Texaco Refining and Marketing Inc
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Ms. Juliet Shin
Alameda Health Care Services Agency
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 95621

Subject: Workplan for the Installation and Operation of an Interim Soil and Groundwater Remediation System utilizing an internal combustion (I.C.) engine and carbon adsorption system for the Former Texaco Service Station, 1127 Lincoln Avenue, Alameda, California.

Dear Ms. Shin:

This Workplan has been prepared to outline the installation and operation of an interim soil and groundwater remediation system for the former Texaco Service Station, 1127 Lincoln Avenue, Alameda, California. Prior sub-surface environmental investigations indicate that soil underlying this site contains residual gasoline hydrocarbons and that dissolved petroleum hydrocarbons are present in groundwater. This workplan outlines and describes the interim soil and groundwater remediation system proposed for this site.

INTRODUCTION

The objectives of the soil and groundwater remediation program include removal of the residual, and dissolved hydrocarbons from soil and groundwater underlying the site, and prevention of further migration offsite. To accomplish these objectives, Texaco Environmental Services (TES) recommends a remediation system consisting of a vapor-extraction system, a groundwater recovery system, and above-ground equipment for treatment of extracted soil vapor and groundwater prior to discharge to the atmosphere and sanitary sewer system.

Dissolved gasoline-petroleum hydrocarbons are currently present on the groundwater surface onsite and possibly down-gradient from the site. As the elevation of the groundwater surface changes due to natural seasonal fluctuations or induced drawdown, soil will be brought into contact with the additional dissolved hydrocarbons, resulting in the adsorption of these hydrocarbons onto sediment grains. The resulting residual hydrocarbons are generally more difficult to remove, especially if the affected soil is re-saturated with groundwater. We therefore recommend that a gradual

depression of the groundwater surface be induced to elevations below the previous seasonal low (approximately two feet above mean sea level). This recommendation places constraints on the rate of groundwater extraction. Maximum drawdown can be deferred for several months until a significant reduction is observed in the rate of the hydrocarbon removal from the soil above groundwater and the existing capillary fringe.

VAPOR-EXTRACTION SYSTEM

On the basis of the information supplied in previous reports, and information from sites with similar subsurface characteristics, TES recommends use of a vapor-extraction system in conjunction with a groundwater removal and treatment system as a practical and cost effective remediation alternative. We anticipate that the vapor-extraction component of the remediation system will directly remove residual product and hygroscopic groundwater containing dissolved product. Vapor extraction will also enhance the volatilization of dissolved hydrocarbons from groundwater to vapor-phase hydrocarbons in the pore space above the groundwater surface. These volatilized hydrocarbons will, in turn, also be removed by the vapor-extraction system.

Construction and operation of off-gas treatment devices for abatement of volatile organic compounds requires a permit from the Bay Area Air Quality Management District (BAAQMD). There are generally four available treatment alternatives to control volatile organic compound off-gas emissions that meet BAAQMD guidelines. These are thermal oxidation, catalytic oxidation, carbon adsorption, and combustion by an internal combustion (I.C.) engine. The initial hydrocarbon concentrations and the duration of remediation system operation make the use of both thermal and catalytic oxidizers prohibitive.

The proposed vapor-extraction system will use existing vapor-extraction wells, installed earlier at this site under a separate phase of work, to extract hydrocarbon-bearing vapor from the soil. Groundwater will be extracted from one or more onsite monitoring well (MW-1, 2, & 5). It is not practical to induce a significant vacuum or an extraction flow rate over an area that includes clean soil. Ideally, a well designed and placed vapor-extraction system should only affect the area of concern. Therefore, each wellhead will be equipped with vacuum gages, sample ports, and shut-off valves so that the flow out of each well can be adjusted to maximize the total pounds of petroleum hydrocarbons being removed from the soil.

The locations of the groundwater and vapor-extraction wells, remediation system trenching, and remediation compound are shown on drawing SM-1. A volume flow rate of up to 150 cfm and the potentially high initial hydrocarbon concentrations may make the use of activated carbon costly, particularly in the first few weeks of remediation system operation. Therefore, TES recommends that an internal combustion engine be installed onsite and operated as a short term emission-control device. A copy of the Authority to Construct/Permit to Operate a Soil Vapor-Extraction System permit application package, as previously filed, is attached.

