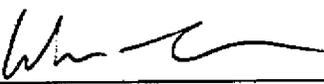


**APPENDIX A**  
**SITE SAFETY AND HEALTH PLAN**

**SITE SAFETY AND HEALTH PLAN**  
**AREA I LANDFILL 1, LANDFILL 2 AND QUARRY 3 AND AREA M QUARRY 1**  
**BENICIA ARSENAL**

Prepared by:  Date: 10/31/00  
Ms. Wendy Linck  
Site Safety Officer

Reviewed/Approved by:  Date: 10-30-00  
Ms. Anne Baptiste, CIH  
Health and Safety Director

Reviewed/Approved by:  Date: 10/31/00  
Ms. Wendy Linck  
Site Safety Officer

Effective Dates: 10/31/00 to 10/31/01

**FORSGREN ASSOCIATES/BROWN AND CALDWELL**  
**SITE SAFETY AND HEALTH PLAN**

**Preface**

This SSHP has been prepared for investigation activities to be conducted at Landfill 1, Landfill 2 and Quarry 3 in Area I, and Quarry 1 in Area M of the former Benicia Arsenal. This SSHP is supplemented by the FA/BC Health and Safety Program Manual and the Benicia Arsenal General SSHP (General SSHP) for the Arsenal FUDS, which will be referenced throughout this site specific SSHP. The FA/BC Health and Safety Program Manual will be referenced by using the appropriate 100 series number followed by the page number. For example, (203.5; p.2-13) represents the 200 series, Section 203.5, page 2-13.

This SSHP presents detailed procedures and limits to address potential chemical, physical and biological hazards at Landfill 1, Landfill 2 and Quarry 3 in Area I and Quarry 1 in Area M.

This investigation of potential contamination and potential waste characterization at Landfill 1, Landfill 2 and Quarry 3 in Area I and Quarry 1 in Area M will be conducted according to procedures and requirements of this site specific SSHP. Because trenching activities in the landfills and quarries have the potential to encounter UXO/OE materials, formal UXO/OE avoidance procedures (USACE Interim Guidance, ETL 385-1-2) will be implemented during trenching under the direction of USA Environmental. A copy of USACE's *Guidance of Ordnance Avoidance* is attached as Appendix B to this FSIP. A separate SSHP has been prepared to address UXO/OE avoidance activities and is included as Appendix C to this FSIP.

Should UXO/OE material be encountered, FA/BC's invasive investigation activities will stop, the work area will be evacuated, and

the USACE Project Manager will be notified. Subsequent identification, evaluation, handling and disposal of UXO/OE material will be conducted under the USACE Sacramento District. As a contingency, health and safety procedures and procedures for investigation and disposal of UXO/OE materials have been attached to this FSIP as Appendix C for use by USACE. Procedures listed in Appendix C will only be implemented by USACE and UXO/OE subcontractors to the USACE.

**PROJECT SUMMARY**

The purpose of this investigation is to determine the location of landfill and quarry boundaries at Landfill 1, Landfill 2 and Quarry 3 in Area I and Quarry 1 in Area M. All areas, including Area I Landfill 1, Landfill 2 and Quarry 3 and Area M Quarry 1 will be cleared in writing for UXO by a qualified UXO contractor prior to any investigation. A subsurface investigation will be conducted by trenching to determine the extent of the landfill and quarry boundaries. Further evaluation of subsurface lithology and groundwater chemistry will be conducted at three locations outside each landfill perimeter. Invasive activities will be limited to drilling outside of the landfill boundaries, and trenching near the landfill and quarry boundaries.

If FA/BC identifies potential UXO/OE material during drilling or trenching activities, the evaluation, removal, and/or disposal of the UXO/OE materials will be handled by USACE Sacramento District according to procedures as Attachment B. A detailed description of field activities is presented in the FSIP for Area I Landfill 1,

Landfill 2 and Quarry 3 and Area M  
Quarry 1.

### KEY PERSONNEL

The key personnel for this site specific  
SSHP are:

- Program Manager: Mr. Dave Jones
- Health and Safety Director: Ms. Anne Baptiste, Certified Industrial Hygienist
- Project Manager: Ms. Patti DeLaO
- Site Safety Officers: Ms. Wendy Linck and Mr. Paul Lopez

Descriptions of responsibilities for each key personnel and subcontractor are included in the General SSHP.

### Project Contacts

A reference list of project contacts is located in the General SSHP.

### HAZARD ANALYSIS

The site specific potential hazards to personnel working have been identified as chemical hazards, physical hazards, UXO, and biological hazards. Each potential hazard, the potential for exposure, and recommended control for all the sites are presented in Table A-1. Procedures of UXO/OE avoidance are covered in Appendices B and C to the FSIP.

### Chemical Hazards

Soil sampling will be conducted only at locations outside the perimeters of the landfills, thus minimizing exposure to workers.

Drilling and well installation in areas outside of the landfill perimeters, and trenching at landfill boundaries are the only invasive technique proposed for this project. However, trenching will be conducted only to confirm landfill and quarry boundaries, and excavation will be limited to at most 2

feet into any waste materials. The chemical related health hazards of this project would primarily be from petroleum, oils, and lubricants (specifically benzene, chlorobenzene, and total petroleum hydrocarbon [TPH]), polyaromatic hydrocarbons (PAHs), acids, and solvents (specifically trichloroethane [TCE]) that may be found in soil within the landfills or quarries. However, exposures to these chemical related health hazards are minimal, since possible direct exposure through soil sampling is not proposed for this investigation within landfill materials. Exposure to heavy metals (i.e., arsenic, chromium and lead), organochlorine pesticides, and dust may also occur. Engineering controls, such as wetting of soil during trenching and working up-wind of excavations, will be implemented to minimize dust and exposure to dust.

The primary routes for exposure from benzene, chlorobenzene, TCE, and solvents at this site may result from inhalation and skin contact. Worker exposures to metal dusts are commonly a result of inhalation. The primary route of work exposure to residual acids, PAHs, and organochlorine pesticides is skin contact. A more detailed discussion of each of the chemical compounds or groups is presented below. Potential chemical hazards, exposure limits and chemical characteristics for key chemicals that may be present at the site are listed in Table A-2.

**Benzene.** Benzene is regulated by OSHA as an occupational carcinogen and has been associated with leukemia. Acute health effects include irritation to the eyes, nose and respiratory system, headache, giddiness, nausea and anorexia. Benzene exposure can also lead to disturbances in gait, dermatitis and bone marrow depression.

**Table A-1  
Potential Hazards and Recommended Controls for Area I Landfill 1, Landfill 2 and Quarry 3  
Area M Quarry 1 Investigation Activities**

Potential hazards	Recommended controls
Chemical exposure	The minimum level of proper PPE during activities is Level D. This level is considered adequate to protect individuals from exposure to petroleum hydrocarbon constituents. Air monitoring will be performed with an OVM, LEL meter, and H <sub>2</sub> S meter to monitor the air quality in and around the work zone during invasive activities. Engineering controls, such as wetting of soil during trenching will be implemented to minimize dust.
Back injury	No sampling, using heavy equipment, or hand digging is anticipated for this project that would require excessive lifting. In general, high manual labor causes high stress forces on the back. Use proper lifting techniques, proper tools, vacuum bailers, two person rotations and adequate back support during all field tasks. Proper lifting techniques may also vary with task. Therefore, these techniques will also be addressed in the daily site safety briefings. Refer to the Ergonomics Program of the FA/BC Health and Safety Program Manual (103; p. 7-9).
Noise	Heavy equipment is anticipated for this project (i.e., backhoe and drilling rig), such that hearing protection may be necessary. A hearing conservation program will be implemented to determine exposure to workers for each piece of equipment that commonly requires hearing protection (backhoe and drilling rig). Noise exposure monitoring will be conducted initially by the SSO with assistance from the HSD to determine correct hearing protection for this type of equipment to be used for the rest of the project. Refer to the Noise/Hearing Conservation section in the FA/BC Health and Safety Program Manual (210; p. 44-45). In general, use hearing protection whenever the noise levels are such that conversation is impaired without raising the voice level.
Drum handling	Drum handling is not anticipated for this project. In general, drums may be used to store soil or water as a result of drilling or excavation operations. Utilize appropriate drum handling equipment (dollies, lift gates, etc.) and avoid manual lifting of filled or partially filled drums.
Migration of contamination	A work zone will be delineated before start of invasive work activities. An area within the work zone will be established for decontamination prior to exiting the site. The decontamination area must be away from the actual working area. Figures A-1, A-2, A-3 and A-4 are provided in this SSHP to show the area of the work zone for each site.
Exposure to potentially contaminated soil/water	Level D PPE is the minimum level required for this project. All personnel will don the appropriate level of PPE upon entering the work area and then use proper decontamination procedures before exiting the work zone. Workers will exit the work zone before eating.
Slips, trips and falls	The proper footwear for this project will include steel-toed boots upon entering the work zone. Wear proper footwear and anticipate footing hazards (i.e., steep slopes, potholes, and uneven surfaces).
Utilities/electrical	Have all utilities (underground and overhead) located and documented prior to the initiation drilling or excavation activities. Maintain a minimum distance of 20 feet clearance between any energized line of 37 kv or less, and any part of a drill rig, boom, or other piece of equipment at all times. If voltage is between 37 kv and 55 kv, then maintain a minimum distance of 27 feet. If voltage is between 55 kv and 100 kv, then maintain a minimum distance of 42 feet (8 CCR Division 1, Chapter 4, Subchapter 5, Group 2, Article 37, Section 2946).

**Table A-1 (continued)**  
**Potential Hazards and Recommended Controls for Area I Landfill 1, Landfill 2 and Quarry 3**  
**Area M Quarry 1 Investigation Activities**

Potential Hazards	Recommended Controls
Heavy equipment and backhoes	Drilling and excavating equipment may be necessary for this project. Personnel communication and wearing proper PPE during work activities is essential for the protection of workers at the site. See the Trenching, Drilling and Heavy Equipment SOPs for specifics. The competent person for trenching will be the on-site SSO.
Unexploded ordnance	All areas will be cleared in writing by a qualified UXO specialist prior to personnel entry. An UXO geophysical survey will be conducted at all sites. Trenching activities will only be conducted in areas that have been cleared by a qualified UXO contractor for UXO. All employees have been UXO avoidance trained.
Biological hazards	The project is in an area where animals, insects, or animal droppings may be present. Level D PPE will be donned for this project, unless conditions indicate an infestation of insects, mold, or animal droppings. Significant amounts of which would cause work stoppage. Be aware of spiders inside well boxes or insect swarms on buildings or in trees. The area around all the sites is open and these types of biological hazards are not anticipated.
Radiological hazards	Area I Landfill 2 was closed prior to 1945. As a result, there are no radiological hazards anticipated for this project.

Table A-2

## Chemical Exposure Limits and Characteristics Controls for Area I Landfill 1, Landfill 2 and Quarry 3 and Area M Quarry 1

Constituent	IP <sup>a</sup>	OVA <sup>b</sup> relative response percent	TLV <sup>c</sup> 8-hour TWA	PEL <sup>d</sup> 8-hour TWA	IDLH <sup>e</sup> level	Flammable range percent	Odor threshold, ppm	Notes <sup>f</sup>	Potential symptoms of exposure <sup>g</sup>
<b>CHEMICALS</b>									
Benzene	9.24	185	0.5 ppm	1 ppm	500 ppm	1.3-7.9	4.68	Ca, 65	irritation to eyes, nose, respiratory system, giddiness, headache, nausea, staggered gait, fatigue, anorexia, lassitude, dermatitis, bone marrow, depression
Boric acid	13.5	NA	10 mg/m <sup>3</sup>	NA	2,000 mg/m <sup>3</sup>	(g)			nasal irritation, conjunctivitis, erythema
Chlorobenzene	9.07	179	10 ppm	75 ppm	1,000 ppm	1.3-9.6			irritation to skin, eyes, nose, drowsiness, incoherence
Ethylbenzene	8.76	111	100 ppm	100 ppm	800 ppm	1.0-6.7	0.25-200		irritation to eyes, muscle membranes, headache, dermatitis, narcosis, coma
Hydrochloric acid	NA	NA	NA	5 ppm	50 ppm	NC		C	inflammation of the nose, throat, laryngeal, coughing, burns throat, choking, burns eyes, skin, dermatitis
PAHs	NA	NA	50 mg/m <sup>3</sup>	0.2 mg/m <sup>3</sup> (coal tar pitch)	500 ppm	0.9%-5.9%	NA		Irritation to eyes, skin, respiratory system. Carcinogen: lung, skin
Phosphoric acid	NA	NA	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	1,000 mg/m <sup>3</sup>	NC			irritation to upper respiratory tract, irritation to eyes, skin, burns skin, burns eyes, dermatitis
Stoddard solvent	NA	approx 40	100 ppm	500 ppm	20,000 mg/m <sup>3</sup>	unknown			irritation to eyes, nose, throat, dizziness, dermatitis
Toluene	8.82	126	50 ppm	200 ppm	500 ppm	1.2-7.1	0.17-40		fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, lassitude, nervousness, muscle fatigue, insomnia, paresthesia, dermatitis
Trichloroethene	9.5	54	50 ppm	25 ppm	1,000 ppm	8-10.5		Ca, 65	headache, vertigo, visual disturbance, tremors, somnolence, nausea, vomiting, irritation to eyes, dermatitis, cardiac arrhythmias, paresthesia

Table A-2 (continued)

## Chemical Exposure Limits and Characteristics Controls for Area I Landfill 1, Landfill 2 and Quarry 3, and Area M Quarry 1

Constituent	IP <sup>a</sup>	OVA <sup>o</sup> relative response percent	TLV <sup>c</sup> 8-hour TWA	PEL <sup>d</sup> 8-hour TWA	IDLH <sup>e</sup> level	Flammable range percent	Odor threshold, ppm	Notes <sup>f</sup>	Potential symptoms of exposure <sup>g</sup>
Xylene	8.56	111	100 ppm	100 ppm	900 ppm	1.0-7.0	0.05-200		dizziness, drowsiness, excitement, incoherence, staggered gait, irritation to eyes, nose, throat, corneal vacuolization, anorexia, nausea, vomiting, abdominal pain, dermatitis
Methane	12.48	100	NA	NA	Not <19.5% O <sub>2</sub>	5-15			
H <sub>2</sub> S	10.46	NA	10	10	100	4-44	0.001-0.113 odor fatigue		
<b>METALS</b>									
Antimony	NA	NA	0.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	50 mg/m <sup>3</sup>	NC			irritation to nose, throat, mouth, coughing, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps, insomnia, anorexia, irritation to skin, unable to smell properly, cardiac abnormalities in antimony trichloride exposures
Arsenic	NA	NA	0.01 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	NC		Ca, 65	ulceration of the nasal septum, dermatitis, gastrointestinal disturbance, peripheral neuropathy, respiratory irritation, hyperpigmentation of the skin
Chromium III	(h)	NA	0.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	25 mg/m <sup>3</sup>	NC		65	histologic fibrosis of the lungs, lung cancer, neoxochrome, ulceration and perforation of the nasal septum
Copper	NA	NA	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	100 mg/m <sup>3</sup>	NC			irritation to nasal and mucous membrane, pharynx, nasal perforation, irritation to eye, metallic taste, dermatitis
Lead	NA	NA	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	100 mg/m <sup>3</sup>	NC		65	weakness, lassitude, insomnia, facial pallor, pal eye, anorexia, low weight, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis of the wrists and ankles, encephalopathy, nephropathy, irritation to eyes, hypotension

Table A-2 (continued)

Chemical Exposure Limits and Characteristics Controls for Area I Landfill 1, Landfill 2 and Quarry 3, and Area M Quarry 1

Constituent	IP <sup>a</sup>	OVA <sup>b</sup> relative response percent	TLV <sup>c</sup> 8-hour TWA	PEL <sup>d</sup> 8-hour TWA	IDLH <sup>e</sup> level	Flammable range percent	Odor threshold, ppm	Notes <sup>f</sup>	Potential symptoms of exposure <sup>g</sup>
Nickel	NA	NA	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>	unknown combustible solid			headache, vertigo, nausea, vomiting, epigastric pain, substernal pain, coughing, hyperpnea, cyanosis, weakness, leukocytosis, pneumonitis, delirium, convulsions
Zinc Chloride	NA	NA		1 mg/m <sup>3</sup>	50 mg/m <sup>3</sup>	unknown			(as zinc chloride fumes) conjunctivitis, irritation to nose, throat, coughing, copious sputum, dyspnea, chest pain, pulmonary edema, bronchopneumonia, pulmonary fibrosis, corpulmonale, fever, cyanosis, tachypnea, burns to skin, irritation to eyes, skin
<b>PESTICIDES</b>									
Chlordane	NA	NA	0.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	100 mg/m <sup>3</sup>	NC		Ca, S, 65	blurred vision, confusion, ataxia, delirium, coughing, abdominal pain, nausea, vomiting, diarrhea, irritability, tremor, convulsions, anuria
DDT	NA	NA	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	500 mg/m <sup>3</sup>	unknown combustible solid		Ca, S, 65	paresthesia tongue, lips, face, tremor, apprehension, dizziness, confusion, malaise, headache, fatigue, convulsions, paresis hands, vomiting, irritation of eyes and skin
Dieldrin	NA	NA	0.25 mg/m <sup>3</sup>	NA	50 mg/m <sup>3</sup>	NC		Ca, 65	headache, dizziness, nausea, vomiting, malaise, sweating, myoclonic limb jerks, clonic, tonic convulsions, coma

<sup>a</sup> Ionization potential in electron-volts.

<sup>b</sup> Century Organic Vapor Analyzer relative response to the compound in percent with methane calibration.

<sup>c</sup> Threshold Limit Value as the airborne 8-hour TWA established by the American Conference of Governmental Industrial Hygienist (ACGIH), 1999.

<sup>d</sup> Permissible Exposure as the airborne 8-hour TWA established by the OSHA.

<sup>e</sup> Immediately Dangerous to Life and Health level as published in the National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards, 1994 edition.

<sup>f</sup> Hazard category: Ca-Carcinogen; C-Ceiling; S-Skin absorption; 65 - Proposition 65 chemicals known to the State of California to cause cancer or reproductive harm.

<sup>g</sup> Sources: NIOSH Pocket Guide to Chemical Hazards, June, 1994; Amdur, Mar O; Doull, John; Klaassen, Curtis, D., Toxicology, The Basic Science of Poisons, fourth Edition, 1993; and Merk & Co. Inc. The Merk Index, 1996.

<sup>h</sup> IP varies with chromium compound.

Notes:

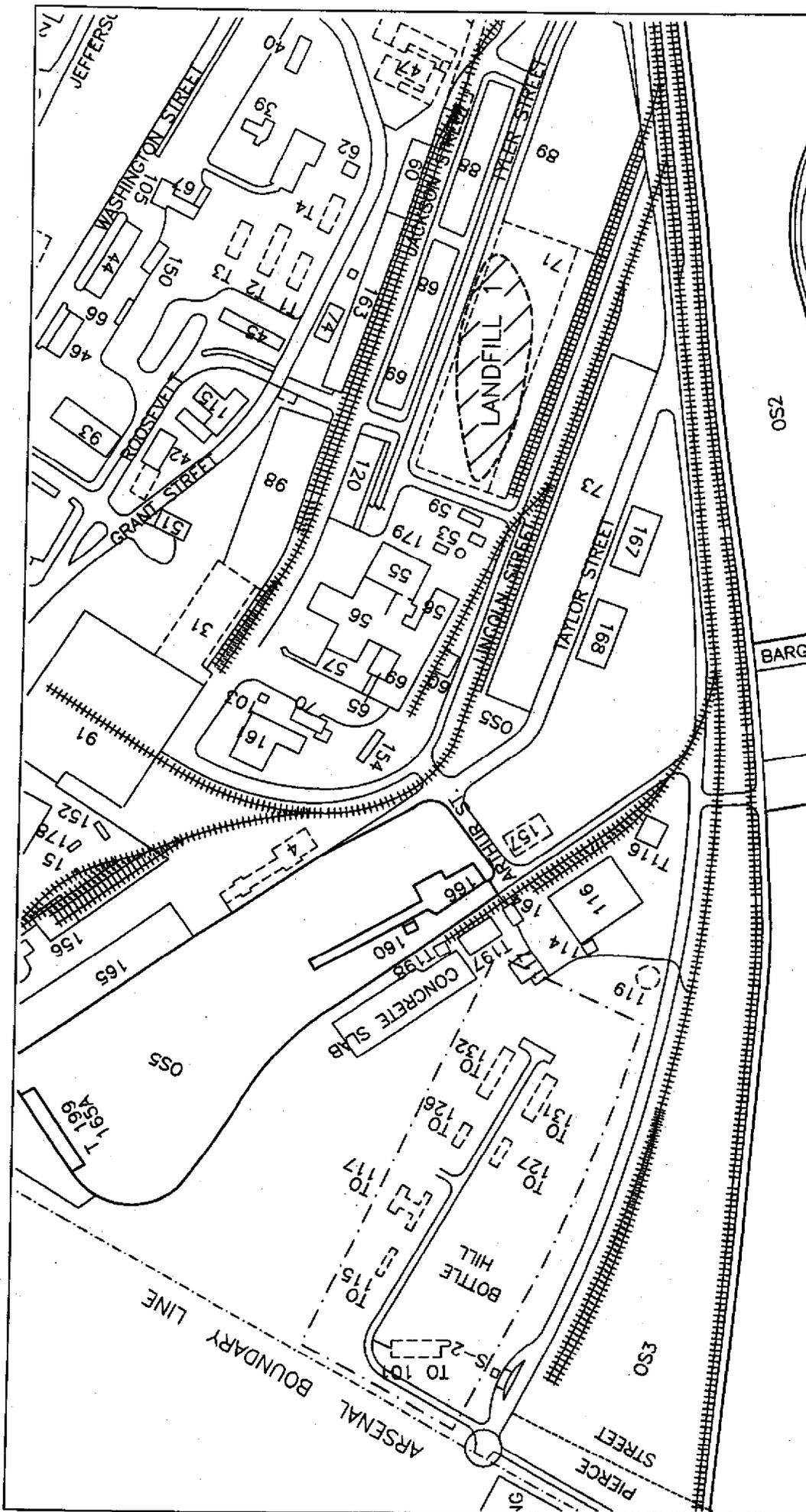
NA = not applicable or not available

NE = not established

NC = noncombustible

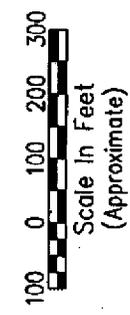
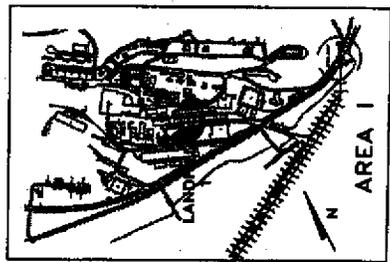
NF = non-flammable

PAHs = polycyclic aromatic hydrocarbons



LEGEND:

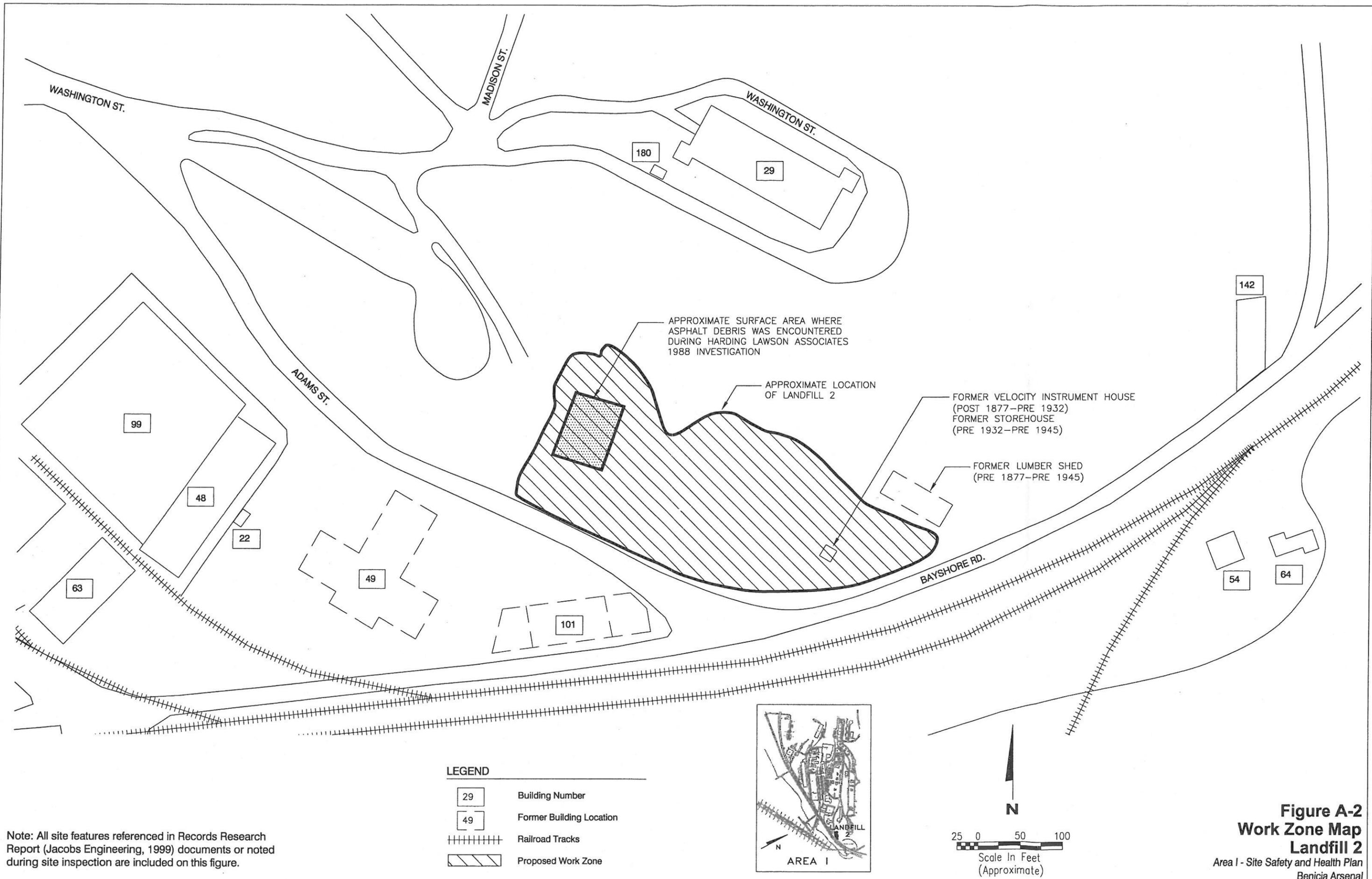
- Arsenal Boundary Line
- Area Boundary Line
- == Road
- ++++ Railroad Tracks
- 40 Building
- Proposed Work Zone



# Figure A-1 Work Zone Map Landfill 1

Area 1 - Site Safety and Health Plan  
Benicia Arsenal

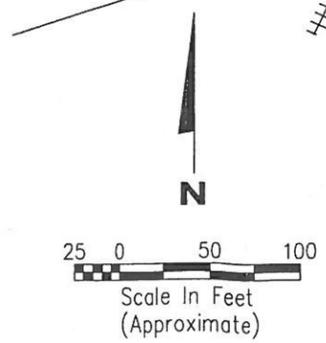
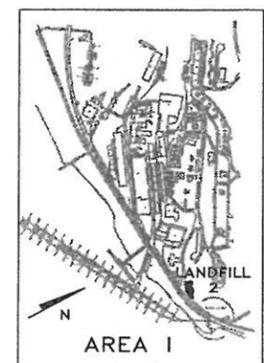
Note: All site features referenced in Records Research Report (Jacobs Engineering, 1999) documents or noted during site inspection are included on this figure.



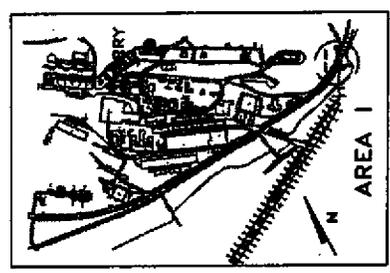
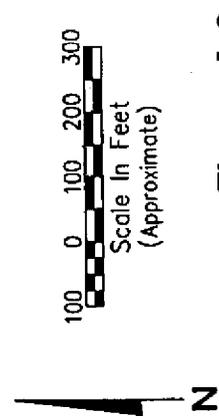
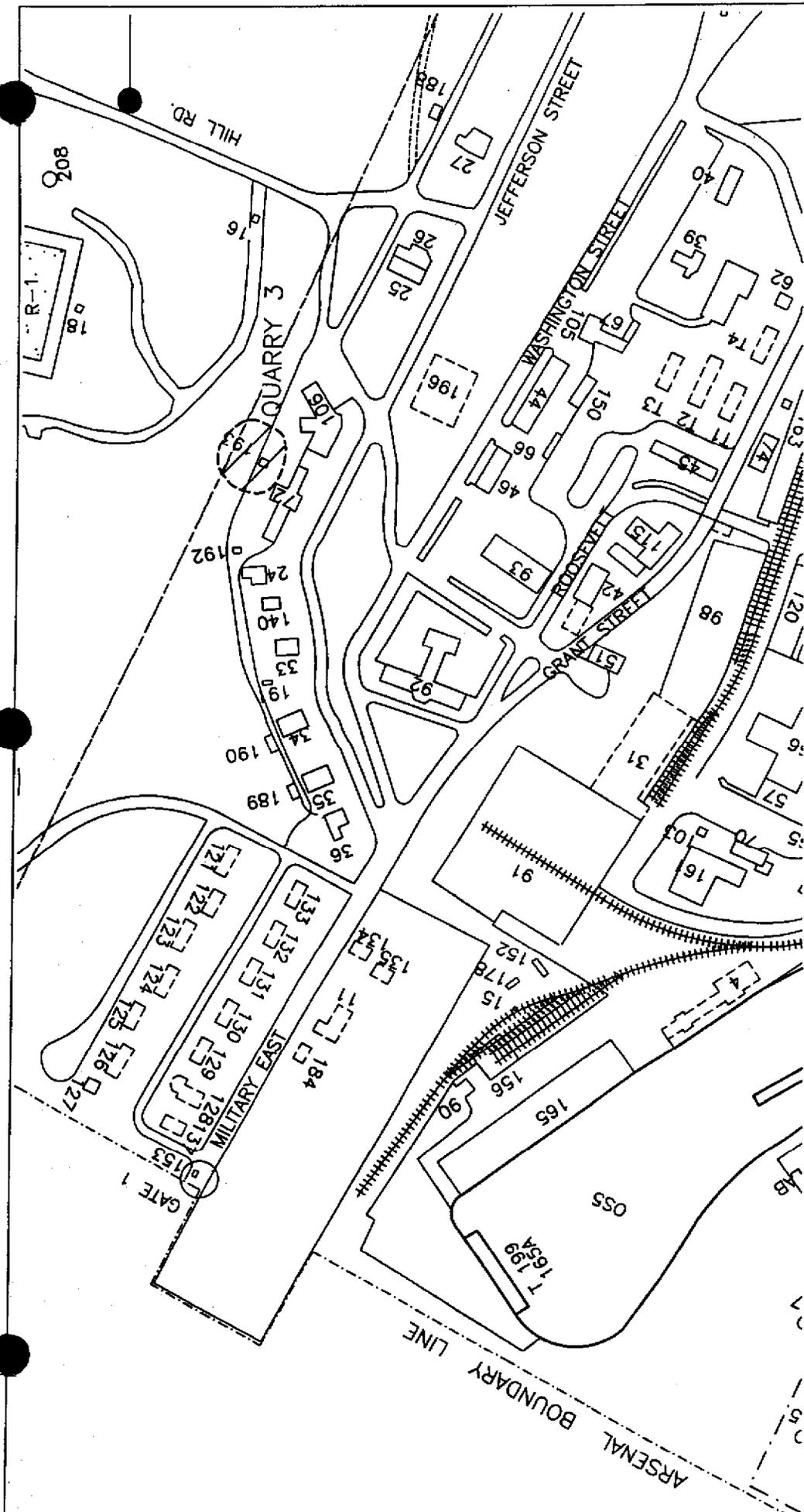
Note: All site features referenced in Records Research Report (Jacobs Engineering, 1999) documents or noted during site inspection are included on this figure.

