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FINAL PHASE 2 REMEDIAL ACTION WORK PLAN

Pacific Coast Pipeline (PCPL) Superfund Site
Fillmore, California

Project No. 225-F02

PREPARED FOR:

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May 2, 1995

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VIA OVERNIGHT MAIL

May 2, 1995

ENV - STUDIES, SURVEYS & REPORTS
Final Phase 2 Remedial Action Work Plan
Pacific Coast Pipeline Superfund Site, Fillmore, California

Ms. Michelle M. Baron (H-7-1)
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Michelle:

Enclosed are two (2) copies of our **Final Phase 2 Remedial Action Work Plan** for the Pacific Coast Pipeline (PCPL) Superfund Site. The work plan has been prepared by England & Associates (E&A) and incorporates responses to U.S. EPA comments on the draft submitted earlier.

As noted previously, the target areas for soil vapor extraction have been revised to account for new and expanded information regarding false positives and actual concentrations of benzene in site-derived air samples. The vapor extraction system has also been modified to reflect this new information and more closely consider actual site conditions and logistics.

We look forward to meeting with you and discussing the work plan in detail at the June 1 Technical Exchange Workshop at E&A's Irvine office.

Sincerely,

Glenn R. Anderson/MP

Glenn R. Anderson
Project Coordinator

MJP:hs
p:\mjp\fillmore\frdra.doc

Enclosures (2)

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AEW	air extraction well
AGA	American Gas Association
ANSI	American National Standards Institute
APR	air purifying respirator
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
bgs	below ground surface
BTEX	benzene, toluene, ethyl benzene, xylenes
CD	Consent Decree
CEG	Certified Engineering Geologist
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CRWQCB	California Regional Water Quality Control Board
CUP	Conditional Use Permit
DOHS	Department of Health Services
DTSC	Department of Toxic Substance Control
E&A	England & Associates
EPA	United States Environmental Protection Agency
ESA	England, Shahin & Associates
ESI	Environmental Solutions, Inc.
EW	extraction well
FID	flame ionization detector
ft	feet
GAC	granular activated carbon
GC/MS	gas chromatography/mass spectrometry
GC/PID	gas chromatography/photoionization detection
gpm	gallons per minute
GWTS	Ground Water Treatment System
H&S	Health and Safety
IBM	International Business Machines
IMT	intermediate metal conduit
INPT	internal national pipe thread
ISA	Instrument Society of America
KB/H	King Buck/Hasstech
LNAPL	light non-aqueous phase liquid

MCC	Motor Control Center
mg/L	micrograms per liter (equivalent to ppb)
MNPT	male national pipe thread
MUL	maximum use limit
MW	monitoring well
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OVM	organic vapor meter
P&ID	Piping and Instrumentation Diagram
PC	personal computer
PCPL	Pacific Coast Pipeline Superfund Site
PDW	Preliminary Design Work Plan
PE	Professional Engineer
PEL	permissible exposure limit
PEW	perched extraction well
PF	protection factor
PID	photoionization detector
PLC	Programmable Logic Controller
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
ppmv	parts per million by volume
psi	pounds per square inch
psig	pounds per square inch gauge
PVC	polyvinylchloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
REL	recommended exposure limit
RG	Registered Geologist
RI/FS	Remedial Investigation/Feasibility Study
ROC	reactive organic compound
ROD	Record of Decision
RPM	Remedial Project Manager

RWQCB	Regional Water Quality Control Board
scfm	standard cubic feet per minute
SOW	Statement of Work
SSO	site safety officer
STEL	short term exposure limit
SVE	soil vapor extraction
TDS	total dissolved solids
TES	Texaco Environmental Services
TPH/TPHG	total petroleum hydrocarbons/gasoline
TSS	total suspended solids
TWA	time weighted average
UBC	Uniform Building Code
UFC	Uniform Fire Code
ug/L	micrograms per liter (equivalent to ppb)
ULTM	Ultramar
USEPA	United States Environmental Protection Agency
UV	ultra violet
V4	VR Systems Model V4
VCAPCD	Ventura County Air Pollution Control District
VES	vapor extraction system
VOCs	volatile organic compounds

1.0 INTRODUCTION AND OBJECTIVE

1.1 Introduction

This document constitutes a work plan to implement the Phase 2 Design at the Pacific Coast Pipeline (PCPL) Superfund Site in Fillmore, California. The design is detailed in the *Final Phase 2 Design Report* (ESA, 1994). A brief discussion of the background and site description are included in Section 2 of this report. For a more detailed description, refer to the *Final Phase 2 Design Report.*

1.2 Consent Decree Requirements

The site *Consent Decree* (CD)(USEPA, 1993) requires submittal of a draft remedial action work plan within 60 days after approval of the *Final Phase 2 Design Report* and submittal of a final remedial action work plan within 30 days after receiving EPA's comments on the draft work plan.

EPA approval of the *Final Phase 2 Design Report* was received by Texaco on January 4, 1995, and the *Draft Phase 2 Remedial Action Work Plan* was submitted on March 6, 1995. EPA comments on the draft work plan were received on April 3, 1995, therefore, this final report is submitted on May 3, 1995 to comply with CD requirements.

The CD requires that the remedial action work plan report shall contain plans and schedules for implementation of the following remedial action tasks:

1. tentative formulation of the remedial action team (Section 7);

2. methodology for selection of a remedial action contractor (Section 8);

3. the schedule for developing and submitting other documents related to required remedial action and for completion of the remedial action (Section 8);

4. revised cost estimates (Section 8);

5. a Health and Safety Plan which conforms to the applicable Occupational Safety and Health Administration (OSHA) and EPA requirements including, but not limited to, 29 CFR § 1910.120. (included in Appendix A);

6. methodology for implementation of the Contingency Plan (to be included in the Operation and Maintenance (O&M) plan and submitted at a later date - refer to schedule in Section 8);

7. methodology for implementation of the Construction Quality Assurance Plan (Appendix B);

8. a ground water monitoring plan (to be completed at a later date - refer to schedule in Section 8);

9. methodology for satisfying permitting requirements (Section 4);

10. methodology for implementation of the Operation and Maintenance Plan (to be completed at a later date - refer to schedule in Section 8);

11. construction quality control plan (Appendix B); and

12. a closeout report documenting procedures and plans for the decontamination of equipment and the disposal of contaminated materials (to be completed at a later date - refer to schedule in Section 8).

The Quality Assurance Project Plan (QAPP) developed by Environmental Solutions Inc. (ESI) for Phase 1 activities (included as Appendix C of the *Preliminary Design Workplan*, ESI, 1992) will be modified for Phase 2 activities and submitted at a later date.

The CD indicates that the remedial action work plan shall also include a schedule for implementation of all Remedial Action tasks identified in the final design report.

1.3 Objective

The objective of the Phase 2 Remedial Action Work Plan is to provide a management framework and a detailed plan for the implementation of the Remedial Action and fulfill the requirements of the CD.

2.0 BACKGROUND AND SITE DESCRIPTION

2.1 Background

The PCPL site is located at 67 East Telegraph Road on the eastern edge of the City of Fillmore, California. A site location map is shown in Figure 2-1. The site, which covers approximately 20 acres, was formerly an oil refinery which has since been dismantled. In 1928, Texaco purchased the existing refinery and operated it until the early 1950s. An old site map indicates that Richfield Oil Co. operated a gas separator plant on a portion of the site in the early 1950s. Since closure of the refinery, a portion of the site has been used by Texaco as a pumping station for crude oil produced from local oil fields.

While the refinery was in operation, miscellaneous hydrocarbon wastes believed to consist primarily of tank bottoms, filter cake, and sludge were disposed of onsite in a large pit, referred to as the Main Waste Pit and in several smaller pits located throughout the property. The approximate location of the former pits and former refinery layout are superimposed on the site plan as shown in Figure 2-2.

2.2 Previous Investigations

In 1980, Texaco submitted a proposal to the California Regional Water Quality Control Board (RWQCB) - Los Angeles Region to remove waste material from the pits and apply it to site roads. Chemical evaluation of the waste indicated that portions of the wastes were hazardous and additional investigations were requested. From 1983 through 1989, Texaco voluntarily conducted ground water and soil assessment programs under the direction of the California Department of Health Services (DOHS) and the RWQCB. In 1986, Texaco excavated and removed 38,000 tons of waste and contaminated soil from the former Main Waste Pit and other small waste disposal areas.

In June 1989, the site was added to the United States Environmental Protection Agency (EPA) National Priorities List (NPL). Between 1990 and 1992, a Remedial Investigation/ Feasibility Study (RI/FS) was conducted by Texaco to delineate the nature and extent of contamination in the soil and ground water at the site and develop a remedial plan. The RI/FS reports (ENSR, 1990-1992) identified total petroleum hydrocarbons (TPH) and benzene, toluene, ethyl benzene, and xylenes (BTEX) in ground water at various locations. Moreover, concentrations of TPH were detected in the vadose zone, but very little evidence of BTEX was found in the vadose zone. The RI/FS concluded that ground water pump-and-treat coupled with limited soil vapor extraction (SVE) in the vadose zone were the appropriate remediation technologies for the site.

In February 1992, the EPA issued a Proposed (Cleanup) Plan outlining the remedial action alternatives for the site and a public hearing was held in March 1992 to obtain comments from interested parties on the plan. The EPA *Record of Decision* (ROD)(USEPA, 1992a) was then issued in March 1992 followed by the *Statement of Work* (SOW)(USEPA, 1992b) in August 1992 outlining the work required for designing and implementing remedial activities at the site. A *Preliminary Design Workplan* (PDW)(ESI, 1992) was submitted and approved by the EPA in December 1992.

The *Consent Decree* (CD) (USEPA, 1993) was entered in August 1993. During CD negotiations, it was agreed that the remedial design would be completed in phases. The *Phase 1 Design Report* (ESI, 1993) was completed in September 1993 and the Phase 1 remedial program was implemented in December 1993.

Based on the results of the Phase 1 remedial efforts, modeling, and testing, the *Final Phase 2 Design Report* (ESA, 1994) was developed. EPA approval was received by Texaco in January 1995. This report describes a work plan for the implementing the approved final Phase 2 design.

2.3 Site Location and Surface Facilities

The PCPL site occupies approximately 20 acres on the eastern edge of the city of Fillmore, in Ventura County, California. A portion of the site is presently used as a crude oil pumping station. Site structures include buried pipelines, pumping equipment, above ground storage tanks, and miscellaneous buildings. Other equipment on the property includes the Phase 1 ground water treatment system (GWTS) and the soil vapor extraction (SVE) system.

The site is surrounded by areas of agricultural, industrial and residential use. An Ultramar gasoline service station is located south of the site. The service station had an underground fuel tank leak which was discovered in the 1980s and is currently undergoing remediation by soil vapor extraction.

2.4 Regional Geology and Hydrogeology

Geologically, the PCPL site lies along the northern boundary of the Santa Clara Trough. Sedimentary deposits in the Santa Clara Trough range from Cretaceous to Recent in age and have an aggregate thickness of over 40,000 feet. In the Fillmore area, the Trough is bordered on the north by the San Cayetano Fault and on the south by the Oakridge Fault. The San Cayetano Fault passes beneath the PCPL site approximately parallel to the eastern property boundary. Pervasive fracturing of bedrock bordering the fault has resulted in extensive landsliding. This fractured rock has also provided a conduit for naturally-occurring

hydrocarbons to reach the Earth's surface. Crude oil seeps and tar sands are common features in the site vicinity.

The PCPL site is located within the Fillmore Ground Water Basin. Sources of ground water recharge include ground water inflow and stream and precipitation infiltration. In the eastern portion of the basin where the PCPL site is located, the alluvial deposits and the underlying San Pedro Formation are the major water-bearing units.

