PES Environmental, Inc.
Engineering & Environmental Services

October 31, 1996

167.0200.P02

Mr. Dale Klettke
Alameda County Department of Environmental Health
1181 Harbor Bay Parkway
Alameda, California 94502

TRANSMITTAL
REVISED INTERIM REMEDIAL ACTION PLAN
SOIL EXCAVATION AND PASSIVE IN-SITU BIOREMEDIATION
FORMER BILL COX CADILLAC FACILITY
230 BAY STREET
OAKLAND, CALIFORNIA

Dear Mr. Klettke:

Enclosed please find a copy of the above referenced interim remedial action plan. Please call either Andrew Briefer or me at (415) 899-1600 should you have any questions.

Yours very truly,

PES ENVIRONMENTAL, INC.

Kyle S. Flory

Enclosure

cc: Mr. Steven Schulman, Wells Fargo Bank
Rory Campbell, Esq., Hanson Bridgett
Mr. Don Eisenberg, EOA
Mr. Bill Cox, Cox Cadillac
Leah Goldberg, Esq., Hanson Bridgett

1670200T.004

1682 Novato Boulevard • Suite 100 • Novato, California 94947 • TEL (415) 899-1600 • FAX (415) 899-1601

PES Environmental, Inc.
Engineering & Environmental Services

FAX TRANSMITTAL

Date *10/31/96 6:11 PM*

Number of pages including cover sheet **17**

To:	*Dale Klettke*
Fax:	*(510) 337-9335*
Office:	*ACDEH*
Subject:	*Revised Interim Remedial Action Plan Former Cox CadillacFacility Oakland California*

From:	**PES Environmental, Inc.** *1682 Novato Boulevard, Suite 100* *Novato, California 94947*
Phone	*(415) 899-1600*
Fax Phone	*(415) 899-1601*
Sent By:	*Andy Briefer*
PES PROJECT	*167.1101.001*

☐ *Urgent* ☒ *For your review* ☐ *Reply ASAP* ☐ *Please Comment*

REMARKS:

A draft copy of this workplan has been sent to Bill Cox and Don Eisenberg earlier today. Neither of them will have the opportunity to provide comments until early next week, however we felt it important to meet the deadline.

cc: Leah Goldberg

If this transmittal has been received in error, please contact
PES ENVIRONMENTAL, INC.
at your earliest convenience (415) 899-1600.

PES Environmental, Inc.
Engineering & Environmental Services

October 31, 1996

167.0200.P02

Mr. Steven Schulman
Wells Fargo Bank
c/o Rory Campbell, Esq.
Hanson, Bridgett, Marcus, Vlahos, & Rudy
333 Market Street, Suite 2300
San Francisco, California 94105-2173

REVISED INTERIM REMEDIAL ACTION PLAN
SOIL EXCAVATION AND PASSIVE IN-SITU BIOREMEDIATION
FORMER BILL COX CADILLAC FACILITY
230 BAY STREET
OAKLAND, CALIFORNIA

Dear Messrs. Campbell and Schulman:

PES Environmental, Inc. ("PES") is pleased to present Wells Fargo Bank ("Wells Fargo") and Hanson, Bridgett, Marcus, Vlahos & Rudy ("Hanson Bridgett") this Revised Interim Remedial Action Plan (Workplan) for remediation of gasoline-affected soil and groundwater associated with a former 10,000-gallon underground gasoline tank operated by Bill Cox Cadillac at 230 Bay Street, Oakland, California (Plate 1). This Workplan is proposed to supersede *EOA's Corrective Action Plan* dated September 5, 1996. It was requested by Mr. Dale Klettke of Alameda County Department of Environmental Health Services (ACDEH) in a letter to Ms. Leah Goldberg of Hanson Bridgett dated October 24, 1996. The October 24, 1996 ACDEH letter specified that soil remediation will include excavation of hydrocarbon-affected soil, and groundwater remediation will include implementation of an oxygen-releasing system. This Workplan contains: (1) a brief discussion of background information; (2) a summary of previous findings; (3) a summary of the remediation approach and scope of work for remediation of soil and groundwater at the site; and (4) a schedule for conducting the work.

1.0 BACKGROUND INFORMATION

The nearly two-acre Bill Cox Cadillac facility is bounded on the northwest by Harrison Street, the southwest by Bay Street, and on the southeast by Vernon Street (Plate 1). The facility has historically been used for automobile sales and services. The onsite activities have included automobile sales, storage, maintenance, repair and painting. Onsite activities have also included use and storage of chemicals associated with these activities, including fuels, oils, greases, paint, thinners, and petroleum solvents. The facility presently contains an approximately 30,000 square feet vacant building. Approximately 6,500 square feet of the building was used or a sales showroom and offices, while the remainder of the building was

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used for automobile storage, body work and painting and an indoor service area. The remaining areas of the site are asphalt covered parking areas.

2.0 PREVIOUS FINDINGS

In December 1988, a 3,000-gallon waste oil storage tank was removed from the southern side of the building in December 1988 by R.S. Eagan & Company ("Eagan") of Concord, California. The location of this former tank is shown on Plate 2. Soil and groundwater in the excavation were sampled at the time of tank removal; however, analytical data were inconclusive as to the presence of petroleum hydrocarbon compounds.

Mr. Thomas Peacock of ACDEH requested in a letter to Mr. Bill Theuringer of Bill Cox Cadillac dated December 15, 1992 that a workplan for a soil and groundwater investigation related to the former waste oil tank be submitted to ACDEH.

