HYDRO ENVIRONMENTAL TECHNOLOGIES, INC.

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December 10, 1993 **7-278**

Ms. Juliet Shin
Alameda County Department of Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

Subject: E-Z Serve Site No. 100877
525 West A Street, Hayward

Dear Ms. Shin:

Hydro-Environmental Technologies, Inc. (HETI) has been retained to develop an effective interim remediation approach for the referenced site. The site location map is shown as Figure 1. The purpose of this workplan is to conduct a field test to assess the feasibility of air sparging as this interim remediation approach. Assuming successful completion of the test, HETI will develop a detailed system design based on the test results. This workplan contains a brief background, a description of proposed tasks, and a schedule for the completion of those tasks.

Background

Several episodes of subsurface site assessment have been conducted since the discovery of a leak in the product lines in 1986. Applicable conditions at the site are as follows:

- The site is currently not in use. The only structures on site are the canopy over the former dispenser islands, some lights and a surrounding fence.
- Soils are predominantly silty clay. Sand has been observed in some borings at an approximate depth of 10 to 15 feet below ground surface (ft bgs) and again at approximately 25 to 30 ft bgs. The maximum depth explored was 30 ft bgs.
- Ground water is at approximately 17.8 ft bgs (June 1993). The ground water gradient is toward the west at 0.14% (June 1993). The depth to ground water has ranged from 16 to 22 ft bgs.
- The highest reported concentration of petroleum hydrocarbons in soil samples taken from borings drilled at the site is 19 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) in the boring for well MW-4. The highest concentration of benzene reported in soil samples (at 2.7 ppm) is also from the boring for well MW-4. All other on-site borings contained reportable concentrations of TPHg and benzene.
- Concentrations of petroleum hydrocarbons in the June 1993 on-site ground water samples ranged from 5,700 parts per billion (ppb) TPHg to 60,000 ppb TPHg.

Concentrations of petroleum hydrocarbons in the June 1993 samples from off-site wells MW-7, MW-9 and MW-10 were similar. Petroleum hydrocarbons were reported in the sample from up-gradient well MW-8 at a concentration of 350 ppb TPHg.

- Eleven monitoring wells exist, eight on site and three off site. All wells have been completed at a total depth of 30 feet except well MW-1A, which is 17.8 feet deep.

Interim Remediation Plan

Two interim remediation approaches have been considered: ground water extraction and treatment, and air sparging. Each method has its merits and drawbacks. Other methods have been eliminated as too costly or unfeasible.

Prior to initiating interim remediation, the feasibility of the chosen approach should be assured and appropriate design parameters must be estimated to develop a workable design.

A brief description of each approach and their respective merits follows:

Ground Water Extraction and Treatment

Ground water extraction is the classic method for controlling migration of hydrocarbon plumes in ground water. The theory is that if a sufficient cone of depression is created, all hydrocarbons within the corresponding capture zone will eventually be recovered, preventing their further migration off site.

The merit to this approach is that it is relatively inexpensive to implement compared to air sparging or other approaches. An aquifer pumping test is required to estimate the extent of the capture zone and the parameters required for treatment system design.

There are two drawbacks to this approach. The first is that the plume from an off-site source could be drawn onto the site. The second is that the time required to remediate a site is very long. This second drawback eventually results in the ground water extraction and treatment approach being less cost effective than air sparging.

Air Sparging

Air sparging has recently come into favor in the remediation industry because site remediation (and closure) can often be achieved in a reasonable amount of time. Secondly, because ground water is not extracted, the extracted and treated ground water would not require disposal, and there is no concern that a plume from an off site source would be drawn onto the site. (A plume naturally headed for the site would not be slowed, however, without instituting other measures.)

Air is injected into the soil matrix below the water table using 2-inch wells and an air compressor. After stripping volatiles from the ground water and soil, this air is collected by separate vapor extraction wells. The potential drawback to using air sparging is that the soil must be sufficiently porous to allow both injection and extraction of air.

The decision to use air sparging can be made by conducting a vapor extraction test at the site. HETI proposes to conduct a vapor extraction test on existing well MW-1A. Following successful completion of the test, air sparging and vapor extraction wells and the appropriate above-ground equipment would be designed based on the test results.

Proposed Scope of Work

The tasks proposed to be performed under this work plan include the following:

- Perform a soil vapor extraction (SVE) test.
- Analyze data/results and prepare design criteria based on the findings of the field test.
- Prepare an Interim Remediation Work Plan.
- Prepare system construction and installation specifications.

Field Methods

The procedures and methods used during field activities are discussed below, and a detailed description of the SVE testing protocols are included in Appendix A.

An SVE test to evaluate subsurface conditions, provide information for the design of an interim remediation system, and to assess the feasibility of air sparging and SVE as a remedial technology is proposed. Before beginning the test, HETI will obtain all required notifications for the air discharge from the Bay Area Air Quality Management District (BAAQMD). A copy of the notification will be kept on site during the test.

