



The Boeing Company  
Santa Susana Field Laboratory  
5800 Woolsey Canyon Road  
Canoga Park, CA 91304-1148

Certified Mail

June 9, 2010

In reply refer to SHEA-110042

Regional Water Quality Control Board  
Los Angeles Region  
320 West 4<sup>th</sup> Street, Suite 200  
Los Angeles, CA 90013

Attention: Mr. Peter Rafferty

Subject: 2010 Health and Safety Plan  
Final Interim Source Removal Action (ISRA) Work Plan submitted in Response  
to California Water Code Section 13304 Order (NPDES No. CA0001309, CI No.  
6027, SCP No. 1111, Site ID No. 2040109)

Dear Mr. Rafferty:

The Boeing Company (Boeing), on behalf of Boeing and the National Aeronautics and Space Administration (NASA), wishes to provide the attached ISRA Health and Safety Plan addendum, as referenced in the May 1, 2009 Final ISRA Work Plan, for your review.

If you have any questions or require anything further, please contact Lori Blair at 818-466-8741.

Very truly yours,

Tom Gallacher  
Director, Santa Susana Field Laboratory  
Environment, Health, and Safety

LNB:bjc

Attachment: ISRA Health and Safety Plan

cc: Ms. Cassandra Owens, RWQCB  
Mr. Buck King, DTSC  
Mr. Allen Elliott, NASA, without attachment  
Mr. Steve Slaten, NASA, without attachment

**INTERIM SOURCE REMOVAL ACTION (ISRA)  
HEALTH AND SAFETY PLAN**

**ADDENDUM 29 TO RCRA FACILITY INVESTIGATION  
HEALTH AND SAFETY PLAN  
SANTA SUSANA FIELD LABORATORY  
VENTURA COUNTY, CALIFORNIA**

---

**REVIEW AND APPROVALS:**

**Prepared by:**



\_\_\_\_\_  
**Meghann Chell**  
MWH, Project Engineer

**June 7, 2010**

\_\_\_\_\_  
**Date**

**Approved by:**



\_\_\_\_\_  
**Ben Stewart, PG, CAPM**  
MWH, Project Manager

**June 7, 2010**

\_\_\_\_\_  
**Date**



\_\_\_\_\_  
**Stu Welch**  
Project Health & Safety

**June 7, 2010**

\_\_\_\_\_  
**Date**

This site-specific Health and Safety Plan has been developed in accordance with Federal OSHA 29 CFR and Cal-OSHA CCR Title 8 Applicable Standards, and has been streamlined to avoid duplication of existing documents.

## **HEALTH AND SAFETY ADDENDUM NUMBER 29**

This Health and Safety Plan Addendum Number 29, prepared May 26, 2010, amends the existing Rocketdyne RCRA Facility Investigation, Volume III, Appendix E, Health and Safety Plan (HSP) dated June 1996. This addendum addresses the new scope of work for the removal actions at various locations within the Outfall 009 watershed. This addendum describes specific health and safety measures to be taken during the field efforts associated with this project. A copy of this HSP addendum must be on site at all times while work is being conducted. MWH subcontractors are to independently evaluate this HSP to determine what additional health and safety safeguard may be necessary or appropriate to protect their employees and others within the context of their own scope of work.

### **SITE**

The Santa Susana Field Laboratory (SSFL) is located approximately 29 miles northwest of Los Angeles, California, in the southeast corner of Ventura County (see Figure 1). The address is:

The Boeing Company Santa Susana Field Laboratory  
5800 Woolsey Canyon Road  
Canoga Park, California 91304-1148

The site is jointly occupied by The Boeing Company (Boeing [formerly the Rocketdyne Division of Rockwell International]), the National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy (DOE). Boeing acts as the agent for NASA and DOE concerning the RFI, RI/FS, and remediation projects at SSFL. Figure 2 is a Site Map with outfall locations. Figure 3 shows the boundaries of the Outfall 009 watershed.

### **SCOPE OF WORK**

The work to be performed includes the excavation of impacted soil from areas within the Outfall 009 watershed, implementing erosion and sediment control measures during construction activities, transporting excavated soil to the offsite disposal facility; collecting confirmation samples from excavation sidewalls and floors; and restoring disturbed areas to approximately existing grades.

Fifteen areas are currently planned for excavation as part of the 2010 ISRA project within the Outfall 009 watershed – nine within the B-1 Area, Instrument and Equipment Laboratory, and Component Test Laboratory I in Boeing Area I (Eastern Outfall 009) and six within the Former Area II Incinerator Ash Pile area in NASA Area II (Western Outfall 009). Figures 4 and 5 show planned excavation extents for excavations at Eastern Outfall 009 and Western Outfall 009, respectively. Final excavation depths are estimated to range from 2 to 4.5 feet below ground surface (bgs). Excavation boundaries may change slightly or additional excavation locations may be added into the scope of work, pending the results of ongoing soil sampling.

Excavated non-hazardous soil from the Eastern Outfall 009 excavation areas will be loaded directly into haul trucks for transportation to the Lower Parking Lot where it will be stockpiled. Excavated non-hazardous soil from the western Outfall 009 excavation areas will be loaded directly into haul trucks for transportation to the parking lot adjacent to the Helipad where it will be stockpiled. Stockpiles will be segregated and maintained in accordance with the 2010 Addendum to the ISRA Soil Management Plan (SMP) and the Ventura County Air Pollution Control District (VCAPCD) Rule 55 (Fugitive Dust). Stockpiled soil will be loaded and transported to the Boeing designated/approved offsite disposal facility in accordance with the 2010 Addendum to the ISRA Transportation Plan. After the excavations are completed, all equipment will be dismantled and removed from SSFL.

The MWH Field Site Manager (MWH FSM) and Contractor will survey the entire work site in order to ensure project safety, site security and prevention of unauthorized entries. This survey will also include evaluation of any obvious hazards (e.g., slips, trips, falls, poison oak, etc).

The site will be secured by the posting of an “Authorized Personnel Only” sign in the staging area. The sign must also contain the contact information for the MWH FSM and the proper level of personal protective equipment (PPE) required. The MWH FSM will verify with Boeing Safety and or security that all support organizations (Medical, Fire Department, and Safety) are on standby and all operation notifications and needed evacuations are complete.

A Safety Briefing will be held in the project zone before the initiation of the project field activities. All contractors and personnel involved in the project are encouraged to attend the safety briefing. This briefing will include the discussion of this HSP Addendum in its entirety. During this meeting the scope of work and job responsibilities of all participating individuals will be discussed, the contingency plan will be reviewed, and hazards anticipated in the project will be described and discussed. All employees will have an opportunity to raise questions, concerns and/or suggestions to improve the work plan. This will be a critical exercise involving the entire participating crew in critiquing the work plan and making adjustments prior to initiation so that work can be completed safely and efficiently.

Once the briefing is concluded all MWH participants will be asked to sign the HSP Amendment as documentation of their understanding of the project and their work responsibilities.

## **HAZARD ANALYSIS**

The sections below provide an evaluation of the hazards anticipated during this project’s fieldwork.

## Constituents of Concern

*During Excavation:* The following are the constituents of concern during removal activities:

- Arsenic (up to 21.7 mg/kg)
- Benzo(a)pyrene (up to 48,400 µg/kg) and other polynuclear aromatic hydrocarbons (PAHs) and phthalates (up to 77,600 µg/kg)<sup>1</sup>
- Cadmium (up to 7.73 mg/kg)
- Chloroform (up to 0.51 µg/L)
- Copper (up to 1,900 mg/kg)
- 1,1-Dichloroethene (up to 12 µg/kg)
- Dioxins/Furans (up to 820 pg/g)
- Lead (up to 3,000 mg/kg)
- Mercury (up to 75.0 mg/kg)
- n-Nitrosodimethylamine (up to 3,370 µg/kg) – potential to reach or exceed OSHA PEL concentrations at CTLI-1
- Polychlorinated biphenyls (PCBs) (up to 1,560 µg/kg)
- Tetrachloroethene (PCE) (up to 41 µg/L)
- 1,1,1-Trichloroethane (1,1,1-TCA) (up to 6,100 µg/kg)
- Trichloroethene (TCE) (up to 272 µg/L) – potential to reach or exceed OSHA PEL concentrations at AP/STP-1 and IEL-2
- Particulates / Dust

Table 1 contains occupational health exposure information and toxicological properties of the potential chemicals of concern.

*Chemicals Brought to SSFL to Support Work:* The following chemicals are brought by MWH to SSFL to support the excavation field work:

- Liquinox
- Isobutylene calibration gas
- Isopropyl alcohol

---

<sup>1</sup> PAHs detected: anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. Phthalates detected : di-n-butyl-phthalate.

Material Safety Data Sheets (MSDSs) for each of these must be kept on file with the Boeing Contractor Coordinator as well as in the HSP Addendum binder on the project site. All containers must be labeled with the identity of the contents as well as a hazard warning and emergency notices.

Each person working on this project shall review these MSDSs to become familiar with the health hazards, handling and storage procedures, first aid, exposure controls and personal protection.

### **Biological**

Some of the biological hazards could be encountered, including poison oak, bees, ticks, mosquitoes, rattle snakes, black widow spiders, brown recluse spiders, bacteria, viruses and wild animals (e.g., coyotes, rats, foxes, mountain lions, etc.). The varied biological hazards associated with the fieldwork will be discussed during the safety briefings. All team members will review the “Health and Safety Plan, RCRA Corrective Action Program Activities, Santa Susana Field Laboratory, Ventura County, California” (Health and Safety Plan, Revision 2, August 2003). Workers should be aware that poison oak grows abundantly in this area. Field personnel at SSFL are accustomed to donning disposable coveralls and barrier creams (e.g., Ivy Block) to help prevent direct contact with poison oak. Level D clothing should be sufficient to protect against incidental contact. If poison oak is contacted, field personnel should clean the affected area with soap and water thoroughly.

Bees exhibiting aggressive behavior have been encountered on numerous occasions at the SSFL field sites. These bees have been known to hover and attach to field vehicles. Boeing has had a professional investigation of these bees and determined that they are NOT the Africanized honey bees. Practice good bee etiquette, wear light colors, do not wave your hands around them, and turn off any vibrating equipment (this seems to irritate them). When going into brushy areas, wear long pants and snake gaiters to protect from rattlesnake bites. If rattlesnakes are encountered, step back slowly from the snake until you are outside of strike range and alert security.

### **Radiological**

Nuclear reactor development and testing programs were carried out at selected sites in SSFL Area IV. Based on site knowledge, previous monitoring of the area, and previous sampling analysis, there is no evidence to suggest that any radiological contamination exists in the 2010 ISRA Outfall 009 excavation areas. However, screening of excavated soils and debris will be conducted to verify that the excavated materials have no radiological restrictions and do not violate any local, state, or federal requirements regarding their management, handling, or disposal. Procedures for radiological monitoring have been established by the Boeing Radiation Safety Team (see Attachment 1).

## **Physical**

*Excavations:* Entry into excavations by an MWH employee will be avoided when possible. If an excavation or trench entry is necessary during the course of the project, specific details concerning the nature of the entry and safety precautions must be discussed with the MWH Environmental Health and Safety (EHS) Director and any necessary modifications will be made to this HSP. The excavation will be overseen by a designated “Competent Person” (someone knowledgeable about the hazards and authorized to implement controls). Protective measures such as sloping, benching, or shoring will be implemented depending on the nature of the entry and soil classification as determined by the designated Competent Person. All trenching and excavation activities will conform to the requirements of 29 CFR 1926 Subpart P / 8 CCR 1541.

Entry into excavations is not anticipated to be required. The following general requirements apply to all excavations at SSFL:

- Identification of Competent Person prior to beginning of excavation – notify all team members during the daily tailgate safety meeting.
- Limit the number of people in work zone to only those necessary to complete the task.
- Maintain at least a two-foot clearance to the edge of the excavation for all equipment, supplies, spoil piles, and people. A greater distance should be selected if possible, especially if the soils are sandy.
- Collect all soil samples from the backhoe or excavator bucket.
- Prior to approaching the backhoe or excavator, make eye contact with the operator and ensure that the bucket is securely on the ground.
- Identify the swing radius of the bucket and operator blind spots and do not stand in those locations.
- Wear a brightly-colored traffic safety vest at all times.

*Dust Control:* The excavation of soil carries with it the potential for dust to become airborne. In order to prevent fugitive dust, the following controls will be implemented:

- Keep soil moist using a water truck or fire hydrant
- Keep soil piles covered if soil is very dry and weather is windy
- If high wind conditions occur, defined in VCAPCD Rule 55 as on-site wind speeds exceeding 25 miles per hour for at least 5 minutes in an hour, operations will cease.

*Foot Hazards:* All personnel are required to wear steel-toed shoes (with the exception of personnel operating electrical equipment) to prevent physical and chemical injuries. Personnel operating electrical equipment shall either wear rubber shoes or hard-toed shoes (e.g., fiber-plastic toe). High-top boots should be used to strengthen ankles and prevent twisting hazards.

*Hand Hazard:* Personnel are required to wear Nitrile gloves when handling soil. If hands come in contact with soil, rinse with soap and water for no less than 20 seconds.

*Eye Hazard:* Personnel are required to wear safety glasses. Eye hazards will be removed during the site assessment. If handling chemicals, personnel should use good chemical handling practices to eliminate splashing.

*Head Hazard:* Personnel are required to wear a hard hat when working in the active areas of excavation.

*Vehicle Hazard:* Personnel are required to wear a traffic vest.

*Material Lifting Hazards:* Heavy items (such as ice chests filled with soil samples) will need to be transported. Use proper lifting procedures. Authorized personnel should use mechanical lifting devices (such as forklifts and/or use two or more persons) to lift heavy items when possible.

*Slipping or Tripping Hazards:* The site may contain tripping hazards. Personnel should be aware of their surroundings at all times. When out in the field, personnel should work in teams and have a radio available at all times.

*Heat Stress:* California Employers with any outdoor places of employment must comply with the Heat Illness Prevention Standard (T8 CCR 3395). Outdoor work environments involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities in high heat have a possibility for inducing heat stress in employees engaged in such operations.