Ground water levels in the Fillmore Basin routinely fluctuate by 30 feet or more in response to short term (1-3 years) climatic changes. The maximum recorded long-term fluctuation in ground water levels was 50 feet, measured in a Ventura County Flood Control District well located near the site.

2.5 Regional Petroleum Geology

The PCPL site lies within the eastern portion of the Ventura Basin petroleum province. Oil fields in the site vicinity include the Fillmore, Shiells Canyon and Bardsdale fields. In addition to the oil fields, several surface oil and tar sand accumulations or seeps have been mapped near the PCPL site. These occur in the fractured sands and shales of the Monterey Formation immediately north of the site along Pole Creek and in recent landslide debris directly east of the site. It is likely that the observed oil seeps resulted from the migration of hydrocarbons along fractures in the Monterey Formation associated with the San Cayetano Fault, which cuts through the site.

2.6 Local Geology and Hydrogeology

The near-surface geology of the PCPL site can be characterized as consisting of laterally discontinuous, interlayers of unconsolidated, fine- to coarse-grained detritus deposited in stream channel, alluvial fan, and mass wasting depositional environments. The extreme heterogeneity of the subsurface strata has created a complex hydrogeologic environment. Previous investigations have identified three water-bearing zones beneath the PCPL site:

- Perched Zone -- Zone of discontinuous perched water generally above a reddish-brown clay layer.
- Aquifer I -- Unconfined to semi-confined shallow aquifer.
- Aquifer II -- Partially confined to confined aquifer below aquifer I.

To a limited degree, ground water flow beneath the site changes direction in response to changing ground water elevations. First quarter 1995 ground water monitoring results

indicate that flow occurs in a northwest direction across the site which is consistent with historical data. The average gradient across the site in aquifer I is approximately 0.006 ft/ft. Permeability of the aquifer I materials ranges from 1 ft/day to 15 ft/day.

Water level fluctuations of more than 30 feet were recorded at the PCPL site between April 1990 and April 1993 and ground water is currently near its historical high level. Changes in water elevation with time for aquifer II roughly parallel that of aquifer I, suggesting some degree of communication between aquifer I and aquifer II. Aquifer II has historically shown little or no hydrocarbon contamination.

2.7 Subsurface Hydrocarbon Distribution

Data from boring logs and soil samples, ground water monitoring and soil gas testing and sampling have been interpreted to estimate concentration and mass distributions of benzene in soil, water and gas phases in the subsurface.

2.7.1 Vadose Zone

Figure 2-3 shows in plan view approximate areas in which benzene has been found in the vadose zone soil above the historic high water elevation, and, in the soil between the high and low water elevations in which hydrocarbons have been smeared by the rising and falling water table (smeared zone). Cross sections presented in the *Final Phase 2 Design Report* depict the site subsurface conditions and interpreted distribution of benzene in the subsurface.

Free oil or light non-aqueous phase liquid (LNAPL) is not present in sufficient amounts to flow freely to the many wells at the site with the recent exception of EW-4. In the first quarter 1995 almost twenty gallons were removed from EW-4. The sudden occurrence of LNAPL in EW-4 may be due to a slug of LNAPL moving toward and into the well due to the change in gradient caused by relatively constant pumping at this well. Recharge of LNAPL in this well has since tapered off significantly.

Other than EW-4, in the past year, a total of less than six gallons have been recovered from six of the seven wells at the site which periodically contain light non-aqueous phase liquids (LNAPL).

A lower and upper vadose zone have been defined based on the observation that gas compositions vary considerably with depth for all components. Figure 2-4 shows a different distribution for benzene in the upper vadose zone than in the lower zone. This figure differs from Figure 4-2 of the *Final Phase 2 Design Report* as a result of recent confirmation testing. The area indicating confirmed benzene in soil gas is considerably smaller than

before. Soil gas confirmation testing by gas chromatography/ mass spectrometry (GC/MS) showed that benzene and other BTEX components had been significantly overstated. These had been measured by gas chromatography/photoionization detector (GC/PID) which has been found to give false positives as a result of co-eluting compounds (see *First Quarter 1995 Quarterly Status Report* for details).

Benzene in the soil gas is present in much lower concentrations than previously reported and in many fewer wells. The result indicate that benzene vapor concentrations based on GC/PID analyses, have been significantly overstated. Benzene has been overstated by factors of greater than 2 to greater than 20 in samples which showed no benzene above the detection limit by GC/MS, and by factors of 3 to 9 in samples with benzene detected by both methods. Most of the wells which had shown significant benzene by GC/PID were found to have no detectable benzene by GC/MS. None of the wells west of Pole Creek showed detectable benzene vapor. Benzene concentrations exceeded 100 parts per million (ppmv) in only two wells (PEW-1 and AEW-1) within the property boundary and only one other well (PEW-3) had benzene above the detection limit.

Well EW-4 could not be sampled due to high water level in the well. However, based on (1) high benzene vapor concentration by GC/PID in August 1994 (470 ppmv), (2) the presence of free LNAPL containing benzene and (3) relatively high concentrations of benzene in ground water in this well, it is expected that the actual benzene vapor concentration may be on the order of 100 ppmv.

2.7.2 Saturated Zone

Hydrocarbons in this zone include residual hydrocarbons in the soil and dissolved phase hydrocarbons in the ground water. The distribution of borings with measured benzene and observed free oil in the smeared zone soil is shown in Figure 2-3.

The most recent ground water analytical data (first quarter 1995) shown in Figure 2-5, indicate there are two primary ground water benzene plumes, plus the plume associated with the off-site Ultramar service station gasoline releases. The highest benzene concentrations are in the north plume, however, the south plume covers a larger area.

Dissolved benzene is limited to near the ground water table and benzene concentration in the ground water varies with water elevation. When water level was at its highest, benzene concentrations were generally highest (Second Quarter 1993). When water level was at its lowest, benzene was not detectable in most wells (Second Quarter 1991). This implies that concentrations of benzene in the ground water are elevated only when the water is moving directly through oily soil.

2.7.3 Naturally-Occurring Hydrocarbons

There is substantial evidence that the site has been impacted by naturally-occurring hydrocarbons:

- Methane and hydrocarbon vapors are apparently migrating from the deep subsurface through the San Cayetano fault zone under the site.

- The presence of several natural oil seeps in the site vicinity have been previously documented. It is extremely likely that the faulting and landslides at the site have placed such natural liquids in the saturated and vadose zones at the site.

2.7.4 Benzene Fate and Transport

2.7.4.1 Benzene Distribution

Based on measured benzene and TPH concentrations in soil samples from throughout the site, equilibrium concentrations were calculated and reported in Table 4-7 of the *Final Phase 2 Design Report*. Several conclusions can be made based on the equilibrium distribution of benzene among the three phases present: [(1) the oil phase (residual hydrocarbons or free LNAPL), (2) the water phase (soil moisture in the vadose zone, ground water in the saturated zone), and (3) in the vadose zone, the soil gas phase.]:

- Benzene concentrations in the soil are generally higher in the vadose zone than in the smeared zone.

- On the order of 80 to 90 percent of all the benzene present is in the oil phase.

- Calculated equilibrium benzene vapor concentrations in the vadose zone soil average between 120 and 180 ppm.

- Calculated equilibrium benzene concentrations in ground water in the smear zone samples average between 0.6 and 1.2 mg/L.

Based on the distribution of benzene in soil samples, more than 70 percent of the soil containing benzene is above the high water elevation. This coupled with the concentration averages discussed above indicates that 80 to 90 percent of the benzene present is above high water elevation, and 10 to 20 percent is within the smeared zone, distributed between the soil and ground water.

2.7.4.2 Benzene Migration Potential

A potential for benzene migration from the vadose zone to the ground water aquifer exists where soil vapor concentrations are in excess of equilibrium concentrations with the underlying ground water. However, the concentration difference alone is not sufficient to result in contamination. There must also be a pathway from the soil gas to the ground water. There is evidence at this site that migration of benzene from the upper portions of the vadose zone may be severely restricted by intervening fine-grained soils.

2.7.4.3 Natural Degradation of Benzene

There is strong evidence that natural degradation of benzene is limiting the size of the benzene plume in ground water downgradient of the site. Following is evidence of the natural degradation:

- Benzene in the ground water has not moved far from the site. If benzene were not being degraded, it would be present at detectable levels thousands of feet downgradient of the site. In fact, detectable benzene is limited to within one or two hundred feet of the site boundary.

- Biodegradation testing, carbon isotope testing, and soil gas composition all provide evidence of biological degradation of hydrocarbons under the site.

- In 1991, when ground water level dropped below the smeared zone, benzene virtually disappeared from the water. This indicates that natural forces deplete the benzene from the water as soon as the water is no longer in contact with the residual hydrocarbons which function as the source for the benzene.

2.8 Selected Remedy and Remediation Goals

The selected remedy includes a ground water extraction and treatment system to treat extracted ground water with carbon to levels that meet the cleanup standard set forth in the ROD with discharge of the treated water to Pole Creek under an NPDES permit. The remedy also includes soil vapor extraction (SVE) for those areas that threaten to contaminate ground water at levels above site cleanup standards. Ground water monitoring will be conducted to demonstrate that the extraction system is effectively capturing the contaminant plume and ultimately, to demonstrate achievement of the cleanup standards throughout the aquifer.

The aquifer cleanup standards are specified in the ROD for five volatile organic compounds (VOCs) and are reiterated in the SOW. The five VOCs and their respective cleanup standards for ground water are:

Contaminant	Standard (ppb)
benzene	1
1,2-dichloroethane	0.5
ethyl benzene	680
methylene chloride	5
toluene	100

Benzene and toluene are the only compounds that currently exceed the cleanup standard. Historic analytical data in the ground water database (includes samples collected from August 1990 to February 1995) indicate that forty-three PCPL wells have had concentrations which exceed the cleanup standard for benzene of 1 ug/L. During the same period, only thirteen PCPL wells have had concentrations which exceed the cleanup standard for toluene of 100 ug/L, and only five of these wells have exceeded the toluene cleanup standard on more than one occasion. These five wells also exceed the cleanup standard for benzene.

The remaining three compounds for which cleanup standards have been set, historic data indicates that 1,2-dichloroethane has only been detected three times and has not been detected in the last three years while ethyl benzene and methylene chloride have not been found at levels above the cleanup standard in any PCPL well.

In wells where toluene is found at levels above the cleanup standard, benzene is also present at concentrations above the cleanup level concentrations. The remediation of benzene to its cleanup standard should ensure that the cleanup of toluene is surpassed, therefore, benzene is the target compound for this remediation program.

3.0 CONCEPTUAL SITE REMEDIES

3.1 Soil Vapor Treatment Conceptual Remedy

The selected remedy described in the ROD calls for "Soil Vapor Extraction for those areas that threaten to contaminate ground water at levels above site cleanup standards..." Figure 2-4 shows the areas in the vadose zone in which benzene vapor concentrations are detectable. These areas are considered preliminary target areas for vapor extraction.

There is evidence that soil layers of low gas conductivity separate the upper vadose zone from the lower zone immediately adjacent to the ground water table. Benzene in the upper zone may not have a direct pathway to the ground water. The portions of the vadose zone representing the greatest threat are those with high concentrations of benzene in close proximity to the ground water. Those upper zones with relatively direct pathways to the ground water also pose a threat to ground water.

