or cosmetic surgery.

Qualitative fit testing is based on the wearer's subjective response to the test agent or chemical, of which the three most popular test are the irritant smoke test, the odorous vapor test, and the taste test. The following represents a brief summary of how to conduct each of these tests.

IRRITANT SMOKE TEST: The irritant smoke test is performed by directing an irritant smoke, usually either stannic oxy-chloride or titanium tetrachloride, from a smoke tube towards the respirator being worn. If the wearer cannot detect the irritant smoke, a satisfactory fit is assumed to be achieved.

The respirator wearer will react involuntarily, usually by coughing or sneezing, to a leakage around or through the respirator. Since this type of test provokes an involuntary response from the employee, it is the preferred testing method when available. In this type of qualitative test, the person administering the test should be interested in any response to the smoke and not necessarily to the degree of response.

When an air-purifying respirator is being tested in this method, it has to be equipped with a high efficiency filter cartridge.

NOTE: The test substances are irritant to the eyes, skin and mucous membranes. Therefore, the respirator wearer should keep his/her eyes closed during testing. Per OSHA regulations,

this type of test must not be performed inside a test chamber, but must be performed in an open area to allow the test subject to rapidly escape the irritant smoke in the event of a reaction.

ODOROUS VAPOR TEST: The odorous vapor test relies on the respirator wearer's ability to detect an odorous material, usually isoamyl acetate (banana oil) inside the respirator. The test is performed by passing an odorant-saturated material around the outside of the respirator. If the wearer is unable to smell the chemical, then a satisfactory fit is assumed to be achieved. When an air-purifying respirator is tested by this method, it should be equipped with an organic cartridge that removes the test vapor from the air.

NOTE: This test is solely dependent upon the employee's honest response, since there is no involuntary reaction. For that reason, it is not to be preferred.

TASTE TEST: The taste test relies upon the wearer's ability to detect a chemical substance, either sodium saccharin or Bitrex®, by tasting it inside the respirator. The test is performed by placing an enclosure over the respirator wearer's head and shoulders and spraying the test agent into the enclosure with a nebulizer. If the wearer is unable to taste the chemical, then a satisfactory fit is assumed to be achieved.

NOTE: This test is totally dependent on the wearer's honest indication of taste. There is no involuntary response, and therefore is not preferred as a method of testing. When conducting this type of test, the person being tested must not be allowed to eat, drink, or chew gum or tobacco for at least 15 minutes prior to taking the test.

3.3.2 Donning the Respirator

Once the type of respirator has been selected that is applicable and suitable for the purpose intended, the fit of the respirator should be adjusted. The employee should be given the opportunity to select a respirator that provides the most comfortable fit. The employee will be shown how to don and assess the device and should eliminate those that are obviously ill fitting. The employee should first inspect the respirator to ensure that it is not cracked or deformed, that all required valves and gaskets are present and in good condition, that any attached visor is intact and clear, and that the head straps are secure and have not lost their elasticity. The employee will first fasten the lower straps around the neck and then slip the upper straps over the top to the crown of the head. Next, while holding the respirator securely, adjust both the lower and upper straps until the facepiece fits snug against the skin without being uncomfortably tight.

An assessment of comfort should include the following points:

- Chin properly placed.
- Fit across nose bridge.
- Positioning of mask on nose.

- Strap Tension.
- Room for safety glasses.
- Room to talk.
- Distance from nose to bridge.
- Tendency to slip.
- Cheeks filled out.
- Hindrance to movement.

3.4 REQUIRED PERSONAL HYGIENE

As a minimum, all job site personnel will be instructed to and be required to perform the following tasks before leaving the work site or eating and drinking. For more detail see Appendix D and Appendix I.

- Clean work clothes and boots of native material;
- Remove and/or discard protective equipment as necessary and in a safe manner.
- Perform more extensive cleaning of, or remove, general work clothes if necessary.
- Thoroughly wash hands, face, and other exposed skin;

On-site facilities will be made available for these tasks to take place.

4. WORK ZONES AND SECURITY MEASURES

4.1 GENERAL

The work site will be controlled to reduce the possibility of exposure to any contaminants present and their transport by personnel or equipment from the site.

The possibility of exposure or translocation of contaminants can be reduced or eliminated utilizing the following control methods:

- Setting up security or physical barriers to exclude unnecessary personnel from areas of suspected contaminated soils.
- Minimizing the number of personnel and equipment on-site consistent with effective operations.
- Establishing work zones, decontamination and storage areas within the site.
- Establishing control points to regulate access to work zones.
- Minimizing the airborne dispersion of contaminants off-site.
- Implementing the appropriate personnel and equipment decontamination procedures.

A detailed map with designated areas will be developed by the Project Manager and the Health and Safety Manager to encompass the entire work zone.

Specific site preparations to best ensure the safety of the public may change depending on the actual environmental conditions and the work procedures to be performed. These specific procedures are to be described in detail, on a daily basis if necessary, by the Project Manager and the Health and Safety Manager and included into the SSP as addenda. These changes will be reviewed with all affected personnel as they occur. Additionally, Overaa will place a white board plan of the site in the inside of the trailer. The white board will be updated daily to visually show egress routes.

4.2 DUST SUPPRESSION

The appearance of visible dust provides an advanced warning that the dust suppression methods being employed may not be performing as intended. If visible clouds of dust are observed near any activity on the site, the dust control procedures being applied to that activity will be modified to afford greater protection. Overaa shall use dust suppression methods that include water misting of all excavation and soil handling areas to control airborne dusts. If normal water misting is not effective, the frequency of water spraying will be increased, or the activity will be modified to reduce soil agitation. Storage of stockpiled soil will be covered by polyethylene sheeting. Sheeting will be secured to control dislocation by wind.

5. CHEMICALS OF CONCERN

5.1 HEALTH EFFECTS

Potential health effects from an exposure to hazardous substances are dependent on several exposure factors such as toxicity of substances, duration of exposure, concentration during exposure and the overall health of the person exposed.

The potentially hazardous substances found at this site are metals (lead and arsenic in soil), petroleum hydrocarbons (in soil), and carbon monoxide (mechanical equipment).

The Overaa Health and Safety Manager will provide awareness training for lead. For more detailed information see Title 8 CCR 1532.1 – Lead (Appendix I).

The following Sections constitute a health analysis of potential hazardous substances that may be encountered on the work site. The routes of exposure for these contaminants are dermal, ingestion and inhalation, as noted.

5.1.1 Lead

Lead has been identified at concentrations exceeding the lead STLC and residential PRG values in the soil at this site. Lead is a heavy, ductile, soft gray metal. Intake of excessive amounts of lead into the body can result in adverse blood effects, including central nervous system depression, abdominal pain, colic and anemia. Exposure routes: inhalation, ingestion.

A lead fact sheet from the United States Agency for Toxic Substances and Disease Registry is attached in Appendix K.

5.1.2 Arsenic

Arsenic has been identified at concentrations exceeding the residential PRG in the soil at this site. Arsenic metal is found widely in nature. Arsenic is utilized in alloys to increase metal hardness and heat resistance. Arsenic has a toxic effect on the nervous system. Occupational exposure to inorganic arsenic compounds is usually through inhalation, ingestion or skin contact. Acute effects at the point of entry may occur if exposure is excessive. Dermatitis may occur as an acute symptom but is more often the result of sensitization. Exposure routes: inhalation, ingestion.

An arsenic fact sheet from the United States Agency for Toxic Substances and Disease Registry is attached in Appendix K.

5.1.3 Diesel

Diesel powered vehicles will be used on this project. Limited concentrations of diesel have also been identified in the soil at this site. Diesel fuel components are less volatile than gasoline. Aliphatic hydrocarbons may be saturated or unsaturated open chain, branched or unbranched molecule. Health precautions include ventilation for confined spaces. Symptoms of over

exposure include nausea, vomiting, lung irritation and headache. Exposure routes: inhalation, dermal, ingestion. A fuel oil fact sheet from the United States Agency for Toxic Substances and Disease Registry is attached in Appendix K.

5.1.4 Oil and Grease

Oil and grease has been identified in the soil at this site. Oil and greases typically have a low order of toxicity. However, additives are frequently found in oils and greases which are significantly more toxic than the base oil itself. Prolonged skin contact with oil and grease can lead to skin disorders, the most common of which is dermatitis. In areas of elevated concentrations of oil and grease personal protection including respirators, chemical resistant suits and gloves, and protective glasses should be worn. Exposure routes: inhalation, dermal, ingestion. A fuel oil fact sheet from the United States Agency for Toxic Substances and Disease Registry is attached in Appendix K.

5.1.5 Carbon Monoxide

Carbon monoxide is formed as the result of the combustion of fuels. The gas-powered vehicles to be used in this project will create carbon monoxide. Symptoms of exposure include headache, nausea and vomiting. Exposure route: inhalation.

5.2 CAL-OSHA PERMISSIBLE EXPOSURE LIMITS

The following table presents the Cal-OSHA permissible exposure limits. These concentrations represent the maximum allowable concentrations to which workers may be exposed during the work shift, expressed as an 8-hour time weighted average.

Contaminant	Cal-OSHA PEL Concentration
Lead	0.05 milligrams per cubic meter (mg/M^3)
Arsenic	0.01 mg/M^3
Petroleum Hydrocarbons	
Diesel Fuel	None
Motor Oil (particulate or mist)	5.0 mg/M^3
Carbon Monoxide	25 parts per million (ppm)
Dust, Total	10.0 mg/M^3
Dust, Respirable	5.0 mg/M^3

6. MONITORING PROCEDURES

6.1 INITIAL AND PERIODIC MONITORING

The greatest potential hazards to safety and health caused by chemical exposure at this site are:

- Exposure to potentially hazardous substances through inhalation.
- Exposure to potentially hazardous substances through skin contact and ingestion.

Air monitoring (photoionization detector, Dräger tubes, CO meter, combustible gas meter, oxygen meter) will be performed or arranged by the Health and Safety Manager, as warranted. At the time when workers may become exposed to soil at the site, initial personal air monitoring will be performed for each category of worker with analysis for lead, arsenic, and dust. In the event that action levels (or PELs, where applicable) are not exceeded, periodic air monitoring should be performed thereafter at the discretion of the Health and Safety Manager.

When new operations or phases begin, additional sampling will resume and re-characterization will begin. New operations or phases include breaking new ground, initiating new types of activities, and encountering unexpected conditions. Personnel to be sampled will include those with the highest potential for exposure. The Health and Safety Manager will provide data to ensure that dust and vapor concentrations and gas levels are within acceptable ranges and will provide selection criteria for increased levels of protection if needed.

Respirator cartridges will be changed twice per day at a minimum. This can be done at a scheduled time or during respirator decontamination. If odor breakthrough is detected while wearing the respirator or breathing becomes difficult, change cartridges immediately. Filter cartridges will be changed whenever filter loading causes an unacceptable increase in breathing resistance, as determined by the worker.

Should a "change" in conditions occur, as compared to the baseline conditions and as determined by project personnel (listed in Section 8) (i.e., pungent odors, visible discoloration of soil, visibly contaminated ground water), increased monitoring will be performed at the direction of the Health and Safety Manager. The Project Manager will be notified immediately so that he can take any necessary precautions to protect the general public.

6.2 TASKS PERFORMED WITHIN A CONFINED SPACE

The scope of work for this project does not include confined space entry such as tanks, but may entail work within excavated areas (greater than 5 feet), which for the purposes of this plan, are considered confined areas. Confined space entry will be limited to personnel who have been requested to perform such entry and who have completed the OSHA prescribed confined space entry training prior to being assigned to any task requiring confined space entry. Prior to worker entry into a confined area all appropriate testing must be conducted by Overaa. Air quality in confined spaces will be monitored for oxygen level, lower explosive limit (LEL), hydrogen sulfide, and petroleum hydrocarbons prior to allowing entry into such a

7. HEALTH AND SAFETY REQUIREMENTS

7.1 MEDICAL MONITORING PROGRAM

All Overaa and subcontract field personnel must have medical evaluations in accordance with the company's Health and Safety Program policy. Initial medical surveillance will be made to any employees occupationally exposed on any day to lead at or above the action level for lead of 30 milligrams per cubic meter. Additional reevaluation will be considered in the event of chemical over-exposure while working on this project.

7.2 OVERAA HAZARD CONTROL PROGRAMS

The following Overaa hazard control programs are in effect and covered in the Overaa existing Site Safety Plan. All subcontractors working on this job will comply with all aspects of these programs.

- Excavation and Trenching
- Housekeeping
- Hazard Communication
- Confined Spaces Injury
- Illness Prevention
- Respiratory Programs

7.3 TRAINING

Prior to working at the site, all personnel who may come into contact with impacted soil or dust at the site must receive lead awareness training in accordance with CCR Title 8, Section 1532.1, in addition to having satisfied HAZWOPER 40-hour classroom training and three days onsite experience requirements. Personnel who have completed their 40-hour HAZWOPER training more than one year prior to working at the site will need to have had an annual 8-hour refresher class within the past 12 months. In addition, 8-hour supervisory personnel must also have received supervisor HAZWOPER training in accordance with CCR Title 8, Section 5192 requirements. These training requirements will remain in place until potential worker exposure to soil has been eliminated. A copy of the Overaa Lead Awareness Program is attached as Appendix D.

Lead awareness orientation and hazard communication training for lead, arsenic, and petroleum hydrocarbons will be provided for all personnel working at the site who may encounter impacted soil until the potential for exposure to these contaminants has been eliminated.

Those supervisors and employees with CPR and first aid training will be identified at weekly tailgate safety meetings.

7.4 HAZARD COMMUNICATION

Communication of hazards on the work site will be by distribution of written hazard descriptions, posting of appropriate signage, and verbally at the weekly safety meetings. The Hazard Communication section of the Overaa existing SSP will be the controlling document for hazard communication on this jobsite. At a minimum, hazard communication training will address lead, arsenic, and petroleum hydrocarbons in the work place.

7.5 WORK ZONES ACCESS

Access within a 10-foot radius of any on-site operation is prohibited to all but Overaa, subcontract field personnel and designated personnel. The work site shall be secured against unauthorized access by the public. The work site will be surrounded with a six-foot high cyclone fence. Areas of excavation within the work site will be surrounded with caution tape and/or a barricade.

7.6 EMERGENCY EQUIPMENT

Vehicles used for site work will be equipped with a first aid kit and safety equipment including:

- Traffic safety vests
- cones
- flags (as needed)
- barricades (as needed)
- fire extinguisher-dry chemical ABC-type extinguisher
- flashlight
- water, suitable for drinking
- portable eye wash
- appropriate emergency bandage material

7.7 ELECTRICAL EQUIPMENT AND GROUND-FAULT CIRCUIT INTERRUPTERS

All electrical equipment and power cables in and around wells or structures suspected of containing hazardous substance contamination must be intrinsically safe and equipped with a three-wire ground lead, rated explosion-proof for hazardous atmospheres. According to OSHA 29 CFR 1926.404, approved ground fault circuit interrupters (GFCI) must be used for all 120 volt, single phase, 15 and 20 ampere receptacle outlets on the site that are not in use by employees. Receptacles on the ends of extension cords are not part of the permanent wiring and, therefore, must be protected by GFCIs whether or not the extension cord is plugged into

The GFCI is a fast-acting circuit breaker that senses small imbalances in the circuit caused by current leakage to ground, and in a fraction of a second shuts off the electricity. However, the GFCI will not protect the employee from line-to-line contact hazards (such as a person holding two "hot" wires or a hot and neutral wire in each hand). The GFCI does provide protection against the most common form of electrical shock hazard, the ground fault. It also provides protection against fires, overheating, and destruction of insulation on wiring.

GFCIs can be used successfully to reduce electrical hazards on construction sites. Tripping of GFCIs - interruption of current flow - can be caused by wet connectors and tools. It is good practice to limit exposure of connectors and tools to excessive moisture by using watertight or sealable connectors. Providing more GFCIs or shorter circuits can prevent tripping caused by the cumulative leakage from several tools or by leakage from extremely long circuits (Adapted from OSHA 3007; Ground-Fault Protection on Construction Sites, 1987).

7.8 FIRE PREVENTION

During confined space entry or whenever the potential exists for the buildup of a flammable atmosphere, periodic vapor concentration measurements should be taken with an explosimeter or combustimeter. If at any time the vapor concentrations exceed 20% of the Lower Explosive Limit (LEL), then the Site Safety Manager or designated field worker should immediately shut down all operations.

Only Factory Mutual (FM) approved fire safety cans will be used to transport and store flammable liquids.

All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool before filling.

Smoking is not allowed during any operations within the work area.

No open flame or spark is allowed in any area containing petroleum products or other flammable liquids.

7.9 GENERAL HEALTH

Medicine and alcohol can increase the effects of exposure to toxic chemicals. Unless specifically approved by a qualified physician, prescription drugs should not be taken by personnel assigned to operations where the potential for absorption, inhalation, or ingestion of toxic substances exists. No persons are allowed on-site while under the influence of drugs or alcohol or under any diminished capacity, whatsoever.

Drinking alcoholic beverages is prohibited on the work site. Drinking alcoholic beverages and driving is prohibited at any time. Driving at excessive speeds is always prohibited.

Skin abrasions must be thoroughly protected to prevent chemicals from penetrating the abrasion.

It is recommended that contact lenses not be worn by persons working on the site. Contact lenses are prohibited in the Exclusion and Contamination Reduction Zone.

7.10 ON-GOING TRAINING

In addition to the initial lead, HAZWOPER, and hazard communication training, the health hazards posed by the primary contaminants on this project will be discussed over the course of the project at weekly "tool box safety meetings" to serve as a refresher to this instruction.

8. PROJECT PERSONNEL

The Health and Safety Manager will report to the Overaa Project Manager relating to hazardous conditions and remedial measures. Overaa will oversee conditions and act accordingly during all phases of the project. The following management structure will be instituted to successfully and safely complete this project. In addition, the following personnel including the Site Safety Manager have the authority to stop any construction activity or to modify work practices based on safety requirements. This authority is in effect during working and non-working hours.

8.1 PROJECT MANAGER

The project manager will be responsible for implementing the project and obtaining any necessary personnel or resources for the completion of the project. This will be Don Stock.

8.2 HEALTH AND SAFETY MANAGER

The Health and Safety Manager shall be responsible for the coordination and oversight of the following aspects of the Site Safety Plan: vapor, combustion gas, particulate, dermal exposure, and ventilation, and for the implementation of this Site Safety Plan on-site and assuring that all other applicable local, state and federal regulations are complied with. This will be Harold Juhala.

8.3 SITE SAFETY AND HEALTH OFFICER

The Site Safety and Health Officer is the Overaa employee or a subcontractor who shall assist and represent the Health and Safety Manager in the continued implementation and enforcement of the SSP. The Site Safety and Health Officer will be assigned to the site on a full-time basis and shall report to Overaa and the Health and Safety Manager in matters pertaining to site health and safety.

8.4 PROJECT ENGINEER, SUPERVISOR & FOREMAN

In the event that the Project Manager, the Site Safety Manager, and the Site Safety and Health Officer are not on site, the Project Engineer or On-Site Supervisor will assume the responsibilities of the Site Safety Manager. If neither the Engineer nor On-Site Supervisor is available, the Foreman will assume all responsibilities of the Site Safety Manager.

Project Engineer: Dan Driver

On-Site Supervisor: Duane Frey

9. EMERGENCY RESPONSE

In the event of an accident or emergency, immediate action must be taken by the first person to recognize the event. First aid equipment is located on site inside all Overaa vehicles. Notify (1) the Site Safety Manager and (2) the Project Manager and the Foreman about the situation immediately after emergency procedures are implemented.

Jobsite telephones are located in the contractor's trailer.

Emergency Equipment is located at the job trailer.

9.1 EMERGENCY TELEPHONE NUMBERS:

Emergency:	Phone
Local Police	911
Fire	911
State Police	911
Ambulance	911
Underground Service Alert (U.S.A.)	(800) 642-2444
Telephone Company	(800) 642-2444

Maps to hospital are also located in the office and in Appendix G.

Primary Hospital:
Alameda Hospital
2070 Clinton Avenue
Alameda, CA 94501
(510) 522-3700

1: Start out going Southwest on 35TH AVE toward SAN LEANDRO ST by turning right.

2: Turn RIGHT onto SAN LEANDRO ST.

3: Turn LEFT onto FRUITVALE AVE.

4: FRUITVALE AVE becomes TILDEN WAY.

5: Turn LEFT onto PARK ST.

6: Turn RIGHT onto ENCINAL AVE/CA-61.

7: Turn LEFT onto WILLOW ST.

8: Turn RIGHT onto CLINTON AVE.

Secondary Hospital:
Highland General Hospital
1400 East 31st Street, Oakland, 94602
(510) 437-4800

1: Start out going Southwest on 35TH AVE towards SAN LEANDRO ST by turning right.

2: Turn RIGHT onto SAN LEANDRO ST.

3: Turn RIGHT onto FRUITVALE AVE.

4: Turn LEFT to take the I-580 W ramp towards HAYWARD.

5: Merge onto I-580 W.

6: Take the exit towards 14TH AVENUE/PARK BLVD.

7: Turn LEFT onto BEAUMONT AVE.

8: Turn RIGHT onto E 31ST ST.

Emergency Telephone Numbers:

Environmental Emergency:	Phone
Poison Control Center	(800) 523-2222
RGA Environmental, Inc. (Robert Gils)	(510) 547-7771
National Response Center (NRC)	(800) 424-8802
U.S. EPA (24 hour hotline)	(800) 424-9346
Office of Emergency Services (24 hour hotline)	(800) 852-7550
Department of Toxic Substances Control:	(510) 540-3840
Regional Water Quality Control	(510) 286-1255
Emergency Services Agency	(510) 820-8468
Project Manager Don Stock	Job Site – _____
Health and Safety Manager Harold Juhala	Mobile – 510-719-3386
	Office – 510-234-0926

9.2 ENCOUNTERING HAZARDOUS SITUATIONS (REQUIRING EVACUATION)

In the event of an emergency, i.e. fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water at the facility, the team member that observes this condition shall give an emergency alarm.

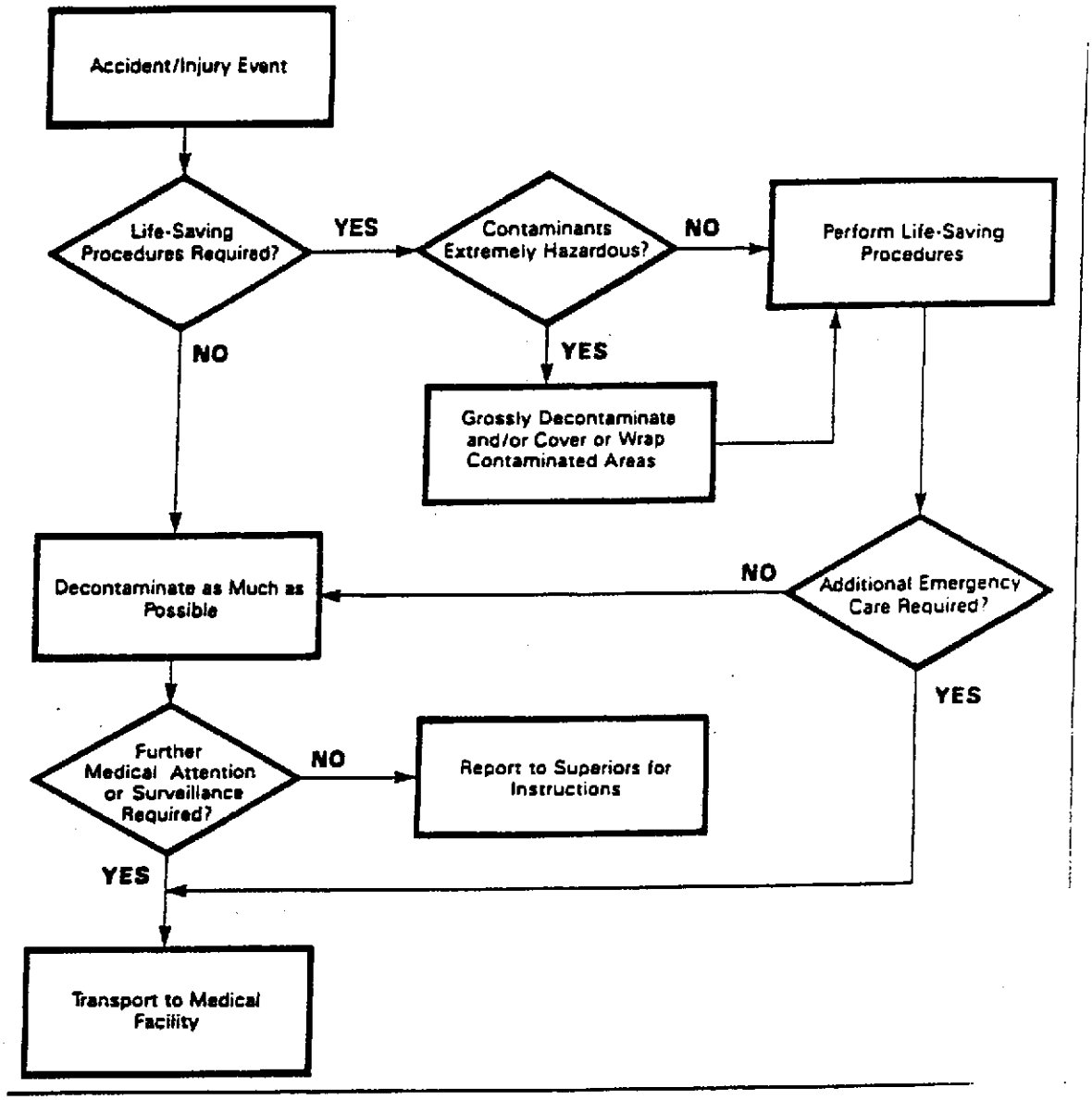
Actions taken will be dictated by the emergency. All appropriate local emergency response agencies shall be notified immediately. The police, fire department, emergency response teams and ambulance may be reached via telephone by dialing 911.

The nearest hospital and additional emergency contacts are listed above.

Personnel encountering a hazardous situation shall instruct others on site to evacuate the vicinity immediately and call the (1) Site Safety Manager, (2) the Project Manager, and (3) the Health and Safety Manager for instructions.

The site must not be re-entered until back-up help, monitoring equipment, and personal protective equipment is on hand.

Should an off-site hazardous spill occur, the safety and emergency procedures will be governed by those of the carrier, hauler, etc.



Source: Occupational Safety and Health Guidance Manual for Hazardous Waste site Activities; Prepared by NIOSH, OSHA, USCG, EPA

9.3 USUAL PROCEDURES FOR INJURY

If the injury is minor, proceed to administer first aid.

Notify the Site Safety Manager, Project Manager, and the Health and Safety Manager of all accidents.

If the injury requires medical attention, notify the Health and Safety Manager, Project Manager.

Telephone for ambulance/medical assistance if necessary. Whenever possible, notify the receiving hospital of the nature of physical injury or chemical overexposure. If no phone is available, transport the person to the nearest hospital.

Send/take this SSP with the MSDSs to the medical facility with injured person. Worker Compensation Insurance Information Packets are in the site office.

Notify the Health and Safety Manager and the Project Manager of all accidents, incidents and near-miss situations.

Complete Accident/Incident/Near-Miss Form as needed.

Notify and provide necessary information to the engineer for all accidents, incidents, and near-miss situations.

9.4 EMERGENCY TREATMENT

When transporting an injured person to a hospital, bring this Site Safety Plan to assist medical personnel with diagnosis and treatment. In all cases of chemical overexposure, follow standard procedures as outlined below for poison management, first aid, and, if applicable, cardiopulmonary resuscitation. Four different routes of exposure and their respective first aid/poison management procedures are outlined below.

9.4.1 Ingestion

Transport person to nearest hospital immediately.

9.4.2 Inhalation/Confined Space

☞ Post in the immediate vicinity of the confined space.

CONFINED SPACE DO NOT ENTER WITHOUT APPROVAL OF THE SITE SAFETY MANAGER.

DO NOT ENTER A CONFINED SPACE TO RESCUE SOMEONE WHO HAS BEEN OVERCOME UNLESS YOU ARE PROPERLY EQUIPPED WITH A SELF-CONTAINED BREATHING APPARATUS AND HAVE A STANDBY PERSON.

9.4.3 Inhalation/Other

Remove the person from the contaminated environment. Initiate CPR if necessary. Call or have someone call for medical assistance. Refer to MSDS for additional specific information. If necessary, transport the victim to the nearest hospital as soon as possible.

9.4.4 Skin contact/Corrosive Contaminant (Acids, Hydrogen Peroxide, etc.)

Wash off skin with a large amount of water immediately. Remove any contaminated clothing and rewash skin with water. Transport person to a medical facility if necessary.

9.4.5 Eyes

Hold eyelids open and rinse the eyes immediately with large amounts of water for 15 minutes. If possible, have the person remove his/her contact lenses (if worn). Never permit the eyes to be rubbed. Transport person to a medical facility as soon as possible.

APPENDIX A

AGREEMENT AND ACKNOWLEDGMENT STATEMENT

Site Safety Plan Agreement

Overaa personnel have the authority to stop work performed by their subcontractors at this site if any work is not performed in accordance with the requirements of this Site Safety Plan.

All project personnel, observers and subcontractor personnel are required to sign the following agreement prior to conducting work at the site.

I have read and fully understand the Site Safety Plan and my individual responsibilities.

I agree to abide by the provisions of the Site Safety Plan.

Name/Company: _____

Signature: _____

Date: _____

APPENDIX B

SITE SAFETY PLAN AMENDMENT SHEET

Project Name: _____

Project Number: _____

Location: _____

Changes in field activities or hazards: _____

Proposed Amendment:

Proposed By: _____

Date: _____

Approved By (Project Manager): _____

Date: _____

Approved By (Health & Safety Manager): _____

Date: _____

Declined By: _____

Date: _____

Amendment Number: _____

Amendment Effective Date: _____

APPENDIX C

DEFINITION OF HAZARD EVALUATION GUIDELINES

Hazard: Airborne Contaminants

Guideline	Explanation
Threshold Limit Value Time-Weighted Average (TLV-TWA)	The time weighted average concentration for a normal eight-hour workday and a forty-hour workweek, to which nearly all workers may be repeatedly exposed without adverse effect.
Permissible Exposure Limit (PEL)	Time weighted average concentrations similar to (and in many cases derived from) the Threshold Limit Values.
Immediately Dangerous to Life and Health (IDLH)	"IDLH" or "Immediately dangerous to life or health" means any atmospheric condition that poses an immediate threat to life, or that is likely to result in acute or immediate severe health effects. This includes oxygen deficiency conditions.

Guideline	Explanation
Lower Explosive Limit (LEL)	The minimum concentration of vapor in air below which propagation of a flame will not occur in the presence of an ignition source.
Upper Explosive Limit (UEL)	Upper Explosive Limit (UEL) The maximum concentration of vapor in air above which propagation of a flame will not occur in the presence of an ignition source.

APPENDIX D

OVERAA

LEAD AWARENESS PROGRAM

OSHA Lead in Construction Advisor 1.0
September 1999

This report describes the results of a Lead in Construction Advisor session to view frequently asked questions and answers.

GENERAL/BACKGROUND

What is OSHA's interim final standard for lead in construction?

On May 4, 1993, OSHA published a final interim rule governing occupational exposure to lead in the construction industry (58 FR 26590). This standard is designed to reduce the risks from exposure to lead.

OHSA's 1993 interim final standard for lead in construction limits worker exposures to 50 micrograms of lead per cubic meter of air averaged over an eight-hour workday.

Why is lead in construction subject to regulation?

Lead is a cumulative and persistent toxic substance that poses a serious health risk. Lead has been poisoning workers for thousands of years. Lead exposure is one of the oldest known occupational hazards. Hundreds of years ago it was recognized that lead was harmful when inhaled or ingested. The absorption of excessive quantities of lead may cause diseases of the kidney, as well as of the peripheral and central nervous systems.

The ^^effect^^s of lead on the nervous system range from mild behavioral symptoms to fatal brain damage. Lead exposure can also result in impotence and sterility in men as well as decreased fertility in women. If proper workplace hygiene practices are not followed, the lead on workers, clothing may expose their families at home.

In the construction industry, traditionally most over-exposures to lead have been found in the trades, such as plumbing, welding and painting.