PES was retained by Wells Fargo and Hanson Bridgett in January 1993 to prepare a workplan, and install one groundwater monitoring well down gradient of the former waste oil tank and obtain groundwater samples from the well for laboratory analyses. In February and March 1993, one monitoring well (Well MW-1) was installed and sampled. The results of the groundwater sample analyses indicated that Total Petroleum Hydrocarbons quantified as gasoline (TPHg) was present at a concentration of 110 ppm. Gasoline detected in groundwater was characterized as "fresh" and no waste oil constituents were detected. Consequently, an additional phase of investigation was conducted to investigate the degree and extent, and the likely source of the gasoline contamination. In October 1993, seven temporary monitoring wells (Wells TW-1 through TW-7) were installed at locations shown on Plate 2. Groundwater samples were collected and analyzed and the groundwater gradient was determined. Results of the additional investigation indicated petroleum hydrocarbon related compounds were detected in four of the temporary wells and in well MW-1. TPHg concentrations ranged from 2 mg/l to 140 mg/l, benzene from 0.065 mg/l to 48 mg/l, toluene from 0.018 mg/l to 25 mg/l, ethylbenzene from 0.049 mg/l to 4 mg/l and total xylenes from 0.033 mg/l to 23 mg/l. The highest concentrations of petroleum hydrocarbon constituents were detected in groundwater samples from two wells (TW-5 and TW-7) closest to the 10,000-gallon gasoline tank and product piping. The general groundwater flow direction was determined to be west-southwest, toward Bay Place, at a gradient of approximately 0.04 feet per foot. The methods and results of the March and October 1993 investigations were presented in PES' December 23, 1993 report, *Soil and Groundwater Investigation, Bill Cox Cadillac, 230 Bay Place, Oakland, California*.

Based on the detection of fresh gasoline in groundwater in the vicinity of the 10,000-gallon gasoline tank, the tank was removed by DECON Environmental Services of Hayward, California and observed and documented by Eisenberg, Olivieri & Associates (EOA) of Oakland, California in January 1994. At that time a corrosion hole was observed in the product piping between the tank and dispenser. Floating free-phase product was observed on the groundwater surface in the tank excavation.

Following tank removal, additional affected soils were excavated and disposed offsite. Some affected soils were left in place because, according to EOA, of geotechnical stability concerns for the adjacent building. EOA, on behalf of Bill Cox, subsequently performed limited investigation to evaluate the offsite extent of gasoline contamination. Additionally, EOA prepared several portions of a Corrective Action Plan (CAP) dated April 1, July 25 and September 5, 1996. The CAP sections recommended active in-situ bioremediation and passive enhanced bioremediation.

3.0 EVALUATION OF REMEDIAL ALTERNATIVES

Although the remedial approaches presented by EOA in their September 5, 1996 CAP, have been approved by ACDEH, the anticipated timeliness and effectiveness of the proposed interim groundwater remedy was not sufficient to meet the redevelopment schedule for the property. PES reviewed potentially applicable alternative groundwater remedial methods. These include: (1) extraction and treatment of groundwater; (2) active in-situ bioremediation of groundwater; and (3) regulatory compliance monitoring. A summary of each method is presented below.

Groundwater Remediation

Extraction and treatment is a method in which groundwater is pumped from an extraction well through a treatment system such as activated carbon or air stripper to remove the hydrocarbons prior to discharge to the sanitary or storm sewer under the authority of the appropriate discharge permit. Groundwater extraction can be effective in preventing migration of hydrocarbon-affected groundwater. However, due to (1) the low solubility of petroleum hydrocarbons in groundwater, (2) the high affinity of petroleum hydrocarbons to fine soil particles, and (3) the low groundwater extraction rate, petroleum hydrocarbons would be removed from the site subsurface at a slow rate. This method is relatively costly and requires significant amounts of equipment and operator attention. In addition, permitting, design, construction, and start-up of an extraction and treatment system may not be completed until March 1997 and operation may be required for an indefinite period of time.

In-Situ Groundwater Remediation

Active in-situ bioremediation, proposed by EOA in their September 5, 1996 CAP, involves introduction of oxygen and nutrients into the subsurface to biologically degrade hydrocarbon in groundwater. Groundwater extraction and treatment is performed concurrently to maintain hydraulic control of the hydrocarbons and injected nutrients. Nutrient injection and groundwater extraction are usually accomplished with a system of wells or trenches. Although active in-situ bioremediation may be able to address both petroleum hydrocarbons in groundwater and currently unsaturated soils which are not accessible for excavation, it is PES' opinion it is a costly method which may be less effective than a passive bioremediation approach. Active bioremediation may be less effective than a passive approach because operating a groundwater extraction system will prevent the flow of injected nutrients from reaching the offsite areas downgradient of the groundwater extraction points. In addition, permitting, design, construction and start-up of an extraction and treatment system may not be completed until March 1997. Furthermore, significant amounts of equipment and operator attention are required for this approach and the above ground facilities may be an impediment to redevelopment of the site.

It is PES' experience that during the time required to perform additional testing, design, permitting, installation and start-up (as proposed by EOA), considerable progress could be achieved using a passive bioremediation method to introduce oxygen and nutrients into the contaminated zones to accelerate the natural biodegradation of dissolved petroleum hydrocarbons. Introducing oxygen and nutrients into the subsurface and allowing the natural groundwater flow to carry them to the contaminated areas requires relatively little effort and expense and could be achieved using existing monitoring wells.