**LEGEND**

	Building Number
	Former Building Location
	Railroad Tracks
	Proposed Work Zone



**Figure A-2**  
**Work Zone Map**  
**Landfill 2**  
 Area I - Site Safety and Health Plan  
 Benicia Arsenal

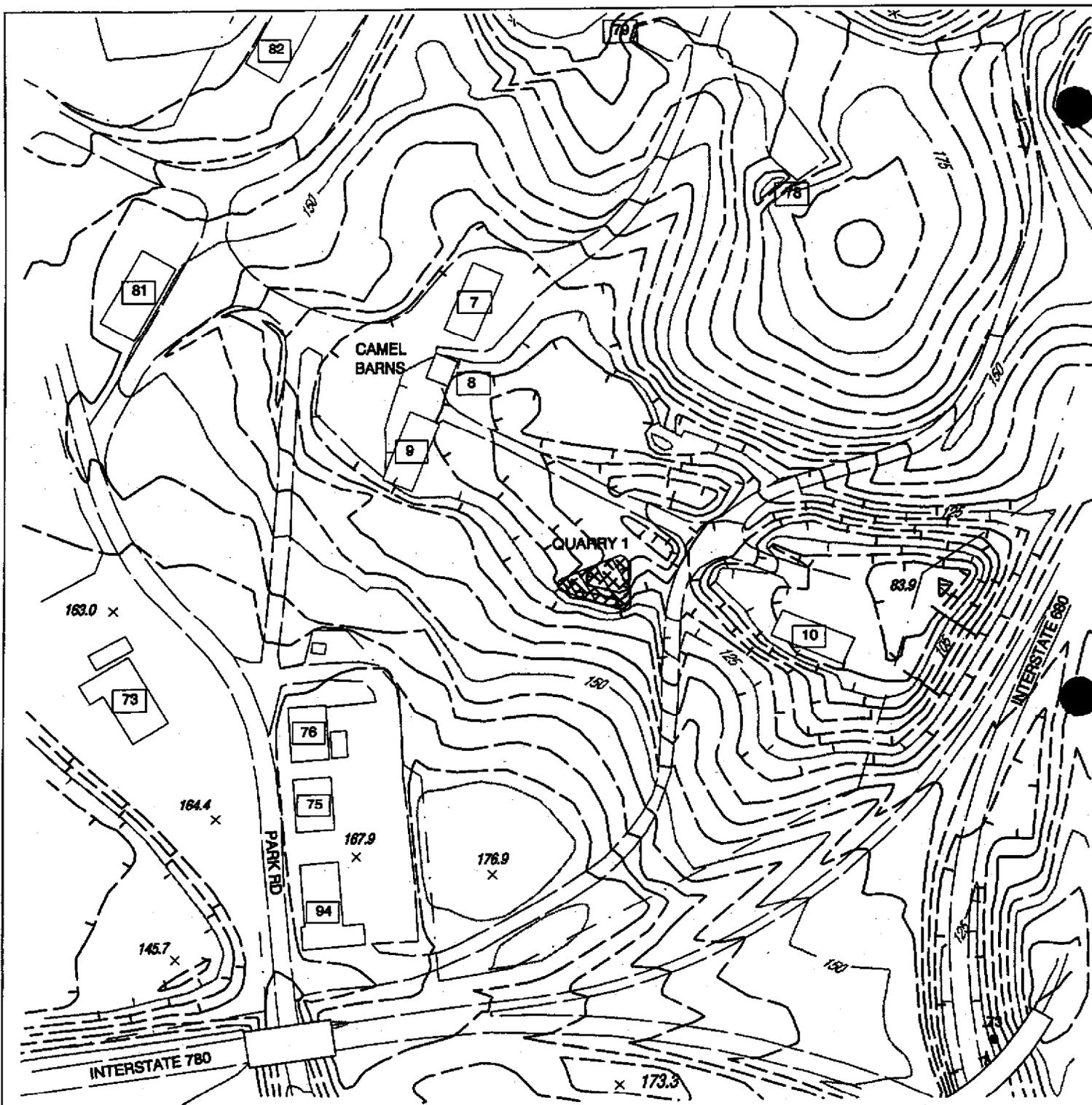


**Figure A-3**  
**Work Zone Map**  
**Quarry 3**  
 Area 1 - Site Safety and Health Plan  
 Benicia Arsenal

**LEGEND:**

-----	Arsenal Boundary Line	+++++	Railroad Tracks
_____	Area Boundary Line	[ 40 ]	Building
====	Road	[ / / ]	Proposed Work Zone

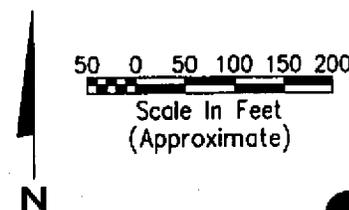
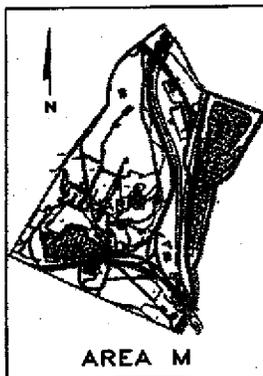
Note: All site features referenced in Records Research Report (Jacobs Engineering, 1999) documents or noted during site inspection are included on this figure.



**LEGEND**

- 98 Buildings
- Fence Line
- ++++ Railroad Tracks
- //// Proposed Work Zone

Note: All site features referenced in Records Research Report (Jacobs Engineering, 1999) documents or noted during site inspection are included on this figure.



**Figure A-1**  
**Work Zone Map**  
**Area M - Quarry 1**  
 Area I - Site Safety and Health Plan  
 Benicia Arsenal

The other BTEX compounds (toluene, ethylbenzene and xylenes) may cause irritation to the eyes, nose and respiratory system, and dermatitis. Acute exposure can lead to central nervous system effects including headache, dizziness, confusion and irritability. Exposure to toluene may also result in pupil dilatation, nervousness, reproductive toxicity and insomnia. Elevated concentrations of xylene isomers may lead to corneal damage, and gastrointestinal symptoms including abdominal pain, nausea and vomiting.

**Total Petroleum Hydrocarbons.** TPH refers to heavy hydrocarbons that may present a fire hazard in extreme circumstances, such as the presence of flame, excessive heat or strong oxidizers. An exposure limit for TPH has not been established due to the varied chemical composition. Presently, there are no known chronic health hazards associated with TPH.

**Oils.** Oils are not considered flammable, only combustible. Because of their low vapor pressure, they do not typically constitute an inhalation hazard unless working conditions include extremely hot temperatures or create excessive airborne oil-contaminated dust. These conditions are not anticipated.

**Oxygenated Solvents.** Oxygenated solvents are flammable liquids such as acetone and methyl ethyl ketone. In high concentrations, inhalation of these materials can cause anesthesia with dizziness being the usual symptom. They do not display serious chronic effects (acetone is found in the human body). These materials are very flammable. They cannot be readily detected by PID, but are easily detected by flame ionization detectors (FID). These materials have considerable odor and can be readily recognized by smell at levels well below those requiring protection.

**PAHs.** PAHs are common components of diesel fuel, fuel oil, and other oils and lubricants. Routes of entry include

inhalation, ingestion, and skin contact. PAHs are not typically very volatile but many are carcinogens. Therefore, unless they are known to be in significant concentrations, such as when strong odors are evident or dust clouds are present, the primary method of protection is by avoiding skin contact and thorough decontamination.

**Halocarbon Solvents.** Halocarbon solvents are non-flammable liquids such as methylene chloride, TCE, tetrachloride, and chloroform. In high concentration, inhalation of these materials can cause acute liver and kidney damage. In lesser concentrations, they may cause acute effects such as dizziness or sleepiness related to their anaesthetic ability. The main chronic effect of these materials is their potential to cause liver disease. They are potential carcinogens as demonstrated by animal studies. Because of the potential of these materials to cause liver disease and cancer, exposure should be minimized. These materials are volatile and will evaporate if left in the open air. They can be detected by PIDs and/or FIDs.

**Arsenic.** Arsenic has toxic health effects, which include dermatitis, gastrointestinal upset, peripheral neuritis, irritation to the respiratory system, and discoloration of the skin. Arsenic is associated with skin cancer and lung cancer due to chronic exposure. Arsenic is an occupational carcinogen, and is regulated by OSHA through a comprehensive occupational health standard. The current PEL for arsenic is 0.01 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ) as an 8-hour time weighted average (TWA) airborne dust concentration. The regulatory action level is 0.005  $\text{mg}/\text{m}^3$  TWA dust concentration. No employee may be exposed to any skin or eye contact with arsenic trichloride or to skin or eye contact likely to cause skin or eye irritation.

**Chromium.** Chromium has toxic health effects that can range from allergic skin reactions to mild, and eventually severe, respiratory system irritation. Chromium

may exist in one of three valence states in compounds (+2, +3, or +6). Toxic health effects are primarily associated with Cr+6 (hexavalent chromium) exposure. It is a suspect carcinogen as Cr+6. Symptoms of acute exposure include coughing, wheezing, painful deep inhalation, and fever. Pulmonary edema may persist after other symptoms subside. Other effects include dermatitis, ulceration of the skin, conjunctivitis and asthma. Chronic exposure may be associated with lung cancer. The current exposure limit for chromium as Cr+6 is 0.05 mg/m<sup>3</sup> as an 8-hour TWA airborne dust concentration.

**Inorganic Lead.** To present a health hazard, lead must be in such a form as to gain entrance into the body or tissue in measurable quantities. The primary mode of entry that is of concern is inhalation of lead dust, and secondary, is ingestion if poor personal hygiene is practiced. Lead is a cumulative poison. It is stored in the body and acts as a cellular poison to all organ systems before symptoms and disability is evident. Lead poisoning creates a red cell anemia and damages organs and tissues of the body such as kidneys, liver, blood vessels, nervous system and reproductive organs. Chemical and physical properties may vary depending upon the specific lead compound.

Lead is considered a carcinogen and reproductive toxin and has an airborne PEL of 0.05 mg/m<sup>3</sup>. The blood lead action level for adults is equal to or less than 30 milligrams per deciliters (mg/dl) of blood. There is no safe level of lead exposure for children. Therefore, decontamination of adults and their clothing is a primary concern.

**Particulates Not Otherwise Regulated.** PNOC is a term given to a variety of dusts that may not cause fibrosis or systemic effects. At high concentrations, otherwise nontoxic particulates have been associated with the occasionally fatal condition known as alveolar proteinosis. High concentration of

finely divided dusts and powders can also be explosive. At lower concentrations, the dust can inhibit the clearance of dust from the lung by decreasing the mobility of the alveolar macrophages. The airborne PEL is 10 mg/m<sup>3</sup> for PNOC total dust and 5.0 mg/m<sup>3</sup> for dust small enough to enter the lower respiratory tract.

#### **Organochlorine Pesticides.**

Organochlorine pesticides are solids at ambient temperatures with no volatility or flammability problems. They are generally lipophilic, making them a potential hazard by means of skin absorption. In addition to skin exposure, inhalation/ingestion of contaminated dusts present a potential hazard. Health effects of organochlorine pesticide poisoning by ingestion, inhalation of dusts or by skin absorption can include liver and kidney damage and central nervous system effects. Symptoms of acute central nervous system toxicity include numbness, staggering gait, nausea, dizziness, headache, confusion, tremors and seizures. Symptoms of chronic toxicity include loss of weight, loss of appetite, mild anemia, muscle weakness, headache, dizziness, memory loss and convulsions. Any person who suspects he is suffering from organochlorine pesticide poisoning should seek medical attention. Skin protection and thorough decontamination are important to control exposure.

**Chlorobenzene.** Chlorobenzene is a flammable solvent used as a carrier in pesticide production. It has a faint, almond like odor. Chlorobenzene is a skin, eye and respiratory irritant which may be absorbed through the skin. It could potentially be ingested via inhalation/ingestion of contaminated dusts. It is toxic to the liver and kidneys and is a central nervous system depressant. Symptoms of acute or chronic exposures are headache dizziness, nausea and fatigue. Acute exposures can progress to sleepiness, coma and death. In the event of a respiratory exposure, the victim should be moved to fresh air

immediately. Medical attention should be sought if ingestion is suspected.

**Landfill Gases.** Methane and carbon dioxide, may be encountered in soil gas or landfill gas as a by-product of landfill waste degradation. Exposure to methane gas can lead to asphyxiation. Methane gas is explosive and flammable. When methane is present in the breathing zone, work zone, or in the atmosphere in the vicinity of the borehole or well head at 20 percent of the LEL or greater, field personnel will evacuate the area. A combination (4-channel) meter will be used that detects CO (parts per million [ppm]), H<sub>2</sub>S (ppm), O<sub>2</sub> (%), and combustible gases (%LEL). The meter will be calibrated to methane gas and will be intrinsically safe.

**Hydrogen Sulfide.** Hydrogen Sulfide (H<sub>2</sub>S) is highly toxic at low concentrations, and flammable. Furthermore it is heavier than air. At very low concentrations (2 parts per billion [ppb]) it produces a strong odor of rotten eggs, however, exposure for greater than 2 minutes may deaden sensitivity to smell. Symptoms of exposure can include: eye and respiratory system irritation, apnea, coma, convulsions, eye pain, lacrimation, photosensitivity, dizziness, headache, fatigue, irritability, insomnia and GI disturbance. OSHA construction industry standard is 10 ppm. This is also the maximum recommended exposure ceiling for 10 minutes.

**Fire Safety.** Fire is a potential hazard due to equipment malfunction or combustible gas levels. Before beginning any work activities, locate fire extinguishers and other emergency equipment. When work is conducted at the landfill, a fire extinguisher will be carried with the sampling vehicle. Do not block the path to this emergency equipment with work materials. Be familiar with the type of extinguishers and what kind of fire they are designated to put out. All job locations must have applicable fire extinguishers.

- Type A extinguishers put out ordinary combustibles such as paper, wood and some plastics.
- Type B extinguishers put out flammable liquids like oil and gasoline.
- Type C extinguishers put out electrical fires.
- Type ABC extinguishers put out all three types of fires.

In addition to potential fire hazard due to equipment malfunction, fire hazard during field operations is a potential for operating vehicles and equipment in and around dry grass, weeds, or other plant material. To reduce potential for vegetative fires, weeds, grass and dry brush will be cleared from work-areas prior to operating equipment. Vehicles will be operated on paved and dirt roads wherever possible. When off-road travel is necessary, areas with tall weeds or grasses will be avoided.

## TRAINING REQUIREMENTS

There are no special training requirements anticipated for this site. General training requirements for all FA/BC staff working on site are described in the General SSHP. The UXO geophysical survey will be non-invasive and will not include excavating or handling UXO. Trenching activities will be conducted in areas that have, based on the geophysical survey, are least likely to encounter UXO. The UXO avoidance policy will be enacted if UXO is uncovered (FA/BC, 1998; USACE, 1996).

## PERSONAL PROTECTIVE EQUIPMENT

The minimum required level of personal protection for all the sites at all times is modified Level D. Level D includes safety boots/shoes, safety glasses, hard hat, and gloves for handling soil and debris. In addition to this protection, colored Tyvek<sup>®</sup> coveralls (preferably blue or brown) or

equivalent will be worn at all times inside the work zone during trenching activities. These items are also listed on Table A-3, Field Equipment. Based on the environmental monitoring plan, if conditions warrant upgrade to Level C will be conducted to protect personnel. Descriptions of other levels of PPE are described in the FA/BC Health and Safety Program Manual (301 and 302; p. 1-24) and the General SSHP.

## ENVIRONMENTAL MONITORING PLAN

The following is the anticipated environmental monitoring plan necessary for Area I Landfill 1, Landfill 2 and Quarry 3 and Area M Quarry 1 field activities. Equipment anticipated for environmental monitoring is listed on Table A-3. Environmental monitoring will be in accordance with the Organic Vapor Response criteria outlined in Table A-4. Generally, only invasive activities will include monitoring of air quality in and around the work area and heat or cold stress.

## MEDICAL SURVEILLANCE REQUIREMENTS

There are no special medical surveillance requirements anticipated for the Area I Landfill 1, Landfill 2 and Quarry 3 and Area M Quarry 1 field activities. The General SSHP describes the general medical surveillance requirements.

## SITE CONTROL MEASURES

The approximate work zones are shown on site maps, which are included as Figures A-1 through A-4. The zone locations are subject to change based on work activities, site access, and wind direction. Equipment necessary for site control measures is listed on Table A-3. Further details regarding site control measures can be found in the FA/BC Health and Safety Program Manual (406; p.25-28).

## DECONTAMINATION

Decontamination will take place within the work zones identified and shown on Figures A-1 through A-4. A sample decontamination set-up can be found in the FA/BC Health and Safety Program Manual (405; p.23). There are no special emergency decontamination procedures anticipated for this project. General decontamination equipment necessary for this project is listed on Table A-3.

## EMERGENCY PROCEDURES

The nearest medical assistance center is **Kaiser Permanente Hospital** located at **975 Sereno Dr., Vallejo, CA.**, telephone number: **(707) 651-1000**. Directions from all sites to the nearest hospital are presented below and shown on the route to hospital map included in this document as Figure A-5.

### *Directions from Landfill 1 to I-780:*

- Turn left onto **Grant Street**, which becomes **Military East**.
- Continue northwest on **Military East** to **East 5<sup>th</sup> Street**.
- Right onto **East 5<sup>th</sup> Street** heading northeast.
- Left onto on-ramp to **I-780 West** towards Vallejo.

### *Directions from Landfill 2 to I-780:*

- Turn right onto **Adams Street** heading northwest.
- Right onto **Grant Street**, which becomes **Military East**.
- Continue northwest on **Military East** to **East 5<sup>th</sup> Street**.
- Right onto **East 5<sup>th</sup> Street** heading northeast.
- Left onto on-ramp to **I-780 West** towards Vallejo.

**Table A-3**  
**Anticipated Field Equipment for Area I Landfill 1, Landfill 2 and Quarry 3 and Area M Quarry 1**

Equipment	Purpose and description
<b>Personal Protective Equipment</b>	
Nitrile disposable gloves	Prevents exposure to potentially contaminated soil or groundwater.
Tyvek® coveralls or equivalent	Prevents exposure to potentially contaminated soil or groundwater.
Respirators and cartridges	If necessary, half face or full face respirator will be used if the level of PPE is upgraded during work. Respiratory equipment must be in working condition and fit-tested for that person. A combination organic vapor/acid gas P100 particulate cartridge should be adequate protection for the contaminants expected at this site. The end of service for cartridge will be 12 hours based on toluene/chlorobenzene/trichloroethane and the respiratory manufacturers recommendations. If upgrade to Level C for unexpected chemicals is required, the HSD will be contacted to determine End of Service Life change out schedule for cartridges based on exposure conditions. All personnel wearing respiratory protection will be in compliance with fit-testing requirements as specified in the FA/BC Health and Safety Program Manual Section 302.
Steel-toed boots or shoes and a hard hat	Required PPE for Level D.
Gloves – leather or nitrile depending on conditions	Required PPE for Level D.
<b>Environmental Monitoring Equipment</b>	
Organic vapor monitor or equivalent	An OVM or equivalent is required to monitor air quality in and around the work zone. The OVM must be calibrated before and after each workday. A calibration data sheet will be maintained. A periodic response check will be performed during the workday to determine that it is responding to contaminants.
LEL/gas meter	For methane and H <sub>2</sub> S detection.
Benzene detector tubes (0.5-10 ppm)	Detector tubes, benzene specific, is required to monitor air quality in the work zone.
<b>Site Control Measures</b>	
Traffic Cones, barricades and safety tape	All work areas will be delineated with traffic cones and/or safety tape to prevent people from entering the work zone. Barricades may also be used in higher traffic areas.
Dust control	Water will be used to minimize dust during trenching activities. Initially, dust monitoring will be conducted to determine if dust controls are effective. Upgrade to Level C PPE if dusts are greater than 3 mg/m <sup>3</sup> .
<b>Decontamination Equipment</b>	
Wash buckets and soap, plastic drop cloth, disposable towels, disposal containers.	Necessary for proper decontamination of small equipment and non-disposable PPE (i.e., work boots).

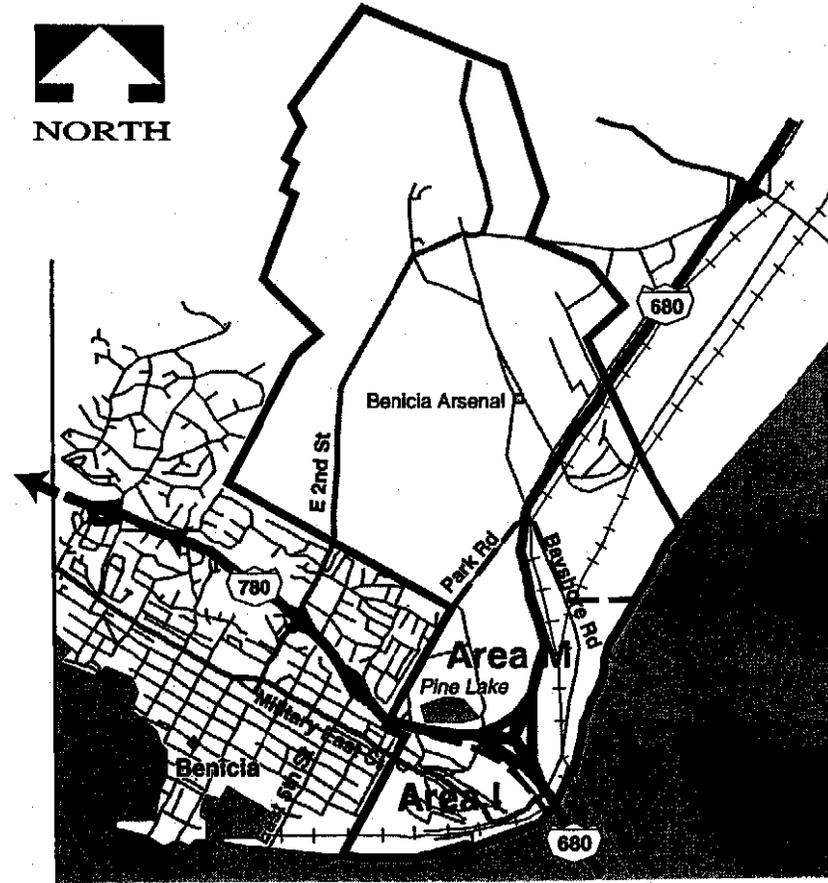
**Table A-3 (continued)**  
**Anticipated Field Equipment for Area I Landfill 1, Landfill 2 and Quarry 3 and Area M Quarry 1**

Equipment	Purpose and Description
<b>Other Equipment</b>	
Water level probe	There is a possibility during drilling that groundwater may be encountered. All equipment will be checked prior to use to determine if it is working properly.
Interface probe	There is a possibility during drilling that free-phase petroleum hydrocarbons in groundwater may be encountered. All equipment will be checked prior to use to determine if it is working properly.
pH/electrical conductance (EC) meter	If groundwater is encountered, physical properties (such as pH, EC, color, odor, and relative clarity) will be noted in the field logbook. This equipment will be calibrated before use and calibration notes will be logged in the field logbook.
Sampling containers (soil and water)	If necessary, appropriate containers for soil and groundwater samples will be required.
Sample labels, COC forms, zip-lock bags, cooler, ice (if necessary), custody seals	Necessary for any soil or groundwater sampling. Proper COC forms, labels, and custody seals will be completed for proper QC. Samples will be stored in a clean cooler (with ice, if necessary for specified analysis) for delivery to an analytical laboratory. If ice is used, all samples will be sealed around the end caps, lids, or caps to prevent water from invading the sample. Then the samples will be double-bagged and sealed for an additional protective barrier from melt water.
Hand auger or post hole digger	Prior to using power drilling equipment, a hand auger or hand operated post hole digger will be used to explore the upper 3 to 5 feet for underground utilities and other obstructions. In addition, the hand auger may be used for the collection of shallow subsurface soil samples.
Thermometer	Monitor air temperature when ambient temperature is above 70 degrees F. Thermometer should be placed in a shady area.
Illumination	All work activities will be conducted in daylight hours to provide adequate lighting for outside activities. Work activities will not be conducted indoors.
Potable water and sanitation	Drinking water and toilets are located at the site for use by all workers.

**Table A-4**  
**Organic Vapor Response Criteria for Petroleum Hydrocarbons that may Include Gasoline, Diesel and Fuel Oil**

Organic vapor concentrations in breathing zone <sup>a</sup>	Sampling frequency	Action taken
0 less than 1 ppm	At a minimum of every 15 minutes, whenever active excavation or drilling is being conducted, upon initial approach to surface water and sediment sampling sites where contamination is anticipated.	Continue work with required minimum PPE for the field activity
1 ppm to 10 ppm for more than 2 minutes	Every 15 minutes until organic vapor concentration levels decrease less than 1 ppm.	Collect benzene detector tubes (DTs) at borehole: <ul style="list-style-type: none"> <li>• If DTs reveal no detectable concentrations then, continue work with required minimum PPE for the field activity</li> <li>• If DTs reveal detectable concentrations greater than 1 ppm upgrade to Level C PPE</li> <li>• If DTs for benzene reveal detectable concentrations greater than 10 ppm, then stop work</li> </ul>
10 to 100 ppm for more than 2 minutes	Every 15 minutes	Level C PPE required
100 ppm for more than 2 minutes with ½-face respirator (500 ppm with full-face respirator)	Every 10 minutes	<ul style="list-style-type: none"> <li>• Stop work</li> <li>• Work crews position themselves upwind of site</li> <li>• Re-evaluate in 15 minutes</li> <li>• Contact HSD and PJM</li> <li>• Evacuate</li> </ul>
<b>Dust in breathing zone</b> 0-3 mg/m <sup>3</sup> dust	Every 15 minutes	<ul style="list-style-type: none"> <li>• Continue work</li> <li>• Upgrade to Level C, assume dust control procedures</li> <li>• Stop work</li> </ul>
>3-15 mg/m <sup>3</sup> dust	Every 15 minutes	
>15 mg/m <sup>3</sup> dust	Every 15 minutes	
<b>H<sub>2</sub>S</b> >10 ppm >10% LEL	Continuous continuous	<ul style="list-style-type: none"> <li>• Stop work</li> <li>• Stop work, evaluate the area</li> </ul>

<sup>a</sup> OVA calibrated to methane (concentrations will be less if calibrated to isobutylene).



© 1993 DeLorme Mapping

**DIRECTIONS FROM LANDFILL 1:**

- TURN LEFT ONTO GRANT STREET, WHICH BECOMES MILITARY EAST.

**DIRECTIONS FROM LANDFILL 2:**

- TURN RIGHT ONTO ADAMS STREET HEADING NORTHWEST.
- RIGHT ONTO GRANT STREET, WHICH BECOMES MILITARY EAST.

**DIRECTIONS FROM QUARRY 1:**

- TURN LEFT ONTO PARK ROAD HEADING SOUTH.
- RIGHT ONTO JEFFERSON STREET.
- RIGHT ONTO GRANT STREET, WHICH BECOMES MILITARY EAST.

**DIRECTIONS FROM QUARRY 3:**

- TURN RIGHT ONTO JEFFERSON STREET.
- RIGHT ONTO GRANT STREET, WHICH BECOMES MILITARY EAST.

**CONTINUING LANDFILLS 1 AND 2, QUARRIES 1 AND 3 TO I-780:**

- CONTINUE NORTHWEST ON MILITARY EAST TO EAST 5TH STREET.
- RIGHT ONTO EAST 5TH STREET HEADING NORTHEAST.
- LEFT ONTO ON-RAMP TO I-780 WEST TOWARDS VALLEJO.

**DIRECTIONS FROM I-780 TO KAISER PERMANENTE HOSPITAL:**

- TRAVEL ON I-780 WEST FOR APPROXIMATELY 5.4 MILES.
- TAKE I-80 EAST TOWARDS SACRAMENTO FOR 2 MILES (HEADING NORTH).
- TAKE REDWOOD STREET EXIT.
- TRAVEL WEST ON REDWOOD STREET FOR 1 MILE.
- RIGHT ONTO BROADWAY HEADING NORTH FOR 0.4 MILES.
- RIGHT ONTO SERENO DRIVE HEADING EAST FOR 0.2 MILES.
- HOSPITAL IS LOCATED ON THE RIGHT AT 975 SERENO DRIVE.

TOTAL TRAVEL TIME FROM THE PROJECT AREA TO KAISER PERMANENTE HOSPITAL IS APPROXIMATELY 20 MINUTES, AND THE TOTAL DISTANCE IS APPROXIMATELY 10 MILES.

**Figure A-5**  
**Route to Hospital**  
**Area I Landfill 1, Landfill 2, and Quarry 3**  
**and Area M Quarry 1**

Area I - Site Safety and Health Plan  
 Benicia Arsenal

*Directions from Quarry 1 to I-780:*

- Turn left onto **Park Road** heading south.
- Right onto **Jefferson Street**.
- Right onto **Grant Street**, which becomes **Military East**.
- Continue northwest on **Military East** to **East 5<sup>th</sup> Street**.
- Right onto **East 5<sup>th</sup> Street** heading northeast.
- Left onto on-ramp to **I-780 West** towards Vallejo.

*Directions from Quarry 3 to I-780:*

- Turn right onto **Jefferson Street**.
- Right onto **Grant Street**, which becomes **Military East**.
- Continue northwest on **Military East** to **East 5<sup>th</sup> Street**.
- Right onto **East 5<sup>th</sup> Street** heading northeast.
- Left onto on-ramp to **I-780 West** towards Vallejo.

*Directions from I-780 to Kaiser Permanente Hospital:*

- Travel on **I-780 West** for approximately 5.4 miles.
- Take **I-80 East** towards Sacramento for ≈ 2 miles (heading north).
- Take **Redwood Street** exit.
- Travel west on **Redwood Street** for ≈ 1 mile.
- Right onto **Broadway** heading north for ≈ 0.4 miles.
- Right onto **Sereno Drive** heading east for ≈ 0.2 miles.
- **Hospital** is located on the right at **975 Sereno Drive**.

Total travel time from the project area to Kaiser Permanente hospital is approximately 20 minutes, and the total distance is approximately 10 miles.

The nearest telephone is located in the work zone. If a cell phone is to be used for emergency purposes, it must be checked upon arrival to the site to verify that reception to the area is available. The emergency telephone numbers to be used to call for assistance are listed in the section on Key Personnel and Responsibilities in the FA/BC Health and Safety Program Manual (Forward; p. F-5). **In the event of a medical emergency cell phones must dial (707) 745-3411 or 3412 for the Benicia Police Department. FA/BC will post the number on or near each cell phone.**

## DOCUMENTATION

Proper completion of standard Attachments A through E is required health and safety documentation for this site. Attachments A through E are located at the end of this SSHP. The procedures and frequency in which each Attachment must be completed is described in Table A-5.

## REFERENCES

- Brown and Caldwell. 1999. Benicia Arsenal General SSHP. Prepared for U.S. Army Corps of Engineers, Sacramento, California. January.
- Forsgren Associates/Brown and Caldwell. 1998. Health and Safety Program Manual. Prepared for U.S. Army Corps of Engineers, Sacramento, California. August.
- U.S. Army Corps of Engineers. 1996. Interim Guidance (ETL 385-1-2). Generic Scope of Work for Ordnance Avoidance Operations. Draft. August.

**Table A-5**

**Attachments A – E for Area I Landfill 1, Landfill 2 and Quarry 3 and  
Area M Quarry 1 Investigation Activities**

Attachment	Procedures	Frequency
Attachment A – Site Safety & Health Plan Acknowledgement Form	Attachment A will be completed and signed by all contractors and subcontractors involved with the field effort. An emergency contact for each contractor and subcontractor will also be required on Attachment A.	Once, prior to the start of the field project
Attachment B – Site Safety & Health Plan Site Activity and Safety Briefing	A safety briefing will be held every day prior to start of work. Attachment B will be included with all other daily sheets (i.e., field notes, boring logs) submitted by the contractor at the end of the day.	Daily
Attachment C – Site Safety & Health Plan Safety Plan Implementation Checklist	Attachment C will be completed prior to the start of each field project and all items listed and their respective status will be reviewed every day of the field effort.	Once, prior to the start of the field project
Attachment D – Unsafe Conditions	Attachment D will be completed, if necessary, for every occurrence of an unsafe condition. If an Attachment D is completed for an unsafe condition, the PJM and the HSD will be notified immediately and all work at the job site will stop until the unsafe condition is corrected.	When necessary
Attachment E – Site Safety & Health Plan Safety Plan Environmental Monitoring Documentation	Attachment E is a sheet to record daily air monitoring data. This attachment will be included with all other daily sheets (i.e., field notes, boring logs) submitted by the contractor at the end of the day.	Daily during invasive activities

**FA/BC****Attachment A—Site Safety and Health Plan Acknowledgment**

Employee Name

Project Name

Project Location

Project Number

**Statement of Acknowledgment/Emergency Information**

I hereby certify that I have read and that I understand the safety and health guidelines contained in the Benicia Arsenal General Site Safety and Health Plan (SSHP), the FA/BC Site-Specific SSHP for the site named above.