Summers are hot in Southern California, and although winters are typically mild, the SSFL area does experience hot, dry, and/or humid weather in wintertime. If temperatures reach 80 to 85 degrees F (°F), personnel should review the signs of heat stress contained in this Addendum or the primary HSP, dated August 2007. If temperatures become elevated to 85 to 90 °F, a shaded area for breaks must be provided and regular hydration breaks should be scheduled by the Site Health and Safety Officer or MWH FSM (e.g., at least every other hour, more if personnel show signs or symptoms of heat disorders).

The stress of working in a hot environment can cause a variety of heat related illnesses (HRI) including sunburn, heat rash, heat cramps, heat exhaustion, and/or heat stroke; the latter can be fatal. PPE (i.e., Level C protection) can significantly increase heat stress. To reduce or prevent heat stress, frequent rest periods and controlled fluid consumption (one liter/hour) to



replace body fluids and salts may be required. It should be noted that heat stress can also occur to people working in Level D, permeable, work clothing.

There are two sources of heat exposure: the outside environment and internal muscle activity (80% of muscle energy is turned into body heat). High temperatures and high levels of physical work cause heat stress. The body defends itself by sweating and evaporating. Caution should be taken, because the higher the humidity levels the more difficult it is for sweat to evaporate from the skin. A heat index chart is included in Attachment 2.

It is difficult to predict just who will be affected and when because individual susceptibility to heat stress varies. In addition, as previously mentioned, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

*Causes, symptoms, and treatment of HRI:*

Heat stress symptoms are a set of natural body signals indicating that something needs to be done to balance the body's heating and cooling. As the body heats up, it tries to rid itself of excess heat through the evaporation of sweat. If it is unable to cool itself this way, your body temperature will increase. When body temperature gets above 100.4 to 102.2°F, the brain starts to overheat, leading to a shutdown of the body's cooling system (sweating stops). The internal temperature continues to rise even faster, leading to heat stroke and possibly death.

The symptoms and treatment of various heat-related illnesses are listed below:

<b>Heat-Related Illness (HRI)</b>	<b>Signs and Symptoms</b>	<b>First Aid and Emergency Response Procedures</b>
<b>Sunburn</b>	Red, hot skin; may blister	Move to shade, loosen clothes to reduce temperature; Apply cool compress or water to cool burn; Get medical evaluation if severe
<b>Heat Rash</b>	Red, itchy skin; Bumpy skin; Skin infection	Apply cool water or compress to cool rash; Keep affected area dry to minimize infection; Control itching and infection with prescribed medication
<b>Heat Cramps</b>	Muscle cramps or spasms; Grasping the affected area; Abnormal body posture	Drink water or sports drinks to re-hydrate body; Rest, cool down in shaded area; Massage affected muscle to release body toxins; and Get medical evaluation if cramps persist

<b>Heat-Related Illness (HRI)</b>	<b>Signs and Symptoms</b>	<b>First Aid and Emergency Response Procedures</b>
<b>Heat Exhaustion</b>	High pulse rate Extreme sweating Pale face Insecure gait Headache Clammy and moist skin Weakness Fatigue Dizziness	Move to shade and loosen clothing to cool down; Initiate rapid cooling with fan, water mister, or ice packs; Lay flat and elevate feet to reduce heart rate and blood pressure; Monitor recovery (is body cooling?); Drink small amounts of water to cool body and re-hydrate Evaluate mental status (ask Who? Where? When? Q's) <b>If no improvement call 911</b>
<b>Heat Stroke</b>	The above but more severe; Hot, dry skin (25-50% of cases); Altered mental status with confusion and agitation; Can progress to loss of consciousness and seizures; Can be fatal	<b>Call 911</b> <b>Provide EMS with directions to work site;</b> Immediately remove from work activity to slow/stop body temp rise; Start rapid cooling with fan, water mister, or ice packs; Lay flat and elevate feet to reduce heart rate and blood pressure; If conscious give sips of water to cool body and re-hydrate; Monitor airway and breathing-administer CPR if needed

Another cause of heat stroke occurs when a person's body has used up all its water and salt reserves, resulting in the cessation of sweating, causing the body temperature to rise rapidly, which results in heat stroke or heat exhaustion.

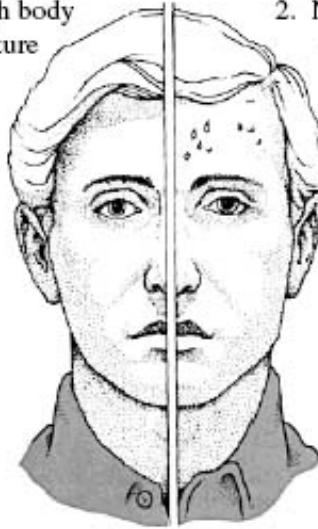
The most serious heat related illness is heat stroke. The symptoms include confusion, irrational behavior, convulsions, coma, and death. While over 20% of heat stroke victims die regardless of health or age, children seem to be more susceptible to heat strain than adults. In some cases, the side effects of heat stroke are heat sensitivity and varying degrees of brain and kidney damage.

#### Heat Stroke

1. Dry, hot skin
2. Very high body temperature

#### Heat Exhaustion

1. Moist clammy skin
2. Normal or subnormal temperature



Signs and symptoms of heat stroke and heat exhaustion

Signs and symptoms of heat stroke included a high body temperature above 105.8°F and any of the following: the person is weak, confused, upset, or acting strangely; has hot, dry, red skin; a fast pulse; headache or dizziness; in later stages, a person may pass out and have convulsions **THIS IS AN IMMEDIATE MEDICAL EMERGENCY. PROMPT ACTION MAY SAVE THE PERSON'S LIFE, CALL AN AMBULANCE.**

This condition can kill a person quickly; before emergency medical personnel arrive remove excess clothing; fan and spray the person with cool water; offer sips of cool water, if the person is conscious.

#### *Prevention of HRI:*

Attachment 3 presents MWH's procedures for heat illness prevention. The best approach is preventative heat stress management. The elements reflected within this consist of the following:

- Provision for Water
- Access to Shade
- Acclimation
- Work/Rest Regime and Work Shift Rotation

#### Provisions for Water

Water is a key preventive measure to minimize the risk of heat related illnesses. Employees shall have access to potable drinking water. Where the supply of water is not plumbed or otherwise continuously supplied, water shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. Work crews may begin the shift with smaller quantities of water if they have

effective procedures for replenishment during the shift as needed to allow all crew members to drink one quart or more per hour. The frequent drinking of water shall be encouraged.

#### Access to Shade

Access to rest and shade or other cooling measures (e.g., an air-conditioned vehicle) are important preventive steps to minimize the risk of heat related illnesses. Employees suffering from heat illness or believing a preventative recovery period is needed shall be provided access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than five minutes. Such access to shade shall be permitted at all times.

#### Acclimation

The human body will get used to working in a hot environment gradually over time. Workers should acclimate to site work conditions by slowly increasing workloads, i.e., do not begin site work activities with extremely demanding activities. This acclimation process may require up to two weeks for completion.

#### Work/Rest Regimen and Work Shift Rotation

An appropriate work/rest regimen can reduce the risk of HRI. The table in Attachment 2 indicates the appropriate work/rest percentage based on level of PPE and temperature. In hot weather, it can be beneficial to rotate shifts of workers with potential heat stress exposure. Also, field activities can be planned to be conducted in either the early morning or evening.

#### **PPE**

The minimum PPE required for site survey, set-up, operation, and clean-up activities will be Level D, which must include full pants, light-colored shirt, steel-toed boots, Nitrile gloves, hard hat and safety glasses.

#### **ADDITIONAL SAFETY PRECAUTIONS**

All required safety equipment must be staged within or near the project zone. The safety equipment will include an ABC fire extinguisher, portable eye wash equipment (with sufficient volume for a 15-minute flush), and Nitrile gloves. A first-aid kit can be accessed by calling Security at ext. 4800 (818-466-8600).

#### **General**

To prevent injuries and to minimize potential exposure, the following general safe work practices will be adhered to at the SSFL. These procedures are particularly important when dealing with situations of known or unknown toxic hazards. These practices serve as a guideline of general precautionary operations at potentially hazardous locations.

## **Personal Hygiene**

1. Eating, drinking, chewing gum or tobacco, taking medication, smoking, and the application of makeup are prohibited in any contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.
2. All contact with potentially contaminated substances will be avoided. Whenever possible, limit the number of individuals entering a known contaminated or restricted work zone.
3. No beard or facial hair may be worn by individuals working in areas that require respiratory protection.

## **Personal Protection**

1. Be familiar with and knowledgeable about safety standard operating procedures.
2. Be familiar, knowledgeable, and adhere to all instructions in this HSP Addendum.
3. Identify and be aware of arrangements for emergency medical assistance.
4. While working, consider fatigue, heat stress, and other environmental factors such as plant surroundings and wildlife that may impact personal safety.

At the end of each work day, the entire project area will be cleaned of loose debris.

## **DECONTAMINATION**

This investigation is not expected to encounter excessive contamination or result in contamination exposure to personnel, equipment, or clothing. However, the following decontamination protocols shall be followed:

- Wash hands with soapy water when leaving the exclusion zone.
- Discard disposable gloves and coveralls in a trash container acceptable to Boeing. These items are not deemed to meet the characteristics of a hazardous waste. They can be discarded as solid waste in a standard trash receptacle.
- A boot wash should include a water rinse and/or brush, if necessary, to ensure that potentially contaminated soil does not leave the SSFL on the soles of worker's boots.

## **Project Personnel**

MWH Onsite Safety Officers: Eric Walker (please add contact numbers)

MWH Field Site Manager: Shelby Valenzuela (626-255-0503)

MWH Project Manager: Alex Fischl (925-627-4627)

MWH Project Safety Manager: Stu Welch (626-568-6688)

Boeing Project Safety Officer: Robert Mako (818-466-8735)

## **EMERGENCY INFORMATION**

Attachment 4 to this HSP Addendum is an updated list of emergency contact phone numbers and a map to the nearest hospital.

At least one two-way radio is required to be used onsite whenever personnel are in the project area. In the case of an incident requiring emergency assistance, the two-way radios can be used to contact Lori Blair or Gilbert Fuentes on Radio Channel. Briefly describe your location and the nature of the emergency.

To ensure that all SSFL personnel are updated of changes and daily work tasks, tailgate safety meetings will be scheduled by the MWH FSM on a daily basis. Attachment 5 to this HSP Addendum is a form to be used to document the tailgate safety meetings. The MWH FSM will direct the meeting and all Site workers (including subcontractors) are expected to attend. Attachments 6 and 7 to this HSP Addendum are Activity Hazard Analysis forms summarizing scope of work, related hazards, and hazard controls.



**TABLE 1**

**OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR  
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN**



**TABLE 1**  
**OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR**  
**CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN**

Contaminant	OSHA PEL	NIOSH REL	ACGIH TLV	ACGIH/OSHA STEL	OSHA/NIOSH IDLH	IP (eV)	Vapor Pressure (mmHg)	Route of Exposure	Symptoms of Exposure
ARSENIC	0.01 mg/m <sup>3</sup>	0.002 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	NA	100 mg/m <sup>3</sup>	NA	NA	INH, ING, CON, ABS	Ulceration of nasal septum, dermatitis, gastro-intestinal disturbances, peripheral neuropathy, respiratory irritant, hyperpigmentation of the skin, CARCINOGEN.
BENZO(A)PYRENE	0.2 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	0.2 mg/m <sup>3</sup>	NA	80 mg/m <sup>3</sup>	NA	NA	INH, CON	Dermatitis; bronchitis; CARCINOGEN
CADMIUM	0.005 mg/m <sup>3</sup>	Ca (lowest possible)	0.01 mg/m <sup>3</sup>	NA	9 mg/m <sup>3</sup>	NA	NA	IHN, ING	Pulmonary edema, dyspnea, cough, chest tightness, pain, headache; chills, muscle aches; nausea, vomiting, diarrhea; emphysema, mild anemia; CARCINOGEN.
CHLOROFORM	240 mg/m <sup>3</sup>	9.78 mg/m <sup>3</sup> (60 minute)	49 mg/m <sup>3</sup>	9.78 mg/m <sup>3</sup> (60 minute)	500 ppm	11.42	160	INH, ABS, ING, CON	Irritated eyes and skin; dizziness, mental dullness, nausea, confusion; headache, weakness, exhaustion; anesthesia; enlarged liver; CARCINOGEN
COPPER	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	NA	100 mg/m <sup>3</sup>	NA	NA	INH, ING, CON	Irritant to nasal mucus membranes, pharynx; nasal perforation; eye irritant; metallic taste; dermatitis.
1,1-DICHLOROETHENE	790 mg/m <sup>3</sup>	Ca (lowest feasible)	NA	20 ppm	3,970 mg/m <sup>3</sup>	9.65	180 – 265	ING, ING, CON	Irritated eyes and respiratory system; CNS depression

INH = Inhalation    ING = Ingestion    ABS = Skin Absorption    CON = Skin or mucous membrane contact  
 NA = Not applicable or available    Ca = NIOSH considered carcinogen    CNS = Central Nervous System

**TABLE 1-1 (Continued)**

**OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR  
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN**

Contaminant	OSHA PEL	NIOSH REL	ACGIH TLV	ACGIH/OSHA STEL	OSHA/NIOSH IDLH	IP (eV)	Vapor Pressure (mmHg)	Route of Exposure	Symptoms of Exposure
DIOXINS/FURANS	None	Ca (lowest possible)	NA	NA	Ca	NA	0.000002	INH, ABS, ING, CON	Irritated eyes; allergic dermatitis, chloracne; prophyria; gastrointestinal disturbance; possible reproductive teratogenic effects. In animals – liver and kidney damage, hemorr. CARCINOGEN.
LEAD	0.05 mg/m <sup>3</sup>	0.100 mg/m <sup>3</sup>	0.15 mg/m <sup>3</sup>	NA	100 mg/m <sup>3</sup>	NA	NA	INH, ING CON	Weakness, lassitude, insomnia, facial pallor; pale eyes, anorexia; malnutrition, constipation; abdominal pain, colic, anemia; gingival lead line; tremors, paralysis of the wrist and ankles; encephalopathy; nephropathy; irritant to eyes; hypotension.
MERCURY	0.1 mg/m <sup>3</sup>	Vapor: 0.05 mg/m <sup>3</sup> (skin) Other: 0.1 mg/m <sup>3</sup> (skin)	NA	NA	10 mg/m <sup>3</sup>	NA	0.0012	INH, ABS, ING, CON	Irritated eyes, skin; cough, chest pain, difficulty breathing, bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, weakness, exhaustion; stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria; CARCINOGEN
n-NITROSODIMETHYLAMINE (NDMA)	Ca	Ca	NA	NA	Ca [ND]	8.69	3	INH, ABS, ING, CON	Nausea, vomiting, diarrhea, abdominal cramps; headache; fever; enlarged liver, jaundice; decreased liver, kidney, and pulmonary function; CARCINOGEN