In building construction, lead is frequently used for roofs, cornices, tank linings, and electrical conduits. In plumbing, soft solder, used chiefly for soldering tinplate and copper pipe joints, is an alloy of lead and tin. Soft solder, in fact, has been banned for many uses in the United States. The use of leadbased paint in residential application has also been banned by the Consumer Product Safety Commission. However, since leadbased paint inhibits the rusting

and corrosion of iron and steel, it is still used on bridges, railways, ships, lighthouses, and other steel structures, although substitute coatings are available.

Significant lead exposures can also arise from removing paint from surfaces previously coated with lead-based paint, such as in bridge repair, residential renovation, and demolition. With the increase in highway work, including bridge repair, residential lead abatement, and residential remodeling, the potential for exposure to lead-based paint has become more common. Certain trades or "jobs" potentially exposed to lead include iron work, demolition work, painting, lead-based paint abatement work, plumbing, heating/airconditioning, electrical work, and carpentry/renovation/remodeling.

What is the role of OSHA?

OSHA was established pursuant to the Occupational Safety and Health Act of 1970 (OSH Act) to help assure safe and healthful workplaces throughout the nation. The OSH Act authorizes OSHA to promulgate safety and health standards, conduct inspections to enforce those standards, and to assist employers and employees in removing workplace hazards by offering training, education and consultative services. The OSH Act also allows states that wish to operate their own occupational safety and health programs to do so. Twenty-three AAstatesAA and jurisdictions administer comprehensive OSHA programs, and two other states operate OSHA programs for their public employees only.

The OSH Act applies, with certain exceptions, to most workplaces -- an estimated 6 million establishments employing more than 90 million persons. The agency addresses not only typical workplace safety hazards such as those associated with electrocutions and unguarded machinery, but also workplace health hazards such as those associated with exposures to toxic substances, including asbestos, airborne chemicals and lead.

What are the benefits of regulating lead in construction?

Because exposure to lead causes a number of different adverse health effects, there are potential benefits associated with this requirement of the Interim Final Standard.

Some of the near-term benefits that are expected to accrue include reductions in the incidence of acute lead poisoning and adverse neurologic and biochemical effects, and reductions in the incidence of blood lead levels above 50 ug/dl(3). These include decreases in the annual number of expected cases of: reduced nerve conduction velocity; reduced blood ALA-D levels and increased urinary ALA which indicate reduced ability to produce blood cells; gastrointestinal disturbances; and blood-lead levels above the medical removal trigger level.

Benefits that accrue over longer time horizons include reductions in the incidence of lead-induced hypertension, which may increase the risk of myocardial (fatal/nonfatal) infarction or stroke and renal disease.

Other potential benefits that are expected to accrue such as reductions in the incidence of lead-induced male and female reproductive effects. Improved hygiene practices will likely yield other benefits such as reductions in worker blood-lead levels.

What are key areas of the standard?

Biological Monitoring and Assoc. Recordkeeping
Change Areas with Storage Facilities
Competent Person
Decontamination Facilities Including Showers
Determination of the Presence of Lead (a)
Eating Areas and Facilities
Enclosures/Containment Systems (b)
Exposure Monitoring and Assoc. Recordkeeping (a)
Handwashing Facilities Only (d)
HEPA Vacuums
Local Exhaust Ventilation
Mechanical Ventilation
Medical Examinations and Assoc. Recordkeeping
Medical Removal Protection Requirements (e)
Notification of Other Employers
Protective Clothing/Gloves/Shoe Covers
Respiratory Protection
Warning Signs
Wetting Agents
Worker Training
Written Compliance Program

Where can I find professional safety and health advice?

Sources for professional safety and health advice include insurance carriers, trade organizations, state on-site consultation programs (known as state 7(c)(1) programs), and consultants.

The OSHA web pages on the internet also provides sources of information and training information. The addresses are:

- http://www.osha.gov
- http://www.osha-slc.gov
- http://www.cdc.gov/niosh/homepage.html
  NIOSH (National Institute For Occupational Safety And Health)
- http://www.hud.gov
- http://www.epa.gov

What are common sources of lead exposure in construction?

In building construction, lead is frequently used for roofs, cornices, tank linings, and electrical conduits. In plumbing, soft solder, used chiefly for soldering tinplate and copper pipe joints, is an alloy of lead and tin. Soft solder, in fact, has been banned for many uses in the United States. The use of leadbased paint in residential application has also been banned by the Consumer Product Safety Commission. However, since leadbased paint inhibits the rusting and corrosion of iron and steel, it is still used on bridges, railways, ships, lighthouses, and other steel structures, although substitute coatings are available.

Significant lead exposures can also arise from removing paint from surfaces previously coated with lead-based paint, such as in bridge repair, residential renovation, and demolition. With the increase in highway work, including bridge repair, residential lead abatement, and residential remodeling, the potential for exposure to lead-based paint has become more common. The trades potentially exposed to lead include iron work, demolition work, painting, lead-based paint abatement work, plumbing, heating/airconditioning, electrical work, and carpentry/renovation/remodeling. Operations that generate lead dust and fume include the following:

-Flame-torch cutting, welding, the use of heat guns, sanding, scraping and grinding of lead painted surfaces in repair, reconstruction, dismantling, and demolition work;
-Abrasive blasting of bridges and other structures containing lead-based paints;
-Use of torches and heat guns, and sanding, scraping, and grinding lead-based paint surfaces during remodeling or abating lead-based paint; and
-Maintaining process equipment or exhaust duct work.

What is the responsibility of the employer with regard to establishing a lead program?

The employer of construction workers is responsible for the development and implementation of a worker protection program in accordance with 29 CFR 1926.20 and 29 CFR 1926.62.

This program is essential in minimizing worker risk of lead exposure. Construction projects vary in their scope and potential for exposing workers to lead and other hazards. Many projects may involve limited exposure, such as the removal of paint from a few interior residential doors. Others may involve the removal, or stripping off, of substantial quantities of lead-based paints on large bridges. The employer should, as needed, consult a qualified safety and health professional(*) to develop and implement an effective worker protection program. The employer must designate a ^^Competent Person^^ to implement the program and monitor compliance.

What is the technological feasibility of compliance with the Lead Exposure in Construction Standard?

Compliance with the PEL and ancillary provisions of the Interim Final Standard is technologically feasible for all affected industries. Existing engineering control types, including mechanical dilution, ventilation, local exhaust ventilation, shrouded tools, HEPA vacuums, and wetting agents are already in use in the construction industry. Further, employee rotation is permitted under the standard to achieve compliance with the PEL prior to using respirators. For the activities in which high exposures to lead are generated, however, supplemental respirator use may be necessary when engineering controls are used.

In order to analyze the technological feasibility of the standard, data on lead exposures were examined by the type of activity generating the potential for exposure to lead. The exposure data reviewed by OSHA were obtained from the following sources: OSHA Integrated Management Information System (IMIS); various National Institute For Occupational Safety And Health (NIOSH) Health Hazard Evaluation reports; various Department of Housing and Urban Development (HUD) Lead Abatement Demonstration Projects; Maryland's Department of Occupational Safety and Health;

site visits conducted by CONSAD Research (a private company) for OSHA and other published reports and studies. The exposure data obtained from each of these sources were the best available at the time the standard was being developed and are believed to be representative and reliable exposure estimates for the construction activities being examined.

What is the most effective way to protect construction workers?

The most effective way to protect workers is to minimize exposure through the use of engineering controls and good work practices. It is OSHA policy that respirators are not to be used in lieu of engineering and work practices, including administrative controls, to reduce employee exposures to below the PEL. Respirators must be used during: (1) periods when an employee's exposure to lead exceeds the PEL; (2) work operations for which engineering and work practice controls are not sufficient to reduce employee exposures to or below the PEL; and (3) periods when an employee requests a respirator.

What types of projects are likely to expose construction workers to lead?

Lead exposure is most common among project types that involve the disturbance of lead or lead-containing materials during additions, alterations, reconstruction, demolition, and repairs. Some examples of potential sources of exposure in these project types include lead-based paint (LBP) and paint dust, lead pipes, leaded solder, the leaded support rods in stained glass windows, and some mineral wool insulation.

In contrast, project types involving exposure to lead during new construction are comparatively rare. This is in part due to government regulations that have banned specific uses of once common lead-containing construction materials. An example is the Consumer Product Safety Commission's 1977 ban on "lead containing paint" prohibiting the use of such paint on products to which consumers are exposed after sale (42 FR44199). Another example is the Environmental Protection Agency's 1986 ban on further use of lead pipes and solder in residential plumbing.

In most new construction projects involving lead use, lead and lead-containing materials are used in limited quantities for specialized applications. Examples include terne (leaded-steel) roofing and the use of lead foil sheet in the walls of hospital x-ray suites.

what if a construction employer who has been subject to the interim final lead in construction standard goes out of business?

The interim final lead in construction standard requires that OSHA have access to the employer's compliance plan (1926.62(e)(2)(iv)), employee information and training records (1926.62(l)(3)(ii)), as well as the employee's medical and monitoring records (1926.62(n)(5)). If an employer ceases business operation and there is no successor employer to receive these records, the employer is required to transmit the records to the Director of the National Institute for Occupational Safety and Health as per 1926.62(n)(6)(ii).

what construction industries are likely to be effected by the Interim Final Standard for Lead Exposure in Construction?

Commercial and Institutional Remodeling
Commercial and Industrial Demolition
Electrical Cable Splicing Elevator Cable
Babbitting Highway and Railroad Bridge
Repainting Highway and Railroad Bridge
Rehabilitation Housing Lead Abatement (Private Housing) Housing Lead Abatement (Public Housing) In-place Management (Public Housing)
In-place Management (Private Housing)
Ind. Process Equipment Mfg./Maint./Repair
Indoor Industrial Facility Maint./Renovation
Industrial Vacuuming Installation of Radiation Shielding Installation of Terne Roofing
Lead Joint Work on Cast Iron Soil Pipes
Outdoor Industrial Facility Maint./Renovation
Petroleum Tank Repainting
Reinsulation Over Existing Mineral Wool
Repair and Removal of Water Lines
Residential Remodeling Stained Glass Window
Removal Transmission and Communication Tower
Maint. Underground Storage Tank Demolition
Water Tank Repainting

what are the key elements of an employer's

required written worker protection program for employees exposed to lead above the PEL?

At the minimum, the following elements must be included in the employer's worker protection program for employees exposed to lead above the PEL:

- Hazard determination, including exposure assessment;
- Engineering and work practice controls;
- Respiratory protection;
- Protective clothing and equipment;
- Housekeeping;
- Hygiene facilities and practices;
- Medical surveillance and provisions for medical removal;
- Training;
- Signs; and
- Recordkeeping.

In addition, OSHA requires that the employer designate a competent person to implement the program and monitor compliance.

ENGINEERING CONTROLS

How are engineering controls used to minimize employee exposure to lead?

Because lead is a cumulative and persistent toxic substance and because health effects may result from low levels of exposure over prolonged periods of time, engineering controls, good work practices, and administrative controls must be used where feasible to minimize employee exposure to lead.

At a minimum, exposures must not exceed the OSHA interim final PEL of 50 micrograms per cubic meter of air (50 ug/m(3)) averaged over an 8-hour-period. When feasible engineering controls and work practice controls cannot reduce worker exposure to lead to at or below 50 ug/m(3), respirators must be used to supplement the use of engineering and work practice controls.

What are engineering controls?

Engineering measures include:

local and general exhaust ventilation;
enclosure/encapsulation;
process and equipment modification;
material substitution;
component replacement with new components; and
isolation or automation.

what are examples of the recommended engineering control termed exhaust ventilation to reduce worker exposure?

Power tools used for the removal of lead-based paint should be equipped with dust collection shrouds or other attachments exhausted through a high-efficiency particulate air (HEPA) vacuum system. Operations such as welding, cutting/burning, heating should be provided with local exhaust ventilation. Vacuums should be equipped with HEPA filters if they are used during clean-up activities.

For abrasive blasting operations where full containment exists, the containment structure should be designed to optimize the flow of ventilation air past the worker(s), so that the airborne concentration of lead is reduced and the visibility is increased. The affected area should be mainrained under negative pressure to reduce the chances that lead dust will contaminate areas outside the enclosure. A containment structure must be equipped with an air-cleaning device to control emissions of particulate matter to the environment.

what are examples of the recommended engineering control termed enclosure/encapsulation to reduce worker exposure?

Lead-based paint can be made inaccessible either by encapsulating it with a material that bonds to the surface, such as acrylic or epoxy coating or flexible wall coverings, or by enclosing it using systems such as gypsum wallboard, plywood panelling, and aluminum, vinyl or wood exterior siding.

Floors coated with lead-based paint can be covered using vinyl tile or linoleum flooring.

The building owner, or other responsible person, should oversee the custodial and maintenance staffs and contractors with regard to all activities that involve enclosed or encapsulated leadbased paint. This will minimize potential inadvertent release of lead during maintenance, renovation, or demolition.

What are examples of the recommended engineering control termed substitution of the hazardous material (lead) to reduce worker exposure?

zinc-containing primers covered by an epoxy intermediate coat and polyurethane topcoat are commonly used instead of lead-containing coatings.

What are examples of the recommended engineering control termed component replacement to reduce worker exposure?

Lead-based painted building components (i.e., windows, doors, and trim) can sometimes be replaced either with new lead-free components or with the same components after the lead-based paint has been removed off-site. Replacement is a permanent solution.

What are examples of the recommended engineering control termed process/equipment modification to reduce worker exposure?

Brush/roller application of lead paints or other lead-containing coatings is a safer method than spraying. (Note: There is a ban on the use of lead-based paint in residential housing.) This method of application introduces little or no paint mist into the air where the mist can present a lead inhalation hazard.

Mobile hydraulic shears can be substituted for torch cutting under certain circumstances.

Surface preparation equipment, such as needle guns with multiple reciprocating needles completely enclosed within an adjustable shroud, can be substituted for abrasive blasting under certain operations. The shroud captures dust and debris at the cutting edge and can be equipped with a HEPA vacuum filtration system with a self-drumming feature. One such commercial unit can remove lead-based paint from flat steel and concrete surfaces, outside edges, inside corners, and pipes.

Chemical strippers used primarily on the exterior of buildings, surfaces involving carvings or molding, or intricate iron works, can be used in place of hand scraping. Chemical removal generates less airborne lead dust.

These strippers, however, can be hazardous and the material safety data sheets (MSDS's) for the products used must be reviewed by the employer for information on worker exposure hazards from the chemical ingredients and protective measures recommended by the manufacturer.

Non-silica containing abrasive (e.g., steel or iron shot/grit) should be used where practical instead of sand in abrasive blasting operations. The crystalline silica portion of the dust presents a respiratory health hazard.

Blasting techniques that are less dusty than abrasive blasting and that can be effective under some conditions include: (1) hydro- or wet-blasting (using high pressure water with or without abrasive or surrounding the blast nozzle with a ring of water), and (2) vacuum blasting where a vacuum hood for material removal is positioned around the exterior of the blasting nozzle.

Heat guns used to remove lead-based paints in residential housing units should be of the flameless electrical softener type. Heat guns should have electronically controlled temperature settings to allow usage below 700 degrees F. Heat guns should be equipped with various nozzles to cover all common applications and to limit heated work area.

When using abrasive blasting with vacuum on exterior building surfaces, care should be taken that the configuration of the heads on the blasting nozzle match the configuration of the substrate so that the vacuum is effective in containing debris. Since HEPA vacuum cleaners can be used to clean surfaces other than just floors, operators should have attachments appropriate for use on unusual surfaces. The proper use of brushes of various sizes, crevice tools and angular tools, when needed, will enhance the quality of the HEPA-vacuuming process and help reduce the amount of lead dust released into the air.

What are examples of the recommended engineering control termed isolation to reduce worker exposure?

Although it is not feasible to completely enclose and ventilate some abrasive blasting operations, it is possible to isolate many operations to help reduce the potential for exposure to lead. Isolation, in this instance, consists of keeping employees not involved in the blasting operations as far away as possible from the work area. By placing the employees at a greater distance from the source of lead exposure, their exposures will be reduced.

HYGIENE

What are effective personal hygiene practices?

To minimize exposure to lead, the employer must provide and ensure that workers use washing facilities. Clean change areas and separate eating areas (which are as free as practicable from lead contamination) must also be provided if employees are exposed about the PEL.

Cars should be parked where they will not be contaminated with lead. These measures will reduce the worker's period of exposure to lead and the ingestion of lead, ensure that the duration of lead exposure does not extend beyond the workshift, significantly reduce the movement of lead from the worksite, and provide added protection to employees and their families.

What is a clean change area?

Where employees are exposed above the PEL, the employer must provide a clean change area equipped with storage facilities for street clothes and a separate area with facilities for the removal and storage of lead-contaminated protective work clothing and equipment. This separation is essential in preventing cross contamination of the employee's clothing.

Clean change areas are to be used for taking off street clothes, suiting up in clean working clothes (protective clothing), donning respirators prior to beginning work, and dressing in street clothes after work. NO lead-contaminated items should enter this area.

Contaminated work clothing must not be worn out of the job site. Under no circumstances shall lead-contaminated work clothes be laundered at home or taken from the worksite, except to be laundered professionally or properly disposed of following applicable Federal, state, and local regulations.

Showers: When there is employee exposure above the PEL, shower facilities must be provided (if feasible) so that exposed employees can wash lead from their skin and hair prior to leaving the worksite. Where showers are provided, employees must change out of their work clothes and shower before changing into their street clothes and leaving the worksite.

Workers who do not change into clean clothing before leaving the worksite may contaminate their homes and automobiles with lead dust. Other members of the household may then be exposed to harmful amounts of lead.

What are the requirements for personal practices?

Personal practices (eating, drinking, etc.): The employer must ensure that employees who are in work areas where any employee is exposed to lead above the PEL either clean or remove their protective clothing and wash their hands and face prior to eating, drinking, smoking or applying cosmetics. The employer must ensure that these latter practices are never permitted while in the work area or in areas subject to the accumulation of lead. HEPA vacuuming can be used to remove loose contamination from the work clothing prior to eating.

What are the requirements for washing facilities?

Washing Facilities: Adequate washing facilities shall be provided for employees. Such facilities shall be in near proximity to the worksite and provided with water, soap, and clean towels to enable employees to remove lead contamination from their skin.

The Environmental Protection Agency requires that contaminated water from washing facilities and showers must be disposed of in accordance with applicable local, state, or federal regulations.

What procedures should workers who are exposed to lead follow at the end of the day?

Workers who are exposed to lead should follow these procedures, where applicable, upon finishing work for the day:

(1) Place disposable coveralls and shoe covers with the lead waste;

(2) Place lead-contaminated clothes, including work shoes (if being cleaned, laundered, or disposed of), and personal protective equipment for laundering/cleaning (by the employer) in a closed container;

(3) Take a shower and wash hair when exposed above the PEL; and

(4) Change into street clothes.

CONTROL PRACTICES

What are control practice requirements associated with OSHA's Interim Final Lead Standards? (Table summarizes control practices by exposure level.)

Control practice	Interim final standard		
	Exposure below 30 ug/m(3) AL	Exposure >= 30 and <= 50	Exposure above 50 ug/m(3) PEL
Determination of the Presence of Lead(a)	X	X	X
Competent Person			X
Exposure Monitoring and Assoc. Recordkeeping(a)	X	X	X
Mechanical Ventilation(b)			X
Local exhaust Ventilation			X
HEPA Vacuums	X	X	X
Written Compliance Program			X
Warning Signs			X
Training(c)		X	X
Notification of Other Employers	X	X	X
Respiratory Protection			X
Protective Clothing/ Gloves/Shoe Covers			X
Handwashing Facilities Only(d)	X	X	X
Change Areas with Storage Facilities			X
Decontamination Facilities Including Showers			X
Eating Areas and Facilities			X
Biological Monitoring and Assoc. Recordkeeping		X	X
Medical Examinations and Assoc. Recordkeeping		X	X
Medical Removal Protection Requirements(e)		X	X

Footnote(a) Exemption is possible if objective data shows that exposures are below the action level or if the employer has relevant data from the past 12 months.

Footnote(b) Enclosures are only assumed to be needed in conjunction with indoor projects

using mechanical ventilation. Outdoor enclosures are required by EPA regulations concerning environmental release of lead.

Footnote(c) The lead standard requires the employer to provide a training program for all employees exposed at or above the AL or who may suffer skin or eye irritation from lead compounds such as lead arsenate or lead azide.

Footnote(d) Hand washing facilities for activities below the PEL are required by 29 CFR 1926.51(f).

Footnote(e) Medical removal is dependent on worker blood-lead level.

Source: OSHA

MISCELLANEOUS

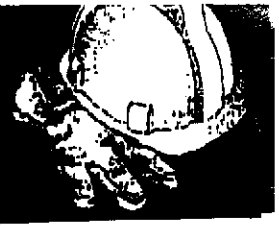
TRAINING

Q. What is the definition of a "competent person" in the construction standard?

A. As in the regulations applying to all construction work, the "competent person" must be "capable of identifying existing and predictable hazards ...which are ...hazardous to employees, and (have) authorization to take prompt corrective measures to eliminate them" (29 CFR 1926.32 (f)). Also, the "competent person" must be designated by the employer (29 CFR 1926.20(b)(2)). A"competent person" is not merely someone with a specified level of training but connotes a high level of knowledge of worksite safety and health issues as well.

TRAINING GUIDE

LEAD



Before you begin the meeting...

This meeting is about preventing exposure to lead on the job. You might think that the only people who have to worry are those who do lead removal work. That's just not true. There can be a problem on any job if you scrape, grind, cut, or disturb surfaces that contain lead. Lead is common in old surface coatings. And even today, many bridges and industrial buildings are still painted with lead-based paint.

The law says you need special training to work with any significant amount of lead. You need to learn about respirators, protective clothing, special work methods, and other safety precautions. We can't give you all this information in a few minutes. What we can do today is make sure everyone is aware of the dangers of lead.

The potential for elevated lead levels exists in the soil on this jobsi,. According to the AkS report provided here.

ASK THE CREW THESE QUESTIONS:

After each question, give the crew time to suggest possible answers. Use the information following each question to add points that no one mentions.

1. **What are some symptoms you might notice if you are exposed to lead?**

- headaches
- trouble sleeping
- fatigue
- reduced sex drive
- mood changes (irritability, depression)
- loss of appetite
- stomach pain
- pain, weakness, or twitching in muscles

2. **If you don't pay attention to these symptoms and reduce your lead exposure, you can get seriously ill from lead poisoning. Does anyone know what diseases can be caused by high, long-term exposure to lead?**

- anemia
- reproductive problems (including impotence and infertility)
- kidney damage
- brain and nervous system damage

3. **What are some jobs on a construction site that might expose you to lead?**

- Renovating or demolishing structures that have lead-painted surfaces.
- Spray painting with lead-based paint, or removing lead-based paint.
- Sandblasting bridges or steel structures that are painted with lead.
- Grinding, cutting, or torching metal surfaces that are painted with lead.
- Welding, cutting, or removing pipes, joints, or duct work that contain lead or are painted with lead.
- Using solder that contains lead.
- Cutting or stripping lead-sheathed cable.
- Heating some roofing products, or dissolving them with solvents. (Fumes from hypalon coatings, cover strips, flashing, splice tape, and seam tape can contain lead oxide.)
- Cleaning up sites where there is lead dust.

4. **We have already tried to identify all possible sources of lead on this job. But what if you run across something you're not sure of? How can you find out if there is lead in the material you are working with?**

- If you're working with old coatings, pipes, or similar materials that might contain lead, **send a sample to a lab** to be analyzed.
- If necessary, the company can bring in a qualified professional to measure the lead dust level in the air with instruments. This is called **air monitoring.**
- **When in doubt** if there is lead, ask!
- If you're working with a new product (like paint), read its **Material Safety Data Sheet** (MSDS). The MSDS should tell you the ingredients and possible health hazards.

5. **If there's lead around, what precautions can you take to avoid getting exposed?**

- Use **safe work practices.**
- **Don't eat, drink, or smoke** on the job. Anything you put in your mouth may be contaminated with lead.
- If necessary, use **personal protective equipment** (PPE) like **gloves, special clothing, and a respirator.** If you use a respirator, we must provide the right type, make sure it fits properly, teach you how to use it, and give you a physical to make sure you're able to wear it safely.

Explain all protective measures required on this job-work practices, etc.:

_____

_____

(PPE and Respirators are covered in more detail in separate Training Guides.)

6. **If you've been working around lead, why is it important to change your clothes and wash up *before* you go home?**

   - You might accidentally take lead dust home on your clothes or in your car. At home, it could contaminate your furniture and rugs. It's especially dangerous to small kids, who like to put things into their mouths.

   Explain cleanup procedures on this site- how and where to clean up, what to do with contaminated clothing, etc.:

_____

_____

7. **Cal/OSHA says anyone who is exposed to a large amount of lead, even for a day, must get a blood test. Why are blood lead tests required?**

   - They tell you how much lead is circulating in your blood. If your blood lead level is too high, Cal/OSHA says you must be given a work assignment away from lead, with no loss of pay.
   - The tests don't tell you how much lead is stored in your bones. Lead can be stored in the bones for long periods and released into the bloodstream later.
   - You should get a "baseline" blood test before you begin to work around lead, so later you can make sure your blood lead level is not going up.
   - Cal/OSHA says that all required blood lead tests must be paid for by your employer.

CAL/OSHA REGULATIONS

Explain: Most of the safety measures we've talked about are required by Cal/OSHA. We have to take these precautions-it's the law. For example, Cal/OSHA requires us to have a written lead compliance program. Copies are available for you to see. Cal/OSHA also says we must make sure no one on the site is exposed to more than **50 micrograms of lead per cubic meter** of air, averaged over an 8-hour shift. This is called the **permissible exposure limit** (PEL) for lead. I have a Checklist of the Cal/OSHA regulations on lead. If you'd like to know more, see me after the meeting.

COMMENTS FROM THE CREW

Ask: **Do you have any other concerns about lead? Do you see any problems on our job?** *(Let the steward answer first, if there is one.)*

What about other jobs you've worked on? Have you had any experience with lead exposure that might help us work safer on this job?

GENERAL SAFETY DISCUSSION

Safety concerns:

APPENDIX E

AREA MAP

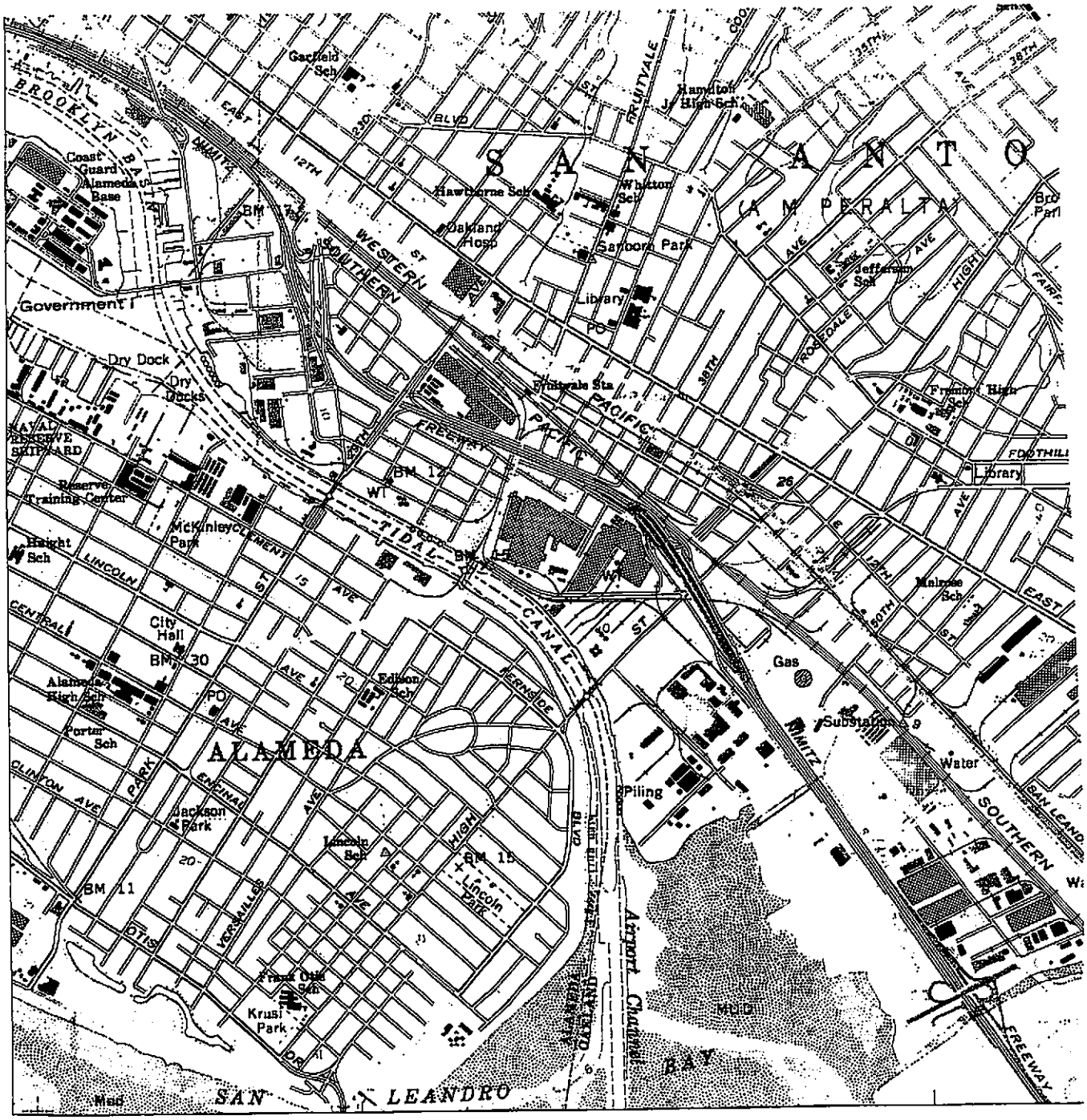


FIGURE 1
AREA MAP
Fruitvale BART Station Parking Structure
Oakland, CA

N

Base Map From:
U.S. Geological Survey
Oakland East, Calif.
7.5 Minute Quadrangle
Photorevised 1980

RGA Environmental, Inc.
4701 Doyle Street
Suite 14
Emeryville, CA 94608

0 1,000 2,000
SCALE IN FEET

APPENDIX F

SITE MAP

SOIL CLASSIFICATION

NON-HAZARDOUS WASTE, 0-2' BGS (BELOW GROUND SURFACE)

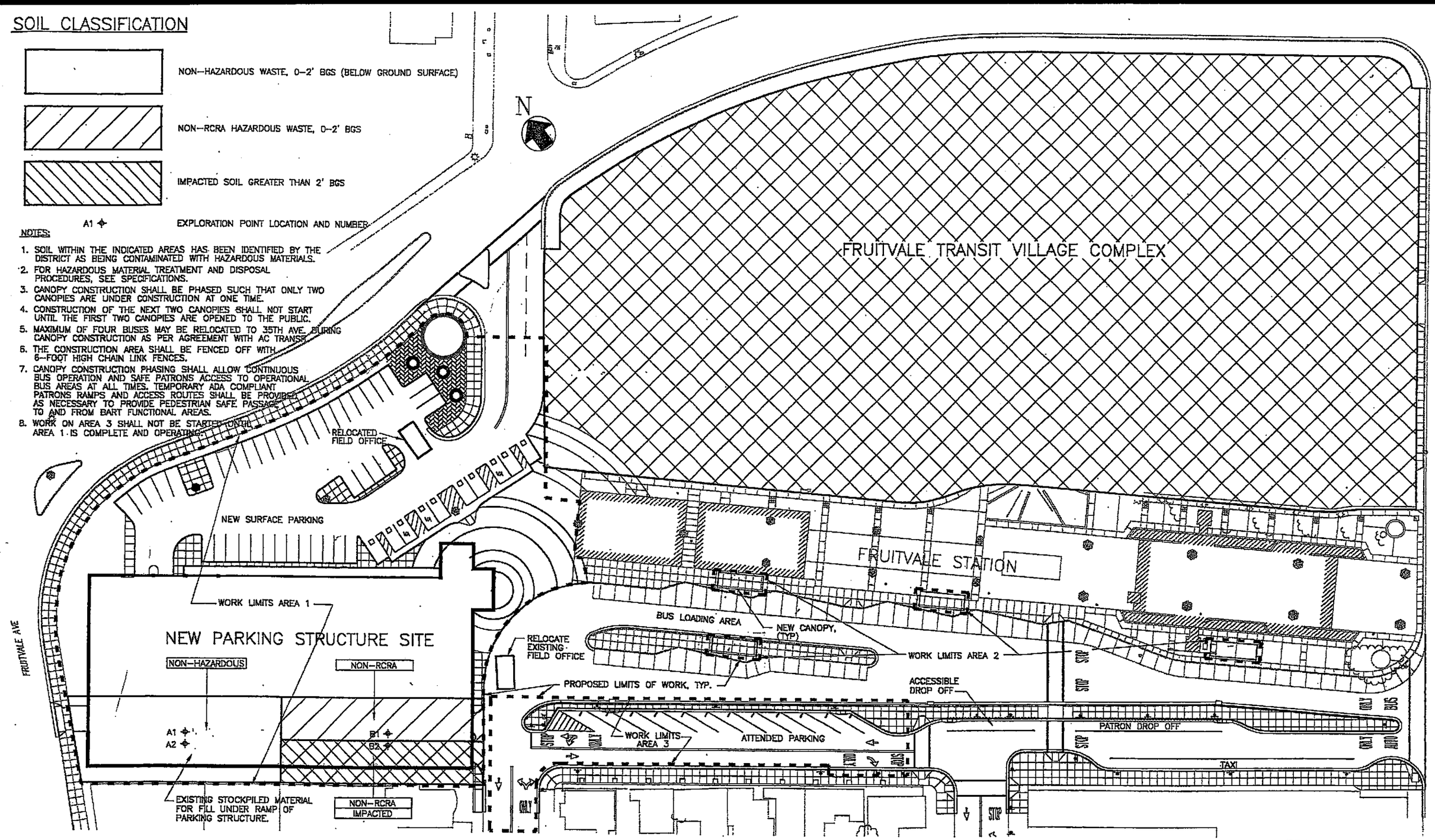
NON-RCRA HAZARDOUS WASTE, 0-2' BGS

IMPACTED SOIL GREATER THAN 2' BGS

A1 ⌖ EXPLORATION POINT LOCATION AND NUMBER

NOTES:

1. SOIL WITHIN THE INDICATED AREAS HAS BEEN IDENTIFIED BY THE DISTRICT AS BEING CONTAMINATED WITH HAZARDOUS MATERIALS.
2. FOR HAZARDOUS MATERIAL TREATMENT AND DISPOSAL PROCEDURES, SEE SPECIFICATIONS.
3. CANOPY CONSTRUCTION SHALL BE PHASED SUCH THAT ONLY TWO CANOPIES ARE UNDER CONSTRUCTION AT ONE TIME.
4. CONSTRUCTION OF THE NEXT TWO CANOPIES SHALL NOT START UNTIL THE FIRST TWO CANOPIES ARE OPENED TO THE PUBLIC.
5. MAXIMUM OF FOUR BUSES MAY BE RELOCATED TO 35TH AVE. DURING CANOPY CONSTRUCTION AS PER AGREEMENT WITH AC TRANSIT.
6. THE CONSTRUCTION AREA SHALL BE FENCED OFF WITH 6-FOOT HIGH CHAIN LINK FENCES.
7. CANOPY CONSTRUCTION PHASING SHALL ALLOW CONTINUOUS BUS OPERATION AND SAFE PATRONS ACCESS TO OPERATIONAL BUS AREAS AT ALL TIMES. TEMPORARY ADA COMPLIANT PATRONS RAMPS AND ACCESS ROUTES SHALL BE PROVIDED AS NECESSARY TO PROVIDE PEDESTRIAN SAFE PASSAGE TO AND FROM BART FUNCTIONAL AREAS.
8. WORK ON AREA 3 SHALL NOT BE STARTED UNTIL AREA 1 IS COMPLETE AND OPERATING.