\_\_\_\_\_  
Employee Name\_\_\_\_\_  
Employee Signature\_\_\_\_\_  
Emergency Info /Relationship\_\_\_\_\_  
Phone Number\_\_\_\_\_  
Employee Name\_\_\_\_\_  
Employee Signature\_\_\_\_\_  
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Phone Number\_\_\_\_\_  
Employee Name\_\_\_\_\_  
Employee Signature\_\_\_\_\_  
Emergency Info /Relationship\_\_\_\_\_  
Phone Number

Name of Site Safety Officer Receiving This Form

Signature of Site Safety Officer

Date

**NOTE: Send completed form to Health and Safety Director.****HS—16 REV. 06/98**

<b>FA/BC</b>	<b>Attachment B—Site Safety and Health Plan Site Activity and Safety Briefing</b>											
Name of Site Safety Officer	Signature of Site Safety Officer											
Project Name	Project Location	Project Number										
<p><b>Who attended the briefing?</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; padding: 5px;"> <p><b>Names of FA/BC Employees</b></p> <hr/><hr/><hr/><hr/><hr/><hr/> </td> <td style="width: 50%; border: none; padding: 5px;"> <p><b>Names of Subcontractor(s) Employees</b></p> <hr/><hr/><hr/><hr/><hr/><hr/> </td> </tr> </table>			<p><b>Names of FA/BC Employees</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p><b>Names of Subcontractor(s) Employees</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>								
<p><b>Names of FA/BC Employees</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p><b>Names of Subcontractor(s) Employees</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>											
<p><b>What items were discussed?</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; padding: 5px;"><input type="checkbox"/> Site Safety and Health Plan</td> <td style="width: 50%; border: none; padding: 5px;"><input type="checkbox"/> Hazardous Site Conditions/Activities</td> </tr> <tr> <td style="border: none; padding: 5px;"><input type="checkbox"/> Specific Accident/Incident</td> <td style="border: none; padding: 5px;"><input type="checkbox"/> Changes/Solutions to Specific Accident(s)</td> </tr> <tr> <td style="border: none; padding: 5px;"><input type="checkbox"/> Protective Equipment to be Used</td> <td style="border: none; padding: 5px;"><input type="checkbox"/> Location of Emergency Telephone Number</td> </tr> <tr> <td style="border: none; padding: 5px;"><input type="checkbox"/> Emergency Hospital Route</td> <td style="border: none; padding: 5px;"><input type="checkbox"/> Work Schedule</td> </tr> <tr> <td colspan="2" style="border: none; padding: 5px;"><input type="checkbox"/> Other _____</td> </tr> </table>			<input type="checkbox"/> Site Safety and Health Plan	<input type="checkbox"/> Hazardous Site Conditions/Activities	<input type="checkbox"/> Specific Accident/Incident	<input type="checkbox"/> Changes/Solutions to Specific Accident(s)	<input type="checkbox"/> Protective Equipment to be Used	<input type="checkbox"/> Location of Emergency Telephone Number	<input type="checkbox"/> Emergency Hospital Route	<input type="checkbox"/> Work Schedule	<input type="checkbox"/> Other _____	
<input type="checkbox"/> Site Safety and Health Plan	<input type="checkbox"/> Hazardous Site Conditions/Activities											
<input type="checkbox"/> Specific Accident/Incident	<input type="checkbox"/> Changes/Solutions to Specific Accident(s)											
<input type="checkbox"/> Protective Equipment to be Used	<input type="checkbox"/> Location of Emergency Telephone Number											
<input type="checkbox"/> Emergency Hospital Route	<input type="checkbox"/> Work Schedule											
<input type="checkbox"/> Other _____												
<p><b>Do any items require assistance from FA/BC Health and Safety staff? (If yes, describe the item and type of assistance required and contact the Health and Safety staff directly.)</b></p> <p><input type="checkbox"/> YES      <input type="checkbox"/> NO</p> <hr/> <hr/> <hr/> <hr/>												

**NOTE: Place a copy of the completed form in the project file.**

**FA/BC**

## Attachment C—Site Safety and Health Plan Safety Plan Implementation Checklist

Project Name	Project Location (city and state)	Date
Name of Site Safety Coordinator	Weather Conditions	Project Number
FA/BC Staff Present	Name	Office
	_____	_____
	_____	_____
	_____	_____

Indicate the status of each of the following:

- |  |                              |                             |                              |
|--|------------------------------|-----------------------------|------------------------------|
| 1. Is a copy of the Site Safety and Health Plan (SSHP) on site?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 2. Is the personal protective equipment required by the SSHP available and being used correctly?                       | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 3. Have the work zones been delineated?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 4. Has a decontamination station been set up as required by the SSHP?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 5. Are the decontamination procedures being followed?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 6. Is access to the exclusion zone being controlled?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 7. Has the site activities briefing and tailgate safety meeting been provided?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 8. Is the list of emergency telephone numbers posted at the support zone?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 9. Are directions to nearest emergency medical assistance posted at support zone?                                      | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 10. Is emergency equipment available and functional, as required by the SSHP?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 11. Has the nearest toilet facility been identified or a portable facility been set up?                                | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 12. Has an adequate supply of drinking water been provided?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 13. Has water for decontamination been provided?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 14. Have the instruments for environmental and exposure monitoring been calibrated and set up as required by the SSHP? | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 15. Are the instruments being used properly and periodically checked during the shift for battery charge status?       | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 16. Have the trenches and excavations been clearly marked?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 17. Have trenches and excavations been shored or sloped as required by soil type and work activities?                  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 18. Are dust suppression measures being used?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 19. Is food and tobacco consumption being restricted to the support zone?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 20. Has a confined space been identified as part of this project?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 21. Are the confined space entry procedures being correctly implemented?   | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| 22. Has the work/rest cycle for the shift been established?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |
| TIME ON (minutes): _____   | TIME OFF (minutes): _____    |                             |                              |
| 23. Has a shaded rest area been set up in the support zone?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> N/A |

**NOTE: Place completed form in project file.**





**APPENDIX B**

**UXO/OE CONSTRUCTION SUPPORT PROCEDURES**

## APPENDIX B

### UXO/OE CONSTRUCTION SUPPORT PROCEDURES

#### B-1.0 GENERAL

This Plan describes site specific activities to perform construction support for potential UXO/OE during trenching at Landfill 1, Landfill 2, Quarry 3 in Area I and Quarry 1 in Area M. The purpose of this work is to provide UXO/OE construction support for these activities. The procedures described in this Plan will be used by USA Environmental, Inc. (USA) under subcontract to FA/BC.

USA will perform operations in accordance with the ETL 385-1-2, FA/BC's Arsenal-Wide Investigation Workplan, SSHP (with input from USA covering UXO specific safety issues) and this Plan. All USA personnel will read and comply with these documents.

The activities described in this Plan will be performed in substantial compliance with CERCLA (Section 104) and the National Contingency Plan (Section 300.120 and 300.400 (e)). The provisions of 29 CFR 1910.120 shall apply to all actions taken at this site. Additionally, the Occupational Safety and Health Administration (OSHA) requires all employers performing on-site activities to develop and maintain an ongoing written Safety and Health Program in compliance with OSHA Standard 29 CFR 1910.120(b) and 29 CFR 1926.65 (b).

#### B-2.0 MOBILIZATION

USA will mobilize all personnel and equipment as required and upon receiving a written notice to proceed from FA/BC. Under this subcontract, UXO support involves providing construction support during:

- the excavation of 5 trenches at Landfill 1 in Area I to a clearance depth of 2 feet below the bottom of the refuse/fill.
- the excavation of 6 trenches at Landfill 2 in Area I to a clearance depth of 2 feet below the bottom of the refuse/fill.
- the excavation of 5 trenches at Quarry 3 in Area I.
- the excavation of 5 trenches at Quarry 1 in Area M.

The goal of mobilization is to ensure that the proper attention is dedicated to ensuring the UXO technicians are prepared and have the resources to perform all tasks described in this Plan. Actions performed during this phase include:

- identify/procure, package, ship, and inventory project equipment
- coordinate with FA/BC project personnel
- organize support facilities and test communications equipment
- procure any additional supplies and equipment required to perform the work and
- conduct site specific training.

### **B-2.1 Personnel**

USA will deploy a SUXOS and a UXO Technician II to perform operations at the landfills and quarries. FA/BC personnel will coordinate with USACE.

### **B-2.2 Project Equipment**

USA has thoroughly assessed the equipment requirements for this project. During mobilization, USA will:

- package and ship corporate equipment items
- coordinate with selected vendors for direct shipment of supplies and equipment
- coordinate with FA/BC for communications, administrative and other support and
- perform maintenance and quality checks of the equipment to ensure that it is operationally ready.

### **B-2.3 Site Specific Training**

As part of the mobilization process, USA will perform site specific training for all personnel assigned to this project. The purpose of this training is to ensure that all personnel fully understand the procedures and methods USA will use to perform operations, their individual duties and responsibilities, and any and all safety and environmental practices/procedures associated with operations. All personnel will be trained as they arrive. A written record of this training and the signatures of personnel attending the training will be maintained. Training topics/issues and training responsibilities are as follows:

- The UXO Technician II will receive operational briefings and training on his duties and responsibilities. All personnel, to include FA/BC crews, will receive ordnance recognition and UXO safety precautions. This training will be performed by the SUXOS.
- All personnel will receive training on the individual equipment they will operate while on-site.
- All USA personnel will receive detailed training on this Plan prior to mobilization.
- All USA UXO personnel will complete HAZWOPER 40-hour (or 8-hour refresher) training as required.

All USA UXO personnel on site have completed a pre-placement or annual physical examination that complies with the requirements of 29 CFR 1910.120 and have been certified as fit to work by an Occupational Physician certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is board eligible. All USA personnel on-site are in the USA medical surveillance program. Documentation as to the medical qualifications of personnel are on file on site and be provided to the contracting officer. All personnel are screened for drugs in accordance with the USA Drug/Alcohol Abuse Program.

### **B-3.0 OPERATIONS**

Upon completion of mobilization, USA will provide construction support during trenching under the direction of FA/BC. The following subparagraphs describe the general work practices that

USA will follow during all operations, and the specific procedures and methods USA will use during this project.

### **B-3.1 General Site Practices**

All UXO operational activities will be performed under the supervision and direction of qualified UXO personnel. Non-UXO qualified personnel will be prohibited from performing operations unless they are accompanied and supervised by a UXO Technician. Throughout operations, USA will strictly adhere to the following general practices. Detailed UXO safety precautions and procedures are in the site specific SSHP as Appendix A of this Plan.

**B-3.1.1 Work Hours.** Operations will be conducted during daylight hours only. In no case will UXO personnel work more than ten hours in any one day.

**B-3.1.2 Site Access.** USA, in conjunction with FA/BC and the current property owners will control access into operating areas and will limit access to only those personnel necessary to accomplish the specific operations or who have a specific purpose and authorization to be on the site. No hazardous operations will be conducted when unauthorized persons are in the vicinity.

**B-3.1.3 Handling of UXO.** UXO items will NOT be handled, even though qualified UXO personnel are on-site. Non-UXO site personnel will be emphatically instructed and closely supervised to ensure they do not handle any UXO. OE scrap will not be handled or touched until inspected by the SUXOS to insure there are no explosives or hazardous material remaining in the items.

**B-3.1.3.1 Incident Reporting and Response Procedures.** OE items found or located during construction support operations will be immediately reported and site investigation activities will cease. The UXO/OE contractor shall immediately secure the area and the area shall remain secure pending arrival of the 787th EOD company. Immediately contact USACE Project Manager (Bruce Handel) at (916) 557-7906 M-F 0800 to 1730, A. R. Smith at (916) 557- 6973, [pager number (831) 520-0602], and 787th EOD company will be contacted directly for response. Outside of the above duty hours, immediately contact USACE Huntsville (Greg Bayuga) at (877) 321-0923 (pager) and 787th EOD company will be contacted directly for response.

In the event the above contacts are not accessible, immediately contact the 787th Ordnance Company (EOD), Moffet Field, California at (650) 603-8301/02 (24 hours).

Local Police department and regulatory agencies will be contacted by the USACE Project Manager.

Subsequent identification, evaluation, handling and disposal of UXO/OE material will be conducted under the USACE Sacramento District. As a contingency, health and safety procedures (Appendix C) and a plan (Appendix D) for investigation and disposal of UXO/OE materials have been attached for use by USACE. Procedures listed in Appendices C and D will only be implemented by USACE and UXO/OE subcontractors to the USACE.

**--THIS POLICY WILL BE STRICTLY FOLLOWED--**

**B-3.1.4 Safety Briefing.** USA will conduct daily tailgate safety briefings. In addition, the SUXOS may hold a safety stand-down at any time he notes any degradation of safety or a safety issue that warrants a review.

**Daily Tailgate Briefing.** Tailgate safety briefings will be conducted by FA/BC with the support of the SUXOS. A written record of this training and the signatures of personnel attending the briefing will be maintained. The briefing will focus on the specific hazards anticipated at each work site during that day's operations and the safety measures that will be used to eliminate or mitigate those hazards. It will also refer to other operations within the area whose proximity may have safety ramifications. As work progresses and the team's location changes within a site, or from site-to-site, any corresponding changes in ingress/egress routes and emergency evacuation routes will also be reviewed during this tailgate briefing.

**Visitor Safety Briefing.** Site visitors must receive a safety briefing prior to entering the operating area and must be escorted at all times by the SUXOS or the FA/BC Representative. All visitors entering must sign in with the FA/BC field representative.

**B-3.1.5 Environmental Awareness.** The promotion of environmental awareness will be ongoing as part of safety and operational briefs.

**B-3.1.6 Safety and Environmental Violations.** Safety violations or unsafe acts will be immediately reported to FA/BC and the SUXOS. Failure to comply with safety rules/regulations or failure to report violations may result in removal from area. Reckless interference with sensitive species or blatant disregard for environmental issues will likewise not be tolerated and may lead to removal from area.

**B-3.1.7 Work Clothing and Field Sanitation.** Work clothing will be appropriate for the conditions encountered. In most cases this will be Level D PPE.

- Short or long sleeve cotton coveralls or work clothing.
- Footwear will be sturdy work boots. UXO personnel will not wear steel toe safety boots when using magnetometers.
- Hand protection will consist of leather or canvas work gloves. Rubber inner or outer gloves may be required where increased protection is needed.
- Safety glasses with side shields, hearing protection, and hard hats will be available and worn when engaged in activities where their use is required.
- In no case will tennis/running shoes or abbreviated attire such as tank tops or shorts be permitted.

The team will be outfitted with field decontamination equipment which will consist of portable eye-wash kits, containers of wash water, paper towels and soap. Prior to commencing operations each day, these facilities will be in place and ready for use in the vicinity of the team's work area as needed. Good housekeeping and decontamination measures will be practiced. Existing field sanitation stations will be utilized by the work team.

**B-3.1.8 Compliance with Plans and Procedures.** USA will conduct operations in a systematic manner using proven operating methods and techniques. All activities will be conducted under the direction, supervision and observation of the SUXOS. All personnel will strictly adhere to approved plans and established procedures. When operational parameters change and there is a corresponding requirement to change procedures or routines, careful evaluation of such changes will be conducted by on-site supervisory personnel in close liaison with the FA/BC representative. Any new course of action or desired change in procedures will be submitted with justification for approval as required. Approved changes will be implemented in a manner that will ensure uniformity in procedures and end-product quality on the part of the UXO team.

**B-3.1.9 Equipment Checks.** All instruments and equipment that require maintenance and/or calibration will be checked prior to the start of each work day. If equipment field checks indicate that any piece of equipment is not operating correctly, and field repair cannot be made, the equipment will be tagged and removed from service and a request for replacement equipment will be placed immediately. Replacement equipment will meet the same specifications for accuracy and precision of the equipment removed from service.

USA will use the Schonstedt GA-52CX magnetometer for anomaly detection. The GA-52CX has the capabilities to detect a 81 mm mortar at a depth of one foot and a MK81 bomb at a depth of 6 feet. Prior to use the magnetometer will be checked and/or calibrated against a known metallic anomaly. The purpose of this test/calibration is to ensure that the instrument is operating properly and to appropriately adjust the sensitivity level of the instrument.

The USA SUXOS will establish a magnetometer check point by burying a 81 mm inert projectile at 1 foot and a 105 mm inert projectile (or similar mass metal objects) at a depth of 3 feet or equivalent. Magnetometers will be checked against these sources to ensure they are operational and capable of detecting ferrous objects at the depth specified in the Scope of Work. This test will be performed daily prior to placing the instrument into operation.

### **B-3.2 UXO Construction Support**

USA will provide all personnel and equipment necessary to perform UXO/OE construction support at landfills and quarries. The approximate boundaries will be identified by geophysical survey and staked prior to trenching. USA will use non-intrusive techniques to locate ferrous objects on the surface and the subsurface.

**B-3.2.1 Equipment.** The equipment requirements for this activity include:

- Schonstedt magnetometers used to detect subsurface metallic anomalies;
- Forms and logbooks to record activities and anomaly identification.

**B-3.2.2 UXO/OE Clearance Procedures.** Each trench will be cleared for near-surface anomalies before intrusive activity begins. The two-person UXO team will sweep the area with a magnetometer. After finding an area free of near-surface anomalies, then the hole may be dug to a depth of no more than 2 feet. At no more than 2 feet, the auger or digging equipment will be removed from the hole and from the area. The excavating equipment must be moved away from the hole to not influence the magnetometer.

The magnetometer will be lowered into the trench to locate any anomalies. This procedure will continue until the total depth of the trench is reached or 2 feet below refuse/fill, whichever

comes first. During the sweep and the downhole survey of the area with the magnetometer, no other personnel except USA will be allowed in the area. The excavating equipment operator will only resume excavating operations after the UXO specialist is clear of the excavating equipment.

**B-3.2.3 Records.** The SUXO will prepare and maintain a detailed accounting of activities performed at each location. The will include information pertaining to the following:

- The date and time construction support operations began.
- The date and time construction operations support were completed.
- The number of hours, by labor category, expended in performing avoidance operations.
- The location, number, type, and description of OE items encountered.

#### **B-4.0 DEMOBILIZATION**

During this phase, USA removes its operational capability from the area and reallocates its personnel and equipment to other projects. The SUXOS will closely monitor operational performance throughout the execution of this project. When a clear projection can be made of the actual completion date he will, with the approval of FA/BC's site representative, initiate actions to demobilize personnel and equipment.

#### **B-5.0 REFERENCES**

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- Forsgren Associates/Brown and Caldwell. 1998. Corporate Health and Safety Manual. Prepared for U.S. Army Corps of Engineers, Sacramento, California. August.
- Forsgren Associates/Brown and Caldwell. 1999a. Arsenal-Wide Investigation Workplan. Prepared for U.S. Army Corps of Engineers, Sacramento, California. February.
- Forsgren Associates/Brown and Caldwell. 1999b. Arsenal-Wide Quality Assurance Project Plan. Prepared for U.S. Army Corps of Engineers, Sacramento, California. February.
- Jacobs Engineering. 1999. Record Research Report. Prepared for U.S. Army Corps of Engineers, Sacramento, California. April.
- USACE. 1996. Interim Guidance (ETL 385-1-2). Generic Scope of Work for Ordnance Avoidance Operations. Draft. August.

**APPENDIX C**

**SITE SAFETY AND HEALTH PLAN  
FOR POTENTIAL UXO/OE MATERIALS**

**SITE SAFETY AND HEALTH PLAN  
FOR  
POTENTIAL UXO/OE MATERIALS  
AREA I LANDFILL 1, LANDFILL 2, QUARRY 3 AND AREA M QUARRY 1  
BENICIA ARSENAL**

Prepared by:  
George R. Spenser  
Safety and Health Manager  
USA Environmental, Inc.

George R. Spenser Date: 10/30/00

Reviewed/Approved by:

John Q. Adams  
Vice President  
USA Environmental, Inc.

John Q. Adams Date: 10/30/00

Effective Dates:

10/31/00 to 10/31/01







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## **APPENDIX C SITE SPECIFIC SAFETY AND HEALTH PLAN**

### **INTRODUCTION**

The purpose of this Site Safety and Health Plan (SSHP) is to establish general guidelines and procedures to ensure protection of USA Environmental, Inc. (USA) personnel and the public while performing operations at the Former Benicia Arsenal (Benicia), Benicia, Solano County, California. This SSHP addresses Ordnance and Explosives (OE) operations and is a supplement to the Prime Contractors, Brown and Caldwell's (BC) Benicia Arsenal General SSHP, and to the site specific SSHP for investigations at Landfills 1 and 2 and Quarry 3 in Area I and Quarry 1 in Area M.

The objective of this SSHP is to provide supervisors and workers the necessary tools to maintain a safe and healthy work place and to protect the environment. USA places safety and accident prevention above operations, and places the burden of responsibility on all employees, consultants, teaming associates, and subcontractors. A copy of this SSHP is available for review by all employees, subcontractors, and visitors upon request. All supervisors and workers will be required to review the SSHP and sign the log prior to performing any work at the site. Personnel that violate policies contained in this SSHP may be dismissed from the work site and considered for termination.

### **C-1.0 INSTALLATION/SITE DESCRIPTION**

#### **C-1.1 Former Benicia Arsenal**

The former Benicia Arsenal is located approximately 25 miles east-northeast of San Francisco adjacent to the City of Benicia. The project area is composed of rolling hills with small streams discharging to the southeast towards Carquinez Strait (part of the Sacramento River Delta). Portions of the property are now owned by Pacific Bay Homes (a housing development company), Benicia Industries, Inc. (an industrial park operated by the City of Benicia) and Exxon Oil Company (operating a refinery).

#### **C-1.2 Area I**

Area I occupies an irregularly shaped tract of land consisting of approximately 200 acres. It is bounded on the north and east by Area M, on the south by Carquinez Strait, and on the west by the Arsenal boundary line.

##### **C-1.2.1 Landfill 1**

Landfill 1 is noted on a 1918 map as a "dump", located slightly northeast of the former shop buildings (55, 56, and 57). The area has since been filled in. Building 71 was constructed over the filled area in 1920, with the southwest corner of the building coinciding with the western end of the landfill. Building 71 extends east beyond the eastern end of the landfill. Building 71 was demolished in the 1980s and is currently used for vehicle storage.

### **C-1.2.2 Landfill 2**

The Landfill 2 area was identified by USACE in its 1997 report as Area 9, situated southwest of Building 29, the Clocktower. The Landfill 2 area is defined for this FSIP as the area bordered to the northeast and northwest by relatively steep escarpments southeast and southwest by Adams Street and by Bayshore Road. Landfill 2 is currently fenced. This landfill was identified by a former Arsenal employee and was in use in the 1940s. Currently, Landfill 2 consists of a large graded flat area that slopes gently to the southeast. Available aerial photographs did not show the boundaries of the landfill. Existing boundaries are approximate and based on the outline of a graded area.

### **C-1.2.3 Quarry 3**

Quarry 3 was located in the vicinity of Building 72, the former Arsenal Infirmary. The location of the quarry is expressed by a bowl-shaped indentation in the bluff along the northern side of former Building 72.

### **C-1.3 Area M**

Area M occupies a rectangular shaped tract of land consisting of approximately 400 acres. It is bounded on the north by the drainage canal adjacent to Area W, on the east by Suisun Bay, on the south by Area I, and on the west by the Arsenal boundary and Area S.

#### **C-1.3.1 Quarry 1**

Quarry 1 is located approximately 300 feet east of Building 9 (part of the Camel Barn Museum site) in the central portion of Area M. The location of the quarry is expressed by a bowl-shaped indentation in the bluff.

## **C-2.0 OBJECTIVE**

The objective is to conduct surface and subsurface investigation activities in accordance with USACE UXO/OE procedures.

Landfill 1, Landfill 2 and Quarry 3 are not classified in the Engineering Evaluation/Cost Analysis (EE/CA) for known UXO/OE disposal. The probability to encounter UXO/OE is considered low. Work is planned with qualified UXO personnel employing construction support.

Quarry 1 in Area M is within a known UXO/OE area, Sector 5 in the EE/CA. As such, field work will not occur at this quarry until the removal action has been completed under the EE/CA. Upon completion of the removal action, field work will be conducted at Quarry 1 in Area M with appropriate OE/UXO construction support and consistent with methods and procedures used for Landfill 1, Landfill 2, and Quarry 3.

## **IF UXO/OE IS FOUND, THEN THIS SSHP WILL BE USED DURING ANY UXO/OE IDENTIFICATION AND REMOVAL OPERATIONS.C-3.0 ORGANIZATION STRUCTURE AND RESPONSIBILITIES**

### **C-3.1 General**

Ensuring the safe and healthful conduct of site operations is the responsibility of everyone assigned to the site, therefore, all USA personnel involved in site activities will be responsible for the following:

- complying with the SSHP and all other required safety and health guidelines
- taking all necessary precautions to prevent injury to themselves and to their fellow employees
- continually being alert to any potentially harmful situation and immediately informing the SSO of any such identified conditions
- performing only those tasks that they believe they can do safely and have been trained to do
- notifying the SSO of any special medical conditions (i.e., allergies, contact lenses, diabetes) which could affect their ability to safely perform site operations
- notifying the SSO of any prescription and/or over-the-counter medication which they are taking that might cause drowsiness, anxiety or other unfavorable side effects
- preventing spillage and splashing of materials to the greatest extent possible
- practicing good housekeeping by keeping the work area neat, clean and orderly
- immediately reporting all injuries, no matter how minor to the SSO
- maintaining site equipment in good working order, and reporting defective equipment to the SSO
- properly inspecting and using the PPE required by the SSHP or the SSO.

### **C-3.2 Organization**

The Safety and Health (S&H) requirements listed in this plan may change as work progresses at the site, however, no changes will be made without approval of Brown and Caldwell and the responsible USA personnel listed below. The safety organization structure and responsibilities for USA personnel operating at Benicia are described in the following paragraphs. USA's Organizational Structure is depicted below:

### **C-3.3 President**

Mr. Jonathan Chionchio is the President of USA Environmental, Inc. He has made safety a priority issue at USA. He has designated each and every USA employee as a Safety Officer and charged each employee with the responsibility for stopping unsafe acts before an accident occurs. USA takes safety seriously and Mr. Chionchio's personal involvement in safety is a reflection of USA's commitment to worker safety.

### **C.3.4 Safety and Health Manager**

The USA Safety and Health Manager (SHM) for this project is:

Mr. George R. Spencer  
USA Environmental, Inc.  
5802 Benjamin Center Drive, Suite 101  
Tampa, Florida 33634  
(813) 884-5722, Ext 152

#### **C-3.4.1 Experience**

Mr. Spencer has extensive safety management experience. He served as an Explosive Ordnance Disposal (EOD) Officer and a Military Safety Manager at the U.S. Army Safety Center. He has analyzed accident cause factors and created accident prevention programs, using risk management, systems management, and motivational concepts, for the Department of the Army. He was a unexploded ordnance (UXO) Safety Specialist for the U.S. Army Corps of Engineers, Huntsville, Alabama and Explosive Safety Officer for the EOD project in Kuwait. Mr. Spencer has conducted on-site safety audits and performed accident investigations both in the military and civilian arenas. Additionally, he has served as a UXO Technician and Senior UXO Supervisor on USA UXO contracts at Fort Monroe, Virginia and the Chocolate Mountain Bombing Range, California.

#### **C-3.4.2 Responsibilities**

The SHM will have the following responsibilities:

- Reports directly to the Vice President of USA Environmental, Inc. for all safety and health matters;
- Assists in preparation and conducts a final review of the SSHP;
- Provides UXO safety and health consultation to the Site Safety Officer; and
- Coordinates with the Certified Industrial Hygienist (CIH) to ensure site compliance with the SSHP and the USA Corporate Safety and Health Plan (CSHP).

#### **C-3.5 Vice President**

Mr. John Q. Adams is the Vice President of USA Environmental, Inc. During the execution phase, he will monitor performance, safety compliance, and act as the primary point of contact for safety/operational issues at USA Tampa.

#### **C-3.6 Senior UXO Supervisor**

The Senior UXO Supervisor (SUXO) is charged with developing and implementing the FSIP and Accident Prevention Plan for this project. The SUXO will be Joe Mares. Mr. Mares meets all the Training Requirements for this position as stated in Section-7.0.

### **C-3.6.1 Responsibilities**

- The SUXO will have the following safety and health related responsibilities:
- Reports directly to the Vice President;
- Managing the funding, manpower and equipment necessary to safely conduct site operations;
- Reviewing and becoming familiar with the FSIP and SSHP;
- Furnishes copies of the FSIP and SSHP to site and subcontract personnel for their review;
- Reviewing the scope of work (SOW) and ensuring that the required safety and health elements are addressed in the SSHP and/or FSIP;
- Coordinating the assignment of subcontractor personnel and ensuring that the personnel and equipment provided by the subcontractor meet the requirements of the FSIP and SSHP;
- Ensuring implementation of project quality and safety and health procedures;
- Early detection and identification of potential problem areas, including safety and health matters, and instituting corrective measures; and
- Directly interfacing with the FA/BC Technical Project Manager and advising him/her of safety and health matters related to conduct of the site operations.

### **C-3.7 Site Safety and Health Officer (SSO)**

The Senior UXO Supervisor will perform the duties of UXO SSO for the Benicia project.

#### **C-3.7.1 Responsibilities**

The SSO will have the following responsibilities:

- Has STOP WORK authority for safety and health reasons;
- Complete Personnel Data Sheets on all site personnel;
- Implement and enforce the SSHP, and report safety violations to the SUXO and SHM;
- Establishing work zones and controlling access to these zones;
- Confirm all contractor and subcontractor personnel's suitability for work, based upon OSHA and site specific medical and training requirements;
- Conduct daily General Safety Briefings;
- Implement and document the USA Site Specific Hazard Information Training Program (as specified by 29 CFR 1910.120);
- Ensure proper condition, maintenance, storage, and use of personal protective clothing (PPE);
- Consulting with the SHM prior to downgrading of alternating monitoring or PPE requirements;

- Assisting in the continued development of the SSHP and other safety and health procedures;
- On-site enforcement of the USA Alcohol/Drug Abuse Policy;
- Investigate accidents/incidents and "near misses";
- Conduct visitor orientation;
- Enforce the "buddy" system;
- Conduct and document daily safety inspections, and weekly safety audits;
- Maintain and calibrate safety monitoring equipment, and document calibration data in the monitoring or safety log;
- Restrict site personnel from site activities if they exhibit symptoms of alcohol or drug use or illness, and continually monitor site personnel for signs of chemical exposure or physical stress;
- Maintain the site safety and monitoring logs;
- Act as the On-Scene-Incident-Commander (OSIC) in the event of an emergency, notify and coordinate off-site emergency and medical response agencies;
- Post the descriptions and maps associated with hospital and emergency evacuation routes;
- Ensure field implementation of the USA CSHP; and
- Conduct on-site safety orientation and operational review. The orientation and review will be accomplished during the first working day at Benicia.

### **C-3.8 Quality Control Specialist (QC)**

No QC Specialist is required for this project.

### **C-3.9 UXO Supervisor**

No UXO Supervisor is required for this project.

### **C-3.10 UXO Specialist**

All UXO specialists are required to comply with the provisions of this SSHP, the FSIP and all applicable Federal, State, and local regulations.

### **C-3.11 Subcontractor Responsibilities**

Any subcontractors operating on-site will be responsible for providing site personnel that have read, understand and will comply with this SSHP. The subcontractor must provide documentation that the personnel assigned have the level of hazardous waste training and medical surveillance as required by this and Brown and Caldwell's SSHP. The subcontractor will also be responsible for providing equipment that is safe for operations and free from any obvious hazards.