Target zones for soil vapor extraction are shown in Figure 3-1. These zones are much smaller than in the *Final Phase 2 Design Report* as discussed in Section 2.7.1. The southern target area and the northern half of the northern target area are in the lower vadose zone. The southern half of the northern target area is in the upper vadose zone, but, there appears to be a vertical pathway near wells MW-25D (abandoned) and MW-47D. Therefore, this portion of the upper zone is included as a target area. Ground water generally flows to the west- northwest, so relatively low concentrations of benzene in ground water wells MW-37S and MW-38S indicate that there is no major migration pathway from the upper zone to the lower zone in the eastern portion of the vadose zone benzene plumes. Therefore, the vicinity of well AEW-1 is considered a secondary target area.

Wells selected to address these target areas are as follows:

- *Well PEW-1* This well is in an area where the historic benzene concentrations in the ground water and the benzene vapor concentrations in the vadose zone have been the highest. Vertical conductivity between the screened interval of well PEW-1 completed in the lower vadose zone and that of adjacent upper vadose well SBB-1 appears to be extremely low (benzene is non-detect in the soil gas of SBB-1). Therefore, soil gas flow to this well is primarily horizontal from within the lower vadose zone. The area affected by extraction from this well is expected to extend hundreds of feet from the well after several months of vapor extraction system operation.

- *Well EW-4* This well is in the southern target area. Although, benzene has not been confirmed in the soil gas from this well (soil gas sample could not be collected during

GC/MS confirmation sampling due to high water levels), it is expected to be present based on benzene concentrations in the ground water, the presence of free LNAPL containing benzene, and the high benzene concentrations by GC/PID in the soil gas. During high water episodes such as the present condition, the screen interval for well EW-4 is submerged (49.5 ft bgs to water table). Ground water extraction from EW-4 will cause water level drawdown of several feet near the well which, at lower static water levels, will enable deeper soil gas flow in that vicinity. Soil gas extraction from EW-4 will also result in evaporation of the light fraction of hydrocarbons (including benzene) from the LNAPL. If future soil gas testing verifies the presence of benzene in the soil gas in this well, vapor extraction from well EW-4 will commence after ground water subsides enough to permit soil gas flow of at least 10 scfm.

- *Well PEW-3* This secondary target area well is completed in the upper vadose zone in the southern end of the northern target area. Based on cross sections developed for the *Final Phase 2 Design Report*, a potential vertical pathway to ground water and high benzene concentrations in the soil and soil gas exist in the well vicinity. Based on nine months of extraction from well PEW-2, it is expected that flow to PEW-3 will be largely horizontal and its influence should extend more than a hundred feet from the well.

- *Well AEW-1* This secondary target area well is completed in the upper vadose zone of the northern target area. There appears to be no direct communication between the soil gas in this area and the ground water below. However, measured benzene vapor concentrations are fairly high, and this well will be targeted for extraction after the hydrocarbon concentrations in the deeper wells have dropped sufficiently to allow new wells to be added to the system.

- *Other wells* Several other wells are already connected to the vapor extraction piping system near the GWTS. These include SBD-2 and EW-1 in the southern target area and MW-28S in the northern area. These wells are not designated as target wells, but one or more may be used if subsequent monitoring indicates the need. For example, since the bottom of PEW-1 is 10 or more feet above the water table, vapor extraction from nearby ground water well MW-28S may be needed to aid in the removal of soil gas closer to the water table. The screen in this well is normally submerged, but ground water extraction causes several feet of screen to be exposed for soil gas extraction. This will result in soil gas removal immediately adjacent to the water table.

Other wells may be connected in the future if evaluation of data indicates these are needed based on subsequent vadose zone monitoring. For example, if elevated levels of benzene are found in the upper or lower vadose zones, when ground water extraction well EW-7 is installed, it will be connected to the vapor extraction system.

Within the vadose zone target areas, extraction will initially be limited to well PEW-1 in the north. Well EW-4 in the south is considered a primary target well, subject to GC/MS confirmation of benzene concentrations. Well EW-4 will be added to the system when a larger vapor extraction unit is procured and the combination of water level and drawdown are sufficient to obtain adequate soil gas extraction rates (10 cfm). Wells PEW-3 and AEW-1 will be added to the extraction system later. As hydrocarbon concentrations decrease in these wells, additional vapor extraction wells may be connected as needed.

Wells will be disconnected from the system when benzene is consistently absent in the extracted gas or major component concentrations indicate an approach to asymptotic values that appears to match natural emissions. A Decision Tree is presented in Figure 3-2 that outlines the process for modifying or shutting down the vapor extraction system.

The *Final Phase 2 Design Report* indicated that vapor extraction systems equivalent to three VR Systems Model V4, would be operated at the site. Based on the revised benzene vapor distribution, as discussed in Section 2.7.1, it appears that lower vapor extraction capacity will be adequate. Initial capacity will be lower, but will be increased to the approximate equivalent of three V4s later. We will start out with a lower capacity, but will increase the capacity to the approximate equivalent of three V4s later. Also, it has been determined that thermal oxidizers which are convertible to catalytic oxidizers are more economical and more reliable than the V4 units. Therefore, the plan for vapor extraction has been revised to include a two-phase approach using thermal oxidizers. The initial phase will include a thermal oxidizer with hydrocarbon destruction capacity matching a single V4 unit. For the final phase, a larger unit with extracted gas handling capacity equal to approximately three V4 units will replace the smaller thermal oxidizer.

A single V4 unit at its normal operating range (about 2,000 rpm) is capable of processing about 370 cfm of gas, including dilution air. The dilution air is needed to maintain at least 18 percent oxygen in the inlet gas and to limit the total hydrocarbons to no more than the hydrocarbon destruction capacity of the equipment (about 80 lb/hr).

Initially, a single thermal oxidizer unit with hydrocarbon destruction capacity at least as high as one V4 unit will be used for extraction from well PEW-1. The chosen unit is a King, Buck/Hasstech (KB/H) unit capable of handling up to 150 cfm total gas and 80 lb/hr hydrocarbons. Because the concentrations of methane and other hydrocarbons are so high in well PEW-1, extraction from the well is limited by hydrocarbon destruction capacity rather than by oxygen requirements.

A larger unit capable of handling 1,000 cfm total gas, but lower hydrocarbon concentrations than the KB/H unit, will replace the smaller unit when it becomes available and after PEW-1 concentrations have decreased considerably and well EW-4 water levels have dropped sufficiently to allow extraction.

Most of the wells at the site have lower hydrocarbon concentrations than well PEW-1. In these wells, oxygen and total flow rate are the limiting factors rather than hydrocarbon destruction capacity. In this case, a 1,000 scfm thermal oxidizer unit is capable of extracting as much soil gas as three V4s.

During the initial phase, the vapor extraction unit will be located just north of the ground water treatment system for ease of connection to the electric power supply. That way, the unit can be put into service fairly soon. Initially, extraction will be from well PEW-1. Vapor extraction may be switched to the other wells to obtain additional information which may aid in optimizing the extraction.

The larger final phase unit may have a higher noise level than the KB/H unit and will need more supplemental fuel. If noise is determined to not be a problem, it will be installed just south of the ground water treatment system (Drawing M-6). If the noise issue cannot be readily resolved, the unit may be installed at the alternative location near well MW-10P so that the neighbors to the west will not be disturbed. Both locations are more than 1,000 feet from the San Cayetano School. It is anticipated that the final phase will be implemented in 1996.

As indicated in the decision tree (Figure 3-2), ongoing evaluations will be conducted to guide the operation of the vapor extraction systems. If a given extraction well shows several months of essentially constant removal rate of key components, such as benzene and total fuel hydrocarbons, this indicates that the removal rate may be matching the rate at which that component is entering the capture area from natural emissions from the deep earth or seeps. At that time, vapor extraction efforts will shift to other target area wells as necessary. System modifications may be made from time to time, if needed to optimize the extraction.

When benzene vapor concentration has been non-detectable for three consecutive months or benzene removal rate has been essentially constant for that period, it will be assumed that the natural emissions rate has been reached and extraction from that well will be stopped. At that time, system modifications may be made as necessary.

The vapor extraction system operation will be terminated when monitoring results indicate the goals have been met, or that benzene vapors are entering the vadose zone from natural sources, or other authorization is given by the EPA.

3.2 Ground Water Treatment Conceptual Remedy

The selected remedy in the ROD calls for ". . . a ground water extraction and treatment system to treat extracted ground water to levels that meet the cleanup standard . . ." and, "Ground water monitoring to demonstrate that the extraction system is effectively capturing the contaminant plume and ultimately, to demonstrate achievement of the cleanup standards

throughout the aquifer . . ." The SOW describes how achievement of the standards shall be measured, for example, by average of water quality data from wells within the former plume, or other approach recommended by EPA guidance or policy.

Benzene is continually being removed by natural degradation. Benzene is non-detectable in ground water a relatively short distance downgradient of the site. If the sources of benzene ("hot spots") were captured by ground water extraction, that benzene which would have moved beyond the capture zone would continue to degrade, and without a supply of additional benzene, would eventually disappear.

An additional objective is to minimize disruption of the residential neighborhoods to the west of the site. To the extent possible, all extraction wells are to be installed on the east side of Pole Creek.

Therefore, the approach to ground water remediation is to (1) extract from wells located such that the hot spots are within the capture zones, and (2) rely on natural forces to degrade benzene to its cleanup standard in areas beyond the capture zones. Quarterly monitoring will be used to evaluate effectiveness of the capture zones and reduction of benzene concentrations throughout the area.

Ground water target areas are shown on Figure 3-3. Selection of the north and south target areas are based primarily on high benzene concentrations in the ground water, but are also influenced by areas of high benzene concentrations in the soil and soil gas. The central target area will be included only if elevated benzene concentrations are encountered in ground water after installation of well EW-7.

Wells for ground water extraction were selected to address the identified target areas based on results of ground water pumping tests and ground water modeling. These are as follows:

Northern Target Area: Wells MW-28S, EW-2 and EW-6 pumping at the rates indicated on Figure 3-3 will capture ground water with the highest concentrations of benzene. The first two wells are existing wells, EW-6 will be installed as part of Phase 2 construction.

Southern Target Area: Ground water in the southern target area will be captured by extraction from wells EW-1, EW-4 and EW-5.

Central Target Area: Well EW-7 will be installed at the approximate location shown on Figure 3-3. Water from this well will be sampled and analyzed to determine whether the well will be used as an extraction well or a monitoring well. If concentrations indicate the existence of an upgradient benzene source, the well will be converted to an extraction well. Otherwise, it will be used as a monitoring well.

There currently are no plans for the treatment of perched water since most of the perched wells are normally either dry or contain little water. If ground water reappears in the perched ground water wells and remains in the wells for extended periods, extraction of perched water may be incorporated into the ground water treatment system. Perched ground water would then be treated above ground in the same manner as ground water from the deeper aquifer.

The chosen remedial method for ground water is extraction using submersible pumps and activated carbon treatment. Except for treatment capacity, the design for the Phase 2 remediation system is similar to that for Phase 1. The system consists of six (or seven, if EW-7 is used for extraction) ground water extraction wells using electric submersible pumps for extraction, and two activated carbon vessels installed in series for ground water treatment.

The extraction wells will consist of two of the three original Phase 1 extraction wells (EW-1 and MW-28S), three replacement extraction wells installed after Phase 1 remediation activities commenced (EW-2, EW-4 and EW-5), and one or two proposed ground water extraction wells (EW-6 and possibly EW-7). Locations for EW-6 and EW-7 are immediately east of Pole Creek, approximately 200 feet north-northwest of EW-2, and approximately 200 feet north-northwest of MW-17S, respectively. The combined flow rates from the extraction wells is expected to be between 100 and 120 gpm; the treatment system design capacity will be approximately 140 gpm.

