WORKPLAN FOR SITE INVESTIGATION
UST 1,2,3 SITE
SANTA RITA CORRECTIONAL FACILITY
DUBLIN, CALIFORNIA

(ESE PROJECT #6-94-5240)

PRESENTED TO:

ALAMEDA COUNTY HEALTH CARE SERVICES AGENCY
DIVISION OF HAZARDOUS MATERIALS
DEPARTMENT OF ENVIRONMENTAL HEALTH
80 SWAN WAY, ROOM 350
OAKLAND, CALIFORNIA 94621

PREPARED BY:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
4090 NELSON AVENUE, SUITE J
CONCORD, CALIFORNIA 94520
(510) 685-4053

JUNE 24, 1994

ESE
A CILCORP Company

Environmental
Science &
Engineering, Inc.

TO: Alameda County
Health Care Services Agency
Division of Hazardous Materials
Department of Environmental Health
1131 Harbor Parkway
Alameda, CA 94502

DATE: June 24, 1994

ATTN: Mr. Scott Seery

JOB NUMBER: 6-94-5240

SUBJECT: UST 1, 2, 3 Site, Santa Rita Correctional Facility, Dublin, California

WE ARE TRANSMITTING THE FOLLOWING:

One Workplan for the proposed subsurface investigation at the subject site.

DIST:
LB
FILE
ORIGINATOR

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

BY _____
Bart S. Miller
Project Geologist

4090 Nelson Avenue, Suite J Concord, CA 94520 Phone (510) 685-4053 Fax (510) 685-5323

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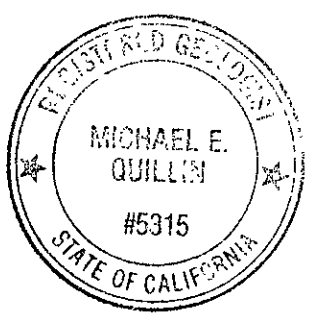
This workplan has been prepared by Environmental Science and Engineering, Inc. (ESE) for the exclusive use of the Alameda County General Services Agency as it pertains to their site located at the UST 1,2,3 Site, Santa Rita Correctional Facility, Dublin, California. This workplan was prepared with that degree of care and skill ordinarily exercised by other geologists and engineers practicing in this field. No other warranty, either express or implied, is made as to professional advice in this workplan.

WORKPLAN PREPARED BY:

Bart S. Miller
Project Geologist

UNDER THE PROFESSIONAL SUPERVISION OF:

Michael E. Quillin
Senior Hydrogeologist
Registered California Geologist No. 5315



June 24, 1994

ESE Project No. 6-94-5240

WORKPLAN FOR SITE INVESTIGATION
AT THE UST 1,2,3 AREA
LOCATED AT THE SANTA RITA CORRECTIONAL FACILITY
IN DUBLIN, CALIFORNIA

1.0 INTRODUCTION

This workplan has been prepared by Environmental Science & Engineering, Inc. (ESE) for the Alameda County Health Care Services Agency (HCSA) on behalf of the Alameda County General Services Agency (GSA). It pertains to the UST 1,2,3 Area (site) located at the Santa Rita Correctional Facility, Dublin, Alameda County, California (Figure 1 - Location Map). The GSA formerly owned and operated three underground storage tanks (USTs) at the site (Figure 2 -Site Map). UST removal activities performed during 1988 indicated the presence of soil impacted with petroleum hydrocarbons in the excavation. The plume of impacted soil in the unsaturated zone was defined during a prelimary site investigation conducted in 1988. The impacted soil was reportedly overexcavated during the same year.

ESE has been retained by the GSA to perform a limited site investigation at the site. The objectives of the work described in this workplan are to:

- Determine whether all soil at the site impacted with petroleum hydrocarbons was removed during overexcavation;
- If impacted, determine the vertical and lateral extent of petroleum hydrocarbons in the soil;
- Determine the depth to ground water at the site; and
- Monitor and sample ground water for a period of four quarters to determine whether any impact with petroleum hydrocarbons has occurred.

2.0 BACKGROUND

In March, 1988, Environmental Technology directed the removal of three underground storage tanks (USTs) at the subject site under permit from the Alameda County Health Care Services Agency (HCSA) and the Dougherty Regional Fire Authority. The GSA owned and operated one 3,000-gallon capacity UST (UST 1; Figure 2) for the storage of diesel fuel and two 5,000-gallon capacity USTs (UST 2 and UST 3; Figure 2) for the storage of Bunker C fuel oil. The fuels were used to operate a series of boilers formerly located at the site. Each UST was of single-wall carbon steel construction.

During the removal of the USTs, the HCSA witnessed the collection of eight soil samples from the base of the excavation. All samples were analyzed for total petroleum hydrocarbons as diesel fuel (TPH-D) and gasoline (TPH-G) using EPA Method 8015 (modified per CA LUFT) and total oil and grease (TOG) using Standard Method for the Examination of Water and Waste Water (SMWW) Method 503E. Four samples were reported to contain detectable concentrations of TPH-D ranging from 25 to 15,500 parts per million (ppm) and two samples were reported to contain TPH-G concentrations of 50 ppm and 195 ppm, respectively. All eight samples were reported to contain detectable concentrations of TOG ranging from 6 to 1,097 ppm.

A preliminary site assessment was performed by Gregg & Associates during March, 1988 to determine the areal extent of soil impacted with petroleum hydrocarbons. One soil sample was collected at a depth of 15 feet from each of the four borings (1C, 3D, 3E, and 3F) drilled during the preliminary site assessment and analyzed for TPH-D (Figure 2). No detectable concentrations of TPH-D were reported to occur in the four samples. Detectable concentrations of TOG were reported for each sample and ranged from 22 to 42 ppm. Based on these findings, Gregg & Associates supervised the overexcavation of soil impacted with petroleum hydrocarbons (Figure 2). All findings were documented in an Underground Tank Removal and Site Remediation Report prepared by Gregg & Associates and submitted to the HCSA during May, 1988.