Non-Attainment Area Monitoring

Regulatory compliance monitoring is an alternative to remediation. Recent revisions to the RWQCB's Water Quality Control Plan (also known as the Basin Plan), and revisions to state-wide and regional policy regarding remediation of leaking underground fuel tanks, allow for alternative approaches to remediation of petroleum hydrocarbon-affected groundwater. Specifically, if it can be demonstrated that a groundwater hydrocarbon plume has not migrated offsite and is not continuing to migrate, then long term monitoring of the groundwater may be acceptable in lieu of an active remediation program. The source of the contamination must be removed or isolated. Furthermore, it must be demonstrated that no cost-effective remedial alternatives exist and an evaluation of risks must be performed. This alternative is not a viable option for this site because risk evaluations performed by EOA indicate unacceptable risk levels for users of the property.

4.0 PROPOSED REMEDIAL APPROACH

Wells Fargo intends to lease or sell the property. In order to prepare the property for lease or sale, the risk to human health posed by environmental conditions must be addressed and regulatory closure of the former 10,000-gallon UST obtained. PES' recommendation, as described below, is intended to cost-effectively reduce concentrations of petroleum hydrocarbons in soil and groundwater concurrently with completing the characterization of the lateral extent of contamination. The reduction in petroleum hydrocarbon concentrations, particularly benzene, will reduce the currently unacceptable risk levels. Additionally, the implementation of an approved remedial plan will allow the property to be leased or sold. PES' proposed approach is a flexible one that will accommodate the use and/or redevelopment of the site.

Soil Remediation

The hydrocarbon-affected soils beneath the former piping between the former UST excavation and the former dispenser will be excavated, characterized and disposed at an appropriately licensed disposal facility. The hydrocarbon-affected soil beneath the former piping and adjacent to the north wall of the former UST excavation is present at depths from approximately 2 feet below ground surface (bgs) to 6 feet bgs (Plate 3). The extent of soil excavation will be limited to the area beneath the former piping that was affected by hydrocarbons based on soil analytical results obtained during the UST removal activities (EOA, 1994). Based on EOA's soil analytical results the extent of hydrocarbon-affected soil extends from the north wall of the former excavation to the approximate location of soil sample number S4. Soil sample S4 was collected beneath the former piping approximately 27 feet to the northeast of the north wall of the former excavation. The excavation of hydrocarbon-affected soil will extend approximately 27 feet northeast of the north wall of the former UST excavation to an estimated depth of approximately 6 feet bgs. The depth of the excavation is estimated to be 6 feet bgs; however, the excavation will not extend into the shallow water-bearing zone. The approximate extent of the proposed excavation is presented on Plate 3. The excavation will be conducted during dry weather prior to implementation of the proposed groundwater remediation.

Groundwater Remediation

PES proposes to conduct enhanced passive in-situ bioremediation as the interim remediation measure. Enhanced passive in-situ bioremediation is a technique that uses naturally occurring hydrocarbon-utilizing microbes to degrade petroleum hydrocarbons in soil and groundwater. The recommended bioremediation approach involves stimulating the native soil bacteria through the addition of oxygen and nutrients (possible including nitrogen and phosphorus) to the affected zone which results in the accelerated degradation of petroleum hydrocarbons in the soil and groundwater by these microbes. This method has several advantages relative to conventional groundwater remediation methods in that it destroys the hydrocarbons and, because the process occurs in-situ, it is not as limited as groundwater extraction by the low solubility of the hydrocarbons in groundwater.

Bioremediation has been previously approved by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) and implemented at similar sites in the Bay Area. PES has implemented bioremediation programs at gasoline-contaminated sites, including sites regulated by ACDEH and RWQCB.

The rate of bioremediation of hydrocarbons in soils and groundwater is typically limited by the supply of available oxygen and possibly by nutrients such as nitrogen and phosphorus. Therefore, PES proposes to apply a combination of passive in-situ bioremediation methods to introduce oxygen and nutrients into groundwater at the site to enhance biodegradation rates of petroleum hydrocarbons. The methods include: (1) adding a nutrient- and hydrogen peroxide-enriched water (hereinafter referred to as enriched water) and (2) placement of Oxygen Releasing Compound (ORC) in selected wells at the site.

The enriched water will consist of concentrated hydrogen peroxide and nutrients mixed with dechlorinated potable water. When the enriched water is introduced, the hydrogen peroxide decomposes into water and oxygen. The introduction of enriched water provides several advantages over other techniques for supplying oxygen to groundwater. Enriched water carries more oxygen than ORC- or oxygen-saturated water and the use of concentrated hydrogen peroxide can prevent biofouling in wells. Periodic addition of enriched water does not require installation of a permanent distribution system and does not preclude the subsequent use of other remedial actions should they be required.

The proposed ORC is a powder form of time release magnesium peroxide. The ORC is blended with an inert carrier matrix of sand and the blend is contained in an approximately two-inch diameter polyethylene webbed sock in one foot lengths (ORC Filter Sock). The ORC Filter Socks become saturated following insertion into groundwater, and begin releasing oxygen into the subsurface. The ORC product contains both magnesium oxide and magnesium peroxide (the active ingredient). Essentially, ORC is "oxygenated magnesia" and releases the oxygen upon contact with water. The spent magnesium peroxide is converted to magnesium hydroxide (a suspension of magnesium hydroxide in water is ordinary "milk of magnesia"). ORC releases of oxygen have been documented to enhance microbial growth in both soil and groundwater, and in turn, accelerate biodegradation rates of petroleum hydrocarbons.