HALF SIZE

REV.	DATE	BY	CHKD.	APP.	DESCRIPTION
00	12/01	H	[illegible]	[illegible]	DRAWN PER BECD EM001133

APPROVED: CHIEF OF SECTION

APPROVED: MANAGER OF DESIGN

REGISTERED PROFESSIONAL ENGINEER — HANSU TAFAGHODI — No. C060482 — Exp. 6-30-03 — CIVIL — STATE OF CALIFORNIA

BART

		DATE
DESIGNED:	H.T.	12/01
DRAWN:	[illegible]	12/01
CHECKED:	[illegible]	12/01
APPROVED:	M. Mead	12/01

FRUITVALE STATION PARKING STRUCTURE

SITE PLAN

REF. NO.

SIZE: D | SCALE

CONTRACT

APPENDIX G

HOSPITAL MAP

MAPQUEST.

< Back

PRIMARY HOSPITAL

FROM:

[1000-1055] 35th Ave
Oakland, CA
94601 US

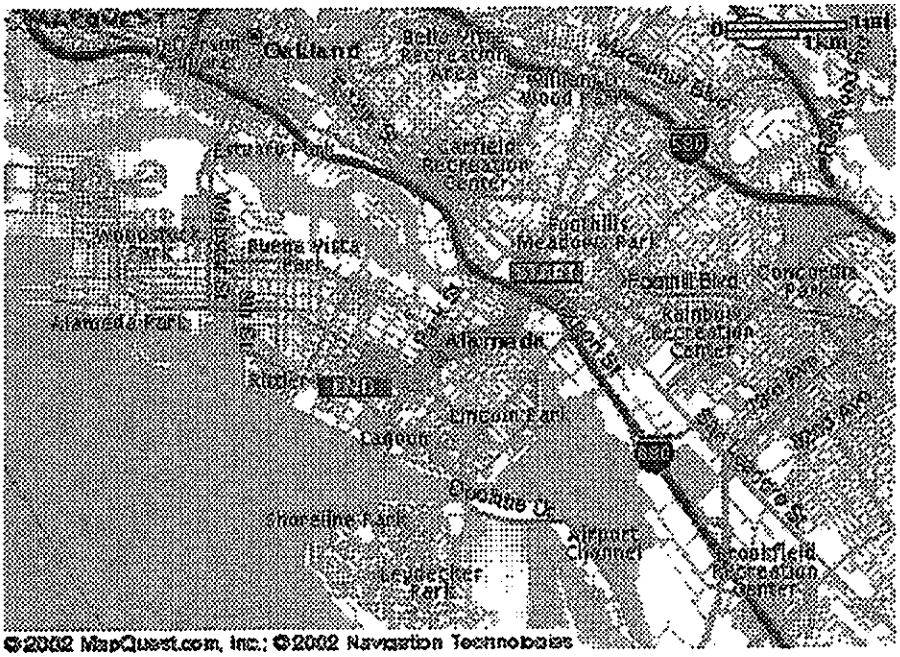
Total Distance: 2.28 miles

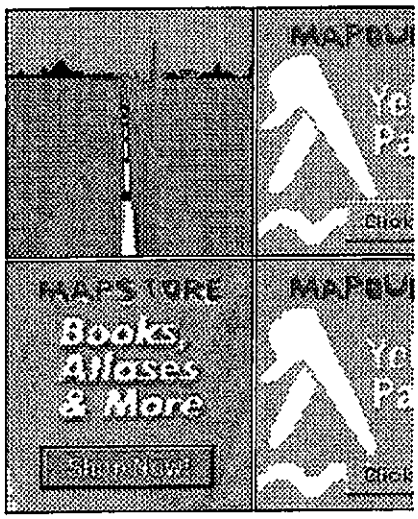
TO:

2070 Clinton Ave
Alameda, CA
94501-4320 US

Total Estimated Time: 5 minutes

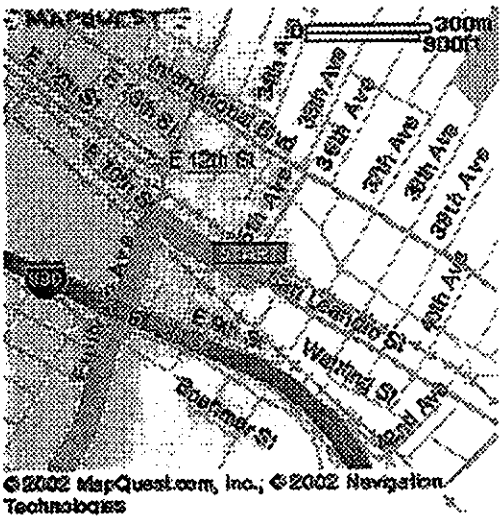
DIRECTIONS	DISTANCE
1: Start out going Southwest on 35TH AVE toward SAN LEANDRO ST by turning right.	0.01 miles
2: Turn RIGHT onto SAN LEANDRO ST.	0.17 miles
3: Turn LEFT onto FRUITVALE AVE.	0.50 miles
4: FRUITVALE AVE becomes TILDEN WAY.	0.59 miles
5: Turn LEFT onto PARK ST.	0.33 miles
6: Turn RIGHT onto ENCINAL AVE/CA-61.	0.42 miles
7: Turn LEFT onto WILLOW ST.	0.21 miles
8: Turn RIGHT onto CLINTON AVE.	0.05 miles
Total Estimated Time: **5 minutes**	**Total Distance:** **2.28 miles**

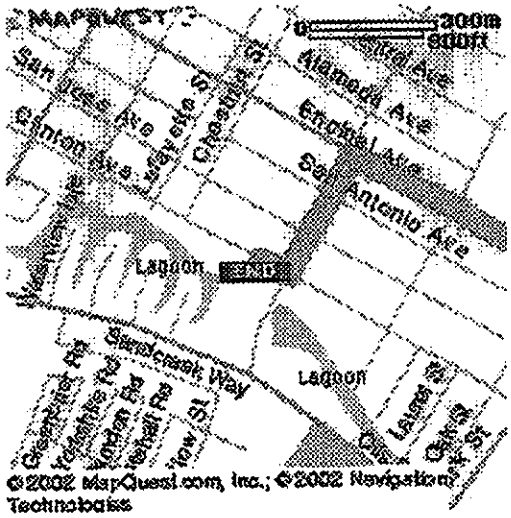




ORIGIN:
[1000-1055] 35th Ave
Oakland, CA
94601 US

DESTINATION:
2070 Clinton Ave
Alameda, CA
94501-4320 US





PREMARY HOSPITAL

MAPQUEST

SECONDARY HOSPITAL

< Back

FROM:

[1000-1055] 35th Ave
Oakland, CA
94601 US

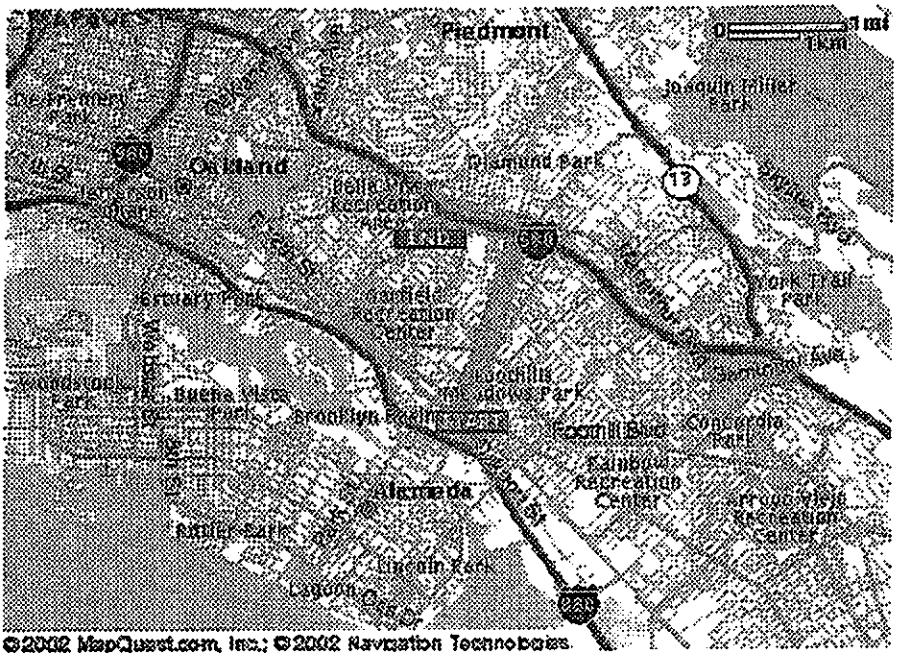
TO:

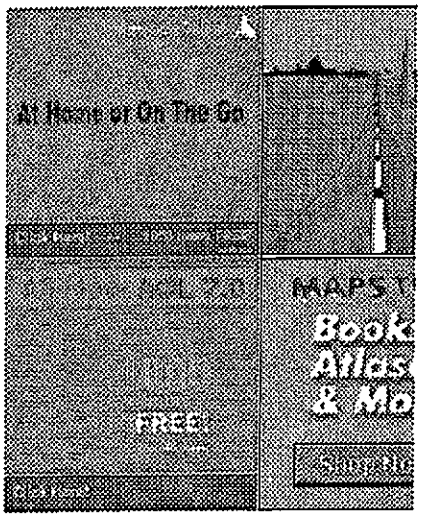
1411 E 31st St
Oakland, CA
94602-1018 US

Total Distance: 2.82 miles

Total Estimated Time: 10 minutes

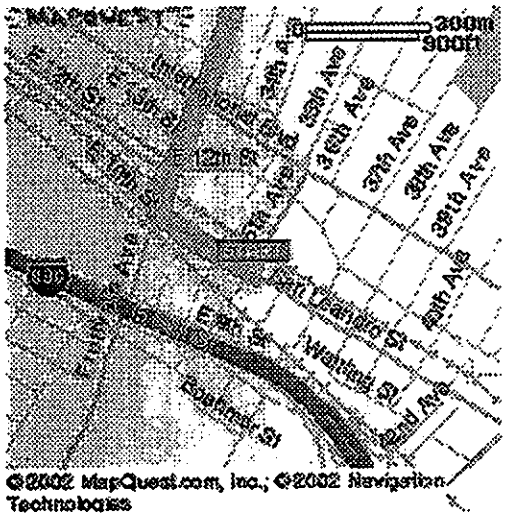
DIRECTIONS	DISTANCE
1: Start out going Southwest on 35TH AVE towards SAN LEANDRO ST by turning right.	0.01 miles
2: Turn RIGHT onto SAN LEANDRO ST.	0.17 miles
3: Turn RIGHT onto FRUITVALE AVE.	1.68 miles
4: Turn LEFT to take the I-580 W ramp towards HAYWARD.	0.19 miles
5: Merge onto I-580 W.	0.23 miles
6: Take the exit towards 14TH AVENUE/PARK BLVD.	0.26 miles
7: Turn LEFT onto BEAUMONT AVE.	0.17 miles
8: Turn RIGHT onto E 31ST ST.	0.09 miles
Total Estimated Time: **10 minutes**	**Total Dista** **2.82 miles**

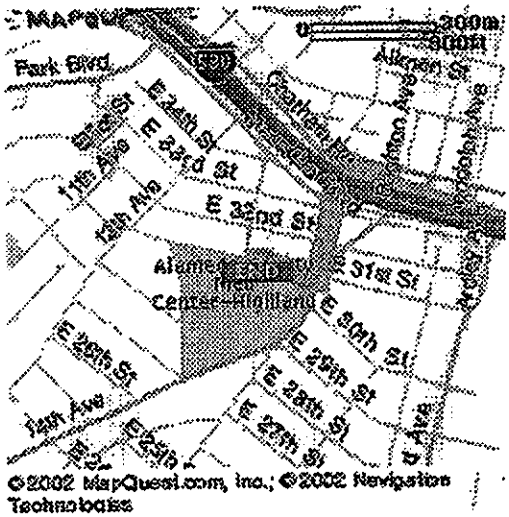




ORIGIN:
[1000-1055] 35th Ave
Oakland, CA
94601 US

DESTINATION:
1411 E 31st St
Oakland, CA
94602-1018 US





These directions are informational only. No representation is made or warranty given as to their content, road conditions or route usability or expeditiousness. User assumes all risk of use. MapQuest and its suppliers assume no responsibility for any loss or delay resulting from such use.

SECONDARY HOSPITAL

APPENDIX H

SEPTEMBER 10, 2002 LETTER,

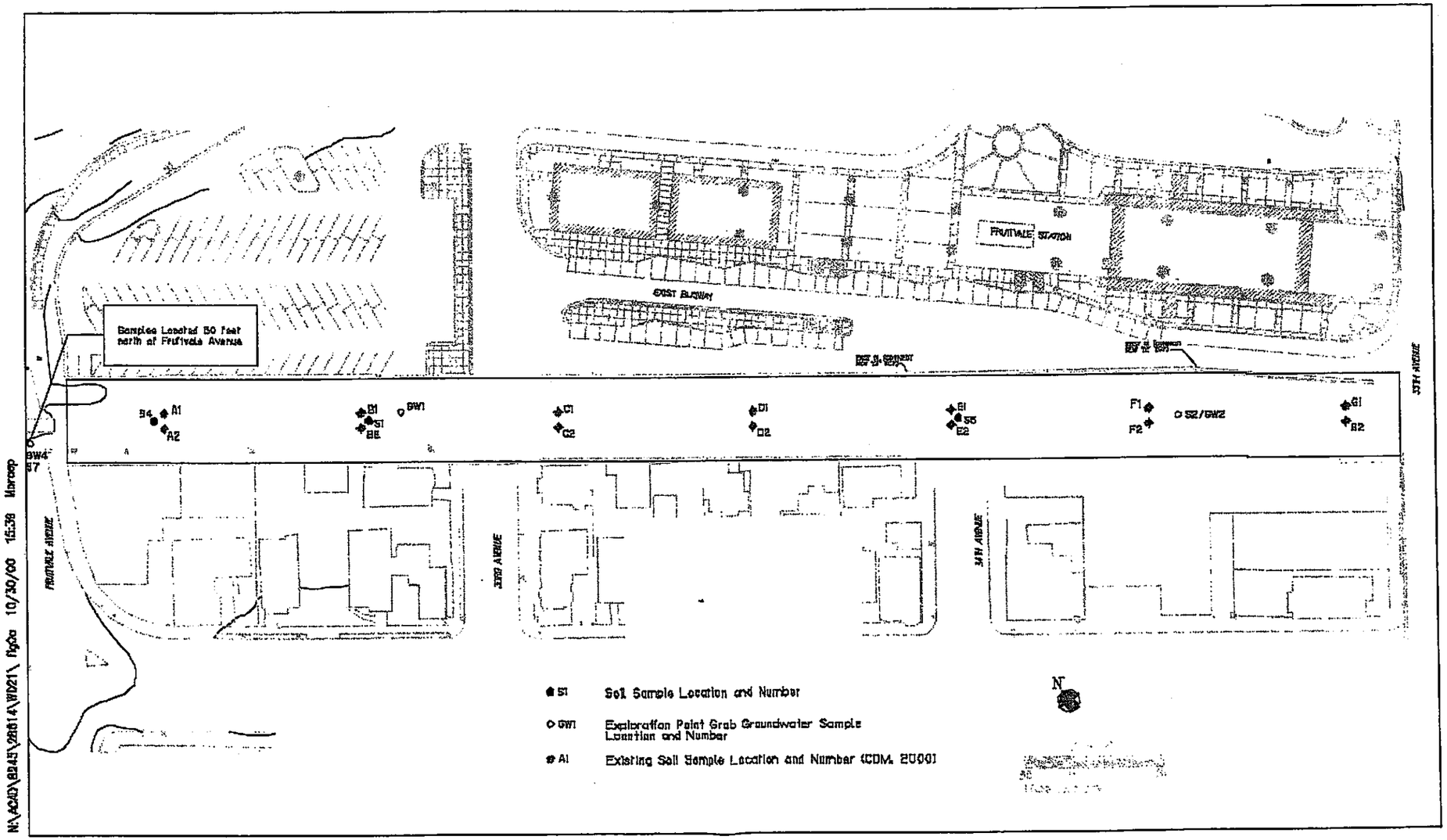
SUMMARY OF SELECTED SOIL ANALYTICAL RESULTS,

SITE MAP SHOWING SAMPLE COLLECTION LOCATIONS

Attachment 1
Summary of Selected Soil Analytical Results
BART Fruitvale Station

SAMPLE INFORMATION			TOTAL EXTRACTABLE PETROLEUM HYDROCARBONS (EPA 8015M)			CAM 17 METALS (ICP)																SOLUBLE METALS (STLC)		SOLUBLE METALS (TCLP)	
			GASOLINE	DIESEL	MOTOR OIL	ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	CADMIUM	CHROMIUM	COBALT	COPPER	LEAD	MOLYBDENUM	NICKEL	SELENIUM	SILVER	THALLIUM	VANADIUM	ZINC	MERCURY	ARSENIC	LEAD	ARSENIC	LEAD
PROJECT-SPECIFIC ACTION LEVEL (mg/kg)			300	300	300	150	19	1000	7.5	10	50	300	250	50	3500	200	10	50	70	240	2500	2	5	5	5	5
DETECTION LIMIT (mg/kg)			1	1	50	2	1	1	0.5	0.5	1	1	1	1	1	1	2	1	1	1	1	0.05	0.5	0.5	0.5	0.5
EXPLORATION POINTS	SAMPLE ID	SAMPLE DATE	RESULTS (mg/kg)																				RESULTS (mg/L)		RESULTS (mg/L)	
A1 & A2	A1-0.5-1.5, A2-0.5-1.5	3/30/2000	--	--	--	--	22	--	--	--	--	--	--	28	--	--	--	--	--	--	--	--	--	ND	--	--
A1	A1-3	3/30/2000	--	--	--	--	4.4	--	--	--	--	--	--	7.9	--	--	--	--	--	--	--	--	--	--	--	--
A2	A2-3	3/30/2000	--	--	--	--	3.5	--	--	--	--	--	--	5.4	--	--	--	--	--	--	--	--	--	--	--	--
B1 & B2	B1-0.5-1.5, B2-0.5-1.5	3/30/2000	ND	6.9	54	ND	120	190	ND	ND	43	8.1	39	90	ND	50	ND	ND	ND	33	160	0.16	11	3.9	ND	--
B1	B1-3	3/30/2000	--	--	--	--	3.6	--	--	--	--	--	--	7.6	--	--	--	--	--	--	--	--	--	--	--	--
B1	B1-4	3/30/2000	--	--	--	--	9	--	--	--	--	--	--	4.5	--	--	--	--	--	--	--	--	--	--	--	--
B1	B1-5	3/30/2000	--	--	--	--	2.8	--	--	--	--	--	--	4.4	--	--	--	--	--	--	--	--	--	--	--	--
B2	B2-3	3/30/2000	--	--	--	--	120	--	--	--	--	--	--	9.9	--	--	--	--	--	--	--	--	2.4	--	--	--
B2	B2-4	3/30/2000	--	--	--	--	5.1	--	--	--	--	--	--	8	--	--	--	--	--	--	--	--	--	--	--	--
B2	B2-5	3/30/2000	--	--	--	--	4.6	--	--	--	--	--	--	8.8	--	--	--	--	--	--	--	--	--	--	--	--
C1 & C2	C1-0.5-1.5, C2-0.5-1.5	3/30/2000	--	--	--	--	98	--	--	--	--	--	--	29	--	--	--	--	--	--	--	--	5.1	--	ND	--
C1	C1-3	3/30/2000	--	--	--	--	8.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
C2	C2-3	3/30/2000	--	--	--	--	2.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
D1 & D2	D1-0.5-1.5, D2-0.5-1.5	3/30/2000	--	--	--	--	120	--	--	--	--	--	--	180	--	--	--	--	--	--	--	--	6.8	6.5	ND	ND
D1	D1-3	3/30/2000	--	--	--	--	2.3	--	--	--	--	--	--	6.1	--	--	--	--	--	--	--	--	--	--	--	--
D2	D2-3	3/30/2000	--	--	--	--	120	--	--	--	--	--	--	7.7	--	--	--	--	--	--	--	--	--	--	--	--
E1 & E2	E1-0.5-1.5, E2-0.5-1.5	3/30/2000	--	--	--	--	96	--	--	--	--	--	--	110	--	--	--	--	--	--	--	--	1.8	1.8	--	--
E1	E1-3	3/30/2000	--	--	--	--	130	--	--	--	--	--	--	150	--	--	--	--	--	--	--	--	--	--	--	--
E2	E2-3	3/30/2000	--	--	--	--	6	--	--	--	--	--	--	7.8	--	--	--	--	--	--	--	--	--	--	--	--
F1 & F2	F1-0.5-1.5, F2-0.5-1.5	3/30/2000	--	--	--	--	120	--	--	--	--	--	--	72	--	--	--	--	--	--	--	--	4.9	--	--	--
F1	F1-3	3/30/2000	--	--	--	--	4.1	--	--	--	--	--	--	50	--	--	--	--	--	--	--	--	--	--	--	--
F2	F2-3	3/30/2000	--	--	--	--	2	--	--	--	--	--	--	24	--	--	--	--	--	--	--	--	--	--	--	--
G1 & G2	G1-0.5-1.5, G2-0.5-1.5	3/30/2000	--	--	--	--	230	--	--	--	--	--	--	170	--	--	--	--	--	--	--	--	8.1	3.8	ND	--
G1	G1-3	3/30/2000	--	--	--	--	20	--	--	--	--	--	--	22	--	--	--	--	--	--	--	--	--	--	--	--
G2	G2-3	3/30/2000	--	--	--	--	3.8	--	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	--	--
H1 & H2	H1-0.5-1.5, H2-0.5-1.5	3/30/2000	--	--	--	--	160	--	--	--	--	--	--	36	--	--	--	--	--	--	--	--	7.1	--	0.62	--
H1	H1-3	3/30/2000	--	--	--	--	17	--	--	--	--	--	--	9.3	--	--	--	--	--	--	--	--	--	--	--	--
H2	H2-3	3/30/2000	--	--	--	--	17	--	--	--	--	--	--	8.8	--	--	--	--	--	--	--	--	--	--	--	--
I1 & I2	I1-0.5-1.5, I2-0.5-1.5	3/30/2000	ND	15	110	ND	80	230	ND	0.52	48	9.9	72	96	3.6	71	ND	ND	ND	28	200	0.13	6.8	4.6	ND	--
I1	I1-3	3/30/2000	--	--	--	--	10	--	--	--	--	--	--	8.3	--	--	--	--	--	--	--	--	--	--	--	--
I2	I2-3	3/30/2000	--	--	--	--	2.5	--	--	--	--	--	--	19	--	--	--	--	--	--	--	--	--	--	--	--
J1 & J2	J1-0.5-1.5, J2-0.5-1.5	3/30/2000	--	--	--	--	150	--	--	--	--	--	--	310	--	--	--	--	--	--	--	--	8.9	16	ND	ND
J1	J1-3	3/30/2000	--	--	--	--	2.1	--	--	--	--	--	--	6.7	--	--	--	--	--	--	--	--	--	--	--	--
J2	J2-3	3/30/2000	--	--	--	--	2	--	--	--	--	--	--	5.2	--	--	--	--	--	--	--	--	--	--	--	--
K1 & K2	K1-0.5-1.5, K2-0.5-1.5	3/30/2000	--	--	--	--	150	--	--	--	--	--	--	140	--	--	--	--	--	--	--	--	5.4	6.2	ND	ND
K1	K1-3	3/30/2000	--	--	--	--	3.7	--	--	--	--	--	--	6.1	--	--	--	--	--	--	--	--	--	--	--	--
K2	K2-3	3/30/2000	--	--	--	--	2.7	--	--	--	--	--	--	5.9	--	--	--	--	--	--	--	--	--	--	--	--
L1 & L2	L1-0.5-1.5, L2-0.5-1.5	3/30/2000	--	--	--	--	110	--	--	--	--	--	--	250	--	--	--	--	--	--	--	--	3.9	8.5	--	ND
L1	L1-3	3/30/2000	--	--	--	--	130	--	--	--	--	--	--	9.4	--	--	--	--	--	--	--	--	--	--	--	--
L2	L2-3	3/30/2000	--	--	--	--	3.5	--	--	--	--	--	--	7	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
Samples B1-0.5-1.5, B2-0.5-1.5 and I1-0.5-1.5, I2-0.5-1.5 were non-detect for SVOCs by EPA Method 8270A
Samples B1-0.5-1.5, B2-0.5-1.5 and I1-0.5-1.5, I2-0.5-1.5 were non-detect for VOCs by EPA Method 8260A
ND = Not Detected
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
-- = Not Analyzed
Sample results in shaded cells indicate constituent reported at concentration greater than ten times the Soluble Threshold Limit Concentration
Sample results in bold text indicate constituent reported at concentration greater than the Soluble Threshold Limit Concentration



Results of Screening Level Soil and Groundwater Sampling
Sample Location Map

Fruitvale Avenue to 35th Avenue
BART Fruitvale Station
Oakland, CA

Camp Dresser & McKee

Figure _a

BART

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
800 Madison Street - Lake Merritt Station
P.O. Box 12688
Oakland, CA 94604-2688
Telephone (510) 464-6000

September 10, 2002

C. OVERAA & CO.
SEP 12 2002
RECEIVED

C. Overaa & Co.
200 Parr Boulevard
Richmond, California 94801

Attention: Mr. Don Stock, Project Manager

SUBJECT: Contract No: 01GL-110A
Design and Build Fruitvale Parking Structure
Analytical Test Results
File 11.2.2 Serial 004

Dear Mr. Stock:

Per Contract Specification Section 01162, please find attached herewith the analytical test results for obtaining the contaminated soils disposal site acceptance. Test result Reports 2, 4, and 5 are for Attachment 1 - Summary of Selected Soil Analytical Results table dated May 30, 2000. Test result Reports 6 through 8 are for additional tests that were performed at the site in September 2000. Please note that only test results for test locations A1, A2, B1, B2, S1, S4 and GW1 pertain to the current project site and that the other test results pertain to materials that have removed under a previous contract.

If you have any questions, please contact the undersigned at 510-464-6455.

Very truly yours,

Bill O'Hair
Resident Engineer

Attachments: Attachment 1 – Summary of Selected Soils Analytical Results
Report 2 - Chromolab Analytical Test Reports Dated 4/13 & 14/2000
Report 4 - Chromolab Analytical Test Reports Dated 4/3 & 4/2000
Report 5 - Chromolab Analytical Test Reports Dated 4/10/2000
Report 6 - Chromolab Analytical Test Reports Dated 10/5, 6, & 9/2000
Report 7 - Chromolab Analytical Test Reports Dated 10/5, 9 & 10/2000
Report 8 - Chromolab Analytical Test Reports Dated 10/5, 6 & 16/2000
CDM drawing Figure a showing added test locations

cc: B. Engle w/o attachments

APPENDIX I

LEAD IN CONSTRUCTION STANDARD

§1532.1. Lead.

Lead Pre-Job Notification Form (MS Excel Format) (153KB pdf format)

(a) Scope. This section applies to all construction work where an employee may be occupationally exposed to lead. All construction work excluded from coverage in the general industry standard for lead by section 5198(a)(2) is covered by this standard. Construction work is defined as work for construction, alteration and/or repair, including painting and decorating. It includes but is not limited to the following:

(1) Demolition or salvage of structures where lead or materials containing lead are present;

(2) Removal or encapsulation of materials containing lead;

(3) New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;

(4) Installation of products containing lead;

(5) Lead contamination/emergency cleanup;

(6) Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed, and

(7) Maintenance operations associated with the construction activities described in this subsection.

(b) Definitions.

Action level means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air (30 mg/m3) calculated as an 8-hour time-weighted average (TWA).

Chief means the Chief of the Division of Occupational Safety and Health or designee.

Lead means metallic lead, all inorganic lead compounds, and organic lead soaps. Excluded from this definition are all other organic lead compounds.

NIOSH means the National Institute of Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services or designee.

Supervisor means one who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to

eliminate them. Supervisors shall be trained, as required by this section, and, when required, be certified consistent with section (l)(3).

(c) Permissible exposure limit.

(1) The employer shall assure that no employee is exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 mg/m3) averaged over an 8-hour period.

(2) If an employee is exposed to lead for more than 8 hours in any work day the employees' allowable exposure, as a time weighted average (TWA) for that day, shall be reduced according to the following formula:

Allowable employee exposure (in mg/m3)=400 divided by hours worked in the day.

(3) When respirators are used to limit employee exposure as required under subsection (c) and all the requirements of subsections (e)(1) and (f) have been met, employee exposure may be considered to be at the level provided by the protection factor of the respirator for those periods the respirator is worn. Those periods may be averaged with exposure levels during periods when respirators are not worn to determine the employee's daily TWA exposure.

(d) Exposure assessment.

(1) General.