On November 3, 1993, ESE measured and mapped the stockpiled soil at the subject site. ESE estimated the total volume of the stockpiled soil at the site to be approximately 400 cubic yards. On November 24, 1993, ESE submitted a workplan to the HCSA for sampling the stockpiled soil (ESE, 1993a). Subsequently, ESE collected soil samples from the stockpile on November 30, 1993 at a frequency of one sample for every 50 cubic yards and analyzed each for TPH-D and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method 8015 (modified per CA LUFT) and EPA Method 8020, respectively. Of the eight soil samples analyzed, one sample (SP-3-2.5') was reported to contain TPH-D at a concentration of 130 ppm (Figure 3 - Soil Stockpile Sample Locations). Results of the stockpile sampling were presented to the HCSA in a letter report dated December 7, 1993 (ESE, 1993b).

3.0 SITE INVESTIGATION

To accomplish the stated objectives of this investigation, ESE will perform a site investigation which includes drilling soil borings, collecting and analyzing soil samples, installing and developing monitoring wells, collecting and analyzing ground water samples, and preparing a site investigation report. In addition, ESE will continue to collect and analyze ground water samples and prepare monitoring reports for a period of three additional quarters.

Prior to beginning work, ESE will obtain all necessary permits for drilling soil borings at the site. In addition, ESE will review the site Health and Safety Plan (HASP) prepared for this investigation with all onsite personnel, subcontractors, and qualified visitors. The HASP is included as Appendix A - Health and Safety Plan. All work to be performed by ESE at the site will be in accordance with Tri-Regional Water Quality Control Board guidelines (RWQCB, 1990) and other applicable State regulations and standards.

3.1 DRILLING AND SOIL SAMPLING

ESE will supervise Exploration Geoservices of San Jose, California in drilling and sampling four soil borings at the site. Boring locations have been selected based on ESE's knowledge of the site and the surrounding area (Figure 3 - Proposed Soil Boring Locations). Present ground water monitoring activities conducted by ESE at a site located approximately ½-mile southeast of the UST 1,2,3 site have indicated local ground water flow to be toward the southeast with a gradient of approximately 0.001 to 0.002 foot per foot (ESE, 1994a; ESE, 1994b).

One boring (MW1) will be drilled at a location approximately 25 feet north of the former UST 1 location, one boring (MW2) will be drilled at a location approximately 25 feet southwest of the former UST 3 location, one boring (MW3) will be drilled at a location approximately 25 feet east of the former UST 2 location, and one boring (MW4) will be drilled at a location approximately 25 feet southeast of the UST 3 location (Figure 3). All

soil borings will be drilled to a depth of approximately 15 feet below the first occurrence of ground water. Data collected at a neighboring site indicates that local ground water occurs at a depth of approximately 20 feet below grade (ESE, 1994a). Given this, ESE anticipates the total depth of each boring to be approximately 35 feet below grade.

Soil samples will be collected from all borings to the occurrence of ground water at five-foot intervals, lithologic contacts, zones of obvious petroleum hydrocarbon impact, and the soil-ground water interface, if possible. All samples will be logged by an ESE geologist according to the Unified Soil Classification System (USCS) and screened in the field for volatile organic compounds (VOCs) using a photoionization detector (PID). ESE will select two soil samples from each boring (total of 16 samples) for analysis based on the results of field sample logging and screening. All drilling and sampling activities will be conducted in accordance with ESE Standard Operating Procedure (SOP) No. 1 for soil borings and soil sampling with hollow-stem augers in unconsolidated formations (Appendix B).

Soil samples will be labeled, placed in a cooler with ice, and transported under chain of custody documentation to McCampbell Analytical (a State-certified laboratory) of Pacheco, California. Each of the soil samples will be analyzed for TOG using method SMWW 5520, TPH-D using EPA Method 8015, and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method 8020 on a five-day turnaround time basis.

All drill cuttings will be placed on and under heavy gauge plastic and left at the site pending receipt of analytical results. Decontamination rinseates will be placed in appropriately labeled, 55-gallon-capacity steel Department of Transportation (DOT)-rated drums and left at the site pending receipt of analytical results. All borings will be backfilled to grade with cement grout.

3.2 WELL INSTALLATION AND DEVELOPMENT

A ground water monitoring well will be installed and developed at each of the four boring locations (Figure 3). ESE will install and develop four-inch diameter ground water monitoring wells in soil borings MW1, MW2, MW3, and MW4. Well installation and development will be conducted in accordance with ESE SOP No. 2 (Appendix B). Utilizing the nearest benchmark, a Licensed Surveyor of the County of Alameda Department of Engineering will survey the elevation and location of the top of each well casing. This will allow ESE to measure ground water elevations relative to mean sea level, generate an accurate site map, and calculate ground water flow direction and gradient.

ESE will monitor and sample ground water at the four new wells in accordance with ESE SOP No. 3 (Appendix B). ESE will monitor and sample each of the four wells during the initial site investigation and for a period of three additional quarters as approved by the HCSA. All ground water samples will be analyzed for TPH-D, TOG, and BTEX using analytical methods EPA 8015, SMWW 5520, and EPA 8020, respectively. For sample handling QA/QC purposes, a travel blank will be supplied by the laboratory for the initial site investigation sampling event and during each subsequent quarterly sampling event. The travel blank will be analyzed for BTEX only using method EPA 8020. For laboratory QA/QC purposes, one duplicate ground water sample will be collected during the initial site investigation sampling event and during each subsequent quarterly sampling event and submitted to the laboratory as a blind sample for TPH-D, TOG, and BTEX analysis using methods EPA 8015 (modified per CA LUFT), SMWW 5520, and EPA 8020, respectively.

3.3 DATA ANALYSIS AND REPORT PREPARATION

ESE will prepare a technical site assessment report describing the procedures used in the field during this investigation. The report will also present the analytical results of the investigation and relevant conclusions based upon interpretations of the field observations and the analytical data. Geologic boring logs and laboratory reports with chain of custody documents will be presented as appendices to the report.

ESE will also prepare a monitoring report for each of the three subsequent quarters of ground water monitoring and sampling at the site. The quarterly reports will describe procedures used in the field during ground water monitoring and sampling. Laboratory reports for ground water samples with chain of custody documents will be presented as appendices in each quarterly report.