The proposed location of well EW-7 is not presently covered by ground water monitoring wells. If initial water quality sampling from this well indicates that benzene concentrations are low, the well will be used as a monitoring well. If concentrations indicate a possible upgradient benzene source which is not within the capture zones of other extraction wells, EW-7 will be added to the ground water extraction system network.

Experience shows that solids continue to precipitate from extracted ground water throughout the treatment system. The existing bag filter housing will be used with extended life filters to minimize solids entering the carbon vessels. These may be supplemented or replaced with additional bag filters if the filter bag replacement frequency becomes unacceptable at higher flow rates. In order to remove suspended solids that may accumulate on the top layers of the GAC vessels, the vessels will be backwashed periodically. This will be performed by reversing the flow of the lead GAC vessel and backwashing with clean water at 300 gpm for 30 minutes. The process will require a portable high flow transfer pump powered by an IC engine, two 10,000-gallon tanks (clean and dirty water), and 4-inch diameter flexible pipe with cam-lock fittings.

Backwashing will be performed manually when backpressure reaches 40 psi through the lead vessel, (refer to Appendix C for backwashing procedures and schematic). Pressure readings

on the inlet of the lead vessel will be monitored at regular intervals via the remote monitoring system. Pressure readings between vessels, on the inlet of the lead vessel, and the outlet of the lag vessel will be monitored and recorded on a weekly basis as part of the system operation and maintenance.

Initially, the backwash tanks will be temporarily located on the unpaved ground surface directly east or south of the GWTS equipment pad. If backwashing proves to be effective, the existing equipment pad will be expanded in the eastern direction to accommodate both tanks. At that time a backwash system with automatic control would be considered. It is important to understand that implementation of backwashing does not require major modifications to the existing system. The existing GAC vessel distribution manifold is designed for manual backwashing. The only new equipment required will be two 10,000 gallon tanks, a trailer mounted diesel engine driven centrifugal transfer pump, flow meter, connection hoses and couplings.

LNAPL has been observed in extraction wells EW-1 and EW-4 and may appear in the proposed extraction wells. In wells where LNAPL is detected, LNAPL absorbers will be installed. In addition, pump shutoff sensors will be installed at sufficient distances above the pump to prevent the introduction of LNAPL into the pumps and the GWTS. As a secondary check for LNAPL, all pumping wells that may have LNAPL will be monitored weekly for the presence of LNAPL. In addition, the bag filters specified for the site are manufactured out of polypropylene which is an oleophillic material that acts as an LNAPL absorber that will minimize the passage of LNAPL. The bag filters will be checked every two weeks for the presence of LNAPL. If the bag filters become oily, this would indicate LNAPL entrainment.

The 4,000 gallon holding tank and 1,000 gallon surge tank are presently bypassed since it was found that contact of the ground water with air in the tanks was aggravating solids precipitation. These tanks are currently used to contain impounded rain water, spills, and purge water from quarterly ground water sampling prior to treatment through the carbon.

In the event that LNAPL entrainment is apparent, extracted ground water from wells with significant LNAPL will be directed to the holding tank which will act as a oil/water separator. The water will then flow to the surge tank and be directed through the bag filters and treated through the carbon. LNAPL retained in the holding tank will be removed and properly disposed of. For operational flexibility, each individual influent well line will be manifolded to pump either directly to the holding tank and surge tank or the GAC vessels.

The necessary modifications to the Phase 1 system will consist of installing additional piping to new and existing extraction wells, upgrading the piping in the equipment area for higher flow capacity, installing additional extraction wells, and upgrading the electrical controls for

additional pumps. Components of the Phase 1 system will be incorporated into the Phase 2 system whenever possible, although modification may be required for some components.

The piping will be modified to allow injection of scale inhibiting chemicals into the influent and to provide gas blanketing of the tanks with nitrogen or carbon dioxide to minimize oxygen contact with the water. Chemical injection and gas blanketing will then be implemented if necessary to limit solids precipitation.

The length of system operation will depend on how quickly cleanup goals are met or alternate closure is approved by the EPA. If operating data show inadequacies in the capture zone, system capacities, etc., the system may require modification. The decision tree (Figure 3-4) presents criteria for modifications and operating time. As stated in the ROD, "Because this remedy will not result in hazardous substances remaining on the site above health-based levels, the five-year review will not apply to this action.

4.0 CONSTRUCTION AND STARTUP ACTIVITIES

4.1 Introduction

This section provides the details for the Phase 2 remedial system construction and startup activities. The Phase 2 remedial system consists of the following:

Soil Vapor Extraction System

- A phased approach to soil vapor extraction implementation is planned.
  - In the initial phase, a 150 scfm King Buck thermal oxidizer will be used.
  - In the final phase, a 1,000 scfm thermal/catalytic oxidizer (or other appropriate unit) will replace the smaller unit.
- There are four target vapor extraction wells: PEW-1, EW-4 (subject to benzene confirmation by GC/MS), PEW-3 and AEW-1. Wells PEW-1, PEW-3 and AEW-1 are already connected to vapor extraction piping near the GWTS. Other wells also connected include SBD-2, MW-28S, and EW-1. Although these wells are not designated as target wells, one or more may be used if evaluations show the need. If elevated levels of benzene are found in the vadose zone when new well EW-7 is installed, it will be connected to the vapor extraction system.
- Initially, extraction will be from well PEW-1. Well EW-4 will be added to the system when the larger vapor extraction unit is installed and water levels decline enough to allow for soil gas extraction. Wells PEW-3 and AEW-1 will be added to the extraction system later. As hydrocarbon and methane concentrations decline, additional extraction wells will be put into operation. On-going evaluation of the system will be conducted to ensure optimum performance of the system and the best extraction well field for the ultimate site remediation goal.

Ground Water Extraction and Treatment System

- Extracted ground water will be treated with two 10,000-pound activated carbon canisters in series and treated water will be discharged under an NPDES permit to Pole Creek.
- Six or seven ground water extraction wells (EW-1, EW-2, EW-4, EW-5, EW-6, MW-28S, and possibly EW-7) will be connected to the ground water treatment system with dedicated electric submersible pumps in each extraction well.

- LNAPL collection devices will be installed in ground water extraction wells EW-1 and EW-4 and any other extraction wells that accumulate LNAPL. If LNAPL entrainment is apparent, wells with significant LNAPL will be directed to an oil/water separator tank (holding tank/surge tank). Each well will be manifolded to pump either to the GAC or he oil/water separator for operational flexibility.

- LNAPL collection will be continued in ground water monitoring wells which have contained LNAPL (SBE-1, PEW-6, MW-9S, MW-17S, and MW-20S).

4.1.1 Design Drawings

Design drawings presented have been modified to reflect:

- comments provided by the EPA
- bypass of the surge tank at GWTS
- use of the holding tank as an oil/water separator should LNAPL entrainment occur
- change in location of SVE units near the GWTS
- change in SVE equipment

The drawings are as follows:

M-1 Site Location Map and General Notes
M-2 Ground Water Treatment System Piping & Instrumentation Diagram
M-3 Ground Water Treatment System Equipment Layout
M-4 Ground Water Treatment System Piping Layout
M-5 Vapor Extraction System Piping & Instrumentation Diagram
M-6 Vapor Extraction Piping Layout
M-7 Vapor Extraction System and Piping Details
M-8 Extraction Well Details
E-1 Single-Line Diagram, Load Schedule, and General Notes
E-2 Schematic Wiring Diagram

4.1.2 Codes and Standards

All work specified in this project will conform to the following listed construction, electrical, and instrumentation codes and standards, as applicable:

- American Society for Testing and Materials (ASTM)
- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)

- American Water Works Association (AWWA)
- Instrument Society of America (ISA)
- National Electric Code (NEC)
- National Electrical Manufacturers Association (NEMA)
- Occupational Health and Safety Administration (OSHA)
- Uniform Building Code (UBC)
- Uniform Fire Code (UFC)

4.2 Soil Vapor Extraction System

4.2.1 Permitting

Permitting for the installation and operation of the Phase 2 vapor extraction system (SVE) will be initiated with the following agencies:

- Ventura County Air Pollution Control District (VCAPCD)
- County of Ventura Building Department (Plan Check)
- County of Ventura Planning Department
- City of Fillmore Fire Department

4.2.1.1 Ventura County Air Pollution Control District

Permit applications to construct and operate the vapor extraction system will be submitted to the VCAPCD. The VCAPCD is the local agency regulating SVE system construction and operation. Following are some considerations for permitting SVE system equipment at the PCPL site:

- SVE unit cannot be located within 1,000 feet of school property;
- Permitting process may take 3 months;
- Reactive organic compound (ROC) credits are required;
- Prior to receiving VCAPCD permit, interim SVE system installation and operation can be performed under a CERCLA waiver.

4.2.1.2 County of Ventura Building Department

Design plans will be submitted to the County of Ventura Building Department for plan check by the county design engineer. The plans will be submitted as one entire package which will include both the GWTS and SVE system designs. The plans will be checked for code compliance at which time the building department will determine what specific permits are required. It is anticipated that electrical and plumbing permits will be required. The electrical permit will cover any electrical motors and power hookups, and electrical service

drops. The plumbing permit will cover the installation of supplemental fuel piping. Additional permits are not anticipated since the construction is minor and trenching should be considered as incidental grading. Permits will be obtained at the completion of the plan check process.

4.2.1.3 County of Ventura Planning Department

As part of the County of Ventura Building Department Plan check, a copy of the plans will be routed to the Planning Department. The planning department will check the design for zoning code requirements, aesthetic requirements, noise requirements etc. Operation of the vapor extraction system does produce moderate sound levels, but the proposed location of the system should assure that noise levels at property boundaries are within acceptable limits. The existing conditional use permit (CUP) for the site may have to be amended to reflect any modifications to the existing SVE system.

4.2.1.4 City of Fillmore Fire Department

Plans will be submitted to the City of Fillmore Fire Department concurrently with submittals to the County of Ventura Building Department. The fire department will check the system design and installation plan for fire code compliance. In addition, the Fire Department will verify that the selected vapor extraction system or systems have the necessary test laboratory approvals such as American Gas Association (AGA).

4.2.2 Vapor Extraction System Procurement

4.2.2.1 Initial Phase

In the initial phase, a King Buck/Hasstech (KB/H) thermal oxidizer (150 cfm) will be installed. The KB/H system uses a 7 1/2 horsepower blower to extract soil gas from the well or wells. The methane and other hydrocarbon vapors in the gas are destroyed by thermal oxidation. Propane will be used as the supplemental fuel when the heating value of the influent well vapors is not sufficient for combustion. The supplemental fuel may be switched to natural gas if a new proposed gas line is installed during this initial phase.

The KB/H unit will be trailer mounted and located at the north end of the GWTS pad. This location is more than 1,000 feet from San Cayetano School. It will be equipped with a 55-gallon knockout pot or equivalent to collect water and other condensates from the influent gas stream.

4.2.2.2 Final Phase

In the final phase, a 1,000 scfm thermal oxidizer with a shell and tube heat exchanger and capable of accommodating a catalytic oxidizer module will replace the KB/H unit.

4.2.3 Fuel Supply

For the first month of Phase 1 vapor extraction at PEW-1 (with the VR Systems V4) no supplemental fuel was required and it is expected that this condition will remain for some time. Once the hydrocarbon concentrations decrease, supplemental fuel will be necessary. Supplemental fuel for the initial phase will consist of propane stored in above ground tanks.

The 1,000 scfm unit needs a constant supply of supplemental fuel to maintain stable oxidizing conditions no matter what the inlet hydrocarbon concentrations. If large amounts of supplemental fuel are required as soil vapor extraction continues, a natural gas line may be installed to supply fuel for vapor extraction. The EPA will be notified of any supplemental fuel changes in a technical memorandum or status report.