(A) Each employer who has a workplace or operation covered by this standard shall initially determine if any employee may be exposed to lead at or above the action level.

(B) For the purposes of subsection (d), employee exposure is that exposure which would occur if the employee were not using a respirator.

(C) With the exception of monitoring under subsection (d)(3), where monitoring is required under this section, the employer shall collect personal samples representative of a full shift including at least one sample for each job classification in each work area either for each shift or for the shift with the highest exposure level.

(D) Full shift personal samples shall be representative of the monitored employee's regular, daily exposure to lead.

(2) Protection of employees during assessment of exposure.

(A) With respect to the lead related tasks listed in subsection (d)(2)(A), where lead is present, until the employer performs an employee exposure assessment as required in subsection (d) and documents that the employee performing any of the listed tasks is not exposed above the PEL, the employer shall treat the employee as if the employee were exposed above the PEL, and not in excess of ten (10) times the PEL, and shall implement employee protective measures prescribed in subsection (d)(2)(E). The tasks covered by this requirement are:

1. Where lead containing coatings or paint are present: manual demolition of structures (e.g., dry wall), manual scraping, manual sanding, heat gun applications, and power tool cleaning with dust collection systems;

2. Spray painting with lead paint

(B) In addition, with regard to tasks not listed in subsection (d)(2)(A), where the employer has any reasons to believe that an employee performing the task may be exposed to lead in excess of the PEL, until the employer performs an employee exposure assessment as required by subsection (d) and documents that the employee's lead exposure is not above the PEL the employer shall treat the employee as if the employee were exposed above the PEL and shall implement employee protective measures as prescribed in subsection (d)(2)(E).

(C) With respect to the tasks listed in this subsection (d)(2)(C), where lead is present, until the employer performs an employee exposure assessment as required in subsection (d), and documents that the employee performing any of the listed tasks is not exposed in excess of 500 mg/m3, the employer shall treat the employee as if the employee were exposed to lead in excess of 500 mg/m3 and shall implement employee protective measures as prescribed in subsection (d)(2)(E). Where the employer does establish that the employee is exposed to levels of lead below 500 mg/m3, the employer may provide the exposed employee with the appropriate respirator prescribed for such use at such lower exposures, in accordance with Table 1 of this section. The tasks covered by this requirement are:

1. Using lead containing mortar; lead burning

2. Where lead containing coatings or paint are present: rivet busting; power tool cleaning without dust collection systems; cleanup activities where dry expendable abrasives are used; and abrasive blasting enclosure movement and removal.

(D) With respect to the tasks listed in this subsection (d)(2)(D) of this section, where lead is present, until the employer performs an employee exposure assessment as required in subsection (d) and documents that the employee performing any of the listed tasks is not exposed to lead in excess of 2,500 mg/m3 (50 x PEL), the employer shall treat the employee as if the employee were exposed to lead in excess of 2,500 mg/m3 and shall implement employee protective measures as prescribed in subsection (d)(2)(E). Where the employer does establish that the employee is exposed to levels of lead below 2,500 mg/m3 , the employer may provide the exposed employee with the appropriate respirator prescribed for use at such lower exposures, in accordance with Table I of this section. Interim protection as described in this subsection is required where lead containing coatings or paint are present on structures when performing:

1. Abrasive blasting,

2. Welding,

3. Cutting, and

4. Torch burning.

(E) Until the employer performs an employee exposure assessment as required under subsection (d) and determines actual employee exposure, the employer shall provide to employees performing the tasks described in subsections (d)(2)(A), (d)(2)(B), (d)(2)(C) and (d)(2)(D) with interim protection as follows:
<

1. Appropriate respiratory protection in accordance with subsection (f).

2. Appropriate personal protective clothing and equipment in accordance with subsection (g).

3. Change areas in accordance with subsection (i)(2).

4. Hand washing facilities in accordance with subsection (i)(5).

5. Biological monitoring in accordance with subsection (j)(1)(A), to consist of blood sampling and analysis for lead and zinc protoporphyrin levels, and

6. Training as required under subsection (l)(1)(A) regarding section 5194, Hazard Communication; training as required under subsection (l)(2)(C), regarding use of respirators; and training in accordance with section 1510, Safety Instruction for Employees.

(3) Basis of initial determination.

(A) Except as provided under subsections (d)(3)(C) and (d)(3)(D) the employer shall monitor employee exposures and shall base initial determinations on the employee exposure monitoring results and any of the following, relevant considerations:

1. Any information, observations, or calculations which would indicate employee exposure to lead;

2. Any previous measurements of airborne lead; and

3. Any employee complaints of symptoms which may be attributable to exposure to lead.

(B) Monitoring for the initial determination where performed may be limited to a representative sample of the exposed employees who the employer reasonably believes are exposed to the greatest airborne concentrations of lead in the workplace.

(C) Where the employer has previously monitored for lead exposures, and the data were obtained within the past 12 months during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results to satisfy the requirements of subsections (d)(3)(A) and (d)(6) if the sampling and analytical methods meet the accuracy and confidence levels of subsection (d)(9).

(D) Where the employer has objective data, demonstrating that a particular product or material containing lead or a specific process, operation or activity involving lead cannot result in employee exposure to lead at or above the action level during processing, use, or handling, the employer may rely upon such data instead of implementing initial monitoring.

1. The employer shall establish and maintain an accurate record documenting the nature and relevance of objective data as specified in subsection (n)(4), where used in assessing employee exposure in lieu of exposure monitoring.

2. Objective data, as described in subsection (d)(3)(D), is not permitted to be used for exposure assessment in connection with subsection (d)(2).

3. Objective data for surface coatings and materials that contain lead shall meet the following methodology:

a. Lead analysis shall be performed for each unique surface coating and material that may constitute a health hazard to employees engaged in activities within the scope of this section and;

b. Analysis of surface coatings and materials shall be performed in a manner that meets the requirements of subsection (d)(9) and shall be recorded, as described in subsection (n)(4),

(4) Positive initial determination and initial monitoring.

(A) Where a determination conducted under subsections (d)(1), (2) and (3) shows the possibility of any employee exposure at or above the action level the employer shall conduct monitoring which is representative of the exposure for each employee in the workplace who is exposed to lead.

(B) Where the employer has previously monitored for lead exposure, and the data were obtained within the past 12 months during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results to satisfy the requirements of subsection (d)(4)(A) if the sampling and analytical methods meet the accuracy and confidence levels of subsection (d)(9).

(C) Objective data for an initial assessment that demonstrate surface coating or material that contain lead at concentrations equal to or exceeding 0.06% lead dry weight (600 ppm) demonstrate the presence of lead surface coatings or material that constitute a health hazard to employees engaged in lead-related construction work. The lead concentration of paint or materials is based on the lead content in the nonvolatile components of the surface coating or material such as paint. Objective data as described in this subsection are not permitted to be used in lieu of exposure assessment in connection with lead-related tasks listed in subsection (d)(2).

(5) Negative initial determination.

(A) Where a determination, conducted under subsections (d)(1), (2), and (3) is made that no employee is exposed to airborne concentrations of lead at or above the action level the employer shall make a written record of such determination. The record shall include at least the information specified in subsection (d)(3)(A) and shall also include the date of determination, location within the worksite, and the name and social security number of each employee monitored.

(B) Objective data that meet the requirements of subsection (n)(4) for an initial assessment that demonstrate surface coating or material that contain lead at concentrations less than 0.06% lead dry weight (600 ppm) are sufficient to establish a negative determination. The lead concentration of surface coatings or materials is based on the lead content in the nonvolatile components of the surface coating or material such as paint. Objective data as described in this subsection are not permitted to be used in lieu of exposure assessment in connection with lead-related tasks listed in subsection (d)(2).

(6) Frequency.

(A) If the initial determination reveals employee exposure to be below the action level further exposure determination need not be repeated except as otherwise provided in subsection (d)(7).

(B) If the initial determination or subsequent determination reveals employee exposure to be at or above the action level but at or below the PEL the employer shall perform monitoring in accordance with this subsection at least every 6 months. The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are below the action level at which time the employer may discontinue monitoring for that employee except as otherwise provided in subsection (d)(7).

(C) If the initial determination reveals that employee exposure is above the PEL the employer shall perform monitoring quarterly. The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are at or below the PEL but at or above the action level at which time the employer shall repeat monitoring for that employee at the frequency specified in subsection (d)(6)(B), except as otherwise provided in subsection (d)(7). The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are below the action level at which time the employer may discontinue monitoring for that employee except as otherwise provided in subsection (d)(7).

(7) Additional exposure assessments. Whenever there has been a change of equipment, process, control, personnel or a new task has been initiated that may result in additional employees being exposed to lead at or above the action level or may result in employees already exposed at or above the action level being exposed above the PEL, the employer shall conduct additional monitoring in accordance with this subsection.

(8) Employee notification.

(A) Within 5 working days after completion of the exposure assessment the employer shall notify each employee in writing of the results which represent that employee's exposure.
(B) Whenever the results indicate that the representative employee exposure, without regard to respirators, is at or above the PEL the employer shall include in the written notice a statement that the employees exposure was at or above that level and a description of the corrective action taken or to be taken to reduce exposure to below that level.

(9) "Accuracy of measurement". The employer shall use a method of monitoring and analysis which has an accuracy (to a confidence level of 95%) of not less than plus or minus 25 percent for airborne concentrations of lead equal to or greater than 30 mg/m3. Methods for the determination of lead concentrations of surface coatings and material shall be determined by methods which have an accuracy (to a confidence level of 95 percent) of not less than plus or minus 25 percent at 0.06% lead dry weight (600 ppm).

(e) Methods of compliance

(1) Engineering and work practice controls.

(A) General. The employer shall implement engineering and work practice controls, including administrative controls, to reduce and maintain employee exposure to lead to or below the permissible exposure limit to the extent that such controls are feasible. Wherever all feasible engineering and work practices controls that can be instituted are not sufficient to reduce employee exposure to or below the permissible exposure limit prescribed in subsection (c), the employer shall nonetheless use them to reduce employee exposure to the lowest feasible level and shall supplement them by the use of respiratory protection that complies with the requirements of subsection (f). <

(2) Compliance program.

(A) Prior to commencement of the job each employer shall establish and implement a written compliance program to achieve compliance with subsection (c).

(B) Written plans for these compliance programs shall include at least the following:

1. A description of each activity in which lead is emitted; e.g. equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures and maintenance

practices;

2. A description of the specific means that will be employed to achieve compliance and, where engineering controls are required engineering plans and studies used to determine methods selected for controlling exposure to lead;

3. A report of the technology considered in meeting the PEL;

4. Air monitoring data which documents the source of lead emissions;

5. A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.;

6. A work practice program which includes items required under subsections (g), (h) and (i) and incorporates other relevant work practices such as those specified in subsection (e)(5);

7. An administrative control schedule required by subsection (e)(4), if applicable;

8. A description of arrangements made among contractors on multi-contractor sites with respect to informing affected employees of potential exposure to lead and of regulated areas.

9. Other relevant information.

(C) The compliance program shall provide for frequent and regular inspections of job sites, regulated areas, materials, and equipment to be made by a supervisor.

(D) Written programs shall be submitted upon request to any affected employee or authorized employee representatives, to the Chief and NIOSH, and shall be available at the worksite for examination and copying by the Chief and NIOSH.

(E) Written programs shall be revised and updated at least every 6 months to reflect the current status of the program.

(3) Mechanical ventilation. When ventilation is used to control lead exposure, the employer shall evaluate the mechanical performance of the system in controlling exposure as necessary to maintain its effectiveness.

(4) Administrative controls. If administrative controls are used as a means of reducing employees TWA exposure to lead, the employer shall establish and implement a job rotation schedule which includes:

(A) Name or identification number of each affected employee;

(B) Duration and exposure levels at each job or work station where each affected employee is located; and

(C) Any other information which may be useful in assessing the reliability of administrative controls to reduce exposure to lead.

(5) The employer shall ensure that, to the extent relevant, employees follow good work practices such as described in Appendix B of this section.

(f) Respiratory protection.

(1) General. For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this subsection. Respirators must be used during:

(A) Periods when an employee's exposure to lead exceeds the PEL;

(B) Work operations for which engineering controls and work practices are not sufficient to reduce exposures to or below the PEL;

(C) Periods when an employee requests a respirator; and

(D) Periods when respirators are required to provide interim protection for employees while they perform the operations specified in subsection (d)(2).

(2) Respirator program.

(A) An employer must implement a respiratory protection program in accordance with section 5144(b) through (d) (except (d)(1)(C)), and (f) through (m).

(B) If an employee exhibits breathing difficulty during fit testing or respirator use, the employer must provide the employee with a medical examination in accordance with subsection (j)(3)(A)2. to determine if the employee can use a respirator while performing the required duties.

(3) Respirator selection.

(A) The employer shall select the appropriate respirator or combination of respirators from Table I below.

(B) The employer shall provide a powered, air-purifying respirator in lieu of the respirator specified in Table I whenever:

1. An employee chooses to use this type of respirator; and

2. This respirator will provide adequate protection to the employee.

(g) Protective work clothing and equipment.

(1) Provision and use. Where an employee is exposed to lead above the PEL without regard to the use of respirators, where employees are exposed to lead compounds which may cause skin or eye irritation (e.g. lead arsenate, lead azide), and as interim protection for employees performing tasks as specified in subsection (d)(2), the employer shall provide at no cost to the employee and assure that the employee uses appropriate protective work clothing and equipment that prevents contamination of the employee and the employee's garments such as, but not limited to:

(A) Coveralls or similar full-body work clothing;

(B) Gloves, hats, and shoes or disposable shoe coverlets; and

(C) Face shields, vented goggles, or other appropriate protective equipment which complies with section 1516.

(2) Cleaning and replacement.

(A) The employer shall provide the protective clothing required in subsection (g)(1) in a clean and dry condition at least weekly, and daily to employees whose exposure levels without regard to a respirator are over 200 mg/m3 of lead as an 8-hour TWA.

(B) The employer shall provide for the cleaning, laundering, and disposal of protective clothing and equipment required by subsection (g)(1).

(C) The employer shall repair or replace required protective clothing and equipment as needed to maintain their effectiveness.

(D) The employer shall assure that all protective clothing is removed at the completion of a work shift only in change areas provided for that purpose as prescribed in subsection (A)(2).

(E) The employer shall assure that contaminated protective clothing which is to be cleaned, laundered, or disposed of, is placed in a closed container in the change area which prevents dispersion of lead outside the container.

(F) The employer shall inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.

(G) The employer shall assure that the containers of contaminated protective clothing and equipment required by subsection (g)(2)(E) are labelled as follows:

Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead contaminated wash water in accordance with applicable local, state, or federal regulations.

(H) The employer shall prohibit the removal of lead from protective clothing or equipment by blowing, shaking, or any other means which disperses lead into the air.

(h) Housekeeping.

(1) All surfaces shall be maintained as free as practicable of accumulations of lead.

(2) Clean-up of floors and other surfaces where lead accumulates shall wherever possible, be cleaned by vacuuming or other methods that minimize the likelihood of lead becoming airborne.

(3) Shoveling, dry or wet sweeping, and brushing may be used only where vacuuming or other equally effective methods have been tried and found not to be effective.

(4) Where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters and used and emptied in a manner which minimizes the reentry of lead into the workplace.

(5) Compressed air shall not be used to remove lead from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.

(i) Hygiene facilities, practices and regulated areas.

(1) The employer shall assure that in areas where employees are exposed to lead above the PEL without regard to the use of respirators, food or beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied.

(2) Change areas.

(A) The employer shall provide clean change areas for employees whose airborne exposure to lead is above the PEL, and as interim protection for employees performing tasks as specified in subsection (d) (2), without regard to the use of respirators.

(B) The employers shall assure that change areas are equipped with separate storage facilities for protective work clothing and equipment and for street clothes which prevent cross-contamination.

(C) The employer shall assure that employees do not leave the workplace wearing any protective clothing or equipment that is required to be worn during the work shift.

(3) Showers.

(A) The employer shall provide shower facilities, where feasible, for use by employees whose airborne exposure to lead is above the PEL.

(B) The employer shall assure, where shower facilities are available, that employees shower at the end of the work shift and shall provide an adequate supply of cleansing agents and towels for use by affected employees.

(4) Eating facilities.

(A) The employer shall provide lunchroom facilities or eating areas for employees whose airborne exposure to lead is above the PEL, without regard to the use of respirators.

(B) The employer shall assure that lunchroom facilities or eating areas are as free as practicable from lead contamination and are readily accessible to employees.

(C) The employer shall assure that employees whose airborne exposure to lead is above the PEL, without regard to the use of a respirator, wash their hands and face prior to eating, drinking, smoking or applying cosmetics.

(D) The employer shall assure that employees do not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed by vacuuming, downdraft booth, or other cleaning method that limits dispersion of lead dust. <

(5) Hand Washing facilities.

(A) The employer shall provide adequate handwashing facilities for use by employees exposed to lead in accordance with section 1527.

(B) Where showers are not provided the employer shall assure that employees wash their hands and face at the end of the work-shift.

(6) Regulated Area.

(A) Employers shall establish regulated areas, where feasible, for work areas where employees are exposed to lead at or above the PEL or performing the tasks described in subsection (d)(2).

(B) Regulated areas shall be posted with signs as described in subsection (m)(2).

(C) Employers shall restrict access to the regulated area to employees authorized by the supervisor, to representatives of affected employees, as described in subsection (o) and to persons authorized by the Chief or NIOSH.

(D) Each employee authorized to enter the regulated area shall be provided with and be required to wear protective equipment required by subsections (f) and (g). <

(j) Medical surveillance.

(1) General.

(A) The employer shall make available initial medical surveillance to employees occupationally exposed on any day to lead at or above the action level. Initial medical surveillance consists of biological monitoring in the form of blood sampling and analysis for lead and zinc protoporphyrin levels.

(B) The employer shall institute a medical surveillance program in accordance with subsections (j)(2) and (j)(3) for all employees who are or may be exposed by the employer at or above the action level for more than 30 days in any consecutive 12 months;

(C) The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician.

(D) The employer shall make available the required medical surveillance including multiple physician review under subsection (j)(3)(C) without cost to employees and at a reasonable time and place.

(2) Biological monitoring.

(A) Blood lead and ZPP level sampling and analysis. The employer shall make available biological monitoring in the form of blood sampling and analysis for lead and zinc protoporphyrin levels to each employee covered under subsections (j)(1)(A) and (B) on the following schedule:

1. For each employee covered under subsection (j)(1)(B), at least every 2 months for the first 6 months and every 6 months thereafter;

2. For each employee covered under subsections (j)(1)(A) or (B) whose last blood sampling and analysis indicated a blood lead level at or above 40 mg/dl, at least every two months. This frequency shall continue until two consecutive blood samples and analyses indicate a blood lead level below 40 mg/dl; and

3. For each employee who is removed from exposure to lead due to an elevated blood lead level at least monthly during the removal period.

(B) Follow-up blood sampling tests. Whenever the results of a blood lead level test indicate that an employee's blood lead level exceeds the numerical criterion for medical removal under subsection (k)(1)(A), the employer shall provide a second (follow-up) blood sampling test within two weeks after the employer receives the results of the first blood sampling test.

(C) Accuracy of blood lead level sampling and analysis. Blood lead level sampling and analysis provided pursuant to this section shall have an accuracy (to a confidence level of 95 percent) within plus or minus 15 percent or 6 mg/dl, whichever is greater, and shall be conducted by a laboratory approved by OSHA.

(D) Employee notification.

1. Within five working days after the receipt of biological monitoring results, the employer shall notify each employee in writing of his or her blood lead level; and

2. the employer shall notify each employee whose blood lead level exceeds 40 mg/dl that the standard requires temporary medical removal with Medical Removal Protection benefits when an employee's blood lead level exceeds the numerical criterion for medical removal under subsection (k)(1)(A).

(3) Medical examinations and consultations.

(A) Frequency. The employer shall make available medical examinations and consultations to each employee covered under subsection (j)(1)(B) on the following schedule:

1. At least annually for each employee for whom a blood sampling test conducted at any time during the preceding 12 months indicated a blood lead level at or above 40 mg/dl;

2. As soon as possible, upon notification by an employee either that the employee has developed signs or symptoms commonly associated with lead intoxication, that the employee desires medical advice concerning the effects of current or past exposure to lead on the employee's ability to procreate a healthy child, that the employee is pregnant, or that the employee has demonstrated difficulty in breathing during a respirator fitting test or during use; and

3. As medically appropriate for each employee either removed from exposure to lead due to a risk of sustaining material impairment to health, or otherwise limited pursuant to a final medical determination.

(B) Content. The content of medical examinations made available pursuant to subsection (j)(3)(A)2. - 3. shall be determined by an examining physician and, if requested by an employee, shall include pregnancy testing or laboratory evaluation of male fertility. Medical examinations made available pursuant to subsection (j)(3)(A)1. shall include the following elements:

1. A detailed work history and a medical history, with particular attention to past lead exposure (occupational and non-occupational), personal habits (smoking, hygiene), and past gastrointestinal, hematologic, renal, cardiovascular, reproductive and neurological problems;

2. A thorough physical examination, with particular attention to teeth, gums, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems. Pulmonary status should be evaluated if respiratory protection will be used;

3. A blood pressure measurement;

4. A blood sample and analysis which determines:

a. Blood lead level;

b. Hemoglobin and hematocrit determinations, red cell indices, and examination of peripheral smear

morphology;

c. Zinc protoporphyrin;

d. Blood urea nitrogen; and,

e. Serum creatinine;

5. A routine urinalysis with microscopic examination; and

6. Any laboratory or other test relevant to lead exposure which the examining physician deems necessary by sound medical practice.

(C) Multiple physician review mechanism.

1. If the employer selects the initial physician who conducts any medical examination or consultation provided to an employee under this section, the employee may designate a second physician:

a. To review any findings, determinations or recommendations of the initial physician; and

b. To conduct such examinations, consultations, and laboratory tests as the second physician deems necessary to facilitate this review.

2. The employer shall promptly notify an employee of the right to seek a second medical opinion after each occasion that an initial physician conducts a medical examination or consultation pursuant to this section. The employer may condition its participation in, and payment for, the multiple physician review mechanism upon the employee doing the following within fifteen (15) days after receipt of the foregoing notification, or receipt of the initial physician's written opinion, whichever is later:

a. The employee informing the employer that he or she intends to seek a second medical opinion, and

b. The employee initiating steps to make an appointment with a second physician.

3. If the findings, determinations or recommendations of the second physician differ from those of the initial physician, then the employer and the employee shall assure that efforts are made for the two physicians to resolve any disagreement.

4. If the two physicians have been unable to quickly resolve their disagreement, then the employer and the employee through their respective physicians shall designate a third physician:

a. To review any findings, determinations or recommendations of the prior physicians; and

b. To conduct such examinations, consultations, laboratory tests and discussions with the prior physicians as the third physician deems necessary to resolve the disagreement of the prior physicians.

5. The employer shall act consistent with the findings, determinations and recommendations of the third physician, unless the employer and the employee reach an agreement which is otherwise consistent with the recommendations of at least one of the three physicians.

(D) Information provided to examining and consulting physicians.

1. The employer shall provide an initial physician conducting a medical examination or consultation under this section with the following information:

a. A copy of this regulation for lead including all Appendices;

b. A description of the affected employee's duties as they relate to the employee's exposure;

c. The employee's exposure level or anticipated exposure level to lead and to any other toxic substance (if applicable);

d. A description of any personal protective equipment used or to be used;

e. Prior blood lead determinations; and

f. All prior written medical opinions concerning the employee in the employer's possession or control.

2. The employer shall provide the foregoing information to a second or third physician conducting a medical examination or consultation under this section upon request either by the second or third physician, or by the employee.

(E) Written medical opinions.

1. The employer shall obtain and furnish the employee with a copy of a written medical opinion from each examining or consulting physician which contains only the following information: <

a. The physician's opinion as to whether the employee has any detected medical condition which would place the employee at increased risk of material impairment of the employee's health from exposure to lead;

b. Any recommended special protective measures to be provided to the employee, or limitations to be placed upon the employee's exposure to lead;

c. Any recommended limitations upon the employee's use of respirators, including a determination of whether the employee can wear a powered air purifying respirator if an physician determines that the employee cannot wear a negative pressure respirator; and

d. The results of the blood lead determinations.

2. The employer shall instruct each examining and consulting physician to:

a. Not reveal either in the written opinion or orally, or in any other means of communication with the employer, findings, including laboratory results, or diagnoses unrelated to an employee's occupational exposure to lead; and

b. Advise the employee of any medical condition, occupational or nonoccupational, which dictates further medical examination or treatment.

(F) Alternate physician determination mechanisms. The employer and an employee or authorized employee representative may agree upon the use of any alternate physician determination mechanism in lieu of the multiple physician review mechanism provided by subsection (j)(3)(C) so long as the alternate mechanism is as expeditious and protective as the requirements contained in this subsection.

(4) Chelation.

(A) The employer shall assure that any person whom he/she retains, employs, supervises or controls does not engage in prophylactic chelation of any employee at any time.

(B) If therapeutic or diagnostic chelation is to be performed by any person in subsection (j)(4)(A), the employer shall assure that it be done under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring and that the employee is notified in writing prior to its occurrence.

(k) Medical removal protection.

(1) Temporary medical removal and return of an employee.

(A) Temporary removal due to elevated blood lead level. The employer shall remove an employee from work having an exposure to lead at or above the action level on each occasion that a periodic and a follow-up blood sampling test conducted pursuant to this section indicate that the employee's blood lead level is at or above 50 mg/dl; and, <

(B) Temporary removal due to a final medical determination.

1. The employer shall remove an employee from work having an exposure to lead at or above the action level on each occasion that a final medical determination results in a medical finding, determination, or opinion that the employee has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to lead.

2. For the purposes of this section, the phrase "final medical determination" means the written medical opinion on the employees' health status by the examining physician or, where relevant, the outcome of the multiple physician review mechanism or alternate medical determination mechanism used pursuant to the medical surveillance provisions of this section.

3. Where a final medical determination results in any recommended special protective measures for an employee, or limitations on an employee's exposure to lead, the employer shall implement and act consistent with the recommendation.

(C) Return of the employee to former job status. 1. The employer shall return an employee to his or her former job status:

a. For an employee removed due to a blood lead level at or above 50 mg/dl when two consecutive blood sampling tests indicate that the employee's blood lead level is at or below 40 mg/dl;

b. For an employee removed due to a final medical determination, when a subsequent final medical determination results in a medical finding, determination, or opinion that the employee no longer has a detected medical condition which places the employee at increased risk of material impairment to health from exposure to lead.

2. For the purposes of this section, the requirement that an employer return an employee to his or her former job status is not intended to expand upon or restrict any rights an employee has or would have had, absent temporary medical removal, to a specific job classification or position under the terms of a collective bargaining agreement.

(D) Removal of other employee special protective measure or limitations. The employer shall remove any limitations placed on an employee or end any special protective measures provided to an employee pursuant to a final medical determination when a subsequent final medical determination indicates that the limitations or special protective measures are no longer necessary.

(E) Employer options pending a final medical determination. Where the multiple physician review mechanism, or alternate medical determination mechanism used pursuant to the medical surveillance provisions of this section, has not yet resulted in a final medical determination with respect to an employee, the employer shall act as follows:

1. Removal. The employer may remove the employee from exposure to lead, provide special protective measures to the employee, or place limitations upon the employee, consistent with the medical findings, determinations, or recommendations of any of the physicians who have reviewed the employee's health status.
2. Return. The employer may return the employee to his or her former job status, end any special protective measures provided to the employee, and remove any limitations placed upon the employee, consistent with the medical findings, determinations, or recommendations of any of the physicians who have reviewed the employee's health status, with two exceptions. If:

a. the initial removal, special protection, or limitation of the employee resulted from a final medical determination which differed from the findings, determinations, or recommendations of the initial physician or;

b. If the employee has been on removal status for the preceding eighteen months due to an elevated blood lead level, then the employer shall await a final medical determination.

(2) Medical removal protection benefits.

(A) Provision of medical removal protection benefits. The employer shall provide an employee up to eighteen (18) months of medical removal protection benefits on each occasion that an employee is removed from exposure to lead or otherwise limited pursuant to this section.

(B) Definition of medical removal protection benefits. For the purposes of this section, the requirement that an employer provide medical removal protection benefits means that, as long as the job the employee was removed from continues, the employer shall maintain the total normal earnings, seniority and other employment rights and benefits of an employee, including the employee's right to his or her former job status as though the employee had not been medically removed from the employee's job or otherwise medically limited.

(C) Follow-up medical surveillance during the period of employee removal or limitation. During the period of time that an employee is medically removed from his or her job or otherwise medically limited, the employer may condition the provision of medical removal protection benefits upon the employee's participation in follow-up medical surveillance made available pursuant to this section.

(D) Workers' compensation claims. If a removed employee files a claim for workers' compensation payments for a lead-related disability, then the employer shall continue to provide medical removal protection benefits pending disposition of the claim. To the extent that an award is made to the employee for earnings lost during the period of removal, the employer's medical removal protection obligation shall be reduced by such amount. The employer shall receive no credit for workers' compensation payments received by the employee for treatment-related expenses.

(E) Other credits. The employer's obligation to provide medical removal protection benefits to a

removed employee shall be reduced to the extent that the employee receives compensation for earnings lost during the period of removal either from a publicly or employer-funded compensation program, or receives income from employment with another employer made possible by virtue of the employee's removal.

(F) Voluntary removal or restriction of an employee. Where an employer, although not required by this section to do so, removes an employee from exposure to lead or otherwise places limitations on an employee due to the effects of lead exposure on the employee's medical condition, the employer shall provide medical removal protection benefits to the employee equal to that required by subsection (k)(2) (A) and (B).

(l) Employee information, training and certification.

(1) General.

(A) The employer shall communicate information concerning lead hazards according to the requirements of the Hazard Communication Standard, section 5194, including but not limited to the requirements concerning warning signs and labels, material safety data sheets (MSDS), and employee information and training.

(B) For all employees who are subject to exposure to lead at or above the action level on any day or who are subject to exposure to lead compounds which may cause skin or eye irritation (e.g. lead arsenate, lead azide), the employer shall provide a training program in accordance with subsection (l)(2) and assure employee participation.

(C) The employer shall provide the training program as initial training prior to the time of job assignment or prior to the start up date for this requirement, whichever comes last.

(D) The employer shall also provide the training program at least annually for each employee who is subject to lead exposure at or above the action level on any day.

(E) Where the certification of employee and supervisor training is required, as described in subsection (l)(3), the training shall be conducted by a training provider accredited by the California Department of Health Services, in accordance with Title 17, California Code of Regulations, Division 1, Chapter 8.

(2) Training program.

The employer shall assure that each employee is trained in the following:

(A) The content of this standard and its appendices;

(B) The specific nature of the operations which could result in exposure to lead above the action level;

(C) The purpose, proper selection, fitting, use, and limitations of respirators;

(D) The purpose and a description of the medical surveillance program, and the medical removal protection program including information concerning the adverse health effects associated with excessive exposure to lead (with particular attention to the adverse reproductive effects on both males and females and hazards to the fetus and additional precautions for employees who are pregnant);

(E) The engineering controls and work practices associated with the employee's job assignment

including training of employees to follow relevant good work practices described in Appendix B of this section;

(F) The contents of any compliance plan and the location of regulated areas in effect;

(G) Instructions to employees that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician; and <

(H) The employee's right of access to records under section 3204.

(3) Certification of training for residential and public buildings.

The employer shall ensure that all employees and supervisors who are engaged in lead related construction work as defined in Title 17, California Code of Regulations, Section 35022, and have been shown to be exposed to lead at or above the permissible exposure limit, meet the training requirements of this section, are trained by an accredited training provider and are certified by the California Department of Health Services. Lead related construction work is defined in Title 17 to be any construction, alteration, painting, demolition, salvage, renovation, repair, or maintenance of any residential or public building, including preparation and cleanup, that, by using or disturbing lead containing material or soil, may result in significant exposure of adults or children to lead. As used in the definition of lead related construction work, "public building" means a structure which is generally accessible to the public, including but not limited to, schools, daycare centers, museums, airports, hospitals, stores, convention centers, government facilities, office buildings and any other building which is not an industrial building or a residential building. Regulations for accreditation of training providers and for the certification of employees and supervisors are found in Title 17, California Code of Regulations, Division 1, Chapter 8.

(4) Access to information, training and certification materials.