3.4 ESTIMATED SCHEDULE

Upon receipt of HCSA approval, ESE will complete the initial site assessment fieldwork described in this workplan within a period of four weeks. All samples (soil and ground water) will be analyzed on a 5 working day turnaround basis. ESE will present a Site Assessment Report to the HCSA within four weeks after the receipt of all analytical results.

4.0 REFERENCES

Environmental Science & Engineering, Inc., 1994a. Unpublished Site Assessment Report for the Old Graystone Fueling Area, Santa Rita Correctional Facility, Dublin, California; February 21, 1994.

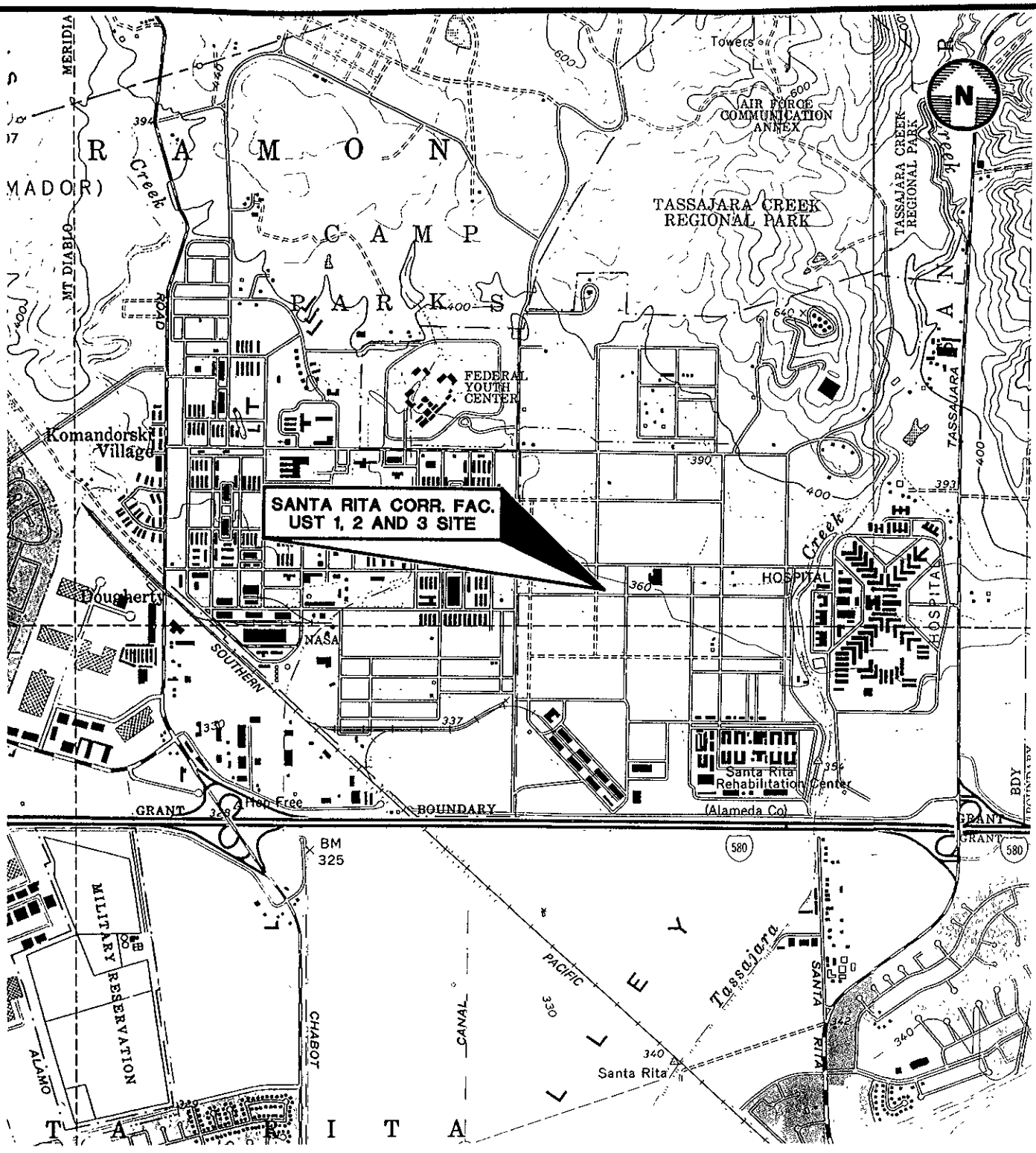
Environmental Science & Engineering, Inc., 1994a. Unpublished Quarterly Monitoring Report (First Quarter, 1994) for the Old Graystone Fueling Area, Santa Rita Correctional Facility, Dublin, California; February 25, 1994.

Environmental Science & Engineering, Inc., 1993a. Unpublished Workplan for Soil Stockpile Sampling at the UST 1,2,3 Site, Santa Rita Correctional Facility, Dublin, California; November 24, 1993.

Environmental Science & Engineering, Inc., 1993a. Unpublished Report of Stockpiled Soil Sampling at the UST 1,2,3 Site, Santa Rita Correctional Facility, Dublin, California; December 7, 1993.

Gregg & Associates, Inc., 1988. Underground Tank Removal and Site Remediation Report for the UST 1,2,3 Site, Santa Rita Correctional Facility, Dublin, California; May, 1988.