The test will consist of applying a vacuum to well MW-1a. Vacuum gauges will be placed on surrounding wells to monitor the radial influence of the vacuum, and the change in that influence over time. The applied vacuum, extracted soil vapor flow rate, and concentration of oxygen and volatile chemicals in extracted vapor will be monitored. The test may be performed at various vacuum levels and flow rates.

The vacuum will be applied and extracted soil vapor will be treated with an internal combustion engine before being discharged to the atmosphere. This engine will leased from a third party, and has been specially modified to treat extracted soil

vapor. Samples of the extracted soil vapor will be obtained from the extraction well at the beginning and the end of the test, and analyzed for TPHg and BTEX by a state-certified laboratory.

Proposed Schedule

The vapor extraction test will commence following approval of this workplan. The following tentative schedule is proposed:

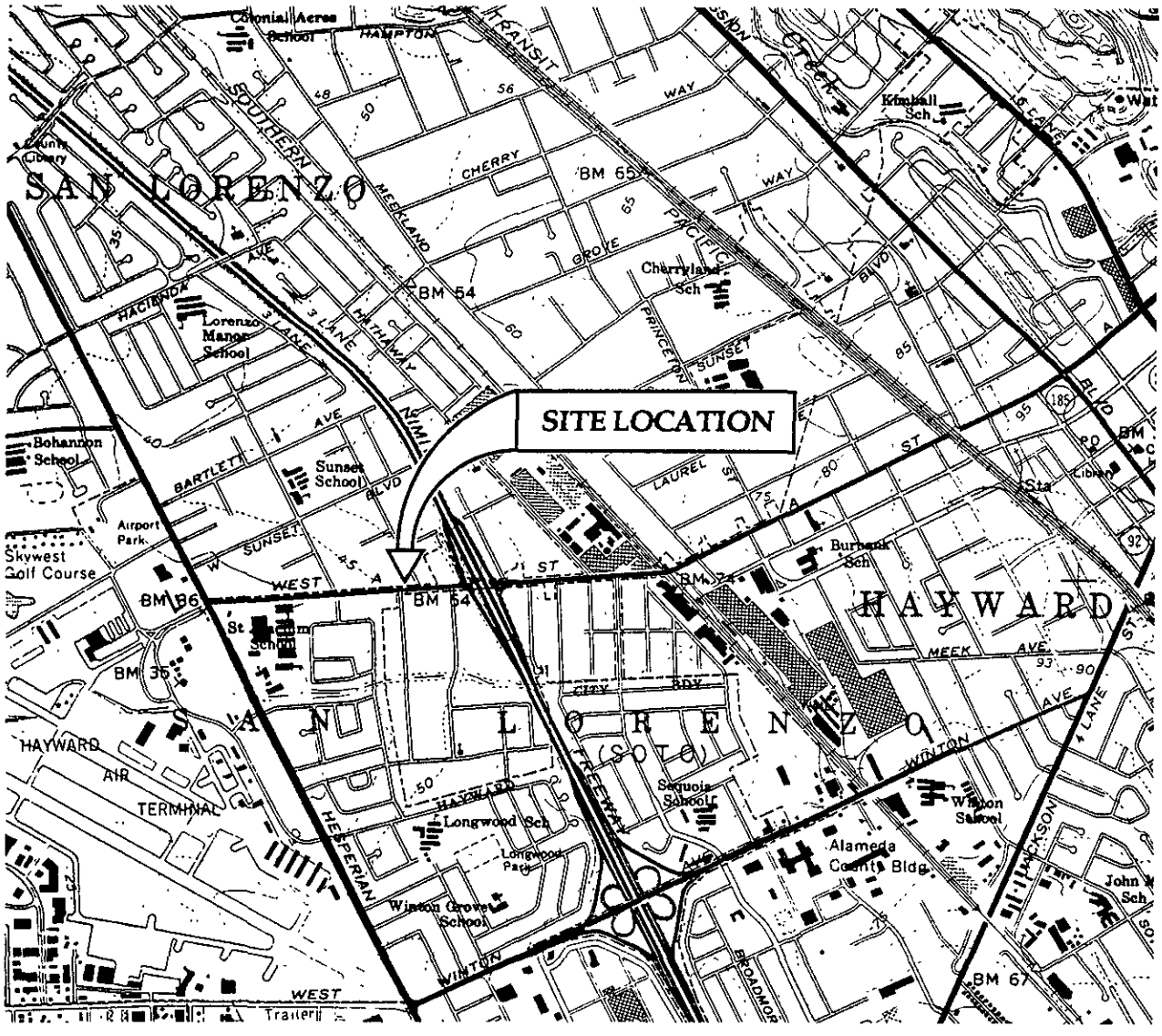
TASK	COMPLETION DATE
Submit workplan to ACDEH	December 16, 1993
Perform vapor extraction test	Within 60 days of plan approval by ACDEH
Submit Interim Remediation Work Plan with test results and design criteria	Within 60 days of SVE test
Complete Construction and Installation Specifications	Within 60 days of completion of Remediation Work Plan

If you have any questions or require additional information, please feel free to call me or Mr. Markus Niebanck at (510) 521-2684.