### **C-3.12 Responsibilities of All Site Personnel**

Ensuring the safe and healthful conduct of site operations is the responsibility of everyone assigned to the site, therefore, all USA personnel involved in site activities will be responsible for the following:

- Complying with the SSHP and all other required safety and health guidelines;
- Taking all necessary precautions to prevent injury to themselves and to their fellow employees;
- Continual alertness to any potentially harmful situation and the need to immediately inform the SSO of any such conditions;
- Performing only those tasks that they believe they can do safely and have been trained to do;
- Notifying the SSO of any special medical conditions (i.e., allergies, contact lenses, diabetes) which could affect their ability to safely perform site operations;
- Notifying the SSO of any prescription and/or over-the-counter medication which they are taking that might cause drowsiness, anxiety or other unfavorable side effects;
- Preventing spillage and splashing of materials to the greatest extent possible;
- Practicing good housekeeping by keeping the work area neat, clean and orderly;
- Immediately reporting all injuries, no matter how minor to the SSO;
- Maintaining site equipment in good working order, and reporting defective equipment to the SSO;
- Reporting to work clean shaven, if required to use respiratory protection; and
- Properly inspecting and using the PPE required by the SSHP or the SSO.

### **C-4.0 SITE CONTROL**

The SSO coordinates access control and security on site. Due to the hazardous nature of OE only authorized personnel will be allowed in the exclusion zone (EZ). The EZ is the work site, encompassing an area large enough to prevent personnel injuries from fragmentation resulting from UXO. During all intrusive operations the initial EZ will be a radius of 200 feet from the operating team. The EZ will be adjusted if UXO is encountered to a distance consistent with the fragmentation hazard of the UXO. Fragmentation distances will be calculated in accordance with the U.S. Army Engineering and Support Center, Huntsville (USAESCH), HNC-ED-CS-S-98-2, Method for Calculating Range to no More Than One Hazardous Fragment per 600 Square Feet. During demolition operations the EZ will be in accordance with the demolition standard operating procedures. The limits of the EZ will be marked with hazard tape, painted stakes, pin flags, or other suitable marking material. During UXO operations, only UXO trained or personnel are allowed in the EZ (unless escorted by the SUXO/SSO). Authorized personnel are those that have completed the required training and meet medical requirements.

Visitors will report to the Brown and Caldwell field office. The Field Office is the administrative area at the Command Post (CP) where operations and support equipment are located. During all operations on individual sites, the SUXO will cease operations if unescorted personnel are observed within the operating area. During duty hours USA personnel will provide security at the site. Equipment will be returned to the CP and secured at the end of the work day.

Representatives from regulatory agencies will be permitted to enter the site at any time during business hours or any other reasonable times provided they have completed the required training and meet medical requirements. Further site controls to ensure safety are as follows:

- Eating, drinking, and smoking are prohibited except in designated areas;
- Hazardous OE operations (intrusive investigations and demolition) will cease if non-UXO trained personnel are present;
- The SSO/SUXO will escort all authorized visitors to the site;
- All personnel entering the site, including visitors, will be in the proper PPE;
- The SSO/SUXO will maintain the site entry control log to ensure accurate accountability for personnel;
- The SSO/SUXO will brief this SSHP to all personnel entering the site to inform them of the potential site hazards. All personnel will acknowledge this briefing by signing the SSHP briefing log;
- In case of an emergency, personnel will exit the site and move to the designated safe area. The safe area will be located upwind of the site outside of the fragmentation area. The SSO/SUXO will determine the severity of the emergency. If the emergency warrants site evacuation, the SUXO/SSO will notify the Brown and Caldwell Technical Project Manager.

### **C-5.0 HAZARD/RISK ANALYSIS**

USA has analyzed the scope of work tasking to determine the work risk hazards associated with each task. The tasks consist of direct tasks and the implied tasks, or sub tasks, to accomplish the work. Task hazard analyzes sheets are in section A3 of this plan. USA has identified the following hazards/risks for the former Benicia Arsenal site:

#### **C-5.1 Perform Intrusive Investigations**

- Exposure to hazards associated with surface or buried OE. These items if moved or handled improperly could detonate, either killing or seriously injuring personnel at the work site;
- Biological hazards: exposure to poison oak/ivy or other types of irritating or toxic plant life; exposure to wildlife, rodents, insects, ticks, and snakes which present the possibility of bites and associated diseases;
- Potential trip hazard associated with ground cover, irregular terrain, and vegetation;
- Transportation risks inherent in the movement of OE and general driving risks;
- Heavy Equipment operation hazards inherent in the excavation of OE;

- Lifting hazards, such as back strain, associated with handling OE scrap;
- Heat/Cold Stress.

### **C-5.2 Perform Demolition Operations**

- Exposure to hazards associated with OE. These items if moved or handled improperly could detonate, either killing or seriously injuring personnel at the work site;
- Biological hazards: exposure to poison oak/ivy or other types of irritating or toxic plant life; exposure to wildlife, rodents, insects, ticks, and snakes which present the possibility of bites and associated diseases;
- Explosion hazard as a result of demolition operations;
- Site control hazard as a result of unauthorized personnel entering the evacuation zone;
- Potential trip hazard associated with ground cover, irregular terrain, and vegetation;
- Transportation risks inherent in the movement of explosives, OE, and general driving risks;
- Heat/Cold Stress.

### **C-5.3 Turn-In of Recovered OE Related and Non-OE Related Scrap**

- Exposure to hazards associated with surface OE. These items if moved or handled improperly could detonate, either killing or seriously injuring personnel at the work site;
- Biological hazards: exposure to poison oak/ivy or other types of irritating or toxic plant life; exposure to wildlife, rodents, insects, ticks, and snakes which present the possibility of bites and associated diseases;
- Potential trip hazard associated with ground cover, irregular terrain, and vegetation;
- Lifting hazards, such as back strain, associated with handling OE scrap;
- Heat/Cold Stress.

## **C-6.0 HAZARD CONTROL, ACCIDENT PREVENTION**

### **C-6.1 General**

USA personnel will follow the below listed procedures to mitigate the hazards/risks outlined in paragraph A-5 of the SSHP:

- Any approach to a suspected OE will be conducted in accordance with procedures outlined in the U.S. Army Engineering and Support Center (CEHNC) Safety Concepts and Basic Considerations Unexploded Explosive Ordnance (UXO), OE Center of Expertise (CX) Interim Guidance Document (IG) 00-02, 07 Mar 00 (see Attachment C1) and CX IG 99-01, UXO support for Other Activities, 5 Mar 99;
- Any OE found within the confines of the work area will be positively identified by two UXO qualified technicians;

- OE items will only be moved or handled by qualified UXO/EOD technicians;
- All personnel will wear as a minimum Level D PPE, sleeves rolled down when in heavy vegetation, leather or canvas work gloves and sturdy work boots. This will minimize contact with potentially irritating and/or toxic plants. In addition to these measures, any person known to have allergic reactions to insect bites or exposure to toxic plants will be identified and will carry appropriate first aid materials at all times;
- While on the job, all personnel will move at a moderate pace and stay alert for possible trip hazards;
- Personnel will avoid, to the maximum extent possible, contact with any wildlife. Should a person become bitten he/she will receive immediate first aid;
- Personnel working in vegetated or wooded areas will be reminded to check themselves for ticks and insect bites after leaving the work area;
- While working on site all personnel will use the "buddy" system. Buddies will be assigned each day prior to beginning work. They will remain in sight of each other at all times to ensure safe working practices. During hazardous operations one buddy will act as a safety observer.

#### **C-6.2 OE**

These basic safety precautions are the minimum OE safety requirements required of all personnel on site. Other precautions and requirements are in the CEHNC Safety Concepts and Basic Considerations UXO at the end of this SSHP and other applicable OE manuals referenced in this SSHP.

##### **C-6.2.1 Basic Considerations**

The following should be taken into consideration when planning or conducting OE operations:

- SAFETY IS PARAMOUNT;
- Do not move or disturb unidentified items.
- All OE will be identified independently by two (2) UXO technicians;
- Do not collect souvenirs;
- Do not smoke except in designated areas;
- Do not carry fire or spark producing devices into the site;
- All OE operations will use the "Buddy" system;
- Prohibit unnecessary personnel from visiting the site.

##### **C-6.2.2 Basic Safety Precautions**

The following safety precautions are applicable to all OE:

- Suspend all operations immediately upon approach of an electrical storm;
- Observe the hazards of electromagnetic radiation (EMR) precautions when working in the vicinity of electrically initiated or susceptible OE;
- Do not handle any OE unnecessarily;

- Avoid inhalation and skin contact with smoke, fumes, dust, and vapors of detonations and OE residue;
- Do not attempt to extinguish burning explosives or any fire which might involve explosive materials;
- Incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting OE operations;
- Do not subject OE to rough handling;
- Hand carry no more than two items at a time (one in each hand) and then only as required by the operation being performed;
- Avoid unnecessary movement of armed or damaged OE;
- Avoid the forward portions of munitions employing proximity fuzing;
- Assume unknown fuzes contain cocked strikers or anti-disturbance features.

### **C-6.2.3 General Safety Precautions**

#### **C-6.2.3.1 Projectiles**

- Determine if the projectile has been fired and if so consider it armed;
- Check for the presence of unburned tracers;
- Avoid the rear and front of rocket assisted and base ejecting projectiles;
- Handle projectile components such as powder increments, cartridges, and primers with caution.

#### **C-6.2.3.2 Grenades**

- Do not attempt to re-install safety pins on a dud fired grenade;
- Do not attempt to withdraw impinged firing pins from the fuze of a dud fired grenade.

#### **C-6.2.3.3 Rockets**

- Approach and work on rockets from the side;
- Do not dismantle or strip dud fired rockets or rocket motors;
- Do not expose electrically fired munitions to radio transmissions within 25 feet.

### **C-6.3 Chemical Hazards**

Chemical hazards/precautions are identified in the Brown and Caldwell Arsenal-Wide Workplan. No chemical munitions have been identified as present on this site. If, during site operations, USA personnel encounter a suspected toxic chemical munition or Chemical Warfare Material (CWM) they will immediately withdraw upwind, outside of the fragmentation zone of the ordnance, to a safe location and contact Brown and Caldwell who will notify the appropriate agencies. USA will secure the site, with two UXO Technicians, until the arrival of the Technical Escort Unit (TEU) or Military Explosive Ordnance Disposal (EOD).

## **C-6.4 Biological Hazards**

Biological hazards which may be found on site include insects, such as ticks, mosquitoes, spiders, centipedes, and particularly poisonous snakes, vermin, and hazardous plants. Depending on the season and weather the hazards will vary. For instance, during cold weather many animals and insects are not active and most plants are dormant. Employee awareness and the safe work practices outlined in the following paragraphs should reduce the risk associated with these hazards.

### **C-6.4.1 Hazardous Plants**

During the conduct of site activities the number and variety of hazardous plants that may be encountered is large and extensive. The ailments associated with these plants range from mild hay fever to contact dermatitis, to carcinogenic affects. However the plants which present the greatest degree of risk to site personnel (i.e., potential for contact vs affect produced) are those which produce skin and tissue injury and skin reactions.

#### **C-6.4.1.1 Plants Causing Skin and Tissue Injury**

Contact with splinters, thorns and sharp leaf edges is of special concern to site personnel. This concern stems from the fact that punctures, cuts and even minor scrapes caused by accidental contact may result in non-infectious skin lesions, and the introduction of fungi or bacteria through the skin or eye. Personnel receiving any of the injuries listed above, even minor scrapes, should report immediately to their Supervisor for initial and continued observation and care of the injury.

#### **C-6.4.1.2 Plants Causing Skin Reactions**

The poisonous plants of greatest concern are poison oak, poison sumac, and poison ivy. Poison oak is mostly found in the southeast and west. Poison oak resembles poison ivy, with one important difference. The poison oak leaves are more rounded rather than jagged like poison ivy and the underside of poison oak leaves are covered with hair. Poison ivy thrives in all types of light and usually grows in the form of a trailing vine, however, it can also grow as a bush and can attain heights of 10 feet or more. Poison ivy has shiny, pointed leaves that grow in clusters of three. Poison sumac is a tall shrub or slender tree that usually grows along swampy areas or ponds in wooded areas. Each poison sumac leaf stalk has 7 to 13 leaflets which have smooth edges.

**C-6.4.1.2.1 Skin Reactions.** The skin reaction associated with contacting these plants is caused by the body's allergic reaction to toxins contained in oils produced by the plant. Becoming contaminated with the oils does not require contact with just the leaves. Contamination can be achieved through contact with other parts of the plant such as the branches, stems or berries, or contact with contaminated items such as tools and clothing. The allergic reaction associated with exposure to these plants will generally cause the following signs and symptoms:

- Blistering at the site of contact, usually occurring within 12 to 48 hours after contact;
- Reddening, swelling, itching and burning at the site of contact;
- Pain, if the reaction is severe;

- Conjunctivitis, asthma, and other allergic reactions if the person is extremely sensitive to the poisonous plant toxin.

If the rash is scratched, secondary infections can occur. The rash usually disappears in 1 to 2 weeks in cases of mild exposure and up to 3 weeks when exposure is severe. Preventative measures which can prove effective for most site personnel are:

- Avoid contact with any poisonous plants on-site, and keep a steady watch to identify, report and mark poisonous plants found on-site;
- Wash hands, face or other exposed areas at the beginning of each break period and at the end of each work day;
- Avoid contact with, and wash on a daily basis, contaminated tools, equipment and clothing;
- Barrier creams, detoxification/wash solutions and orally administered desensitization may prove effective and should be tried to find the best preventative solution.

## **C-6.5 Reptiles and Animals**

### **C-6.5.1 Snakes**

When site activities are conducted in warm weather on sites that are located in wooded, grassy or rocky environments, the potential for contact with snakes becomes a very real danger. Normally, if a person is approaching a snake, the noise created by the person is usually sufficient to frighten the snake off. However, during the warm months, extreme caution must be exercised when conducting site operations around areas where snakes might be found (i.e., rocks, bushes, logs, or in holes, crevices, and abandoned pipes). If poisonous snakes are identified on-site, USA will have available for use protective clothing, such as snake leggings, for site personnel. The rules to follow if someone is bitten by a snake are:

- Do not cut "Xs" over the bite area as this will intensify the effect of the venom;
- Do not apply suction to the wound since this has a minimal effective in removing venom;
- Do not apply a tourniquet since this will concentrate the venom and increase the amount of tissue damage in the immediate area;
- If possible to kill the snake without risk to other personnel, bag it and transport it with the victim or try to get a good look at it so it can be identified for proper selection of anti-venom;
- Do not allow the victim to run for help since running increases the heart rate and will increase the spread of the venom throughout the body;
- Keep the victim calm and immobile;
- Have the victim hold the affected extremity lower than the body while waiting for medical assistance;
- Transport the victim for medical attention immediately.

## **C-6.5.2 Vermin**

Rodents and other small animals may be infected with the Hantavirus. Available data indicates that Deer Mice, Brush mice, and western Chipmunks have been found to carry this disease. Infected rodents shed the virus in the saliva, urine, and feces.

### **C-6.5.2.1 Hantavirus**

Hantavirus is transmitted to humans through the inhalation of aerosolized excreta (feces, urine, and saliva) and contaminated dust. Transmission may also occur when dried materials contaminated by rodent excreta are disturbed, directly introduced into broken skin, introduced on the conjunctivae, or possibly ingested in contaminated food or water. Persons have also been infected after being bitten by infected animals.

**C-6.5.2.1.1 Symptoms.** Workers infected with Hantavirus will develop febrile or respiratory illness within forty five days of their last exposure. The initial symptoms are flu-like and may progress to life threatening respiratory distress.

**C-6.5.2.1.2 Treatment.** Besides supportive measures, there is no proven therapeutic agent available to Hantavirus at this time. Workers showing symptoms should seek medical attention immediately. The physician should be informed that Hantavirus is a potential occupational risk and a blood sample should be drawn for comparison with the baseline serum sample. The blood samples should be forwarded to the State Department of Health for transfer to the Center for Disease Control for testing.

**C-6.5.2.1.3 Protective Measures.** Hantavirus have lipid envelopes that are susceptible to most disinfectants. The virus is easily killed with common disinfectants such as household bleach or rubbing alcohol. Direct sunlight will kill the virus in less than one hour. In areas not exposed to direct sunlight, the virus can remain viable in a protein rich medium for as long as three days. Urine is considered a protein rich environment.

Enclosed workplaces will be constructed and maintained to prevent the entrance or harboring of rodents and other vermin. If signs of rodent infestation are present, an extermination program using traps will be implemented. Approved insecticides will be used to eliminate fleas and other ectoparasites that may transmit Hantavirus. When rodent nests at work sites are disturbed, personnel will use respirators, gloves, coveralls with sleeves rolled down and openings taped. The nests will be wet down with a bleach/water solution prior to clearing them.

## **C-6.5.3 Other Animals**

Normally wildlife avoid people and areas where activities are ongoing. Small animals, such as coyotes and raccoons, infected with rabies or when cornered, may become aggressive. When working remain alert for likely locations that animals inhabit. Avoid nests, dens, and holes in the ground that may be the animal's home. If bitten by an animal, seek medical attention immediately. Do not try to capture the animal, you may only get other personnel bitten.

## **C-6.5.4 Tick Bites**

The Center for Disease Control (CDC) has noted the increase of Lyme Disease and Rocky Mountain Spotted Fever (RMSF) which are caused by bites from infected ticks that live in and

near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma up to about one quarter inch. They are sometimes difficult to see. The tick season extends from spring through summer. When embedded in the skin, they may look like a freckle.

#### **C-6.5.4.1 Lyme Disease**

Lyme disease has occurred in 43 states, with the heaviest concentrations in the Northeast (Connecticut, Massachusetts, New Jersey, New York, Pennsylvania), the upper Midwest (Minnesota and Wisconsin), and along the northern Texas coast. It is caused by deer ticks and the lone star ticks which have become infected with spirochetes. Female deer ticks are about one quarter inch in size, and are black and brick red in color. Male deer ticks are smaller, and completely black. Lone star ticks are larger and chestnut brown in color.

#### **C-6.5.4.2 Rocky Mountain Spotted Fever**

RMSF has occurred in 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. It is caused by Rocky Mountain wood ticks, and dog ticks which have become infected with rickettsia. Both are black in color.

**C-6.5.4.2.1 Symptoms.** The first symptoms of either disease are flu-like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain. If immediately treated by a physician, most individuals recover fully in a short period of time. If not treated, more serious symptoms can occur.

**C-6.5.4.2.2 Treatment.** If you believe you have been bitten by a tick, or if any of the signs and symptoms noted above appear, contact the SSO, who will authorize you to visit a physician for an examination and possible treatment.

**C-6.5.4.2.3 Protective Measures.** Standard field gear (work boots, socks, and work uniform) provide good protection against tick bites, particularly if the openings are taped. However, even when wearing field gear, the following precautions should be taken when working in areas that might be infested with ticks:

- When in the field, check yourself often for ticks, particularly on your lower legs and areas covered with hair;
- Spray outer clothing, particularly your pant legs and socks, **BUT NOT YOUR SKIN**, with an insect repellent that contains permethrin;
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible;
- If you find a tick, remove it by pulling on it gently with tweezers;
- If the tick resists, cover the tick with salad oil for about 15 minutes to asphyxiate it, then remove it with tweezers;
- Do not use matches, a lit cigarette, nail polish or any other type of chemical to "coax" the tick out;
- Be sure and remove all parts of the tick's body, and disinfect the area with alcohol or a similar antiseptic after removal;

- For several days to several weeks after removal of the tick, look for the signs of the onset of Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center;
- Also look for the signs of the onset of RMSF, such as an inflammation which is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

### **C-6.7 Bees, Hornets and Wasps**

Contact with stinging insects like bees, hornets and wasps may result in site personnel experiencing adverse health affects that range from being mild discomfort to life threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Some of the factors related to stinging insects that increase the degree of risk associated with accidental contact are as follows:

- The nests for these insects are frequently found in remote wooded, grassy areas where many waste sites are located;
- The nests can be situated in trees, rocks, bushes or in the ground, and are usually difficult to see;
- Accidental contact with these insects is highly probable, especially during warm weather conditions when the insects are most active;
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention;
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction resulting in a life-threatening condition known as anaphylactic shock;
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth and respiratory passages;
- The hypersensitivity needed to cause anaphylactic shock, can in some people, accumulate over time and exposure; therefore, even if someone has been stung previously, and has not experienced an allergic reaction, there is no guarantee that they will not have an allergic reaction upon receipt of another sting.

#### **C-6.7.1 Protective Measures**

With these things in mind and with the high probability of contact with stinging insects, all site personnel will comply with the following safe work practices:

- If a worker knows that he is hypersensitive to bee, wasp or hornet stings, they must inform the SSO of this condition prior to participation in site activities;
- All site personnel will be watchful for the presence of stinging insects and their nests, and will advise the SSO if a stinging insect nest or presence of a swarm of bees is located or suspected in the area;

- Any nests located on-site will be flagged off and site personnel will be notified of its presence;
- If stung, site personnel will immediately report the SSO to obtain treatment and to allow the SSO to observe them for signs of allergic reaction;
- Site personnel with a known hypersensitivity to stinging insects will keep required emergency medication on or near their person at all times.

### **C-6.8 Biting Insects**

Many types of biting insects such as mosquitoes, flies and fleas may be encountered on-site. The use of insect repellents will be encouraged by the SSO if deemed necessary. The biting insects of greatest concern are spiders, especially the black widow and the brown recluse. These spiders are of special concern due to the significant adverse health effects that can be caused by their bite.

#### **C-6.8.1 Black Widow Spider**

The black widow is a coal-black bulbous spider  $\frac{3}{4}$  to  $\frac{1}{2}$  inches in length, with a bright red hour-glass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite;
- Appearance of small punctures (but sometimes none are visible);
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities.

#### **C-6.8.2 Brown Recluse Spider**

The brown recluse is brownish to tan in color, rather flat, 2 to  $\frac{5}{8}$  inches long with a dark brown "violin" shape on the underside. It may be found in trees, or in dark locations. Victims of a brown recluse bite may exhibit the following signs or symptoms:

- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite;
- Formation of a large, red, swollen, pustulating lesion with a bull's-eye appearance;
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting; and pain may become severe after 8 hours, with the onset of tissue necrosis.

#### **C-6.8.3 Tegenaria (Hobo/Aggressive House Spider)**

The Tegenaria spider is brown without any distinguishing marks. It measures 10-15 mm in diameter including the legs. The Tegenaria is an indoor spider, referred to as a funnel spider, for the shape of its web. Victims of a Tegenaria Spider bite may exhibit the following signs or symptoms:

- Sensation of pinprick at the location of the bite.;
- Formation of a hard lesion surrounded by a pale halo (similar to a brown recluse bite);
- Ensuing blister will measure two to six inches and take months to heal;
- Bite may leave permanent scar.

#### **C-6.8.4 Treatment For Spider Bites**

There is no effective first aid treatment for any of these bites. Except for very young, very old or weak victims, these spider bites are not considered to be life threatening, however medical treatment must be sought to reduce the extent of damage caused by the injected toxins. If any these spiders are suspected or known to be on-site, the SSO will brief the site personnel as to the identification and avoidance of the spiders. As with stinging insects, site personnel should report to the SSO if they locate these spiders on site or notice any type of bite while involved in site activities.

#### **C-6.9 Drug and Alcohol**

USA is committed to having a drug free work place. The unlawful manufacture, distribution, dispensation, purchase, or sale of illegal drugs or alcohol at work is prohibited. Violation of this rule will result in employee termination. In accordance with the Drug-Free Workplace Act of 1988, any employee convicted of a violation of criminal drug statutes while in the employ of USA must notify the USA Human Resources Manager or the subsidiary Human Resources representative within 5 days of the conviction.

#### **C-6.9.1 Substance Abuse**

##### **C-6.9.1.1 General Conditions**

All employees and subcontractors shall at all times comply with all aspects of USA's Substance Abuse Prevention Program. A copy of the program is available upon request and is included in this section on the following pages. Employees, or agents, who fail to comply with the program will be prohibited from entering the site.

##### **C-6.9.1.2 Drug Screening Test**

All USA employees or agents of subcontractors, or independent contractors hired by subcontractor to perform any of the work under the subcontract who participate in this subcontract, will be required to participate in a drug screening test prior to commencing work on the project, excluding orientation, and after any project related accident they may be involved in. Employees will be considered probationary workers until drug screen test results are received by the individual's employer and such results are certified to the senior UXO Supervisor by an officer of the employer. The drug screening test will require the production of a urine sample. The urine sample will be tested as a minimum for the following substances:

- cocaine metabolite
- amphetamines
- opiates
- phencyclidine
- cannabinoids.

Any person employed or hired by any contractor who receives a confirmed positive test result will be permanently prohibited from entering project property.

#### **C-6.9.1.3 Substance Abuse Prevention Program**

The use of illegal drugs, on or off duty is inconsistent with law biding behavior expected of all citizens. The use of illegal drugs, or abuse of alcohol or prescription drugs, on or off duty, may impair the ability of project employees to perform tasks that are critical to proper work performance. The result is an increase in accidents and failures which pose a serious threat to the safety of all employees, visitors and the general public. Impaired employees also tend to be less productive, less reliable and prone to greater absenteeism resulting in the potential for increased cost and delays in the timely completion of our contracts.

Furthermore, employees have the right to work in a drug-free environment and to work with persons free from the effects of drugs and alcohol. Employees who abuse alcohol or drugs are a danger to themselves and to other employees. In addition, drug and alcohol abuse inflicts a terrible toll on the nation's resources and the health and well-being of American workers and their families.

**C-6.9.1.3.1 Program Objectives.** The substance abuse prevention program has the following objectives and goals:

- To assist in maintaining a safe and healthful working environment for our employees, our customers, visitors, vendors, suppliers, trade/subcontractors and members of the general public;
- To minimize absenteeism and tardiness; to improve productivity; and to ensure quality workmanship;
- To comply with contractual obligations.

**C-6.9.1.3.2 Program Application.** This program will apply to all regular full-time, probationary, casual or contract employees of all subcontractors and to employees and applicants of USA. This program will be applied to USA on-site contractors, subcontractors, suppliers and vendors. Compliance with this program will be required by USA. Entry onto the Owner's property constitutes consent to the right of the USA, or its authorized representatives, to enforce any aspect of this Substance Abuse Prevention Program.

#### **C-6.9.1.4 Company Premises for Property Defined**

For the purpose of this program the term "Owner's property" includes property, offices, facilities, land, buildings, structures, fixtures, installations, automobiles, vessels, trucks and all other vehicles and equipment, whether owned, leased or used. This also includes all areas under control, or any other work locations or mode of transportation to and from those locations (parameters of job site) during working time and while in the course and scope of company employment, or pay status or while the person is on company business during regular work hours.

#### **C-6.9.1.5 Unauthorized Drugs, Alcoholic Beverages and Other Items**

All USA and subcontractor employees, applicants, suppliers, vendors and visitors that the use, abuse, presence in the body or reporting to work under the influence, bringing onto company property, unlawful manufacture, distribution, dispensation, possession, transfer, storage, concealment, transportation, promotion or sale of the following illegal and unauthorized drugs, controlled substances, alcoholic beverages, drug-related paraphernalia or weapons by employees and others is strictly prohibited from the company premises, or while on company business and/or during working time.

#### **C-6.9.1.6 Illegal Drugs**

Illegal drugs include:

- marijuana - pot, dope, hash or hashish
- cocaine - coke, rock, crack or base
- LSD - acid
- PCP - angel dust, crystal
- MDMA - ecstasy
- heroin - smack, black tar
- opium - morphine, white stuff, tar, black stuff
- Any other unauthorized drugs and abnormal or dangerous substances which may affect an employee's/person's mood, responses, motor functions or alter or affect a person's perception, performance, judgement, reactions, or senses while working.

The foregoing list is provided by way of example only and is not to be considered as all inclusive. This policy prohibits the presence of any confirmed detectable amount of these drugs in the employee/person while on the Owner's property regardless of when or where the substance entered their body.

#### **C-6.9.1.7 Prescription Drug Abuse**

Employees and others may possess prescription drugs and "over the counter" medications provided:

- The prescription drugs are prescribed by an authorized medical practitioner for current use (within the past 12 months) of the person in possession and the medicine is in its original container and in the employee's/person's name;
- Employees must not consume prescribed drugs more often than as prescribed by the employee's physician, and they must not allow any other person to consume the prescribed drug;
- Any employee who has been informed that the medication could cause adverse side effects while working or where medication indicates such warning, must inform his or her supervisor prior to using such substances on the job;

- The use of drugs/medicine prescribed by a licensed physician for the individual employee is permitted provided that it will not affect work performance. However, the SUXO reserves the right to have a licensed physician determine if use of a prescription drug or medication by an employee may produce effects which increase the risk of injury to the employee or others while working. If such a finding is made, the SUXO may ask the employer to limit or suspend the work activity of the employee during the period that the physician advises that the employee's ability to perform his/her job safely may be adversely affected by the consumption of such medication. Any employee who has been suspended or limited may seek substitute medication from his/her physician and if determination is made that the substitute medication will not adversely affect the employees' performance, then the suspension of limitations will be lifted.

#### **C-6.9.1.8 Prohibited Material**

The following material are prohibited by this program:

- Drug related paraphernalia is unauthorized material or equipment or item used or designed for use in testing, packaging, storing, injecting, ingesting, inhaling, or otherwise introducing into the human body a controlled substance;
- Unauthorized Possession of firearms, weapons, or explosive (incendiary) materials including, but not limited to: brass knuckles, illegal knives and other dangerous instruments;
- No firearms are allowed on the Owner's property (loaded or unloaded), except when authorized for security purposes.

#### **C-6.9.1.9 Program Enforcement Activity**

(Work place searches, certified urine, drug and/or breathalyzer testing) The SUXO also reserves the right to require all project site employees and applicants to undergo medical or physical examinations or tests at any time as a condition of employment or continued employment, including NIDA certified urine drug tests and breathalyzer tests to determine the use of any illegal or unauthorized drugs or substances prohibited in this program or to determine the employee's satisfactory fitness for duty. These tests, through the employee's direct employer, will be utilized under the following circumstances:

- Pre-employment/pre-placement testing will be required of any qualified applicant or candidate as a condition of consideration for employment with USA and trade contractors/subcontractors.
- If an employee suffers an occupational on-the-job injury: (requiring treatment from a doctor) or following a serious or potentially serious accident or incident in which safety precautions were violated, equipment or property was damaged, unusually careless acts were performed, or where the cause was due to an employee's or other person's failure to wear prescribed personal protective equipment or follow prescribed safety rules while working on the Owner's property.

**C-6.9.1.9.1 Searches.** Whenever the SUXO has a reasonable basis to suspect that an employee's work performance or on-the-job behavior may have been affected by alcohol or drugs, or that the employee has sold, purchased, used or possessed alcohol, drugs, or drug paraphernalia on Owner's property, or at all times while entering, departing, or on property, properties, or work areas, the SUXO may search the employee, the employee's locker, desk or other property

under the control of the employee, as well as the employee's personal effects or automobile on the Owner's property. *AT NO TIME WILL EMPLOYEES OR OTHERS BE TOUCHED*; only outer clothing will be required to be removed during these searches and inspections. Wherever it deems appropriate, the SUXO may use trained dogs to detect illegal drugs on personnel or on the site.

**C-6.9.1.9.2 Notice of Disciplinary Action for Program Violations.** The SUXO will require employees and others to participate in such urinalysis, Breathalyzer or search activity as may be necessary to assist in providing a safe, healthful and productive working environment and to comply with Federal Laws. *NO EMPLOYEE OR PERSON SEARCH, URINE DRUG TEST, BREATHALYZER OR INSPECTION WILL BE CONDUCTED WITHOUT THE EMPLOYEE'S CONSENT*, and whenever practicable, the SUXO will request the employee's written consent. However, failure to comply with the provisions of this program or failure to provide consent when requested shall be grounds for removal from the job site.

**C-6.9.1.9.3 Offense Discharge.** An employee shall be subject to removal from the job site for the following:

- The employee refuses to submit to a search or inspection, or urine drug test when requested by the SUXO. Refusal to submit to a search, inspection or test will be considered sufficient for removal from the job site.
- While on the site, the employee was using, manufacturing, distributing, dispensing, selling, or possessing any illegal or unlawful drug.
- The employee has failed his/her Substance Abuse Test.