INH = Inhalation    ING = Ingestion    ABS = Skin Absorption    CON = Skin or mucous membrane contact    MAX = 5-minute maximum peak in any 3-hours  
 NA = Not applicable or available    Ca = NIOSH considered carcinogen    CNS = Central Nervous System    ND = non-detect

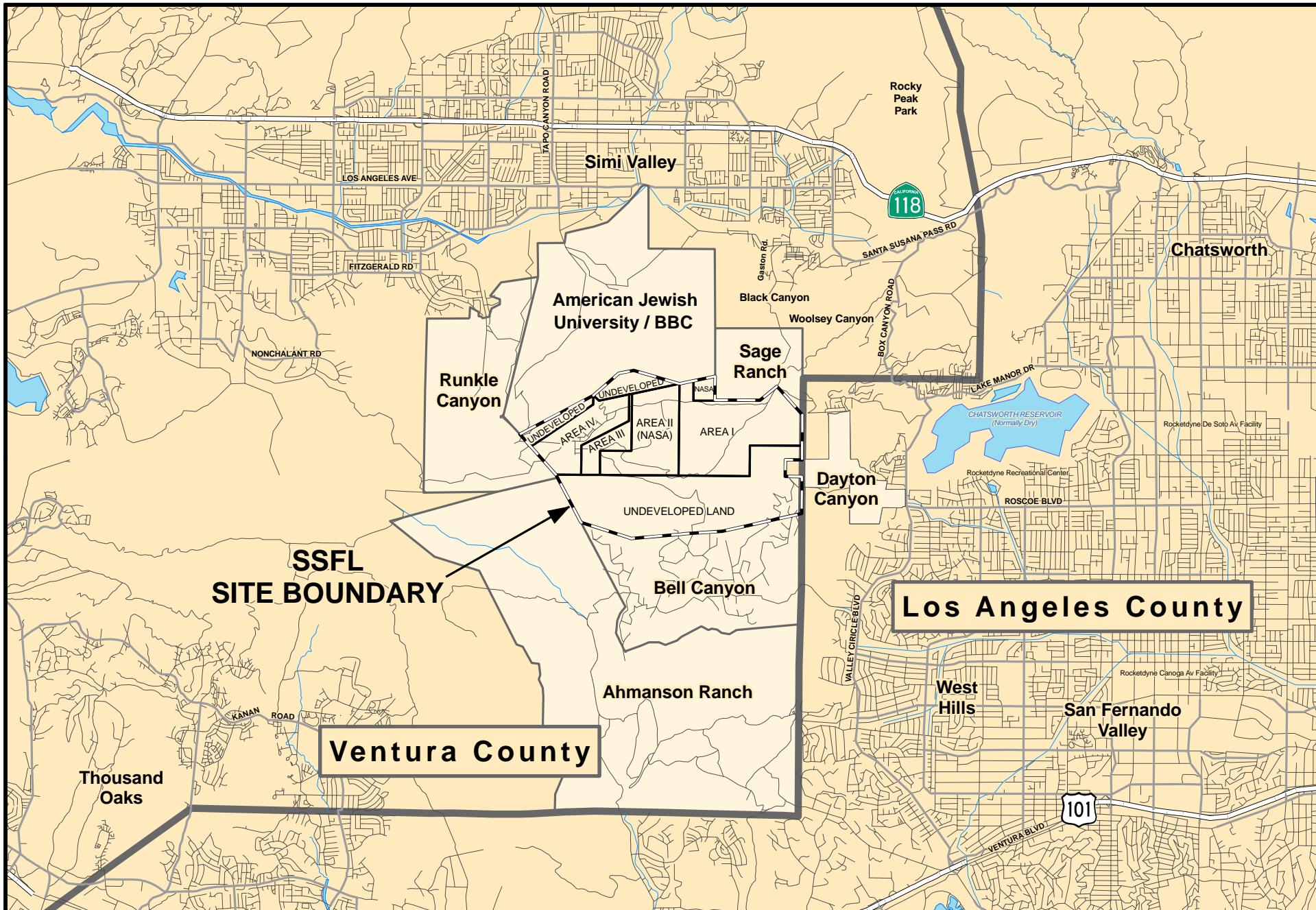
**TABLE 1-1 (Continued)**

**OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR  
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN**

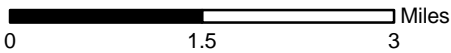
Contaminant	OSHA PEL	NIOSH REL	ACGIH TLV	ACGIH/OSHA STEL	OSHA/NIOSH IDLH	IP (eV)	Vapor Pressure (mmHg)	Route of Exposure	Symptoms of Exposure
POLYCHLORINATED BIPHENYLS (PCBs)	0.5 mg/m <sup>3</sup> (skin)	Ca 0.001 mg/m <sup>3</sup>	NA	NA	Ca 5 mg/m <sup>3</sup>	NA	0.00006	INH, ABS, ING, CON	Irritated eyes, chloracne; liver damage; reproductive effects; CARCINOGEN
TETRACHLOROETHENE (PCE)	TWA: 678 mg/m <sup>3</sup> C: 1,356 mg/m <sup>3</sup> MAX: 2,034 mg/m <sup>3</sup>	Ca	NA	NA	1,017 mg/m <sup>3</sup>	9.32	14	INH, ABS, ING, CON	Irritated eyes, skin, nose, throat, respiratory system; nausea; flushed face and neck; dizziness, incoordination; headache, drowsiness; skin redness; liver damage; CARCINOGEN
1,1,1-TRICHLOROETHANE (TCA)	TWA 1,900mg/m <sup>3</sup>	1,900 mg/m <sup>3</sup> [15 minute]	NA	NA	3,822 mg/m <sup>3</sup>	11.00	100	INH, ING, CON	Irritated eyes and ski; headache, weakness, exhaustion, CNS depression, poor equilibrium; dermatitis; cardiac arrhythmia; liver damage
TRICHLOROETHYLENE (TCE)	100 ppm	Ca	50 ppm	100 ppm	Carcinogen 1,000 ppm	9.45	58	INH, ING, CON	Headache, vertigo; visual disturbance, tremors, somnolence, nausea, vomiting; irritation to eyes; dermatitis; cardiac arrhythmia; CARCINOGEN.

INH = Inhalation    ING = Ingestion    ABS = Skin Absorption    CON = Skin or mucous membrane contact    MAX = 5-minute maximum peak in any 3-hours  
 NA = Not applicable or available    Ca = NIOSH considered carcinogen    CNS = Central Nervous System    ND = non-detect

## **FIGURES**



1 inch equals 1.5 miles



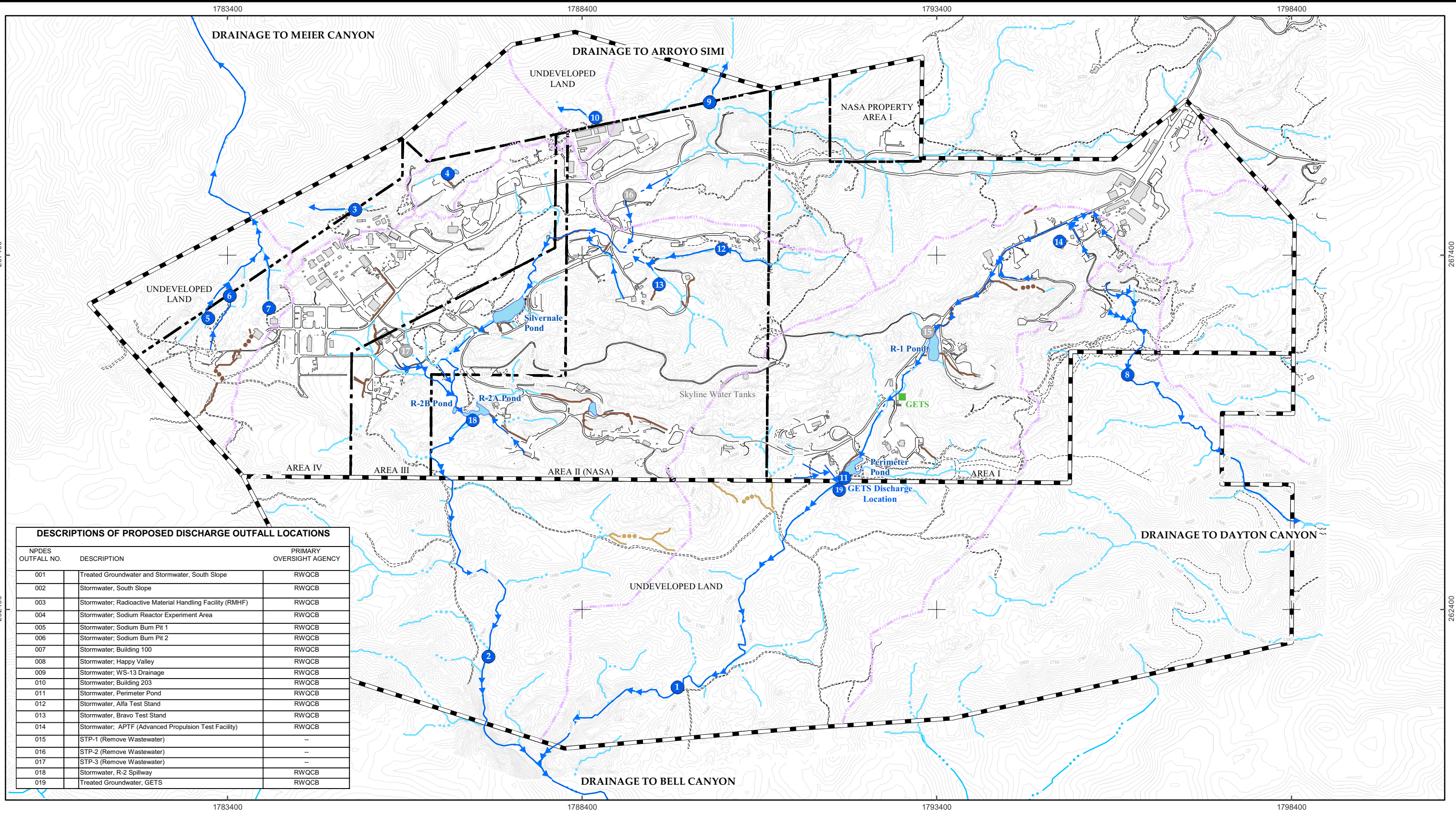
### SANTA SUSANA FIELD LABORATORY

Document: Offsite-Report-Regional\_Map.mxd

Date: Dec 10, 2007

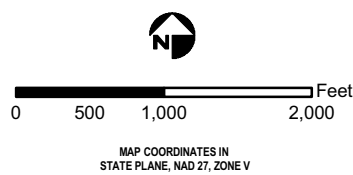
Regional Map

FIGURE  
1



**DESCRIPTIONS OF PROPOSED DISCHARGE OUTFALL LOCATIONS**

NPDES OUTFALL NO.	DESCRIPTION	PRIMARY OVERSIGHT AGENCY
001	Treated Groundwater and Stormwater, South Slope	RWQCB
002	Stormwater, South Slope	RWQCB
003	Stormwater; Radioactive Material Handling Facility (RMHF)	RWQCB
004	Stormwater; Sodium Reactor Experiment Area	RWQCB
005	Stormwater; Sodium Burn Pit 1	RWQCB
006	Stormwater; Sodium Burn Pit 2	RWQCB
007	Stormwater; Building 100	RWQCB
008	Stormwater; Happy Valley	RWQCB
009	Stormwater; WS-13 Drainage	RWQCB
010	Stormwater; Building 203	RWQCB
011	Stormwater, Perimeter Pond	RWQCB
012	Stormwater, Alfa Test Stand	RWQCB
013	Stormwater, Bravo Test Stand	RWQCB
014	Stormwater; APTF (Advanced Propulsion Test Facility)	RWQCB
015	STP-1 (Remove Wastewater)	--
016	STP-2 (Remove Wastewater)	--
017	STP-3 (Remove Wastewater)	--
018	Stormwater, R-2 Spillway	RWQCB
019	Treated Groundwater, GETS	RWQCB



- Legend**
- NPDES Outfalls (RWQCB Primary Oversight Authority)
  - Historical NPDES Outfalls
  - Groundwater Extraction Treatment System (GETS)
  - Effluent Pathways
  - Surface Water Drainage Divide
  - Natural Drainage
  - Concrete Lined Drainage
  - Graded Drainage
  - Surface Water Reclamation Ponds

- Base Map Legend**
- SSFL Property Boundary
  - Administrative Area Boundary
  - Ground Elevation Contours
  - Drainage Pathways
  - A/C Curbing
  - Dirt Road
  - Existing Building or Structure