FIGURES



SCALE 1:24,000

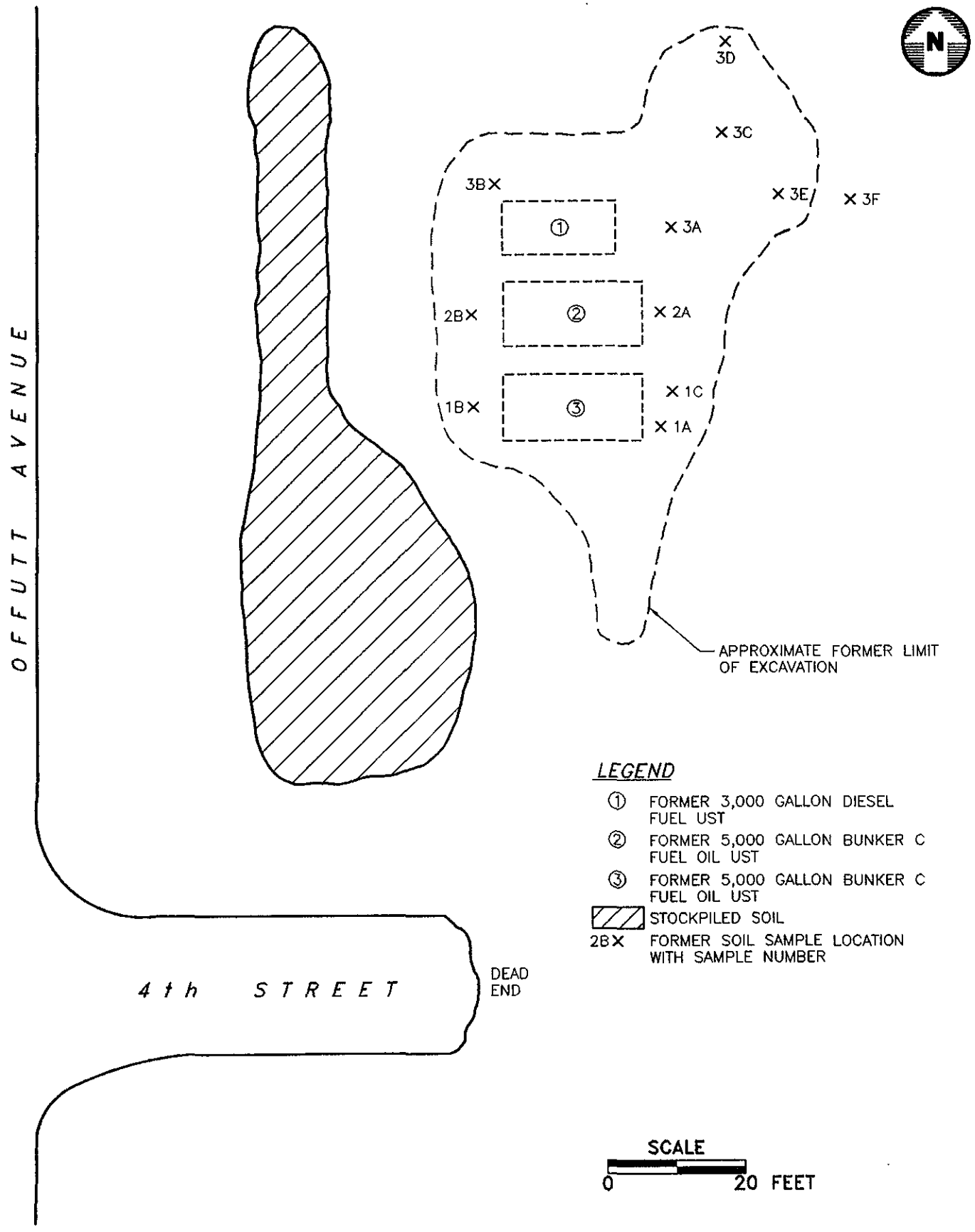
1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

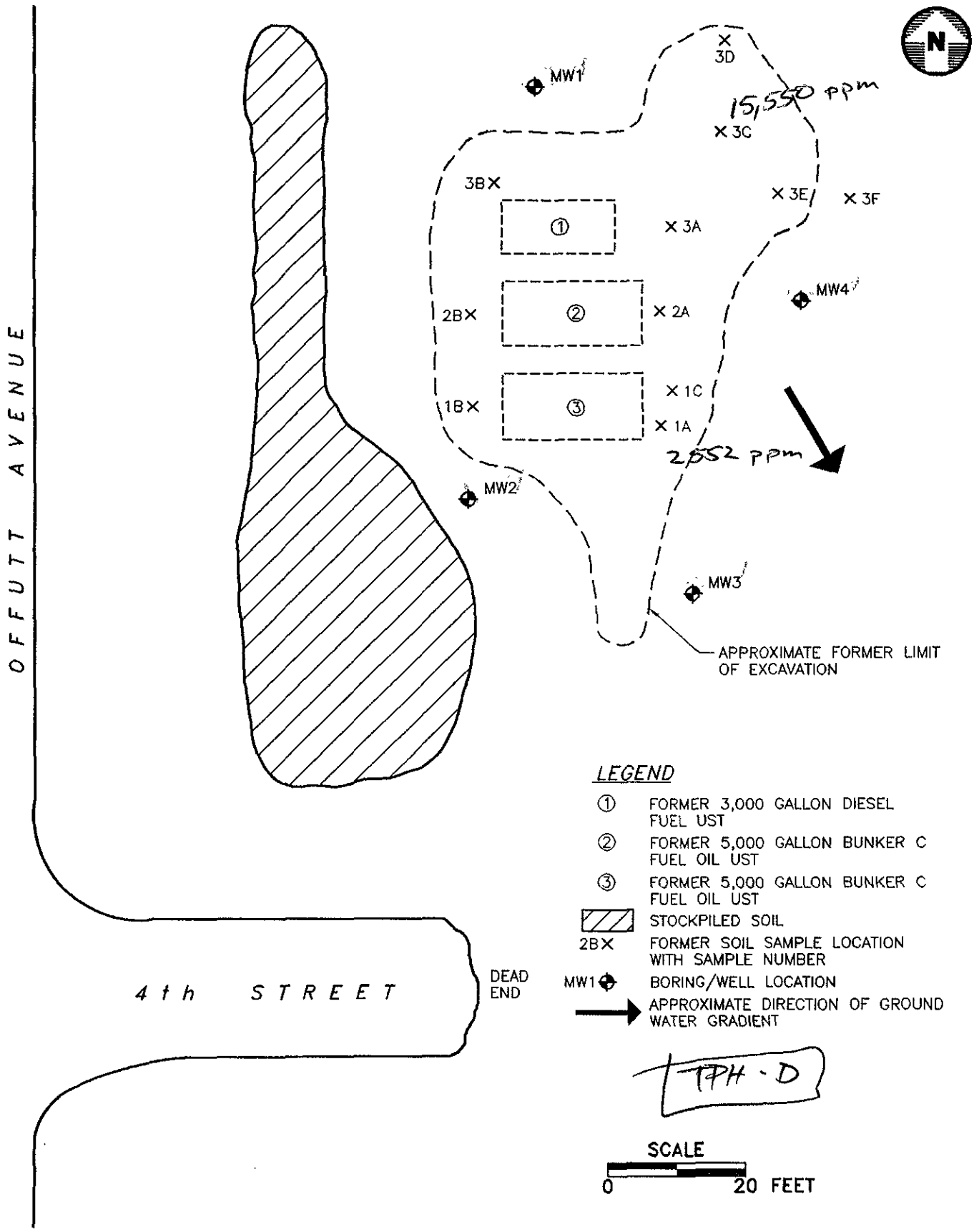
1 .5 0 1 KILOMETER

ADAPTED FROM U.S.G.S. DUBLIN AND LIVERMORE, CALIFORNIA 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS, 1980.