4.2.4 Electrical Supply

The initial thermal oxidation system will require electrical power for the controls and blower motor. Power requirements of the SVE system are 240 volt, single phase service which will be supplied from the GWTS motor control center. A transformer is being installed to provide 240 volt power. The final system requires 460 volt, three phase service.

4.2.5 System Piping and Well Head Construction

Four-inch Schedule 40 PVC piping will be installed connecting the vapor extraction wells to the treatment systems as indicated in Design Drawings M-6 and M-7, Vapor Extraction Piping Layout and Vapor Extraction System and Piping Details. For ease of operation and adjustment, three separate lines will be piped to the area where the vapor extraction unit will be located. Following is a summary of wells to be connected to each line:

Line 1	Line 2	Line 3
PEW-1	EW-4	PEW-3
AEW-1	EW-1	EW-7 (if
MW-28S	SBD-2	needed)

Wells PEW-1, PEW-3, AEW-1, MW-28S, SBD-2, and EW-1 are currently piped to the GWTS pad. Existing piping will be modified as necessary. Additional piping will be installed where appropriate to complete the design. All above ground PVC piping (including existing piping) will be painted to provide UV protection.

Piping will be installed in a manner to eliminate accumulation of condensed liquid by keeping pipes even and sloped toward the wells. The section of piping passing under the unpaved road near EW-7 (Drawing M-6) will be equipped with a separate condensate collection trap for each line. The trap will be constructed of 12-inch diameter PVC pipe. Each trap will be double contained using a 16-inch diameter corrugated metal pipe filled with a minimum of 3 inches of concrete at the bottom (Drawing M-7). Existing above ground pipe will be supported wherever there are sections that may sag.

Each vapor extraction well will be connected to the system piping using either 2- or 4-inch Schedule 40 PVC fittings as shown on the wellhead detail drawing (Design Drawings M-6 through M-8). Extraction wells with casing diameters of 4 inches or larger will be connected with 4-inch fittings and extraction wells with less than 4-inch diameter casing will be connected with 2-inch fittings.

Schedule 40 PVC ball valves will be installed near each extraction wellhead. A wellhead vapor sampling port will be installed between each extraction well and the ball valve.

4.2.6 Startup Monitoring

System startup will be performed in conjunction with the specifications provided by the system manufacturer. During the startup period, individual system components will be inspected and checked according to the system manufacturer specifications. Vapor samples will be collected from the influent and effluent of each system and will be analyzed to evaluate its performance. System adjustments will be made as necessary based on the evaluations. After initial startup, systems will be operated continuously following the criteria outlined in Section 5.

4.3 Ground Water Extraction and Treatment System

4.3.1 Permitting

Permitting for the installation and operation of the Phase 2 GWTS will be initiated with the following agencies:

- Regional Water Quality Control Board
- County of Ventura Building Department

- County of Ventura Planning Department
- County of Ventura Public Works Agency

4.3.1.1 Regional Water Quality Control Board

A new NPDES permit application will be submitted to provide for higher flow rates and increased discharge limits for naturally-occurring compounds. The request for higher discharge volumes is in anticipation of incorporation of additional extraction wells. The request for increased effluent concentrations is in response to high levels of naturally-occurring compounds in ground water that are inherent to the area and not related to on-site activities. Studies will be conducted on the naturally-occurring compounds and results and conclusions will be submitted in support of the application. In addition, a request will be included to inject a scale inhibitor to help reduce solids precipitation, if this proves necessary.

4.3.1.2 County of Ventura Building Department

Design plans will be submitted to the County of Ventura Building Department for plan check by the design engineer. The plans will be submitted as one entire package which will include both GWTS and SVE system design. The plans will be checked for code compliance at which time the building department will determine what specific permits are required. It is anticipated that an electrical permit will be required for the GWTS. The electrical permit will cover additional pump motors, and modifications to the control system. Other permits are not anticipated since the construction is minor and trenching should be considered as incidental grading. Permits will be obtained at the completion of the plan check process.

4.3.1.3 County of Ventura Planning Department

As part of the County of Ventura Building Department Plan check, a copy of the plans will be routed to the Planning Department. The planning department will check the design for zoning code requirements, aesthetic requirements, etc. The existing conditional use permit (CUP) may need to be amended to reflect any modifications to the system.

4.3.1.4 County of Ventura Public Works Agency

Permits will be obtained from the County of Ventura, Public Works Agency for the installation of ground water extraction wells. Inspection by a registered inspector will be required during the installation of the extraction wells. Following the installation of the wells, a completed well log, well location map, and registered inspection sealing report will be submitted to the county as required by the permit.

4.3.2 New Extraction Well Installation

Two new extraction wells, EW-6 and EW-7, will be installed and incorporated into the ground water extraction and monitoring system. Figure 3-3 shows the proposed locations of the new wells. EW-7 will be used as an extraction well if ground water sampling and subsequent chemical analysis indicates elevated benzene concentrations. Otherwise, EW-7 will be used as a monitoring well.

Well locations will be marked and cleared by Underground Service Alert and Texaco Transportation & Trading Inc. for underground piping, etc. As an additional safety precaution, the first five feet will be hand-augered. Borings will be installed using a nominal 10-inch diameter continuous flight auger. All equipment will be steam cleaned and decontaminated at the site prior to any drilling activities.

Geologic logging of the borehole will consist of logging cuttings to the ground water table. Once the water table is encountered, continuous core samples will be collected to the total well depth. Cores will be photographed and logged by the on-site geologist. Soil samples will be collected at five foot intervals for possible chemical analyses. The field geologist will select samples for laboratory submittal based on photoionization detector (PID) readings of head space vapors, lithology, staining and odor changes. Selected soil samples will be properly preserved and submitted under chain of custody for analysis of TPHG and BTEX concentrations (EPA 8015m/8020 and confirmed by EPA 8240). At a minimum, two soil samples from the proposed completion zones will be submitted for analyses.

The proposed well construction details are based on previous knowledge of the on-site conditions which will be verified during borehole installation. The wells will be constructed of 6-inch diameter Schedule 40 PVC casing and 0.012-inch slotted manufactured PVC screen. Screen and blank casing will be hung in the boring to minimize deflection.

The proposed screen intervals in EW-6 will extend from approximately 97 feet to 133 feet below ground surface. The proposed screen interval in EW-7 will extend from 80 feet to 100 feet below ground surface. Actual completion zones will be determined in the field during drilling based on the subsurface conditions encountered. The annular space surrounding the screened intervals will be backfilled using a tremmie pipe with a 20-40 silica sand filter to a minimum of one foot above the screen. On-site sieve analysis of soil samples from the proposed completion zones will be conducted to verify screen and sand pack selection. The sand pack will be sealed to the surface with hydrated bentonite chips (to 3 feet above sand pack) and Volclay grout.

Upon completion, the wells will be developed by surging with a surge block. In addition, at least three to five well volumes of water will be removed with a bailer. Development will

continue until the pH, conductivity, and turbidity equilibrate. Equilibration will be assumed when field measurements of the parameters do not vary more than 10% on subsequent readings. Proposed construction details are shown in Design Drawing M-8, Extraction Well Details.

Ground water modeling, and previous aquifer testing indicates that the expected maximum flow rates from the wells are 10 gpm for EW-6 and 11 gpm for EW-7. Based on this information, a Grundfos 0.5 horsepower pump will be installed in EW-6. Pump installation in EW-7 will be done only if an upgradient benzene source is confirmed. Pump installation may differ based on water production characterization observed during well development. After pump and ancillary piping installation is complete, a 48-hour aquifer test will be conducted on each well to confirm anticipated pumping rates and provide aquifer property information for each location.

4.3.3 Equipment Procurement and Installation

Equipment specifications for the Phase 2 ground water treatment system are listed below. Components of the Phase 1 system will be incorporated into the Phase 2 system whenever possible and modified where necessary.

4.3.3.1 Major Equipment Components

Electric Submersible Pumps (4 existing, 2 or 3 new): The pumps shall be electric submersible pumps. All pumps shall have 3-phase 460-volt motors manufactured by Franklin (or equivalent). Electrical wire shall be 4 wire, all weather cable, and resistant to hydrocarbons. Down hole piping shall be MNPT threaded Schedule 80 PVC. Pumps will be supported by down hole steel cable.

LNAPL Skimmer: Passive LNAPL skimmers will be installed in extraction wells EW-1 and EW-4, and any other extraction wells where LNAPL is encountered. The skimmer will consist of an oleophilic absorption material in a 2-inch diameter housing of 304 stainless steel screens. Stainless steel sanitary well seals will be designed and fabricated for EW-1 and EW-4 that will allow for installation and removal of skimmers through the well seals. Each skimmer will be supported by a steel cable and shall be SoakEase™ brand or equivalent.

Separator/Holding Tank (existing): The existing 4,000-gallon polyethylene holding tank will be piped to serve as either an oil/water gravity separation tank (in-line) or multipurpose holding tank (off-line) for storing well purge water, well development water, and sump water. Piping will be sufficient in size to allow for full flow through the tank when valved for separation. Piping from the wells will be valved such that water from individual wells

can be diverted to the separator tank, if needed. Water will flow from the separator tank to the surge tank by gravity. The outlet pipe of the tank will be installed internally, terminating approximately 1 foot from the bottom to ensure that floating product does not enter the surge tank.

This tank will be bypassed under normal operating conditions. Use of the tank as an oil/water separator would be strictly a backup measure. LNAPL skimmers in the extraction wells will remove free oil to a sheen. So there would have to be a simultaneous failure of the low-level shutoff on the well pump and failure of the skimmer, before a significant amount of free oil could be pumped out of the well. However, there is potential for a small amount of LNAPL to be entrained in the water from such wells as EW-4 inch which free LNAPL was observed below the water table during drilling.

Transfer Pump -- Holding Tank (P-1): The holding tank transfer pump will be a 1/3 horsepower centrifugal pump capable of 45 gpm at 15 feet of head. The pump will be operated manually.

Surge Tank (existing): The surge tank is a 1,000-gallon rectangular tank (dimensions: 106"l x 56"w x 50"h) and is constructed of polypropylene. The tank is equipped with 4-inch and 2-inch female fittings to be used for inlet/outlet level sensor connections. There is a 2' x 2' wide manway. The surge tank is equipped with slotted PVC inlet piping to reduce turbulence. This tank will be bypassed under normal operating conditions.

Transfer Pump -- Surge Tank (P-2): The transfer pump is a Pacer model 2CL centrifugal pump capable of 150 gpm at 17 feet of head. The pump is operated automatically with level controls in the surge tank.

Bag Filtration System (existing): The existing bag filter housing will be used with extended life bags. A larger filter housing may be installed at later date, if necessary. An area will be left open on the equipment pad for a large capacity bag filter housing. The optional filter housing shall be constructed of carbon steel and rated to 150 psi. The filter housing will hold between three (3) and twenty-four (24) 4 ft^2 polypropylene filter bags with a minimum flow capacity of 200 gpm.

GAC Vessels (existing): The existing GAC vessels will be used in the Phase 2 GWTS. The vessels are Westates model HP-10, rated for a maximum flow rate of 250 gpm and pressure of 75 psi. The existing manifold is designed for alternating lead/lag vessels and reverse flow capabilities for backwashing. When the pressure drop across the lead vessel reaches 40 psi, the beds will be backwashed for 30 minutes at 300 gpm. A wheel mounted high-flow internal combustion powered transfer pump will be used for backwashing. Two 10,000-gallon tanks will be used for clean supply water and discharge water.