## **C-6.10 Safe Working Practices (SWP)**

### **C-6.10.1 General**

All personnel on-site will be required to follow the SWPs contained in this Section and the Brown and Caldwell Arsenal-Wide Workplan, and will immediately report to the SSO any conditions which do not comply with this section. The provisions outlined in this section are intended to be the minimum SWPs which site personnel will follow.

### **C-6.10.2 Power And Hand Tool Operation**

#### **C-6.10.2.1 Power Tools**

By their very nature, power tools have great capability for inflicting serious injury upon site personnel if they are not used and maintained properly. To control the hazards associated with power tool operation, the requirements outlined in EM 385-1-1, and the safe work practices listed below shall be observed when using power tools:

- Operation will be conducted by authorized personnel familiar with the tool, its operation, and safety precautions;
- Power tools will be inspected prior to use, and defective equipment will be removed from service until repaired;

- Power tools designed to accommodate guards will have such guards properly in place prior to use;
- Loose fitting clothing or long hair will not be permitted around moving parts;
- Hands, feet, etc., will be kept away from all moving parts;
- Maintenance and/or adjustments to equipment will not be conducted while it is in operation; the power will be disconnected prior to maintenance activities;
- An adequate operating area will be provided, allowing sufficient clearance and access for operation;
- Personnel will use required protective equipment, such as gloves, chaps, and/or shin guards when using chainsaws and weed-eaters.

#### **C-6.10.2.2 Hand Tools**

Use of improper or defective tools can contribute significantly to the occurrence of accidents on site. Therefore, the requirements outlined in EM 385-1-1, Section 13 and the safe work practices listed below shall be observed when using hand tools:

- Hand tools will be inspected for defects prior to each use;
- Defective hand tools will be removed from service and repaired or properly discarded;
- Tools will be selected and used in the manner for which they were designed;
- Be sure of footing and grip before using any tool;
- Do not use tools that have split handles, mushroom heads, worn jaws, or other defects;
- Gloves will be worn to increase gripping ability and/or if cut, laceration or puncture hazards exist during the use of hand tools;
- Safety glasses or a face shield will be used if use of tools presents an eye/face hazard;
- Do not use makeshift tools or other improper tools;
- When working overhead, tools will be secured to ensure they cannot fall on someone below;
- Use non-sparking tools in the presence of explosive vapors, gases, or residue.

#### **C-6.10.3 Material Lifting**

Many types of objects are handled in normal day to day operations. Care should be taken in lifting and handling heavy or bulky items because they are the cause of many joint and back injuries. The following fundamentals address the proper lifting of materials to avoid joint and back injuries:

- The size, shape and weight of the object to be lifted must be considered. Site personnel will not lift more than they can handle comfortably;
- A firm grip on the object is essential, therefore the hands and object shall be free of oil, grease and water, which might prevent a firm grip;

- The hands, and especially the fingers shall be kept away from any points that cause them to be pinched or crushed, especially when setting the object down;
- The item will be inspected for metal slivers, jagged edges, burrs, rough or slippery surfaces and pinch points, and gloves shall be used, if necessary, to protect the hands;
- The feet will be placed far enough apart for good balance and stability;
- Personnel will ensure that solid footing is available prior to lifting the object;
- When lifting, get as close to the load as possible, bend the legs at the knees, and keep the back as straight as possible;
- To lift the object, the legs are straightened from their bending position;
- Never carry a load that you cannot see over or around;
- When placing an object down, the stance and position are identical to that for lifting: with the back kept straight and the legs bent at the knees, the object is lowered; and
- If needed, USA will provide back support devices to aid in preventing back injury during lifting activities.

When two or more people are required to handle an object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each person, if possible, shall face the direction in which the object is being carried.

#### **C-6.10.4 Fire Hazards**

##### **C-6.10.4.1 Causes of Fires and Explosions**

Although fires and explosions may arise spontaneously, they are more commonly the result of carelessness during the conduct of site activities, such as moving drums, mixing/bulking of site chemicals and during refueling of heavy or hand held equipment. Some potential causes of explosions and fires include:

- Mixing of incompatible chemicals, which cause reactions that spontaneously ignite due to the production of both flammable vapors and heat;
- Ignition of explosive or flammable chemical gases or vapors by external ignition sources;
- Ignition of materials due to oxygen enrichment;
- Agitation of shock or friction-sensitive compounds;
- Sudden release of materials under pressure.

##### **C-6.10.4.2 Fire Prevention**

Explosions and fires not only pose the obvious hazards of intense heat, open flames, smoke inhalation, and flying objects, but may also cause the release of toxic chemicals into the environment. Such releases can threaten both personnel on-site and members of the general public living or working nearby. Site personnel involved with potentially flammable material or operations will follow the guidelines listed below and EM 385-1-1, Section 9, to prevent fires and explosions:

- Potentially explosive/flammable atmospheres involving gases or vapors will be monitored using a combustible gas indicator;
- Prior to initiation of site activities involving explosive/flammable materials, all potential ignition sources will be removed or extinguished;
- Non-sparking and explosion-proof equipment will be used whenever the potential for ignition of flammable/explosive gases/vapors/liquids exists;
- Dilution or induced ventilation may be used to decrease the airborne concentration of explosive/flammable atmospheres;
- Smoking is prohibited at OE work sites, or in the vicinity of, operations which may present a fire hazard, and the area will be conspicuously posted with signs stating "No Smoking or Open Flame Within 50 Feet";
- Flammable and/or combustible liquids must be handled only in approved, properly labeled metal safety cans equipped with flash arrestors and self-closing lids;
- Transfer of flammable liquids from one metal container to another will be done only when the containers are electrically interconnected (electrically bonded);
- The motors of all equipment being fueled will be shut off during the fueling operations;
- Metal drums used for storing flammable/combustible liquids will be equipped with self-closing safety faucets, vent bung fittings, grounding cables and drip pans, and will be stored outside buildings in an area approved by the SSO.

#### **C-6.10.4.3 Fire Protection**

The following safe work practices will be used to protect against fires:

- Vehicles and equipment will not be fueled while running;
- Flammable/combustible liquid storage areas will have at least one 4A:20:B:C fire extinguisher located within 25-75 feet, marked with the appropriate fire symbol and no smoking signs;
- Temporary offices will be equipped with a fire extinguisher of not less than 10:ABC;
- At least one portable fire extinguisher having a rating of not less than 20:ABC will be located at each work site.

#### **C-6.10.5 Heavy Equipment Operation**

Heavy equipment utilized onsite will be operated under strict adherence to the applicable OSHA regulations found in 29 CFR 1910, 29 CFR 1926, the requirements of EM 385-11, Section 16 and the guidelines listed below:

- The operation of heavy equipment will be limited to authorized personnel specifically trained in its operation;
- The operator will visually inspect heavy equipment daily prior to operation, and report any abnormalities/deficiencies to the SSO;
- The operator will use the safety devices provided with the equipment, including seat belts, and backup warning indicators and horns will be operable at all times;

- While in operation, all personnel not directly required in the area will keep a safe distance from the equipment;
- The operator's cab will be kept free of all non-essential items and all loose items will be secured;
- Personnel will avoid moving into the path of operating equipment and areas blinded from the operator's vision will be avoided;
- When heavy equipment must negotiate in tight quarters, or if operators of earth moving equipment cannot see the bucket, a secondary person will be stationed to guide the operator;
- Additional riders will not be allowed on equipment unless it is specifically designed for that purpose (i.e., there is an additional seat with a seat belt).

## **C-6.10.6 Excavations and Confined Spaces**

### **C-6.10.6.1 Excavations**

Excavation activities will be conducted in accordance with EM 385-1-1, Section 25, Subpart P of 29 CFR 1926, and the USA SHP. The guidelines below are intended to reflect minimum requirements to be followed on this site.

- Prior to initiation of any excavation or trenching activity, the location of underground installations will be determined if applicable;
- When the excavation/trench achieves a depth of greater than four feet, the SSO will determine the type of soil being excavated and designate the slope which will be used;
- The excavation(s) will be inspected daily by the SSO prior to commencement of work activities;
- Evidence of cave-ins, slides, sloughing, or surface cracks will be cause for work to cease until necessary precautions are taken to safeguard workers;
- Excavations 5 ft. or deeper, which cannot be sloped at a 1 to 1 ratio, will require a competent individual, with the aid of a registered civil engineer or soils specialist, to design and install a protective system;
- Protective systems shall be selected from OSHA 29 CFR 1926 Subpart P and/or designed by a registered professional civil engineer;
- Spoils and other materials will be placed 2 ft. or more from the edge of the excavation;
- Materials used for sheeting, shoring, or bracing will be in good condition.
- Timbers will be sound, free of large or loose knots, and of appropriate dimensions for the excavation;
- Safe access will be provided into the excavation(s) by means of a gradually sloped personnel access/egress ramp, or ladders or stairs will be provided;
- Ladders used will extend 3 ft. above grade level and be secured from movement.
- Excavations 4 ft. or more in depth will have a means of egress at a frequency such that lateral travel to the egress point does not exceed 25 ft.;

- Walkways or bridges with standard guardrail will be provided where employees are required or permitted to cross over excavations;
- If the depth of an excavation is greater than 4 feet, it will be inspected by the SSO to determine if it meets the criteria for a confined space;
- If an excavation is determined to be a Confined Space the requirements set forth in the Confined Space Program found in the USA SHP will apply;
- IAW the requirements of 29 CFR 1926.651(g), if an excavation is greater than 4 feet in depth, and the potential for having a hazardous atmosphere inside the excavation exists, then the atmosphere shall be tested for oxygen deficiency and toxicity prior to entry by site personnel.

#### **C-6.10.6.2 Confined Spaces**

According to 29 CFR 1910.146, a confined space is defined as having all of the following criteria:

- It is large enough and so configured that an employee can bodily enter and perform assigned work;
- Is not designed for continuous human occupancy;
- Has limited or restricted means for entry or exit.

If an excavation meets all three of the criteria listed above, it must be defined as a confined space, and the provisions and safety precautions of the USA SHP will apply.

To avoid classifying an excavation as a confined space, it is imperative that one of the requirements listed above be removed or avoided. The easiest requirement to remove is the one related to limited means of entry and exit. Entry/exit points must be designed and maintained which allow for easy entry and exit from the excavation. This can be accomplished through the construction of gently sloping entry and exit ramps which are located such that lateral travel to an exit is no greater than 25 feet from the work area in the excavation. If this can not be accomplished, then the excavation must be classified as a confined space and the appropriate safety precautions implemented.

#### **C-6.11 Bloodborne Pathogen Program and Training**

Due to the nature of OE work there is the potential for exposure to blood pathogens as a result of an accident or injury. Typically, work sites are in remote areas and first aid and/or initial emergency first aid is provided on site by other employees. Personnel will receive training on bloodborne pathogens prior to beginning work at the site.

##### **C-6.11.1 Definitions**

- Bloodborne Pathogens: Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).
- Exposure Incident: A specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employees duties.

- Other Potentially Infectious Materials: The following human body fluids:
  - Semen, vaginal secretions, cerebro-spinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.
  - Any unfixed tissue or organ (other than intact skin) from a human living or deceased.
- Parenteral: Piercing mucous membranes or the skin barrier through such events as needle sticks, human bites, cuts, and abrasions.
- Work Practice Controls: Controls that reduce the likelihood of exposure by altering the manner in which a task is performed.
- Universal Precautions: An approach to infection control. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

### **C-6.11.2 Exposure Control Plan**

#### **C-6.11.2.1 Exposure Determination**

Due to the hazardous nature of OE work there is the potential for accidents and the exposure to blood pathogens. USA employees will be required to perform emergency first aid and/or CPR in the event of an accident or injury.

#### **C-6.11.2.2 Work Practice Controls**

PPE (CPR Pocket Mask and disposable surgical gloves) are available in all first aid kits on site. Hand washing facilities are available in the EZ and SZ. Personnel performing first aid and/or CPR will comply with the following:

- Personnel that provide any first aid will wear disposable latex gloves if there is any visible body fluids;
- The CPR Pocket mask will be used when performing CPR and disposed of after use;
- Personnel will change clothing immediately, or as soon as feasible, that becomes contaminated with body fluids as a result of performing first aid;
- Personnel will immediately wash their hands after performing first aid procedures;
- Contaminated clothing and equipment will be bagged in red BIO-Hazard bags, labeled as to date and contents, and disposed of as infectious waste.

#### **C-6.11.2.3 Post-Exposure Evaluation and Follow-up**

Following an exposure incident, USA will make available, to the exposed employee, a confidential medical evaluation and follow-up containing the following elements:

- Documentation of the route(s) of exposure, and the circumstances under which the exposure incident occurred;

- The source individual's and exposed employee's blood will be collected as soon as feasible and tested after consent is obtained;
- The results of the source individual's testing will be made available to the exposed employee, and the employee will be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual.

#### **C-6.11.2.4 Information and Training**

Training will be provided as initial site training prior to beginning work at the site. The training will be documented on the USA *ON-SITE SAFETY MEETING RECORD* on file as part of initial training. This training will be provided and documented annually for all employees.

### **C-7.0 QUALIFICATION TRAINING**

All USA UXO personnel working on site have completed Naval Explosive Ordnance Disposal (USNAVSCLEOD) training which details procedures for evaluation and disposal of OE. All employees at this job site will have completed a training program, prior to beginning work on site, which complies with OSHA Regulations 29 CFR 1910.120e(9). All USA employees who work on hazardous sites receive training, which includes an equivalent of 40 hours of training off-site and 3 days of actual field experience under the direct supervision of a trained, experienced Supervisor. Management and Supervisors receive an additional 8 hours training on program supervision. Each employee receives 8 hours of OSHA refresher training annually. Copies of training and qualifications will be on file at the CP.

#### **C-7.1 Site Specific Training**

The SSO will give site specific training to all UXO and non-UXO personnel prior to initial site entry. The training will include:

- Project scope to include: organization and responsibilities; site orientation, facilities, access, egress, evacuation routes, and other general information;
- Safety, to include: safe work practices; physical hazards, PPE; on/off-site emergencies; evacuation routes; emergency agencies/numbers; emergency equipment; medical emergencies; Drug and Alcohol; Bloodborne pathogens; and other pertinent safety information.

#### **C-7.2 Additional Training/Meetings**

##### **C-7.2.1 Tailgate Meetings**

Safety training will be provided each morning on-site at the daily safety meeting. The safety and health considerations for the day's activities will be reviewed. Additional training will be conducted when circumstances dictate. The daily meeting will address that day's activities; safety issues; specific hazards; and emergency procedures, to include:

- Notification procedures and phone numbers;
- Rally points, and safe areas;
- Hospital and evacuation routes;

- Emergency equipment.

## **C-8.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)**

PPE required at the site will be at a level necessary to protect personnel. Normal work clothing will be Level D. During OE operations a hard hat is not required unless a possible head injury could result from the use of heavy equipment or overhead hazards. Steel toe footwear will not be used while operating magnetometers.

### **C-8.1 Level D PPE**

The minimum level of protection required of all personnel at the site is Level D. The following is Level D protection:

- Short or long sleeve cotton coveralls or work clothing;
- Sturdy work boots/shoes, (steel toe, reflective vest, when working around heavy equipment) (*Note: UXO personnel will not wear steel toe footwear when using magnetometers*);
- Safety glasses with side shields or goggles when an eye hazard exists;
- Hard hat (when required);
- Leather or canvas work gloves;
- Hearing protection, when working around heavy equipment or powered hand tools.

The level of protection is based on what is known about the site. The levels of protection may change as site conditions change. The SSO will monitor site conditions and provide information to the SUXO as necessary. The SSO may increase the levels of protection when necessary but will not downgrade them without approval from the USA SHM.

## **C-9.0 MEDICAL**

All personnel on site have completed a pre-placement or annual physical examination that complies with the requirements of 29 CFR 1910.120 and have been certified as fit to work by an Occupational Physician certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is board eligible. All USA UXO personnel on-site are in the USA medical surveillance program. Documentation as to the medical qualifications of personnel are on file on site and available to the contracting officer. All personnel are screened for drugs in accordance with the USA Drug/Alcohol Abuse Program.

## **C-10.0 EXPOSURE MONITORING/AIR SAMPLING**

While OE investigation may result in emissions of inhalable particulates and other criteria pollutant, these activities are not expected to adversely affect air quality. Engineering controls, such as wetting, may be used to eliminate the suspension of dust and other particulates that may become airborne and migrate off-site.

## C-11.0 COLD AND HEAT STRESS

During activities conducted on OE sites, extreme temperature conditions can create serious safety and health threats to site workers. Initially the concern at Benicia will be heat stress and as the season changes, cold stress. The SSO will identify and monitor personnel that have had previous problems with heat or cold stress. This section addresses the potential hazards associated with cold and heat stress, and outlines the procedures for monitoring and controlling those hazards.

### C-11.1 Cold Stress

The affects experienced by site personnel when working in cold environments depend upon many environmental and personal factors, such as ambient air temperature, wind speed, duration of exposure, type of protective clothing and equipment worn, type of work conducted, level of physical effort, and health status of the worker. In cold environments, overexposure can cause significant stress on the body which can lead to very serious, and permanent injury. Cold may affect just the exposed body surfaces and extremities, or may affect down to the deeper body tissues and the body core. Presented below is information about the most common cold stress disorders, and their signs, symptoms, affects, and control techniques.

#### C-11.1.1 Hypothermia/Frostbite

Hypothermia results when the body loses heat faster than it can produce it. When this occurs, the blood vessels in the skin and extremities constrict, reducing the flow of warm blood to those areas, thereby reducing the rate of heat loss. This reduction in blood flow usually affects the peripheral extremities first. Ears, fingers and toes begin to experience chilling, pain and then numbness due to loss of both blood flow and heat. Shivering begins as the body's core temperature begins to drop, and the body uses the shivering to compensate and create metabolic heat. Shivering is often the first sign of hypothermia. The pain and numbness in the extremities is an indication that the heat loss is increasing, and when shivering becomes uncontrollable, the heat loss in the body core has become extreme. Further heat loss produces speech difficulty, forgetfulness, loss of manual dexterity, collapse, and finally death.

Frostbite usually occurs on exposed skin and the extremities, such as face, hands and feet. There are several degrees of injury from frostbite ranging from mild to severe: frost nip or incident frostbite is characterized by sudden blanching or whitening of the skin; with superficial frostbite the skin has a waxy or white appearance and is firm to the touch but the tissue beneath is resilient; the most serious is deep frostbite where the tissues are cold, pale, and solid.

#### C-11.1.2 Treatment Of Cold Stress Disorders

The intent of all cold stress treatment is to bring the deep body core temperature back to its normal temperature of about 98.6°F. Work performed in cold environments should be discontinued for any worker who exhibits the signs or symptoms associated with hypothermia or frost bite. Workers exhibiting those symptoms should be brought to a warm area and allowed to rest and warm-up. If a worker's clothing becomes wet, which reduces its insulation affect, it should be removed and replaced by dry clothing, or allowed to dry before resuming work. A warm, non-alcohol, decaffeinated drink (not coffee) or soup may be given. Re-warming should be gradual.

For frostbite, the victim should be sheltered from the wind and cold and given warm drinks. If the frost bite is superficial, the frozen part should be covered with extra clothing or blankets or warmed against the body.

### **C-11.1.3 Prevention of Cold Stress Disorders**

During work in cold environments, the SSO will use the tailgate safety briefing to inform site personnel of the measures to be utilized in the prevention and control of cold stress. The SSO will also use meteorological data and Table 1 to inform site personnel of the combined temperature/wind chill affect to be expected during the day's activities. Prevention methods which site personnel will utilize include:

- Wear adequate, appropriately layered clothing, including a water repellant outer layer if precipitation is forecasted;
- Layered clothing should include, an inner most layer, such as cotton or silk to trap heat and absorb perspiration, an insulating layer of wool or synthetic fiberfill (such as polypropylene), a layer of work weight clothing, and an outer protective layer designed to be wind/water proof, such as nylon, or Gortex; (*\*Note: When Handling OE, wear only cotton clothing.*)
- Wear a hat and gloves and socks, that are synthetic or wool insulated, to help retain body heat and prevent its loss;
- Remove outer layers of clothing during breaks in heated shelters to prevent excessive sweating;
- In windy, cold conditions, cover all exposed skin;
- Eat well-balanced meals and maintain adequate intake of non-alcoholic, decaffeinated fluids;
- Seek shelter in a warm protected area when signs and symptoms of cold stress become evident;
- Protect clothing from getting wet; this includes keeping clothing from getting wet with sweat, so remove outer layers if work activities cause excessive sweating.

USA will assist in the prevention of cold stress by providing sheltered, warm areas where site personnel can rest and regain body heat during breaks. USA will also provide the following to assist site personnel in abating cold stress:

- Warm fluids, such as soup or de-caffeinated tea and cocoa, will be provided as needed;
- A minimum of one fifteen minute break in a heated shelter every two hours;
- A heated shelter may be provided inside the EZ, upwind from the work area, where site personnel can rest and warm-up after having processed through a limited PDS consisting of glove wash and removal, respirator wash and removal, and hand washing.

### **C-11.2 Heat Stress**

Heat stress is one of the most common (and potentially serious) illnesses that can affect hazardous waste site workers. The most common cause of heat stress during site activities is the affect that PPE has on the bodies natural cooling mechanism. Individuals will vary in their

susceptibility and degree of response to the stress induced by increased body heat. Factors which may predispose a worker to heat stress include: lack of physical fitness; lack of acclimatization to hot environments; degree of hydration; level of obesity; current health status (i.e., having an infection, chronic disease, diarrhea, etc.); alcohol or drug use; and the worker's age and sex. For the remainder of this section, reference to "liquids" will indicate water or an electrolyte replacement solution - not tea, coffee or soft drinks.

## **C-11.2.1 Heat Stress Disorders**

### **C-11.2.1.1 Heat Rash**

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by wet chafing clothes. This condition can decrease a worker's ability to tolerate hot environments.

- Symptoms: Mild red rash, especially in areas of the body which sweat heavily.
- Treatment: Decrease amount of time in protective gear and provide powder such as corn starch or baby powder to help absorb moisture and decrease chafing. Maintain good personal hygiene standards and change into dry clothes if needed.

### **C-11.2.1.2 Heat Cramps**

Heat cramps are caused by a rate of perspiration that is not balanced by adequate fluid and electrolyte intake. The occurrence of heat related cramps are often an indication that excessive water and electrolyte loss has occurred, which can further develop into heat exhaustion or heat stroke.

- Symptoms: Acute, painful spasms of voluntary muscles such as the back, abdomen and extremities.
- Treatment: Remove victim to a cool area and loosen restrictive clothing. Stretch and massage affected muscles to increase blood flow to the area. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Consult with physician if condition does not improve. If available, an electrolyte replacement solution should be taken along with water. Consumption of soft drinks will not be adequate and may aggravate the condition.

### **C-11.1.1.3 Heat Exhaustion**

Heat exhaustion is a state of very definite weakness or exhaustion caused by excessive loss of fluids from the body. This condition leads to inadequate blood supply and cardiac insufficiency. Heat exhaustion is less dangerous than heat stroke, but nonetheless must be treated. If allowed to go untreated, heat exhaustion can quickly develop into heat stroke.

**C-11.1.1.3.1 Symptoms.** Pale or flushed, clammy, moist skin, profuse perspiration, and extreme weakness. Body temperature is basically normal or slightly elevated, the pulse is weak and rapid, and breathing is shallow. The individual may have a headache, be dizzy or nauseated.

**C-11.1.1.3.2 Treatment.** Remove the individual to a cool, air-conditioned place, loosen clothing, elevate feet and allow individual to rest. Consult physician, especially in severe cases. Have patient drink one to two cups of liquids immediately, and every twenty minutes thereafter. Total liquid consumption should be about one to two gallons per day. If the signs and symptoms of heat exhaustion do not subside, or become more severe, immediate medical attention will be

required.

#### **C-11.1.1.4 Heat Stroke**

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the heat regulating mechanisms of the body. The failure of the individual's temperature control mechanism causes the perspiration system to stop working correctly. When this occurs, the body core temperature rises very rapidly to a point where brain damage and death will result if the person is not cooled quickly.

**C-11.1.1.4.1 Symptoms.** The victims skin is hot, and may or may not be red and dry, due to the fact that the individual may still be wet from having sweat while wearing protective clothing earlier; nausea; dizziness; confusion; extremely high body temperatures, rapid respiratory and pulse rate; delirium; convulsions; unconsciousness or coma.

**C-11.1.1.4.2 Treatment.** Cool the victim immediately. If the body temperature is not brought down quickly, permanent brain damage or death may result. Cool the victim by either sponging or immersing the victim in very cool water to reduce the core temperature to a safe level. If conscious, give the victim cool liquids to drink. Observe the victim and obtain immediate medical help. Do not give the victim caffeine or alcoholic beverages.

#### **C-11.2.2 Preventative Measures**

In order to avoid heat related illnesses, proper preventative measures will be implemented whenever environmental conditions dictate the need. Heat stress monitoring will begin at +75 degrees Fahrenheit. The preventative measures listed in this paragraph represent the minimal steps to be taken and will include the following procedures:

- The SSO will examine each site worker prior to the start of daily operations in order to determine the individuals susceptibility to heat stress. Workers exhibiting factors which make them susceptible to heat stress will be closely monitored by the SSO.
- Site workers will be trained to recognize and treat heat related illnesses. This training will include the signs, symptoms and treatment of heat stress disorders.
- Workers will be encouraged to drink a minimum of sixteen ounces of liquids prior to start of work in the morning, after lunch and prior to leaving the site at the conclusion of the days activities. Acceptable liquids will include water and an electrolyte replacement solution, with the intake of each being equally divided. Liquids containing caffeine are to be avoided.
- When ambient conditions and site workload requirements dictate, as determined by the SSO, workers will be required to drink a minimum of sixteen (16) to thirty-two (32) ounces of liquids during each rest cycle.
- A shelter or shaded area will be provided where workers may be protected from direct sunlight during rest periods.
- Monitoring of ambient or physiological heat stress indices will be conducted to allow prevention and/or early detection of heat induced stress.

- Site workers will be given time to acclimatize to working in hot environments. Acclimatization usually takes two to six days and allows the worker's body to become adjusted to working in hot environments.

### **C-11.2.3 Additional Preventative Measures**

When possible and/or feasible, the following measures will also be implemented to aid in prevention or reduce the affects of heat induced stress:

- Designated rest areas should be out of the direct sun and the number and frequency of breaks increased.
- Depending on the severity of the heat exposure some form of artificial cooling may be required to ensure protection of the workers.
- Workers will be encouraged to achieve and maintain an optimum level of physical fitness. Increased physical fitness will allow workers to better tolerate and respond to hot environments and heavy work loads. In comparison to an unfit person, a fit person will have: less physiological strain; a lower heart rate and body temperature; and a more efficient sweating mechanism.

## **C-12.0 PERSONNEL HYGIENE AND DECONTAMINATION**

Site sanitation will be established and maintained IAW 29 CFR 1910.120(n) and EM 385-1-1, Section 2.

### **C-12.1 Potable Water Supply**

An adequate supply of potable (drinkable) water, coolers, and ice will be provided on site at all times.

### **C-12.2 Non-Potable Water**

Containers of water, clearly marked non-potable, additional water will be available with teams for washing.

### **C-12.3 Toilet Facilities**

Existing facilities will be used.

### **C-12.4 Washing Facilities**

Hand and face washing facilities are available at the SZ/CP, in the site support vehicles, and will be utilized by all personnel during breaks or exiting the EZ prior to eating, drinking, tobacco use, or other hand to face activities. Washing facilities in the EZ will consist of water containers, buckets, soap and drying towels.

## **C-13.0 SITE HOUSEKEEPING**

All work areas will be maintained in a clean/ neat fashion, free of loose debris and scrap. Any materials/equipment not being used will be removed and stored or disposed of accordingly. All work areas will be supplied with a trash receptacle with lid, the contents of which will be emptied daily.

## **C-14.0 ILLUMINATION**

Personnel will only work during the hours of daylight, and no field activities will be scheduled during the period of thirty minutes before dusk to thirty minutes after dawn.

## **C-15.0 COMMUNICATIONS**

On and off site communications will be provided using radios and cellular telephones. Communication of evacuation routes and assembly points will occur daily during the tailgate safety briefing. All communications will be tested daily. When emergency services are requested from any agency, the caller will remain available to provide information and directions to responding personnel.

### **C-15.1 Off-Site Communications**

Off-site communication will be available at all times. Site UXO operations will not be conducted unless off-site communications are available.

### **C-15.2 Telephone Numbers**

The telephone numbers for all emergency services, including the telephone numbers for the USA SHM, will be posted in the office/break area and all site personnel will be aware of the location of the closest telephone or will have direct communications to someone with telephone service available.

### **C-15.3 On-Site Communications**

Communication between personnel in the SZ and personnel in the EZ will be maintained at all times. Personnel in the EZ should remain in constant communication with the CP. Any failure of communication requires an evaluation of whether personnel should leave the EZ. A repeated long horn blast (15 sec or longer) on the support vehicle is the emergency signal to indicate that all personnel should leave the EZ.

## **C-16.0 LOGS, REPORTS, AND RECORD KEEPING**

### **C-16.1 Safety Log**

The SSO will maintain a safety log of all safety related site activity. The SSO is responsible for ensuring that safety and health activities and events for the day are part of the log. The log

may include the minutes of the tailgate safety meeting, or the meeting may be documented on the Tailgate Safety Briefing form. As a minimum the safety log should reference the tailgate safety briefing, and mention: accidents, near misses, internal and external audits, the reason for and duration of safety related "stop work" orders, and any other issues pertaining to site or personnel safety or health.

### **C-16.2 Injury/Illness/Accident Reports**

In the event that a reportable accident/incident occurs at the job site, the USA accident report will be completed and forwarded within two working days to the USA home office, and Brown and Caldwell. If a near miss occurs the SSO will investigate the near miss and report the results of the investigation to the USA home office.

### **C-16.3 Training Log**

The SSO is responsible for ensuring that all training conducted relative to job site activities is documented in the Training Log and/or on the appropriate training forms. This log will include the initial site specific training conducted prior to the start of site activities. The SSO will maintain this log and any associated training forms on-site so they will be available for inspection.

### **C-16.4 Equipment Maintenance Log**

Required scheduled maintenance and Calibration of equipment performed will be annotated in the SUXO Daily Journal.

### **C-16.5 Visitor Log**

The SSO will be responsible for maintaining the visitor log which will be used to record the entry and exit of all visitors, including Federal, state or local officials who visit the site. This log will reflect name, organization, date and time of visitor entry/exit. Visitors will be briefed on:

- the Benicia SSHP
- restricted and safe areas
- site hazards and risks to include OE, biological, heat/cold and trip hazards
- PPE required and use
- fire and OE safety requirements
- site evacuation and emergency procedures.

## **C-17.0 DAILY AND WEEKLY SITE INSPECTIONS**

Daily safety and health inspections will be conducted by the SSO and the results will be recorded in the safety log. The results of the inspection will be reported to the SUXO on a weekly basis, the SSO will conduct a compliance audit of the site and complete the weekly inspection form. A copy of this form will be forwarded to the USA home office, where it will be reviewed by the SHM. The daily tailgate meetings will include:

- scope of operations
- personnel assignments
- safety precautions on OE expected to be encountered
- equipment to be used
- emergency procedures to include requests for support
- communication procedures.

## **C-18. EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES**

These procedures supplement the Brown and Caldwell Benicia Arsenal General SSHP. Additional emergency procedures are contained in the Brown and Caldwell General SSHP for Benicia. USA will brief all USA employees on additional requirements contained in the Brown and Caldwell Safety Plan.

### **C-18.1 General**

The frequency and severity of emergency situations can be dramatically reduced through proper implementation of the SSHP. However, if an emergency does occur, quick, decisive action will be required since delays in minutes can create or escalate life-threatening situations. In an emergency situation, site personnel involved in emergency response and rescue must be prepared to respond immediately and all required equipment must be on hand, in proper working order and ready to use. To ensure rapid, effective response to a site emergency, the procedures and contingency plans outlined in this Section, will be implemented prior to and during the conduct of any site activities involving exposure to safety and health hazards.