5.0 SCOPE OF WORK

The proposed approach for this Workplan consists of five tasks: (1) project planning; (2) implement interim remediation; (3) complete site characterization; (4) conduct quarterly groundwater monitoring; and (5) prepare site characterization and progress evaluation reports.

The objective of the remediation is to reduce the concentrations of petroleum hydrocarbons in soil and groundwater to achieve acceptable risk levels. The remedial goals for the site are based on risk analyses conducted by EOA. The remedial goals, as stated in a June 25, 1996 ACDEH letter, are 69 parts per billion (ppb) of benzene in groundwater and 16 ppb of benzene in soil. PES recommends the excavation of hydrocarbon-affected soil and the use of a combination of oxygen delivery methods to utilize the advantages of each of the methods to accelerate the rate of biodegradation.

Excavation of hydrocarbon-affected soil will effectively remove the source of hydrocarbons leaching from soil into the shallow groundwater beneath the site. The removal of the source of the hydrocarbons leaching into groundwater through excavation may increase the effectiveness of the oxygen delivery methods proposed for groundwater remediation.

The use of hydrogen peroxide provides a method for introducing a greater mass of oxygen to groundwater relation to other methods of oxygen delivery. Additionally, because high concentrations of hydrogen peroxide inhibit microbial growth, the concentration of hydrogen peroxide introduced can be adjusted to prevent excessive microbial growth in the introduction wells and prevent plugging of the water-bearing zone by biomass.

While the hydrogen peroxide is capable of supplying a large mass of oxygen in a short time, the primary advantage of the ORC is that it provides a longer-lasting and steady supply of oxygen. The hydrogen peroxide introductions typically provide elevated oxygen levels for up to approximately two weeks. After the peroxide is utilized, there is typically not sufficient oxygen present to maintain the rate of microbial degradation. The ORC will provide sufficient oxygen to maintain the microbial populations until the subsequent peroxide introduction, thereby reducing the required frequency of peroxide introductions.

The following sections describe the scope of work proposed to implement a one year program to stimulate the natural biodegradation of petroleum hydrocarbons by indigenous microorganisms and to monitor the progress of the remediation. The program includes the following five tasks.

5.1 Task 1 - Project Planning

PES will conduct project preparation activities following Workplan approval by ACDEH. This task will include: (1) preparation of a site safety plan to be used during the remediation program; (2) filing for permits from Alameda County and the City of Oakland prior to implementing the remedial program; and (3) obtaining bids from qualified subcontractors for the soil remediation.

As part of this task PES will also conduct negotiations with State Underground Storage Tank Cleanup Fund ("USTCF") representatives for pre-approval of costs for the remediation program.

5.2 Task 2 - Soil Remediation

The hydrocarbon-affected soils beneath the former piping between the former UST and former dispenser will be excavated and disposed offsite at an appropriately licensed disposal facility. The hydrocarbon-affected soil beneath the former piping and adjacent to the north wall of the former UST excavation ranges in depth from approximately 2 feet bgs to 6 feet bgs. PES' proposed extent of soil excavation is limited to the area beneath the former piping that was affected by hydrocarbons based on soil analytical results obtained during the UST removal activities. The excavation of hydrocarbon-affected soil is proposed to extend approximately 27 feet northeast of the north wall of the former UST excavation to an estimated depth of approximately 6 feet bgs (see Plate 3).

The excavation will be conducted by a qualified subcontractor using a backhoe. The asphalt surface will be removed and segregated for disposal. The soil will be removed and segregated through field screening and characterized to evaluate offsite disposal/recycling and reuse alternatives. Hydrocarbon-affected soil will be placed on and covered with visqueen until disposal arrangements are completed. Off site disposal or recycling of the hydrocarbon-affected soil will be conducted based on the soil stockpile analytical results and in accordance with applicable Federal, State, and local regulations.

Confirmation soil samples will be collected from the sidewalls of the excavation using a hand sampler and the backhoe. The soils adjacent to the cutting edge within the backhoe bucket will be sampled because they represent the deepest and least disturbed soils. In general, the backhoe bucket will not be decontaminated between sampling locations; however, in order to avoid cross contamination of samples, soil samples will be collected from soil which does not come in direct contact with the bucket surface.

Soil samples will be collected from backhoe bucket using a hand-held impact sampler with stainless-steel liners. Following collection in stainless-steel liners, each soil sample will be sealed with Teflon tape, polypropylene end caps and tape. The soil samples will be labeled, and stored in an iced cooler for delivery to a California-Department of Heath Services-approved laboratory for chemical analysis. Confirmation soil samples will be analyzed for TPHg using U.S. Environmental Protection Agency (USEPA) Test Method 8015 modified, and BTEX using USEPA Test Method 8020.

The excavation will be backfilled with imported crushed rock, placed in 8 to 12 inch lifts, compacted to 90 percent relative maximum density. The subgrade and asphalt will be replaced and to match the thickness and grade of the existing subgrade and asphalt. Groundwater remediation activities will be implemented following the completion of the soil remediation activities at the subject property.

5.3 Task 3 - Nutrient Introduction

A mixture of potable water, hydrogen peroxide and a blend of micronutrients (enriched water) will be prepared and introduced twice each quarter into wells TW-3, TW-5, TW-6, TW-7, and MW-1 to stimulate natural biodegradation of the hydrocarbons.

The in-situ bioremediation system will consist of a drum of 35 percent concentrated hydrogen peroxide and a metering pump to deliver a controlled amount of hydrogen peroxide to a mixing tank where it will be combined with dechlorinated potable water and small quantities of nitrogen and phosphorus nutrients. A centrifugal pump, globe valve and flow meter will be attached to the mixing tank to allow periodic controlled addition of enriched water at a constant rate into TW-4, TW-5, TW-6, TW-7, and MW-1.