**Site Map with Outfall Locations and Storm Water Drainage Systems**










Date: Jan 28, 2008

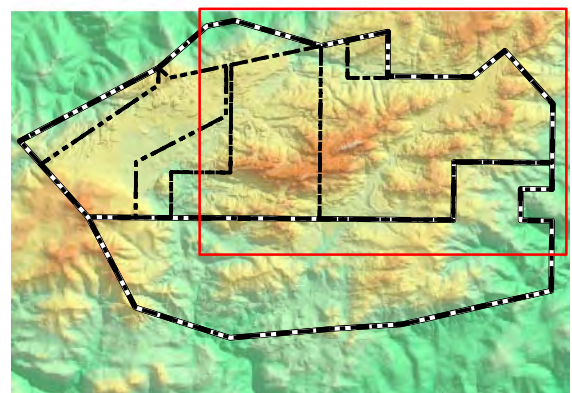
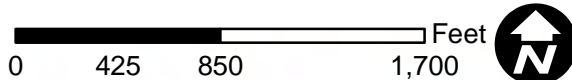
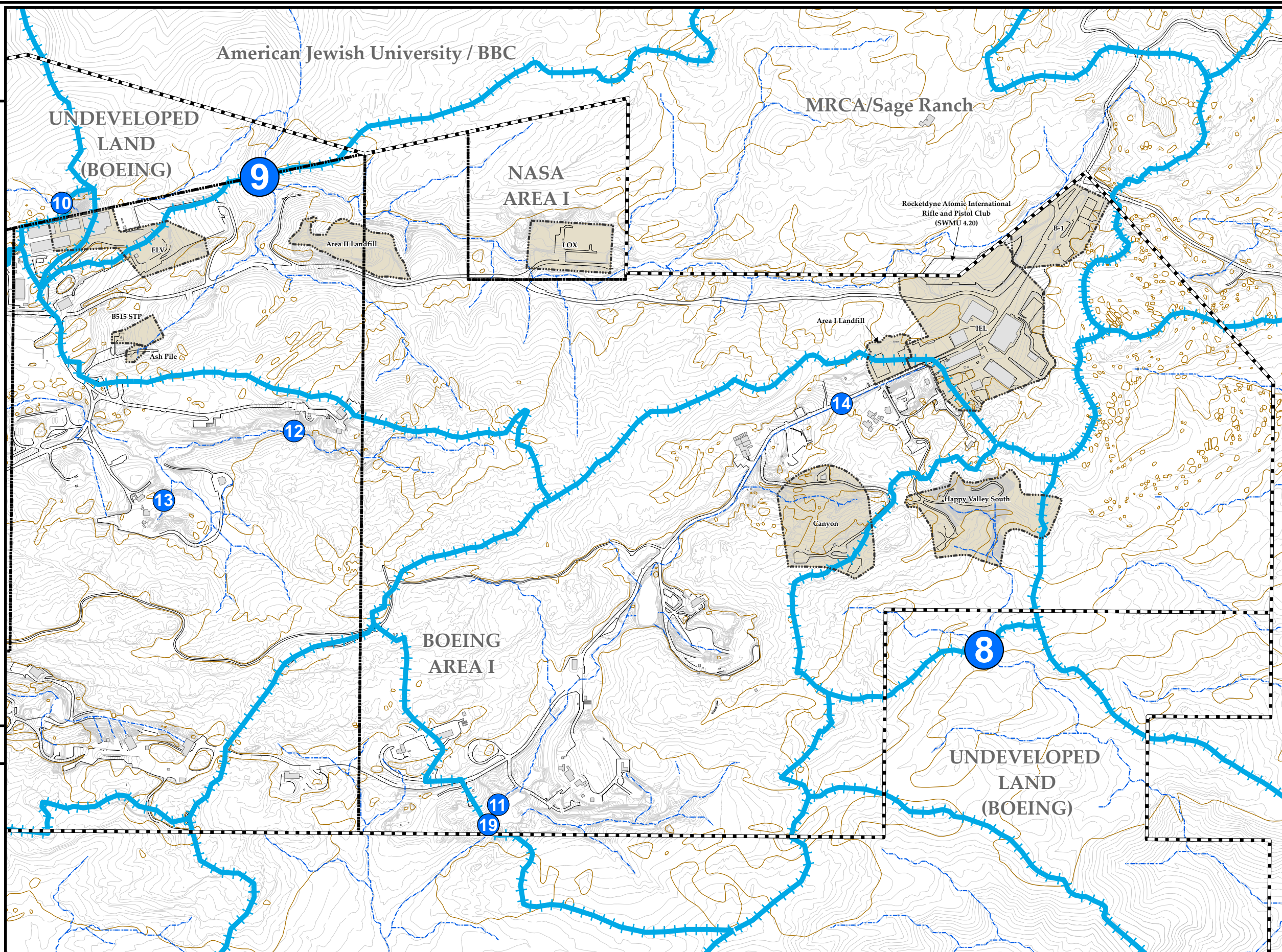
File: T:\projects\rock\plots\acmap\LOXX\Draft\NPDES.mxd



# Outfalls 008 and 009 Location Map

## Base Map Legend

-  Administrative Area Boundary
-  Historical Operations Areas (RFI Sites) Within Outfall 008 and 009
-  Surface Water Drainage
-  Surface Water Divide
-  NPDES Outfall
-  Existing Building or Structure
-  Paved Road
-  Elevation Contour
-  Bedrock Outcrop















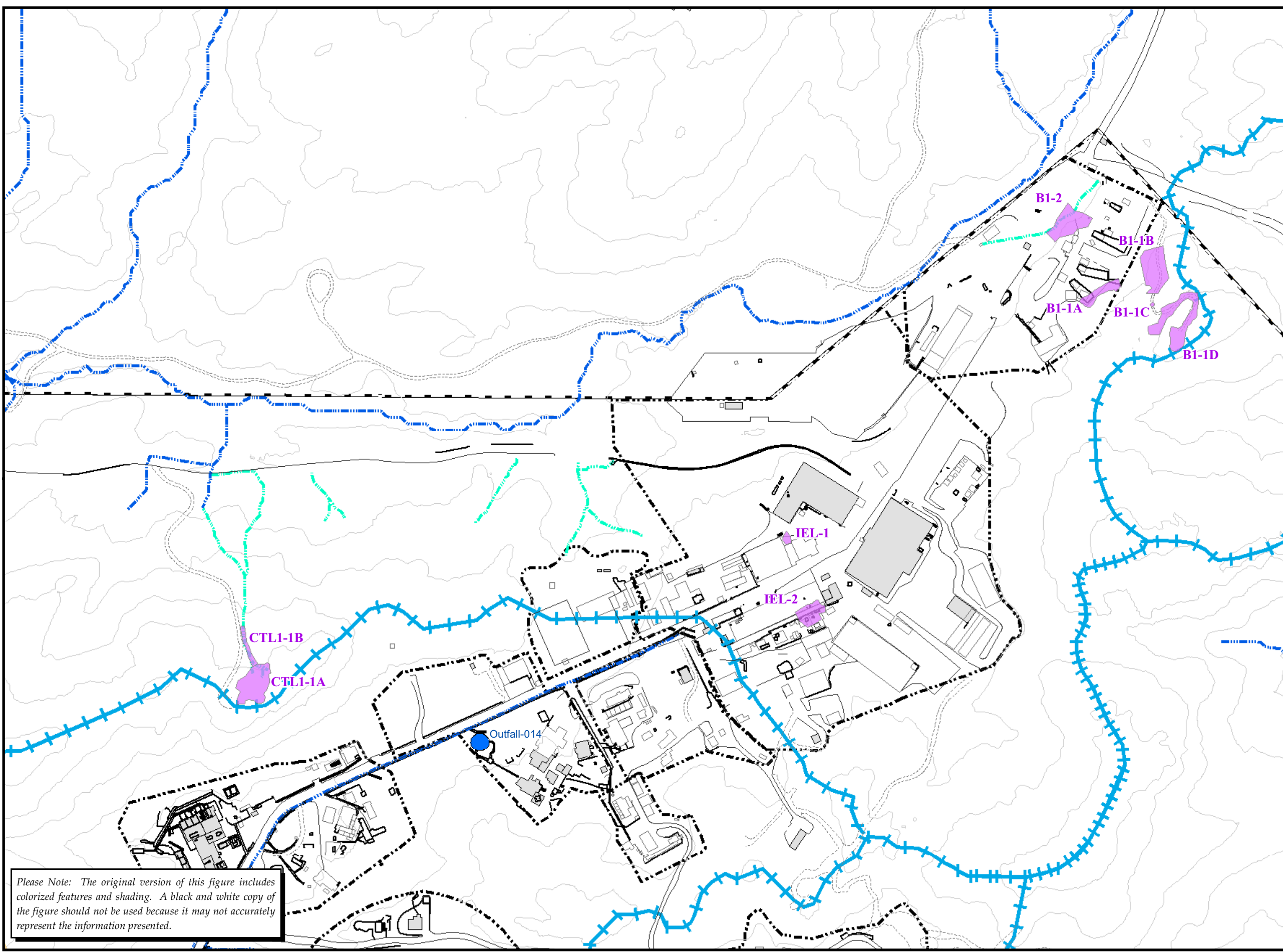
S A N T A S U S A N A F I E L D L A B O R A T O R Y



# ISRA Excavation Areas for 2010 Eastern Outfall 009 Watershed

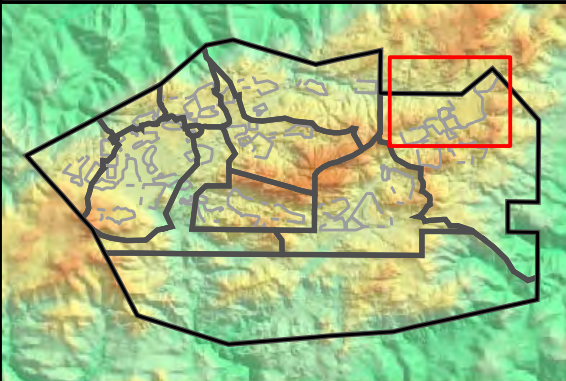
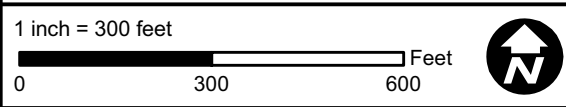
## Base Map Legend

-  Administrative Area Boundary
-  RFI Site Boundary
-  Report Group Boundary
-  Existing Building
-  Removed Building
-  NPDES Outfall
-  Dirt Road
-  A/C Paving
-  Drainage
-  Non Jurisdictional Surface Water Pathway
-  Surface Water Divide
-  Elevation Contour



**DRAFT**

Document: ISRA\_Plots\_WP\_B1\_SampleLocations.mxd Date: May 18, 2010



Please Note: The original version of this figure includes colored features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.



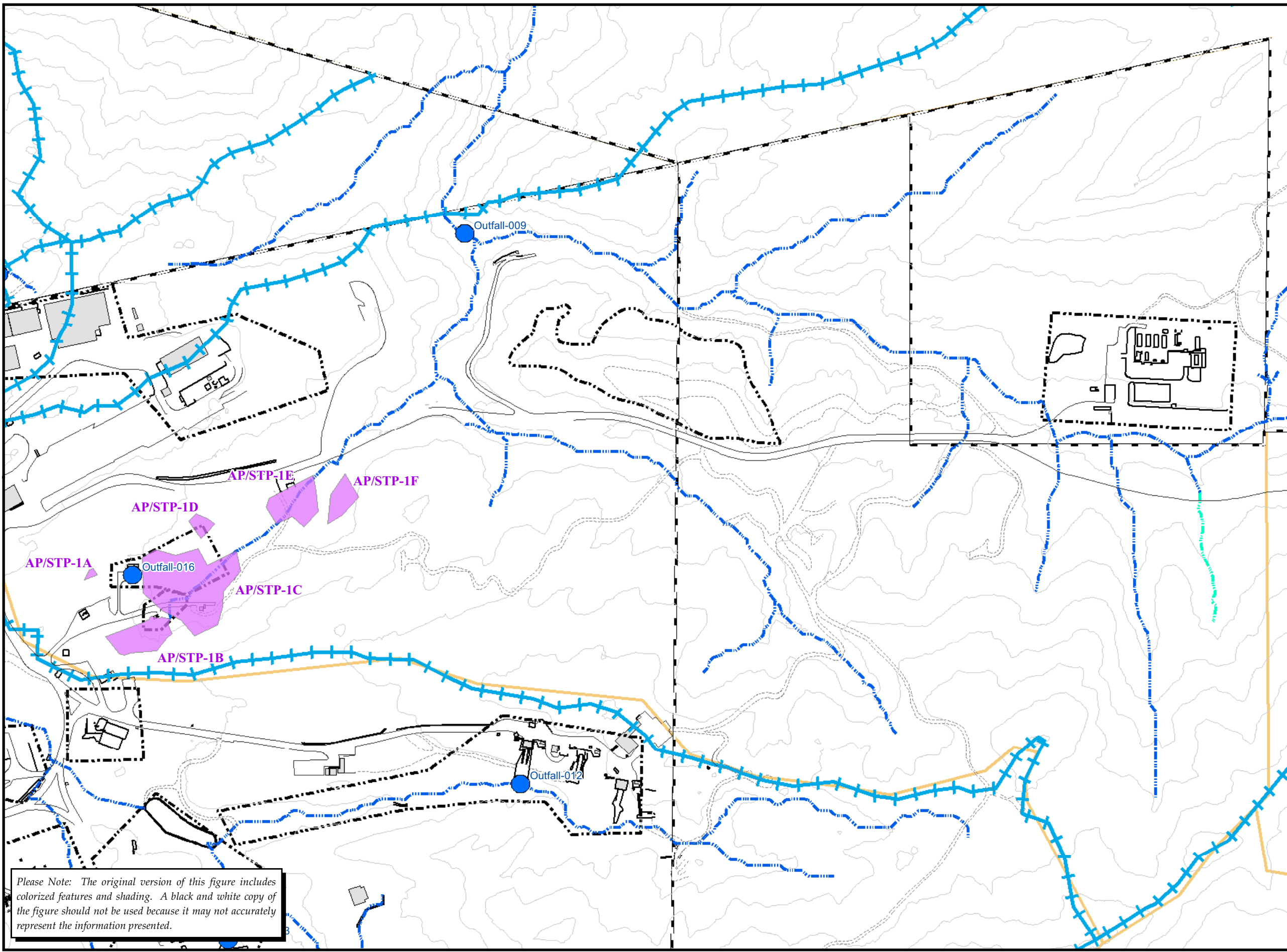
SANTA SUSANA FIELD LABORATORY

FIGURE 4



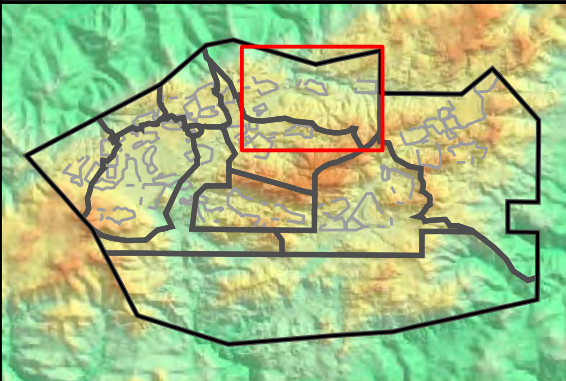
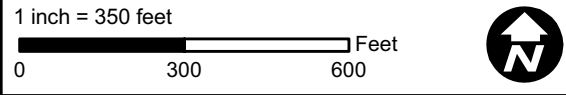
# ISRA Excavation Areas for 2010 Western Outfall 009 Watershed

- Base Map Legend**
- Administrative Area Boundary
  - RFI Site Boundary
  - Report Group Boundary
  - Existing Building
  - Removed Building
  - NPDES Outfall
  - Dirt Road
  - A/C Paving
  - Drainage
  - Non Jurisdictional Surface Water Pathway
  - Surface Water Divide
  - Elevation Contour



**DRAFT**

Document: ISRA\_Plots\_SWP\_Outfall9\_Western.mxd Date: May 18, 2010



Please Note: The original version of this figure includes colored features and shading. A black and white copy of the figure should not be used because it may not accurately represent the information presented.