This selection of an I.C. engine as the initial abatement device was made also because of safety concerns. The loading of vapor-phase activated carbon with petroleum hydrocarbon-bearing vapor produces significant amounts of heat at high hydrocarbon concentrations. Elevated carbon canister temperatures can easily cause ignition of the activated carbon, melting of connecting piping, and other safety concerns. Additionally, breakthrough of both carbon canisters may occur much faster during the first days of system operation, resulting in higher operating costs. As soon as TPHg concentrations have been reduced to approximately 200 ppmv. The I.C. engine can be removed and the system modified to operate with vapor-phase activated carbon as emission control.

Hydrocarbon concentrations in extracted vapor at this site are expected to decrease substantially in the first few months of operation. TES will use a six-cylinder internal combustion (I.C.) engine for the first several months of system operation. The layout of this trailer mounted I.C. engine is shown on the attached VET-1. A process flow diagram of this I.C. engine is shown on the attached VET-2.

GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

The vapor-extraction component of the remediation system will remove a significant portion of the residual hydrocarbons, and will also enhance volatilization of dissolved hydrocarbons from groundwater. Extracting groundwater from these wells will assist in providing hydraulic control and additional recovery of the dissolved hydrocarbon plume. TES proposes to begin water extraction by utilizing, existing groundwater monitoring well MW-5, one of the three proposed water extraction wells. Later, the additional proposed recovery wells, existing wells MW-1 and MW-2, will be activated and brought into the system. The location of these proposed recovery wells (MW-1, MW-2, and MW-5) are shown on SM-1.

TES will be utilizing a modular approach to remediation at this site. A trailer-mounted groundwater treatment system, including water filters, an aeration system, a water hardness chemical injector, and activated carbon polishing is proposed for this site. Instrumentation and controls on this system include water level indicators, transfer pumps, flow indicator, flow totalizer, and sample ports. The system is trailer-mounted and is provided with double-containment for all water and chemical storage drums. An approximate layout of this trailer-mounted system is shown on the attached GTS-1. The system can also be operated without aeration treatment. The aeration tank then serves as only a settling tank before extracted groundwater is treated by liquid-phase activated carbon. A process flow diagram of this system, along with the compressor and groundwater extraction pump, is shown on the attached GTS-2.

Due to the low transmissivity of the water-table aquifer, recovery well productivities are limited. Available disposal options and disposal rates for treated groundwater are also limited. TES proposes to use a groundwater pump or pumps to recover a maximum of approximately 2.0 gpm of groundwater. This maximum will be derived from pumping out of one groundwater extraction well or a combination of these wells. We propose to operate the groundwater extraction pump only at the minimum pumping rate required to produce adequate hydraulic control of the dissolved hydrocarbon plume. The hydraulic control will be evaluated by monitoring the drawdown of the potentiometric surface on a monthly frequency; quantitative analyses of groundwater samples will also continue on a quarterly basis. Each groundwater recovery well will be fitted with quick-disconnect fittings to the piping of the groundwater removal system. This will allow relocation of pumps within the system without rewiring or repiping of the groundwater removal system. These quick-disconnect fittings also enhance flexibility to focus groundwater removal in areas of greatest concern. As remediation progresses, these areas of concern will be identified through laboratory analyses of water and vapor samples from each well.

Treatment of the 2.0 gpm removed by the groundwater extraction system will be in two stages. The first stage will consist of an aeration system consisting of spray, tray, and diffused aeration. Air removed from this aeration system will be treated by the internal combustion engine as part of the off-gas treatment system. Typical removal rates for diffused aeration tanks such as these are above 95 percent reduction from inlet conditions. Activated carbon will be used as secondary water treatment. Two in-line canisters of liquid-phase granular activated carbon will be used for this

secondary water treatment. If the system is operated without aeration treatment, the aeration tank then serves as only a settling tank before extracted groundwater is treated by liquid-phase activated carbon. When inlet vapor-phase hydrocarbon concentrations have been reduced to below 200 ppmv, the system can be modified to operate with activated carbon as the emission control device. Activated carbon can then be used to treat liquid and vapor process streams. As initially configured, the groundwater treatment system is capable of processing up to ten gallons per minute.

REMEDIATION COMPOUND

The remediation compound will house all of the above-grade portion of the remediation system and will be located in the south-eastern portion of the station (SM 1). The groundwater remediation trailer and the I.C. engine will both be located in a remediation compound about the size of one parking space at this site. An approximate system layout is shown on RCL-1. The vapor-abatement portion of the remediation system will be converted to use activated carbon after the I.C. engine is removed from the site. The remediation compound layout with this configuration is shown on RCL-2.