The enriched water will be mixed at a concentration to maximize oxygen delivery and prevent accumulation of biomass in the immediate vicinity of the wells while reducing the potential for precipitation of inorganic carbonates. It is currently anticipated that a volume of approximately 800-900 gallons per event (two events per quarter) will be introduced into the wells at a concentration between 2,000 and 12,000 ppm hydrogen peroxide. This delivery program is intended to result in a concentration of hydrogen peroxide which will inhibit biological activity in the vicinity of the wells to prevent plugging of the well screen by biomass. Higher concentrations of hydrogen peroxide in the well may result in precipitation of carbonates and plugging of the well screen. Application rates and concentrations may be adjusted as necessary to minimize mounding of the groundwater and well plugging and to maximize oxygen delivery.

Following enriched water introduction, ORC Filter Socks will be installed in each of the five designated wells. The ORC Filter Socks will provide continuous supply of oxygen between enriched water introductions. The ORC Filter Socks will be replaced when they no longer maintain elevated dissolved oxygen concentrations. PES estimates that the ORC will be replaced after approximately six months of use.

5.4 Task 4 - Complete Site Characterization and Install and Develop a Downgradient Monitoring Well

PES will conduct a subsurface investigation beneath the building and sidewalk to complete characterization of the lateral extent of gasoline hydrocarbons at the west-southwest portion of the site. The additional site characterization will include installation of three sample points and one temporary well at the site. Two of the sample points will be installed inside the building near the southwest corner (in the former office/showroom) and one will be installed outside the building in the sidewalk along Bay Street. The temporary well will be installed in the former showroom inside the building. The proposed sample points and temporary well locations are presented on Plate 2.

The sample points will be installed to the depths ranging from six to eight feet bgs using a direct push coring method. The direct push coring method enables continuous sampling of the soil and minimizes the amount of soil cuttings generated. The temporary well will be drilled using hollow-stem auger drilling equipment. The equipment will be cleaned using a combination steam/high pressure wash system.

The subsurface soils will be logged from the core samples and drill cuttings in accordance with the Unified Soil Classification System by a PES field geologist. Soil samples from each sampling drive will be retained in cleaned stainless steel liners and will be field screened for volatile petroleum hydrocarbons using a photo-ionization organic vapor meter (OVM). The OVM readings will be recorded on the boring logs and used to assist in selection of samples for laboratory analyses. One sample from each soil boring, which exhibits the greatest indications of contamination, will be selected for laboratory chemical analyses. The sample liners will be sealed with Teflon sheeting, plastic end caps, and adhesive-less silicone tape; labeled with project name and number, boring identification and sample depth, sampling date and time, and requested laboratory analyses; placed in a chilled thermally-insulated chest; and submitted to the project laboratory under chain-of-custody protocol.

After coring the sample points to a depth of at least 2 feet below the first encountered groundwater, a cleaned 1-inch diameter Schedule 40 PVC casing with 5 feet of 0.020 inch machine slotted screen will be placed in the borehole for groundwater sampling. Groundwater samples will be collected using a clean teflon bailer. The samples will be transferred to the appropriate laboratory sample containers by filling slowly to minimize sample volatilization and to ensure that the sample is free of bubbles. Groundwater sample containers will be labeled with project name and number, sample identification number, sampling date and time, and requested laboratory analyses, placed in a chilled thermally-insulated chest, and submitted to the project laboratory for analyses under chain-of-custody protocol. After completion of sampling, the borehole will be grouted to ground surface with neat cement.

The monitoring well will be installed in a boring drilled to approximately 20 feet below ground surface by using hollow-stem auger drilling equipment. The approximate location of the temporary well is shown on Plate 2. The location may be modified based on the results of the field screening from the sampling points. Soil samples will be collected for lithologic logging and possible chemical analyses as described above. A 2-inch diameter well casing with approximately 15 feet of slotted well screen will be installed in the boring and the screened interval will be located to intersect the groundwater surface. The annulus between the casing and the borehole wall will be packed with Number 2/12 size clean sand to approximately one foot above the screen. Two feet of bentonite will be placed above the sand to seal the annulus and the well will be grouted to ground surface with neat cement. The well will be completed at ground surface with a locking well cap.

A temporary well will be installed at the approximate location shown on Plate 2. After drilling to approximately 20 feet bgs, the temporary well will be constructed following protocol for permanent wells with the exception of the surface completion. A 2-inch diameter Schedule 40 PVC casing with 10 feet of 0.020 inch machine slotted screen will be placed in the borehole through the hollow stem of the augers. The annulus between the casing and the borehole will be packed with Number 2/12 size clean sand to approximately one foot above the screen. A two feet thick seal of bentonite pellets will be placed above the sand and a Portland cement seal will be placed to approximately 0.5 bgs. The temporary well casing will be fitted at the top with a locking expansion plug.

The monitoring well and temporary well will be developed to remove fine-grained sediment from the well borehole and sort the sandpack to allow for collection of representative groundwater samples free of excessive sediment. Well development will consist of alternately surging and bailing the well until the water is reasonably clear and free of sediment. Following development, the monitoring well and temporary well will be sampled as described below in Section 5.5.

To avoid cross contamination, drilling and sampling equipment will be decontaminated prior to use and between each sampling location. Sampling equipment rinseate and soil cuttings will be contained in sealed 55-gallon drums as necessary and stored onsite until appropriate disposal arrangements are made.