4.3.3.2 Minor Equipment Specifications

Butterfly Valves: Butterfly valves will be used as flow control valves on individual recovery lines from the extraction wells in the equipment pad, and as flow control on the transfer pump between the surge tank and GAC vessels. Seat rings and valve seals shall be constructed of viton or Teflon.

Ball Valves: All ball valves in equipment areas shall be Schedule 80 true union type. Ball valves for vapor return control inside well boxes shall be molded-in-place slip to slip type. All valves shall have O-rings constructed of viton or Teflon.

Check Valves: Check valves shall be spring or swing type with PVC bodies and Buna-N seals.

Piping and Fittings: Schedule 40 PVC pipe will be used for subsurface fluid and vapor recovery piping. Schedule 40 PVC piping will conform to ASTM-D-1785, and commercial standard CS-207-60. Pipe shall bear labeling from the manufacturer stating conformance to the standards listed above. Pipe shall be slip connected and glued using PVC cement conforming to ASTM D2564.

Schedule 80 PVC piping will be used for all fluid piping in equipment areas and as down hole recovery pipe for submersible pumps. Schedule 80 PVC pipe will conform to ASTM-D-1785 and CS-207-60. Pipe must be labeled accordingly and also bear labeling of pressure rating. Pipe shall be slip connected and glued using PVC cement conforming to ASTM D2564, except for down hole pipe which will be MNPT threaded. PVC pipe fittings shall meet or exceed the requirements of ASTM-2466-73 for socket type PVC pipe fittings.

Pipe Support: All piping supports shall be constructed from 1-5/8-inch wide Unistrut or equivalent steel channel. The Unistrut is to be secured to appropriate bases and fastened to the concrete using 3/8-inch red-head anchors or equal.

Unions: Schedule 80 PVC unions will be installed at the inlet and outlets of all components that may need to be serviced, removed or require maintenance including flow sensor assemblies, pressure sensor assemblies, particulate filter housings (if used) and transfer pumps. Schedule 80 PVC unions shall meet or exceed the requirements of ASTM D-2467.

Sample Ports: Sample ports will be installed at locations shown on the design plans. Samples shall have 1/4-inch MNPT x barbed end with Teflon or Viton seals and seats, and shall be constructed of PVC.

Well Seals: Well seals on extraction wells shall be a sanitary type constructed of 304 stainless steel with Buna-N gaskets secured with steel tightening bolts. Holes will be drilled on top for power supply wiring, control wiring, SoakEase™ access and fluid return piping with INPT (2-inch hole for SoakEase™ access, two 3/4-inch for electrical, 1-1/2-inch for fluid return).

4.3.3.3 Instrumentation and Controls Specifications

Flow Sensors and Meters: Individual extraction wells, total inlet flow from the extraction wells, and a total outlet flow from the GAC vessels will be monitored using paddle wheel type flow sensors with analog display flow meters and digital totalizers. The flow meter converts a pulse signal to a 4-20 ma signal. Signet or equivalent flow instrumentation will be used. If paddle wheels become clogged with suspended solids after operation of the system begins, magnetic inductive flow meters will be considered. Magnetic inductive flow meters have no ports or paddlewheels to clog, but procurement costs are substantially higher. The paddle wheel flow sensors will be installed with unions on both ends of the sensor assemblies to allow for easy removal for cleaning and maintenance.

Pressure Indicators: Pressure indicators will be installed at locations specified on the design drawings. Pressure gauges shall be Omega type S or equivalent.

Pressure Transmitters: The existing pressure transmitters on the individual extraction well lines will be removed and replaced with pressure indicators. Only the pressure transmitter on the inlet and outlet of the bag filter housing will remain. The pressure transmitter is manufactured by Signet, or equivalent.

Down Hole Level Sensors: High-low level sensors shall be Series 3Y (or equivalent) corrosion - resistant electrodes manufactured by Warrick. There shall be three sensors per well: high, low, and ground or reference. Sensors shall be used for pump activation with intrinsically safe level controls located in the main control panel. Suspension wire shall be PVC coated with an additional PVC heat shrink jacket used as protection from hydrocarbons.

Down Hole Pressure Transducers: Pressure transducers will be installed in all extraction wells and monitoring wells MW-39S and MW-14S for continuous monitoring of ground water levels. Pressure transducers shall be Model PX 161D manufactured by In-Situ™, or equivalent. The extraction well transducers will be linked to Hermit model 1000 or equivalent data loggers manufactured by In-Situ™. At the extraction and monitoring wells MW-39S and MW-14S, the Hermit 1000 data loggers will be located inside the well boxes and data will be manually down loaded, periodically. The data loggers installed in MW-14S

and MW-39S will be In-Situ™ well sentinels which hang in the wells for protection and security. Data will be downloaded periodically. Down hole transducer wire shall be Teflon or PVC coated with a secondary PVC heat shrink jacket as protection from hydrocarbons.

Flow Protection for Extraction Pumps: In the Phase 1 remediation system, Omega PSW series pressure switches were used to send a signal to the motor control center in the event of a high or low pressure condition to shut the pump off. Examples would be a break in the recovery piping (low) or blockage in recovery piping (high). Since operating line pressures are almost as low as static pressures, the pressure switches cannot be set to detect any difference. The signal from the individual well flow meters will be used to detect low flow in the recovery lines. The PLC will have programmed setpoints so if the pump is not operating at or above minimum flow the pump motors will shut off.

Telemetry System: The telemetry system consists of two Microtel or equivalent telemetry units for data recovery and an IBM equivalent PC for data storage and transmission to a host site via modem. Each unit will be equipped with eight analog inputs for a total of sixteen. Data can be monitored continuously or down loaded via the modem. System monitoring will include instantaneous flow for each well, and/or the GAC vessels, inlet pressure and total inlet and outlet instantaneous flow.

Float Switches: Float switches installed in the surge tank serve as on-off control for the 2 horsepower transfer pump (P-2) and overfill protection to shut the system off. There are three level sensors (L-H-HH) installed in the surge tank. The separator/holding tank has one flow switch used as overfill protection. The containment pad has a stainless steel ball type float switch to shut the system off, if the containment pad fills with water (a secondary shut off switch was recently installed for back-up purposes). This would most likely occur in the event of a sump pump failure. All float switches installed in tanks are the hanging mercury tilt type manufactured by Warrick or equivalent.

Motor Control Center (MCC): The motor control center contains main disconnects, motor starters, 240-volt breaker panel, level control relays, 480/240-volt transformer, and a Programmable Logic Controller (PLC). The MCC is a series 2100 manufactured by Westinghouse. Modifications to the MCC shall consist of additional motor starters and disconnect switches to be used for the additional submersible pumps. The addition of a PLC with digital and analog inputs manufactured by Square D or equivalent will be used to serve as a safety shutoff controller. The PLC will be programmed to shut extraction pumps off in the event of a low flow situation and to shut off the system if any of the high level float switches in the tanks or containment area are activated. Warning lights will be installed in the MCC to identify the appropriate alarm. In the event of a low flow situation, a manual reset will need to be activated to restart the corresponding submersible pump; or to restart the GWTS in the event of an overfill situation.

4.3.3.4 Electrical Specifications

Hazardous Location Classification: From the ground to 18 inches above grade in the equipment enclosures, inside the extraction well boxes, and 18 inches in all directions of any tank where free phase hydrocarbon may be present shall be classified as a Class I, Division II, Group D Area as specified in NEC. All electrical conduit, fittings, junction boxes, seal offs, and any other materials necessary for the installation of the remediation system in the listed potentially hazardous areas shall meet the appropriate classification requirements.

Electrical Conduit: Subsurface conduit shall be Type 40 PVC conduit with rigid coated sweeps at transitions to grade. Connections to transfer pump motors, float switches, etc., may use flexible liquid-tight conduit for short transitions. All above grade conduit shall be rigid steel conduit, except for phone line conduit which shall be intermediate metal conduit (IMT). Conduits shall be supported in accordance with Article 346-12 of NEC.

Electrical Conductors: All conductors or wire shall be stranded copper wire with PVC insulation and nylon jackets.

Seal-Offs: Sealing unilets (Seal-Offs) shall be installed on conduit when leaving or entering a hazardous area.

Fittings and Junction Boxes: Fittings and junction boxes shall be constructed of cast malleable iron or cast gray iron alloy and shall be approved for the location in which they are installed.

4.3.4 System Piping and Well Head Construction

System piping and well head construction will commence following completion of the new extraction well installation. All new fluid return piping will be constructed with Schedule 40 PVC. All subsurface pipe and conduit will be installed according to local regulatory agency permitting requirements and with a minimum burial of 24 inches. Trenches shall be backfilled with native soil at maximum lifts of 8-inches. All above ground PVC piping will be painted to provide UV protection.

Upon completion of the fluid return piping installation, pressure tests will be performed at three times the working pressure for a minimum of one hour. This test is performed to ensure the integrity of the piping.

Traffic rated 36-inch square, rain tight steel well boxes will be installed for proposed wells EW-6 and EW-7. Equipment to be installed within the well box includes submersible electric pumps, LNAPL skimmer (optional), down hole fluid recovery piping and fittings

(Schedule 80 PVC), pipe support, well seals, and down hole level sensors and pressure transducers. Details of the equipment to be installed within the well boxes are described in the final design report.

4.3.5 Submersible Pumps

The installation of submersible well pumps shall be performed in accordance with the specifications presented in Table 10-1 of the *Final Phase 2 Design Report.* Presently there are three pumps operating on-site in extraction wells EW-4, EW-5 and MW-28S. The Grundfos 60S pump in MW-28S shall remain there for Phase 2 operation, however the 10S05-9 pumps in well EW-4, and EW-5 will be relocated to EW-1 and possibly EW-7. Since EW-7 has yet to be installed, an alternative pump may be used after the exact ground water yield is determined.

There is a Grundfos 10S05-9 pump installed in EW-2 that is not connected to the system and will remain in EW-2. As part of Phase 2 construction, new fluid return piping, electrical conduit, and electrical wire (power and sensor) shall be installed from wells EW-1, EW-2, EW-6 (proposed), and EW-7 (proposed) to the GWTS enclosure as shown in design drawing M-4.

Existing piping from EW-4, EW-5 and MW-28S will remain and be utilized. New pumps will be installed in EW-4, EW-5, EW-6 and possibly EW-7. Since EW-6 and EW-7 are yet to be installed, alternative pumps may used instead of the pumps listed in Table 10-1 after the exact ground water yield is determined.

4.3.6 Startup Monitoring

Prior to system startup, base line data on all ground water extraction wells will be obtained (including water levels, TPHG and BTEX concentrations). TPHG and BTEX analysis may be taken from a quarterly ground water monitoring event, if it coincides with system startup. Pressure transducers will be used in the extraction wells and Hermit pressure transducers and dataloggers, or equivalent, in selected remote monitoring wells. Constant rate aquifer testing will be performed on the two newly installed extraction wells at system startup. Following development, ground water from the new extraction wells will also be analyzed for general mineral analysis, total dissolved solids (TDS) and total suspended solids (TSS) to compare water quality and solids content to those of existing extraction wells.

Additionally, following system startup, system components will be tested and adjusted as necessary, including flow meters, pressure gages, telemetry system, and automatic control systems. After initial startup, the system will be operated continuously according to the criteria outlined in Section 5.

4.4 Design Modifications and As-Built Drawings

At the completion of the job, the plans will be amended to show any deviations or modifications from the original scope of work. Any changes or modifications will be approved by Texaco prior to the work being done. These changes will result either as modifications made in the field to complete the installation as intended or changes specified by the design engineer prior to construction. Continued Phase 1 operation may provide data that result in additional modifications to the design presented in the *Final Phase 2 Design Report*. A final set of as-built drawings will be prepared by the design engineer and submitted to the EPA with the construction completion report.