Sincerely,
HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

John H. Turney, P.E.
Senior Engineer

cc: Mr Brian Cobb, E-Z Serve Management Company.



SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

NORTH

Source: USGS 7.5' Quadrangle "Hayward"

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.

SITE LOCATION MAP

E-Z Serve Station No. 100877
525 West A Street
Hayward, California

Job No. 7-278
Figure 1

12/7/93

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.
CALIFORNIA

SOIL VAPOR EXTRACTION TEST PROTOCOL

December 1993

SOIL VAPOR EXTRACTION TEST PROTOCOL

Successful design of a Soil Vapor Extraction (SVE) system requires knowledge of the following:

- Contaminant composition
- Soil plume definition
- Vapor concentration and composition
- Flow rate vs applied vacuum
- Radius of Influence

The last three of these components are found by testing. The particular aspects of these items are expanded as follows:

Vapor Concentration and Composition

The determination of vapor concentration in the extracted air stream is important for two reasons: to calculate the removal efficiency of the test extraction well and to provide information necessary to specify the off-gas treatment equipment. Vapor samples should be taken at the beginning and end of the SVE test, which should be conducted for a long enough time to extract at least one pore volume of vapor from the contaminated soil zone. The initial vapor concentration is representative of the initial equilibrium vapor concentration, while the concentration measured after one pore volume has been extracted gives an indication of realistic removal rates.

The initial and final concentration measurements during the SVE test should be done using State DHS-certified laboratory analysis of vapor samples using methods 8015/8020 (modified). Samples will be collected in evacuated, one-liter Tedlar® bags from the undiluted vapor stream using a sample pump. The sample data will be entered onto a Chain-of-Custody form and each sample labeled with a unique designation. Following collection, the sample bag will be placed immediately into an opaque cooler to minimize exposure to light. Chilling is not required. Samples will be analyzed as soon as possible, but no more than 72 hours from collection.

A Gastech 1214S LEL/O_2 meter, or equivalent, should be used for intermediate measurements to follow progress. However, these instruments must be calibrated to an appropriate gas such as hexane or heptane.

The oxygen concentration in the extracted vapor stream must be taken, as this affects designs using a thermal or catalytic oxidizer, or internal combustion (IC) engine. A Gastech 1214S LEL/O_2 meter, or equivalent, should be used.

Flow Rate vs Applied Vacuum

To properly specify the vapor extraction blower, the actual flow rate and vacuum during the test must be known. The vapor flow rate should be measured using a Kurz Model 443 thermal anemometer, or equivalent.

Anemometers should be installed with 10 pipe diameters of straight pipe upstream and 5 diameters downstream. The upstream straight pipe may be shortened by installing straightening vanes. They should be mounted through a tight-fitting hole in the side of the pipe. Use of a tee fitting would disrupt flow, causing additional inaccuracy.

Since SVE tests are often conducted using existing monitoring wells, water table upwelling within the well must be considered when determining screen height. In a monitoring well, approximately one inch of screen height will be lost for every inch of vacuum applied.

The absolute atmospheric pressure should be assumed as the day's barometric reading obtained from the local newspaper and corrected for altitude.

Radius of Influence

Determining soil permeability and radius of influence (R_I) requires that we measure induced vacuum vs distance or induced vacuum vs time for several points. Induced vacuum vs time for several monitoring points is preferable because soil permeability may vary with direction. The data can be entered into Shell Oil Company's HyperVentilate® computer program to determine the soil air permeability.

Radial pressure from an extraction well can be simplified for a fixed P_W, P_{Atm}, R_W and R_I to the following form:

$$P(r) = Ar^b \qquad (5)$$

Where A and b are constants.

Plot P(r) vs r using a program such as Cricket Graph®, which will do a logarithmic curve fit, to determine an average A and b. Then solve for $r = R_I$ where $P(r) = P_{Atm}$.

Vapor Extraction Testing

Vapor extraction testing should be conducted using the attached Vapor Extraction Test Setup and Log sheets. Completion of these forms will provide a checklist for collection of all required information.

Vapor Well Installation Guidelines

Prior to any drilling activities, Hydro-Environmental Technologies, Inc. (HETI) will verify that necessary drilling permits have been secured.

Prior to drilling, underground and above ground utilities will be located using Underground Service Alert (USA) and site reconnaissance. To the extent possible, drilling will be conducted so that disruptions of normal business activities at the project site are minimized. Drilling equipment will be inspected for suitability and integrity prior to performing work.

Wells selected or installed for testing should, if possible, be wells that would be used for remediation. At least one well should be installed and screened in the heart of the plume. Wells screened through clean soils decrease the overall effectiveness of the system unless they will be used for air induction wells. Multiple wells are required for vapor extraction testing to allow measurement of induced pressure as a function of distance.

Well spacing is a function of soil type. Some guidelines for well spacing are:

Gravel	30 to 100 ft
Sand	25 to 75 ft
Silt	15 to 50 ft
Clay	5 to 40 ft

Each pair of wells used for measurements should be screened in the same horizon. The vertical permeability in undisturbed soils can be as little as 10% of the horizontal permeability. Care must be taken near the surface to prevent "short circuiting" of air flow either from the surface, tank field or through paving base rock.