Two possibilities for discharge of the treated groundwater were considered. These were discharge to the sanitary sewer and discharge to a storm drainage system. Discharge to the storm drain system through the National Pollution Discharge Elimination System (NPDES) is allowed only after refusal is obtained from other available discharge alternatives. Your agency will receive a copy of the discharge permit application when it is submitted to the East Bay Municipal Utilities District (EBMUD).

PERMITTING

As mentioned above, an air discharge permit has been filed with the BAAQMD, and a treated groundwater discharge permit is being completed and will soon be filed with EBMUD. Processing times for these permits are typically between two and three months. Additional permits will be required from the City of Alameda Building, Fire, and Planning and Safety Departments. Application for these permits will be initiated upon permit approval of both discharge applications.

SYSTEM START-UP AND OPERATION

The following procedures should be used when the groundwater treatment system is being started-up for normal operation:

1. Inspect System Installation. This includes verifying that the all valves, piping, and equipment are installed according to design.

2. Fill all water lines, diffused aeration tank, and liquid-phase activated carbon canisters with water. Check for air blockage or leaks.

3. Turn Main Power on.

4. Turn on vapor-extraction blower selected to run either with or without vapor-extraction wells. This begins the air flow through the diffused aeration tank. Adjust air flow to optimize volatilization rate in the aeration tank.

5. Turn on power to controls, instrumentation, and compressor. All instrumentation and transmitters are to be calibrated or adjusted as appropriate.

6. Activate switch to open solenoid from compressor to groundwater pump. Adjust regulator to set the groundwater pumping flow rate to 1.2 gpm.

7. Observed operation of system and verify that all gauges and meters are functioning correctly.

System monitoring will be conducted based on the requirements set forth by EBMUD or by the self-monitoring program set forth by the Regional Water Quality Control Board's Resolution No. 73-16. System start-up and operation instructions will be included in the Operation and Maintenance Manual for the treatment system, copies of which will be kept onsite for operating personnel.

Operation and maintenance of the groundwater treatment system will include weekly site inspection and cleaning of water filters, removing bacteria and scale in the aeration tank when needed, and periodic sampling of system influent and effluent water as required by EBMUD. The results of the influent and effluent water sampling events will be used as an indication of the loading of the activated carbon canisters. A totalizing flow meter will be installed to determine the quantity of treated groundwater

discharged. Process monitoring equipment will be installed to insure the quality of the discharged water.

Subsequent evaluation will be made of the efficacy of the operating interim remediation system. Appropriate system additions or modifications to system configuration can be made on as needed based on the results of system evaluation.

FUNDING

Funding for the installation, operation, and maintenance of this remediation project will be provided on an on-going basis by TES.

OPERATOR STAFFING

The system will be operated and maintained under the direction of TES engineers and field technicians. The remediation system is designed to operate continuously, 24 hours per day, without continuous operator attention. Systems instrumentation and controls have been designed to shut the system down if and when abnormal conditions occur. The site will be visited once a week to confirm the correct operation of the system and to maintain the system.

TRAINING REQUIREMENTS

All engineers and field technicians working at this site and potentially exposed to hazardous substances, health or safety hazards, have received Hazardous Waste Operations and Emergency Response Training, which satisfies the requirements of 29 CFR 1910.120. All engineers and field technicians working at this site will also receive an eight-hour training session, with both office and onsite training, covering the theory, operation and maintenance of this groundwater removal and treatment system utilizing a diffused aeration tank and activated carbon canisters. All engineers and field technicians working at this site will also be familiar with basic principals of the plumbing and electrical components at the site, as well as with similar treatment systems.

Please call me at (818) 505-2476 if you have any questions or wish to discuss this workplan.

Very truly yours,
Texaco Refining and Marketing Inc.

Bob Robles
Environmental Protection Coordinator

Ravi Vangipuram, PE, CIH
Project Manager

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Attachments

Vicinity Map
AM-1, Area Map
SM-1, Site Map
GTS-1, Trailer Mounted Groundwater Treatment System "S-1"
GTS-2, Groundwater Extraction and Treatment System Process Diagram, "S-2"
VET-1, Vapor-Extraction Internal Combustion Engine, "A-1"
VET-2, Internal Combustion Engine Process Diagram, "A-2"
RCL-1, Initial Remediation Compound Layout
RCL-2, Long-Term Remediation Compound Layout
- Authority to Construct/Permit to Operate Permit Application submitted to the Bay Area Air Quality Management District
- **(NOT SUBMITTED-TO FOLLOW)** Permit Application to discharge Treated Groundwater to the Sanitary Sewer submitted to the East Bay Municipal Utilities District

cc: Mr. Vijay Patel, CRWQCB-SF Region
Mr. Michael Hodges, CEECON
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