SANTA SUSANA FIELD LABORATORY

FIGURE 5

**ATTACHMENT 1**

**ISRA WASTE SAMPLING FOR RADIONUCLIDES**

## Attachment 1

### ISRA Waste Sampling for Radionuclides

The following provides guidance for radiological sampling of waste generated during excavation of the ISRA Areas at Outfalls 008 and 009.

All of the chemical samples taken for waste disposal characterization shall be split for potential analyses for gamma spectroscopy, strontium-90 and tritium, using an off-site laboratory. Radiological analyses shall be conducted only if the results of chemical analyses determine that off-site disposal is necessary. A 1-liter plastic or glass bottle shall be used for the combined gamma, strontium and tritium sample. Minimum detectable activity for both cesium-137 and strontium-90 shall be  $\leq 0.05$  pCi/g. Minimum detectable activity for tritium shall be  $\leq 1$  pCi/g. The laboratory gamma spectroscopy library shall also include the following contaminants-of-concern as a minimum: Na-22, K-40, Mn-54, Co-60, Cs-134, Cs-137, Eu-152, Eu-154, Th-228, Th-232, U-235, U-238 and Am-241. Any detection of any gamma emitting radionuclides in the library shall also be reported.

Statistical evaluation of sample analytical results to determine whether or not the sampled waste contains Cs-137 or Sr-90 activity elevated above local background shall be conducted using the Wilcoxon Rank Sum Test using protocols described in NUREG-1505<sup>1</sup> and Department of Toxic Substances Control (DTSC) guidance<sup>2</sup>. Local background identified in Table 20 of the 1995 McLaren/Hart report<sup>3</sup> will be used in the statistical comparison. The Department of Public Health (DPH) and the DTSC will be notified if wastes are determined to contain radionuclides above background. The need for further waste evaluation or alternate disposition shall be determined. The waste shall be subjected to a dose analysis to determine if the material can be shipped off-site in compliance with the California Health & Safety Code<sup>4</sup>.

Field surveys, including gamma exposure, total beta contamination and alpha/beta wipe tests will be taken of any discrete objects which may be found that would be difficult to sample and analyze in a laboratory. Any solid debris surveyed that exceeds instrument minimum detectable activity, using commonly used survey instrumentation, will be held for further evaluation.

Waste generated shall be shown to meet the requirements of the relevant waste disposal facility permit before being shipped offsite.

Based on site knowledge, previous monitoring of the area, and/or previous sampling analysis, there is no evidence to suggest that any radiological contamination exists in the ISRA areas. The ISRA is not a radiological remediation project. Therefore the radiological controls normally associated with radiological

---

<sup>1</sup> NUREG-1505, Nuclear Regulatory Commission, "A Non-parametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys." January 1998. [http://www.philrutherford.com/Radiation\\_Cleanup\\_Standards/NUREG-1505.pdf](http://www.philrutherford.com/Radiation_Cleanup_Standards/NUREG-1505.pdf)

<sup>2</sup> DTSC, "Selecting Inorganic Constituents as Chemicals of Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities." February 1997.

<sup>3</sup> McLaren/Hart, "Additional Soil and Water Sampling at the Brandeis-Bardin Institute and Santa Monica Mountains Conservancy." Jan 19, 1995. <http://www.etec.energy.gov/Health-and-Safety/Documents/BrandeisBardin/AddSoilandWaterSamp.pdf>

<sup>4</sup> California Health & Safety Code, Division 104, Part 9, Chapter 5, Sections 114705-114780 of the Radiation Control Law. <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=114001-115000&file=114705-114780>



remediation projects including, radiation worker training, personnel dosimetry, baseline and post-project bioassays, workplace air monitoring for radionuclides, continuous routine radiation and contamination surveys, personnel and area contamination controls, tenting and HEPA ventilation, etc., are not planned for the ISRA project. However, as part of Boeing's commitment to a safe working environment, site conditions will be reviewed throughout the duration of the project, and adjustment to work plan monitoring will be made, as necessary.

**ATTACHMENT 2**

**HEAT INDEX CHART**

**WORK/REST REGIMENTS TO PREVENT HRI**

## HEAT INDEX CHART

		RELATIVE HUMIDITY								
		10%	20%	30%	40%	50%	60%	70%	80%	90%
TEMPERATURE F°	104°	98	104	110	120	>130	>130	>130	>130	>130
	102°	97	101	108	117	125	>130	>130	>130	>130
	100°	95	99	105	110	120	>130	>130	>130	>130
	98°	93	97	101	106	110	125	>130	>130	>130
	96°	91	95	98	104	108	120	128	>130	>130
	94°	89	93	95	100	105	111	122	128	>130
	92°	87	90	92	96	100	106	115	122	128
	90°	85	88	90	92	96	100	106	114	122
	88°	82	86	87	89	93	95	100	106	115
	86°	80	84	85	87	90	92	96	100	109
	84°	78	81	83	85	86	89	91	95	99
	82°	77	79	80	81	84	86	89	91	95
	80°	75	77	78	79	81	83	85	86	89
	78°	72	75	77	78	79	80	81	83	85
	76°	70	72	75	76	77	77	77	78	79
74°	68	70	73	74	75	75	75	76	77	

Directions: Locate the current temperature on the left column and then locate the relative humidity on the top row. Follow the temperature across and the humidity down until they meet; this measurement is the heat index. The heat index will increase 15 degrees in direct sunlight.

<b>Extreme Danger:</b>	<b>Heat Stroke likely to occur when working under these conditions.</b>
<b>Danger:</b>	<b>Heat Exhaustion or Heat Cramps likely. Heat Stroke may occur upon prolonged exertion.</b>
<b>Extreme Caution:</b>	<b>Heat Cramps or Heat Exhaustion likely to occur. The FSM or OSSO will implement adjusted schedules and procedures.</b>
<b>Caution:</b>	<b>Heat Fatigue may occur. Normal summer working conditions should be observed.</b>

Note: Information from National Weather Service, USAF, Texas A&M University

## Work/Rest Regimens to Prevent HRI

	(1)	(2)	(3)	(4)
Work/Rest (%)	WBGT °F	WBGT °F	WBGT °F	WBGT °F
Continuous	80	74	77	71
75/25	82	76	78	72
50/50	85	79	82	76
25/75	88	82	86	80

### Work/Rest Regimen for Moderate Work based on WBGT Temperature Readings

- (1) Level D PPE – Hard hat, safety glasses, gloves and leather steel-toed shoes
- (2) Level C PPE – includes Level D PPE plus Tyvek coveralls. May also include respiratory protection.

### Work/Rest Regimen for Heavy Work based on WBGT Temperature Readings

- (3) Level D PPE – Hard hat, safety glasses, gloves and leather steel-toed shoes
- (4) Level C PPE – includes Level D PPE plus Tyvek coveralls. May also include respiratory protection.

**Note: Physiological monitoring may be utilized by workers in lieu of the work/rest regimen provided above. Refer to Attachment D for physiological monitoring guideline. The recommended work/rest regimen above can be exceeded and physiological monitoring implemented at the discretion of the entrant.**

**ATTACHMENT 3**  
**PROCEDURES FOR HEAT ILLNESS PREVENTION**



**MWH AMERICAS, INC.**

**HEAT STRESS ILLNESS PREVENTION PLAN**

**March 2009**

*Prepared by:*



**MWH AMERICAS, INC.  
ARCADIA, CA**

## TABLE OF CONTENTS

<b><u>Section No.</u></b>	<b><u>Page No.</u></b>
I. INTRODUCTION.....	1
II. HEAT RELATED ILLNESSES (HRI).....	1
III. PREVENTION OF HRI.....	4
IV. GENERAL PROCEDURES FOR CONTROLLING HRI .....	7
V. HSIPP TRAINING .....	8

### **APPENDICES**

APPENDIX A – MWH HEAT ILLNESS PREVENTION POSTER

## **MWH AMERICAS, INC. HEAT-STRESS ILLNESS PREVENTION PLAN**

### **I. INTRODUCTION**

California Employers with any outdoor places of employment must comply with the Heat Illness Prevention Standard T8 CCR 3395. Outdoor work environments involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities in high heat have a possibility for inducing heat stress in employees engaged in such operations.

The purpose of this heat stress illness prevention plan is to provide strategies for:

- Recognizing the symptoms of heat related illnesses (HRI)
- Assessing the risk of HRI
- An acclimation program for new employees or employees returning to work from three day or greater absence
- Specific procedures to be followed for heat related emergencies; and
- First aid for HRI

MWH is committed to preventing HRI. HRI can occur to employees working in indoor or outdoor environments. MWH recognizes that exposure to extreme temperatures, humidity, and other environmental factors can lead or contribute to serious illnesses including heat fatigue, heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. This Heat Stress Illness Prevention Plan (HSIPP) has been developed to protect employees from the hazards posed by working in an outdoor environment.

### **II. HEAT RELATED ILLNESSES (HRI)**

There are two sources of heat exposure, the outside environment and internal muscle activity (80% of muscle energy is turned into body heat). High temperatures and high levels of physical work create heat stress. The body defends itself by sweating and evaporating. Caution should be noted, because the higher the humidity levels the more difficult it is for sweat to evaporate from the skin.

The human body will get used to working in a hot environment gradually over time. This process of the body becoming more efficient at cooling itself down is known as “acclimatization”. Acclimation and cooling occurs through one of the following methods:

- The body redirects blood to the skin’s surface
- The heart tries to pump blood more efficiently
- Sweating starts sooner, and there is more of it; and
- Sweat contains less salt

During this adjustment period, symptoms of fatigue, dizziness, heat rash, and stomach discomfort are common. Acclimatized workers will generally be able to work longer in a hot environment than un-acclimatized workers. It should be noted, however, that dehydration can cancel the benefits of acclimatization.

The heating and cooling balance in the body depends on the following factors:

- Air temperature
- Humidity (moisture in the air)
- Radiant heat load (sun, furnaces, molten material, steam, etc.)
- Physical activity (how hard you’re working)
- Cooling (by the evaporation of sweat)
- Body adjustments (acclimatization)

Several casual factors that can lead to HRI that can affect a person’s sensitivity to heat include the following: age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or drugs, and a variety of medical conditions such as hypertension. However, even the type of clothing worn must be considered a contributing factor to body heat loading. Prior heat injury also predisposes an individual to additional injury.

It is difficult to predict just who will be affected and when, because individual susceptibility varies. In addition, as previously mentioned, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

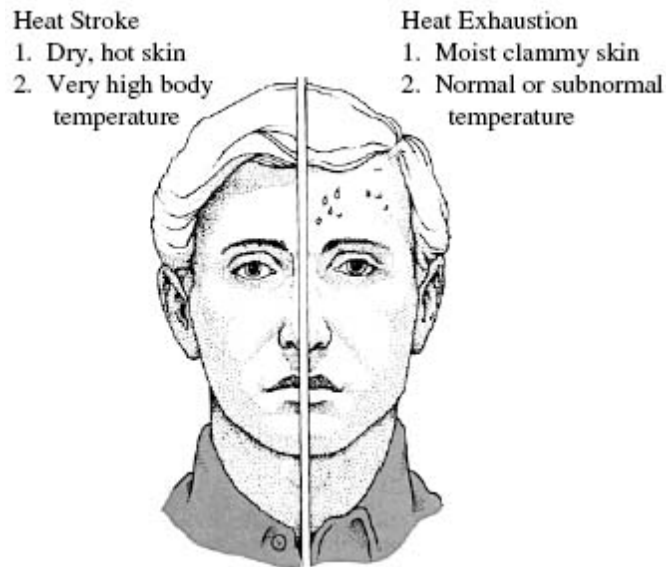
### **Causes, Symptoms, and Treatment of HRI**

Heat stress symptoms are a set of natural body signals indicating that something needs to be done to balance the body’s heating and cooling. As the body heats up, it tries to rid itself of excess heat through the evaporation of sweat. If it is unable to cool itself this way, your body temperature will increase. When body temperature gets above 100.4 to 102.2°F, the brain starts to overheat, leading to a shutdown of the body’s cooling system (sweating stops). The internal temperature continues to rise even faster, leading to heat stroke and possibly death. The causes, symptoms, and treatment of various heat-related illnesses are listed below:

<b>Heat-Related Illness (HRI)</b>	<b>Signs and Symptoms</b>	<b>First Aid and Emergency Response Procedures</b>
<b>Sunburn</b>	Red, hot skin; May blister	Move to shade, loosen clothes to reduce temperature; Apply cool compress or water to cool burn; Get medical evaluation if severe
<b>Heat Rash</b>	Red, itchy skin; Bumpy skin; Skin infection	Apply cool water or compress to cool rash; Keep affected area dry to minimize infection; Control itching and infection with prescribed medication
<b>Heat Cramps</b>	Muscle cramps or spasms; Grasping the affected area; Abnormal body posture	Drink water or sports drinks to re-hydrate body; Rest, cool down in shaded area; Massage affected muscle to release body toxins; and Get medical evaluation if cramps persist
<b>Heat Exhaustion</b>	High pulse rate Extreme sweating Pale face Insecure gait Headache Clammy and moist skin Weakness Fatigue Dizziness	Move to shade and loosen clothing to cool down; Initiate rapid cooling with fan, water mister, or ice packs; Lay flat and elevate feet to reduce heart rate and blood pressure; Monitor recovery (is body cooling?); Drink small amounts of water to cool body and re-hydrate Evaluate mental status (ask Who? Where? When? Q's) <b>If no improvement call 911</b>
<b>Heat Stroke</b>	The above but more severe; Hot, dry skin (25-50% of cases); Altered mental status with confusion and agitation; Can progress to loss of consciousness and seizures; Can be fatal	<b>Call 911</b> <b>Provide EMS with directions to work site;</b> Immediately remove from work activity to slow/stop body temp rise; Start rapid cooling with fan, water mister, or ice packs; Lay flat and elevate feet to reduce heart rate and blood pressure; If conscious give sips of water to cool body and re-hydrate; Monitor airway and breathing-administer CPR if needed

Another cause of heat stroke occurs when a person's body has used up all its water and salt reserves, resulting in the cessation of sweating, causing the body temperature to rise rapidly; resulting in heat stroke or heat exhaustion.