Environmental Science & Engineering, Inc. A CH2M HILL Company	DATE 6/16/94 REVISED	LOCATION MAP	FIGURE NO. 1
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	CAD FILE 52401003	ALAMEDA COUNTY GSA SANTA RITA CORRECTIONAL FACILITY DUBLIN, CALIFORNIA	PROJ. NO. 6-94-5240



Environmental Science & Engineering, Inc. A CB&I Company	DATE 6/16/94 REVISED	SITE PLAN	FIGURE NO. 2
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	CAD FILE 52401001	ALAMEDA COUNTY GSA SANTA RITA CORRECTIONAL FACILITY DUBLIN, CALIFORNIA	PROJ. NO. 6-94-5240



ESE Environmental Science & Engineering, Inc. (A DICORP Company)	DATE 6/16/94	BORING/WELL LOCATIONS	FIGURE NO. 3
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	ALAMEDA COUNTY GSA SANTA RITA CORRECTIONAL FACILITY DUBLIN, CALIFORNIA	
	CAD FILE 52401002		PROJ. NO. 6-94-5240

APPENDIX A
HEALTH AND SAFETY PLAN

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

HASP APPROVAL

Project:	**Alameda County General Services Agency**	Site:	**UST 1, 2, 3 Site**
Project Number:	**6-94-5240**	Site Location:	**Santa Rita Correctional Facility**

We have reviewed the attached HASP for the above referenced site. We recognize that when this form is completed, the attached HASP is approved for field activities on the above referenced site. Changes to this HASP shall be documented in writing.

Michael E. Dill — Project Manager Signature — 6/24/94 — Date

Field Team Leader Signature — 6/24/94 — Date

Site Health & Safety Officer Signature — 6-24-94 — Date

Signature of HASP Reviewer — 6-24-94 — Date

Signature of Subcontractor — Date

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

Project:	**Alameda County GSA**	Project Number:	**6-94-5240**
Project Manager:	**Bart S. Miller**	Site:	**UST 1,2,3 Site**
Site Team Leader:	**Bart S. Miller**	Site Location:	**Santa Rita Correctional Facility, Dublin, CA**
Site Health & Safety Officer:	**Bart S. Miller**		

HASP ACKNOWLEDGEMENT

I acknowledge that I understand the requirements of the HASP, and agree to abide by the procedures and limitations specified. I also acknowledge that I have been given an opportunity to have my questions concerning the HASP and its requirements answered prior to performing field activities. Health and safety training, and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

SIGNATURE	EMPLOYEE NUMBER	DATE

PROJECT MANAGER

I have provided subcontractors who will be performing field activities on this site with a copy of this HASP. I have also informed the subcontractors that OSHA § 29 CFR 1910.120 applies to their site field activities.

Project Manager Signature _____ Date _____

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

EMERGENCY INFORMATION

Address & Phone Numbers

Police: **911**

Fire: **911**

Ambulance: **911**

Primary Medical Facility Name: **Valley Care Medical Center**

Route: South on Santa Rita Road to intersection with West Las Positas Boulevard. Facility at northwest corner of intersection at 5555 West Las Positas Boulevard (Tel: 510-847-3000)

FTM Who Drove Route: Route known by SHSO and site personnel.

Secondary Medical Facility Name: **Valley Memorial Hospital**

Route: South on Santa Rita Road to intersection with East Stanley Boulevard. Proceed east on East Stanley Boulevard to intersection with Murrieta. Facility on southeast corner of intersection at 1111 East Stanley Boulevard (Tel: 510-447-7000)

FTM Who Drive Route: Route known by SHSO and site personnel.

*Provide Map Showing Route:

REGIONAL RESOURCES

Poison Control Center: **1-800-523-2222**

Chemtrec: **1-800-424-9300**

Waste Clean-up Contacts: **Integrated Wastestream Management (408-942-8955)**

SITE RESOURCES

List equipment and locations:

First Aid: Fully stocked Field First Aid Kit to be kept in SHSO's vehicle

Fire Control: ABC 5lb. fire extinguisher to be kept in SHSO's vehicle

Transportation: SHSO's vehicle shall be in safe zone and available to transport injured to hospital

Communication: Verbal

Other:

EMERGENCY CONTACTS

ESE	Phone: (510) 685-4053
Other: Exploration Geoservices, Inc.	Phone: (408) 280-6822
Alameda County GSA (Peter Kinney)	Phone: (510) 535-6280

NOTES:

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

UST 1,2,3 SITE
SANTA RITA
CORRECTIONAL
FACILITY
DUBLIN, CA

SITE CONTAMINANTS/MONITORING INFORMATION
FOR ALL IDENTIFIED OR SUSPECTED SITE CONTAMINANTS

CONTAMINANT NAME (SYNONYMS)	APPEARANCE AND PHYSICAL FORM	EXPOSURE LIMIT OSHA PEL (ppm)	ROUTE OF ENTRY	IDLH (ppm)	PID IONIZATION POTENTIAL	HEALTH EFFECTS ACUTE/CHRONIC	FIRST AID	PHYSICAL HAZARDS
Unknown VOC's	N/A	N/A (5 ppm Action Level)	Inhalation, Skin absorption, Ingestion.	Unknown	N/A	Irritates mucous membranes, headache, fatigue, nausea, narcotic effects.	Irrigate and wash contact area immediately. Seek medical attention.	Incompatible with strong oxidizers, flash point 12 F.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

HAZARD EVALUATION AND CONTROLS

For each task to be performed onsite, list any associated hazards and potential hazards. For each task hazard or potential hazard, provide the control method and/or the level of protection (LOP) which shall be used to control that hazard.