Soil and groundwater samples collected from the sample points, temporary well and downgradient well will be submitted under proper chain-of-custody control to a California-certified laboratory for analyses. Samples will be analyzed for TPHg by USEPA Test Method 5030/8015 modified and BTEX by USEPA Test Method 8020. The samples will be analyzed on a standard 10-day turnaround time.

5.5 Task 5 - Quarterly Groundwater Monitoring

Quarterly groundwater monitoring at the site will be conducted to evaluate environmental conditions and monitor the progress of the remedial program. Water levels in all the wells will be measured before quarterly groundwater sampling events and converted to water-level elevations to evaluate groundwater gradient. Water-level measurements will be obtained using an electronic water-level sounder.

Prior to sampling each well, a minimum of three well volumes will be purged using a clean stainless steel bailer, bladder pump, or teflon bailer. During purging, the discharge water will be monitored for pH, temperature, and electrical conductivity. Once the water quality parameters have stabilized, groundwater samples will be collected using a teflon bailer.

Wells TW-2, TW-6, TW-7, MW-1 and the new temporary and downgradient well will be purged and sampled quarterly and samples submitted to a California-certified analytical laboratory under chain-of-custody procedures. Samples will be analyzed for TPHg by EPA Test Method 5030/8015 modified and BTEX by EPA Test Method 8020. The samples will be analyzed on a standard 10-day turnaround time.

In addition to recording the groundwater quality parameters, PES will monitor parameters related to the progress of the bioremediation. To monitor the progress of the bioremediation and effectiveness of nutrient delivery, the concentration of dissolved oxygen will be measured in all the wells during quarterly groundwater monitoring and prior to and following each nutrient delivery event. Dissolved oxygen is an indirect indicator of hydrocarbon concentration. In areas of high hydrocarbon concentration, dissolved oxygen is consumed by the native bacteria and residual dissolved oxygen concentrations are expected to be low. Conversely, effective nutrient addition will be demonstrated by elevated concentrations of dissolved oxygen in the monitoring wells.

5.6 Task 6 - Site Characterization Report and Performance Evaluation and Reporting

After completing the field investigation and reviewing the sample analytical results of the additional site characterization, PES will prepare a summary report. The report will include the results of the site characterization evaluation of the quantity of hydrocarbons present in subsurface soil and groundwater and present recommended modifications to this proposed remedial program as necessary.

In addition, PES will evaluate the progress of the program quarterly and adjust the nutrient delivery and monitoring programs as necessary to maximize biodegradation of hydrocarbons and reduce the potential for plugging the aquifer.

Reports will be prepared quarterly summarizing the bioremediation activities performed and the findings of each quarterly monitoring event. The reports will present results of water-level measurements, a brief description of sampling procedures, a summary of chemical analysis results, water-level elevation contour map and an evaluation and interpretation of results. Data from the bioremediation program will be incorporated into the quarterly groundwater monitoring reports. Copies of laboratory reports and chain-of-custody forms will be included in an appendix.

At the end of the one year program, PES will review and summarize the results and assess whether the program is effective in remediating hydrocarbon-affected groundwater contamination at the site. PES will evaluate residual risk levels at that time. Recommendations will be developed for future remedial actions at the site, which may include continuation of the passive bioremediation program.

6.0 SCHEDULE

Upon approval of the workplan by the ACDEH, PES will initiate the project preparation activities. Acquisition of permits is expected to take approximately two to three weeks. Upon receipt of the permits, PES can coordinate the soil excavation, additional site characterization and interim groundwater remediation. Soil excavation will be conducted during dry weather prior to onset of significant winter rainfall. Soil excavation and backfilling is expected to take approximately two days to complete. The additional site investigation is expected to take approximately two days to complete. Well development will require one additional day. Nutrient applications will be scheduled to follow within several days and midway between of each quarterly groundwater monitoring event to maximize the opportunity for transport of the enriched water and biological degradation of hydrocarbons.

PES trusts this scope of work and schedule meet your requirements at this time. Please do not hesitate to call if you have any questions or comments.