(A) The employer shall make readily available to all affected employees a copy of this standard and its appendices.

(B) The employer shall provide, upon request, all materials relating to the employee information training program and certification to affected employees, their designated representatives, the Chief and NIOSH.

(m) Signs.

(1) General.

(A) The employer may use signs required by other statutes, regulations or ordinances in addition to, or in combination with, signs required by this subsection.

(B) The employer shall assure that no statement appears on or near any sign required by this subsection which contradicts or detracts from the meaning of the required sign.

(2) Signs.

(A) The employer shall post the following warning signs in each regulated area or work area where an employees exposure to lead is above the PEL.

WARNING

LEAD WORK AREA

POISON

NO SMOKING OR EATING

(B) The employer shall assure that signs required by this subsection are illuminated and cleaned as necessary so that the legend is readily visible.

(n) Recordkeeping.

(1) Exposure assessment.

(A) The employer shall establish and maintain an accurate record of all monitoring and other data used in conducting employee exposure assessments as required in subsection (d).

(B) Exposure monitoring records shall include:

1. The date(s), number, duration, location and results of each of the samples taken if any, including a description of the sampling procedure used to determine representative employee exposure where applicable;

2. A description of the sampling and analytical methods used and evidence of their accuracy;

3. The type of respiratory protective devices worn, if any;

4. Name, social security number, and job classification of the employee monitored and of all other employees whose exposure the measurement is intended to represent; and <

5. The environmental variables that could affect the measurement of employee exposure.

(C) The employer shall maintain monitoring and other exposure assessment records in accordance with the provisions of section 3204.

(2) Medical surveillance.

(A) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance as required by subsection (j).

(B) This record shall include:

1. The name, social security number, and description of the duties of the employee;

2. A copy of the physician's written opinions;

3. Results of any airborne exposure monitoring done on or for that employee and provided to the physician; and

4. Any employee medical complaints related to exposure to lead.

(C) The employer shall keep, or assure that the examining physician keeps, the following medical records:

1. A copy of the medical examination results including medical and work history required under subsection (j);

2. A description of the laboratory procedures and a copy of any standards or guidelines used to interpret the test results or references to that information;

3. A copy of the results of biological monitoring.

(D) The employer shall maintain or assure that the physician maintains medical records in accordance with the provisions of section 3204.

(3) Medical removals.

(A) The employer shall establish and maintain an accurate record for each employee removed from current exposure to lead pursuant to subsection (k).

(B) Each record shall include:

1. The name and social security number of the employee;

2. The date of each occasion that the employee was removed from current exposure to lead as well as the corresponding date on which the employee was returned to his or her former job status;

3. A brief explanation of how each removal was or is being accomplished; and

4. A statement with respect to each removal indicating whether or not the reason for the removal was an elevated blood lead level.

(C) The employer shall maintain each medical removal record for at least the duration of an employee's employment.

(4) "Objective data for exemption from requirement for initial monitoring".

(A) For purposes of this section, objective data are information demonstrating that a particular product or material containing lead or a specific process, operation, or activity involving lead cannot release dust or fumes in concentrations at or above the action level under any expected conditions of use. Objective data can be obtained from any industry-wide study or from laboratory product test results from manufacturers of lead containing products, including surface coatings or other materials. The data the employer uses from an industry-wide survey must be obtained under workplace conditions closely resembling the processes, types of material, control methods, work practices and environmental conditions in the employer's current operations.

(B) The employer shall maintain the record of the objective data relied upon for at least 30 years.

(5) Availability. The employer shall make available upon request all records required to be maintained

by subsection (n) to affected employees, former employees, and their designated representatives, and to the Chief and NIOSH for examination and copying.

(6) Transfer of records.

(A) Whenever the employer ceases to do business, the successor employer shall receive and retain all records required to be maintained by subsection (n). <

(B) Whenever the employer ceases to do business and there is no successor employer to receive and retain the records required to be maintained by this section for the prescribed period, these records shall be transmitted to NIOSH.

(C) At the expiration of the retention period for the records required to be maintained by this section, the employer shall notify NIOSH at least 3 months prior to the disposal of such records and shall transmit those records to NIOSH if requested within the period.

(D) The employer shall also comply with any additional requirements involving transfer of records set forth in section 3204(h).

(o) Observation of monitoring.

(1) Employee observation. The employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to lead conducted pursuant to subsection (d).

(2) Observation procedures.

(A) Whenever observation of the monitoring of employee exposure to lead requires entry into an area where the use of respirators, protective clothing or equipment is required, the employer shall provide the observer with and assure the use of such respirators, clothing and equipment, and shall require the observer to comply with all other applicable safety and health procedures.

(B) Without interfering with the monitoring, observers shall be entitled to:

1. Receive an explanation of the measurement procedures;

2. Observe all steps related to the monitoring of lead performed at the place of exposure; and

3. Record the results obtained or receive copies of the results when returned by the laboratory.

(p) Lead-Work Pre-Job Notification. The employer shall provide written notification to the nearest Division District Office in the manner prescribed by subsections (p)(1) through (p)(4) when work is planned that includes any of the tasks listed in subsection (d)(2).

Exception No. 1: The employer is not required to notify the Division if:

A. The amount of lead-containing materials to be disturbed is less than 100 square or 100 linear feet; or

B. The only subsection (d)(2) task to be performed consists of torch cutting or welding, not to exceed a duration of 1 hour in any shift.

Exception No. 2: The employer is not required to notify the Division if the percentage of lead in the material disturbed is less than 0.5%, 5,000 parts per million (weight by weight), or 1.0 mg/cm2.

(1) The employer shall ensure that the information required by subsection (p)(2) is received by the nearest Division District Office at least 24 hours prior to the commencement of the work by any of the following means:

(A) Letter;

(b) Facsimile;

(C) Electronic mail; or

(D) Telephone call, followed by written notification sent or mailed within 24 hours of placing the call.

Exception: When an employer intends to initiate unforeseen lead-work on an urgent basis within 24 hours, the notification requirement may be met by giving telephone notice to the Division at any time prior to commencement of the work, followed by written notification sent or mailed within 24 hours of telephoning the Division.

(2) The written notification provided by the employer shall contain the following:

(A) The name, address and phone number of the employer;

(B) The address of the job (or common name of the site with closest streets or roadways identified);

(C) The precise physical location of the lead related work at the job site;

(D) The projected starting date;

(E) The expected completion date or approximate duration of the work in days;

(F) The approximate number of workers planned to do the lead-related work;

(G) The type of structure(s) in which or on which the work is to be performed;

(H) The amount of lead containing material to be disturbed in square feet or linear feet;

(I) A description of the type of lead-related work to be performed and work practices that will be utilized;

(J) The name of the supervisor who will be responsible for the lead-related work; and

(K) The amount of lead in the disturbed materials (percent by weight, parts per million or milligrams per square centimeter) if known.

(3) The employer shall notify the Division, and provide the current information, if changes are made to the starting date, the surface area to be disturbed, or the type of lead-related work performed or work practices to be utilized, before or upon adoption of that change.

(4) An employer conducting ongoing, lead-related operations and maintenance work on stationary steel

structures need only notify the Division once for each structure if the duration of the operations and maintenance work is less than one year. If the duration of the work is more than one year, the employer shall submit to the Division at least once per year a supplemental written notification updating all of the information required by subsection (p)(2) for each structure.

(q) Appendices. The information contained in the appendices to this section is not intended by itself, to create any additional obligations not otherwise imposed by this standard nor detract from any existing obligation.

1532.1 Appendix B
1532.1 Appendix C
1532.1 Appendix D

NOTE

Authority cited: Sections 142.3 and 6717, Labor Code. Reference: Sections 142.3 and 6717, Labor Code.

HISTORY

1. New section filed 9-28-93; operative 11-4-93 pursuant to Labor Code section 142.3(a)(4) (Register 93, No. 40). This section is identical to the interim final rule adopted by the federal Occupational Safety and Health Administration on 5-4-93 and is exempt from OAL review. Pursuant to Labor Code section 142.3(a)(4)(c), this section shall remain in effect until 5-4-94 unless readopted for an additional 6 months or superceded by permanent regulations.

2. Change without regulatory effect amending opening paragraph filed 10-18-93 pursuant to title 1, section 100, California Code of Regulations (Register 93, No. 43).

3. New section refiled 4-28-94 with amendments; operative 5-4-94 pursuant to Labor Code section 142.3(a)(4) (Register 94, No. 17). This section is identical to the interim final rule adopted by the Federal Occupational Safety and Health Administration on 5-4-93 and is exempt from OAL review. Pursuant to Labor Code section 142.3(a)(4)(C), this section shall remain in effect for six months unless superseded by permanent regulations.

4. Amendment of section and amendment of Appendices headings and text filed 10-19-94; operative 10-19-94. Submitted to OAL for printing only pursuant to Labor Code section 142(a)(3) (Register 94, No. 42).

5. Change without regulatory effect amending Appendix A heading filed 2-16-95 pursuant to section 100, title 1, California Code of Regulations (Register 95, No. 7).

6. Editorial correction of subsection (d)(2)(E)5. (Register 95, No. 36).

7. Amendment of section, Appendix B and Note filed 2-5-97; operative 3-7-97 (Register 97, No. 6).

8. Amendment of former subsections (f)(1)-(f)(4)(C) including subsection renumbering and relettering resulting in newly designated subsections (f)(1)-(f)(3)(B)2., amendment of Appendix B, subsection IV, and amendment repealing appendix D and adding editorial reference filed 8-25-98; operative 11-23-98 (Register 98, No. 35).

9. Change without regulatory effect amending subsection (a) filed 2-16-2000 pursuant to section 100, title 1, California Code of Regulations (Register 2000, No. 7).

10. Amendment of subsection (f)(3)(B)2. (Table I) filed 5-24-2000; operative 6-23-2000 (Register 2000, No. 21).

11. Repealer of subsection (p) and new subsections (p)-(p)(4) filed 12-26-2001; operative 1-25-2002 (Register 2001, No. 52).

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APPENDIX J

HAZWOPER STANDARD

Subchapter 7. General Industry Safety Orders
Group 16. Control of Hazardous Substances
Article 109. Hazardous Substances and Processes

New query

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§5192. Hazardous Waste Operations and Emergency Response.

(a) Scope, Application and Definitions.

(1) Scope: This section covers the following operations, unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards:

(A) Clean-up operations or hazardous substance removal work required by a governmental body, whether Federal, state, local or other involving hazardous substances that are conducted at uncontrolled hazardous waste sites (including, but not limited to, the Environmental Protection Agency's (EPA) National Priority Site List (NPL), state priority site lists, sites recommended for the EPA, NPL, and initial investigations of government identified sites which are conducted before the presence or absence of hazardous substances has been ascertained);

(B) Corrective actions involving hazardous waste clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901. et seq.) and Chapters 6.5 and 6.8 of Division 20 of the California Health and Safety Code;

(C) Voluntary clean-up operations at sites recognized by Federal, state, local or other governmental bodies as uncontrolled hazardous waste sites;

(D) Operations involving hazardous wastes that are conducted at treatment, storage, and disposal (TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA; or facilities regulated by Chapter 6.5 of Division 20 of the California Health and Safety Code; or by agencies under agreement with U.S.E.P.A. to implement RCRA regulations; and

(E) Emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard.

(2) Application.

(A) All requirements of Title 8 of the California Code of Regulations apply pursuant to their terms to hazardous waste operations (whether covered by this section or not). If there is a conflict or overlap, the provision more protective of employee safety and health shall apply without regard to 8 CCR 3202(a).

(B) Hazardous substance clean-up operations within the scope of subsections (a)(1)(A) through (a)(1)(C) of this section must comply with all subsections of this section except subsections (p) and (q).

(C) Operations within the scope of subsection(a)(1)(D) of this section must comply only with the requirements of subsection (p) of this section.

NOTES AND EXCEPTIONS TO (a)(2)(C):

A. All provisions of subsection (p) of this section cover any treatment, storage, or disposal (TSD) operation regulated by 40 CFR parts 264 and 265 or by Chapter 6.5 of Division 20 of the California Health and Safety Code, and required to have a permit or interim status from EPA pursuant to 40 CFR 270.1 or from the Department of Health Services (DHS) pursuant to Chapter 6.5 of Division 20 of the California Health and Safety Code.

B. Employers who are not required to have a permit or interim status because they are conditionally exempt small quantity generators under 40 CFR 261.5 or are generators who qualify under 40 CFR 262.34 for exemptions from regulation under 40 CFR parts 264, 265 and 270 ("excepted employers") are not covered by subsections (p)(1) through (p)(7) of this section. Excepted employers who are required by the EPA or state agency such as the Department of Health Services (DHS) to have their employees engage in emergency response or who direct their employees to engage in emergency response are covered by subsection (p)(8) of this section, and cannot be exempted by (p)(8)(A) of this section. Excepted employers who are not required to have employees engage in emergency response, who direct their employees to evacuate in the case of such emergencies and who meet the requirements of subsection (p)(8)(A) of this section are exempt from the balance of subsection (p)(8) of this section.

C. If an area is used for hazardous waste treatment, storage, or disposal, any emergency response operations in that area shall comply with subsection (p)(8) of this section. In other areas not used for treatment storage, or disposal of hazardous waste, any emergency response operation shall comply with subsection (q) of this section. Compliance with the requirements of subsection (q) of this section shall be deemed to be in compliance with the requirements of subsection (p)(8) of this section.

(D) Emergency response operations for releases of, or substantial threats of releases of, hazardous substances which are not covered by subsections(a)(1)(A) through (a)(1)(D) of this section must only comply with the requirements of subsection (q) of this section.

(3) Definitions.

Buddy system: A system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide quick assistance to employees in the event of an emergency.

Certified employee: An employee that has completed all of the requirements for training certification delineated in subsection (e)(6) of this section.

Certified supervisor: A supervisor that has completed all of the requirements for training certification delineated in subsection (e)(6) of this section.

Clean-up operation: An operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment.

Decontamination: The removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

Emergency response, or responding to emergencies: A response effort by employees from outside the

immediate release area or by other designated responders (i.e., mutual aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release, which may cause high levels of exposure to toxic substances, or which poses danger to employees requiring immediate attention. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses within the scope of this standard. Responses to releases of hazardous substances where there is no immediate safety or health hazard (i.e., fire, explosion, or chemical exposure) are not considered to be emergency responses.

NOTE: The "immediate release area" can be the entire geographic boundary of the employee's assigned work area.

Facility: A. Any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock, or aircraft, or B. any site or area where a hazardous substance has been deposited, stored, disposed of, placed, or otherwise come to be located; but does not include any consumer product in consumer use or any water-borne vessel.

Hazardous materials response (HAZMAT) team: An organized group of employees, designated by the employer, which is expected to perform work to handle and control actual or potential leaks or spills of hazardous substances requiring possible close approach to the substance. The team members perform responses to releases or potential releases of hazardous substances for the purpose of control or stabilization of the incident. A HAZMAT team is not a fire brigade nor is a typical fire brigade a HAZMAT team. A HAZMAT team, however, may be a separate component of a fire brigade or fire department.

Hazardous substance: Any substance designated or listed under A. through D. below, exposure to which results or may result in adverse affects on the health or safety of employees:

A. Any substance defined under Section 101(14) of CERCLA or under Sections 25316 and 25317 of the California Health and Safety Code;

B. Any biological agent and other disease-causing agent which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring;

C. Any substance listed by the U.S. Department of Transportation and regulated as hazardous materials under 49 CFR 172.101 and appendices; and

D. Hazardous waste as herein defined.

Hazardous substance removal work: Clean-up work at any of the following:

A. A site where removal or remedial action is taken pursuant to any of the following:

1. Chapter 6.8 (commencing with Section 25300) of Division 20 of the Health and Safety Code, regardless of whether the site is listed pursuant to Section 25356 of the Health and Safety Code.

2. The federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. Sec. 9601 et seq.).

3. Any operations covered under subsections(a)(1)(A) through (a)(1)(C) of this section.

B. A site where corrective action is taken pursuant to Section 25187 or 25200.10 of the Health and Safety Code or the federal Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sec. 6901 et seq.)

C. A site where clean-up of a discharge of a hazardous substance is required pursuant to Division 7 (commencing with Section 13000) of the Water Code.

D. A site where removal or remedial action is taken because a hazardous substance has been discharged or released in an amount that is reportable pursuant to Section 13271 of the Water Code or the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. Sec. 6901 et seq.). Hazardous substance removal work does not include work related to a hazardous substance spill on a highway.

Hazardous waste: A waste or combination of wastes as defined in 40 CFR 261.3, or regulated as hazardous waste in California pursuant to Chapter 6.5, Division 20, California Health and Safety Code, or B. those substances defined as hazardous wastes in 49 CFR 171.8.

Hazardous waste operation: Any operation conducted within the scope of this regulation including hazardous substance removal work as defined in Labor Code Section 142.7(b).

Hazardous waste site, or site: Any facility or location at which hazardous waste operations within the scope of this regulation take place.

Health hazard: A chemical, mixture of chemicals or a pathogen for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens; toxic or highly toxic agents; reproductive toxins; irritants; corrosives; sensitizers; hepatotoxins; nephrotoxins; neurotoxins; agents which act on the hematopoietic system; and agents which damage the lungs, skin, eyes, or mucous membranes. It also includes stress due to temperature extremes. Further definition of the terms used above can be found in Title 8, California Code of Regulations, Section 5194.

IDLH or Immediately dangerous to life or health: An atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

Incidental release: An incidental release is one that does not cause a health or safety hazard to employees and does not need to be cleaned up immediately to prevent death or serious injury to employees.

Oxygen deficiency: That concentration of oxygen by volume below which air supplying respiratory protection must be provided. It exists in atmospheres where the percentage of oxygen by volume is less than 19.5 percent oxygen.

Permissible exposure limit (PEL): The exposure, inhalation or dermal permissible exposure limit specified in 8 CCR, Chapter 4, Subchapter 7, Groups 14 and 15; and Group 16, Articles 107, 109, and 110.

Post-emergency response: That portion of an emergency response performed after the immediate threat of a release has been stabilized or eliminated and clean-up of the site has begun. If post emergency response is performed by an employer's own employees who were part of the initial emergency response, it is considered to be part of the initial response and not post-emergency response. However, if a group of an employer's own employees, separate from the group providing initial response, performs the clean-up operation, then the separate group of employees would be considered to be performing post-emergency response and subject to subsection (q)(11) of this section.

Pre-job health and safety conference: A health and safety conference or briefing held prior to entering a site for the purpose of initiating hazardous substance removal work.

Published exposure level: The exposure limits published in "NIOSH Recommendations for Occupational Safety and Health Standards 1988" incorporated by reference, or if no limit is specified, the exposure limits published in the standards specified by the American Conference of Governmental Industrial Hygienists in their publication "Threshold Limit Values and Biological Exposure Indices for 1989-90" dated 1989 incorporated by reference.

Qualified person: A person with specific training, knowledge and experience in the area for which the person has the responsibility and the authority to control.

Site safety and health supervisor (or official): The individual located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.

Small quantity generator: A generator of hazardous wastes who in any calendar month generates no more than 1,000 kilograms (2,205 pounds) of hazardous waste in that month.

Uncontrolled hazardous waste site: An area where an accumulation of hazardous waste creates a threat to the health and safety of individuals or the environment or both. Some sites are found on public lands, such as those created by former municipal, county, or state landfills where illegal or poorly managed waste disposal has taken place. Other sites are found on private property, often belonging to generators or former generators of hazardous waste. Examples of such sites include, but are not limited to, surface impoundments, landfills, dumps, and tank or drum farms.

Normal operations at TSD sites are not covered by this definition.

Uncontrolled release: An uncontrolled release is the accidental release of a hazardous substance from its container. If not contained, stopped, and removed, the release would pose a hazard to the employees in the immediate area or in areas in the path of the release, or from its byproducts or its effects (such as toxic vapors, fire, over-pressurization, toxic gases, or toxic particulates.

(b) Safety and health program.

NOTE TO (b): Safety and health programs developed and implemented to meet other Federal, state, or local regulations are considered acceptable in meeting this requirement if they cover or are modified to cover the topics required in this subsection. An additional or separate safety and health program is not

required by this subsection.

(1) General.

(A) Employers shall develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program shall be designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations.

(B) The written safety and health program shall incorporate the following:

1. An organization structure;

2. A comprehensive workplan;

3. A site-specific safety and health plan which need not repeat the employer's standard operating procedures required in subsection (b)(1)(B)6. of this section;

4. The safety and health training program;

5. The medical surveillance program;

6. The employer's standard operating procedures for safety and health; and

7. Any necessary interface between general program and site specific activities.

(C) Site excavation. Site excavations created during initial site preparation or during hazardous waste operations shall be shored or sloped as appropriate to prevent accidental collapse in accordance with 8 CCR, Chapter 4, Subchapter 4, Article 6.

(D) Contractors and sub-contractors. An employer who retains contractor or sub-contractor services for work in hazardous waste operations shall inform those contractors, sub-contractors, or their representatives of the site emergency response procedures and any potential fire, explosion, health, safety or other hazards of the hazardous waste operation that have been identified by the employer, including those identified in the employer's information program. Each contractor/sub-contractor is responsible for compliance with all safety and health protection requirements for its employees. An employer's safety and health plan can be used by contractors/sub-contractors at the site if it appropriately addresses their activity and potential safety and health hazards.

(E) Program availability. The written safety and health program shall be made available to any contractor or subcontractor or their representative who will be involved with the hazardous waste operation; to employees; to employee designated representatives; to Division representatives, and to personnel of other Federal, state, or local agencies with regulatory authority over the site.

(2) Organizational structure part of the site program.

(A) The organizational structure part of the program shall establish the specific chain of command and specify the overall responsibilities of supervisors and employees. It shall include, at a minimum, the following elements:

1. A general supervisor (or Certified supervisor for hazardous substance removal work) who has the

responsibility and authority to direct all hazardous waste operations.

2. A Site Safety and Health Supervisor who has the responsibility and authority to develop and implement the site safety and health plan and verify compliance.

3. A Qualified Person for operations defined as hazardous substance removal work, who shall be responsible for scheduling any air sampling, laboratory calibration of sampling equipment, evaluation of soil or other contaminated materials sampling results, and for conducting any equipment testing and evaluating the results of the tests.

4. All other personnel needed for hazardous waste site operations and emergency response and their general functions and responsibilities.

5. The lines of authority, responsibility, and communication.

(B) The organizational structure shall be reviewed and updated as necessary to reflect the current status of waste site operations.

(3) Comprehensive workplan part of the site program: The comprehensive workplan part of the program shall address the tasks and objectives of the site operations and the logistics and resources required to reach those tasks and objectives.

(A) The comprehensive workplan shall address anticipated clean-up activities, as well as normal operating procedures, which need not repeat the employer's procedures available elsewhere.

(B) The comprehensive workplan shall define work tasks and objectives and identify the methods for accomplishing those tasks and objectives.

(C) The comprehensive workplan shall establish personnel requirements for implementing the plan.

(D) The comprehensive workplan shall provide for the implementation of the training required in subsection (e) of this section.

(E) The comprehensive workplan shall provide for the implementation of the required informational programs required in subsection (i) of this section.

(F) The comprehensive workplan shall provide for the implementation of the medical surveillance program described in subsection (f) of this section.

(4) Site-specific safety and health plan part of the program.

(A) General: The site safety and health plan, which must be kept on site, shall address the safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection.

NOTE TO (A): In general, a site plan organized as a single document, with component sections/appendices covering all tasks, operations, and contractors/sub-contractors, may be used to promote use efficiency, and enhance completeness, clarity, and coordination.

(B) Elements: The site safety and health plan, as a minimum, shall address the following:

1. A safety and health risk or hazard analysis for each site task and operation found in the workplan.

2. Employee training assignments to assure compliance with subsection (e) of this section.

3. Personal protective equipment (PPE) to be used by employees for each of the site tasks and operations being conducted as required by the personal protective equipment program in subsection (g)(5) of this section.

4. Medical surveillance requirements in accordance with the program in subsection (f) of this section.

5. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment to be used.

6. Site control measures in accordance with the site control program required in subsection (d) of this section.

7. Decontamination procedures in accordance with subsection (k) of this section.

8. An emergency response plan meeting the requirements of subsection (l) of this section for safe and effective responses to emergencies, including the necessary PPE and other equipment.

9. Confined space entry procedures.

10. A spill containment program meeting the requirements of subsection (j) of this section.

(C) Pre-entry briefing: The site-specific safety and health plan shall provide for pre-entry briefings to be held prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the site safety and health plan and that this plan is being followed. The information and data obtained from site characterization and analysis work required in subsection (c) of this section shall be used to prepare and update the site safety and health plan.

(D) For operations defined as Hazardous substance removal work, a Pre-job health and safety conference shall be held before the start of actual work. The conference shall include representatives of the owner or contracting agency, the contractor, the employer, employees, and employee representatives; and shall include a discussion of the employer's safety and health program and the means, methods, devices, processes, practices, conditions, or operations which the employer intends to use in providing a safe and healthy place of employment.

(E) Effectiveness of site safety and health plan: Inspections shall be conducted by the site safety and health supervisor or, in the absence of that individual, another individual who is knowledgeable in occupational safety and health, acting on behalf of the employer as necessary to determine the effectiveness of the site safety and health plan. Any deficiencies in the effectiveness of the site safety and health plan shall be corrected by the employer.

(c) Site Characterization and Analysis.

(1) General: Hazardous waste sites shall be evaluated in accordance with this subsection to identify specific site hazards and to determine the appropriate safety and health control procedures needed to protect employees from the identified hazards.

(2) Preliminary evaluation: A preliminary evaluation of a site's characteristics shall be performed prior to site entry by a qualified person to aid in the selection of appropriate employee protection methods prior to site entry. Immediately after initial site entry, a more detailed evaluation of the site's specific characteristics shall be performed by a qualified person to further identify existing site hazards and to further aid in the selection of the appropriate engineering controls and personal protective equipment for the tasks to be performed.

(3) Hazard identification: All suspected conditions that may pose inhalation or skin absorption hazards that are immediately dangerous to life or health (IDLH) or other conditions that may cause death or serious harm shall be identified during the preliminary survey and evaluated during the detailed survey. Examples of such hazards include, but are not limited to, confined space entry, potentially explosive or flammable situations, visible vapor clouds, or areas where biological indicators such as dead animals or vegetation are located.

(4) Required information: The following information to the extent available shall be obtained by the employer prior to allowing employees to enter a site:

(A) Location and approximate size of the site.

(B) Description of the response activity and/or the job task to be performed.

(C) Duration of the planned employee activity.

(D) Site topography and accessibility by air and roads.

(E) Safety and health hazards expected at the site.

(F) Pathways for hazardous substance dispersion.

(G) Present status and capabilities of emergency response teams that would provide assistance to hazardous waste clean-up site employees at the time of an emergency.

(H) Hazardous substances and health hazards involved or expected at the site, and their chemical and physical properties.

(5) Personal protective equipment: Personal protective equipment (PPE) shall be provided and used during initial site entry in accordance with the following requirements:

(A) Based upon the results of the preliminary site evaluation, an ensemble of PPE shall be selected and used during initial site entry which will provide protection to a level of exposure below PELs and published exposure levels for known or suspected hazardous substances and health hazards and will provide protection against other known and suspected hazards identified during the preliminary site evaluation. If there is no PEL or published exposure level, the employer may use other published studies and information as a guide to appropriate personal protective equipment.

(B) If positive-pressure self-contained breathing apparatus is not used as part of the entry ensemble, and if respiratory protection is warranted by the potential hazards identified during the preliminary site evaluation, an escape self-contained breathing apparatus of at least five minute's duration shall be carried by employees during initial site entry.

(C) If the preliminary site evaluation does not produce sufficient information to identify the hazards or suspected hazards of the site, an ensemble providing protection equivalent to Level B PPE shall be provided as minimum protection and direct reading instruments shall be used as appropriate for identifying IDLH conditions. (See Appendix B for guidelines on Level B protective equipment, and a description of Level B hazards.)

(D) Once the hazards of the site have been identified, the appropriate PPE shall be selected and used in accordance with subsection (g).

(6) Monitoring: The following monitoring shall be conducted during initial site entry when the site evaluation produces information that shows the potential for ionizing radiation or IDLH conditions, or when the site information is not sufficient to rule out these possible conditions:

(A) Monitoring with direct reading instruments for hazardous levels of ionizing radiation.

(B) Monitoring the air with appropriate direct reading test equipment (i.e., combustible gas meters, detector tubes) for IDLH and other conditions that may cause death or serious harm (combustible or explosive atmospheres, oxygen deficiency, toxic substances.)

(C) Visually observing for signs of actual or potential IDLH or other dangerous conditions.

(D) An on-going air monitoring program in accordance with subsection (h) shall be implemented after site characterization has determined the site is safe for the start-up of operations.

(7) Risk identification: Once the presence and concentrations of specific hazardous substances and health hazards have been established, the risks associated with these substances shall be identified. Employees who will be working on the site shall be informed of any risks that have been identified. In situations covered by the Hazard Communication standard, 8 CCR 5194, training required by that standard need not be duplicated.

NOTE TO (c)(7): Risks to consider include, but are not limited to:

A. Exposures exceeding the PELs, and published exposure levels.

B. IDLH concentrations.

C. Potential skin absorption and irritation sources.

D. Potential eye irritation sources.

E. Explosion sensitivity and flammability ranges.

F. Oxygen deficiency.

(8) Employee notification: Any information concerning the chemical, physical, and toxicologic properties of each substance known or expected to be present on site that is available to the employer and relevant to the duties an employee is expected to perform shall be made available to the affected employees prior to the commencement of their work activities. The employer may utilize information developed for the hazard communication standard, 8 CCR 5194, for this purpose.

(d) Site Control.

(1) General: Appropriate site control procedures shall be implemented to control employee exposure to hazardous substances before clean-up work begins.

(2) Site control program: A site control program for protecting employees which is part of the employer's site safety and health program required in subsection (b) of this section shall be developed during the planning stages of a hazardous waste clean-up operation and modified as necessary as new information becomes available.

(3) Elements of the site control program: The site control program shall, as a minimum, include: A site map; site work zones; the use of a "buddy system;" site communications including alerting means for emergencies; the standard operating procedures or safe work practices; and, identification of nearest medical assistance. Where these requirements are covered elsewhere they need not be repeated.

(e) Training.

(1) General.

(A) All employees working on site (such as but not limited to equipment operators, general laborers, and others) exposed to hazardous substances, health hazards, or safety hazards, and their supervisors and management responsible for the site shall receive training meeting the requirements of this subsection before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety, or health hazards, and they shall receive review training as specified in this subsection.

(B) Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility.

(2) Elements to be covered: The training shall thoroughly cover the following:

(A) Names of personnel and alternates responsible for site safety and health;

(B) Safety, health and other hazards present on the site;

(C) Use of PPE;

(D) Work practices by which the employee can minimize risks from hazards;

(E) Safe use of engineering controls and equipment on the site;

(F) Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards; and

(G) Subsections 7. through 10. of the site safety and health plan set forth in subsection (b)(4)(B) of this section.

(3) Initial training.

(A) General site workers (such as equipment operators, general laborers, and supervisory personnel)

engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.

(B) Workers on site only occasionally for a specific limited task (such as, but not limited to, ground water monitoring, land surveying, or geo-physical surveying) and who are unlikely to be exposed over PELs and published exposure levels shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

(C) Workers regularly on site who work in areas which have been monitored and fully characterized indicating that exposures are under PELs and published exposure levels where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

(D) Workers with 24 hours of training who are covered by subsections (e)(3)(B) and (e)(3)(C) of this section, and who become general site workers or who are required to wear respirators, shall have the additional 16 hours and two days of training necessary to total the training specified in subsection (e)(3)(A).

(4) Management and supervisor training: On-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations shall receive 40 hours initial training, and three days of supervised field experience (the training may be reduced to 24 hours and one day if the only area of their responsibility is employees covered by subsections (e)(3)(B) and (e)(3)(C)) and at least eight additional hours of specialized hazardous waste operations management training at the time of job assignment on such topics as, but not limited to, the employer's safety and health program and the associated employee training program, PPE program, spill containment program, and health hazard monitoring procedure and techniques.

(5) Qualifications for trainers: Trainers shall be qualified to instruct employees about the subject matter that is being presented in training. Such trainers shall have satisfactorily completed a training program for teaching the subjects they are expected to teach, or they shall have the academic credentials and instructional experience necessary for teaching the subjects. Instructors shall demonstrate competent instructional skills and knowledge of the applicable subject matter.