### **C-18.2 Pre-Emergency Planning**

#### **C-18.2.1 Identification Of Local Emergency Services**

Prior to the conduct of site operations, USA site representatives will meet with the appropriate local authorities. The purpose of this meeting is to inform local authorities of the nature of the site activities to be performed under this SSHP, and the potential hazards that the conduct of these activities pose to site personnel, the environment, and the general public. In the unlikely event that the evacuation of the general public is required due to either normal site operations or an emergency event, Brown and Caldwell will be responsible for contacting the appropriate local officials who will execute and coordinate the evacuation. The phone numbers for pre-notified local emergency services are listed in the table below.

<b>Emergency/Contact</b>	<b>Telephone Number</b>
Fire/Emergency/Police	911
Kaiser Permanente Hospital	(707) 651-1000
Poison Control Center	1-800-962-1253
CEHNC Safety Office	(256) 895-1580
USA SHM	(813) 884-5722 ext 152

### **C-18.2.2 Identification Of Potential Emergencies**

During the development of this SSHP, great attention has been given to identifying potential safety and health hazards associated with the conduct of site activities. Once identified, these hazards were assessed to determine the risk that these hazards could result in an emergency situation. Contingency plans for responding to the potential emergency situations have been developed and are included in this section. The potential emergencies which may result during the conduct of site activities are as follows:

- Injury or illness
- Fire/explosion
- Inclement weather.

### **C-18.2.3 Other Hazard Information**

In the event that additional site or task hazard information becomes available during the conduct of site activities, this information will be assessed by the SHM to determine if the contingency plans in this section will need to be updated.

## **C-18.3 Emergency Response Responsibilities**

### **C-18.3.1 On-Scene Incident Commander (OSIC)**

In the event of an emergency, the SSO will assume the responsibility of being the On-scene Incident Commander (OSIC). The alternate person to assume this role, in the event that the SSO is unavailable or incapacitated, will be the Brown and Caldwell site technical manager. The OSIC will have the responsibility of directing all on-site and off-site response personnel, and will, as soon as possible, advise Brown and Caldwell of the emergency situation.

### **C-18.3.2 On-Site Emergency Response Services**

USA personnel will provide first aid treatment for minor injuries. The SSO will determine if the injury requires further treatment. If necessary the SSO will contact medical personnel to determine if additional treatment is required.

### **C-18.3.3 Off-Site Emergency Response Services**

The off-site emergency response services which may be needed in the event of a site emergency include fire and law enforcement personnel. Fire Protection and emergency medical services (EMS) can be obtained by dialing 911. All requests for emergency service will go to Brown and Caldwell. Brown and Caldwell will notify the required emergency services.

### **C-18.3.4 Medical Evacuation (MedEvac)**

Medical evacuation will be determined by the emergency first responder. The emergency first responder will determine and coordinate medical evacuation if required.

## **C-18.4 Emergency Training**

All site personnel will receive specialized training which will be given by the SSO and conducted prior to initiating site activities involving safety and health hazards. The content of this training

will include the items listed below, and will be documented using the site training log.

- USA and Brown and Caldwell SSHP requirements
- emergency chain-of-command
- communication methods and signals
- emergency equipment and PPE
- removing injured personnel from the site
- emergency contacts, phone numbers.

### **C-18.5 Site Control and Security**

In an emergency, it is imperative that site control and security be maintained. To control site personnel, the OSIC will utilize the Site Entry/Exit Log to ensure all personnel are present or accounted for at the assembly point(s). Depending upon site size and configuration, weather and wind conditions and the nature of the emergency, the following will, as applicable, be used to maintain site security:

- close, but do not lock, gates as evacuation occurs
- erect flagging or barrier tape to prevent accidental entry
- use a megaphone to alert personnel to stay clear of the site
- use vehicles to block access routes to the site, but ensure they can be moved rapidly if emergency vehicles must use the access route.

### **C-18.6 Evacuation Route**

The location and evacuation route to the emergency treatment facility are detailed in the Brown and Caldwell General SSHP. The route will be briefed and traveled by all site personnel prior to start of site activities to familiarize them with the route. The nearest medical assistance center is Kaiser Permanente Hospital located at 975 Sereno Drive, Vallejo, CA, telephone number: (707) 651-1000.

### **C-18.7 General Emergency Procedures**

Emergency response procedures include all steps to be taken for notifying, evaluating, reacting to, documenting and following-up on a given emergency situation. To ensure all necessary elements are covered, the procedural steps outlined in this paragraph will be implemented for each emergency, regardless of its nature.

#### **C-18.7.1 Notification**

Once the OSIC has been informed of the emergency, the OSIC will alert site personnel to the presence of the emergency by radios. This will be done in order to:

- Notify personnel and to get their attention;
- Stop all work activity as required;

- Lower noise levels in order to speed and simplify communication;
- Begin emergency and/or evacuation procedures.

If on-site USA personnel or off-site emergency personnel are to enter the site in response to the emergency, the OSIC will to the extent possible, notify the response personnel about the nature of the emergency, to include:

- What happened and when it happened;
- Where on-site the emergency situation occurred;
- Who is involved and, if possible, the cause of the emergency;
- The extent of damage and what hazards may be involved;
- What actions should be taken.

### **C-18.7.2 Assessing the Emergency**

Available information related to the emergency and the on-site response capabilities should be evaluated and the information listed below obtained to the extent possible:

- What happened:
  - a. type of incident
  - b. casualties involved
  - c. victims (number, location and condition)
  - d. treatment required
  - e. missing personnel
  - f. cause of incident
  - g. extent of damage to structures, equipment and terrain.
- What could happen from this point; consider:
  - a. potential for fire or explosion
  - b. location of all personnel in relation to hazardous areas
  - c. potential for emergency affecting the general public or the environment.
- What can be done to remediate the situation; consider:
  - a. equipment and personnel needed for rescue and hazard mitigation
  - b. number of uninjured personnel available for response
  - c. resources available on-site
  - d. resources available from off-site response groups and agencies
  - e. time needed for off-site response resources to reach the site
  - f. hazards involved in rescue and response.

### **C-18.7.3 Rescue and Response Actions**

Based on the information collected during the emergency assessment, the general actions listed below will be taken, with some actions being conducted concurrently. No one will attempt emergency response/rescue until the situation has been assessed and the appropriate response outlined by the OSIC.

- Enforce the Buddy System:
  - a. allow no one to enter a hazardous area without a partner

- b. personnel in the EZ should be in line-of-sight or in communication with the OSIC or his designee.
- Survey casualties:
  - a. locate all victims and assess their condition
  - b. determine resources needed for stabilization and transport
  - c. assess existing and potential hazards and determine whether and how to respond
  - d. the need for evacuation of site personnel and off-site population
  - e. the resources needed for evacuation and response.
- Request aid:
  - a. contact the required off-site/on-site personnel or facilities, such as ambulance, fire department, police, etc.
  - b. allocate Resources
  - c. allocate on-site personnel and equipment to rescue and initiate incident response operations
  - d. control
  - e. assist in bringing the hazardous situation under complete or temporary control and use measures to prevent the spread of the emergency (i.e., control fire, secure site, etc.).
- Extricate:
  - a. remove or assist victims from the area.
- Stabilize:
  - a. administer any medical procedures that are necessary before the victims can be moved
  - b. stabilize or permanently fix the hazardous condition
  - c. attend to what caused the emergency and anything damaged or endangered by the emergency (e.g., drums, tanks).
- Transport:
  - a. using either on-site or off-site assets
  - b. casualty logging
  - c. record who, time, destination and condition upon transport.
- Evacuate:
  - a. move site personnel to the rally point, a safe distance upwind of the incident
  - b. monitor the incident for significant changes; the hazards may diminish, permitting personnel to re-enter the site, or hazards may increase and require public evacuation.
- Casualty Tracking:

- a. record disposition, condition and location.

#### **C-18.7.4 Post Emergency Follow-up**

Before normal site activities can resume, the site and personnel must be prepared and equipped to handle another emergency. It is also imperative that all Federal, state and local regulatory agencies be notified of the emergency. Therefore, the following activities must be conducted prior to re-start of site activities:

- Notify all appropriate governmental agencies as required (i.e., OSHA must be notified if there have been any fatalities or three or more personnel hospitalized);
- Restock and clean all equipment and supplies utilized or damaged in the emergency;\*
- Conduct an accident investigation to determine the cause of the emergency and what preventative measures could be taken to ensure the emergency does not occur again; \*
- Complete the Brown and Caldwell Accident Investigation Report and any other governmental or USA accident or insurance forms;
- Review and revise, as needed, the site operational procedures, and if necessary update the SSHP to reflect the new procedures.

\*To be accomplished prior to re-starting site activities

#### **C-18.7.5 Documentation**

Documentation related to the emergency will be recorded in an accurate, authentic and complete fashion. Documentation shall be recorded as soon as possible after the emergency to ensure it is recorded while the events are vivid in the minds of the personnel involved. The information recorded will include:

- A chronological record of events;
- A listing of the personnel involved, including personnel on-site, site personnel who responded, personnel in charge, and off-site groups or agencies that responded;
- A listing of the actions taken to minimize the effects of or mitigate the emergency;
- An assessment of the potential exposures received by site personnel and the surrounding public;
- A recording of the injuries or illnesses which occurred as a result of the emergency.

#### **C-18.8 On-Site Emergency Equipment**

The emergency equipment listed below in Table 1 will be on-site, stored in the location indicated, and available for use during the operation specified. The Support Vehicle EZ will be on the work site with each team. The team support vehicle will be designated as an emergency vehicle. Equipment at the SZ will be at the CP. All emergency equipment will be maintained in proper working order and inspected by the SSO at least weekly to ensure completeness and proper working order. The results of the inspection will be documented on the Safety Inspection Control Log. In the event that any of the disposable items are utilized, the SSO will ensure they are replaced immediately. Site operations will not be conducted if the required emergency equipment is not available on-site.

**Table C-18-1.**

Emergency Equipment	Number per Location	Location Stored	Operation Where Emergency Equipment is Required
First Aid/Burn Kit,	1 ea.	Team Support Vehicle EZ, SSO Vehicle	Each team has complete sets of first aid equipment.
Eye Wash	1 ea.	All First Aid Kits	
CPR Pocket Mask	1 ea	All First Aid Kits	
Disposable latex Gloves	5 ea.	All First Aid Kits	
Fire Extinguisher 10 BC rated	1 ea.	All Vehicles	All operations.

### **C-18.9 Contingency Plans**

The following paragraphs contain emergency specific contingency plans. These plans outline the procedures for mitigating each of the potential emergency situations that were identified in the pre-emergency planning. These contingency plans specify the minimum emergency procedures and may be subject to alteration by the SSO, based on actual or changing site conditions. Any changes to these contingency plans will be approved by the USA SHM and Brown and Caldwell.

#### **C-18.10 Injury or Illness**

In the event of an emergency involving personal injury or illness, immediate response will be key in preventing further injury/illness and providing comfort to the affected party. When EZ personnel are injured or overcome by illness, the following procedure will be followed:

- Upon notification of the occurrence and nature of the injury/illness the OSIC will, if deemed necessary, summon emergency personnel;
- EZ personnel will transport the injured/ill victim to the rally point;
- The OSIC or Senior UXO Supervisor will assess the severity of the injury/illness, direct the EZ personnel to provide immediate life support if required;
- If immediate life support is not required, or once the victim is stabilized, and if required, transport victim to the appropriate medical facility for further attention.

To ensure that adequate first aid supplies are available, the size and number of first aid kits will be sufficient to accommodate the maximum number of people (including government personnel and visitors) on-site at any given time. The kits will be located at each EZ work site and the location of the kit will be made known to all EZ personnel. Additional kits will also be maintained in each vehicle and in the SZ. Kit locations will be provided with adequate water and other supplies necessary to cleanse and decontaminate burns, wounds or lesions.

#### **C-18.11 Fires and Explosions**

##### **C-18.11.1 Fire Extinguishers**

The occurrence of a fire on-site can present a serious threat to all site personnel, the environment and the general public. To ensure immediate, aggressive response is possible, dry-chemical-type fire extinguishers will be available at each individual work site. Dry chemical fire extinguishers will also be provided at any other site location where flammable materials may present a fire risk, such as the petroleum, oil and lubricant (POL) storage area. Additionally, a fire extinguisher rated at least 2A:10B:C will be located with each piece of heavy equipment and in each site vehicle. Fire extinguishers will be inspected, and the results recorded, monthly by the SSO.

#### **C-18.11.2 Small Fires**

A small fire is defined as a fire that can be extinguished with a 4A:20B:C type fire extinguisher. In the event of a small fire, site personnel will take the following actions:

- All unnecessary personnel will be evacuated from the immediate area, to an upwind location;
- Extinguish the fire using portable fire extinguishers or by smothering from an upwind location;
- Request emergency response assistance (ambulance, fire, police) as needed;
- Do not attempt to extinguish a fire, even a small one, involving explosives;
- Notify the SSO, Senior UXO Supervisor and Brown and Caldwell.

#### **C-18.11.3 Large Fires**

In the event of a large fire or small fire which Cannot be extinguished, the following actions will be taken:

- All unnecessary personnel will be evacuated from the site, to an upwind location;
- The 911 emergency response services (police, ambulance, hospital, etc.) will be notified by the OSIC as required;
- If it can be conducted safely, the OSIC will direct personnel to move vital equipment/supplies from the fire path;
- The OSIC will order the appropriate level of protective clothing to be worn by personnel fighting the fire;
- To the extent possible, and with available resources, fight the fire from an upwind location;
- At no time, will attempts be made to extinguish a fire involving explosives;
- Notify Brown and Caldwell.

#### **C-18.11.4 Explosion**

In the event of an explosion, all nonessential personnel will evacuate and help secure the site, the OSIC will request the required support equipment and personnel, and Range Control will be notified. It is essential that the site be evacuated and no one is allowed to re-enter, except to possibly save a life, until at least 30 minutes, or longer if necessary, after the explosion. The OSIC will determine what actions, if any, are appropriate.

### **C-18.12 Inclement Weather**

In the event of inclement weather: high winds, electrical storms, tornado, extremely hot weather (>100 degrees F), or extremely cold weather (<0 degrees F), it may be necessary to cease operations and evacuate the site. The SSO will be responsible for contacting the U.S. Weather Service on a daily basis. If necessary, the weather service will be contacted on a more frequent basis.

### **C-19. HAZARD ANALYSIS WORKSHEETS**

The following Hazard Analysis worksheets were used to identify hazards associated with operations at Benicia and the safety methods that would be used to mitigate, eliminate, or control exposure to hazards.

## USA Hazard Analysis

**PROJECT NAME:** former Benicia Arsenal

**CUSTOMER:** Brown and Caldwell

**ACTIVITY:** Anomaly Investigation

Principal Steps	Potential Hazards	Recommended Controls
<p>Excavating contacts. Hand digging.</p>	<p>Potential UXO, unplanned detonation. Slips, trips, and falls. Scrapes and cuts. Heat/Cold Stress. Sunburn/Windburn. Unauthorized personnel within the EZ.</p>	<p>Only UXO technicians will excavate or handle UXO. Personnel in the immediate vicinity of UXO operations will be kept to the minimum necessary for safe operations but no less than two UXO technicians. Only hand excavation permitted within 1 foot of UXO.</p> <p>Do not subject UXO to heat, shock or friction. Establish Exclusion Zone (EZ); post Warning signs; Stop all UXO operations when non-UXO trained personnel are in the EZ. Wear Level D PPE. Be aware of footing and terrain; avoid obstacles when possible. Dress for the weather. Use Buddy system monitoring. Use sunscreen, insect repellent/barrier cream as necessary.</p>
Equipment to be Used	OSHA and Other Requirements	Training Requirements
<p>Vehicle; extinguishers; first aid kit; communication equipment. shovels, picks, trowels.</p>	<p>Daily PMCS first aid kit contents, extinguishers. Hand tool inspection. Radio or telephone check; calibrate Magnetometer.</p>	<p>Current state driver license; OSHA Qualifications; UXO personnel are EOD trained. Safe work practices and hazard protection IAW the SSHP. Daily tailgate safety briefings to include evacuation and notification procedures. UXO identification and safety precautions training for non-UXO trained personnel.</p>

## USA Hazard Analysis

**PROJECT NAME:** former Benicia Arsenal

**CUSTOMER:** Brown and Caldwell

**ACTIVITY:** Scrap Inspection and Turn-in

Principle Steps	Potential Hazards	Recommended Controls
Recovery and turn-in of OE and non-OE related scrap. Loading vehicles.	Vehicle accident, Potential OE, unplanned detonation, wildlife, insects, toxic plants, slips, trips, falls, heat/cold stress, sunburn/windburn, cuts and lacerations from metal scrap and lifting hazards.	All scrap inspected by UXO Supervisor and certified by Senior UXO Supervisor. Only UXO technicians will handle UXO; Do not subject UXO to heat, shock or friction. Wear Level D PPE when loading scrap; Wear gloves when handling scrap. No smoking except in designated areas. Be aware of footing and terrain; avoid obstacles when possible. Dress for the weather. Use Buddy system monitoring. Use sunscreen, insect repellent/barrier cream as necessary. Lifting precautions and safe work practices IAW WP SSHP. Use proper lifting techniques.
Equipment To Be Used	Inspection Requirements	Training Requirements
Vehicles, communication equipment extinguishers, first aid kit, packing material.	Daily PMCS first aid kit contents, extinguishers. Hand tool inspection. Radio or telephone check.	Current state driver license; OSHA Qualifications; UXO personnel are EOD trained. Safe work practices and hazard protection IAW the SSHP. Daily tailgate safety briefings to include evacuation and notification procedures. UXO identification and safety precautions training for non-UXO trained personnel.

## USA Hazard Analysis

<b>PROJECT NAME:</b> The former Benicia Arsenal <b>CUSTOMER:</b> Brown and Caldwell <b>ACTIVITY:</b> Heavy Equipment Operation		
Principle Steps	Potential Hazards	Recommended Controls
Operating Heavy Equipment. Excavating using Earth Moving Machinery (EMM).	Vehicle accident. Potential UXO, unplanned detonation. Wildlife, insects, poison oak and hazardous plants. Slips, trips, and falls. Scrapes and cuts. Heat/Cold Stress. Sunburn/Windburn	Only UXO technicians will excavate or handle UXO. EMM will be operated by trained, experienced personnel. Look before backing; be aware of personnel in the area of EMM. Negotiate slopes straight up or down; do not travel across a slope. All controls in traveling position when moving EMM between sites; When excavating, if personnel are in range of bucket, put bucket on the ground and remove hands from the controls; Place blades and buckets on ground when not operating. Wear Level D PPE with hard hat, hearing protection, steel toe footwear, when working in the vicinity of operating EMM. Be aware of terrain; avoid obstacles when possible; take care when mounting/dismounting EMM. Dress for the weather. Use Buddy system monitoring. Use sunscreen, insect repellent/barrier cream as necessary.; Stop all UXO operations when non-UXO trained are in the EZ.
Equipment To Be Used	Inspection Requirements	Training Requirements
Earth Moving Machinery (EMM). Communication equipment, fire extinguisher, first aid kit.	Daily PMCS first aid kit contents, extinguishers. Daily PMCS of EMM. Radio check.	OSHA Qualified; UXO personnel are EOD trained. Experienced operators. Daily Tailgate meeting. Daily inspection, maintenance, calibration, of all equipment. Emergency procedures and safe working practices IAW the SSHP. Symptoms and treatment for biological and chemical hazards IAW the SSHP. Daily checks of all communication equipment and emergency contacts.

## USA Hazard Analysis

**PROJECT NAME:** The former Benicia Arsenal

**CUSTOMER:** Brown and Caldwell

**ACTIVITY:** Demolition Operations

Principle Steps	Potential Hazards	Recommended Controls
Transportation of explosives/UXO. Preparing and placing charges. Blow (detonation) In Place (BIP). Venting inert filled UXOs.	Vehicle accident, Fire, unplanned detonation. Slips, Trips, and Falls. Heat/Cold Stress. Noise, fragmentation, debris.	Load/unload vehicle in designated areas. Use authorized explosive route. Placard vehicle. No personnel in cargo compartment. No explosives in passenger compartment. Observe explosives transportation compatibility requirement. Do not fuel when loaded. No smoking. Shut vehicle off and block wheels when loading. Block/brace secure explosives/UXO. Use Demolition Procedures IAW Work Plan, EODB/TM/TO 60A-1-1-31, USA SOPs. Maintain Exclusion Zone, distance, tamping, personnel shelters, control of shot size. Be aware of obstacles - watch footing
Equipment To Be Used	Inspection Requirements	Training Requirements
Vehicles, fire extinguisher, demolition materials, explosives, blocking, bracing, cushioning material.	All equipment and explosives serviceable. Vehicle inspection IAW DD Form 626.Daily PMCS first aid kit contents, extinguishers. Radio check.	EOD trained personnel. Daily tailgate meetings, procedures IAW WP, SSHP, EODB/TM/TO 60A-1-1-31. Valid State driver license. Current OSHA qualification. Daily checks of all communication equipment and emergency contacts.

### C-20.0 REGULATIONS AND REFERENCES

The safety and health of on-site personnel and the local community will be ensured by following all applicable requirements and regulations listed in the following publications:

- OSHA Occupational Safety and Health Standards, 29 CFR 1910;
- OSHA Construction Standards, 29 CFR 1926;
- Applicable sections of EPA 40 CFR Parts 260 to 299;
- Applicable sections of DOT 49 CFR Parts 100 to 199;
- USA Safety and Health Program (SHP);
- USACE EM 385-1-1, Safety and Health Requirements Manual;

- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions;
- DOD 6055.9-STD, DOD ammunition and Explosives Safety Standards;
- DoD 4160.21-M, Defense Reutilization and Marketing Manual;
- AR 200-1, Environmental Protection and Enhancement;
- AR 385-10, The Army Safety Program;
- AR 385-16, System Safety Engineering and Management;
- AR 385-40, w/USACE supplement, Accident Reporting and Records.
- TM 9-1300-200, Ammunition General;
- TM 9-1300-214, Military Explosives;
- TM-60 series, EOD Publications.
- CX IG 00-02, Safety Concepts And Basic Considerations For Unexploded Ordnance (Uxo) Operations, 07 Mar 00
- CX IG 99-01, UXO support for Other Activities, 5 Mar 99

**ATTACHMENT C-1**

**BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR  
ORDNANCE AND EXPLOSIVES OPERATIONS**

***BASIC SAFETY CONCEPTS AND  
CONSIDERATIONS FOR  
ORDNANCE AND EXPLOSIVES  
OPERATIONS***

**U.S. ARMY ENGINEERING AND SUPPORT  
CENTER, HUNTSVILLE**

22 May 2000

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# **BASIC SAFETY CONCEPTS AND CONSIDERATIONS FOR ORDNANCE AND EXPLOSIVES (OE) OPERATIONS**

## **CHAPTER 1 INTRODUCTION**

1-1. Purpose. This pamphlet establishes the safe operating procedures for dealing with ordnance and explosives (OE) and unexploded ordnance (UXO) items on formerly used defense sites (FUDS), base realignment and closure (BRAC) and installation restoration (IR) projects. Because there are no absolute safe procedures for dealing with OE, merely procedures considered being least dangerous, it is essential that a planned and systematic approach be established.

1-2. Applicability. This pamphlet applies to all Headquarters, United States Army Corps of Engineers (HQUSACE) elements, United States Army Corps of Engineers (USACE) commands, and their contractors having the responsibility for performing OE response activities. For the purpose of this document, all references to OE include UXO.

1-3. References. Required and related publications are listed in appendix A.

1-4. Distribution. Approved for public release; distribution is unlimited.

1-5. Policy. It is the policy of the USACE to produce products and services that fully meet the customers' expectations of quality, timeliness and cost effectiveness. All OE response procedures must be formulated to ensure harmony with the USACE Strategic Vision and should be in concert with activities presented in other USACE guidance. There should be no compromise of health and safety requirements to meet production or quality goals. Safety is the leading edge of quality.

1-6. Responsibilities. It is the responsibility of all USACE and contractor personnel involved with OE response projects to safely execute them in accordance with (IAW) the approved Site Safety and Health Plan (SSHP), Work Plan (WP), and all applicable laws, regulations, and policies.

1-7. Terms and Definitions.

a. Ordnance and Explosives. Ammunition, ammunition components, chemical or biological warfare materiel, or explosives that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried or fired. Such ammunition components and explosives are no longer under accountable record control of any DOD organization or activity.

b. Explosive Soil. Explosive soil refers to a mixture of explosives in soil, sand, clay or other solid media at concentrations such that the mixture itself is explosive.

c. Unexploded Ordnance (UXO). Military Munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to the operations, installations, personnel, or material, and remain unexploded either by malfunction, design, or any other cause.

d. UXO Qualified Personnel. The term UXO Qualified Personnel applies only to personnel meeting the requirements for the positions of UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and the Senior UXO Supervisor. For qualification requirements, refer to EP 1110-1-18, Ordnance and Explosives Response.

e. OE Procedures. These procedures include, but are not limited to, the following actions performed by a UXO qualified individual.

(1) Gaining access to (manual excavation) and identifying subsurface anomalies and assessing the condition of buried OE.

(2) Identifying and assessing the condition of surface OE.

(3) Recovery and final disposal of all OE.

f. OE Related procedures: These OE related procedures include, but are not limited to, the following and can be performed by a non-UXO qualified individual:

(1) Location and marking of subsurface anomalies.

(2) Location and marking of suspected surface OE.

(3) Transportation and storage of recovered OE.

(4) Utilizing earth-moving machinery (EMM) to excavate overburden from suspected OE.

#### 1-8. General Safety Concerns and Procedures.

a. OE operations will not be conducted until a complete plan for the site is prepared and approved. These plans will be based upon limiting exposure to the minimum number of personnel, for the minimum time, to the least amount of OE consistent with safe and efficient operations.

b. Only UXO qualified personnel will perform OE procedures. Non-UXO personnel may be utilized to perform OE related procedures when supervised by a UXO Technician III. All personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards of the procedures being performed. To ensure that these procedures are performed to standards, all field personnel will be under the direct supervision of a UXO Technician III.

c. Personnel who will be handling OE items will not wear outer or inner garments having static electricity generating characteristics. Materials made of 100 percent polyester, nylon, silk and wool, are highly static producing. Refer to DA Pam 385-64 for more information regarding non-static producing clothing.

d. Prior to any action being performed on an ordnance item, all fuzing will be positively identified. This identification will consist of fuze type by function, condition (armed or unarmed), and the physical state/condition of the fuze, i.e., burned, broken, parts exposed/sheared, etc.

## CHAPTER 2 OE SAFETY PRECAUTIONS

### 2-1. OE Safety Precautions.

a. Every effort will be made to identify a suspect OE item. Under no circumstances will any OE be moved in an attempt to make a positive identification. The OE item will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown OE item is encountered, the on-site USACE representative will be notified immediately. If there is no USACE personnel on-site, the District or Design Center's OE Safety representative will be notified as soon as possible. If external research is required, it will be initiated by the U.S. Army Engineering and Support Center, Huntsville. The following are additional considerations for the safe handling of OE items:

- (1) Projectiles containing Base Detonating (BD) fuzes are to be considered armed if the round is fired.
- (2) Arming wires and pop-out pins on unarmed fuzes should be secured prior to any movement.
- (3) Do not depress plungers, turn vanes, rotate spindles, levers, setting rings or other external fittings on OE items. Such actions may arm or activate the OE.
- (4) Do not attempt to remove any fuze(s) from the OE. Do not dismantle or strip components from any OE items.
- (5) UXO Personnel are not authorized to inert any OE items found on-site.
- (6) OE /UXO items will not be taken from the site as souvenirs/training aids.
- (7) Civil War ordnance will be treated as any other OE.

b. Prior to entering areas/ranges contaminated with Improved Conventional Munitions (ICM) an approved DA -waiver must be obtained. The District and/or Design Center's OE Safety representative must be notified.

c. Any time -suspect chemical warfare materiel (CWM) is encountered during conventional OE site activities, all work will immediately cease. Project personnel will withdraw along cleared paths upwind from the discovery. A team consisting of a minimum of two personnel will secure the area to prevent unauthorized access. Personnel should position themselves as far upwind as possible while still maintaining security of the area.

(1) On Formerly Used Defense Sites (FUDS), the UXO team will notify the local Point of Contact (POC) designated in the Work Plan. The local POC will facilitate Explosives Ordnance Disposal (EOD) response and two personnel will secure the site until EOD's arrival. If the local POC designated in the Work Plan is not the local law enforcement agency, the local POC will inform the local law enforcement agency of the discovery. The EOD unit will notify the Technical Escort Unit (TEU) and secure the area until TEU's arrival. After notifying the local law enforcement agencies, the local POC will notify the USAESCH Safety Office to inform them of the actions taken.

(2) On active installations, the UXO team will normally notify the Range Control Officer, Facility Engineer, Post Headquarters, or POC designated in the Work Plan.

d. Avoid inhalation and skin contact with smoke, fumes, and vapors of explosives and other related hazardous materials.

e. Consider OE items, which may have been exposed to fire and detonation, as extremely hazardous. Chemical and physical changes may have occurred to the contents, which might render it more sensitive than its original state.

f. Do not rely on the color coding of OE for positive identification. Munitions having incomplete or improper color codes have been encountered.

g. Avoid approaching the forward area of an OE item until it can be determined whether or not the item contains a shaped charge. The explosive jet, which is formed during detonation, can be lethal at great distances. Assume that all shaped charge munitions contain a piezoelectric (PZ) fuzing system until identified. PZ fuzing is extremely sensitive. They can function at the slightest physical change and can remain hazardous for an indefinite period of time.

h. Approach an unfired rocket motor from the side at a 45-degree angle. Accidental ignition can cause a missile hazard and hot exhaust.

i. Do not expose unfired rocket motors to any Electromagnetic Radiation (EMR) sources.

j. Consider an emplaced landmine armed until proven otherwise. It may be intentionally booby-trapped to deceive.

(1) Many training mines contain spotting charges capable of inflicting serious injury.

(2) Exercise extreme care with wooden mines that have been buried for long periods of time. Certain soil conditions can cause the wood to deteriorate and any inadvertent movement or pressure may initiate the fuze.

k. Assume that practice OE contains a live charge until it can be determined otherwise. Expended pyrotechnic and practice devices can contain red or white phosphorus residue. Due to incomplete combustion, the phosphorous residue may re-ignite spontaneously if the crust is broken and exposed to air.

l. Do not approach a smoking white phosphorous (WP) munition. Burning WP may detonate the explosive burster charge at anytime.

m. Foreign ordnance was returned to the United States for exploitation and subsequent disposal. Every effort will be made to research the applicable documentation and publications prior to commencement of a project.

n. Anomaly Avoidance Operations. Anomaly Avoidance procedures are detailed in

- ETL 385-1-2, (Draft) Generic Scope of Work for Ordnance Avoidance Operations, August 1996, and
- Ordnance and Explosives (OE) Center of Expertise (CX) Interim Guidance Document 99-01, Unexploded Ordnance (UXO) Support for Other Activities, 5 February 1999.

These documents can be located on the OE Home Page at:

<http://www.hnd.usace.army.mil/oew/policy/regpro.html>

## CHAPTER 3 OE STORAGE

3-1. OE Storage. During OE projects, explosive storage falls into two categories, on-DOD installations and off-DOD installations.

a. On-DOD installations the provisions of DOD 6055.9 STD will be followed. Generally, the installation should have an explosive storage area that meets DOD standards. The permitting and compliance requirements are the responsibility of the installation. The compatibility of explosives found in Chapter 3, DOD 6055.9 STD will be followed. OE items awaiting final disposition will not be stored with other explosives. Storage of commercial explosives requires DOD hazard class storage compatibility group.

b. In the event the installation does not have an existing storage facility, the provisions of paragraph c, in this section, will apply.

c. Off-DOD installations, the contractor will be responsible for the construction of a temporary explosive storage area. This temporary storage area will meet all local, state, and 27 CFR, Bureau of Alcohol Tobacco and Firearms (BATF) requirements and as much of DOD 6055.9 STD as is practical to implement. The establishment of a temporary explosive storage area must meet the following requirements.

(1) The area will, if possible, meet the inhabited building and public traffic route distances specified in DOD 6055.9 STD. If the distances are less than required by the DOD guidance, a proposed barricading plan to protect the public from accidental detonation must be submitted and approved by the Huntsville Center's Engineering Directorate.

(2) Magazines must meet the requirements of the BATF regulations, and each magazine must have a Net Explosive Weight (NEW) established for the explosives to be stored.