4.5 Construction Inspection and Testing

In order to assure that the GWTS and the SVE are constructed in accordance with the required construction standards and specifications, periodic inspections and testing will be performed during construction activities. Inspections and testing will be performed by the construction or the supervision engineers according to the construction quality assurance/quality control plans.

It will be the responsibility of the supervision engineer to inspect and approve each phase of construction before the next phase commences. The supervision engineer will inspect work to see that it is being performed in strict accordance to the approved construction plans and all applicable building codes. It is the responsibility of the construction contractor to obtain all necessary construction permits and perform the work in accordance with all applicable codes and regulations. All inspections will be documented in writing, photographs will be taken of work in progress such as open trenches to verify depths of subsurface piping.

Testing of the SVE system will include:

- Pressure testing all vapor recovery piping (subsurface and enclosure) at 10 psig pressure for a minimum of one hour.
- Pressure test supplemental fuel piping at 50 psig for a minimum of one hour.
- System checks on SVE as specified in manufacturer's instructions. A technical representative of the SVE manufacturer will be onsite to assist in system performance tests.
- Verification that quality, workmanship, materials, and equipment meet the design specifications.

Testing of the GWTS will include:

- Pressure testing of all fluid recovery piping (subsurface and enclosure) at 50 psig for a minimum of one hour prior to the backfilling of the trenching.

- Test all control system components including high level sensors, transfer pump, low flow sensors, flow sensors and controls. A complete diagnostic on the GWTS control system will be performed which includes existing Phase 1 and Phase 2 components. This work will be performed by a licensed electrical contractor and witnessed by the supervision engineer.

- Prior to startup of the GWTS, the PLC and telemetry system will be programmed and tested.

- Remote data loggers with level transducers in the extraction wells and monitoring wells will be programmed and tested.

- Transfer pump will be checked for proper rotation.

- Test pressure relief valve at discharge of transfer pump for proper opening pressure.

- Verify that quality, workmanship, materials, and equipment meet the design specifications.

5.0 REMEDIAL SYSTEM OPERATION ACTIVITIES

Following installation and startup of the vapor extraction and ground water treatment systems, these will be operated continuously until the cleanup goals are achieved or alternative closure is approved by the EPA. On-going evaluations of the remediation systems will be performed to ensure optimum performance of the systems and to review cleanup progress. Modifications to the system will be made, if needed, following approval by EPA.

5.1 Soil Vapor Extraction System Operation

5.1.1 System Monitoring

The vapor extraction system will be monitored twice weekly during the first month of system operation following the completion of system startup. After that, system monitoring will be conducted approximately weekly. Operational monitoring will be done as appropriate for each system. Extracted soil gas flow rates, vacuum pressures at extraction well heads and at the extraction system, and other system performance data will be collected during each site visit (refer to Appendix D for Thermal/Catalytic Oxidizer Vapor Extraction System Data Sheet). Vapor from each operating well will be field tested for hydrocarbon concentrations and methane using a flame ionization detector (FID) with and without a carbon filter during routine monitoring.

5.1.2 Vapor Sampling

Vapor samples will be collected and analyzed for TPHG and BTEX from each operating extraction well approximately on a weekly basis for the first three months and monthly thereafter. The vapor samples will be analyzed for TPHG by EPA 8015 and BTEX by EPA 8020 with mass spectrometer confirmation of the BTEX compounds. Carbon distribution and fixed gases will be analyzed in each new extraction well as it is added to the system and then periodically thereafter based on the need for evaluation.

We anticipate that after three months of operation, vapor concentrations in the extraction wells will be greatly reduced and a less frequent sampling schedule will be sufficient. When new extraction wells are brought on line, approximately weekly sampling will be conducted for the new extraction well for a period of three months.

Collected data and laboratory analytical results will be used to evaluate remediation progress and system performance. Modifications will be made as needed.

5.1.3 Maintenance

When propane is used, the fuel pressure gauge attached to the propane tank will be checked at each routine site visit to ensure sufficient fuel is available to power the units. If natural gas is used, there would be no requirements to check fuel pressure gauges since, gas would be provided by Southern California Gas Company through a metered system. The liquid levels in the knockout pots will also be checked. Any non-aqueous phase liquid present in the knockout pot will be decanted and transferred to the production drum and temporarily stored on the decon pad. Any LNAPL collected will be manifested and appropriately disposed of. The remaining water will be transferred and treated through the ground water treatment system.

System maintenance will be conducted as specified by the manufacturer. The maintenance for the thermal oxidizer and thermal/catalytic oxidizer consists of recording data and performing necessary maintenance tasks. The following maintenance items shall be performed or checked: condition of well gas air filter, check dilution air filter, check blower belts, replace data logger paper, check data logger pens. Linkages on the dilution air valves and bearings on extraction blower shall be cleaned and lubricated on a monthly basis. The following safety shutdowns shall be checked on a monthly basis: UV-flame sensor, high and low temperature shutdowns, high level liquid sensor on knockout drum, and low flow sensor. On a bimonthly basis the oil in the extraction blower will be drained and replaced as necessary, and the UV-flame sensor lenses will be cleaned if needed.

5.1.4 Soil Vapor Extraction System Evaluation and Changes to Well Field Configurations

To optimize vapor extraction system activities, target areas have been designated. The primary vapor extraction wells are located in these target zones. A decision tree outlining the strategy for system operation is included in Figure 3-2. Influent well vapors will be analyzed for benzene approximately monthly. Wells will be removed from or added to the system depending on concentration trends of benzene.

Due to low oxygen levels and high hydrocarbon concentrations previously observed at the site, a high percentage of dilution air will be required to maintain an adequate oxygen level in the influent vapor stream and to not exceed the treatment capacity of the systems. The addition of this dilution air will limit the soil gas flow rate from the extraction wells. Prolonged operation of the system should result in increased oxygen levels and decreased hydrocarbon concentrations in the soil gas. Therefore, over time the flow rate from the extraction wells may be increased. Well field configurations (additions and reductions of extraction wells) will be modified following an evaluation according to the decision tree.

5.2 Ground Water Treatment System Operation

5.2.1 System Monitoring

The ground water treatment system will be monitored as follows:

Monitoring with Telemetry System

- Individual well flow rates from each extraction well (telemetry).
- Combined well flow rate (system inlet and outlet) and cumulative volume (telemetry).
- Inlet pressure to GAC vessels and bag filter (telemetry).

Weekly Monitoring

- Individual well flow rates and cumulative volumes from panel.
- Combined well flow rate (system inlet and outlet) and cumulative volume.
- Individual well pressures at well head and equipment pad.
- Inlet, intermediate, and outlet pressure of GAC vessels.
- Inlet and outlet pressure of bag filter system.
- LNAPL monitoring and removal as necessary in extraction wells.

Bi-Weekly Monitoring (every other week)

- Sample influent water to carbon and intermediate water between the two vessels and analyze for TPHG/BTEX by EPA 8015m/8020.
- Sample effluent water and analyze only if TPHG or BTEX is detected in the intermediate water sample.
- Inspect bag filters for presence of LNAPL.

Monthly Monitoring

- LNAPL monitoring and removal in monitoring wells that contain LNAPL.

NPDES Monitoring and Sampling

- Monitor, sample, analyze and report according to NPDES requirements. Current permit includes monthly, quarterly and annual sampling with quarterly and annual reporting.

5.2.2 Ground Water Monitoring and Sampling

Ground water monitoring and sampling will include:

Monitoring with Telemetry System

- Water levels in extraction wells and selected monitoring wells (individual data loggers).

Monthly Sampling

- Extraction wells for TPHG/BTEX by EPA 8015m/8020.

Quarterly Monitoring and Sampling

- Water levels in all accessible PCPL and Ultramar Service Station wells (approximately seventy-eight wells).
- Sampling of approximately thirty-five wells for TPHG/BTEX by EPA 8015m/8020 (according to quarterly ground water program).

Annual Sampling

- Sampling of approximately ten wells for TPHG/BTEX by EPA 8015m/8020 (according to quarterly ground water program).
- Sampling of approximately five wells for volatile organics by EPA 8240 (reduced list).

The monitoring and confirmation sampling plan is to be completed at a later date (refer to schedule in Section 8).

5.2.3 Maintenance

The following maintenance items will be performed as needed:

- Periodically change bag filters
- Periodically backwash GAC vessels (Appendix C)
- Clean inline paddlewheel flow sensors
- Periodically calibrate flow meters

5.2.4 GWTS Evaluation and Changes to Well Field Configuration

The length of system operation will depend on how quickly cleanup goals are met. System and ground water monitoring data will be used to determine system effectiveness. If operating data show inadequacies in the capture zone, downgradient degradation of benzene, system capacities, etc., the system may require modification. The decision tree (Figure 3-4) presents criteria for modifications.

5.3 Documentation and Reporting

Operations logs documenting site field activities and data collection will be maintained for the duration of the site remediation. These records include the following forms:

- *Daily Field Activity Report Form*: Summarizes daily site field activities and includes information pertaining to the location and description of activities and the equipment used on the project;

- *Thermal/Catalytic Oxidizer Vapor Extraction System Data Sheet*: Records data which pertain to the operation and maintenance of the thermal/catalytic oxidizer vapor extraction unit such as temperature, pressure, and flow rate measurements. Maintenance records include oil, coolant and knockout pot reservoirs;

- *Ground Water Treatment System (GWTS) Field Data Sheet*: Records operational data pertaining to the GWTS on an individual extraction well basis. Inlet/outlet filter pressure, GAC vessel pressure and discharge flow measurements are reported;

- *Monitoring Well Purge and Sample Form*: Records data pertaining to the purging and sampling of ground water extraction/monitoring wells. Static water level, depth to ground water, purge method, purge volume and standard water parameters (pH, temperature and conductivity) are reported;

- *Ground Water Depth - Quarterly Form*: Summarizes data gathered from quarterly ground water sampling of individual extraction/monitoring wells. Includes much of the information reported on the Monitoring Well Purge and Sample Forms along with historical information gathered from the prior quarter; and

- *LNAPL Monitoring Form:* Summarizes data gathered during LNAPL monitoring.

- *Chain-Of-Custody Form* (Vapor and Water Analytical Data): Standard laboratory form indicating sampling conditions and analytical tests to be conducted on the

collected samples. This form also provides a record of the orderly transfer of samples from the field to the stationary laboratory.

Examples of these forms are included in Appendix D.

Laboratory records are produced in the form of laboratory analytical reports which are provided by the State-certified, environmental testing laboratories. These records indicate the sample matrix and test methods used to analyze samples and provide a summary of the analytical results, method detection limits and quality assurance/quality control (QA/QC) information.

Data and laboratory reports generated during the routine O&M site visits will be included in the Quarterly Status Report. Copies of each Quarterly Status Report will be submitted to the EPA and State Department of Toxic Substance Control (DTSC).

6.0 PROJECT MANAGEMENT AND REPORTING

6.1 Remedial Action Management Plans

6.1.1 Health & Safety (H&S) Plan

The existing site H&S plan has been modified to include a description of precautions, procedures, action levels and personnel protective equipment for the operation and maintenance of the site remediation systems. The site H&S plan is included in Appendix A.

6.1.2 Operation and Maintenance (O&M) Plan

The O&M Plan will cover the implementation and long-term maintenance of the remediation system. The following items will be covered:

- Description of equipment;
- Description of routine O&M;
- Description of potential operating problems;
- Description of routine monitoring and laboratory testing;
- Description of alternative O&M options;
- Contingency Plan;
- Relevant O&M health and safety issues; and
- Required records and reporting documentation.