(6) Training certification: Employees and supervisors that have received and successfully completed the training and field experience specified in subsections (e)(1) through (e)(4) of this section shall be certified by their instructor or the head instructor and trained supervisor as having successfully completed the necessary training. A written certificate shall be given to each person so certified. Any person who has not been so certified or who does not meet the requirements of subsection (e)(9) of this section shall be prohibited from engaging in hazardous waste operations.

(7) Emergency response: Employees who are engaged in responding to hazardous emergency situations at hazardous waste clean-up sites that may expose them to hazardous substances shall be trained in how to respond to such expected emergencies.

(8) Refresher training: Employees specified in subsection (e)(1) of this section, and managers and supervisors specified in subsection (e)(4) of this section, shall receive eight hours of refresher training

annually on the items specified in subsection (e)(2) and/or (e)(4) of this section, any critique of incidents that have occurred in the past year that can serve as training examples of related work, and other relevant topics.

(9) Equivalent training: Employers who can show by documentation or certification that an employee's work experience and/or training has resulted in training equivalent to that training required in subsections (e)(1) through (e)(4) of this section shall not be required to provide the initial training requirements of those subsections to such employees. However, certified employees or employees with equivalent training new to a site shall receive appropriate, site specific training before site entry and have appropriate supervised field experience at the new site. Equivalent training includes any academic training or the training that existing employees might have already received from actual hazardous waste site work experience.

(f) Medical Surveillance.

(1) General: Employers engaged in operations specified in subsections (a)(1)(A) through (a)(1)(D) of this section and not covered by (a)(2)(C) exceptions, and employers of employees specified in subsection (q)(9) shall institute a medical surveillance program in accordance with this subsection.

(2) Employees covered: The medical surveillance program shall be instituted by the employer for the following employees:

(A) Any employee who is or may be exposed to hazardous substances or health hazards at or above the PELs or, if there is no PEL, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year.

(B) Any employee who wears a respirator during any part of a day for a period of 30 days or more in a year, or as required by 8 CCR 5144.

(C) Any employee who is injured, becomes ill or develops signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and

(D) Members of HAZMAT teams.

(3) Frequency of medical examinations and consultations: Medical examinations and consultations shall also be made available by the employer to each employee covered under subsection (f)(2) on the following schedules:

(A) For employees covered under subsections (f)(2)(A), (f)(2)(B), and (f)(2)(D):

1. Prior to assignment.

2. At least once every twelve months for each employee covered, unless the attending physician believes a longer interval (not greater than biennially) is appropriate.

3. At termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last six months.

4. As soon as possible, upon notification by an employee either that the employee has developed signs

or symptoms indicating possible overexposure to hazardous substances or health hazards or that the employee has been injured or exposed above the PELs or published exposure levels in an emergency situation.

5. At more frequent times, if the examining physician determines that an increased frequency of examination is medically necessary.

(B) For employees covered under subsection(f)(2)(C) and for all employees including those of employers covered by subsection (a)(1)(E) who may have been injured, received a health impairment, developed signs or symptoms which may have resulted from exposure to hazardous substances resulting from an emergency incident, or exposed during an emergency incident to hazardous substances at concentrations above the PELs or the published exposure levels without the necessary personal protective equipment being used:

1. As soon as possible following the emergency incident or development of signs or symptoms;

2. At additional times, if the examining physician determines that follow-up examinations or consultations are medically necessary.

(4) Content of medical examinations and consultations.

(A) Medical examinations required by subsection (f)(2) of this section shall include a medical and work history (or updated history if one is in the employee's file) with special emphasis on symptoms related to the handling of hazardous substances and health hazards, and to fitness for duty including the ability to wear any required PPE under conditions (e.g., temperature extremes) that may be expected at the work site.

(B) The content of medical examinations or consultations made available to employees pursuant to subsection (f) shall be determined by the examining physician. The guidelines in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (see Appendix D, Reference #10) should be consulted.

(5) Examination by a physician and costs: All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

(6) Information provided to the physician: The employer shall provide one copy of this standard and its appendices to the attending physician, and in addition, the following for each employee:

(A) A description of each employee's duties as they relate to the employee's exposures.

(B) Each employee's exposure levels or anticipated exposure levels.

(C) A description of any PPE used or to be used by each employee.

(D) Information from previous medical examinations of each employee which is not readily available to the examining physician.

(E) Information required by 8 CCR 5144 for each employee.

(7) Physician's written opinion.

(A) The employer shall obtain and furnish the employee with a copy of a written opinion from the examining physician containing the following:

1. The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

2. The physician's recommended limitations upon the employee's assigned work.

3. A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.

(B) The written opinion obtained by the employer shall not reveal specific findings or diagnoses unrelated to occupational exposures.

(C) The physician shall provide the results of the medical examination and tests to the employee if requested.

(8) Recordkeeping.

(A) An accurate record of the medical surveillance required by subsection (f) shall be retained. This record shall be retained for the period specified and meet the criteria of 8 CCR 3204.

(B) The record required in subsection (f)(8)(A) shall include at least the following information:

1. The name and social security number of the employee.

2. Physician's written opinions, recommended limitations, and results of examinations and tests.

3. Any employee medical complaints related to exposure to hazardous substances.

4. A copy of the information provided to the examining physician by the employer, with the exception of the standard and its appendices.

(g) Engineering Controls, Work Practices, and Personal Protective Equipment for Employee Protection: Engineering controls, work practices, PPE, or a combination of these shall be implemented in accordance with this subsection to protect employees from exposure to hazardous substances and safety and health hazards.

(1) Engineering controls, work practices and PPE for substances regulated in 8 CCR, Ch. 4, Subch. 7, Groups 14, 15, and 16.

(A) Engineering controls and work practices shall be instituted to reduce and maintain employee exposure to or below the PELs of substances regulated by 8 CCR 5155, except to the extent that such controls and practices are not feasible.

NOTE TO (g)(1)(A): Engineering controls which may be feasible include the use of pressurized cabs or control booths on equipment, and/or the use of remotely operated material handling equipment. Work

practices which may be feasible are removing all non-essential employees from potential exposure during opening of drums, wetting down dusty operations and locating employees upwind of possible hazards.

(B) Whenever engineering controls and work practices are not feasible or not required, any reasonable combination of engineering controls, work practices, and PPE shall be used to protect employees to reduce exposure to or below established PELs or exposure limits for substances regulated by 8 CCR, Ch. 4, Subch. 7, Group 16.

(C) The employer shall not implement a schedule of employee rotation as a means of compliance with PELs or exposure limits except when there is no other feasible way of complying with the applicable ionizing radiation exposure standards.

(D) The provisions of 8 CCR, Ch. 4, Subch. 7, Groups 14 and 15 shall be followed.

(2) Engineering controls, work practices, and PPE for substances not regulated in 8 CCR, Ch. 4, Subch. 7, Groups 14, 15, and 16: An appropriate combination of engineering controls, work practices, and personal protective equipment shall be used to reduce and maintain employee exposure to or below the published exposure levels for hazardous substances and health hazards not regulated by 8 CCR, Ch. 4, Subch. 7, Groups 14, 15, and 16. The employer may use the published literature and Material Safety Data Sheets (MSDS's) as a guide in making the employer's determination as to what level of protection the employer believes is appropriate for hazardous substances and health hazards for which there is no PEL or published exposure level.

(3) Personal protective equipment selection.

(A) Personal protective equipment (PPE) shall be selected and used which will protect employees from the hazards and potential hazards they are likely to encounter as identified during the site characterization and analysis.

(B) Personal protective equipment selection shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

(C) Positive pressure self-contained breathing apparatus (SCBA) or positive pressure airline respirators equipped with an escape air supply shall be used when chemical exposure levels present will create a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.

(D) Totally-encapsulating chemical protective suits (protection equivalent to Level A protection as recommended in Appendix B) shall be used in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.

(E) The level of protection provided by PPE selection shall be increased when additional information on site conditions shows that increased protection is necessary to reduce employee exposures below established PELs and published exposure levels for hazardous substances and health hazards. (See Appendix B for guidance on selecting PPE ensembles.)

(F) Personal protective equipment shall be selected and used to meet the requirements of 8 CCR, Ch. 4,

Subch. 7, Group 2, Articles 10 and 10.1, and 8 CCR 5144 of the General Industry Safety Orders, and additional requirements specified in this section.

NOTE TO (g)(3): The level of employee protection provided may be decreased when additional information or site conditions show that decreased protection will not result in hazardous exposures to employees.

(4) Totally-encapsulating chemical protective suits.

(A) Totally-encapsulating suits shall protect employees from the particular hazards which are identified during site characterization and analysis.

(B) Totally-encapsulating suits shall be capable of maintaining positive air pressure. (See Appendix A for a test method which may be used to evaluate this requirement.)

(C) Totally-encapsulating suits shall be capable of preventing inward test gas leakage of more than 0.5 percent. (See Appendix A for a test method which may be used to evaluate this requirement.)

(5) Personal protective equipment (PPE) program: A written personal protective equipment program, which is part of the employer's safety and health program required in subsection (b) of this section or required in subsection (p)(1) of this section and which is also a part of the site-specific safety and health plan shall be established. The PPE program shall address the elements listed below. When elements, such as donning and doffing procedures, are provided by the manufacturer of a piece of equipment and are attached to the plan, they need not be rewritten into the plan as long as they adequately address the procedure or element.

(A) PPE selection based upon site hazards,

(B) PPE use and limitations of the equipment,

(C) Work mission duration,

(D) PPE maintenance and storage,

(E) PPE decontamination and disposal,

(F) PPE training and proper fitting,

(G) PPE donning and doffing procedures,

(H) PPE inspection procedures prior to, during, and after use,

(I) Evaluation of the effectiveness of the PPE program, and

(J) Limitations during temperature extremes, heat stress, and other appropriate medical considerations.

(h) Monitoring.

(1) General.

(A) Monitoring shall be performed in accordance with this subsection where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices, and PPE so that employees are not exposed to levels which exceed PELs, or published exposure levels if there are no PELs, for hazardous substances.

(B) Air monitoring shall be used to identify and quantify airborne levels of hazardous substances, and health and safety hazards in order to determine the appropriate level of employee protection needed on site.

(2) Initial entry: Upon initial entry, representative air monitoring shall be conducted to identify any IDLH conditions, exposure over PELs or published exposure levels, exposure over a radioactive material's dose limits, or other dangerous situations such as the presence of flammable atmospheres or oxygen-deficient environments.

(3) Periodic monitoring: Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over PELs or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

(A) When work begins on a different portion of the site.

(B) When contaminants other than those previously identified are being handled.

(C) When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling).

(D) When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon).

(4) Monitoring of high-risk employees: After the actual clean-up phase of any hazardous waste operation commences; for example, when soil, surface water or containers are moved or disturbed; the employer shall monitor those employees likely to have the highest exposures to hazardous substances and health hazards likely to be present above PELs or published exposure levels by using personal sampling frequently enough to characterize employee exposures.

If the employees likely to have the highest exposure are over PELs or published exposure levels, then monitoring shall continue in order to identify all employees likely to be above those limits. The employer may utilize a representative sampling approach by documenting that the employees and chemicals chosen for monitoring are based on the criteria stated above.

NOTE TO (h): It is not required to monitor employees engaged in site characterization operations covered by subsection (c) of this section.

(i) Informational Programs: Employers shall develop and implement a program, which is part of the employer's safety and health program required in subsection (b) of this section, to inform employees, contractors, and subcontractors (or their representatives) actually engaged in hazardous waste operations of the nature, level, and degree of exposure likely as a result of participation in such hazardous waste operations. Employees, contractors, and subcontractors working outside of the operations part of a site are not covered by this regulation.

(j) Handling Drums and Containers.

(1) General.

(A) Hazardous substances and contaminated soils, liquids, and other residues shall be handled, transported, labeled, and disposed of in accordance with this subsection.

(B) Drums and containers used during the clean-up shall meet the appropriate U.S. Department of Transportation (DOT), OSHA, and EPA regulations for the wastes that they contain.

(C) When practical, drums and containers shall be inspected and their integrity shall be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (i.e., buried beneath the earth, stacked behind other drums, stacked several tiers high in a pile, etc.) shall be moved to an accessible location and inspected prior to further handling.

(D) Unlabeled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

(E) Site operations shall be organized to minimize the amount of drum or container movement.

(F) Prior to movement of drums or containers, all employees exposed to the transfer operation shall be warned of the potential hazards associated with the contents of the drums or containers.

(G) U. S. Department of Transportation (DOT) specified salvage drums or containers and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur.

(H) Where major spills may occur, a spill containment program which is part of the employer's safety and health program required in subsection (b) of this section shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred.

(I) Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container using a device classified for the material being transferred.

(J) A ground-penetrating system or other type of detection system or device shall be used to estimate the location and depth of buried drums or containers.

(K) Soil or covering material shall be removed with caution to prevent drum or container rupture.

(L) Fire extinguishing equipment meeting the requirements of 8 CCR, Ch. 4, Subch.7, Group 27 of the General Industry Safety Orders shall be on hand and ready for use to control incipient fires.

(2) Opening drums and containers: The following procedures shall be followed in areas where drums or containers are being opened:

(A) Where an airline respirator system is used, connections to the bank of air cylinders shall be protected from contamination and the entire system shall be protected from physical damage.

(B) Employees not actually involved in opening drums or containers shall be kept a safe distance from the drums or containers being opened.

(C) If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the employee and the drums or containers being opened to protect the employee in case of accidental explosion.

(D) Controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier.

(E) When there is a reasonable possibility of flammable atmosphere being present, material handling equipment and hand tools shall be of the type to prevent sources of ignition.

(F) Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved. If pressure cannot be relieved from a remote location, appropriate shielding shall be placed between the employee and the drums or containers to reduce the risk of employee injury.

(G) Employees shall be instructed not to stand upon or work from drums or containers.

(3) Material handling equipment: Material handling equipment used to transfer drums and containers shall be selected, positioned and operated to minimize sources of ignition related to the equipment from igniting vapors released from ruptured drums or containers.

(4) Radioactive wastes: Drums and containers containing radioactive wastes shall not be handled until such time as their hazard to employees is properly assessed.

(5) Shock sensitive wastes: As a minimum, the following special precautions shall be taken when drums and containers containing or suspected of containing shock-sensitive wastes are handled:

(A) All non-essential employees shall be evacuated from the area of transfer.

(B) Material handling equipment shall be provided with explosive containment devices or protective shields to protect equipment operators from exploding containers.

(C) An employee alarm system capable of being perceived above surrounding light and noise conditions shall be used to signal the commencement and completion of explosive waste handling activities.

(D) Continuous communications (i.e., portable radios, hand signals, telephones, as appropriate) shall be maintained between the employee-in-charge of the immediate handling area and both the site safety and health supervisor and the command post until such time as the handling operation is completed. Communication equipment or methods that could cause shock sensitive materials to explode shall not be used.

(E) Drums and containers under pressure, as evidenced by bulging or swelling, shall not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the drum.

(F) Drums and containers containing packaged laboratory wastes shall be considered to contain shock-sensitive or explosive materials until they have been characterized.

CAUTION: Shipping of shock sensitive wastes may be prohibited under U. S. Department of Transportation (DOT) regulations. Employers and shippers should refer to 49 CFR 173.21 and 173.50.

(6) Laboratory waste packs: In addition to the requirements of subsection (j)(5), the following precautions shall be taken, as a minimum, in handling laboratory waste packs (lab packs).

(A) Lab packs shall be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes.

(B) If crystalline material is noted on any container, the contents shall be handled as a shock-sensitive waste until the contents are identified.

(7) Sampling of drum and container contents: Sampling of containers and drums shall be done in accordance with a sampling procedure which is part of the site safety and health plan developed for and available to employees and others at the specific worksite.

(8) Shipping and transport.

(A) Drums and containers shall be identified and classified prior to packaging for shipment.

(B) Drum or container staging areas shall be kept to the minimum number necessary to safely identify and classify materials and prepare them for transport.

(C) Staging areas shall be provided with adequate access and egress routes.

(D) Bulking of hazardous wastes shall be permitted only after a thorough characterization of the materials has been completed.

(9) Tank and vault procedures.

(A) Tanks and vaults containing hazardous substances shall be handled in a manner similar to that for drums and containers, taking into consideration the size of the tank or vault.

(B) Appropriate tank or vault entry procedures as described in the employer's safety and health plan and meeting the requirements of 8 CCR, Ch. 4, Subch. 7, Article 108 of the General Industry Safety Orders shall be followed whenever employees must enter a tank or vault.

(k) Decontamination.

(1) General: Procedures for all phases of decontamination shall be developed and implemented in accordance with this subsection.

(2) Decontamination procedures.

(A) A decontamination procedure shall be developed, communicated to employees, and implemented before any employees or equipment may enter areas on site where potential for exposure to hazardous substances exists.

(B) Standard operating procedures shall be developed to minimize employee contact with hazardous substances or with equipment that has contacted hazardous substances.

(C) All employees leaving a contaminated area shall be appropriately decontaminated; all contaminated

clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated.

(D) Decontamination procedures shall be monitored by the site safety and health supervisor to determine their effectiveness. When such procedures are found to be ineffective, appropriate steps shall be taken to correct any deficiencies.

(3) Location: Decontamination shall be performed in geographical areas that will minimize the exposure of uncontaminated employees or equipment to contaminated employees or equipment.

(4) Equipment and solvents: All equipment and solvents used for decontamination shall be decontaminated or disposed of properly.

(5) Personal protective clothing and equipment.

(A) Protective clothing and equipment shall be decontaminated, cleaned, laundered, maintained, or replaced as needed to maintain its effectiveness.

(B) Employees whose non-impermeable clothing becomes wetted with hazardous substances shall immediately remove that clothing and proceed to shower. The clothing shall be disposed of or decontaminated before it is removed from the work zone.

(6) Unauthorized employees: Unauthorized employees shall be instructed not to remove protective clothing or equipment from change rooms.

(7) Commercial laundries or cleaning establishments: Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment shall be informed of the potentially harmful effects of exposures to hazardous substances.

(8) Showers and change rooms: Where the decontamination procedure indicates a need for regular showers and change rooms outside of a contaminated area, they shall be provided and meet the requirements of 8 CCR, Ch. 4, Subch. 7, Article 9 of the General Industry Safety Orders. If temperature conditions prevent the effective use of water, then other effective means for cleansing shall be provided and used.

(l) Emergency Response by Employees at Uncontrolled Hazardous Waste Sites.

(1) Emergency response plan.

(A) An emergency response plan shall be developed and implemented by all employers within the scope of subsections (a)(1)(A)-(B) of this section to handle anticipated emergencies prior to the commencement of hazardous waste operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, Division personnel, and other governmental agencies with relevant responsibilities.

(B) Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this subsection if they provide an emergency action plan complying with 8 CCR 3220 of the General Industry Safety Orders.

(2) Elements of an emergency response plan: The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following:

(A) Pre-emergency planning.

(B) Personnel roles, lines of authority, and communication.

(C) Emergency recognition and prevention.

(D) Safe distances and places of refuge.

(E) Site security and control.

(F) Evacuation routes and procedures.

(G) Decontamination procedures which are not covered by the site safety and health plan.

(H) Emergency medical treatment and first aid.

(I) Emergency alerting and response procedures.

(J) Critique of response and follow-up.

(K) Personal protective equipment (PPE) and emergency equipment.

(3) Procedures for handling emergency incidents.

(A) In addition to the elements for the emergency response plan required in subsection (l)(2), the following elements shall be included for emergency response plans:

1. Site topography, layout, and prevailing weather conditions.

2. Procedures for reporting incidents to local, state, and federal governmental agencies.

(B) The emergency response plan shall be a separate section of the Site Safety and Health Plan.

(C) The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.

(D) The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.

(E) The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.

(F) An employee alarm system shall be installed in accordance with 8 CCR, Ch. 4, Subch. 7, Article 165 of the General Industry Safety Orders to notify employees of an emergency situation, to stop work activities if necessary, to lower background noise in order to speed communication, and to begin emergency procedures.

(G) Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan.

(m) Illumination: Areas accessible to employees shall be lighted to not less than the minimum illumination intensities listed in Table H-1 while any work is in progress:

Table H-1
Minimum Illumination Intensities in Foot-Candles

Foot candles	*Area or operations*
5	General site areas.
3	Excavation and waste areas, accessways, active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors: Warehouses, corridors, hallways, and exitways.
5	Tunnels, shafts, and general underground work areas. (EXCEPTION: Minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Mine Safety and Health Administration approved cap lights shall be acceptable for use in the tunnel heading.)
10	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and workrooms.)
30	First aid stations, infirmaries, and offices.

(n) Sanitation at Temporary Workplaces.

(1) Potable water.

(A) An adequate supply of potable water shall be provided on the site.

(B) Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap, and shall be otherwise designed, constructed, and serviced so that sanitary conditions are maintained. Water shall not be dipped from containers.

(C) Any container used to store, dispense, or distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose.

(D) Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

(2) Nonpotable water.

(A) Outlets for nonpotable water, such as water for industrial or firefighting purposes, shall be identified to indicate clearly that the water is unsafe and is not to be used for drinking, washing, or cooking purposes.

(B) There shall be no cross-connection, open or potential, between a system furnishing potable water

and a system furnishing nonpotable water.

(3) Toilet facilities.

(A) A minimum of one separate toilet facility shall be provided for each 20 employees or fraction thereof of each sex. Such facilities may include both toilets and urinals provided that the number of toilets shall not be less than one half of the minimum required number of facilities.

EXCEPTION: Where there are less than 5 employees, separate toilet facilities for each sex are not required provided the toilet facilities can be locked from the inside and contain at least one toilet.

(B) Under temporary field conditions, provisions shall be made to assure that at least one toilet facility is available.

(C) Hazardous waste sites, not provided with a sanitary sewer, shall be provided with the following toilet facilities unless prohibited by local codes:

1. Chemical toilets;

2. Recirculating toilets;

3. Combustion toilets; or

4. Flush toilets.

(D) The requirements of this subsection for sanitation facilities shall not apply to mobile crews having transportation readily available to nearby toilet facilities.

(E) Doors entering toilet facilities shall be provided with entrance locks controlled from inside the facility.

(F) Toilet facilities shall be kept clean, maintained in good working order, and provided with an adequate supply of toilet paper.

(4) Food handling: All food service facilities and operations for employees shall meet the applicable laws, ordinances, and regulations of the jurisdictions in which they are located.

(5) Temporary sleeping quarters: When temporary sleeping quarters are provided, they shall be heated, ventilated, and lighted.

(6) Washing facilities: The employer shall provide adequate washing facilities for employees engaged in operations where hazardous substances may be harmful to employees. Such facilities shall be in near proximity to the worksite; in areas where exposures are below PELs and published exposure levels and which are under the control of the employer; and shall be so equipped as to enable employees to remove hazardous substances from themselves.

(7) Showers and change rooms: When hazardous waste clean-up or removal operations commence on a site and the duration of the work will require six months or greater time to complete, the employer shall provide showers and change rooms for all employees exposed to hazardous substances and health hazards involved in hazardous waste clean-up or removal operations.

(A) Showers shall be provided and shall meet the requirements of 8 CCR 3366(f).

(B) Change rooms shall be provided and shall meet the requirements of 8 CCR 3367. Change rooms shall consist of two separate change areas separated by the shower area required in subsection (n)(7)(A) of this section. One change area, with an exit leading off the worksite, shall provide employees with a clean area where they can remove, store, and put on street clothing. The second area, with an exit to the worksite, shall provide employees with an area where they can put on, remove, and store work clothing and personal protective equipment.

(C) Showers and change rooms shall be located in areas where exposures are below the PELs and published exposure levels. If this cannot be accomplished, then a ventilation system shall be provided that will supply air that is below the PELs and published exposure levels.

(D) Employers shall assure that employees shower at the end of their work shift and when leaving the hazardous waste site.

(o) New Technology Programs.

(1) The employer shall develop and implement procedures for the introduction of effective new technologies and equipment developed for the improved protection of employees working with hazardous waste clean-up operations, and the same shall be implemented as part of the site safety and health program to assure that employee protection is being maintained.

(2) New technologies, equipment, or control measures available to the industry, such as the use of foams, absorbents, adsorbents, neutralizers, or other means to suppress the level of air contaminants while excavating the site or for spill control, shall be evaluated by employers or their representatives. Such an evaluation shall be done to determine the effectiveness of the new methods, materials, or equipment before implementing their use on a large scale for enhancing employee protection. Information and data from manufacturers or suppliers may be used as part of the employer's evaluation effort. Such evaluations shall be made available to the Division upon request.

(p) Certain Operations Conducted Under the Resource Conservation and Recovery Act of 1976 (RCRA): Employers conducting operations at treatment, storage, and disposal (TSD) facilities specified in subsection (a)(1)(D) of this section shall provide and implement the programs specified in this subsection. (See the "NOTES AND EXCEPTIONS" to subsection (a)(2)(C) of this section for employers not covered.)

(1) Safety and health program: The employer shall develop and implement a written safety and health program for employees involved in hazardous waste operations that shall be available for inspection by employees, their representatives, and Division personnel. The program shall be designed to identify, evaluate, and control safety and health hazards in their facilities for the purpose of employee protection; to provide for emergency response meeting the requirements of subsection (p)(8) of this section; and to address as appropriate site analysis, engineering controls, maximum exposure limits, hazardous waste handling procedures, and uses of new technologies.

(2) Hazard communication program: The employer shall implement a hazard communication program meeting the requirements of 8 CCR 5194 as part of the employer's safety and health program.

NOTE TO 8 CCR 5192: The exemption for hazardous waste provided in 8 CCR 5194 is applicable to this section.

(3) Medical surveillance program: The employer shall develop and implement a medical surveillance program meeting the requirements of subsection (f) of this section.

(4) Decontamination program: The employer shall develop and implement a decontamination procedure in accordance with subsection (k) of this section.

(5) New technology program: The employer shall develop and implement procedures meeting the requirements of subsection (o) of this section for introducing new and innovative equipment into the workplace.

(6) Material handling program: Where employees will be handling drums or containers, the employer shall develop and implement procedures meeting the requirements of subsections (j)(1)(B) through (H), and (K) of this section, as well as (j)(3) and (j)(8) of this section prior to starting such work.

(7) Training program.

(A) New employees: The employer shall develop and implement a training program, which is part of the employer's safety and health program, for employees exposed to health hazards or hazardous substances at TSD operations to enable employees to perform their assigned duties and functions in a safe and healthful manner so as not to endanger themselves or other employees. The initial training shall be for 24 hours and refresher training shall be for eight hours annually. Employees who have received the initial training required by this subsection shall be given a written certificate attesting that they have successfully completed the necessary training.

(B) Current employees: Employers who can show by an employee's previous work experience and/or training that the employee has had training equivalent to the initial training required by this subsection, shall be considered as meeting the initial training requirements of this subsection with respect to that employee. Equivalent training includes the training that existing employees might have already received from actual site work experience. Current employees shall receive eight hours of refresher training annually.

(C) Trainers: Trainers who teach initial training shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, or they shall have the academic credentials and instruction experience necessary to demonstrate a good command of the subject matter of the courses and competent instructional skills.

(8) Emergency response program.

(A) Emergency response plan: An emergency response plan shall be developed and implemented by all employers. Such plans need not duplicate any of the subjects fully addressed in the employer's contingency planning required by permits, such as those issued by the U. S. Environmental Protection Agency, provided that the contingency plan is made part of the emergency response plan. The emergency response plan shall be a written portion of the employer's safety and health program required in subsection (p)(1) of this section. Employers who will evacuate their employees from the worksite location when an emergency occurs and who do not permit any of their employees to assist in handling the emergency are exempt from the requirements of subsection (p)(8) if they provide an emergency action plan complying with 8 CCR 3220.

(B) Elements of an emergency response plan: The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following areas to the extent that they are not

addressed in any specific program required in this subsection:

1. Pre-emergency planning and coordination with outside parties.

2. Personnel roles, lines of authority, and communication.

3. Emergency recognition and prevention.

4. Safe distances and places of refuge.

5. Site security and control.

6. Evacuation routes and procedures.

7. Decontamination procedures.

8. Emergency medical treatment and first aid.

9. Emergency alerting and response procedures.

10. Critique of response and follow-up.

11. Personal protective equipment (PPE) and emergency equipment.

(C) Training.

1. Training for emergency response employees shall be completed before they are called upon to perform in real emergencies. Such training shall include the elements of the emergency response plan, standard operating procedures the employer has established for the job, the PPE to be worn and procedures for handling emergency incidents.

EXCEPTION #1: An employer need not train all employees to the degree specified if the employer divides the work force in a manner such that a sufficient number of employees who have responsibility to control emergencies have the training specified, and all other employees, who may first respond to an emergency incident, have sufficient awareness training to recognize that an emergency response situation exists and that they are instructed in that case to summon the fully trained employees and not attempt control activities for which they are not trained.

EXCEPTION #2: An employer need not train all employees to the degree specified if arrangements have been made in advance for an outside fully-trained emergency response team to respond in a reasonable period and all employees, who may come to the incident first, have sufficient awareness training to recognize that an emergency response situation exists and they have been instructed to call the designated outside fully-trained emergency response team for assistance.

2. Employee members of TSD facility emergency response organizations shall be trained to a level of competence in the recognition of health and safety hazards to protect themselves and other employees. This would include training in the methods used to minimize the risk from safety and health hazards; in the safe use of control equipment; in the selection and use of appropriate personal protective equipment; in the safe operating procedures to be used at the incident scene; in the techniques of coordination with other employees to minimize risks; in the appropriate response to over- exposure from health hazards or

injury to themselves and other employees; and in the recognition of subsequent symptoms which may result from over-exposures.

3. The employer shall certify that each covered employee has attended and successfully completed the training required in subsection (p)(8)(C) of this section, or shall certify the employee's competency at least yearly. The method used to demonstrate competency for certification of training shall be recorded and maintained by the employer.

(D) Procedures for handling emergency incidents.

1. In addition to the elements for the emergency response plan required in subsection (p)(8)(B) of this section, the following elements shall be included for emergency response plans to the extent that they do not repeat any information already contained in the emergency response plan:

a. Site topography, layout, and prevailing weather conditions.

b. Procedures for reporting incidents to local, state, and federal governmental agencies.

2. The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.

3. The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.

4. The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.

5. An employee alarm system shall be installed in accordance with 8 CCR 6184 to notify employees of an emergency situation; to stop work activities if necessary; to lower background noise in order to speed communication; and to begin emergency procedures.

6. Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan.

(q) Emergency Response to Hazardous Substance Releases: This subsection covers employers whose employees are engaged in emergency response no matter where it occurs except that it does not cover employees engaged in operations specified in subsections (a)(1)(A) through (a)(1)(D) of this section. Those emergency response organizations who have developed and implemented programs equivalent to this subsection for handling releases of hazardous substances pursuant to Section 303 of the Superfund Amendments and Reauthorization Act of 1986 (Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. 11003) shall be deemed to have met the requirements of this subsection.

(1) Emergency response plan: An emergency response plan shall be developed and implemented to handle anticipated emergencies prior to the commencement of emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, and Division personnel. Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this subsection if they provide an emergency action plan in accordance with 8 CCR 3220.

(2) Elements of an emergency response plan: The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following to the extent that they are not addressed elsewhere:

(A) Pre-emergency planning and coordination with outside parties.

(B) Personnel roles, lines of authority, training, and communication.

(C) Emergency recognition and prevention.

(D) Safe distances and places of refuge.

(E) Site security and control.

(F) Evacuation routes and procedures.

(G) Decontamination.

(H) Emergency medical treatment and first aid.

(I) Emergency alerting and response procedures.

(J) Critique of response and follow-up.

(K) Personal protective equipment (PPE) and emergency equipment.

(L) Emergency response organizations may use the local emergency response plan or the state emergency response plan or both, as part of their emergency response plan, to avoid duplication. Those items of the emergency response plan that are being properly addressed by the SARA Title III plans may be substituted into their emergency plan or otherwise kept together for the employer and employee's use.

(3) Procedures for handling emergency response.

(A) The senior emergency response official who has ultimate site control responsibility shall confirm that the Incident Command System (ICS) is in place and the position of Incident Commander (IC) instituted.

All emergency responders and their communications shall be coordinated and controlled through the ICS.