(3) Each magazine must be grounded as specified in NFPA 780 and must meet the intermagazine distances as defined in the DOD guidance.

(4) A physical security survey will be conducted to determine if fencing or guards are required. This survey will be coordinated through local law enforcement agencies. Generally, a fence around the magazine is not needed IAW BATF regulations. However, it is the responsibility of the contractor for determining the degree of protection to prevent the theft of explosives and OE items.

(5) A fire plan for either on or off-installation explosive storage areas will be prepared and coordinated with the local fire department. All magazines will have placards IAW 27 CFR/ATF P 5400.7 or DOD 6055.9 STD.

## CHAPTER 4 OE TRANSPORTATION

4-1. OE Transportation. In the event that OE items must be transported off-site, the provisions of 49 CFR, DA Pam 385-64 state and local laws will be followed. These additional considerations are provided for the safe transportation of OE items:

- a. USACE contractors are prohibited from transporting OE off-site for destruction until the provisions of paragraph 1-9, TB 700-2 are followed.
- b. Do not transport WP munitions unless they are immersed in water, mud or wet sand.
- c. If loose pyrotechnic, tracer, flare or similar mixtures are to be transported, they will be placed in #10 mineral oil or equivalent to minimize the fire and explosion hazards.
- d. Incendiary loaded munitions should be placed on a bed of sand and covered with sand to help control the burn if a fire should start.
- e. If an unfired rocket motor must be transported, it will be positioned in the vehicle parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.
- f. If a base-ejection projectile must be transported to a disposal area, the base will be oriented in the vehicle so that it is parallel to the rear axle. This will afford maximum protection for the personnel operating the vehicle.
- g. OE with exposed hazardous fillers such as High Explosive (HE), will be placed in appropriate containers with packing material to prevent migration of the hazardous fillers. Padding should be added to protect the exposed filler from heat, shock and friction.

**CHAPTER 5**  
**EXCLUSION ZONE OPERATIONS**

5-1. Exclusion Zone Operations. On OE project sites, it is the responsibility of the contractor's UXO Safety Officer (UXOSO) to establish the exclusion zone for each UXO team. This exclusion zone should not be confused with the safe separation distance, which is maintained between teams.

a. The purpose of the exclusion zone is for the protection of non-essential project personnel and the public from blast overpressure and fragmentation hazards. There are two criteria for calculating exclusion zones;

(1) Intentional Detonations. When destroying ordnance, both the hazards from fragmentation and overpressure must be considered. The minimum separation distances in DOD 6055.9 STD will be used unless otherwise stated. The maximum fragmentation and overpressure distances may also be calculated IAW HNC-ED-CS-S-98-1, Methods for Predicting Primary Fragmentation Characteristics of Cased Munitions.

(2) Unintentional Detonations. If the identification of OE on an OE site is unknown, the minimum separation distance specified in DOD 6055.9 STD, Chapter 5, Paragraph C5.5.4, will be used to establish the exclusion zones. When the identification of OE items are known, the exclusion zones will be determined by the U.S. Army Engineering and Support Center, Huntsville, (USAESCH) Engineering Directorate using HNC-ED-CS-S-98-1.

b. When multiple teams are working on site, a safe separation distance will be established. The minimum distance maintained between teams will never be less than 200 feet or the K50 overpressure distance. The one that is greater will be used.

c. While OE operations are being conducted, only personnel essential for the operation will be allowed in the exclusion zone. When non-essential personnel enter the exclusion zone, all OE operations will cease. In addition to this work stoppage, the following actions will be accomplished:

(1) The individual(s) must receive a safety briefing and sign the visitor's log prior to entering the zone.

(2) The individual(s) will be escorted by a UXO qualified individual.

(3) All OE operations will cease within the radius of the exclusion zone for the areas to be visited.

d. All personnel working within the exclusion zone will comply with the following:

(1) There will be no smoking within the exclusion zone, except in areas designated by the UXOSO.

(2) There will be no open fires for heating or cooking (gas stoves, grills, etc.) within the exclusion zone, except where authorized by the UXOSO.

(3) During magnetometer operations, workers will have no metal parts in or on their shoes that would cause the magnetometer to present false indications.

**CHAPTER 6**  
**OE EXCAVATION OPERATIONS**

**6-1. OE Excavation Operations.**

a. Hand excavation is the most reliable method for uncovering OE provided the item is near the surface. Hand excavation exposes personnel to the hazard of detonation for longer periods of time than any other method. Taking this into consideration, only UXO qualified personnel will be used to accomplish this task.

b. Earth-Moving Machinery (EMM) may be used to excavate overburden from suspected OE. EMM will not be used to excavate within 12 inches of a suspected OE. Once the EMM is within 12 inches of the OE, the excavation will be completed by hand excavation methods. Personnel who are not UXO qualified may operate EMM only when supervised by a UXO Technician III.

(1) If more than one EMM is to be used on site, the same minimum separation distances required for multiple work teams applies.

(2) EMM operations will be conducted within the guidelines of EM 385-1-1 and 29 CFR 1926 Subpart P.

c. Excavation operations, whether by hand or EMM, will employ a step down or offset access method. Under no circumstances will any excavation be made directly over the suspected OE.

CHAPTER 7  
OE DISPOSAL OPERATIONS

7-1. OE Disposal Operations. All demolition operations will be conducted IAW TM 60A 1-1-31 and the USAESCH Procedures for Demolition of Multiple Rounds on OE Sites. No other publications are to be used for these operations.

a. As a general rule, all demolition operations will be accomplished by electrical means to assure maximum safety. There are exceptions to this requirement in situations where static electricity or Electromagnetic Radiation (EMR) hazards are present. Unintentional detonations can occur because of these induced currents (or lightning). The following precautions from TM 9-1375-213-12 are to be followed.

(1) Premature detonation of electric blasting caps by induced current from radio frequency (RF) signals is possible. Refer to TM 9-1375-213-12 that shows the minimum safe distance in respect to transmitter power and indicates distance beyond which it is safe to conduct electric blasting even under the most adverse conditions.

(2) Lightning is a hazard to both electric and non-electric blasting caps. A strike or a nearby miss is almost certain to initiate either type of cap or other sensitive explosive elements such as caps in delay detonators. Lightning strikes, even at distant locations, may cause extremely high local earth currents that may initiate electrical firing circuits. Effects of remote lightning strikes are multiplied by proximity to conducting elements, such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduits. The only safe procedure is to suspend all blasting activities during electrical storms and when one is impending.

(3) Electric power lines also pose a hazard for electric initiating systems. It is recommended that any demolition operation closer than 155 meters to electric power lines be done with a non-electric system such as NON-EL. This non-electric firing system provides the same amount of safety and control as electrical firing systems, but without the interference of EMR and static electricity hazards.

(4) Provisions of paragraph 1-9, TB 700-2 will be fully complied with prior to USACE contractors transporting OE off-site for destruction.

a. Only serviceable condition explosive material will be used for disposal operations.

b. The only acceptable disposal method is the one stated in the appropriate TM60 Series manual for specific ordnance types. Any commercial explosives being used will be equivalent to the military explosive required for the disposal operation.



c. If a situation dictates, protective measures to reduce shock, blast overpressure, and fragmentation will be taken. The USAESCH Engineering Directorate will assist in any design work and will review and approve all proposed protective works. As a minimum requirement all demolition shots will be tamped with clean earth or sand. IAW DOD 6055.9 STD the following separation distances will be observed unless otherwise directed by the Engineering Directorate.

(1) Minimum separation distance for non-fragmenting explosive materials will be no less than 1250 feet.

(2) Minimum separation distance for fragmenting explosive ordnance will be no less than 2500 feet. For bombs and projectiles with a diameter of 5 inches or greater, use a minimum distance of 4000 feet.

(3) Ordnance items with lifting lugs, strong backs, base plates, etc., will be oriented away from personnel, as fragments from these items tends to travel farther than normal.

d. Once demolition operations are completed, a thorough search of the demolition area will be conducted with a magnetometer to ensure a complete disposal was accomplished.

g. Inert ordnance will not be disposed of for scrap until the internal fillers/voids have been exposed and unconfined. Heat generated during the reclamation process can cause the inert fillers, moisture or air to expand and burst the sealed casings. In this situation, Oil Well Perforators can be used for venting these ordnance items which require demilitarization.

## Appendix A

27 CFR 55	Alcohol, Tobacco Products and Firearms
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
49 CFR 100-199	Hazardous Materials Transportation
DOD 6055.9 STD	DOD Ammunition and Explosives Safety Standards, August 1997
AR 190- 11	Physical Security
DA PAM 385-64	Ammunition and Explosives Safety Standards
TM 9-1375-213-12	Operators and Organizational Maintenance Manual; Demolition Materials
TM 60A 1-1-22	EOD Procedures /General EOD Safety Procedures, April 1991
TM 60A 1-1-31	EOD Procedures/General Information on EOD Disposal Procedures, May 1994
EM 385-1-1	USACE Safety and Health Requirements Manual, September 1996
USAESCH	Procedures for Demolition of Multiple Rounds (consolidated shots) on Ordnance and Explosive Sites, August 1998
ER 1110-1-8153	Ordnance and Explosives Response, 19 May 1999
EP 1110-1-18	Ordnance and Explosives Response, 24 April 2000
ATF P 5400.7	ATF Explosives Laws and Regulations, June 1990
HNC-ED-CS-S 98-1	Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives, January 1998
HNC-ED-CS-S 98-2	Methods for Calculating Range to No More Than One Hazardous Fragment Per 600 Square Feet on OE Sites, January 1998
HNC-ED-CS-S 96-8	Guide Selection and Siting of Barricades for Selected OE, September 1997

**APPENDIX D**

**INVESTIGATION PLAN  
FOR POTENTIAL UXO/OE MATERIALS**

## APPENDIX D

### INVESTIGATION PLAN FOR POTENTIAL UXO/OE MATERIALS

This plan is to be used by USACE in the event that UXO/OE-related material are found during the intrusive environmental investigation activities at Landfill 1, Landfill 2, and Quarry 3 in Area I and Area M Quarry 1. The plan is organized to include general information, mobilization of UXO personnel and equipment, operations for UXO removal, and demobilization of UXO personnel and equipment.

#### D-1.0 GENERAL

This plan addresses UXO/OE material that may be uncovered during environmental investigation activities at Landfill 1, Landfill 2, and Quarry 3 in Area I and Area M Quarry 1. If UXO/OE material is identified, environmental investigation work will cease, and a UXO contractor working directly for USACE will be mobilized to address UXO/OE material. The procedures described in this plan will be used by USACE to perform UXO removal operations, if necessary. This plan is provided so that any UXO/OE may be removed in a timely and safe manner.

The UXO contractor will perform operations in accordance with the SOW from the USACE, FA/BC's Arsenal-Wide Investigation Workplan, SSHP (with input from UXO contractor covering UXO specific safety issues) and this plan. UXO contractor personnel will read and comply with these documents.

The activities described in this plan will be performed in substantial compliance with CERCLA (Section 104) and the National Contingency Plan (Section 300.120 and 300.400 (e)). The provisions of 29 CFR 1910.120 shall apply to all actions taken at this site. Additionally, the Occupational Safety and Health Administration (OSHA) requires all employers performing on-site activities to develop and maintain an ongoing written Safety and Health Program in compliance with OSHA Standard 29 CFR 1910.120(b) and 29 CFR 1926.65 (b).

#### D-2.0 MOBILIZATION

UXO contractor will mobilize all personnel and equipment as required and upon receiving a written notice to proceed from USACE. The goal of mobilization is to ensure that the proper attention is dedicated to ensuring the UXO Technicians are prepared and have the resources to perform all tasks described in this plan. Actions performed during this phase include:

- Identify/procure, package, ship, and inventory project equipment
- Coordinate with USACE project personnel
- Organize support facilities and test communications equipment
- Procure any additional supplies and equipment required to perform the work
- Conduct site specific training.

### **D-2.1 Personnel**

UXO contractor will deploy a Senior UXO Supervisor and a UXO Specialist to perform operations at the site. USACE personnel will be prohibited from entering the exclusion zone. USACE will provide heavy equipment and operator support via subcontractor if required for excavation of the UXO/OE.

### **D-2.2 Project Equipment**

UXO contractor has thoroughly assessed the equipment requirements for this project. During mobilization, UXO contractor will:

- Package and ship corporate equipment items to the site.
- Coordinate with selected vendors for direct shipment of supplies and equipment.
- Coordinate with USACE for communications, administrative and other support.
- Perform maintenance and quality checks of the equipment to ensure that it is operationally ready.

### **D-2.3 Site Specific Training**

As part of the mobilization process, UXO contractor will perform site specific training for all personnel assigned to this project. The purpose of this training is to ensure that all personnel fully understand the procedures and methods the UXO contractor will use to perform operations at the site, their individual duties and responsibilities, and any and all safety and environmental practices/procedures associated with operations. All personnel will be trained as they arrive. Training topics/issues and training responsibilities are as follows:

- The UXO specialist will receive operational briefings and training on his duties and responsibilities. All personnel, to include USACE crews, will receive ordnance recognition and UXO safety precautions. This training will be performed by the Senior UXO Supervisor.
- All personnel will receive training on the individual equipment they will operate while on-site.
- All UXO contractor personnel will receive detailed training on the plan prior to mobilization.
- All UXO contractor UXO personnel will complete HAZWOPER 40-hour (or 8-hour refresher) training as required.

All UXO contractor personnel on-site have completed a pre-placement or annual physical examination that complies with the requirements of 29 CFR 1910.120 and have been certified as fit to work by an Occupational Physician certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is board eligible. All UXO contractor personnel on-site are in the UXO contractor medical surveillance program. Documentation as to the medical qualifications of personnel are on file on site and be provided to the contracting officer. All personnel are screened for drugs in accordance with the UXO contractor Drug/Alcohol Abuse Program.

## D-3.0 OPERATIONS

Upon completion of mobilization, UXO contractor will begin investigation operations. The following subparagraphs describe the general work practices that UXO contractor will follow during all operations, and the specific procedures and methods UXO contractor will use during this project.

### D-3.1 General Site Practices

All UXO operational activities will be performed under the supervision and direction of qualified UXO personnel. Non-UXO qualified personnel will be prohibited from performing operations unless they are accompanied and supervised by a UXO Technician. Throughout operations, UXO contractor will strictly adhere to the following general practices. Detailed UXO safety precautions and procedures are in the site specific SSHP as Appendix C.

**D-3.1.1 Work Hours.** Operations will be conducted during daylight hours only. In no case will UXO personnel work more than 10 hours in any one day.

**D-3.1.2 Site Access.** UXO contractor, in conjunction with USACE and the current property owner will control access into operating areas and will limit access to only those personnel necessary to accomplish the specific operations or who have a specific purpose and authorization to be on the site. No hazardous operations will be conducted when unauthorized persons are in the vicinity. The initial exclusion zone (EZ) will be a radius of 200 feet from the intrusive operations. In the event that is OE encountered, UXO contractor will notify USACE and will contact the Structures Branch of the U.S Army Engineering and Support Center, Huntsville (UXO CONTRACTORESCH), Dr. Michelle Crull or Mr. Wallace Watanabe at 256-895-1650, for the appropriate fragmentation distance.

**D-3.1.3 Handling of UXO.** If required, UXO items will be handled by qualified UXO personnel only. Non-UXO site personnel will be emphatically instructed and closely supervised to ensure they do not handle any UXO. OE scrap will not be handled or touched unless it has first been checked by a UXO Technician.

### **--THIS POLICY WILL BE STRICTLY FOLLOWED--**

**D-3.1.4 Safety Training/Briefing.** UXO contractor will routinely conduct daily tailgate safety briefings. In addition, the Senior UXO Supervisor may hold a safety stand-down at any time he notes any degradation of safety or a safety issue that warrants a review.

**Daily Tailgate Briefing.** Tailgate safety briefings will be conducted by the Senior UXO Supervisor. A written record of this training and the signatures of personnel attending the training will be maintained. The training will focus on the specific hazards anticipated at each work site during that day's operations and the safety measures that will be used to eliminate or mitigate those hazards. It will also refer to other operations within the area whose proximity may have safety ramifications. As work progresses and the team's location changes within a site, or from site-to-site, any corresponding changes in ingress/egress routes and emergency evacuation routes will also be reviewed during this tailgate briefing.

**Visitor Safety Briefing.** Site visitors must receive a safety briefing prior to entering the operating area and must be escorted at all times by the Senior UXO Supervisor or USACE Project Manager. All visitors entering must sign in with the USACE field representative.

**D-3.1.5 Environmental Awareness.** The promotion of environmental awareness will be ongoing as part of safety and operational briefs.

**D-3.1.6 Safety and Environmental Violations.** Safety violations or unsafe acts will be immediately reported to the Senior UXO Supervisor. Failure to comply with safety rules/regulations or failure to report violations may result in immediate termination of employment. Reckless interference with sensitive species or blatant disregard for environmental issues will likewise not be tolerated and may lead to termination of employment.

**D-3.1.7 Work Clothing and Field Sanitation.** Work clothing will be appropriate for the conditions encountered. In most cases this will be Level D PPE.

- Short or long sleeve cotton coveralls or work clothing.
- Footwear will be sturdy work boots. UXO personnel will not wear steel toe safety boots when using magnetometers.
- Hand protection will consist of leather or canvas work gloves. Rubber inner or outer gloves may be required where increased protection is needed.
- Safety glasses with side shields, hearing protection, and hard hats will be available and worn when engaged in activities where their use is required.
- In no case will tennis/running shoes or abbreviated attire such as tank tops or shorts be permitted.

The team will be outfitted with field decontamination equipment which will consist of portable eye-wash kits, containers of wash water, paper towels and soap. Prior to commencing operations each day, these facilities will be in place and ready for use in the vicinity of the team's work area as needed. Good housekeeping and decontamination measures will be practiced. Existing field sanitation stations will be utilized by the work team.

**D-3.1.8 Compliance With Plans and Procedures.** UXO contractor will conduct operations in a systematic manner using proven operating methods and techniques. All activities will be conducted under the direction, supervision and observation of the SUXO. All personnel will strictly adhere to approved plans and established procedures. When operational parameters change and there is a corresponding requirement to change procedures or routines, careful evaluation of such changes will be conducted by on-site supervisory personnel in close liaison with the USACE representative. Any new course of action or desired change in procedures will be submitted with justification for approval as required. Approved changes will be implemented in a manner that will ensure uniformity in procedures and end-product quality on the part of the UXO team.

**D-3.1.9 Equipment Checks.** All instruments and equipment that require maintenance and/or calibration will be checked prior to the start of each work day. If equipment field checks indicate that any piece of equipment is not operating correctly, and field repair cannot be made, the equipment will be tagged and removed from service and a request for replacement equipment will be placed immediately. Replacement equipment will meet the same specifications for accuracy and precision of the equipment removed from service.

UXO contractor will use the Schonstedt GA-72CV magnetometer for anomaly detection. The GA-72CV has the capabilities to detect a 81mm mortar at a depth of one foot and a MK81 bomb at a depth of six feet. Prior to use the magnetometer will be checked and/or calibrated against a known metallic anomaly. The purpose of this test/calibration is to ensure that the instrument is operating properly and to appropriately adjust the sensitivity level of the instrument.

The UXO contractor Senior UXO Supervisors will establish a magnetometer check point by burying a 60mm inert projectile at two feet and a 105mm inert projectile (or similar mass metal objects) at a depth of 4 feet. Magnetometers will be checked against these sources to ensure they are operational and capable of detecting ferrous objects at the depth specified in the Scope of Work. This test will be performed daily prior to placing the instrument into operation.

### **D-3.2 Disposal of UXO/OE and OE Related Material**

Any OE or OE-related material containing explosives or hazardous material encountered will be disposed of in accordance with USACE requirements. If OE or OE-related material is identified, USACE-SPK will be responsible for implementing the proper procedures for security, handling, demolition, or disposal and will mobilize appropriate personnel to the site to conduct operations. Mobilization may include coordination of explosives and/or delivery of a BATF Type II, explosives magazine if required. OE encountered may be either blown in place (BIP) or, if safe to move, stored in the portable magazine pending disposition instructions. USACE-SPK will dispose of OE and OE-related material containing explosives or hazardous material as follows.

**D-3.2.1 OE Disposal.** All OE and OE-related material containing explosives or hazardous material determined to be too hazardous to move will be disposed of in place by detonation utilizing standard electric firing procedures as outlined in Technical Manual (TM) 60A-1-1-31 and SOPs attached to this plan as Appendix D-1. The attached SOPs allow the option to utilize non-electric firing procedures if the particular situation dictates. If these methods of Treatment are determined to be impractical, the on-site USACE Safety Specialist will request local military Explosive Ordnance Disposal (EOD) support. The following paragraphs describe the procedures that will be used to detonate OE and UXO/OE related items at Benicia.

OE will be disposed of in the area where the item(s) are encountered. Items that are safe to move (unfuzed or unfired) may be consolidated to reduce the number of demolition shots and fragmentation contamination. In areas where an acceptable fragmentation distances cannot be achieved items safe to move may be moved to another grid (as long as the movement does not require transportation on public roads). If movement to another area is not possible, other methods of mitigation, such as berms, tamping, or barricades, will be employed to reduce the fragmentation hazard area.

Disposal operations begin in the work site when all non-essential and non-UXO personnel are out of the fragmentation zone of the ordnance being detonated. UXO that is safe to move may be consolidated to reduce the number of shots.

All roads/trails that provide access to the disposal site will have roadblocks established during demolition operations. The SUXO and a SSO will be on-site at all times during demolition operations. The operation is performed under the direction and supervision of the SUXO, who is charged with the responsibility to ensure that procedures contained in this work plan and referenced documents are followed. The SSO monitors compliance with the safety measures contained in the work plan and associated documents and in the event of non-compliance is vested with the authority to stop or suspend operations.

Prior to the start of demolition activities the USACE provided or contracted SUXO and SSO will verify that the area around the operating site is clear of all non-UXO and non-essential personnel and verify with FA/BC that all required notifications have been made. A minimum distance of 1,250 feet (non-fragmenting), 2,500 feet (fragmenting) and 4,000 feet (bombs and projectiles greater than 5 inches in diameter) is established and maintained around the operating site. Depending on the type of munitions being destroyed, the fragmentation distance may be increased or decreased based on data obtained from USACE, in accordance with HNC-ED-CS-S-98-1: Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives and with approval of the USACE Site Safety Specialist. Personnel remaining on-site is limited to those personnel needed to safely and efficiently prepare the item(s) of destruction.

**D-3.2.2 Equipment.** Standard electric and non-electric demolition equipment is used. Procedures follow the guidelines dictated by TM 60A-1-1-31 and the Demolition SOP attached to this plan as Appendix D-1.

**D-3.2.3 Evacuation and Site Control.** Prior to initiation of demolition operations all non-essential personnel are evacuated from the treatment site. Prior to priming the demolition charges all avenues of ingress are physically blocked by guard personnel. Radio communications are maintained between all involved parties at all times. Avenues of ingress are not opened without the express permission of the SSO. A constant state of vigilance is maintained by all personnel to detect any intrusion into the fragmentation zone or overflights of aircraft.

### **D-3.3 Removal and Disposal of Scrap Metal**

Within or adjacent to each location, the SUXO will establish temporary non-hazardous OE scrap collection points. During operations, OE items that are free of explosive contamination will be placed into these collection points. Upon completion of operations in that location, the material in these temporary collection points will be transported to a pre-designated central scrap collection point.

The SUXO shall perform a final inspection of the scrap at the central collection point and certify it to be free of any explosive hazard. The SUXO shall sign and annotate either a DD Form 1348-1 (Release/Receipt Document) or other document with the following statement: *"I certify that the property listed hereon has been inspected by me and, to the best of my knowledge and belief, contains no items of a dangerous nature."* The scrap will then be turned over to FA/BC for disposal.

### **D-3.4 Records**

The SUXO will prepare and maintain a detailed accounting of activities performed at each location. The will include information pertaining to the following:

- The date and time operations began
- The date and time operations were completed
- The number of hours, by labor category, expended in performing operations
- The location, number, type, and description of OE items encountered
- The amount of explosives used (if any)
- An estimated weight, in pounds, of the OE related scrap metal removed from the location.

### **D-3.5 Quality Control**

UXO contractor will verify that all sources for the identified geophysical anomalies have been removed from each intrusive investigation during excavation. Prior to closing an excavation the SUXO will check the location with the magnetometer to verify that all ferrous metal has been removed from the anomaly site.

## **D-4.0 DEMOBILIZATION**

During this phase, UXO contractor removes its operational capability from the area and reallocates its personnel and equipment to other projects. The SUXO will closely monitor operational performance throughout the execution of this project. When a clear projection can be made of the actual completion date he will, with the approval of FA/BC's site representative, initiate actions to demobilize personnel and equipment.

**ATTACHMENT D-1**

**STANDARD OPERATING PROCEDURES  
DISPOSAL/DEMOLITION OPERATIONS**

# STANDARD OPERATING PROCEDURE DISPOSAL/DEMOLITION OPERATIONS

## 1.0 GENERAL

The following UXO contractor policies are not all inclusive nor are they applicable in all situations. This SOP is not a stand-alone document and is to be used together with the Workplan, SSHP, applicable Federal, State, local regulations and, contract restrictions and guidance.

### 1.1 References

- CEHNC Safety Considerations for UXOs;
- USA Safety and Health Program (SHP);
- OSHA, 29 CFR 1910, Occupational Safety and Health Standards;
- OSHA, 29 CFR 1926, Construction Standards;
- Applicable sections of EPA, 40 CFR Parts 260 to 299, Protection of Environment;
- Applicable sections of DOT, 49 CFR Parts 100 to 199, Transportation;
- USACE EM 385-1-1, Safety and Health Requirements Manual;
- USACE ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous Waste Remedial Actions;
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards;
- DoD 4160.21-M, Defense Reutilization and Marketing Manual;
- DA PAM 385-64, Ammunition and Explosives Safety Standards;
- AR 385-64, Ammunition and Explosives Safety Standards;
- AR 200-1, Environmental Protection and Enhancement;
- AR 385-10, The Army Safety Program;
- AR 385-16, System Safety Engineering and Management;
- AR 385-40 w/USACE supplement, Accident Reporting and Records;
- TM 9-1300-200, Ammunition General;
- TM 9-1300-214, Military Explosives;
- TM 60 Series Publications.

## 2.0 DISPOSAL/DEMOLITION OPERATIONS

The following demolition procedures are not all inclusive. Additional safety and procedures information are found in the references cited in Section 1.1.

### 2.1 General Disposal Operations

The following is a general guide for disposal operations:

- Analyze explosive operations with a view towards reducing the number of personnel and quantity of explosive material subject to an accident. However, never allow one person to work alone;

- Prohibit tasks not necessary to the explosive operation in the fragmentation zone of such operations;
- Use sufficient warning signals and maintain a restricted/exclusion area when explosive operations are conducted. Cease operations when non-UXO personnel are present;
- Comply with the authorized explosive limits and safe separation distances;
- Discontinue explosive operations when unforeseen hazard conditions develop and do not resume until the condition is corrected;
- Smoke only in designated areas;
- Plan for, provide for, and know the emergency procedures in the event of an accident;
- Use special care in handling and disposal of damaged or deteriorated explosives, munitions items, and other hazardous materials;
- Disperse explosives awaiting destruction, in small quantities at safe distances, and protect them from unintentional initiation;
- Protect explosives and munitions items from the elements and static electricity;
- Provide an emergency vehicle outside the fragmentation zone for response in the event of an accident;
- Perform disposal operations during daylight hours;
- Carry blasting caps in an approved container and handle them carefully;
- Do not use UXOs for donor charges in demolition operations. They may be in an extremely sensitive and hazardous condition;
- Use caution when investigating post demolition shots. Search the area after each shot for any remaining explosives or explosive components.

## **2.2 Demolition Procedures**

UXO contractor personnel will perform demolition operations in a manner consistent with industry standards and safety practices. The following procedures and safety precautions will be adhered to at all times.

**2.2.1 OE/UXO Basic and General Safety Precautions.** These basic safety precautions are the minimum OE safety requirements required of all personnel on site. Other precautions and requirements are in other applicable OE manuals.

**2.2.1.1 Basic Considerations.** The following should be taken into consideration when planning or conducting UXO operations:

- **SAFETY IS PARAMOUNT;**

- The preferred method of disposal is Blow (detonate) in Place (BIP), however, items that are safe to move may be consolidated to reduce the number of shots;
- Do not move or disturb unidentified items.
- All UXOs will be identified, independently, by two (2) UXO technicians;
- Do not collect souvenirs;
- Do not smoke except in designated areas;
- Do not carry fire or spark producing devices into the site;
- All UXO operations will use the "Buddy" system;
- Prohibit unnecessary personnel from visiting the site;
- Demolition operations will be IAW TM 60A-1-1-31.

**2.2.1.2 Basic Safety Precautions.** The following safety precautions are applicable to all UXOs:

- Suspend all operations immediately upon approach of an electrical storm;
- Observe the hazards of electromagnetic radiation (EMR) precautions and grounding procedures when working with, or on, electrically initiated or susceptible OE;
- Do not dismantle, strip, or handle any UXO unnecessarily;
- Avoid inhalation and skin contact with smoke, fumes, dust, and vapors of detonations and OE residue;
- Do not attempt to extinguish burning explosives or any fire which might involve explosive materials;
- Do not manipulate external features of ordnance items;
- Incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting OE operations;
- Do not subject OE to rough handling or transportation. Sand bag, chock, and block appropriately;
- Carry explosives in an appropriate container;
- Hand carry no more than two items (one in each hand) at a time and then only as required by the operation being performed;

- Destroy shaped charge munitions by counter charging the cone to prevent formation of the explosive jet;
- The preferred method for disposing of white phosphorous (WP) is to blow the munition in a manner that disperses the WP into the air versus down into the ground;
- Do not transport damaged WP munitions unless fully submerged in water;
- Avoid unnecessary movement of armed or damaged UXOs;
- Avoid the forward portions of munitions employing proximity fusing;
- Assume unknown fuses contain cocked strikers or anti-disturbance features.

**2.2.1.3 General Safety Precautions.** The following sub-paragraphs describe safety precautions for various types of munitions/disposal operations:

#### **2.2.1.3.1 Bombs**

- Ensure fuse wells do not contain fuse components;
- Exercise caution when packing fuse wells of bombs or projectiles with explosives as there may be components of the fuse remaining.

#### **2.2.1.3.2 Clusters, Dispensers, Launchers**

- Approach and work from the sides of a dispenser;
- Consider an intact dispenser as fully or partially loaded;
- Consider any payloads outside the container or dislodged inside as armed;
- Take precautions for the most hazardous payloads until positively identified.

#### **2.2.1.3.3 Projectiles**

- Determine if the projectile has been fired and if so consider it armed;
- Check for the presence of unburned tracers;
- Avoid the rear and front of rocket assisted projectiles;
- Handle projectile components such as powder increments, cartridges, and primers with caution;
- Seal the open ends of projectiles or sheared projectile components with tape or other suitable material before transporting.

#### **2.2.1.3.4 Grenades**

- Do not attempt to re-install safety pins on a dud fired grenade;
- Do not attempt to withdraw impinged firing pins from the fuse of a dud fired grenade;
- Do not dispose of grenades by functioning them as designed.

#### **2.2.1.3.5 Rockets**

- Approach and work on rockets from the side;
- Do not dismantle or strip dud fired rockets or rocket motors;
- Do not expose electrically fired munitions to radio transmissions within 25 feet;
- Do not transport an unfired rocket motor until having shielded the motor igniter from EMR;
- Dispose of unfired rocket motors, with or without warheads, in such a manner as to prevent them becoming propulsive.

#### **2.2.1.3.6 Guided Missiles**

- When found, restrict vehicular movement in the area of a guided missile;
- Avoid entanglement with guidance wires of wire guided missiles;
- Restrict radio communications in the vicinity of a dud fired missile;
- Approach and work on missiles from the side and rear quarter;
- Do not dismantle or strip dud fired missiles or missile motors;
- Do not transport an unfired missile motor until having shielded the motor igniter from EMR;
- Dispose of unfired missile motors, with or without warheads, in such a manner as to prevent them becoming propulsive.

**2.2.2 Demolition Procedures.** The following sub-paragraphs outline the procedures UXO contractor personnel will use to perform both electric and non-electric demolition operations.