The most serious heat related illness is heat stroke. The symptoms include confusion, irrational behavior, convulsions, coma, and death. While over 20% of heat stroke victims die regardless of health or age, children seem to be more susceptible to heat strain than adults. In some cases, the side effects of heat stroke are heat sensitivity and varying degrees of brain and kidney damage.



Signs and symptoms of heat stroke and heat exhaustion

Signs and symptoms of heat stroke included a high body temperature above 105.8°F and any of the following: the person is weak, confused, upset, or acting strangely; has hot, dry, red skin; a fast pulse; headache or dizziness; in later stages, a person may pass out and have convulsions THIS IS AN IMMEDIATE MEDICAL EMERGENCY. PROMPT ACTION MAY SAVE THE PERSON'S LIFE, CALL AN AMBULANCE.

This condition can kill a person quickly; before emergency medical personnel arrive remove excess clothing; fan and spray the person with cool water; offer sips of cool water, if the person is conscious.

### III. PREVENTION OF HRI

HRI can be avoided by understanding the risk associated with hot work environments; environmental monitoring techniques; and personal monitoring of fluid intake, heart rate and core body temperature. MWH will encourage personnel, co-workers and supervisors to routinely evaluate potential HRI hazards by checking one or more of the following:

The elements reflected within this HSIPP consist of the following:

- Provision for Water
- Access to Shade
- Heat Index Chart
- Personal Monitoring
- Training

**PROVISION FOR WATER:**

Water is a key preventive measure to minimize the risk of heat related illnesses. Employees shall have access to potable drinking water. Where the supply of water is not plumbed or otherwise continuously supplied, water shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. Work crews may begin the shift with smaller quantities of water if they have effective procedures for replenishment during the shift as needed to allow all crew members to drink one quart or more per hour. The frequent drinking of water shall be encouraged.

**To ensure access to sufficient quantities of potable drinking water, the following steps will be taken:**

- Bring at least 2 quarts per employee at the start of the shift, and
- Supervisor/designated person will monitor water containers every 30 minutes, and employees are encouraged to report to supervisor/designated person low levels or dirty water.
- Supervisor will provide frequent reminders to employees to drink frequently, and more water breaks will be provided.
- Every morning there will be short tailgate meetings to remind workers about the importance of frequent consumption of water throughout the shift.
- Place water containers as close as possible to the workers, not away from them.
- When drinking water levels within a container drop below 50%, the water shall be replenished immediately; or water levels should not fall below the point that will allow for adequate water during the time necessary to effect replenishment.
- Disposable/single use drinking cups will be provided to employees, or provisions will be made to issue employees their own cups each day.

- Noise making devices, such as air horns, may be used to remind employee's to take their water break.

### **ACCESS TO SHADE:**

Access to rest and shade or other cooling measures (e.g., an air-conditioned vehicle) are important preventive steps to minimize the risk of heat related illnesses. Employees suffering from heat illness or believing a preventative recovery period is needed shall be provided access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than five minutes. Such access to shade shall be permitted at all times.

### **Sample procedures include but are not limited to the following:**

- Supervisor will set-up an adequate number of; umbrellas, canopies or other portable devices, at the start of the shift and will relocate them to be closer to the crew, as needed. Equipment should be placed in close proximity (i.e., no more than 50-100 yards) to the work activity.
- Employees have access to office or construction trailer, or other building with air conditioning.
- Every morning there will be short tailgate meetings (in the employees' language) to remind workers about the importance of rest breaks and the location of shade.
- Non-agricultural employers can use other cooling measures (e.g., an air-conditioned vehicle) **if** they demonstrate that these methods are as effective as shade.
- Whenever possible, provide areas for employees to take their breaks which are:
  1. Readily accessible
  2. In the shade and open to the air, and ventilated or cooled
  3. Near sufficient supplies of drinking water

### **Heat Index Chart**

The heat index chart has devised by meteorologists to describe how hot, humid weather feels to the average person. The heat index chart combines the temperature and humidity into one number to reflect the perceived temperature. Because it takes into account the two most important factors that affect comfort in hot work environments, it can be a quick measure of how stifling the air feels rather than relying exclusively on temperature or humidity alone.



Calculating the heat index requires an electronic thermal hygrometer that is designed to measure temperature and relative humidity. Measure the temperature and humidity readings and then refer to the chart in Appendix C to determine the heat index. The color coded heat index chart corresponds to the caution and danger warnings of the accompanying Table.

### **Personal Monitoring**

MWH employees should be instructed to monitor their personal heat stress load by checking their heart rate, recovery heart rate, ear temperature and extent of body water loss. During the summer months employees should be encouraged to keep a personal record of these parameters. When employees are working in hot and humid conditions they should check these parameters at the beginning of their shift, during breaks and at the end of the shift. One or more of the following measures may mark excessive heat strain, and the employee's exposure to heat stress should be discontinued when any of the following occur:

- Employee heart rate should be measured by taking the employees radial pulse for 30 seconds at the beginning of the work shift and during breaks or rest periods. The heart rate should not exceed 180 beats per minute (bpm) minus the individual's age (180 bpm – 30 = 150 for a maximum heart rate).
- The recovery heart rate should be measured during breaks. The employee should take a pulse rate at 30 seconds ( $P_1$ ) with a second pulse rate taken at 2.5 minutes ( $P_3$ ) after the initial pulse was counted. The pulse rate should not exceed 120 bpm after 3-minutes of recovery time.
- The body core temperature should not exceed 101.3°F for acclimated personnel or 100.4°F for un-acclimated workers.
- Employee, body water loss can be measured by weighing on a scale at the beginning and end of each work day. Weight loss should not exceed 1.5% of total body weight in a work day.

## **IV. GENERAL PROCEDURES FOR CONTROLLING HRI**

MWH will implement the following general controls to help reduce HRI:

- Provide accurate verbal and written instructions, annual training programs, and other information about heat stress and heat strain
- Encourage employees to drink small volumes of cool water (approximately 1 cup) or a acceptable fluid replacement drink every 20-minutes

- Permit self-limitation of exposure and encourage co-worker observation to detect signs and symptoms of heat strain in others
- Provide contact with medical providers for employees with medical conditions that can compromise their ability to tolerate heat exposure
- Encourage healthy lifestyles and ideal body weight
- Retrain employees returning to work after more than one week absence about the hazards associated with hot work environments and exposure situations
- Provide access to medical practitioners to evaluate employees prior to heat exposures
- Monitor the heat stress conditions and reports of heat related disorders

## **V. HSIPP TRAINING**

Prior to assignment of any outdoor work activities, all MWH employees will receive training in MWH HSIPP procedures and the elements outlined below:

### **Employee Training**

- Recognizing the environmental causes of HRI and personal factors that can increase the risk of HRI
- Methods employed to identify, evaluate, and control HRI exposure
- Importance to remove personal protective equipment during all breaks
- Frequently consuming water when HRI hazards are present
- Methods and importance of acclimatization (Getting used to hot weather)
- Different types of HRI and the common signs and symptoms
- Importance of immediately reporting HRI symptoms of self and co-workers
- Company response to HRI symptoms and emergencies
- The purpose and requirements of the HRI rules

### **Supervisor Training**

- How to implement the provisions of the HRI rule

- How to recognize and what to do when an employee exhibits signs or symptoms of HRI, including emergency response
- How to safely move employees to a place that is easily reached by emergency medical providers
- How to provide clear directions to emergency medical providers so they can find the work site

**APPENDIX A**

**MWH HEAT ILLNESS PREVENTION POSTER**

## PROTECT YOURSELF FROM HEAT ILLNESS

In a one-year investigation of 25 cases of suspected heat-related illnesses, Cal/OSHA found that more than half of the heat illness victims died, and almost one third of them required hospitalization.

Heat illness can kill you. During hot weather you must take the simple steps outlined here to protect yourself.



### WHAT IS HEAT ILLNESS?

Heat illness can be one or more serious medical conditions like heat cramps, fainting, heat exhaustion and heatstroke.

### WHAT CAUSES HEAT ILLNESS?

Heat illness occurs when your body keeps in more heat than it loses and your temperature rises. You are at greater risk of heat illness when you:

- Are dehydrated. Dehydration is your worst enemy during hot weather.
- Are not used to working in the heat.
- Are in poor health.
- Have had heat illness before.

### WHAT YOU CAN DO TO PREVENT HEAT ILLNESS

Your two best defenses against the heat are:

- Getting out of the sun or finding a cool resting place when you are starting to overheat and need to cool down.



- Drinking cool, fresh water throughout the day (four 8-oz cups per hour) during hot weather. That is how much water your body loses just by sweating. **Don't wait until you are thirsty to drink.**



### OTHER THINGS YOU CAN DO

- **Tell your supervisor immediately if you think you are getting sick from the heat.**
- Know the location(s) of your closest drinking water supplies.
- Choose water over sodas and other drinks containing caffeine or sugar.

- You are better off avoiding alcohol altogether. The more you drink, even beer, the more dehydrated you will get.
- Always know who and how to call for help when you start a new work day.
- Know the symptoms to watch for:
  - discomfort, excessive sweating, headache, poor concentration, muscle pain, cramping, dizziness, fatigue, irritability, loss of coordination, throwing-up, blurry vision, confusion, lack of sweating, fainting, seizures.
- If you are new to working in the heat, tell your employer. Your employer should have procedures to allow you to adjust during your first two weeks of hot weather work.
- Get your doctor's advice if you know you have risk factors for heat illness, such as:
  - illnesses like diabetes
  - taking medications or over-the-counter drugs
  - being on a low salt diet

- Keep track of your coworkers. You all need to watch out for each other. If anyone looks like they are not okay, check them out.
- After work take a cold bath or shower.

### YOUR RIGHTS

If you are working outdoors, by law, your employer must guarantee you all of the following:

- access to fresh, cool drinking water throughout the day.
- access to shade (all employees) or an equally cool spot (if you are not an agricultural worker) **for 5 minutes at a time** to rest and cool down.
- training on how to work safely in the heat, including how to call for emergency services if someone is overcome by the heat.

For more information, call  
1-800-963-9424



## PROTEJASE DE LAS ENFERMEDADES CAUSADAS POR EL CALOR

En la investigación de un año, de 25 casos, en que se sospecha que fueron ocasionados por las enfermedades causadas por el calor, Cal/OSHA encontró que más de la mitad de las víctimas, murieron y casi un tercio de ellas necesitaron hospitalización. Las enfermedades causadas por el calor pueden matarlo. En clima caliente, tome las siguientes precauciones.



### QUE SON LAS ENFERMEDADES CAUSADAS POR EL CALOR?

Las enfermedades causadas por el calor pueden ser condiciones médicas serias tales como calambres por el calor, desmayos, agotamiento por el calor o insolación.

### QUE OCASIONAN LAS ENFERMEDADES CAUSADAS POR EL CALOR?

Las enfermedades causadas por el calor ocurren cuando su cuerpo produce y conserva más calor que lo que pierde, elevando su temperatura. Usted está en gran riesgo de sufrir enfermedades causadas por el calor cuando:

- Se deshidrata. La deshidratación es su peor enemigo durante el clima caliente.
- No está acostumbrado a trabajar en el calor.
- Se encuentra en condiciones de mala de salud.
- Anteriormente ha sufrido de enfermedades causadas por el calor.

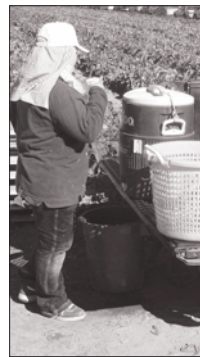
### COMO PUEDE PREVENIR ESTAS ENFERMEDADES

Sus dos mejores defensas contra el calor son:

- Buscar un lugar sombreado y fresco para descansar cuando se sienta sobrecalentado y necesite enfriarse.



- En clima caliente, beber agua fresca durante todo el día (cuatro vasos de 8 onzas de agua por hora). Esta es la cantidad de agua que su cuerpo pierde cuando suda. **No espere a sentir sed para beber agua.**



### OTRAS COSAS QUE USTED PUEDE HACER

- **De inmediato informe a su supervisor si usted piensa que se está enfermando a causa del calor.**
- Sepa donde están las provisiones de agua más cercanas a usted.
- Elija agua en lugar de sodas u otras bebidas cafeinadas o azucaradas.
- Evite tomar bebidas alcohólicas. Cuanto más tome, incluso cerveza, más se deshidratará.