Dedicated vapor extraction wells are normally screened with 2-inch or 4-inch diameter, 0.030-inch slotted casing. A coarse sand pack is used to minimize resistance to air flow. Typical air flow rates from a single well are 25 to 100 scfm.

Well installation protocols are found in HETI's "Drilling, Well Construction and Sampling Protocols." These will be followed.

Conducting The Test

Prior to any testing activities, HETI will verify that necessary air discharge permits have been secured or notifications made. To the extent possible, testing will be conducted so that disruptions of normal business activities at the project site are minimized. Testing equipment will be inspected for suitability and integrity prior to performing work.

1. Extracted soil vapor will be treated with an internal combustion engine, or equivalent, before being discharged to the atmosphere. The engine will be rented from a third party that has specifically modified the engine to treat extracted soil vapor.
2. A Gastech 1214S LEL meter, or equivalent, will be used to measure the vapor concentration in each well. These readings will be recorded. Testing will begin with the well with the highest concentration.
3. The depth to water (and product) in each extraction and observation well will be measured and recorded.
4. A Magnehelic® or manometer will be connected to each observation well. These instruments will be vented prior to beginning the test.
5. After applying vacuum to the extraction well, the vacuum and flow rate will be recorded. Within 5 minutes, a vapor sample will be collected from the well. Corresponding O_2 and LEL readings will be recorded.
6. A second person will record vacuum vs time in the nearest observation wells. Initial readings will be taken as frequently as possible until vacuum stabilizes. Vacuum may stabilize within the nearest observation well within minutes.
7. Readings of flow, vacuum, extraction well temperature, O_2 and vapor concentration from the extraction well will be recorded until one pore volume has been removed.
8. After one pore volume has been removed, a second vapor sample from the extraction well should be collected. A corresponding O_2 and LEL reading will be recorded.
9. Steps 4 through 8 may be repeated on other extraction wells, especially if screened at different vertical intervals.

HETI Vapor Extraction Test Setup

Client: _____ HETI Job Number: _____

Site Address: _____

Vacuum Source: _____

Flow Measuring Instrument: _____

Barometer Reading: _____ Source: _____ Site Elevation _____

Pore volume: $V_p = \varepsilon_A \pi R^2 H$

$= $ _____

$= $ _____

Where:

ε_A = the air-filled void fraction. If unknown, assume 0.3.
R = radius of the zone of contamination
H = the vertical thickness of the zone of contamination or the screen height, whichever is greater

Well No.	Well Dia. in.	Slot Width in.	Slot Spacing in.	Depth to Screen ft	Depth to Water ft	Depth to Bottom ft	Screened Interval ft

HETI Vapor Extraction Test Log

Client: _____ HETI Job Number: _____

Site Address: _____

Tester(s): _____ Date: _____

Extraction Well: _____

Time	Applied Vacuum in. WC	Extract'n. Rate ft/min	Sample - LEL %	Sample - O_2 %	Well _____ Vac,"WC	Well _____ Vac,"WC	Well _____ Vac,"WC	Well _____ Vac,"WC	Well _____ Vac,"WC	Comments
Distance from Extraction Well, ft										

8/27/93

SITE SAFETY PLAN

FOR

CLIENT: EZ SERVE

SITE: 10877 **Job No:** 7-278

ADDRESS: 525 WEST A STREET
HAYWARD, CA

SCOPE OF WORK (Check all that apply):

Soil Excavation	☐	**Soil Stockpile Sampling**	☐
Drilling	☐	**Monitoring Well Sampling**	☐
Testing		**System Installation**	
Aquifer	☐	**Ground Water**	☐
Vapor Extraction	☑	**Vapor Extraction**	☐
Air Sparging	☐	**Air Sparging**	☐

System Operation and Maintenance... ☐

PURPOSE AND SCOPE

This Site Safety Plan (SSP) establishes the basic safety guidelines and requirements for the above scope(s) of work at the above site (see Site Location Map - Figure 1). This SSP addresses the expected potential hazards that may be encountered during this project.

The provisions set-forth in this SSP will apply to Hydro-Environmental Technologies, Inc. (HETI) employees and any subcontractors working for HETI at the job site. All personnel working for HETI, including subcontractors, at the job site must read this SSP, and sign the attached Compliance Agreement (Appendix A) before entering the work area.

I. FACILITY BACKGROUND / WORKPLAN

SITE BACKGROUND AND HISTORY:

Several episodes of subsurface site assessment have been conducted since the discovery of a leak in the product lines in 1986. Applicable conditions at the site are as follows:

- The site is currently not in use. The only structures on site are the canopy over the former dispenser islands, some lights and a surrounding fence.
- Soils are predominantly silty clay. Sand has been observed in some borings at an approximate depth of 10 to 15 feet below ground surface (ft bgs) and again at approximately 25 to 30 ft bgs. The maximum depth explored was 30 ft bgs.