TASK	DESCRIPTION OF HAZARD	CONTROL METHOD/LOP*
DRILLING	**PHYSICAL - heavy machinery with moving parts, noise, flying particles, electrical hazards, buried pressurized pipes (eg. gas)**	• **No loose clothing or hair allowed near moving parts.** • **Hard hats, safety glasses, safety shoes, hearing protection.** • **Full compliance with ESE H&S Standard Operating Procedure (SOP) for drilling and boring, or equivalent submitted by subcontractor.** • **Utility locator service, as needed.**
	CHEMICAL - airborne dust particulates and liberated volatile organic compounds, and wet soil.	**Level D personal protective equipment including disposable nitrile gloves, protective eyewear, steel toe leather or rubber boots, and hearing protection. Modified to include half-face personal air purifying respirator equipped with dust and organic vapor filters, when VOC's exceed 5 ppm at breathing zone on a continuous basis or 50 ppm on an intermittent basis.**
SAMPLING	**CHEMICAL - Exposure to airborne vapors and particulates and contact with impacted soil and ground water.**	**Level D personal protective equipment including disposable nitrile gloves, protective eyewear, steel toe leather or rubber boots, and hearing protection. Modified to include half-face personal air purifying respirator equipped with dust and organic vapor filters, when VOC's exceed 5 ppm at breathing zone on a continuous basis or 50 ppm on an intermittent basis.**

Specific Condition/Contaminants/Level		Level of Protection or Action
DRILLING	**Visible airborne dust/volatile organic compound concentration greater than 5 ppm sustained or 50 ppm on an intermittent basis.**	**Don personal air-purifying respirator equipped with dust and organic vapor filters.**
SAMPLING	**Volatile organic compound concentration greater than 5 ppm sustained or 50 ppm on an intermittent basis.**	**Don personal air-purifying respirator equipped with dust and organic vapor filters.**

Note: Monitoring Comments (e.g. Breathing Zone).

Background levels of volatile organic compounds shall be collected every hour using Organic Vapor Meter. Measurements will be collected from the breathing zone of site workers periodically. Measurements shall be made with a Organic Vapor Meter. Upwind and downwind measurements shall be collected every hour. Noise levels above **85 dba** will require hearing protection. Historical data indicates heavy equipment operations exceed **90dba**, therefore hearing protection will be required during use of Heavy Equipment. **[§29 CFR 1910.95.7]**

Physical Hazard Control:

SITE SAFETY MEETING PRIOR TO WORK TO IDENTIFY PHYSICAL HAZARDS. PROPER HANDLING, SERVICING, AND USE OF PERSONAL PROTECTIVE EQUIPMENT DESCRIBED ABOVE. NO PERSONS TO ENTER EXCLUSION ZONE ON BLIND SIDE OF MACHINE OPERATOR. NO NONQUALIFIED PERSONS TO ENTER EXCLUSION ZONE. QUALIFIED PERSONS TO ENTER EXCLUSION ZONE ONLY AFTER REVIEW OF HASP. DRY POWDER FIRE EXTINGUISHER AT WORK LOCATION AT ALL TIMES.

Chemical Hazard Control:

SITE SAFETY MEETING PRIOR TO WORK TO IDENTIFY CHEMICAL HAZARDS. PROPER HANDLING, SERVICING, AND USE OF PERSONAL PROTECTIVE EQUIPMENT DESCRIBED ABOVE. NO PERSONS TO ENTER CONFINED SPACE. NO NONQUALIFIED PERSONS TO ENTER EXCLUSION ZONE. QUALIFIED PERSONS TO ENTER EXCLUSION ZONE ONLY AFTER REVIEW OF HASP. BREATHING ZONE TO BE MONITORED FOR VOLATILE ORGANIC COMPOUNDS. DUST TO BE MONITORED VISIBLY.

Personnel Protective Equipment:

NITRILE GLOVES, STEEL-TOED BOOTS WITH CHEMICAL RESISTANT SOLES, EAR PROTECTION, EYE PROTECTION AND HARD HAT. PERSONAL AIR-PURIFYING RESPIRATORS EQUIPPED WITH DUST AND ORGANIC VAPOR CARTRIDGES TO BE READILY AVAILABLE.

Site Control Methods and Procedures:

EXCLUSION ZONE OF 50 FEET WILL EXIST AROUND WORK AREA. ALL PERSONNEL ENTERING EXCLUSION ZONE WILL HAVE CURRENT/VALID OSHA HAZARDOUS MATERIALS TRAINING, CURRENT HAZARDOUS MATERIALS WORKER MEDICAL BASELINE MONITORING (ANNUAL), AND WILL BE REQUIRED FOR THE WORK BEING PERFORMED AT THE SITE.

Monitoring Equipment:		PID – 10.6 ev Lamp		FID		OXYGEN METER		EXPLOSIMETER		

Instrument Calibrated: Daily Date: Where Documented*: **Daily Field Logs**

Personnel and Area Monitoring Tasks and Frequency:

Periodic breathing zone measurementswith PID (10.6 ev Lamp). Upwind and downwind measurements every hour. Constant monitoring will commence if concentration consistently greater than 10 ppm in breathing zone. These measurements will be documented in the Daily Field Logs of the Site Health & Safety Officer or the Site Team Leader.

Decontamination Procedures:

Personnel/Equipment	Segregated equipment drop with plastic liner established. Nitrile gloves to be washed and rinsed with detergent and clean water. The washed nitrile gloves will be discarded into a plastic bag. All reusable exposed equipment including eyewear and respirators will be washed and rinsed prior to removal of nitrile gloves. Inner teflon gloves will be removed and placed in a plastic bag. Workers to wash hands and face with tap water.
Sampling Equipment	All sampling equipment will be steam cleaned prior to departing site. All rinsates will be placed in 55-gallon capacity DOT-rated drums and left at the site pending analytical results.