NOTE TO (q)(3)(A): The "senior official" at an emergency response is the most senior official on the site who has the responsibility for controlling the operations at the site until the emergency response official who is determined to have ultimate incident control authority arrives. Initially it is the senior officer on the first-due piece of responding emergency apparatus to arrive on the incident scene, usually a police or fire vehicle. As more senior officials arrive the position is passed up the line of authority which has been previously established. As there may be several separate spheres of responsibility at a given site (police, fire, CalTrans, for example), there may be several "senior officials," each responsible for his/her own employees. The "senior emergency response official" who will have ultimate site control responsibility is established in the Hazardous Material Incident Contingency Plan for the State of California (January 1991), promulgated by the State Office of Emergency Services (OES) as directed by

Health and Safety Code, Sec. 25503 (HS 25503), and California Code of Regulations, Title 19, Division 2 (19 CCR, Div. 2: Office of Emergency Services) and in coordination with the various city and county, i.e., area emergency response plans.

(B) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures, and use of any new technologies.

(C) Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations, and assure that the PPE worn is appropriate for the hazards to be encountered. However, PPE shall meet, at a minimum, the criteria contained in 8 CCR 3401-3408 when worn while performing fire fighting operations beyond the incipient stage for any incident.

(D) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus (SCBA) while engaged in emergency response, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees.

(E) The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site in those areas of potential or actual exposure to incident or site hazards, to those who are actively performing emergency operations. However, operations in hazardous areas shall be performed using the buddy system in groups of two or more.

(F) Back-up personnel shall stand by with equipment ready to provide assistance or rescue, and shall not engage in activities that will detract from that mission. Back-up personnel shall be protected, at a minimum, as the same level as the entry team. Advance first aid support personnel, at a minimum, shall also stand by with medical equipment and transportation capability.

(G) The individual in charge of the ICS shall designate a safety official, who is knowledgeable in the operations being implemented at the emergency response site, with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

(H) When activities are judged by the safety official to be an IDLH condition and/or to involve an imminent danger condition, the safety official shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.

(I) After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.

(J) When deemed necessary for meeting the tasks at hand, approved SCBA may be used with approved cylinders from other approved SCBA, provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with SCBA shall meet U. S. Department of Transportation (DOT) and National Institute for Occupational Safety and Health (NIOSH) criteria.

(4) Skilled support personnel: Personnel, not necessarily an employer's own employees, who are skilled in the operation of certain equipment, such as mechanized earth moving or digging equipment or crane

and hoisting equipment, and who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by an employer's own employees, and who will be or may be exposed to the hazards at an emergency response scene, are not required to meet the training required in this subsection for the employer's regular employees.

However, these personnel shall be given an initial briefing at the site prior to their participation in any emergency response. The initial briefing shall include instruction in the wearing of appropriate personal protective equipment, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to the employer's own employees shall be used to assure the safety and health of these support personnel.

(5) Specialist employees: Employees who, in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge, shall receive training or demonstrate competency in the area of their specialization annually.

(6) Training: Training shall be based on the duties and function to be performed by each responder of an emergency response organization. The skill and knowledge levels required for all new responders (those hired after the effective date of this standard) shall be conveyed to them through training before they are permitted to take part in actual emergency operations on an incident. Employees who participate, or are expected to participate, in emergency response, shall be given training in accordance with the following subsections:

(A) First Responder, Awareness Level (FRA): First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas:

1. An understanding of what hazardous substances are, and the risks associated with them in an incident.

2. An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.

3. The ability to recognize the presence of hazardous substances in an emergency.

4. The ability to identify the hazardous substances, if possible.

5. An understanding of the role of the first responder awareness individual in the employer's emergency response plan (including site security and control), and the U. S. Department of Transportation's Emergency Response Guidebook.

6. The ability to realize the need for additional resources, and to make appropriate notifications to the communication center.

(B) First Responder, Operations Level (FRO): First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release.

Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level; and the employer shall so certify:

1. Knowledge of the basic hazard and risk assessment techniques.

2. Know how to select and use proper PPE provided to the first responder operational level.

3. An understanding of basic hazardous materials terms.

4. Know how to perform basic control, containment, and/or confinement operations and rescue injured or contaminated persons within the capabilities of the resources and PPE available with their unit.

5. Know how to implement basic equipment, victim, and rescue personnel decontamination procedures.

6. An understanding of the relevant standard operating procedures and termination procedures.

(C) Hazardous Materials Technician: Hazardous materials technicians are individuals who respond to releases or potential releases of hazardous substances for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch, or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training of which 8 hours shall be equivalent to the first responder operations level and in addition have competency in the following areas; and the employer shall so certify:

1. Know how to implement the employer's emergency response plan.

2. Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment.

3. Be able to function within an assigned role in the ICS.

4. Know how to select and use proper specialized chemical PPE provided to the hazardous materials technician.

5. Understand hazard and risk assessment techniques.

6. Be able to perform advanced control, containment, and/or confinement operations and rescue injured or contaminated persons within the capabilities of the resources and PPE available with the unit.

7. Understand and implement equipment, victim, and rescue personnel decontamination procedures.

8. Understand termination procedures.

9. Understand basic chemical and toxicological terminology and behavior.

(D) Hazardous Materials Specialist: Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various

substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local, and other government authorities in regards to site activities. Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas; and the employer shall so certify:

1. Know how to implement the local emergency response plan.

2. Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.

3. Know of the state emergency response plan.

4. Be able to select and use proper specialized chemical PPE provided to the hazardous materials specialist.

5. Understand in-depth hazard and risk techniques.

6. Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and PPE available.

7. Be able to determine and implement decontamination procedures.

8. Have the ability to develop a site safety and health control plan.

9. Understand chemical, radiological, and toxicological terminology and behavior.

(E) Incident Commander/On-scene Manager: Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas; and the employer shall so certify:

1. Know and be able to implement the employer's incident command system.

2. Know how to implement the employer's emergency response plan.

3. Know and understand the hazards and risks associated with employees working in chemical protective clothing.

4. Know how to implement the local emergency response plan.

5. Know of the state emergency response plan and of the Federal Regional Response Team.

6. Know and understand the importance of decontamination procedures.

NOTE TO (q)(6)(E): Management personnel who, during an emergency situation, stay out of the hazardous area and who are not taking charge of the incident, and are not a "specialist" employee under subsection (q)(5) of this section are not subject to the provisions of this section.

(7) Trainers: Trainers who teach any of the above training subjects shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the

California Specialized Training Institute, the California State Fire Marshal's Office, the University of California, or the U. S. National Fire Academy; or they shall have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach.

(8) Refresher training.

(A) Those employees who are trained in accordance with subsection (q)(6) of this section shall receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate competency in those areas at least yearly.

(B) A statement shall be made of the training or competency; and if a statement of competency is made, the employer shall keep a record of the methodology used to demonstrate competency.

(9) Medical surveillance and consultation.

(A) Members of an organized and designated HAZMAT team, and hazardous materials specialists shall receive a baseline physical examination and be provided with medical surveillance as required in subsection (f) of this section.

(B) Any emergency response employee who exhibits signs or symptoms which may have resulted from exposure to hazardous substances during the course of an emergency incident, either immediately or subsequently, shall be provided with medical consultation as required in subsection (f)(3)(B) of this section.

(10) Chemical protective clothing: Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists shall meet the requirements of subsections (g)(3) through (5) of this section.

(11) Post-emergency response operations: Upon completion of the emergency response, if it is determined that it is necessary to remove hazardous substances, health hazards, and materials contaminated with them (such as contaminated soil or other elements of the natural environment) from the site of the incident, the employer conducting the clean-up shall comply with one of the following:

(A) Meet all of the requirements of subsections (b) through (o) of this section; or

(B) Where the clean-up is done on plant property using plant or workplace employees, such employees shall have completed the training requirements of the following: 8 CCR 3220, 8 CCR 5144, 8 CCR 5194, and other appropriate safety and health training made necessary by the tasks that they are expected to perform such as the use of PPE, and decontamination procedures. All equipment to be used in the performance of the clean-up work shall be in serviceable condition and shall have been inspected prior to use.

NOTE: Authority cited: Sections 142.3 and 142.7, Labor Code. Reference: Sections 142.3 and 142.7, Labor Code.

Appendix A
Appendix B
Appendix C
Appendix D

HISTORY

1. New section including Appendices A-D filed 8-26-91; operative 9-25-91 (Register 92, No. 12).

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Subchapter 7. General Industry Safety Orders
Group 16. Control of Hazardous Substances
Article 109. Hazardous Substances and Processes

New query

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§5192. Hazardous Waste Operations and Emergency Response, Appendix A

Appendices to 5192

Hazardous Waste Operations and Emergency Response

NOTE: The following appendices serve as non-mandatory guidelines to assist employees and employers in complying with the appropriate requirements of this section. However, subsection 5192(g) makes mandatory in certain circumstances the use of Level A and Level B PPE protection.

Personal Protective Equipment (PPE) Test Methods

(Non-Mandatory)

This appendix sets forth the non-mandatory examples of tests which may be used to evaluate compliance with subsections (g)(4)(B) and (C). Other tests and other challenge agents may be used to evaluate compliance.

A. Totally-encapsulating chemical protective suit pressure test.

1.0 -- Scope.

1.1 This practice measures the ability of a gas tight totally- encapsulating chemical protective suit material, seams, and closures to maintain a fixed positive pressure. The results of this practice allow the gas tight integrity of a totally-encapsulating chemical protective suit to be evaluated.

1.2 Resistance of the suit materials to permeation, penetration, and degradation by specific hazardous substances is not determined by this test method.

2.0 -- Definition of terms.

2.1 "Totally-encapsulated chemical protective suit (TECP suit)" means a full body garment which is constructed of protective clothing materials; covers the wearer's torso, head, arms, legs and respirator; may cover the wearer's hands and feet with tightly attached gloves and boots; completely encloses the wearer and respirator by itself or in combination with the wearer's gloves and boots.

2.2 "Protective clothing material" means any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with potentially hazardous liquid or gaseous chemicals.

2.3 "Gas tight" means, for the purpose of this test method, the limited flow of a gas under pressure from

the inside of a TECP suit to atmosphere at a prescribed pressure and time interval.

3.0 -- Summary of test method.

3.1 The TECP suit is visually inspected and modified for the test. The test apparatus is attached to the suit to permit inflation to the pre-test suit expansion pressure for removal of suit wrinkles and creases. The pressure is lowered to the test pressure and monitored for three minutes. If the pressure drop is excessive, the TECP suit fails the test and is removed from service. The test is repeated after leak location and repair.

4.0 -- Required Supplies.

4.1 Source of compressed air.

4.2 Test apparatus for suit testing including a pressure measurement device with a sensitivity of at least 1/4 inch water gauge.

4.3 Vent valve closure plugs or sealing tape.

4.4 Soapy water solution and soft brush.

4.5 Stop watch or appropriate timing device.

5.0 -- Safety Precautions.

5.1 Care shall be taken to provide the correct pressure safety devices required for the source of compressed air used.

6.0 -- Test procedure.

6.1 Prior to each test, the tester shall perform a visual inspection of the suit. Check the suit for seam integrity by visually examining the seams and gently pulling on the seams. Ensure that all air supply lines, fittings, visor, zippers, and valves are secure and show no signs of deterioration.

6.1.1 Seal off the vent valves along with any other normal inlet or exhaust points (such as umbilical air line fittings or face piece opening) with tape or other appropriate means (caps, plugs, fixture, etc.). Care should be exercised in the sealing process not to damage any of the suit components.

6.1.2 Close all closure assemblies.

6.1.3 Prepare the suit for inflation by providing an improvised connection point on the suit for connecting an airline. Attach the pressure test apparatus to the suit to permit suit inflation from a compressed air source equipped with a pressure indicating regulator. The leak tightness of the pressure test apparatus should be tested before and after each test by closing off the end of the tubing attached to the suit and assuring a pressure of three inches water gauge for three minutes can be maintained. If a component is removed for the test, that component shall be replaced and a second test conducted with another component removed to permit a complete test of the ensemble.

6.1.4 The pre-test expansion pressure (A) and the suit test pressure (B) shall be supplied by the suit manufacturer but in no case shall they be less than: (A) = 3 inches water gauge; and (B) = 2 inches water

gauge. The ending suit pressure (C) shall be no less than 80 percent of the test pressure (B); i.e., the pressure drop shall not exceed 20 percent of the test pressure (B).

6.1.5 Inflate the suit until the pressure inside is equal to pressure (A), the pre-test expansion suit pressure. Allow at least one minute to fill out the wrinkles in the suit. Release sufficient air to reduce the suit pressure to pressure (B), the suit test pressure. Begin timing. At the end of three minutes, record the suit pressure as pressure (C), the ending suit pressure. The difference between the suit test pressure and the ending suit test pressure (B-C) shall be defined as the suit pressure drop.

6.1.6 If the suit pressure drop is more than 20 percent of the suit test pressure (B) during the three-minute test period, the suit fails the test and shall be removed from service.

7.0 -- Retest Procedure.

7.1 If the suit fails the test, check for leaks by inflating the suit to pressure (A) and brushing or wiping the entire suit (including seams, closures, lens gaskets, glove-to-sleeve joints, etc.) with a mild soap and water solution. Observe the suit for the formation of soap bubbles, which is an indication of a leak. Repair all identified leaks.

7.2 Retest the TECP suit as outlined in Test Procedure 6.0.

8.0 -- Report.

8.1 Each TECP suit tested by this practice shall have the following information recorded:

8.1.1 Unique identification number identifying brand name, date of purchase, material of construction, and unique fit features, e.g., special breathing apparatus.

8.1.2 The actual values for test pressures (A), (B), and (C) shall be recorded along with the specific observation times. If the ending pressure (C) is less than 80 percent of the test pressure (B), the suit shall be identified as failing the test. When possible, the specific leak location shall be identified in the test records. Retest pressure data shall be recorded as an additional test.

8.1.3 The source of the test apparatus used shall be identified and the sensitivity of the pressure gauge shall be recorded.

8.1.4 Records shall be kept for each pressure test even if repairs are being made at the test location.

CAUTION

Visually inspect all parts of the suit to be sure they are positioned correctly and secured tightly before putting the suit back into service. Special care should be taken to examine each exhaust valve to make sure it is not blocked.

Care should also be exercised to assure that the inside and outside of the suit is completely dry before it is put into storage.

B. Totally-encapsulated chemical protective suit qualitative leak test.

1.0 -- Scope.

1.1 This practice semi-qualitatively tests gas tight totally- encapsulating chemical protective suit integrity by detecting inward leakage of ammonia vapor. Since no modifications are made to the suit to carry out this test, the results from this practice provide a realistic test for the integrity of the entire suit.

1.2 Resistance of the suit materials to permeation, penetration, and degradation is not determined by this test method. ASTM test methods are available to test suit materials for these characteristics and the tests are usually conducted by the manufacturers of the suits.

2.0 - Definition of terms.

2.1 "Totally-encapsulated chemical protective suit (TECP suit)" means a full body garment which is constructed of protective clothing materials; covers the wearer's torso, head, arms, legs and respirator; may cover the wearer's hands and feet with tightly attached gloves and boots; completely encloses the wearer and respirator by itself or in combination with the wearer's gloves and boots.

2.2 "Protective clothing material" means any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with potentially hazardous liquid or gaseous chemicals.

2.3 "Gas tight" means, for the purpose of this test method, the limited flow of a gas under pressure from the inside of a TECP suit to atmosphere at a prescribed pressure and time interval.

2.4 "Intrusion Coefficient" means a number expressing the level of protection provided by a gas tight totally-encapsulating chemical protective suit. The intrusion coefficient is calculated by dividing the test room challenge agent concentration by the concentration of challenge agent found inside the suit. The accuracy of the intrusion coefficient is dependent on the challenge agent monitoring methods. The larger the intrusion coefficient the greater the protection provided by the TECP suit.

3.0 -- Summary of recommended practice.

3.1 The volume of concentrated aqueous ammonia solution (ammonium hydroxide, NH4OH) required to generate the test atmosphere is determined using the directions outlined in 6.1. The suit is donned by a person wearing the appropriate respiratory equipment (either positive-pressure self-contained breathing apparatus or a positive-pressure supplied air respirator) and worn inside the enclosed test room. The concentrated aqueous ammonia solution is taken by the suited individual into the test room and poured into an open plastic pan. A two-minute evaporation period is observed before the test room concentration is measured using a high range ammonia length of stain detector tube. When the ammonia vapor reaches a concentration of between 1000 and 1200 ppm, the suited individual starts a standardized exercise protocol to stress and flex the suit. After this protocol is completed, the test room concentration is measured again. The suited individual exits the test room and his stand-by person measures the ammonia concentration inside the suit using a low range ammonia length of stain detector tube or other more sensitive ammonia detector.

A stand-by person is required to observe the test individual during the test procedure; aid the person in donning and doffing the TECP suit; and monitor the suit interior. The intrusion coefficient of the suit can be calculated by dividing the average test area concentration by the interior suit concentration. A colorimetric ammonia indicator strip of bromophenol blue or equivalent is placed on the inside of the suit face piece lens so that the suited individual is able to detect a color change and know if the suit has a significant leak. If a color change is observed the individual shall leave the test room immediately.

4.0 -- Required supplies.

4.1 A supply of concentrated aqueous ammonium hydroxide (58% ammonia by weight).

4.2 A supply of bromophenol blue indicating paper or equivalent, sensitive to 5-10 ppm ammonia or greater over a two-minute period of exposure. (pH 3.0 (yellow) to pH 4.6 (blue))

4.3 A supply of high range (0.5-10 volume percent) and low range (5-700 ppm) detector tubes for ammonia and the corresponding sampling pump. More sensitive ammonia detectors can be substituted for the low range detector tubes to improve the sensitivity of this practice.

4.4 A shallow plastic pan (PVC) at least 12":14":1" and a half pint plastic container (PVC) with tightly closing lid.

4.5 A graduated cylinder or other volumetric measuring device of at least 50 milliliters in volume with an accuracy of at least +1 milliliters.

5.0 -- Safety precautions.

5.1 Concentrated aqueous ammonium hydroxide, NH4OH, is a corrosive volatile liquid requiring eye, skin, and respiratory protection. The person conducting the test shall review the MSDS for aqueous ammonia.

5.2 Since the established short term exposure limit (STEL) for ammonia is 35 ppm as a 15 minute STEL, only persons wearing positive pressure self-contained breathing apparatus or a positive pressure supplied air respirator shall be in the chamber. Normally only the person wearing the totally-encapsulating suit will be inside the chamber. A stand-by person shall have a positive pressure self-contained breathing apparatus, or a positive pressure supplied air respirator available to enter the test area should the suited individual need assistance.

5.3 A method to monitor the suited individual must be used during this test. Visual contact is the simplest but other methods using communication devices are acceptable.

5.4 The test room shall be large enough to allow the exercise protocol to be carried out and then to be ventilated to allow each exhaust of the ammonia test atmosphere after the test(s) are completed.

5.5 Individuals shall be medically screened for the use of respiratory protection and checked for allergies to ammonia before participating in this test procedure.

6.0 --Test procedure.

6.1.1 Measure the test area to the nearest foot and calculate its volume in cubic feet. Multiply the test area volume by 0.2 milliliters of concentrated aqueous ammonia solution per cubic foot of test area volume to determine the approximate volume of concentrated aqueous ammonia required to generate 1000 ppm in the test area.

6.1.2 Measure this volume from the supply of concentrated aqueous ammonia and place it into a closed plastic container.

6.1.3 Place the container, several high range ammonia detector tubes, and the pump in the clean test pan

and locate it near the test area entry door so that the suited individual has easy access to these supplies.

6.2.1 In a non-contaminated atmosphere, open a pre-sealed ammonia indicator strip and fasten one end of the strip to the inside of suit face shield lens where it can be seen by the wearer. Moisten the indicator strip with distilled water. Care shall be taken not to contaminate the detector part of the indicator paper by touching it. A small piece of masking tape or equivalent should be used to attach the indicator strip to the interior of the suit face shield.

6.2.2 If problems are encountered with this method of attachment, the indicator strip can be attached to the outside of the respirator face piece lens being used during the test.

6.3 Don the respiratory protective device normally used with the suit, and then don the TECP suit to be tested. Check to be sure all openings which are intended to be sealed (zippers, gloves, etc.) are completely sealed. DO NOT, however, plug off any venting valves.

6.4 Step into the enclosed test room such as a closet, bathroom, or test booth, equipped with an exhaust fan. No air should be exhausted from the chamber during the test because this will dilute the ammonia challenge concentrations.

6.5 Open the container with the pre-measured volume of concentrated aqueous ammonia within the enclosed test room, and pour the liquid into the empty plastic test pan. Wait two minutes to allow for adequate volatilization of the concentrated aqueous ammonia. A small mixing fan can be used near the evaporation pan to increase the evaporation rate of the ammonia solution.

6.6 After two minutes a determination of the ammonia concentration within the chamber should be made using the high range colorimetric detector tube. A concentration of 1000 ppm ammonia or greater shall be generated before the exercises are started.

6.7 To test the integrity of the suit the following four-minute exercise protocol should be followed:

6.7.1 Raising the arms above the head with at least 15 raising motions completed in one minute.

6.7.2 Walking in place for one minute with at least 15 raising motions of each leg in a one-minute period.

6.7.3 Touching the toes with at least 10 complete motions of the arms from above the head to touching of the toes in a one-minute period.

6.7.4 Deep knee bends with at least 10 complete standing and squatting motions in a one-minute period.

6.8 If at any time during the test the colorimetric indicating paper should change colors, the test should be stopped and section 6.10 and 6.12 initiated. (See paragraph 4.2).

6.9 After completion of the test exercise, the test area concentration should be measured again using the high range colorimetric detector tube.

6.10 Exit the test area.

6.11 The opening created by the suit zipper or other appropriate suit penetration should be used to determine the ammonia concentration in the suit with the low range length of stain detector tube or other

ammonia monitor. The internal TECP suit air should be sampled far enough from the enclosed test area to prevent a false ammonia reading.

6.12 After completion of the measurement of the suit interior ammonia concentration the test is concluded and the suit is doffed and the respirator removed.

6.13 The ventilating fan for the test room should be turned on and allowed to run for enough time to remove the ammonia gas. The fan shall be vented to the outside of the building.

6.14 Any detectable ammonia in the suit interior (five ppm ammonia (NH3) or more for the length of stain detector tube) indicates that the suit has failed the test. When other ammonia detectors are used a lower level of detection is possible, and it should be specified as the pass/fail criteria.

6.15 By following this test method, an intrusion coefficient of approximately 200 or more can be measured with the suit in a completely operational condition. If the intrusion coefficient is 200 or more, then the suit is suitable for emergency response and field use.

7.0 -- Retest procedures.

7.1 If the suit fails this test, check for leaks by following the pressure test in test A above.

7.2 Retest the TECP suit as outlined in the test procedure 6.0.

8.0 -- Report.

8.1 Each gas tight totally-encapsulating chemical protective suit tested by this practice shall have the following information recorded.

8.1.1 Unique identification number identifying brand name, date of purchase, material of construction, and unique suit features, e.g., special breathing apparatus.

8.1.2 General description of test room used for test.

8.1.3 Brand name and purchase date of ammonia detector strips and color change data.

8.1.4 Brand name, sampling range, and expiration date of the length of stain ammonia detector tubes. The brand name and model of the sampling pump should also be recorded. If another type of ammonia detector is used, it should be identified along with its minimum detection limit for ammonia.

8.1.5 Actual test results shall list the two test area concentrations, their average, the interior suit concentration, and the calculated intrusion coefficient. Retest data shall be recorded as an additional test.

8.2 The evaluation of the data shall be specified as "suit passed" or "suit failed" and the date of the test. Any detectable ammonia (five ppm or greater for the length of stain detector tube) in the suit interior indicates the suit has failed this test. When other ammonia detectors are used, a lower level of detection is possible and it should be specified as the pass/fail criteria.

CAUTION

Visually inspect all parts of the suit to be sure they are positioned correctly and secured tightly before

putting the suit back into service. Special care should be taken to examine each exhaust valve to make sure it is not blocked.

Care should also be exercised to assure that the inside and outside of the suit is completely dry before it is put into storage.

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§5192. Hazardous Waste Operations and Emergency Response, Appendix B

Appendices to 5192

Hazardous Waste Operations and Emergency Response

NOTE: The following appendices serve as non-mandatory guidelines to assist employees and employers in complying with the appropriate requirements of this section. However, subsection 5192(g) makes mandatory in certain circumstances the use of Level A and Level B PPE protection.

General Description and Discussion of the Levels of Protection and Protective Gear

(Non-Mandatory)

This appendix sets forth information about personal protective equipment (PPE) protection levels which may be used to assist employers in complying with the PPE requirements of this section.

As required by the standard, PPE must be selected which will protect employees from the specific hazards which they are likely to encounter during their work on-site.

Selection of the appropriate PPE is a complex process which must take into consideration a variety of factors. Key factors involved in this process are identification of the hazards, or suspected hazards; their routes of potential hazard to employees (inhalation, skin absorption, ingestion, and eye or skin contact); and the performance of the PPE materials (and seams) in providing a barrier to these hazards. The amount of protection provided by PPE is material-hazard specific. That is, protective equipment materials will protect well against some hazardous substances and poorly, or not at all, against others. In many instances, protective equipment materials cannot be found which will provide continuous protection from the particular hazardous substance. In these cases the breakthrough time of the protective material should exceed the work durations.

Other factors in this selection process to be considered are matching the PPE to the employee's work requirements and task-specific conditions. The durability of PPE materials, such as tear strength and seam strength, should be considered in relation to the employee's tasks. The effects of PPE in relation to heat stress and task duration are a factor in selecting and using PPE. In some cases layers of PPE may be necessary to provide sufficient protection, or to protect expensive PPE inner garments, suits or equipment.

The more that is known about the hazards at the site, the easier the job of PPE selection becomes. As more information about the hazards and conditions at the site becomes available, the site supervisor can make decisions to upgrade or downgrade the level of PPE protection to match the tasks at hand.

The following are guidelines which an employer can use to begin the selection of the appropriate PPE. As noted above, the site information may suggest the use of combinations of PPE selected from the different protection levels (i.e., A, B, C, or D) as being more suitable to the hazards of the work. It should be cautioned that the listing below does not fully address the performance of the specific PPE material in relation to the specific hazards at the job site, and that PPE selection, evaluation, and re-selection is an ongoing process until sufficient information about the hazards and PPE performance is obtained.

Part A. Personal protection equipment is divided into four categories based on the degree of protection afforded. (See Part B of this appendix for further explanation of Levels A, B, C, and D hazards):

I. Level A -- To be selected when the greatest level of skin, respiratory, and eye protection is required.

The following constitute Level A equipment; it may be used as appropriate.

1. Positive-pressure, full face-piece, self-contained breathing apparatus (SCBA), or positive pressure supplied-air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH).

2. Totally-encapsulating chemical-protective suit.

3. Coveralls.*

4. Long underwear.*

5. Gloves, outer, chemical-resistant.

6. Gloves, inner, chemical-resistant.

7. Boots, chemical-resistant, steel toe and shank.

8. Hard hat (under suit).*

9. Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit.)

II. Level B--The highest level of respiratory protection is necessary but a lesser level of skin protection is needed.

The following constitute Level B equipment; it may be used as appropriate.

1. Positive-pressure, fullface-piece, self-contained breathing apparatus (SCBA), or positive-pressure supplied-air respirator with escape SCBA (NIOSH approved).

2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).

3. Coveralls.*

4. Gloves, outer, chemical-resistant.

5. Gloves, inner, chemical-resistant.

6. Boots, outer, chemical-resistant steel toe and shank.

7. Boot-covers, outer, chemical-resistant (disposable).*

8. Hard hat.*

9. Face shield.*

III. Level C--The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met.

The following constitute Level C equipment; it may be used as appropriate.

1. Full-face or half-mask, air-purifying respirators (NIOSH approved).

2. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).

3. Coveralls.*

4. Gloves, outer, chemical-resistant.

5. Gloves, inner, chemical-resistant.

6. Boots (outer), chemical-resistant steel toe and shank.*

7. Boot-covers, outer, chemical-resistant (disposable).*

8. Hard hat.*

9. Escape mask.*

10. Face shield.*

IV. Level D--A work uniform affording minimal protection; used for nuisance contamination only.

The following constitute Level D equipment; it may be used as appropriate.

1. Coveralls.

2. Gloves.*

3. Boots/shoes, chemical-resistant steel toe and shank.

4. Boots, outer, chemical-resistant (disposable).*

5. Safety glasses or chemical splash goggles.*

6. Hard hat.*

7. Escape mask.*

8. Face shield.*

* Optional, as applicable.

Part B. The types of hazards for which levels A, B, C, and D protection are appropriate are described below:

I. Level A--Level A protection should be used when:

1. 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 skin.

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

3. Operations are being conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A have not yet been determined.

II. Level B--Level B protection should be used when:

1. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection; and/or

2. The atmosphere contains less than 19.5 percent oxygen; or

3. 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 skin.

NOTE: This involves atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards and that do not represent a severe skin hazard; or that do not meet the criteria for use of air-purifying respirators.

III. Level C--Level C protection should be used when:

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

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

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

IV. Level D--Level D protection should be used when:

1. The atmosphere contains no known hazard; and

2. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

NOTE: As stated before, combinations of personal protective equipment other than those described for Levels A, B, C, and D protection may be more appropriate and may be used to provide the proper level of protection.

As an aid in selecting suitable chemical protective clothing, it should be noted that the National Fire Protection Association has developed standards on chemical protective clothing, including:

NFPA 1991--Standard on Vapor-Protective Suits for Hazardous Chemical Emergencies (EPA Level A Protective Clothing)

NFPA 1992--Standard on Liquid Splash-Protective Suits for Hazardous Chemical Emergencies (EPA Level B Protective Clothing)

NFPA 1993--Standard on Support Function Protective Garments for Hazardous Chemical Operations (EPA Level B Protective Clothing)

These standards apply documentation and performance requirements to the manufacture of chemical protective suits. Chemical protective suits meeting these requirements are labelled as compliant with the appropriate standard. As these standards, have been adopted by the National Fire Protection Association, it is recommended that chemical protective suits which meet these standards be used.

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§5192. Hazardous Waste Operations and Emergency Response, Appendix C

Appendices to 5192

Hazardous Waste Operations and Emergency Response

NOTE: The following appendices serve as non-mandatory guidelines to assist employees and employers in complying with the appropriate requirements of this section. However, subsection 5192(g) makes mandatory in certain circumstances the use of Level A and Level B PPE protection.

Compliance Guidelines

(Non-Mandatory)

1. Occupational Safety and Health Program: Each hazardous waste site clean-up effort will require an occupational safety and health program headed by the site coordinator or the employer's representative. The purpose of the program will be the protection of employees at the site and will be an extension of the employer's overall safety and health program. The program will need to be developed before work begins on the site and implemented as work proceeds as stated in subsection (b). The program is to facilitate coordination and communication of safety and health issues among personnel responsible for the various activities which will take place at the site. The program will provide the means for identifying and controlling worksite hazards and the means for monitoring program effectiveness. It will provide the overall means for planning and implementing the needed safety and health training and job orientation of employees, who will be working at the site. The program will need to cover the responsibilities and authority of the site coordinator or the employer's manager on the site for the safety and health of employees at the site, and the relationships with contractors or support services as to what each employer's safety and health responsibilities are for their employees on the site. Each contractor on the site needs to have its own safety and health program so structured that it will smoothly interface with the program of the site coordinator or principal contractor.

Also those employers involved with treating, storing or disposal of hazardous waste as covered in subsection (p) must have implemented a safety and health program for their employees. This program is to include the hazard communication program required in subsection (p)(1) and the training required in subsections (p)(7) and (p)(8) as parts of the employer's comprehensive overall safety and health program. This program is to be in writing.

Each site or workplace safety and health program will need to include the following: (1) Policy statements of the line of authority and accountability for implementing the program, the objectives of the program, and the role of the site safety and health supervisor or manager and staff; (2) means or methods for the development of procedures for identifying and controlling workplace hazards at the site; (3) means or methods for the development and communication to employees of the various plans, work

rules, standard operating procedures and practices that pertain to individual employees and supervisors; (4) means for the training of supervisors and employees to develop the needed skills and knowledge to perform their work in a safe and healthful manner; (5) means to anticipate and prepare for emergency situations; and (6) means for obtaining information feedback to aid in evaluating the program and for improving the effectiveness of the program. The management and employees should be trying continually to improve the effectiveness of the program thereby enhancing the protection being afforded those working on the site.