- Ground water is at approximately 17.8 ft bgs (June 1993). The ground water gradient is toward the west at 0.14% (June 1993). The depth to ground water has ranged from 16 to 22 ft bgs.
- The highest reported concentration of petroleum hydrocarbons in soil samples taken from borings drilled at the site is 19 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) in the boring for well MW-4. The highest concentration of benzene reported in soil samples (at 2.7 ppm) is also from the boring for well MW-4. All other on-site borings contained reportable concentrations of TPHg and benzene.
- Concentrations of petroleum hydrocarbons in the June 1993 on-site ground water samples ranged from 5,700 parts per billion (ppb) TPHg to 60,000 ppb TPHg. Concentrations of petroleum hydrocarbons in the June 1993 samples from off-site wells MW-7, MW-9 and MW-10 were similar. Petroleum hydrocarbons were reported in the sample from up-gradient well MW-8 at a concentration of 350 ppb TPHg.
- Eleven monitoring wells exist, eight on site and three off site. All wells have a total depth of 30 feet except well MW-1A, which is 17.8 feet deep.

WORK ACTIVITIES:

The tasks proposed to be performed under this SSP include the following:

- Perform a SVE test.
- Analyze data/results and prepare design criteria based on the findings of the field test.
- Prepare an Interim Remediation Work Plan.
- Prepare system construction and installation specifications.

II. KEY SAFETY PERSONNEL AND RESPONSIBILITIES

All personnel working for HETI at the job site are responsible for project safety. Specific individual responsibilities are listed below:

Project Manager: JOHN TURNEY

The Project Manager is responsible for preparation of this SSP. He/she has the authority to provide for the auditing of compliance with the provisions of this SSP, suspend or modify work practices, and to report to the Regional Manager any individuals whose conduct does not meet the provisions presented in this SSP. The Project Manager can be reached at (510) 521-2684.

Site Safety Officer: _____

The Site Safety Officer (SSO) is responsible for the dissemination of the information contained in this SSP to all HETI personnel working at the job site, and to the responsible representative(s) of each subcontractor firm working for HETI at the job site.

The SSO is responsible for ensuring the following items are adequately addressed:

- Inspection of tools, drilling equipment and safety equipment
- Safety supplies & equipment inventory
- Site-specific training/hazard communication
- Accident/incident reporting
- Decontamination/contamination reduction procedures

The Site Safety Officer shall be responsible to take necessary steps to ensure that employees are protected from physical hazards, which could include;

- Falling objects such as tools or equipment
- Falls from elevations
- Tripping over hoses, pipes, tools, or equipment
- Slipping on wet or oily surfaces
- Insufficient or faulty protective equipment
- Insufficient or faulty operations, equipment, or tools
- Noise

The SSO has the authority to suspend work anytime he/she determines the safety provisions set-forth in this SSP are inadequate to ensure worker safety. The SSO or Project Manager must be present during all phases of the site work.

SSO Pager Number: ____( )_____

III. JOB HAZARD ANALYSIS / SITE CHARACTERIZATION

CHEMICAL HAZARDS:

The hazardous chemicals which may be encountered at the site are petroleum hydrocarbons, including benzene, toluene, ethylbenzene, and xylene. A summary of relevant chemical, physical and toxicological properties for each chemical hazard is discussed below:

Benzene: Colorless liquid with an aromatic odor.

Vapor pressure	75 mm Hg @ 68 °F
Flash point	12 °F
Hazard classification	flammable liquid
Permissible exposure limit (PEL)	none

Benzene is recognized by the National Institute of Occupational Safety and Health (NIOSH) as a potential human carcinogen.

Benzene can enter the body through all four routes of exposure: (1) inhalation; (2) adsorption; (3) ingestion; and (4) injection. Target organs are the blood, central nervous system, skin, bone marrow, eyes, and respiratory system. Acute exposure effects include irritation of the eyes, nose, and respiratory system as well as headache, nausea, staggered gait, depression, and abdominal pain. The chronic effect of over-exposure is the potential for cancer.

Toluene: Colorless liquid with an aromatic odor.

Vapor pressure	22 mm Hg @ 68 °F
Flash point	40 °F
Hazard classification	flammable liquid
Permissible exposure limit (PEL)	100 ppm

Toluene can enter the body through all four routes of exposure: (1) inhalation; (2) adsorption; (3) ingestion; and (4) injection. Target organs are the central nervous system, liver, kidneys, and skin. Acute exposure effects include fatigue, dizziness, headache, euphoria, dilated pupils, paralysis.

Ethylbenzene: Colorless liquid with an aromatic odor.

Vapor pressure	7.1 mm Hg @ 68 °F
Flash point	55 °F
Hazard classification	flammable liquid
Permissible exposure limit (PEL)	100 ppm

Ethylbenzene can enter the body through all four routes of exposure: (1) inhalation; (2) adsorption; (3) ingestion; and (4) injection. Target organs are the eyes, upper respiratory system, skin and central nervous system. Acute exposure effects include

irritation of the eyes and mucous membranes, nose, and respiratory system as well as headache, nausea, staggered gait, headache, dermatitis, narcosis and coma.

Xylenes: Colorless liquid with an aromatic odor.