Equipment Required: Two bristle brushes; large container of clean water; pump/heater for steam cleaning;detergent for wash water; plastic containers lined with plastic bags for disposal. Two plastic containers, one for washing and one for rinsing.

Site Specific Training: Site worker documentation will show they meet the training requirements. **[§ 29CFR 1910.120]** Prior to starting field work the Site Health and Safety Officer shall brief site workers on contents of this HASP and hazards. Each ESE employee shall sign HASP acknowledgement form, and site specific training log attached to HASP.

Site Specific Medical Requirements: Obtain pertinent MSDS's and Personnel training Certificates.

APPENDIX B

ESE STANDARD OPERATING PROCEDURES NO. 1, 2, AND 3

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 1
FOR SOIL BORINGS AND SOIL SAMPLING WITH HOLLOW-STEM AUGERS IN UNCONSOLIDATED FORMATIONS

Environmental Science & Engineering, Inc. (ESE) typically drills soil borings using a truck-mounted, continuous-flight, hollow-stem auger drill rig. The drill rig is owned and operated by a drilling company possessing a valid State of California C-57 license. The soil borings are conducted under the direct supervision and guidance of an experienced ESE geologist. Prior to drilling, the ESE geologist will clear the borehole location with a hand auger to a depth of five feet. The ESE geologist logs each borehole during drilling in accordance with the Unified Soil Classification System (USCS). Additionally, the ESE geologist observes and notes the soil color, relative density or stiffness, moisture content, odor (if obvious) and organic content (if present). The ESE geologist will record all observations on geologic boring logs.

Soil samples are collected during drilling at a minimum of five-foot intervals by driving an 18-inch long Modified California Split-spoon sampler (sampler), lined with new, thin-wall brass sleeves, through the center of and ahead of the hollow stem augers, thus collecting a relatively undisturbed soil sample core. The brass sleeves are typically 2-inches in diameter and 6-inches in length. The sampler is driven by dropping a 140-pound hammer 30-inches onto rods attached to the top of the sampler. Soil sample depth intervals and the number of hammer blows required to advance the sampler each six-inch interval are recorded by the ESE geologist on geologic boring logs. The ends of one brass sleeve are covered with Teflon sheeting, then covered with plastic end caps. The end caps are sealed to the brass sleeve using duct tape. Each sample is then labeled and placed on ice in a cooler for transport under chain of custody documentation to the designated analytical laboratory. A portion of the remaining soil in the sampler is placed in either a new Ziploc® bag or a clean Mason Jar® and set in direct sunlight to enhance the volatilization of any Volatile Organic Compounds (VOCs) present in the soil. After approximately 15-minutes that sample is screened for VOCs using a photoionization detector (PID). The PID measurements will be noted on the geologic boring logs. The PID provides qualitative data for use in selecting samples for laboratory analysis. Soil samples from the saturated zone (beneath the ground-water table) are collected as described above, are not screened with the PID, and are not submitted to the analytical laboratory. The samples from the saturated zone are used for descriptive purposes. Soil samples from the saturated zone may be retained as described above for physical analyses (grain size, permeability and porosity testing).

If the soil boring is not going to be completed as a well, then the boring is typically terminated upon penetrating the saturated soil horizon or until a predetermined interval of soil containing no evidence of contamination is penetrated. This predetermined interval is typically based upon site specific regulatory or client guidelines. The boring is then backfilled using either neat cement, neat cement and bentonite powder mixture (not exceeding 5% bentonite), bentonite pellets, or a sand and cement mixture (not exceeding a 2:1 ratio of sand to cement). However, if the boring is to be completed as a monitoring well, then the boring is continued until either a competent, low estimated-permeability, lower confining soil layer is found or 10 to 15-feet of the saturated soil horizon is penetrated, whichever occurs first. If a low estimated-permeability soil layer is found, the soil boring will be advanced approximately five-feet into that layer to evaluate its competence as a lower confining layer, prior to the termination of that boring.

All soil sampling equipment is cleaned between each sample collection event using an Alconox® detergent and tap water solution followed by a tap water rinse. Additionally, all drilling equipment and soil sampling equipment is cleaned between borings, using a high pressure steam cleaner, to prevent cross-contamination. All wash and rinse water is collected and contained onsite in Department of Transportation approved containers (typically 55-gallon drums) pending laboratory analysis and proper disposal/recycling.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 2
FOR MONITORING WELL INSTALLATION AND DEVELOPMENT
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Environmental Science & Engineering, Inc. (ESE) typically installs ground-water monitoring wells in unconsolidated sediments drilled using a truck-mounted hollow-stem auger drill rig. The design and installation of all monitoring wells is performed and supervised by an experienced ESE geologist. Figure A - Typical ESE Monitoring Well Construction Diagram (attached) graphically displays a typical ESE well completion. Prior to the construction of the well, the portion of the borehole that penetrates a lower confining layer (if any) is filled with bentonite pellets. The monitoring well is then constructed by inserting polyvinylchloride (PVC) pipe through the center of the hollow stem augers. The pipe (well-casing) is fastened together by joining the factory threaded pipe ends. ESE typically uses two-inch or four-inch diameter pipe for ground-water monitoring wells. The diameter of the borehole is typically 6-inches greater than that of the diameter of the well-casing, but is at least four-inches greater than that of the well casing. The lowermost portion of the well-casing will be factory perforated (typically having slot widths of 0.010-inch or 0.020-inch). The slotted portion of the well-casing will extend from the bottom of the boring up to approximately five-feet above the occurrence of ground water. A PVC slip or threaded cap will be placed at the bottom end of the well-casing, and a locking expandable well cap will be placed over the top (or surface) end of the well-casing. A sand pack (typically No. 2/12 or No. 3 Monterey sand) will be placed in the borehole annulus, from the bottom of the well-casing up to one to two-feet above the top of the slotted portion, by pouring the clean sand through the hollow stem augers. One to two-feet of bentonite pellets will be placed on top of the sand pack. The bentonite pellets will then be hydrated with three to four-gallons of potable water, to protect the sand pack from intrusion during the placement of the sanitary seal. The sanitary seal (grout) will consist of either neat cement, a neat cement and bentonite powder mixture (containing no more than 5% bentonite), or a neat cement and sand mixture (containing no more than a 2:1 sand to cement ratio). If, the grout seal is to be greater than 30-feet in depth or if standing water is present in the boring on top of the bentonite pellet seal, then the grout mixture will be tremied into the boring from the top of the bentonite seal using either a hose, pipe or the hollow-stem augers, which serve as a tremie. The well will be protected at the surface by a water tight utility box. The utility box will be set into the grout mixture so that it is less than 0.1-foot above grade, to prevent the collection of surface water at the well head. If the well is set within the public right of way, then the utility box will be Department of Transportation (DOT) traffic rated, and the top of the box will be set flush to grade. If the well is constructed in a vacant field a brightly painted metal standpipe may be used to protect the well from traffic. If a standpipe is used, it will be held in place with a grout mixture and will extend one to two-feet above ground surface. All well completion details will be recorded by the ESE geologist on the geologic boring logs.