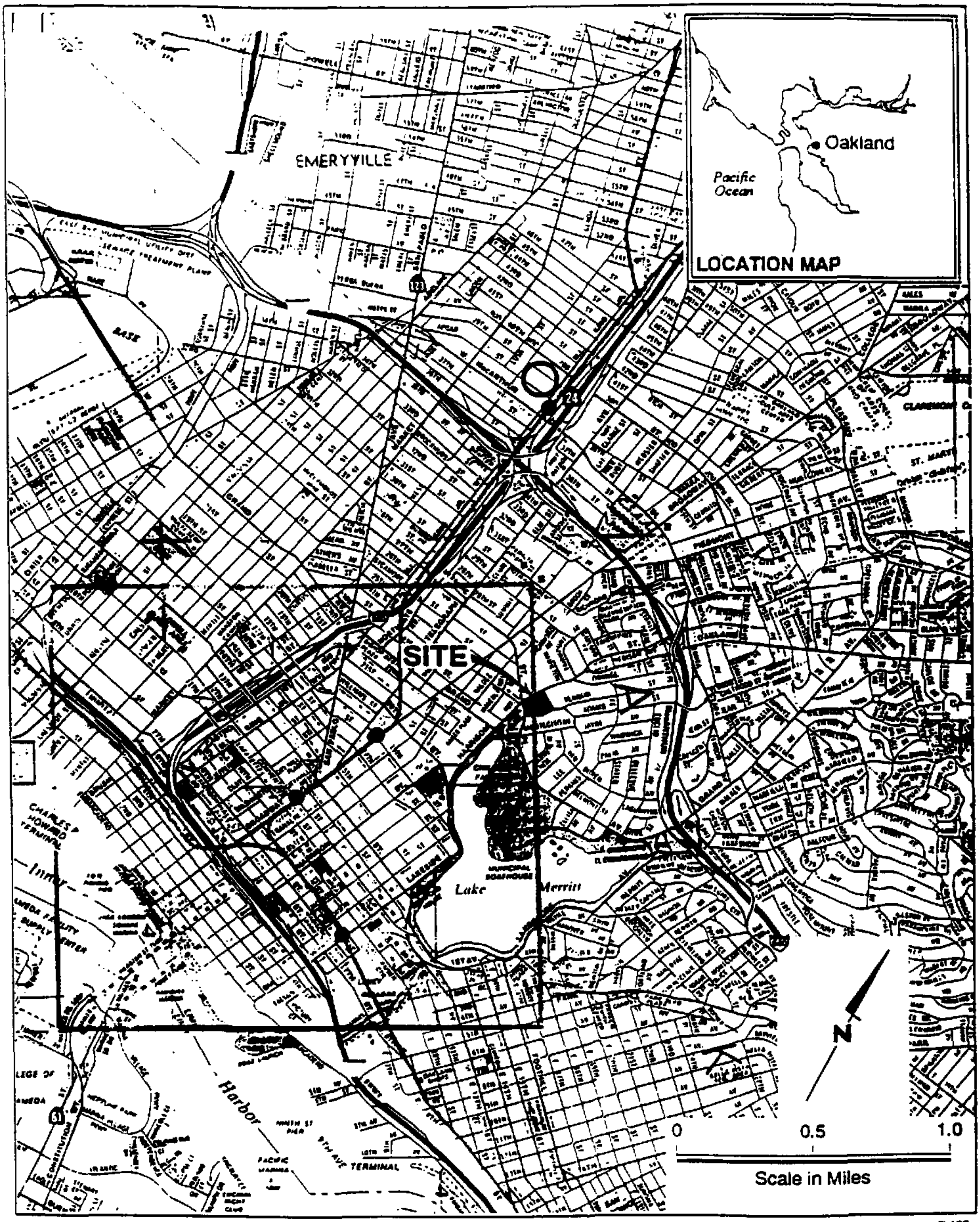
Yours very truly,

PES ENVIRONMENTAL, INC.

Kyle S. Flory, R.G.
Senior Geologist

Andrew A. Briefer, P.E.
Associate Engineer

Attachments: Plate 1 Site Location Map
Plate 2 Proposed Sample Point and Well Location Map
Plate 3 Proposed Soil Excavation Map



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Site Location Map
Cox Cadillac
230 Bay Place
Oakland, California