Vapor pressure	8 mm Hg @ 68 °F
Flash point	63° F to 81 °F
Hazard classification	flammable liquid
Permissible exposure limit (PEL)	100 ppm

Xylenes can enter the body through all four routes of exposure: (1) inhalation; (2) adsorption; (3) ingestion; and (4) injection. Target organs are the central nervous system, eyes, gastrointestinal tract, blood, liver, kidneys and skin. Acute exposure effects include dizziness, excitement, drowsiness, incoordination, abdominal pain, vomiting, and irritation of the eyes, nose and throat.

Other Potentially Hazardous Chemicals:

Propane: Colorless gas with mercaptan added as an odorant (rotten egg).

Vapor pressure	>760 mm Hg @ 68 °F
Flash point	Gas
Hazard classification	flammable gas
Permissible exposure limit (PEL)	1000 ppm

Xylenes can enter the body through inhalation. Exposure effects include freezing of skin from vaporization of liquid and cold gas, dizziness, disorientation and asphyxiation.

The controls to limit potential for exposure to the above chemical hazards is addressed below:

- Inhalation of contaminants will be controlled by MONITORING VAPORS PER SECTION I. PROPANE TANK FILLING WILL BE PERFORMED BY TRAINED FILLING STATION PERSONNEL ONLY.

- Ingestion of contaminants will be controlled by prohibiting eating, drinking, smoking, and chewing in the work area. In addition, workers shall wash their hands and face before engaging in any of the above activities.

- Absorption of contaminants will be controlled by KEEPING THEM WITHIN CLOSED SYSTEM, LONG SLEEVE SHIRTS & TROUSERS, GLOVES

- Injection of contaminants will be controlled by wearing work gloves in the work area.

FIRE HAZARDS:

The potential for fire or explosion exists whenever flammable liquids or vapors are present above lower explosions limit (LEL) concentrations and sufficient oxygen is present to support combustion. These potential fire hazards are addressed below:

- The potential exists for petroleum hydrocarbon vapors to exceed LEL concentrations within the wells. However, well-gas generally does not contain sufficient oxygen to support combustion.

- Other potential fire hazards associated with the scope of work have been mitigated by: FIRE SAFETY CONTROLS ON IC ENGINE.

- In addition to the above, the HETI truck shall have an operative fire extinguisher on board. All personnel shall be familiar with its location and use.

ELECTRICAL HAZARDS:

The potential electrical hazards expected on the job site are addressed below:

- Expected voltages: N/A
- No electrical enclosures will be opened unless power is disconnected. Power will be verified disconnected with a meter prior to working on any circuits.

PHYSICAL HAZARDS:

The potential physical hazards expected at the job site are addressed below:

- The potential for physical injury exists from the operation of moving equipment such as drill rigs, forklifts and trucks. Use of steel toe boots, hard hats, and safety glasses will be required when in the work area. Backup alarms are required on all trucks and forklifts.
- The potential for physical injury exists from public traffic on the site. The site is ☐ is not ☑ open to public vehicles. Work will ☐ will not ☑ be performed in the public right-of-way. If work is performed in the public right-of-way, orange vests shall be worn, a traffic control plan is attached and an encroachment permit from the appropriate government agency shall be obtained.
- The potential for burns from hot surfaces exist from the operation of an internal combustion engine ☑, an air compressor ☐. Compressed air piping is hot. All hot surfaces shall be allowed to cool and/or be handled with thick cloth work gloves.
- The potential for noise hazards exist at the site from the operation of IC ENGINE. It is not expected that noise levels will exceed the acceptable CAL-OSHA permissible exposure level of 90 dB. However, workers should be aware of the presence of these hazards and take steps to avoid them. Ear / noise protection, though not required, shall be available to all personnel within the job site in the event noise levels exceed worker comfort or protection levels.
- Personnel should be cognizant of the fact that when protective equipment such as respirators, gloves, and/or protective clothing are worn, visibility, hearing, and manual dexterity are impaired.

HEAT STRESS:

The anticipated weather conditions will be: COOL / COLD.

The potential for heat stress is present if the temperature exceeds 80°F. Some signs and symptoms of heat stress are presented below:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms, heavy sweating, dizziness, nausea and fainting.
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea and fainting.

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occurs. Competent medical help must be obtained. Signs and symptoms are: red, hot, unusually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse and coma.

Preventing heat stress is particularly important because once someone suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat injuries. To avoid heat stress the following steps shall be taken whenever the ambient temperature is over 80 °F:

1) Field personnel shall have a work/rest cycle of 2 hours work, 15 minutes rest.

2) The Site Safety Officer shall mandate work slowdowns as needed.

IV. JOB HAZARD SUMMARY

In summary, the expected potential hazards to personnel working in the work area are (Check all that apply):

(1) Over exposure to chemical contaminants	☑
(2) Physical injury from equipment being operated at job site	☑
(3) Public traffic	☐
(4) Hot surfaces	☑
(5) Heat stress	☐
(6) Fire	☑
(7) Electrical shock	☐
(8) Other	☐

As described in Section III - Job Hazard Analysis, these potential hazards have been mitigated for the protection of both the worker health and safety. The proposed work does not appear to present any potential health risk to workers, the surrounding community, or the environment.