##### **2.2.2.1 Basic Procedures**

- The method that provides the most positive control over the specific time of detonation is electric. However, situations may occur, such as an area with a high EMR hazard, when non-electric firing may be the only option;

- Cut fuse long enough when initiating a non-electric charge to reach a safe distance by walking at a normal pace. Use a minimum of 5 minutes safe separation time on all shots;
- A minimum of 30 seconds separation time will be observed between multiple non-electric shots initiated simultaneously;
- A mandatory 60 minute wait, plus the burn time of the fuse, will be observed on misfires;
- For all buried charges use a dual priming system and Detonating Cord, **DO NOT BURY CAPS.**
- The demolition UXO Supervisor will investigate misfires;
- A fire in the hole warning will be sounded 3 times verbally, and on the radio, prior to firing a shot.

**2.2.2.2 Non-Electric Demolition Procedures.** The following safety and operating procedures will be used to assemble and detonate explosive charges using non-electric firing trains.

**2.2.2.2.1 Safety Considerations.** Do all demolition cap preparation procedures a safe distance (minimum 25 feet) from the item(s) to be destroyed and demolition charges. Observe the following safety considerations:

- Do not strike, roughly handle, tamper with or attempt to remove or investigate the contents of a blasting cap;
- Handle caps only by their open end except during attachment to time fuse or detonating cord;
- Maintain positive control of caps;
- Do not force time fuse or detonating cord into caps;
- Always point explosive end of caps away from body and other personnel during handling and crimping;
- Handle primed safety fuse and sensitized detonating cord with care. Avoid contact between caps and/or between caps and other hard objects; and
- Do not allow time fuse to coil up and contact itself, other time fuse, or explosives.

**2.2.2.2.2 Procedures.** Assemble all equipment and explosives. Keep blasting caps away from explosives until priming the shot.

- Test burn time fuse:
  - Cut, and dispose of on the shot, the first 6 inches of fuse. This will preclude an inaccurate burn rate or misfire due to moisture.

- cut and test burn an appropriate length of fuse (no less than 3 feet) to determine burn rate.
- These procedures will be accomplished at least 25 feet from explosives.
- Compute and cut time fuse to length (minimum 5 minutes) required for safe separation time;
- Inspect cap for foreign matter. Do not blow into cap to clear. Holding cap by the open end, lightly tap wrists together. If the foreign matter remains dispose of the cap on the shot and use a new cap;
- Crimp cap on time fuse, 1/8 to 1/4 inch from the base of the cap and attach fuse lighter.
- Lay out and weight down time fuse;
- Prime explosive charge, sound the warning, initiate the fuse, and return to the safe area.

WAIT A MINIMUM OF 60 MINUTES, PLUS BURNING TIME OF THE FUSE, AFTER MAXIMUM DELAY COMPUTED FOR ANY PART OF THE DISPOSAL SHOT TO ELAPSE BEFORE PROCEEDING DOWN RANGE.

#### **2.2.2.2.3 Non-Electric Misfire Procedures**

- Up range, prepare a new non-electric firing system to include a new donor charge.
- After the required wait time has elapsed proceed down range. Place a new charge close enough to the original charge to ensure detonation of both charges. When employing a detonating cord firing system: after the wait time, proceed down range, cut the detonating cord between the cap and the charge, and attach a new firing system to the end of the detonating cord going to the original charge. Destroy the cut detonating cord and cap with the newly primed shot.
- Sound the warning, initiate the new firing system and return to the safe area.

**2.2.2.3 Electric Demolition Procedure.** Personnel performing electrically initiated demolition operations will strictly adhere to the following safety and operating procedures

**2.2.2.3.1 Safety Considerations.** Do all demolition preparation procedures a safe distance (minimum 25 feet) from the item(s) to be destroyed. Observe the following safety considerations:

- Never hook up caps to unshunted wire;
- Never leave caps unshunted unless actually testing or hooking to firing wire;
- Observe explosive safety (i.e., do not strike, handle roughly, tamper with or attempt to investigate the contents of the blasting cap);

**2.2.2.3.2 Procedures.** The following procedures will be used to assemble, test, and function electric firing trains:

- Prior to going down range, gather all equipment and explosives;
- Lay out (from the site to the safe area) and test firing wire;
- Ground yourself prior to breaking out caps. Keep explosive end of cap pointed away from the body and other personnel;
- Grip the cap lead wires 3-to 6-inches behind the base of the cap, pull an initial arm's length of wire off the wire coil;
- Barricade the cap, at least 25 feet from other explosives;
- Unshunt and test blasting cap(s);
- Splice the cap leads to the firing wire in a parallel circuit and insulate connections;
- Prime the shot;
- Return to the safe area and test the circuit for continuity;
- Hook up the firing machine, sound the warning, and fire the shot.

### **2.2.2.3.3 Electric Misfires**

**2.2.2.3.3.1 Prevention of Electric Misfires:** In order to prevent misfires, insure that:

- All blasting caps are included in firing circuit;
- All connections between blasting cap wires, connecting wires, and firing wires are properly made.
- Short circuits are avoided;
- Grounds are avoided;
- Number of blasting caps in any circuit does not exceed rated capacity of power source on hand.

**2.2.2.3.3.2 Causes of Electric Misfires:** Common specific causes of electric misfires include:

- Inoperative or weak blasting machine or power source;
- Improperly operated blasting machine or power source;
- Defective and damaged connections, causing either a short circuit, a break in the circuit, or high resistance with resulting low current;

- Faulty blasting caps;
- The use in the same circuit of blasting caps made by different manufacturers or of different design;
- The use of more blasting caps than power source rating permits.

**2.2.2.3.3 Clearing Electric Misfires:** If charge is primed electrically, proceed as follows:

- Make several successive attempts to fire;
- Check firing wire connections to blasting machine terminals to be sure that contacts are good;
- Make 2 or 3 more attempts to fire charge;
- Disconnect blasting machine and short firing wire;
- A mandatory 60 minute wait will be observed on misfires.
- Test firing circuit with circuit tester for breaks and short circuits, and correct any defects discovered;
- Remove and disconnect old blasting cap(s) and short wires;
- Connect wires of new blasting caps(s) to firing circuit and re-prime charge;
- Reconnect firing wire ends to blasting machine, sound the warning, and fire charge(s).

**2.2.2.4 Multiple Sensitive UXOs Destruction Trunk and Branch Line Procedures.**

Personnel will use the following procedures to explosively link multiple shots, using detonating cord:

- Lay out detonation (Det) cord trunk line from the initiation point to the farthest UXO, being careful not to contact the UXOs with the Det cord, and weighing down (securing) the Det cord as you go;
- Working from the farthest UXO to the initiation point, cut Det cord branch lines of sufficient length, to include additional length for knots and overlap, to reach from the trunk line to the UXO;
- Prepare one end of the branch line, (i.e., sensitize with a knot);
- Attach the bare end of the branch line to the trunk line;
- Utilizing the sensitized end of the branch line, prime a charge and place it as close as possible to, but not touching, the UXO;

- Inspect the trunk and branch lines to make sure none of the primed charges have moved and that no branch line is less than a 90 degree angle with the trunk line from the direction of initiation;
- Proceed to the initiation point and prepare a firing system, either electric or non-electric, sound the warning and initiate the shot.

### **2.3 Summary**

UXO contractor uses proven procedures and methods to assemble and function both electric and non-electric explosive demolition shots. Only UXO-trained personnel will perform tasks associated with the assembly and functioning of demolition charges. The procedures outlined in this SOP are based on industry standards and ensure that operations are safely and efficiently performed.

**APPENDIX E**

**PROCEDURES USED TO DETERMINE REQUIRED SAMPLE SIZE**

## APPENDIX E

### PROCEDURE USED TO DETERMINE REQUIRED SAMPLE SIZE FOR SOIL SAMPLES AT LANDFILLS

Surface soil samples will be collected at one landfill and two quarries ranging in size from 8,000 square feet to 80,000 square feet. The samples will be analyzed for metals, pesticides, PCBs and PAHs.

In general, sample size equations are specific to the statistical method that will be used to analyze the data. In this case, it is assumed that the primary use of the data will be to determine the 95<sup>th</sup> one-sided, upper confidence limit (95% UCL) on the mean for purposes of risk assessment. It is also assumed that the data will be independent and lognormally distributed. A smaller number of samples will be needed if the data are normally distributed.

The required sample size for estimating the mean of an independent population can be determined from the following equation<sup>1</sup>:

$$n = (Z_{1-\alpha/2} \eta / d_r)^2$$

In this equation,  $n$  is the required sample size,  $Z_{1-\alpha/2}$  is the standard normal deviate that cuts off (100 $\alpha$ /2)% of the upper tail of a standard normal distribution,  $\eta$  is the coefficient of variation (CV), and  $d_r$  is the relative error. The CV, which is also known as the relative standard deviation, is equal to the mean divided by the standard deviation. The relative error,  $d_r$ , is equal to the absolute value of the estimated mean minus the true mean divided by the true mean. The equation is designed to answer the question, "How large a sample must be taken to achieve a desired precision in estimating the mean of a population?" The smaller the confidence interval half-width, the more precise the estimate of the mean.

There are a number of ways to approach sample size determination, all of which involve pre-specification of desired parameters. For this estimation example, FA/BC has assumed a relative error of one and a CV of 1.5. A CV of 1.5 is used because many environmental data are skewed resulting in a CV greater than one. If  $d_r$  is pre-specified as one and  $\eta$  is assumed to be 1.5 then the appropriate Z statistic is 1.6449 and the required number of samples is six. The calculation was conducted assuming a 90% confidence interval. This means that 5% of the distribution lies above the upper confidence limit and 5% lies below the lower confidence limit because the calculation is two-sided. The location of the upper confidence limit is therefore equivalent to the location of the 95%, one-sided upper confidence limit.

It is common practice to collect approximately 20% more samples than the number indicated by sample size estimates. In this case, the minimum required number of samples would be seven because 20% of six is approximately one.

<sup>1</sup> Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring*. Page 33. Van Nostrand Reinhold Company, New York, NY, 320 pp.

**Agency Comments and Responses (Inclusive of Back Check Comments) for Area I Landfills 1 and 2, Quarry 3 and Area M Quarry 1**  
**David Price, Mark Vest - Department of Toxic Substances Control (DTSC)**  
**Claudia Villacorta - Regional Water Quality Control Board (RWQCB), San Francisco Bay Region**

*A Technical Team Meeting was held with DTSC, RWQCB, USACE and FA/BC for the Benicia Arsenal Project on 18 September 2000. During this meeting, DTSC provided comments to "Agency Comments and Responses for Area I Landfill 1, 2, Quarry 3 and Area M Quarry 1", submitted to DTSC and RWQCB on 28 August 2000. Formal written comments were not provided by DTSC or RWQCB. However, DTSC personnel (Dave Price) indicated that these verbal comments were the formal comments. DTSC's 18 September 2000 comments are considered back check comments. This table has been revised to include the back check comments and responses. This table contains the original comments and responses from DTSC and RWQCB. The back check comments/responses are highlighted in [redacted] to distinguish the original comments/responses from the back check comments/responses. This table reflects all comments and responses from DTSC and RWQCB pertaining to the subject document.*

**Comments from David Price, Department of Toxic Substances Control, dated 20 April 2000**

1.	General	A more inclusive chemical of potential concerns (COPCs) list should be considered for each sampling location. At a minimum, surface and subsurface soils metals should be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), TPHs (volatile and extractable), explosive residues and metals. It is possible that various military industrial activities at the Arsenal in the past century may have caused disposal seemingly unrelated to historical uses of the sites. Therefore, the most effective way to commence the investigation at the Landfill/Quarry sites is to include all the above mentioned COPCs, then to refine the COPCs for further investigation.	<p>Concur. Analyte lists for surface and subsurface soil samples have been expanded as requested, except for TPH analyses for surface soil samples. Evaluating potential risk from TPH in surface soils has been addressed by including analysis of PAH and VOCs for each surface soil sample.</p> <p>Changes due to this comment/response are reflected in:</p> <ul style="list-style-type: none"> <li>• Table I7-5 Sampling and Analysis Matrix</li> <li>• Table I7-9 Analytical Method, Container and QA/QC Specification Matrix</li> <li>• Table I7-11 Summary of Soil Analytical and QA/QC Specifications</li> </ul>
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**Agency Comments and Responses (inclusive of Back Check Comments) for Area I Landfills 1 and 2, Quarry 3 and Area M Quarry 1**  
**David Price, Mark Vest - Department of Toxic Substances Control (DTSC)**  
**Claudia Villacorta - Regional Water Quality Control Board (RWQCB), San Francisco Bay Region**

4.	General	<p>Please explain the rationale for the proposed number and locations of monitoring wells and grab samples at the landfill and quarry sites. Additional monitoring wells should be installed at Landfill 2 in the southcentral and southeastern boundaries and at Landfill 1 in the southwestern boundary and between proposed wells L001TW003 and L001TW002. Also, additional grab groundwater samples are warranted at both Area M Quarry 1 and Area I Quarry 3. We would like to work with the USACE to select additional groundwater sampling locations at these sites.</p>	<p>We disagree that additional monitoring wells are needed at this time. Three monitoring wells for each landfill are proposed in this FSIP as the minimum number of locations necessary to evaluate flow direction and gradient. However, proposed locations of wells L001TW002 and L001TW003 have been moved to the west to include the suggested location. It is important to note that all three proposed well locations may be modified based on the location of the landfill derived from geophysical and trenching results. These wells will be monitored and sampled for 4 quarters. Additional wells, as appropriate, may be added during another phase of investigation based on results of the monitoring.</p> <p>Additional sampling (i.e., wells or hydropunch), as appropriate, will be added during another phase of investigation based on the results of this investigation. Three grab samples at each quarry are planned in this FSIP to evaluate groundwater quality. Three samples were selected to provide minimum coverage around anticipated landfill boundaries. Sampling locations may be modified based on the results from the geophysical survey and trenching activities.</p>
5.	Section 5.2, page 17-27	<p>The FSIP states that interior trenches will be excavated within the landfills/quarries to determine the vertical extent of the refuse or fill and to document the type of material found. If possible, the USACE should attempt to collect a sample of the refuse/fill encountered (not just the surface soil). Also, the report states that soil samples may be collected from the native soil beneath the refuse/fill. In order to assess the vertical extent of the contamination, soil samples below any refuse/fill should be collected. If groundwater is encountered during excavation of the interior trenches, a grab groundwater sample should be collected.</p>	<p>Table 17-5, Table 17-9 and Table 17-11 have been revised to include subsurface soil samples from native soil just below the refuse/fill material, and grab water samples if water is encountered in a trench. These samples will be collected from [REDACTED] relatively fine-grained sediments, which are expected to retain soil moisture and contaminants better than the coarser grained sediments. Due to the typical heterogeneous nature of landfill content, samples of refuse/fill are not proposed for this investigation. If necessary, samples of refuse/fill may be collected during later phases to assist in assessment of potential remedial actions.</p> <p><i>Note: Response to Comment is changed per Back Check Comment #10 (see highlighted text)</i></p>

**Agency Comments and Responses (inclusive of Back Check Comments) for Area I Landfills 1 and 2, Quarry 3 and Area M Quarry 1**  
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6.	Section 5.2, page 17-27	Excavated materials are stated to be replaced in their original position. Waste removed from the trenches will need to be characterized properly and if hazardous, disposed of as hazardous waste.	The following will be added as paragraph 3 in Section 5.2, Trenches:  "If refuse/fill material deemed to be potentially hazardous (as determined by visual inspection by the FTL) is encountered, trenching activities will immediately stop. Refuse/fill material deemed to be potentially hazardous will not be used as backfill. The potentially hazardous refuse/fill material will be placed in an over pack drum. The decision to continue trenching or move trenching locations will be approved by the FA/BC TOM and the USACE PM."
7.	Section 5.2, page 17-28	No monitoring wells are proposed for Area I Quarry 3 and Area M Quarry 1 because the quarries are located in bedrock and are less likely to contain leachable producing materials. Although this is unlikely, it may be possible that the bedrock in this area contains fractures that could act as preferential pathways. As such, if contaminants are detected in the grab groundwater samples, the installation of monitoring well may be required at the quarries. Monitoring wells may not be required at these sites if it can be shown that groundwater cannot be found in fractured rock.	Concur. Later phases of investigation will include monitoring wells, as appropriate, based on the findings from this investigation.
8.	Section 5.3, page 17-29	The FSIP states no trenches along the western boundary of Landfill 2 were proposed because the HLA investigation found no refuse in this area. However, during the HLA investigation, fill material was encountered in this area, but the extent was not determined. Since the goal of this investigation is to determine the extent of refuse or fill at these sites, additional trenching should be performed to determine the western boundary at Landfill 2.	Figure 17-6 has been revised to include a trench along the western boundary of Landfill 2. Trench locations shown on figures in this FSIP are proposed and likely will be moved based on the results from the geophysical survey. The primary purpose of the trenches is to best confirm the presence or extent of refuse or fill at each site.

**Agency Comments and Responses (Inclusive of Back Check Comments) for Area I Landfills 1 and 2, Quarry 3 and Area M Quarry 1**  
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<b>Comments from Mark Vest, Department of Toxic Substances Control, dated 7 April 2000</b>			
1.	17-1	<p>The FSIP discusses the possibility that these sites may be more appropriately called fillsites rather than landfills.</p> <p>The FSIP should be amended to indicate that the sites will be considered fillsites only if the materials disposed of meet the definition of inert wastes as per State Water Resources Control Board (SWRCB) definitions.</p>	<p>Corrected as noted. Executive Summary, paragraph 2 revised as follows:</p> <p>"However, if this investigation determines that these "landfills" do not contain refuse, then the name will be changed to reflect the use. The term "fillsite" will be considered if the materials disposed of meet the definition of inert wastes as per CCR, Title 27 regulations."</p>
2.	Page 17-1	<p>The FSIP references California Code of Regulations (CCR), Title 27 as applicable regulations.</p> <p>It should be noted in the FSIP that CCR, Title 22 regulations are likely to also be applicable in view of the reported disposal of industrial wastes and UXO in landfills at the Arsenal.</p>	<p>Corrected as noted. Executive Summary, paragraph 5 revised as follows:</p> <p>"If refuse is found, an evaluation of the compliance requirements in CCR, Title 27, Division 2, Subdivision 1; CCR, Title 22, Division 4.5; and CCR, Title 23, Division 3, Chapter 15 will be included in the report for this investigation."</p>
3.	Pages 17-1 and 17-2	<p>The FSIP identifies the goals of the investigation.</p> <p>The goals should be amended to include developing estimates of the volumes of material disposed of at the sites.</p>	<p>Corrected as noted. Executive Summary revised as follows:</p> <ul style="list-style-type: none"> <li>develop preliminary estimates of the volumes of material disposed of at each landfill/quarry.</li> </ul> <p>Table 17-1, Data Quality Objectives has been revised to include this Investigation-wide decision:</p> <ul style="list-style-type: none"> <li>develop a preliminary estimate of the volumes of the materials disposed in each landfill/quarry using results from the geophysical survey, and trenching.</li> </ul> <p>Section 3.0, bullet #5 has been added.</p> <ul style="list-style-type: none"> <li>After the trenching has been completed, a preliminary estimate of the volume of the materials disposed in each landfill/quarry will be calculated using the geophysical boundaries and the boundaries confirmed by trenching.</li> </ul>

**Agency Comments and Responses (Inclusive of Back Check Comments) for Area I Landfills 1 and 2, Quarry 3 and Area M Quarry 1**  
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4.	Page 17-2	<p>The FSIP states <i>If refuse is found, an evaluation of the compliance requirements in CCR, Title 27, Division 2, Subdivision 1 and CCR, Title 23, Division 3, Chapter 15 will be included in the report for this investigation.</i></p> <p>The FSIP should be amended to include evaluating the requirements of Title 22 if the presence of hazardous waste or hazardous waste constituents is assumed based on site history or confirmed by investigation activities.</p>	Corrected as noted. See above Mark Vest Comment #2.
5.	Page 17-3 -	<p>The FSIP discusses avoiding trenching into areas associated with anomalous geophysical readings which may indicate buried UXO.</p> <p>a. It should be noted in the FSIP that anomalous readings may indicate the presence of not only UXO, but of any number of other things including buried drums, vehicle bodies or frames, engine blocks, steel plate or other scrap metal.</p> <p>b. If identifying the sources of anomalies is intended, it is recommended to excavate overlying soil, identify and remove encountered metal objects and resurvey.</p> <p>c. The FSIP should be amended to specify that where anomalies are assumed to be UXO and are not excavated and identified, then it will be assumed that the landfills exhibiting such anomalies also contain hazardous wastes (UXO).</p>	<p>The landfills and Quarry 3 have a low probability of finding UXO/OE. In addition, EE/CA removal action activities will be completed prior to beginning field activities at Quarry 1 in Area M. As such, anomalies will not be avoided at these sites and construction support will be provided during the trenching.</p> <p>Based on this approach, the Executive Summary, Section 2.0, Section 3.0, and Section 5.2 (Trenches) have been revised.</p> <p>a. Corrected as noted. Page 17-3 revised as follows:          "Geophysical surveys will be used to identify potential anomalous readings at the locations to be trenched. Anomalous geophysical readings may indicate the presence of UXO/OE related material. Anomalous geophysical readings may also indicate the presence of other metallic objects such as buried drums, vehicle bodies, engine blocks, scrap metal, etc."</p> <p>b. All excavation activities will be conducted with UXO/OE support. Anomalies may be identified during the excavation process at Landfill 1, Landfill 2, Quarry 3, and Quarry 1 in Area M (after removal action) but anomalies will not be avoided. Excavation will be coordinated with appropriate UXO/OE construction support.</p> <p>c. See above response to Dave Price Comment #2.</p>

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6.	Page 17-12	<p>The FSIP again mentions conducting a geophysical survey at the sites.</p> <p>When the FSIP first discusses geophysical methods it should identify the specific methods that are proposed.</p>	<p>Section 3.0, bullet #1 has been revised to include the specific methods to be used during the geophysical survey.</p> <ul style="list-style-type: none"> <li>• A geophysical survey (using magnetic gradiometry, terrain conductivity, electromagnetic metal detection, ground penetrating radar, electromagnetic line locating) will be conducted....."</li> </ul>
7.	Pages 17-12 and 17-17	<p>The FSIP discusses trenching to confirm the landfill boundaries that are tentatively identified by geophysical methods.</p> <p>To provide for estimating volumes of waste, the exploratory trenching should also be used to estimate the angles of slopes underlying the wastes and depths of landfills.</p>	<p>Concur. Section 5.2, paragraph 1 has been revised to include:</p> <p>"Information from the trenches will be used to estimate the angles of slopes underlying the refuse and depths of landfills."</p>

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<p>8.</p>	<p>Page 17-17</p>	<p>The FSIP proposes to construct three temporary monitoring wells at Landfills 1 and 2. However, at Quarries 1 and 3 the FSIP proposes to collect three in situ water samples from borings.</p> <p>a. The FSIP should explain what is meant by temporary monitoring wells. At the landfill sites, wells should be constructed and samples should be collected and analyzed for constituents of concern quarterly for one year. Also, ground water elevations should be determined and flow directions identified at least quarterly. Any tidal influence on ground water flow direction should be assessed.</p> <p>b. If wastes are present in the former quarry sites then ground water monitoring wells should be constructed and samples should be collected and analyzed for constituents of concern quarterly for one year. Also, ground water elevations should be determined and flow directions identified at least quarterly.</p> <p>[REDACTED]</p> <p>[REDACTED]</p>	<p>a. The term "temporary" monitoring well is used per the USACE Right-Of-Entry agreements until data suggest permanent legal agreements should be entered into. A temporary monitoring well is expected to exist no more than 3 years. One year of quarterly data (water levels, flow directions, gradients and chemistry) will be collected at the landfills.</p> <p>b. Installation of groundwater monitoring wells at the quarries (if appropriate based on results of this investigation) will be conducted in another phase of investigation.</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>
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**Agency Comments and Responses (inclusive of Back Check Comments) for Area I Landfills 1 and 2, Quarry 3 and Area M Quarry 1**  
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**Claudia Villacorta - Regional Water Quality Control Board (RWQCB), San Francisco Bay Region**

9.	Page 17-17 -	<p>The FSIP states <i>If refuse/fill material is observed in the trench, soil samples may be collected from the native soil just below the refuse/fill boundary. The decision to collect these soil samples will be approved by the FA/BC TOM and the USACE PM.</i></p> <p>a. The FSIP should be amended to specify sampling beneath the fill at all of the landfills and quarries. The landfills and quarries may have received liquid wastes that may or may not have left obvious staining. Accordingly, samples should be collected from sediments underlying the trenches whether or not visual indications of wastes are identified.</p> <p>b. The samples should be collected from relatively fine-grained sediments which are expected to retain soil moisture and contaminants better than relatively clean sands.</p>	<p>a. Concur. See response to Dave Price Comment #5.</p> <p>b. Concur. See response to Dave Price Comment #5.</p>
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**Agency Comments and Responses (inclusive of Back Check Comments) for Area I Landfills 1 and 2, Quarry 3 and Area M Quarry 1  
David Price, Mark Vest - Department of Toxic Substances Control (DTSC)  
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13.	Page 17-18 and 17-19	<p>- Section 5.1, Geophysical Survey provides some information regarding the geophysical methods that are proposed for implementation.</p> <p>a. Site-specific geophysical work plans should be prepared as part of the FSIP. The work plans should specify instrumentation to be used, mode of operation (e.g., in-phase and quadrature readings for conductivity, total field magnetic intensity values and gradiometer/vertical magnetic field for magnetometer surveys), and orientation and spacing of transects (magnetic north-south is recommended for magnetometer transects).</p> <p>b. The work plans should also discuss reporting of geophysical data. Reports should include maps illustrating transects and stations, as well as contours of data with associated values posted legibly. In addition to interpretations, data should be provided in a tabular format on a computer disc.</p> <p>████████████████████</p> <p>██</p>	<p>a. Site specific geophysical work plans are not planned, but the information requested will be added to this FSIP. Section 5.1 has been revised and expanded to include the information requested.</p> <p>b. Concur. The following paragraph has been added to the end of Section 5.1 Geophysical Survey:</p> <p>"The geophysical contractor will submit a letter report to FA/BC summarizing the procedures and findings from each geophysical survey at the landfills and quarries. ██████████</p> <p>██ FA/BC and the UXO contractor will review the report before the invasive activities begin. Trench locations will be finalized based on the recommendations from the geophysical contractor and the UXO contractor to best complete the data quality objectives for each site."</p> <p>██</p>
14.	Page 17-21	<p>The FSIP states <i>If UXO/OE-related material is suspected, the uncovering, evaluation and removal of these materials will be conducted by others under the direction of the USACE Sacramento District.</i></p> <p>The above, along with discussions regarding moving wells/trenches away from mapped anomalies, is interpreted to say that geophysical anomalies which result in relocation of monitoring wells or trenches will be excavated and the source of the anomalies will be identified.</p>	See response to Dave Price Comment #2.



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17.	Page 17-28	<p>The FSIP states <i>Surface soil samples will be collected at Landfill 2 and both quarries</i>. The presence of asphalt paving on Landfill 1 does not eliminate future exposure potential.</p> <p>As discussed above, surface soil samples should be collected from Landfill 1.</p> <p>████████████████████</p> <p>████████████████████</p>	<p>See response to Mark Vest Comment #12.</p> <p>████████████████████</p> <p>████████████████████</p>
18.	Page 17-28	<p>The FSIP refers to Appendix D regarding the statistical basis for determining the required sample size. The analysis in Appendix D assumes the sample results will be normally distributed. Contaminant concentrations in environmental samples are often lognormally distributed.</p> <p>The FSIP should be amended to discuss this possibility and calculate required sample size assuming a lognormal distribution.</p>	<p>Concur. Appendix D has been revised to include a discussion of the possibility that the data may be lognormally distributed. Appendix D has also been revised to include a calculation of the required sample size assuming that the coefficient of variation is greater than one.</p>
19.	Page 17-28	<p>The FSIP states <i>Because the quarries are located in bedrock and are less likely to contain leachable producing materials, wells are not necessary and insitu groundwater samples will be collected instead</i>.</p> <p>a. The FSIP should be amended to specify the drilling method proposed to be used at these sites.</p> <p>b. If other than inert wastes are disposed of in the former quarries, or if there is no documentation of the types of wastes disposed, monitoring wells should be constructed and both water elevations and quality should be monitored and reported quarterly for at least one year.</p> <p>c. The FSIP should be amended to include well construction specifications for these wells.</p>	<p>a. Concur. The planned method of drilling will be hollow stem auger. This has been added to Table 17-6 as a "specific aspect" under SOP No. 27.0.</p> <p>b. Groundwater monitoring wells may be installed in a subsequent phase of work, based on the results of this investigation. See response to Mark Vest Comment #8.</p> <p>c. The construction procedures for temporary monitoring wells are described in SOP 21.0 of the QAPP (as indicated on Table 17-6). Construction specifics are stated in Paragraph 1 of Section 5.2 Subsurface Investigation, Temporary Monitoring Wells.</p>

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20.	Page 17-28 -	<p>According to the FSIP, one boring at each landfill or quarry will be advanced to bedrock to obtain stratigraphic data.</p> <p>The FSIP should specify the method proposed to backfill the deep borings to depths appropriate for monitoring well construction.</p>	<p>Concur. The following sentence has been added to the end of Paragraph 1 of Section 5.2 Subsurface Investigation, Soil Borings:</p> <p>"Deep borings that are converted into shallow monitoring wells will be backfilled with bentonite slurry via tremmie to the total depth of the well."</p>
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21.	Page 17-29	<p>The FSIP states <i>Impacts from potential releases into groundwater will be assessed by installing three temporary monitoring wells at each landfill (Figures 17-5 and 17-6). The locations of these temporary wells have been selected based on site topography and the anticipated direction of groundwater flow and are shown on each figure referenced above.</i></p>	<p>a. Concur. See response to Dave Price Comment #4.</p> <p>b. Locations of the wells will be finalized based on geophysics and trenching. Due to the lack of historical groundwater data, actual flow direction is not known. Sentence 1 of Paragraph 1 in Section 5.2 Subsurface Investigation, Temporary Monitoring Wells has been revised to :</p> <p>“Temporary monitoring wells will be installed in each of the three soil borings outside the perimeter of each landfill based on geophysical and trenching results.”</p> <p>c. Noted.</p> <p>d. Concur. See response to Dave Price Comment #4.</p>
		<p>a. To assess potential releases from the landfills, two down gradient wells should be monitored quarterly for at least one year.</p> <p>b. It should be demonstrated that the wells are down gradient from a significant part of the unit being monitored, not down gradient from marginal areas of disposal.</p> <p>c. If historical information indicates that wastes were disposed in canyons or other drainage courses, monitoring wells should target those areas. According to the RRR, Landfill 1 appears to be located in such an area.</p> <p>d. As discussed above, ground water elevations should be determined and flow directions identified at least quarterly. Any tidal influence on ground water flow direction should be assessed.</p>	<p>[REDACTED]</p> <p>c. [REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>

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22.	Table 17-4	<p>Summary of Commonly Used Substances and Table 17-5 Sampling and Analysis Matrix - The tables should be amended to incorporate the following recommendations.</p> <ul style="list-style-type: none"> <li>a. Samples should be collected and analyzed from sediments underlying wastes from multiple locations at each site.</li> <li>b. The surface samples should be analyzed for SVOCs in addition to the analyses proposed in the FSIP.</li> <li>c. The samples from beneath the base of the wastes should be analyzed for VOCs, SVOCs, and the analyses proposed for soil samples in the FSIP.</li> <li>d. Soil gas surveys should be completed to identify if VOCs are present in the shallow subsurface within and surrounding waste disposal areas. This information is most important at sites where nearby structures are present or may be constructed in the future.</li> <li>e. Soil samples for VOC analysis should be collected, handled, and analyzed in a manner consistent with the USEPA Region 9 interim policy for determining VOC concentrations in soil. A memorandum describing the policy is attached for ready reference.</li> </ul>	<ul style="list-style-type: none"> <li>a. See response to Mark Vest Comment #11</li> <li>b. Concur. See response to Dave Price Comment #1</li> <li>c. Concur. See response to Dave Price Comment #1</li> <li>d. See response to Dave Price Comment #3</li> <li>e. Concur. This procedure has been implemented for the Benicia Arsenal project.</li> </ul>
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