- Cuando empiece un día nuevo de trabajo, siempre sepa a quién y como llamar para pedir auxilio.
- Conozca los síntomas a los que debe estar alerta
  - Incomodidad, sudor excesivo, dolor de cabeza, falta de concentración, dolor muscular, calambres, mareos, fatiga, irritabilidad, incoordinación, vómito, visión borrosa, confusión, ausencia de sudor, desmayo y convulsiones.
- Si usted no está acostumbrado a trabajar en temperaturas altas, informe a su supervisor. Su empleador debe tener procedimientos para permitirle que usted se adapte al calor durante las dos primeras semanas de trabajo.
- Consulte a su médico si sabe que tiene cualquier factor de riesgo que cause enfermedades causadas por el calor tales como:
  - enfermedades como la diabetes,
  - tomar medicinas de prescripción o “sin prescripción” médica,
  - una dieta baja en sal

- No pierda de vista a sus compañeros de trabajo. Esté atento si usted o uno de sus compañeros no se siente bien. Si alguno se ve mal, compruebe como está.
- Después del trabajo, tómese un baño o ducha fría.

### SUS DERECHOS

Si usted trabaja al aire libre, por ley, su empleador debe garantizarle todo lo siguiente:

- acceso a **agua fresca de beber** durante todo el día.
- Acceso a la sombra (para todos los trabajadores) o a un ambiente igualmente fresco (si usted no es un trabajador agrícola) **durante 5 minutos cada vez** para descansar y enfriarse.
- Entrenamiento para trabajar de forma segura en el calor incluyendo como llamar a los servicios de emergencia si alguien sucumbe al calor.

Para más información, llame  
1-800-963-9424

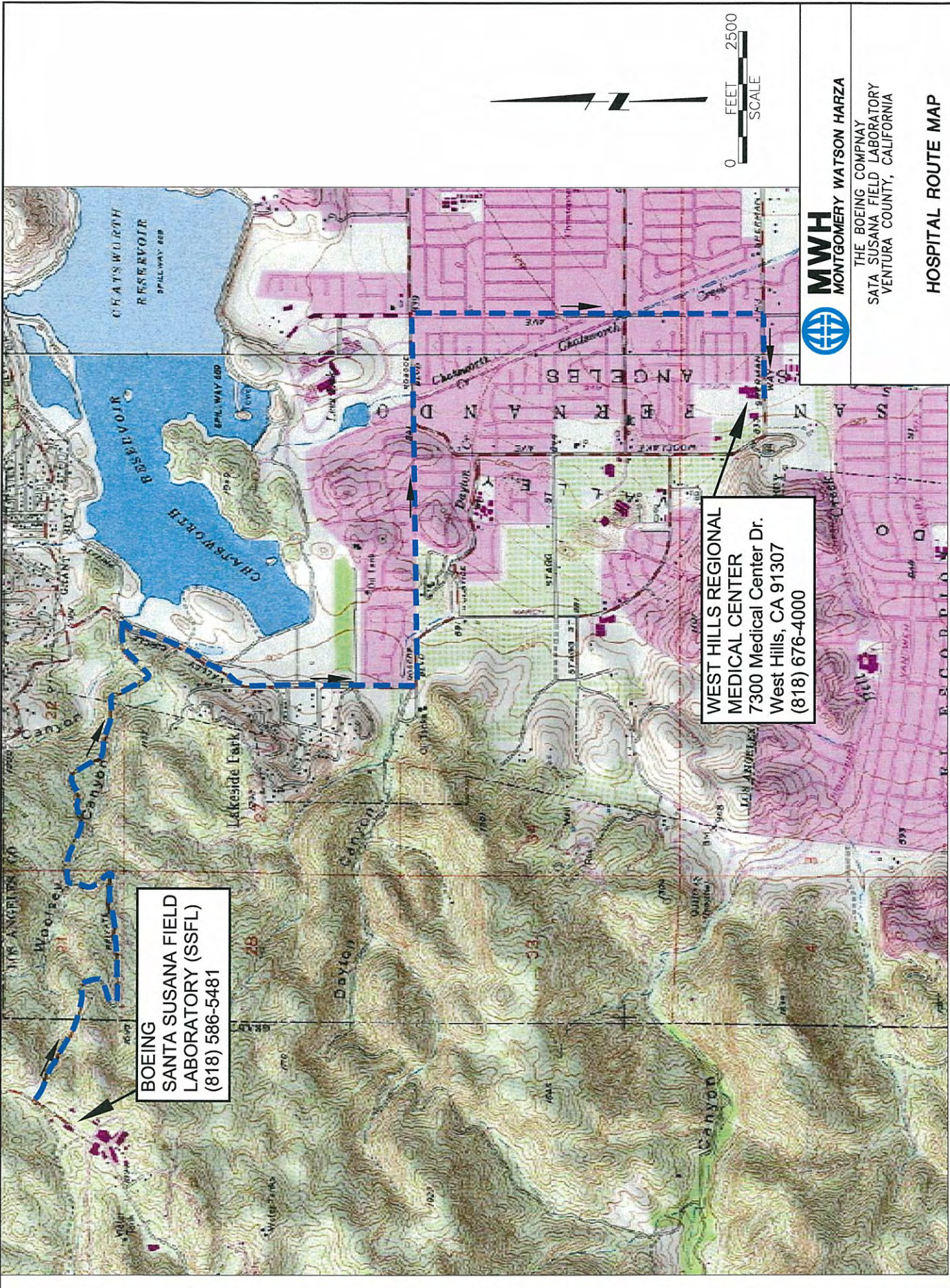


**ATTACHMENT 4**  
**EMERGENCY ASSISTANCE INFORMATION**

**BOEING (ROCKETDYNE) SANTA SUSANA FIELD LABORATORY  
TOP OF WOOLSEY CANYON  
SIMI VALLEY, CALIFORNIA, 93063**

<b>Nearest Hospital</b>	<b>West Hills Hospital and Medical Center</b> 7300 Medical Center Dr. West Hills, California Phone: (818) 676-4000  <u>Directions to Hospital</u> – See Emergency Route Map (next page) Exit onto Woolsey Canyon Road and make a right on Valley Circle Blvd. (Lake Manor Road). Head south to Vanowen St. and make a left. Go to Sherman Way and make a left to Medical Center Dr. Make a left and the hospital is on the right.	
<b>Nearest Telephone</b>	Field Vehicle	
<b>Ambulance, Fire, Police, &amp; Sheriff</b>	1. Boeing SSFL Security Department Control Center (fire and emergency medical technicians with ambulance available to contractors ) (818) 586-5481 or (818) 586-5333 2. <b>From a Boeing phone dialing 911 will automatically transfer to their emergency dispatch – but you will need to explain that you are at the SSFL</b> 3. Fire (LAFD), Valley Industrial Unit (818) 756-8561 4. Police (818) 756-8542, West Valley Division	
<b>State Highway Patrol</b>	(818) 888-0980, Woodland Hills Division	
<b>First-Aid Kit, Fire Extinguishers and eye lavages</b>	Field Vehicle and Field Command Center	
<b>Poison Control</b>	(800) 876-4766	
<b>Project Contacts</b>	<u>MWH</u> Shelby Valenzuela Field Site Manager (626) 255-0503 (cell)	
		Alex Fischl Project Manager (925) 627-4627
	<u>Client Contact</u> Mr. Robert Mako EHS Health and Safety Officer Boeing 818-466-8735 office	
		Lori Blair Project Coordinator Boeing (818) 466-8741
<b>Regulatory Notification</b>	Cal-EPA DTSC Gerard Abrams (916) 255-3600 EPA Region IX (415) 744-1305 EPA Region IX spill response (415) 744-2000 NRC (800) 424-8802 California Office of Emergency Services (800) 852-7550	
<b>Utilities</b>	<ul style="list-style-type: none"> <li>• <u>DigAlert (Underground Service Alert)</u> (800) 227-2600</li> <li>• <u>Electric (Boeing owned and controlled)</u> Emergency: (818) 586-5333  Maintenance Manager – Brian Logan (818) 586-9052</li> <li>• <u>The Gas Company (Dean Jaedtke):</u></li> </ul>	<ul style="list-style-type: none"> <li>• <u>Water:</u> Calleguas Water District (805) 526-9323</li> <li>• <u>Sewer (Boeing controlled treatment plant):</u> Emergency: (818) 586-5333 Maintenance Manager – Brian Logen (818) 586-9052 (805) 520-7529; (805) 523-4777 pager</li> </ul>





**BOEING**  
**SANTA SUSANA FIELD**  
**LABORATORY (SSFL)**  
**(818) 586-5481**

**WEST HILLS REGIONAL**  
**MEDICAL CENTER**  
**7300 Medical Center Dr.**  
**West Hills, CA 91307**  
**(818) 676-4000**



**MWH**  
**MONTGOMERY WATSON HARZA**

THE BOEING COMPANY  
 SATA SUSANA FIELD LABORATORY  
 VENTURA COUNTY, CALIFORNIA

**HOSPITAL ROUTE MAP**

**ATTACHMENT 5**  
**TAILGATE SAFETY MEETING FORM**



**TAILGATE SAFETY MEETING FORM**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Job Number: \_\_\_\_\_

Client: \_\_\_\_\_

Site Specific Location: \_\_\_\_\_

**Safety Topics Presented**

Protective Clothing/Equipment: \_\_\_\_\_

Chemical Hazards: \_\_\_\_\_

Physical Hazards: \_\_\_\_\_

Special Equipment: \_\_\_\_\_

Other (IIPP): \_\_\_\_\_

Emergency Procedures: \_\_\_\_\_

Hospital: \_\_\_\_\_ Phone: \_\_\_\_\_ Ambulance Phone: \_\_\_\_\_

Hospital Address and Route: \_\_\_\_\_

**ATTENDEES**

NAME PRINTED

SIGNATURE

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Meeting Conducted By: \_\_\_\_\_  
Name Printed Signature

On-Site Safety Officer: \_\_\_\_\_ Project Manager: \_\_\_\_\_

**ATTACHMENT 6**  
**ACTIVITY HAZARD ANALYSIS FORM NO. 1**

## Attachment 6

### Activity Hazard Analysis Form No. 1

ACTIVITY: Excavation and Backfilling CERTIFIED BY: Stu Welch 6/4/10 REVIEWED BY: Ben Stewart, PG 6/4/10

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Identify the principal steps and sequence. List equipment below.	Analyze each principal step for its potential chemical/ toxicological, radiological, biological and physical hazards.	Develop specific controls for each potential hazard. Also: <ul style="list-style-type: none"> <li>• List inspection requirements for the equipment / machinery listed</li> <li>• Specify worker training requirements</li> </ul>
1. Access excavation location with vehicle 2. Excavation of soil with backhoe, trackhoe, excavator, loader or similar track-mounted equipment. 3. Drive soil from Eastern Outfall 009 to temporary stockpile location at the Lower Parking Lot. Drive soil from Western Outfall 009 to parking lot near Helipad for	<u>Chemical/Toxicological Hazards:</u> <ul style="list-style-type: none"> <li>• Arsenic</li> <li>• Benzo(a)pyrene</li> <li>• Cadmium</li> <li>• Chloroform</li> <li>• Copper</li> <li>• 1,1-dichloroethene</li> <li>• Dioxins/Furans</li> <li>• Lead</li> <li>• Mercury</li> <li>• N-nitrosodimethylamine</li> <li>• Polychlorinated biphenyls (PCBs)</li> <li>• Tetrachloroethene (PCE)</li> <li>• 1,1,1-trichloroethane (1,1,1-TCA)</li> <li>• Liquinox</li> <li>• Isobutylene calibration gas</li> <li>• Isopropyl Alcohol</li> <li>• Particulates/Dust</li> </ul> <u>Radiological Hazards:</u> None  <u>Biological Hazards:</u> <ul style="list-style-type: none"> <li>• <b>Poison Oak</b></li> <li>• Poisonous snakes</li> <li>• Spiders</li> <li>• Bees</li> <li>• Mosquitoes</li> <li>• Ticks</li> </ul>	<u>Chemical/Toxicological Hazards:</u> <ol style="list-style-type: none"> <li>a) Monitoring Requirements               <ul style="list-style-type: none"> <li>✓ Visual monitoring for dust</li> </ul> </li> <li>b) Engineering and Work Practice Controls               <ul style="list-style-type: none"> <li>✓ Keep soil moist to prevent dust potentially containing hazardous constituents from becoming airborne</li> <li>✓ Ensure that soil piles are covered if very dry and windy.</li> <li>✓ Ensure contractor has necessary supplies to handle a hydraulic oil leak.</li> </ul> </li> <li>c) Personal Protective Equipment (PPE)               <ul style="list-style-type: none"> <li>✓ Initial Level D, plus safety vest and snake gators. Use nitrile (or other glove is specified for a particular site) when handling soil, contaminated equipment or water.</li> </ul> </li> </ol> <u>Radiological Hazards:</u> None; However, screening of excavated soils and debris will be conducted to verify that the excavated materials have no radiological restrictions and do not violate any local, state, or federal requirements regarding their management, handling, or disposal.  <u>Biological Hazards:</u> <ul style="list-style-type: none"> <li>• PPE: Long pants, light colored clothing, ankle high boots, Tyvek and gloves optional.</li> <li>• First Aid Kit: Insect repellent with the active ingredient DEET at no more than 30%; bug bite supplies.</li> <li>• Conduct self inspection for ticks or insect bites or Poison oak.</li> </ul> <u>Physical Hazards:</u> <ul style="list-style-type: none"> <li>• Track-mounted equipment has been specifically chosen for this work because of the steep, narrow and difficult access road. Driving is to be done by experienced,</li> </ul>