V. EXPOSURE MONITORING PLAN

Periodic monitoring for organic vapors is ☐ is not ☑ required. The Site Safety Officer shall monitor the ambient air in the work area with an organic vapor photoionization meter (Thermo Environmental Model 580B OVM, or equivalent) should their presence be detected by odor. If the meter indicates petroleum

hydrocarbon concentrations in the area exceed 300 ppm, the Site Safety Officer shall require personnel in the work area to wear respirators with organic vapor cartridges (MSA 464046, or equivalent).

The manufacturer's calibration procedures for the Model 580B OVM are located within the instrument case. Field calibration shall be performed daily during use.

All personnel working for HETI at the job site shall be monitored for heat stress. Because workers at the job site are expected to be wearing permeable clothing (e.g. standard cotton or synthetic work clothes), monitoring for heat stress will consist of personnel constantly observing each other for any of the heat stress symptoms discussed in Section III.

Field personnel shall be cautioned to inform each other of non-visual effects of the presence of toxins, such as: headaches, dizziness, nausea, blurred vision, cramps, irritation of eyes, skin, or respiratory tract, changes in complexion or skin discoloration, changes in apparent motor coordination, changes in personality or demeanor, excessive salivation or changes in pupillary response or changes in speech ability or pattern.

VI. PERSONAL PROTECTIVE EQUIPMENT

Level D personal protection equipment is expected to be the highest protective level required to complete the field activities for this project. Modified Level C protection may also be required at the discretion of the Site Safety Officer. The following lists summarize the personal protective equipment that shall be available to all field personnel working in the work area:

Level D Protection (shall be worn at all times)

- Boots, steel toe
- Safety glasses, chemical splash goggles, or face shield
- Hard hat
- Work gloves required ☑ optional ☑ — WHILE CONNECTING/DISCONNECTING SYSTEM — DURING SYSTEM OPERATION
- Long leg trousers
- Long sleeves required ☑ optional ☐

Modified Level C Protection (available at all times.)

- Half-face air purifying respirator with organic vapor cartridges to be used should organic vapor concentrations exceed 300 ppm as discussed in Section V of this SSP.
- Hearing protection

VII. *SITE CONTROL*

The exclusion, contamination reduction, and support zones are shown in Figure 2. these zones shall be marked with natural barriers, cones or tape as appropriate. Personnel without the proper training, personal protective equipment or who have not agreed to follow this SSP shall not be allowed into the exclusion or contamination reduction zones.

VIII. DECONTAMINATION MEASURES

Field personnel shall wash hands and face before entering a clean area. Additional decontamination measures are discussed under General Safe Work Practices (section IX).

IX. GENERAL SAFE WORK PRACTICES

The project operations shall be conducted with the following minimum safety requirements employed:

- Eating, drinking, and smoking shall be restricted to a designated support zone.
- All personnel shall wash hands and face before eating, drinking, or smoking.

X. SANITATION

The location of the nearest running water source and toilet is LIBERTY PIZZA ACROSS GARDEN AVE.

A portable potable water cooler or other source of drinking water shall be maintained on site.

XI. STANDARD OPERATING PROCEDURES

The following HETI protocols apply to this scope of work:

Drilling, Well Construction and Sampling Protocols	☐
Soil Vapor Extraction Protocol	☑
Air sparging Protocol	☐

XII EMERGENCY RESPONSE PLAN

In the event of an accident resulting in physical injury, first aid will be administered and the injured worker will be transported to
MEDICAL EXPRESS

In the event of a fire or explosion, local fire or response agencies will be called by dialling 9-1-1. The Project Manager shall also be notified.

Emergency Telephone Numbers:

Fire and Police **911**
Hospital ..... (510) 782-7111

Directions to Hospital: See Figure 1
WEST ON A ST TO HAYWARD AIRPORT
LEFT ON HESPERIAN BLVD
22429 HESPERIAN BLVD

A fire extinguisher, located in the HETI vehicle will be located on-site during all installation, testing and servicing activities.

Additional Contingency Telephone Numbers:

HETI ..... **(510) 521-268**
All cases where an accident has occurred will require filling out an incident / accident report and submitting it within 48 hours of the accident.

XIII. TRAINING REQUIREMENTS

All site personnel will be required to have completed the 40 hours of basic OSHA-SARA training for personnel assigned to hazardous waste sites in compliance with OSHA Standard 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, and all are required to participate in the annual OSHA-SARA 8-hour refresher courses.

XIV. MEDICAL SURVEILLANCE PROGRAM

HETI personnel and subcontractors engaged in field operations shall be participants in their company Medical Surveillance program, and must be cleared by the examining physician(s) to wear respiratory protection devices and protective clothing for working with hazardous materials. The applicable requirements under California Administrative Code (CAC) Title 8, Section 5216, which is available at the HETI office for review, shall be observed. Project-specific medical surveillance is ☐ is not ☑ required.

XV. DOCUMENTATION

All personnel shall sign the compliance agreement (Appendix A).