PLATE
1

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE	REVISED DATE
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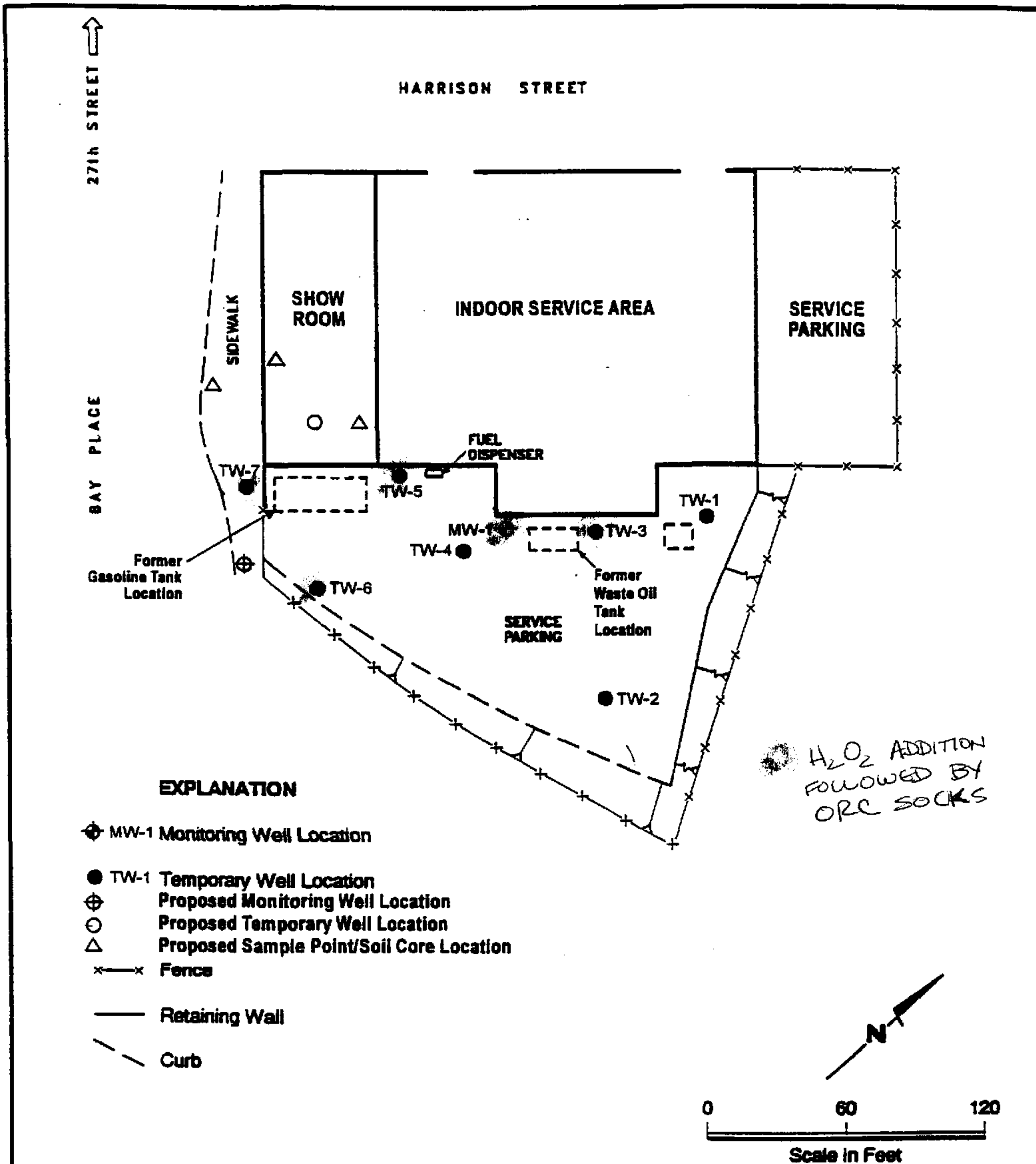
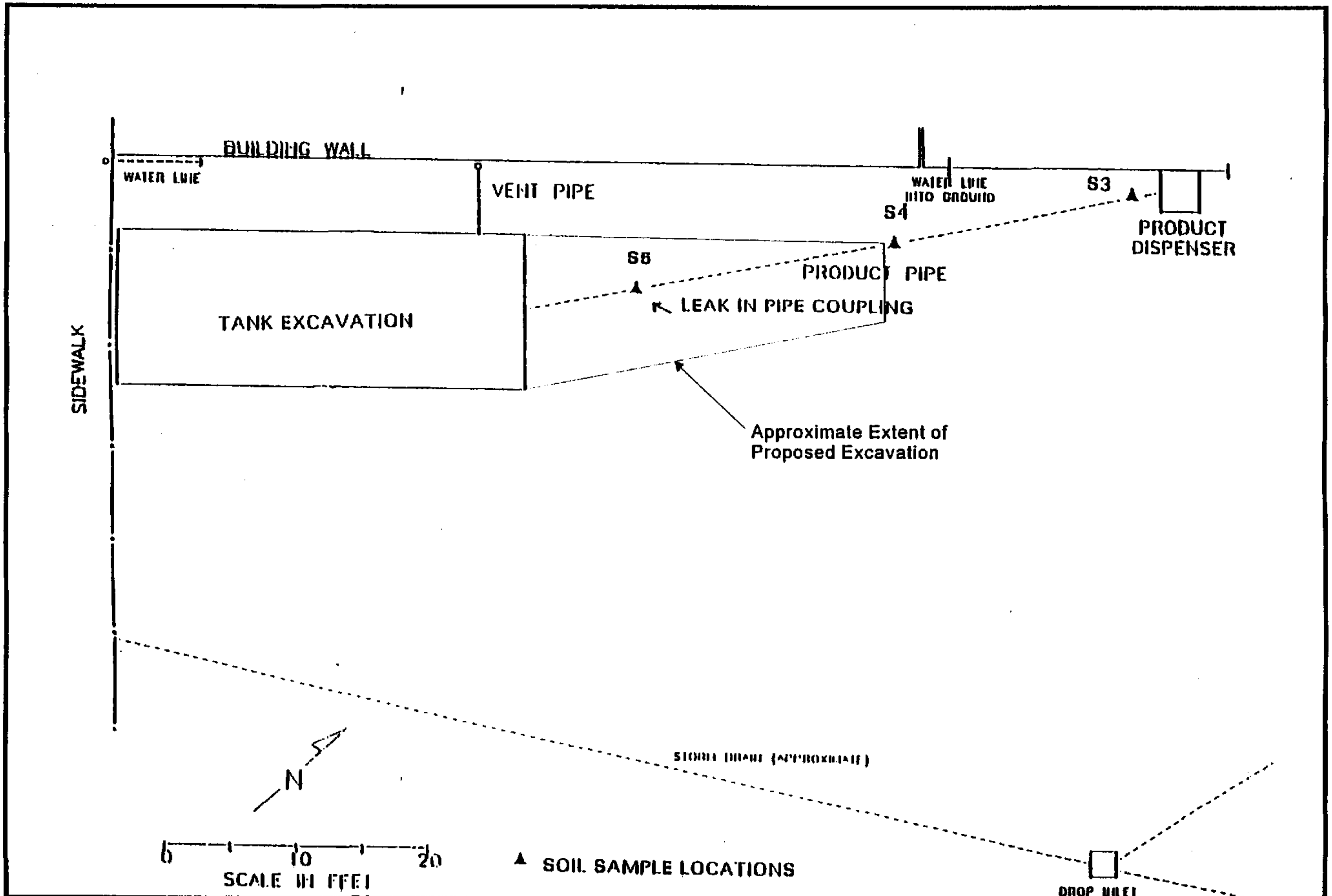


PES Environmental, Inc.
Engineering & Environmental Services

Proposed Sample Point and Well Location Map
Cox Cadillac
230 Bay Street
Oakland, California

PLATE
2

JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE
167.0200.P02	00P02_S1.CDR		10/96



PES Environmental, Inc.
Engineering & Environmental Services

Proposed Soil Excavation Map
Cox Cadillac
230 Bay Place
Oakland, California

PLATE
3

187.0200.P01	02P01_D1.CDR		10/98
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	