<p>stockpiling.</p> <p>4. Haul backfill soil from acceptable location and drive to excavation area.</p> <p>5. Decon heavy equipment with steam/pressure washer.</p> <p>6. Placement of perimeter control to prevent accidental walk into open pit.</p> <p>7. Backfilling to grade as required to meet elevation specifications.</p>	<ul style="list-style-type: none"> <li>• Bacteria</li> <li>• Viruses</li> </ul> <p><u>Physical Hazards:</u></p> <ul style="list-style-type: none"> <li>• Slip/trip/fall on uneven terrain or into open excavation</li> <li>• Sidewall collapse due to unstable soils, water in excavation, vibration from surface, etc.</li> <li>• Heat stress, sunburn</li> <li>• General heavy equipment hazards of being struck by or caught between moving parts.</li> <li>• Noise from heavy equipment</li> <li>• Hand injury from hand tools and heavy equipment</li> <li>• Fires from dry brush or refueling generators</li> <li>• Spill or damage to equipment not secured in vehicles during travel.</li> <li>• Burn or laceration from high temperature/pressure steam cleaning equipment.</li> <li>• Fugitive dust</li> </ul>	<p>trained and authorized operators only. While vehicle is moving all other people are to be clear of the road and areas below or to the side where it could possibly fall. If at any time the operator believes it would be unsafe to access an area, work shall stop and the crew will meet to discuss options. Jeopardizing anyone's safety is not acceptable or expected – it is understood that this area is difficult to access.</p> <ul style="list-style-type: none"> <li>• Watch where you step, be aware that sticks, rocks or other items can be concealed by leaves and grass, causing you to trip.</li> <li>• Personnel will stay at least 3 feet from the edge of the trench. A competent person must be on-site at all times to monitor the safety of the excavation and to classify the soils. Be cautioned that the soil could contain sands that would make the sidewall less stable, a classification of the soil should be made prior to approaching the edge. De-watering may be necessary to allow for visual observation and for safety of personnel at the surface.</li> <li>• The Contractor must have a current permit on file with Cal-OSHA for excavation work.</li> <li>• Moving equipment must have properly functioning back-up alarms</li> <li>• Spotters on the ground will assist operators in maneuvering vehicles and equipment into tight or confined places</li> <li>• Operators will maintain a constant awareness of personnel and equipment in the work area.</li> <li>• Workers will wear high visibility vests and hard hats and stay out of the way of moving equipment and at least 3 feet from the edge of the excavation.</li> <li>• Machinery or equipment shall not run unattended unless secured by the operator.</li> <li>• Blade, bucket etc. will be fully lowered or blocked when not in use or being repaired</li> <li>• Rollover protection will be used when conditions call for such use. Safety belts will be used by the operator while equipment is in use</li> <li>• Hearing Protection will be worn at 85 dBA (typically only needed when within 10 feet of operating machinery)</li> <li>• Equipment or machinery will be taken out of service if an unsafe deficiency is noted and will remain out of service until corrected</li> <li>• Machinery or equipment will not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded</li> <li>• Seats will be provided for each occupant of the equipment</li> <li>• Equipment operated on the highway will be equipped with headlights, taillights, brake lights, back-up lights, and turn signals visible from the front and rear</li> <li>• All mobile equipment and the areas in which they are operated will be adequately</li> </ul>
---	--	--

		<p>illuminated.</p> <ul style="list-style-type: none"> <li>• Before starting work, walk around the site looking up for any overhead lines. If a 20-foot clearance can not be maintained contact the utility and arrange to have the power turned off or insulated.</li> <li>• On hot days (e.g., over 90 degrees F) wear light colored clothing. It is recommended that sunscreen be used if working in direct sunlight. Refer to the original HSP for work/rest schedule and methods of monitoring for heat stress.</li> <li>• Use heavy work gloves when handling tools or equipment with sharp edges. Select hand tools carefully, considering the relative safety of the tool compared to others. Choose cutters over knives for cutting things like tubing, ties, string, etc. and make a loop and cut away from the body. Use a knife as last resort – if it or other similar sharp tools like a machete is needed, call a short timeout and discuss its use with the rest of the field team to ensure that it is the best tool and the safest method will be employed. When not in use protect blades in a covered sheath. Cut away from the body and be sure that no one else is within two arms’ lengths of the tool.</li> <li>• Practice safe lifting and ergonomics refer to the original HSP for specific reminders.</li> <li>• For general safe work practices around excavating equipment refer to the original HSP. In general, ensure that the contractor inspects the equipment, keeps a tidy workplace around the site, replaces any faulty or suspect items. Stay away from rotating parts (ask operator to identify pinch points – do not touch anything you are not familiar with and know is safe), approach only when the operator knows you are there (e.g., make eye contact).</li> <li>• Mechanized equipment will be shut down prior to and during refueling operations.</li> <li>• Whenever equipment is parked, the parking brake will be set and at least two wheels choked.</li> <li>• Load capacities ratings will not be exceed at any time</li> <li>• No guard, safety appliance, or device will be tampered with</li> <li>• Operators will notify their supervisors when taking medication that may impair safe operation of the vehicle</li> <li>• Stay out of the swing radius of the equipment and any operator blind spots.</li> <li>• Verify that no dry brush is under parked vehicles. Only refuel when equipment has been turned off and is safe (cool) enough to be refueled. Have fire extinguisher readily accessible.</li> <li>• As a standard rule of practice ensure that items being hauled in vehicles are secured in sturdy containers and held from sliding with bungee cords, ties, or compartments. Any compressed gas cylinders (e.g., for equipment calibration must be secured</li> </ul>
--	--	---

		<p>upright or in a carry case).</p> <ul style="list-style-type: none"> <li>• When using high pressure/temperature steam for decontamination – ensure that the person using the equipment has been trained and operates it in accordance with the manufacturer’s guidelines (good idea to ask for a copy of the manual to be sure it is available for reference). Metatarsal guards may be necessary for the operation to protect against lacerations.</li> </ul>
<p><u>Equipment List:</u></p> <ol style="list-style-type: none"> <li>1. Field vehicle</li> <li>2. Excavator or Backhoe</li> <li>3. Loader</li> <li>4. Compaction equipment</li> <li>5. Decon water</li> </ol>	<p><u>Training:</u></p> <ul style="list-style-type: none"> <li>• Current HAZWOPER Training</li> <li>• Boeing Contractor Orientation</li> <li>• Operator training for heavy equipment</li> <li>• Daily Tailgate Safety Meetings <ul style="list-style-type: none"> <li>✓ Check in with Contractor Coordinator and Technicians</li> <li>✓ Identify nearest assembly area</li> <li>✓ Prepare for adverse weather conditions</li> <li>✓ Review team roles and responsibilities, schedule and goals</li> </ul> </li> </ul>	<p><u>Inspections:</u></p> <ul style="list-style-type: none"> <li>• Daily vehicle operability inspection</li> <li>• Continuous observation of site for identified hazards</li> <li>• Inspect excavation for signs of sidewall collapse, water in the bottom.</li> <li>• Inspect all heavy equipment in accordance with the manufacturer’s instructions. The contractor shall keep a written record of the inspection at the site. Any items that could result in a safety hazard must be repaired or replaced prior to starting work (e.g., hydraulic hoses, frayed cords, loose bolts, unguarded drive trains).</li> <li>• Terrain stability and access for moving equipment</li> <li>• Inspect site for dry brush that could cause a fire hazard – remove as necessary and acceptable to Boeing.</li> <li>• Concrete coring equipment must have an operating guard in place to protect against cuts – electrical connections must be solid and the cord not frayed.</li> </ul>



**ATTACHMENT 7**  
**ACTIVITY HAZARD ANALYSIS FORM NO. 2**

## Attachment 7

### Activity Hazard Analysis Form No. 2

ACTIVITY: Soil Sampling CERTIFIED BY: Stu Welch 6/4/10 REVIEWED BY: Ben Stewart 6/4/10

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
Identify the principal steps and sequence. List equipment below.	Analyze each principal step for its potential chemical/ toxicological, radiological, biological and physical hazards.	Develop specific controls for each potential hazard. Also: <ul style="list-style-type: none"> <li>• List inspection requirements for the equipment / machinery listed</li> <li>• Specify worker training requirements</li> </ul>
Set-up 1. Mobilize/drive equipment to site. 2. Evaluate site conditions for hazards (muddy, poison oak, etc.) 3. Set up materials on truck tailgate or card table – cover with visqueen or foil if handling potentially contaminated materials. 4. Core concrete if needed.  Collect Samples 1. Trowel and bowl	<u>Chemical/Toxicological Hazards:</u> <ul style="list-style-type: none"> <li>• Benzo(a)pyrene</li> <li>• Cadmium</li> <li>• Chloroform</li> <li>• Copper</li> <li>• 1,1-dichloroethene</li> <li>• Dioxins/Furans</li> <li>• Lead</li> <li>• Mercury</li> <li>• N-nitrosodimethylamine</li> <li>• Polychlorinated biphenyls (PCBs)</li> <li>• Tetrachloroethene (PCE)</li> <li>• 1,1,1-trichloroethane (1,1,1-TCA)</li> <li>• Liquinox</li> <li>• Isobutylene calibration gas</li> <li>• Isopropyl Alcohol</li> <li>• Particulates/Dust</li> </ul> <u>Radiological Hazards:</u> None  <u>Biological Hazards:</u> <ul style="list-style-type: none"> <li>• Poison Oak</li> <li>• Poisonous snakes</li> <li>• Spiders</li> <li>• Bees</li> <li>• Mosquitoes</li> <li>• Ticks</li> <li>• Bacteria</li> </ul>	<u>Chemical/Toxicological Hazards:</u> <ol style="list-style-type: none"> <li>a) Monitoring Requirements See Form No. 1</li> <li>b) Engineering and Work Practice Controls Keep soil moist since many of the contaminants are particulates.</li> <li>c) Personal Protective Equipment (PPE) Initial Level D, plus safety vest and snake gators. Use nitrile (or other glove is specified for a particular site) when handling soil, contaminated equipment or water. Use hard hat if working inside designated Hard Hat area.</li> <li>d) Review MSDS for Alconox and isopropyl alcohol.</li> </ol> <u>Radiological Hazards:</u> None; However, screening of excavated soils and debris will be conducted to verify that the excavated materials have no radiological restrictions and do not violate any local, state, or federal requirements regarding their management, handling, or disposal.  <u>Biological Hazards:</u> <ul style="list-style-type: none"> <li>• PPE: Long pants, light colored clothing, ankle high boots, snake gators, and safety vest, Tyvek and gloves optional.</li> <li>• First Aid Kit: Insect repellent with the active ingredient DEET at no more than 30%; bug bite supplies.</li> <li>• Conduct self inspection for ticks or insect bites or Poison oak.</li> </ul> <u>Physical Hazards:</u> <ul style="list-style-type: none"> <li>• Observe terrain for holes and trip hazards. Wear boots with significant tread, switch to rubber or PVC if wet and muddy conditions exist.</li> <li>• On hot days (e.g., over 90 degrees F) wear light colored clothing. It is recommended that sunscreen be used if working in direct sunlight.</li> </ul>

<p>2. Jar, sleeve or other container</p> <p>3. Hand auger</p> <p>4. Slide hammer</p> <p>5. Place soil on visqueen or in buckets</p> <p>6. Decontaminate with a 4-stage process (soap, water, isopropyl alcohol spray, deionized water)</p> <p>Demobilization</p> <p>1. Pack samples for analysis</p> <p>2. Containerize waste</p> <p>3. Transport waste to Building 27</p> <p>4. Replace borehole with grout or concrete patch.</p>	<ul style="list-style-type: none"> <li>• Viruses</li> </ul> <p><u>Physical Hazards:</u></p> <ul style="list-style-type: none"> <li>• Slip / Trip / Fall on same level</li> <li>• Fall in water if sampling from pond or stream</li> <li>• Contact with buried utility</li> <li>• Heat stress, sunburn</li> <li>• Hand injury (cut or pinch) from hand tools and augering equipment</li> <li>• Heavy lifting</li> <li>• Awkward posture and force on hand augers, or kneeling to collect surface soil or surface water.</li> <li>• Blade and rotating concrete coring machinery.</li> <li>• Noise if using concrete coring equipment</li> <li>• Fugitive dust</li> </ul>	<ul style="list-style-type: none"> <li>• Use heavy work gloves when handling tools or equipment with sharp edges. Check the threads and ends of sampling devices for defects that could be sharp.</li> <li>• Select hand tools carefully, considering the relative safety of the tool compared to others (e.g., choose cutters over knives for cutting things). Use a knife as last resort – if it is needed, call a short timeout and discuss its use with the rest of the field team to ensure that it is the best tool and the safest method will be employed.</li> <li>• When using a hand auger use heavy work gloves to prevent blistering.</li> <li>• Use nitrile gloves when handling soil.</li> <li>• When using a slide hammer be sure to release hands when thrusting the hammer both downward and upward.</li> <li>• Practice safe lifting and ergonomics. Set sample coolers at waist height before filling, place decon buckets on a cooler to avoid stooping, or sit on a bucket to avoid prolonged stooping.</li> <li>• Specifically when augering – be sure to bend at the knees to keep the back’s natural ‘S’ curve. Move feet rather than twisting the back. Trade off with buddy to prevent overuse strain and allow for breaks.</li> <li>• Be sure that the vehicle’s emergency brake is set and wheels chocked if not in standard parking space.</li> <li>• Wear safety glasses when in the exclusion zone.</li> <li>• Wear hearing protection while using coring equipment. Hearing protection may be discarded if a noise survey indicates that levels are below 85 dBA.</li> <li>• As a standard rule of practice ensure that items being hauled in vehicles are secured in sturdy containers and held from sliding with bungee cords, ties, or compartments. Any compressed gas cylinders (e.g., for equipment calibration must be secured upright or in a carry case).</li> </ul>
---	---	---

<p><u>Equipment List:</u></p> <ol style="list-style-type: none"> <li>1. Hand Auger</li> <li>2. Slide Hammer</li> <li>3. Bowl and trowel</li> <li>4. Sample containers</li> <li>5. Support vehicle</li> <li>6. Hand tools</li> <li>7. Concrete corer</li> </ol>	<p><u>Training:</u></p> <ul style="list-style-type: none"> <li>• Current HAZWOPER Training</li> <li>• Boeing Contractor Orientation</li> <li>• Hand auger use</li> <li>• Daily Tailgate Safety Meetings <ul style="list-style-type: none"> <li>✓ Check in with Contractor Coordinator and Technicians</li> <li>✓ Identify nearest assembly area.</li> <li>✓ Prepare for adverse weather conditions.</li> <li>✓ Review team roles and responsibilities, schedule and goals.</li> <li>✓ Check capacity of soil and water waste containers.</li> </ul> </li> </ul>	<p><u>Inspections:</u></p> <ul style="list-style-type: none"> <li>• Daily vehicle operability inspection</li> <li>• Continuous observation of site for identified hazards</li> <li>• Concrete coring unit according to manufacturer's instructions being sure that the blade guard is in place and electrical cord in good shape.</li> <li>• Augers – look for sharp or jagged edges, signs of wear or unusual tightness in parts that should move freely. Replace or repair parts not in safe working condition.</li> </ul>
--	---	--