Accidents on the site should be investigated to provide information on how such occurrences can be avoided in the future. When injuries or illnesses occur on the site or workplace, they will need to be investigated to determine what needs to be done to prevent this incident from occurring again. Such information will need to be used as feedback on the effectiveness of the program and the information turned into positive steps to prevent any reoccurrence. Receipt of employee suggestions or complaints relating to safety and health issues involved with site or workplace activities is also a feedback mechanism that can be used effectively to improve the program and may serve in part as an evaluative tool(s).

For the development and implementation of the program to be the most effective, professional safety and health personnel should be used. Personnel such as, but not necessarily limited to Certified Safety Professionals, Board Certified Industrial Hygienists, or Registered Professional Safety Engineers are good examples of professional stature for safety and health managers who will administer the employer's program.

2. Training: The training programs for employees subject to the requirements of subsection (e) of this standard should address: The safety and health hazards employees should expect to find on hazardous waste clean-up sites; what control measures or techniques are effective for those hazards; what monitoring procedures are effective in characterizing exposure levels; what makes an effective employer's safety and health program; what a site safety and health plan should include; hands on training with personal protective equipment and clothing they may be expected to use; the contents of the OSHA standard relevant to the employee's duties and function; and employee's responsibilities under OSHA and other regulations. Supervisors will need training in their responsibilities under the safety and health program and its subject areas such as the spill containment program, the personal protective equipment program, the medical surveillance program, the emergency response plan, and other areas.

The training programs for employees subject to the requirements of subsection (p) of this standard should address: The employer's safety and health program elements impacting employees; the hazard communication program; the medical surveillance program; the hazards and the controls for such hazards that employees need to know for their job duties and functions. All require annual refresher training.

The training programs for employees covered by the requirements of subsection (q) of this standard should address those competencies required for the various levels of response such as: The hazards associated with hazardous substances; hazard identification and awareness; notification of appropriate persons; the need for and use of personal protective equipment including respirators; the decontamination procedures to be used; preplanning activities for hazardous substance incidents including the emergency response plan; company standard operating procedures for hazardous substance emergency responses; the use of incident command system; and other subjects. Hands-on training should be stressed whenever possible. Critiques done after an incident which include an evaluation of what worked and what did not, and how could the incident be better handled the next time may be counted as training time.

For hazardous materials specialists (usually members of hazardous materials teams), the training should address the care, use, and/or testing of chemical protective clothing including totally encapsulating suits; the medical surveillance program; the standard operating procedures for the hazardous materials team including the use of plugging and patching equipment; and other subject areas.

Officers and leaders who may be expected to be in charge at an incident should be fully knowledgeable of their company's incident command system. They should know where and how to obtain additional assistance and be familiar with the local district's emergency response plan and the state emergency response plan.

Specialist employees such as technical experts, medical experts, or environmental experts that work with hazardous materials in their regular jobs, who may be sent to the incident scene by the shipper, manufacturer, or governmental agency to advise and assist the person in charge of the incident should have training on an annual basis. Their training should include the care and use of personal protective equipment (PPE) including respirators; knowledge of the incident command system and how they are to relate to it; and those areas needed to keep them current in their respective field as it relates to safety and health involving specific hazardous substances.

Those skilled support personnel, such as employees who work for public works departments or equipment operators who operate bulldozers, sand trucks, backhoes, etc., who may be called to the incident scene to provide emergency support assistance, should have at least a safety and health briefing before entering the area of potential or actual exposure. These skilled support personnel, who have not been a part of the emergency response plan and do not meet the training requirements, should be made aware of the hazards they face and should be provided all necessary protective clothing and equipment required for their tasks.

There are two National Fire Protection Association standards, NFPA 472--Standard for Professional Competence of Responders to Hazardous Material Incidents and NFPA 471--Recommended Practice for Responding to Hazardous Material Incidents, which are excellent resource documents to aid fire departments and other emergency response organizations in developing their training program materials. NFPA 472 provides guidance on the skills and knowledge needed for first responder awareness level, first responder operations level, HAZMAT technicians, and HAZMAT specialists. It also offers guidance for the officer corps who will be in charge of hazardous substance incidents.

3. Decontamination: Decontamination procedures should be tailored to the specific hazards of the site and may vary in complexity and number of steps, depending on the level of hazard and the employee's exposure to the hazard. Decontamination procedures and PPE decontamination methods will vary depending upon the specific substance, since one procedure or method may not work for all substances. Evaluation of decontamination methods and procedures should be performed, as necessary, to assure that employees are not exposed to hazards by reusing PPE. References in Appendix D may be used for guidance in establishing an effective decontamination program. In addition, the U.S. Coast Guard's Manual, Policy Guidance for Response to Hazardous Chemical Releases, U.S. Department of Transportation, Washington, DC (COMDTINST M16465.30) is a good reference for establishing an effective decontamination program.

4. Emergency response plans: The state, along with designated districts within the state, will be developing or have developed local emergency response plans. These state and district plans should be utilized in the emergency response plans called for in this standard. Each employer should assure that its emergency response plan is compatible with the local plan. The major reference being used to aid in developing the state and local district plans is the Hazardous Materials Emergency Planning Guide, NRT-1.

The current Emergency Response Guidebook from the U.S. Department of Transportation, CMA's CHEMTREC, and the Fire Service Emergency Management Handbook may also be used as resources.

Employers involved with treatment, storage, and disposal facilities for hazardous waste, which have the required contingency plan called for by their permit, would not need to duplicate the same planning elements. Those items of the emergency response plan that are properly addressed in the contingency plan may be substituted into the emergency response plan required in 8 CCR 5192 or otherwise kept together for employer and employee use.

5. Personal protective equipment programs: The purpose of personal protective clothing and equipment (PPE) is to shield or isolate individuals from the chemical, physical, and biologic hazards that may be encountered at a hazardous substance site.

As discussed in Appendix B, no single combination of protective equipment and clothing is capable of protecting against all hazards. Thus PPE should be used in conjunction with other protective methods and its effectiveness evaluated periodically. The use of PPE can itself create significant worker hazards, such as heat stress, physical and psychological stress, and impaired vision, mobility, and communication. For any given situation, equipment and clothing should be selected that provide an adequate level of protection. However, over-protection, as well as under- protection, can be hazardous and should be avoided where possible.

Two basic objectives of any PPE program should be to protect the wearer from safety and health hazards, and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. To accomplish these goals, a comprehensive PPE program should include hazard identification; medical monitoring; environmental surveillance; selection, use, maintenance, and decontamination of PPE; and its associated training.

The written PPE program should include policy statements, procedures, and guidelines. Copies should be made available to all employees, and a reference copy should be made available at the worksite. Technical data on equipment, maintenance manuals, relevant regulations, and other essential information should also be collected and maintained.

6. Incident command system (ICS): Subsection 5192(q)(3)(B) requires the implementation of an ICS. The ICS is an organized approach to effectively control and manage operations at an emergency incident. The individual in charge of the ICS is the senior official responding to the incident. The ICS was originated by the California fire service. During large complex fires involving several companies and many pieces of apparatus, a command post would be established. This enabled one individual to be in charge of managing the incident, rather than having several officers from different companies making separate, and sometimes conflicting, decisions. The individual in charge of the command post would delegate responsibility for performing various tasks to subordinate officers. Additionally, all communications were routed through the command post to reduce the number of radio transmissions and eliminate confusion. However, strategy, tactics, and all decisions were made by one individual.

The ICS is also implemented for emergency response to all incidents, both large and small, that involve hazardous substances.

For a small incident, the individual in charge of the ICS may perform many tasks of the ICS. There may not be any, or little, delegation of tasks to subordinates. For example, in response to a small incident, the individual in charge of the ICS, in addition to normal command activities, may become the safety officer.

To illustrate the operation of the ICS, the following scenario might develop during a small incident, such as an overturned tank truck with a small leak of flammable liquid.

The first responding senior officer would implement and take command of the ICS. That person would size-up the incident and determine if additional personnel and apparatus were necessary; would determine what actions to take to control the leak; and determine the proper level of personal protective equipment. If additional assistance is not needed, the individual in charge of the ICS would implement actions to stop and control the leak using the fewest number of personnel that can effectively accomplish the tasks. The individual in charge of the ICS then would designate himself as the safety officer and two other employees as a back-up in case rescue may become necessary. In this scenario, decontamination procedures may not be necessary.

A large complex incident may require many employees and difficult, time-consuming efforts to control. In these situations, the individual in charge of the ICS will want to delegate different tasks to subordinates in order to maintain a span of control that will keep the number of subordinates that are reporting, to a manageable level.

Delegation of tasks at large incidents may be by location, where the incident scene is divided into sectors, and subordinate officers coordinate activities within the sector that they have been assigned.

Delegation of tasks can also be by function. Five major functional areas (Incident Command, Operations, Planning, Logistic, and Finance) are activated at major incidents addressing such issues as: medical services; evacuation; water supply; resources (equipment, apparatus); media relations; safety; and site control (integrate activities with police for crowd and traffic control). Also for a large incident, the individual in charge of the ICS will designate several employees as back-up personnel; and a number of safety officers to monitor conditions and recommend safety precautions.

Therefore, no matter what size or complexity an incident may be, by implementing an ICS there will be one individual in charge who makes the decisions and gives directions; and, all actions, and communications are coordinated through one central point of command. Such a system should reduce confusion, improve safety, organize and coordinate actions, and should facilitate effective management of the incident.

The details of the ICS as well as several different scenarios are incorporated into the California Hazardous Material Incident Contingency Plan (HMICP) developed by the State's Office of Emergency Services (OES). The HMICP is written primarily for agencies of the State of California to guide them in understanding the state's role in hazardous material emergencies. Secondarily, the HMICP is anticipated to be utilized by local and federal governments, and private organizations to clarify their roles and relationships concerning hazardous material emergencies. This plan should be used for pre-incident planning; or during a hazardous material emergency for guidance and clarification where a state agency has responsibility (i.e., State Agency Coordination) or jurisdiction (i.e., on the right of way of a state highway), or the incident exceeds local resources beyond those of the SARA Title III Regional Plan.

7. Site Safety and Control Plans: The safety and security of response personnel and others in the area of an emergency response incident site should be of primary concern to the incident commander. The use of a site safety and control plan could greatly assist those in charge of assuring the safety and health of employees on the site.

A comprehensive site safety and control plan should include the following: Summary analysis of hazards on the site and a risk analysis of those hazards; site map or sketch; site work zones (clean zone,

transition or decontamination zone, work or hot zone); use of the buddy system; site communications; command post or command center; standard operating procedures and safe work practices; medical assistance and triage area; hazard monitoring plan (air contaminant monitoring, etc,); decontamination procedures and area; and other relevant areas. This plan should be a part of the employer's emergency response plan or an extension of it to the specific site.

8. Medical surveillance program: Workers handling hazardous substances may be exposed to toxic chemicals, safety hazards, biologic hazards, and radiation. Therefore, a medical surveillance program is essential to assess and monitor worker's health and fitness for employment in hazardous waste operations and during the course of work; to provide emergency and other treatment as needed; and to keep accurate records for future reference.

The Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities developed by the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (Federal OSHA), the U.S. Coast Guard (USCG), and the Environmental Protection Agency (EPA), October 1985, provides an excellent example of the types of medical testing that should be done as part of a medical surveillance program.

9. New Technology and Spill Containment Programs: Where hazardous substances may be released by spilling from a container that will expose employees to the hazards of the material, the employer will need to implement a program to contain and control the spilled material. Diking and ditching, as well as use of absorbents like diatomaceous earth, are traditional techniques which have proven to be effective over the years. However, in recent years new products have come into the marketplace, the use of which complement and increase the effectiveness of these traditional methods. These new products also provide emergency responders and other with additional tools or agents to use to reduce the hazards of spilled materials.

These agents can be rapidly applied over a large area and can be uniformly applied or otherwise can be used to build a small dam, thus improving the workers' ability to control spilled material. These application techniques enhance the intimate contact between the agent and the spilled material allowing for the quickest effect by the agent or quickest control of the spilled material. Agents are available to solidify liquid spilled materials, to suppress vapor generation from spilled materials, and to do both. Some special agents, which when applied as recommended by the manufacturer, will react in a controlled manner with the spilled material to neutralize acids or caustics, or greatly reduce the level of hazard of the spilled material.

There are several modern methods and devices for use by emergency response personnel or others involved with spill control efforts to safely apply spill control agents to control spilled material hazards. These include portable pressurized applicators similar to hand-held portable fire extinguishing devices, and nozzle and hose systems similar to portable fire fighting foam systems which allow the operator to apply the agent without having to come into contact with the spilled material. The operator is able to apply the agent to the spilled material from a remote position.

The solidification of liquids provides for rapid containment and isolation of hazardous substance spills. By directing the agent at run-off points or at the edges of the spill, the reactant solid will automatically create a barrier to slow or stop the spread of the material. Clean-up of hazardous substances is greatly improved when solidifying agents, acid or caustic neutralizers, or activated carbon adsorbents are used. Properly applied, these agents can totally solidify liquid hazardous substances or neutralize or absorb them, which results in materials which are less hazardous and easier to handle, transport, and dispose of. The concept of spill treatment, to create less hazardous substances, will improve the safety and level of protection of employees working at spill clean-up operations or emergency response operations to spills

of hazardous substances.

The use of vapor suppression agents for volatile hazardous substances, such as flammable liquids and those substances which present an inhalation hazard, is important for protecting workers. The rapid and uniform distribution of the agent over the surface of the spilled material can provide quick vapor knockdown. There are temporary and long-term foam-type agents which are effective on vapors and dusts, and activated carbon adsorption agents which are effective for vapor control and soaking-up of the liquid. The proper use of hose lines or hand-held portable pressurized applicators provides good mobility and permits the worker to deliver the agent from a safe distance without having to step into the untreated spilled material. Some of these systems can be recharged in the field to provide coverage of larger spill areas than the design limits of a single charged applicator unit. Some of the more effective agents can solidify the liquid flammable hazardous substances and at the same time elevate the flashpoint above 14°F so the resulting substance may be handled as a nonhazardous waste material if it meets the U.S. Environmental Protection Agency's 40 CFR Part 261 requirements (See particularly § 261.21).

All workers performing hazardous substance spill control work are expected to wear the proper protective clothing and equipment for the materials present and to follow the employer's established standard operating procedures for spill control. All involved workers need to be trained in the established operating procedures; in the use and care of spill control equipment; and in the associated hazards and control of such hazards of spill containment work.

These new tools and agents are the things that employers will want to evaluate as part of their new technology program. The treatment of spills of hazardous substances or wastes at an emergency incident as part of the immediate spill containment and control efforts is sometimes acceptable to EPA and a permit exception is described in 40 CFR § 264.1(g)(8) and 265.1(c)(11).

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Subchapter 7. General Industry Safety Orders
Group 16. Control of Hazardous Substances
Article 109. Hazardous Substances and Processes

New query

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§5192. Hazardous Waste Operations and Emergency Response, Appendix D

Appendices to 5192

Hazardous Waste Operations and Emergency Response

NOTE: The following appendices serve as non-mandatory guidelines to assist employees and employers in complying with the appropriate requirements of this section. However, subsection 5192(g) makes mandatory in certain circumstances the use of Level A and Level B PPE protection.

References

(Non-Mandatory)

The following references may be consulted for further information on the subject of this standard:

1. OSHA Instruction DFO CPL 2.70 - January 29, 1986: Special Emphasis Program: Hazardous Waste Sites.

2. OSHA Instruction DFO CPL 2-2.37A - January 29, 1986: Technical Assistance and Guidelines for Superfund and Other Hazardous Waste Site Activities.

3. OSHA Instruction DTS CPL 2.74 - January 29, 1986: Hazardous Waste Activity Form, OSHA 175.

4. Hazardous Waste Inspections Reference Manual; U.S. Department of Labor, Occupational Safety and Health Administration, 1986.

5. Memorandum of Understanding Among the National Institute for Occupational Safety and Health, the Occupational Safety and Health Administration, the United States Coast Guard, and the United States Environmental Protection Agency: Guidance for Worker Protection During Hazardous Waste Site Investigations and Clean-up and Hazardous Substance Emergencies, December 18, 1980.

6. National Priorities List, 1st Edition; October 1984; U.S. Environmental Protection Agency, revised periodically.

7. The Decontamination of Response Personnel; Field Standard Operating Procedures (F.S.O.P.) 7; U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Hazardous Response Support Division, December 1984.

8. Preparation of a Site Safety Plan; Field Standard Operating Procedures (F.S.O.P.) 9; U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Hazardous Response

Support Division, April 1984.

9. Standard Operating Safety Guidelines; U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Hazardous Response Support Division, Environmental Response Team; November 1984.

10. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities; National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), U.S. Coast Guard (USCG), and Environmental Protection Agency (EPA); October 1985.

11. Protecting Health and Safety at Hazardous Waste Sites: An overview; U.S. Environmental Protection Agency, EPA/625/9-85/006; September 1985.

12. Hazardous Waste Sites and Hazardous Substance Emergencies; NIOSH Worker Bulletin, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health; December 1982.

13. Personal Protective Equipment for Hazardous Materials Incidents: A Selection Guide; U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health; October 1984.

14. Fire Service Emergency Management Handbook; International Association of Fire Chiefs Foundation, 101 East Holly Avenue, Unit 108, Sterling, VA 22170; January, 1985.

15. Emergency Response Guidebook; U.S. Department of Transportation, Washington, DC, 1990.

16. Report to the Congress on Hazardous Materials Training, Planning and Preparedness; Federal Emergency Management Agency, Washington, DC, July 1986.

17. Workbook for Fire Command; Alan V. Brunacini and J. David Beageron, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269, 1985.

18. Site Emergency Response Planning; Chemical Manufacturers Association, Washington, DC 20037, 1986.

19. Hazardous Materials Emergency Planning Guide; NRT-1, Environmental Protection Agency, Washington, DC, March 1987.

20. Community Teamwork: Working Together to Promote Hazardous Materials Transportation Safety; U.S. Department of Transportation, Washington, DC, May 1983.

21. Disaster Planning Guide for Business and Industry; Federal Emergency Management Agency, Publication No. FEMA 141, August 1987.

22. Hazardous Materials Medical Management Protocols; State Emergency Medical Services Authority, Publication #231, March 1989; 1030 15th Street, Suite 302, Sacramento, CA 95814.

23. Hazardous Material Incident Contingency Plan; Office of Emergency Services, Hazardous Materials Division, Sacramento; January 1991.

24. Hazardous Materials Handbook; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NOTE: Authority cited: Sections 142.3 and 142.7, Labor Code. Reference: Sections 142.3 and 142.7, Labor Code.

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APPENDIX K

UNITED STATES AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY FACT SHEETS

ARSENIC FACT SHEET

HIGHLIGHTS: Exposure to higher than average levels of arsenic occurs mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found at 1,014 of the 1,598 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Organic arsenic compounds are used as pesticides, primarily on cotton plants.

What happens to arsenic when it enters the environment?

- Arsenic cannot be destroyed in the environment. It can only change its form.
- Arsenic in air will settle to the ground or is washed out of the air by rain.
- Many arsenic compounds can dissolve in water.
- Fish and shellfish can accumulate arsenic, but the arsenic in fish is mostly in a form that is not harmful.

How might I be exposed to arsenic?

- Eating food, drinking water, or breathing air containing arsenic.
- Breathing contaminated workplace air.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living near uncontrolled hazardous waste sites containing arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.

How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting high levels of inorganic arsenic can result in death. Lower levels of arsenic can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Organic arsenic compounds are less toxic than inorganic arsenic compounds. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

How likely is arsenic to cause cancer?

Several studies have shown that inorganic arsenic can increase the risk of lung cancer, skin cancer, bladder cancer, liver cancer, kidney cancer, and prostate cancer. The World Health Organization (WHO), the Department of Health and Human Services (DHHS), and the EPA have determined that inorganic arsenic is a human carcinogen.

How does arsenic affect children?

We do not know if exposure to arsenic will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to inorganic arsenic.

It is likely that health effects seen in children exposed to high amounts of arsenic will be similar to the effects seen in adults.

How can families reduce the risk of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.

Is there a medical test to show whether I've been exposed to arsenic?

There are tests to measure the level of arsenic in blood, urine, hair, or fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels or arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict how the arsenic levels in your body will affect your health.

Has the federal government made recommendations to protect human health?

EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or canceled many uses of arsenic in pesticides. EPA has set a limit of 0.05 parts per million (ppm) for arsenic in drinking water. The EPA arsenic drinking water standard of 0.01 ppm (10 ppb) reported in the ATSDR February 2001 Arsenic ToxFAQs was based on the EPA final rule for arsenic in drinking water, published on January 22, 2001, in the Federal Register. However, the EPA is currently reviewing the science and cost estimate supporting this rule, and, in the interim, has

reverted to the previous standard for arsenic. Thus, the current EPA arsenic drinking water standard remains at 0.05 ppm (50 ppb).

The Occupational Safety and Health Administration has set limits of 10 microgram arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

Source of Information

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for arsenic (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop E-29
Atlanta, GA 30333
Phone: 1-888-422-8737
FAX: (404)498-0057

LEAD FACT SHEET

HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system.

What is lead?
(Pronounced led)

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.
- Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

How might I be exposed to lead?

- Eating food or drinking water that contains lead.
- Spending time in areas where lead-based paints have been used and are deteriorating.
- Working in a job where lead is used.
- Using health-care products or folk remedies that contain lead.
- Engaging in certain hobbies in which lead is used (for example, stained glass).

How can lead affect my health?

Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between these effects and exposure to low levels of lead is uncertain.

How likely is lead to cause cancer?

The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably be anticipated to be carcinogens based on studies in animals.

There is inadequate evidence to clearly determine lead's carcinogenicity in people.

How does lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. A large amount of lead might get into a child's body if the child ate small pieces of old paint that contained large amounts of lead. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead.

How can families reduce the risk of exposure to lead?

- Avoid exposure to sources of lead.
- Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint (homes built before 1978).
- Run your water for 15 to 30 seconds before drinking or cooking with it. This will get rid of lead that may have leached out of pipes.
- Some types of paints and pigments that are used as make-up or hair coloring contain lead.
- Keep these kinds of products away from children.
- Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth and bones can be measured with X-rays, but this test is not as readily available. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 micrograms per deciliter (45 µg/dL).

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that children ages 1 and 2 be screened for lead poisoning. Children who are 3 to 6 years old should be tested for lead if they have never been tested for lead before and if they receive services from public assistance programs; if they live in or regularly visit a building built before 1950; if they live in or visit a home built before 1978 that is being remodeled; or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers children to have an elevated level of lead if the amount in the blood is 10 µg/dL.

The EPA requires lead in air not to exceed 1.5 micrograms per cubic meter (1.5 $\mu g/m^3$) averaged over 3 months. EPA limits lead in drinking water to 15 µg per liter.

The Occupational Health and Safety Administration (OSHA) develops regulations for workers exposed to lead. The Clean Air Act Amendments of 1990 banned the sale of leaded gasoline. The Federal Hazardous Substance Act bans children's products that contain hazardous amounts of lead.

Source of Information

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop E-29
Atlanta, GA 30333
Phone: 1-888-422-8737
FAX: (404)498-0057

FUEL OILS FACT SHEET

This Statement was prepared to give you information about fuel oils and to emphasize the human health effects that may result from exposure to them. The Environmental Protection Agency (EPA) has identified 1,397 sites on its National Priorities List (NPL). Fuel oils have been found in 2% (26 out of the 1,397) of the NPL sites. However, we do not know how many of the 1,397 NPL sites have been evaluated for fuel oils. As EPA evaluates more sites, the number of sites at which fuel oils are found may change. This information is important for you to know because fuel oils may cause harmful health effects and because these sites are potential or actual sources of human exposure to fuel oils.

When a chemical is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing, eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to hazardous chemicals such as fuel oils, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, lifestyle, and state of health.

1.1 What are fuel oils?

Fuel oils are petroleum products that are used in many types of engines, lamps, heaters, furnaces, stoves, and as solvents. Fuel oils come from crude petroleum and are refined to meet specifications for each use. Fuel oils are mixtures of aliphatic (open chain and cyclic compounds that are similar to open chain compounds) and aromatic (benzene and compounds similar to benzene) petroleum hydrocarbons. In addition, they may contain small amounts of nitrogen, sulfur, and other elements as additives. The exact chemical composition (i.e., precise percentage of each constituent) of each of the fuel oils discussed in this profile may vary somewhat, depending on the source and other factors. Fuel oils are distinguished from each other primarily by their boiling point ranges, chemical additives, and uses. In this profile, six fuel oils are discussed. The fuel oils of interest and common synonyms follow:

fuel oil no. 1 (the most widely used fuel oil)

- kerosene
- straight-run kerosene
- kerosine
- range oil
- Deobase (the trade name of a clear, white, deodorized kerosene)
- coal oil
- JP-5 (jet fuel)

fuel oil no. 1-D

- diesel fuel

- diesel fuel oil no. 1

fuel oil no. 2

- home heating oil
- gas oil
- no. 2 burner oil

fuel oil no. 2-D

- diesel fuel oil no. 2
- diesel fuel no. 2
- diesel oil no. 2
- no. 2 diesel

fuel oil no. 4

- diesel fuel oil no. 4
- heavy residual fuel oil
- marine diesel fuel
- residual fuel oil no. 4

fuel oil UNSP (which is not referred to by any synonyms)

In the toxicological profile, a fuel oil is referred to by the name used in the cited study. That is, if one study identifies a fuel oil as fuel oil no. 1, and another study identifies the same fuel oil as kerosene, the names "fuel oil no. 1" and "kerosene" will be used, respectively. All fuel oils are liquids at room temperature, although they can evaporate. The rates at which the various fuel oils will evaporate is dependent on the temperature and the composition of the individual fuel oil. Most fuel oils are yellowish to light brown in color. They generally have a kerosene-like odor, are flammable, and burn at temperatures between 177 °C and 329 °C.

In the profile, fuel oils are discussed together because of the similarities in their chemical and physical properties.

1.2 What happens to fuel oils when they enter the environment?

Fuel oils are composed of a large number of different chemicals, and each fuel oil is a slightly different mixture of these chemicals. Some of these chemicals evaporate into the air when fuel oils are spilled onto soils or surface waters (e.g., streams, rivers, lakes, or oceans) or are stored in open containers. Other chemicals in the fuel oils dissolve in water following spills to surface waters or leaks from underground storage tanks. Some of the chemical constituents of fuel oils may slowly move down through the soil to the groundwater. Another group of chemicals in fuel oils can attach to particles in the soil or water and, in water, may sink down into the sediment. The chemicals that evaporate may break down in air by reacting with sunlight, e.g., photooxidation, or other chemicals in the air. The chemicals that dissolve in water may also be broken down by organisms (primarily bacteria and fungi) in the soil or water. However, this may take up to a year to occur, if ever, depending on the environmental conditions. Chemicals that attach to soil or other matter (e.g., marsh sediment) may remain in the environment for more than a decade. Benzene, toluene, and fuel oilsylenes (single-ring aromatic compounds), as well as polycyclic aromatic compounds, are the fuel

oil components about which we have the greatest amount of information. You can find this information in the ATSDR toxicological profiles for these specific chemicals.

1.3 How might I be exposed to fuel oils?

The most likely way for you to be exposed to fuel oils in the home is if you use a kerosene heater. If you handle fuel oils or use a fuel oil to clean equipment at your job, or if fuel oils are stored at your workplace, you may also be exposed to them through contact with the skin or in the air. Some workers may be exposed to fuel oils through their skin if they come into contact with them without adequate protection, such as gloves, boots, coveralls, or other protective clothing. There are no data on background levels of fuel oils that may be found in the environment or workplace.

You may also be exposed to fuel oils if you swim in waters where fuel oils have been spilled. If fuel oils have leaked from underground storage tanks and entered underground water, you may drink contaminated water from a well containing fuel oils. The vapor (the gas phase) of fuel oils can also move through the soil and enter basements of homes or buildings near areas where leaks have occurred. Children may also be exposed by playing in soil contaminated with fuel oils. A major pathway of exposure is washing one's hands with fuel oils to remove paint, grease, etc.

1.4 How can fuel oils enter and leave my body?

Fuel oils can enter and leave your body when you breathe them in the air, when you drink water or eat food containing them, and when your skin comes into contact with them. This can occur in the workplace or if you live near an area where fuel oils have been dumped or spilled. We do not know how much of a fuel oil might be taken up by your body if you inhale fuel oil vapor, drink contaminated water, or come in contact with fuel oils. We have no information on what happens to fuel oils once they enter your body. Kerosene has been found in small amounts in the brain, lung, liver, spleen, and kidney of exposed animals. We do not know if fuel oils are broken down and leave the body in the urine or the feces.

1.5 How can fuel oils affect my health?

We know very little of the human health effects caused by fuel oils. Daily use of a kerosene stove for cooking should not cause any breathing problems for most people. People who use kerosene stoves to cook do not have more colds than people who have other types of stoves. Breathing moderate amounts of deodorized kerosene (fuel oil no. 1) has been shown to slightly affect the ability to smell and to cause a taste sensation. Numerous case-studies have reported accidental poisoning in children as the result of drinking kerosene. These accidents are probably much more frequent in areas where kerosene is commonly used for cooking and heating. Drinking kerosene may cause vomiting, diarrhea, swelling of the stomach, stomach cramps, coughing, drowsiness, restlessness, irritability, and unconsciousness; also, it may be difficult to breathe, and breathing may be painful. Coughing, pneumonia, and difficult or painful breathing after drinking kerosene suggest that kerosene has entered the lungs. In addition, drinking large amounts of kerosene can put you into a coma, cause convulsions, and may even cause death. When kerosene gets on your skin for short periods, it can make your skin itchy, red, and sore; sometimes blisters may occur and your skin may peel.

Breathing fuel oil no. 1 vapor for periods as short as 1 hour may make you feel nauseous, increase your blood pressure, be irritating to your eyes, or make your eyes bloodshot. Breathing kerosene or JP-5 vapors can also affect your nervous system. Some of the effects that have been noted in case

studies include headache, light-headedness, anorexia (loss of appetite), poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for a long time may damage your kidneys, increase your blood pressure, or lower your blood's ability to clot. Constant skin contact (for example, washing) with diesel fuel may also damage your kidneys.

It appears that repeated contact with fuel oils can cause skin cancer in mice and may cause liver cancer in mice. However, there is some conflicting information. Further, the fuel oils were tested only on mice. We do not know if fuel oils can cause cancer in humans. The International Agency for Research on Cancer (IARC) has determined that residual (heavy) fuel oils and marine diesel fuel are possibly carcinogenic to humans (Group 2B classification). In addition, IARC considers that there is not enough information (Group 3 classification) available to determine if distillate (light) fuel oils or distillate (light) diesel fuels cause cancer. They have also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic to humans (Group 2A classification). We do not know if fuel oils can cause birth defects or if they affect reproduction.

1.6 Is there a medical test to determine whether I have been exposed to fuel oils?

There is no medical test that shows if you have been exposed to fuel oils. There are methods to determine if your blood contains some fuel oil components such as benzene, toluene, and fuel oilsylenes; however, the concentrations of these compounds in distilled fuels are so low that if they were detected in your blood, it might not indicate specific or exclusive exposure to fuel oils. For information on tests for measuring exposure to some individual components of fuel oils, see the ATSDR toxicological profiles on benzene, toluene, total fuel oilsylenes, and polycyclic aromatic hydrocarbons.

1.7 What recommendations has the federal government made to protect human health?

The government has developed regulations and guidelines for fuel oils and some of the chemicals in them. These are designed to protect the public from the possible harmful health effects of these chemicals. The Department of Transportation also regulates the transportation of fuel oils, because they are classified as hazardous materials that are considered to pose a risk to health, safety, or property when transported.

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) regulate levels of petroleum products in the private sector and Air Force workplaces, respectively. The maximum allowable amount of petroleum products in the workroom air during an 8-hour workday, 40-hour workweek, is 400 parts of petroleum distillates (naphtha) per million parts of air, or more simply stated, 400 ppm.

1.8 Where can I get more information?

If you have any more questions or concerns, please contact your community or state health or environmental quality department or

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop E-29
Atlanta, GA 30333

* Information line and technical assistance

Phone: 888-422-8737
FAX: (404)498-0057

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses resulting from exposure to hazardous substances.

* To order toxicological profiles, contact

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: 800-553-6847 or 703-605-6000

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for fuel oils. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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