Daily documentation shall be provided by a daily log, completed by the Site Safety Officer in his/her field notebook. The Site Safety Officer shall record the names of all personnel working for HETI and any site visitor(s). (S)he shall also record accidents, illness and other safety related matters. In the case of an accident, or injury, during field operations, (s)he will prepare and submit an Incident/Accident Report.

In case air monitoring is implemented, OVM readings (including times) shall be recorded in the daily log.

SSP prepared by: _____ Date: 12/7/93

SSP Approved by: _____ Date: 12/7/93

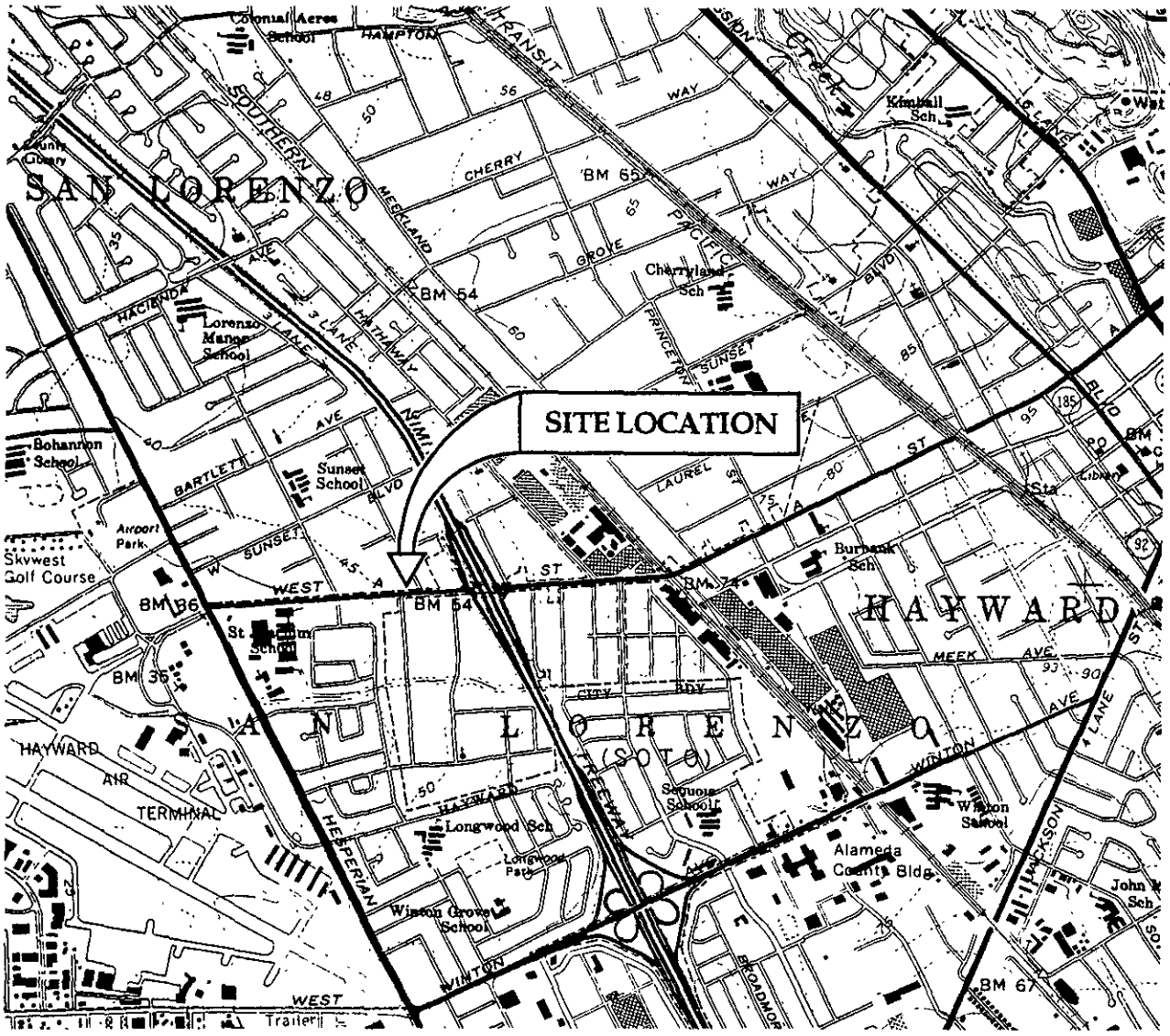
Project Manager

COMPLIANCE AGREEMENT

I have read and understand the Site Safety Plan.

I will comply with the minimum safety requirements set forth in this Site Safety Plan. I agree to notify the responsible employee of HETI should any unsafe acts be witnessed by me while I am on this site.

Print Name	Company	Signature	Date



SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

NORTH

Source: USGS 7.5' Quadrangle "Hayward"

HYDRO-ENVIRONMENTAL TECHNOLOGIES, INC.	**SITE LOCATION MAP** E-Z Serve Station No. 100877 525 West A Street Hayward, California	**Job No. 7-278** **Figure 1** 12/7/93