Subsequent to the solidification of the sanitary seal of the well (a minimum of 72 hours), the new well will be developed by an ESE geologist or field technician. Well development will be performed using surging, bailing and overpumping techniques. Surging is performed by raising and lowering a surge block through the water column within the slotted interval of the well casing. The surge block utilized has a diameter just smaller than that of the well casing, thus, forcing water flow through the sand pack due to displacement and vacuum caused by the movement of the surge block. Bailing is performed by lowering a bailer to the bottom of the well and gently bouncing the bailer off of the well end cap, then removing the full bailer and repeating the procedure. This will bring any material (soil or PVC fragments) that may have accumulated in the well into suspension for removal. Overpumping is performed by lowering a submersible pump to the bottom of each well and pumping at the highest sustainable rate without completely evacuating the well casing. Effective well development will settle the sand pack surrounding the well-casing, which will improve the filtering properties of the sand pack and allow water to flow more easily through the sand pack; improve the communication between the aquifer and the well by aiding the removal of any smearing of fine sediments along the borehole penetrating the aquifer; and, remove fine sediments and any foreign objects (PVC fragments) from the well casing. The ESE geologist or

technician will monitor the ground water purged from the well during development for clarity, temperature, pH and conductivity. Development of the well will proceed until the well produces relatively clear, sand-free water with stable temperature, pH and conductivity measurements. At a minimum, 10 well-casing volumes of ground water will be removed during the development process. Measurements of temperature, conductivity, pH and volume of the purged water and observations of purge water clarity and sediment content will be recorded on the ESE Well Development Data Forms. All equipment used during the well development procedure will be cleaned using an Alconox® detergent and tap water solution followed by a tap water rinse prior to use in each well. All ground water purged during the well development process and all equipment rinse water will be collected and contained onsite in DOT approved containers (typically 55-gallon drums) pending analytical results and proper disposal or recycling.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 3
FOR GROUND-WATER MONITORING AND SAMPLING FROM MONITORING WELLS

Environmental Science & Engineering, Inc. (ESE) typically performs ground-water monitoring at project sites on a quarterly basis. As part of the monitoring program an ESE staff member will first gauge the depth to water and free product (if present) in each well, then collect ground-water samples from each well. Depth to water measurements are taken by lowering an electric fiberglass tape measure into the well and recording the occurrence of water in feet below a fixed datum set on the top of the well-casing. If free-phase liquid hydrocarbons (free product) are known or suspected to be present in the well, then an electric oil/water interface probe is used to determine the depth to the occurrence of ground-water and the free product in feet below the fixed datum on the top of the well-casing. Depth to water and depth to product measurements are measured and recorded within an accuracy of 0.005-foot. The electric tape and the electric oil/water interface probe are washed with an Alconox® detergent and tap water solution then rinsed with tap water between uses in different wells.

Ground-water samples are collected from a well subsequent to purging a minimum of three to four well-casing volumes of ground water from the well, if the well bails dry prior to the removal of the required minimum volume, then the samples are collected upon the recovery of the ground water in that well to 80% of its initial static level. Ground water is typically purged from monitoring wells using either a hand-operated positive displacement pump, constructed of polyvinylchloride (PVC); a new (precleaned), disposable polyethylene bailer; or, a variable-flow submersible pump, constructed of stainless steel and Teflon®. The hand pumps and the submersible pumps are cleaned between each use with an Alconox® detergent and tap water solution followed by a tap water rinse. During the well purging process the conductivity, pH and temperature of the ground water are monitored by the ESE staff member. Ground-water samples are collected from the well subsequent to the stabilization of the of the conductivity, pH and temperature of the purge water, and the removal of four well-casing volumes of ground-water (unless the well bails dry). The parameters are deemed to have stabilized when two consecutive measurements are within 10% of each other, for each respective parameter. The temperature, pH, conductivity and purge volume measurements, and observations of water clarity and sediment content will be documented by the ESE staff member on ESE Ground-Water Sampling Data Forms.

Ground-water samples are collected by lowering a new (precleaned), disposable polyethylene bailer into the well using new, disposable nylon cord. The filled bailer is retrieved, emptied, then filled again. The ground water from this bailer is decanted into appropriate laboratory supplied glassware and/or plastic containers (if sample preservatives are required, they are added to the empty containers at the laboratory prior to the sampling event). The containers are filled carefully so that no headspace is present to avoid volatilization of the sample. The filled sample containers are then labeled and placed in a cooler with ice for transport under chain of custody documentation to the designated analytical laboratory. The ESE staff member will document the time and method of sample collection, and the type of sample containers and preservatives (if any) used. These facts will appear on the ESE Ground-Water Sampling Data Forms. ESE will collect a duplicate ground-water sample from one well for every ten wells sampled at each site. The duplicate will be a blind sample (its well designation will be unknown to the laboratory). The duplicate sample is for Quality Assurance and Quality Control (QA/QC) purposes, and provides a check on ESE sampling procedures and laboratory sample handling procedures. When VOCs are included in the laboratory analyses, ESE will include a trip blank, if required, in the cooler with the ground-water samples for analysis for the identical VOCs. The trip blank is supplied by the laboratory and consists of deionized water. The trip blank is for QA/QC purposes and provides a check on both ESE and laboratory sample handling and storage procedures. Since disposable bailers are used for sample collection, and are not reused, no equipment blank (rinsate) samples are collected.