The O&M Plan is to be completed and submitted at a later date (refer to schedule in Section 8).

6.1.3 Construction Quality Assurance/Quality Control (QA/QC) Plan

A Construction QA/QC Plan for the subject site has been prepared in accordance with the Draft EPA Superfund Remedial Design and Remedial Action Handbook guidance document (OSWER, August 1993). The plan is included in Appendix B.

6.1.3.1 Construction Quality Assurance (QA) Plan

The Construction QA Plan outlines the procedures to be used to assure that field construction activities are provided in a reliable manner and contains the following elements:

- Personnel responsibility and authority;
- Construction quality assurance personnel qualifications;
- Inspection activities; and

- Reporting documentation.

6.1.3.2 Construction Quality Control (QC) Plan

The Construction QC Plan describes the QC procedures to be used during the course of remedial construction activities. The Construction QC Plan includes the following:

- Quality control organization;
- Quality control testing; and
- Documentation and reporting.

6.1.4 Monitoring and Confirmation Sampling Plan

The Monitoring and Confirmation Sampling Plan will describe the monitoring and sampling procedures to be employed during the remedial activities. The Monitoring and Confirmation Sampling Plan is to be submitted at a later date (refer to schedule in Section 8). It will include the following:

- Sampling procedures;
- Ground water monitoring;
- NPDES monitoring;
- Vapor monitoring;
- Confirmation monitoring; and
- Data quality objectives.

6.1.5 Quality Assurance Project Plan (QAPP)

The existing QAPP will be modified for the Phase 2 remedial activities. This plan is to be submitted at a later date (refer to schedule in Section 8).

6.2 Quarterly Reporting

6.2.1 Quarterly Status Reporting

Quarterly Status Reporting will continue through the remedial action activities. As required by the CD, the status report contains the following items:

- Progress made during reporting period;
- Summary of sampling and testing results;
- Summary of items submitted to the EPA;
- Description of work planned for next period; and

- Description of problems encountered.

As required by the CD, these reports are submitted to the EPA and the State by the twentieth day following the end of each quarter.

6.2.2 Quarterly Ground Water Monitoring and Reporting

Quarterly ground water monitoring and reporting will continue through the remedial activities. The quarterly ground water monitoring reports contain the following:

- Field procedures employed;
- Ground water surface elevations and gradients;
- Chemical analyses and trends; and
- Data validation results.

In addition, annual reports are submitted in the final quarter of each year which contain an evaluation of the monitoring program and recommend modifications if necessary.

6.3 Remedial Action Construction Reports

As required by the CD and SOW, a Closeout Report and Extraction and Treatment System Completion Report will be submitted. These reports may be combined into one document and will be submitted approximately two months after construction completion. A separate report may be submitted for the SVE system construction since this will be completed in stages.

6.3.1 Closeout Report

The closeout report will contain a description of all areas of pertinent operations including, but not limited to: locations of clean equipment and materials staging and storage areas; the equipment and personnel decontamination areas; the water treatment facility and associated tanks and piping; ground water and soil vapor extraction well fields; and the location of treated water disposal or discharge points and facilities.

6.3.2 Ground Water Treatment System Completion Report

The extraction and treatment system completion report for the ground water treatment system will document and certify the completion of construction of the final extraction wells, conveyance piping and treatment system in accordance with the *Final Phase 2 Remedial Action Work Plan*. The report will also contain the first three weeks of system monitoring data.

6.3.3 Soil Vapor Extraction System Completion Report

The extraction and treatment system completion report for the vapor extraction system will document and certify the completion of construction of the final extraction wells, conveyance piping and treatment system in accordance with the *Final Phase 2 Remedial Action Work Plan*. The report will also contain the first three weeks of system monitoring data.

7.0 PROJECT ORGANIZATION

7.1 Project Management and Project Team

Figure 7.1 illustrates the organization chart for the remedial action activities. The EPA's Remedial Project Manager (RPM), *Ms. Michelle M. Baron*, will be responsible for managing the project for the EPA and interfacing with Texaco's Project Coordinator, *Mr. Glenn A. Anderson*. Ms. Baron recently replaced Ms. Katherine L. Moore as the EPA RPM. The day-to-day management of the activities will be the responsibility of *Mr. Mark J. Passarini*, Texaco's Alternate Project Coordinator. The project activities will be conducted by England & Associates, the acting supervising contractor.

Mr. Passarini will be supported in the day-to-day management by *Dr. Dennis C. England* (Senior Project Manager) and *Ms. Joni L. Fisher* (Assistant Project Manager) of England & Associates. These individuals will maintain daily involvement with each step of the technical activities to assure that the necessary remedial action activities are conducted and supported by appropriate data within the required schedule. Project management will include:

- Coordinating plans and schedules with the EPA RPM and EPA's subcontractor (*Mr. John R. Kirtley* of Bechtel Environmental Inc.)
- Coordinating the involvement and activities of the project staff and subcontractors.
- Monitoring project performance and providing day-to-day guidance and technical support.
- Preparing and submitting reports to the EPA RPM and other agencies.
- Coordinating the quality control oversight for all activities.

The following individuals will also perform key roles in this project:

- *Mr. Jinghui Niu* will serve as Construction Supervisor and Construction QA/QC Officer. Mr. Niu will also be responsible for: interacting with the Ventura County Air Pollution Control District, obtaining necessary permits for vapor extraction treatment system operation, and vapor extraction equipment procurement and installation.
- *Mr. Michael A. Rendina* will serve as Drilling and Well Installation Supervisor.

- *Mr. Frank J. Hagar* will conduct aquifer testing on the newly installed wells and will continue to refine the site ground water model.

- *Mr. Zachary Dickson* will serve as Corporate Health and Safety Officer.

- *Mr. Bob Dadfar* will be responsible for quarterly ground water sampling and operation and maintenance of the ground water and vapor treatment systems. He will also play a major role in construction activities.

- *Mr. Richard Solomon* will assist Mr. Niu with equipment procurement, permitting, construction and installation activities.

- *Mr. Gary Beckerman* will provide waste management and regulatory direction.

- *Mr. Darren Azarian* will assist Mr. Dadfar in sampling and O&M activities.

Resumes for these and other key individuals who may participate in the project are included in Appendix E.

7.2 Communication and Coordination

Formal communication between EPA and Texaco will be conducted with quarterly progress reports, quarterly monitoring reports, technical memoranda, and other correspondence as necessary.

In addition, informal technical exchanges will be necessary to assure that EPA is informed about important site activities, and allow for input from EPA. Informal exchanges should generally include:

- Periodic conference calls between EPA RPM, Texaco, and E&A to discuss key project activities, preliminary observations, and changes in activities.

- Technical exchange meetings at agreed-upon locations, at appropriate intervals to update all parties on project progress and to discuss technical issues which are determined to be important. The location and agenda for each technical exchange meeting will be agreed upon by the RPM and Texaco.

8.0 PROJECT IMPLEMENTATION AND SCHEDULE

8.1 Contractor Selection

England and Associates (E&A) has been selected as the Phase 2 remedial action Supervising Contractor (Supervision Engineer). E&A has been working on this project during the earlier phases of site investigation, ground water monitoring, remedial design and construction, and project coordination. During the implementation of Phase 2 remedial action, E&A will provide technical oversight and remedial construction management services.

In addition to the services provided by E&A, the following tasks will require services from the contractors specialized on the tasks under the supervision of E&A:

- Monitoring/extraction well installations;
- Laboratory analytical services;
- Electrical and plumbing contractors;
- Vapor extraction system manufacturers; and
- Other equipment suppliers.

When the above-listed services are required during the Phase 2 construction, contractors specialized in the field will be evaluated based on their qualifications, proposed schedule, and costs. Services will be evaluated using the following listed guidelines:

- Proper and current license(s) to perform the required scope of work;
- Proper and current liability insurance;
- Company and project team experience and qualification; and
- Proposed schedule and costs.

All selected contractors performing on-site work will be required to read and sign the site health and safety plan and all personnel involved in the project shall be instructed to follow this plan. All personnel performing work in safety sensitive areas of the site, shall possess a current training certificate for 40-hour OSHA 29 CFR. All contractors providing services for the site shall follow the QA/QC procedures outlined in Appendix B.

8.2 Schedule

A project schedule is developed based on the major remedial action tasks specified in Section 4. A detailed Site Remediation Schedule is included as Figure 8-1 and descriptions of the schedules in respect to the implementation of soil vapor extraction and ground water treatment systems are provided in the following sections.

8.2.1 Soil Vapor Treatment System

The implementation of soil vapor extraction system construction has been divided into two phases. The initial phase includes the installation and operation of an available 150 cfm King, Buck/Hasstech (KB/H) thermal oxidizer with hydrocarbon destruction capacity about the same as one VR Systems Model V4 (80 lb/hr).

The final phase will include installation of a 1,000 cfm thermal/catalytic oxidizer. A 1,000 cfm thermal oxidizer has about three times the capacity of a VR Systems Model V4 operating at 2,000 rpm, when oxygen is limiting (site wells have low oxygen).

8.2.2 Ground Water Treatment System

The implementation of ground water treatment system construction includes the installation of additional extraction/monitoring wells and piping, existing treatment system modifications and associated permitting. Since most major components of the ground water treatment system are existing, construction of the Phase 2 ground water system is relatively simple.

A new NPDES permit application will be submitted to amend the existing permit to allow for higher flow rates and modified discharge limits. Prior to obtaining the amended NPDES permit, the ground water treatment system will be operated under the existing permit.

8.3 Costs

The Feasibility Study and Record of Decision for the site show estimated total capital cost for the remedial actions of $1,075,000 and an estimated annual O&M cost of $480,000. The assumptions for estimating the costs are listed below:

- Single phase remedial action approach;
- Ground water extraction and treatment system including the following components:
  - five extraction wells,
  - granular activated carbon treatment units,
  - reinjection or beneficial reuse of treated water,
- One year subsurface study; and
- Soil vapor extraction including the following components:
  - a vacuum pump,
  - vapor phase activated carbon treatment system,
  - 15 vapor extraction wells.

A Consent Decree (CD) was entered for the site in August 1993. During the CD negotiation, it was agreed that the remedial design would be completed in two phases. The Phase 1 remedial program would provide necessary information for the Phase 2 remedial design. During the implementation of the Phase 1 remedial actions, unexpectedly high vapor concentrations were detected in the soil gas stream from various vadose zone wells at the site. Additionally, high concentrations of total dissolved solids were detected in ground water extracted from the aquifers beneath the site. As a result of these findings, additional evaluation and studies were conducted in order to provide sufficient information for the Phase 2 design. These additional studies included:

- Various vapor extraction and treatment technologies;
- Extracted soil gas vapor condensation and recovery;
- Naturally-occurring hydrocarbons and their distribution;
- Refinement of the site hypothesis;
- Additional subsurface investigation;
- Vadose zone benzene concentration distributions and their effects on dissolved-phase benzene concentrations; and
- Solids removal from extracted ground water including testing of engineered extraction wells, bag filters, dissolved air flotation, centrifuge separation, and chemical additions.

Additional costs were incurred to complete the above listed studies. With anticipated Phase 2 remedial actions described in the *Final Phase 2 Design Report*, the revised total estimated capital cost for the remedial actions (including Phase 1 and Phase 2) is $1,800,000. The estimated annual O&M cost remains $480,000.

The Feasibility Study indicated a time frame of up to 30 years to complete the cleanup. At this time, the duration of the remedial activities cannot be accurately predicted due to the presence of naturally-occurring hydrocarbons and other factors, but is expected to be within the range of the time indicated previously indicated in the Feasibility Study.

9.0 REFERENCES

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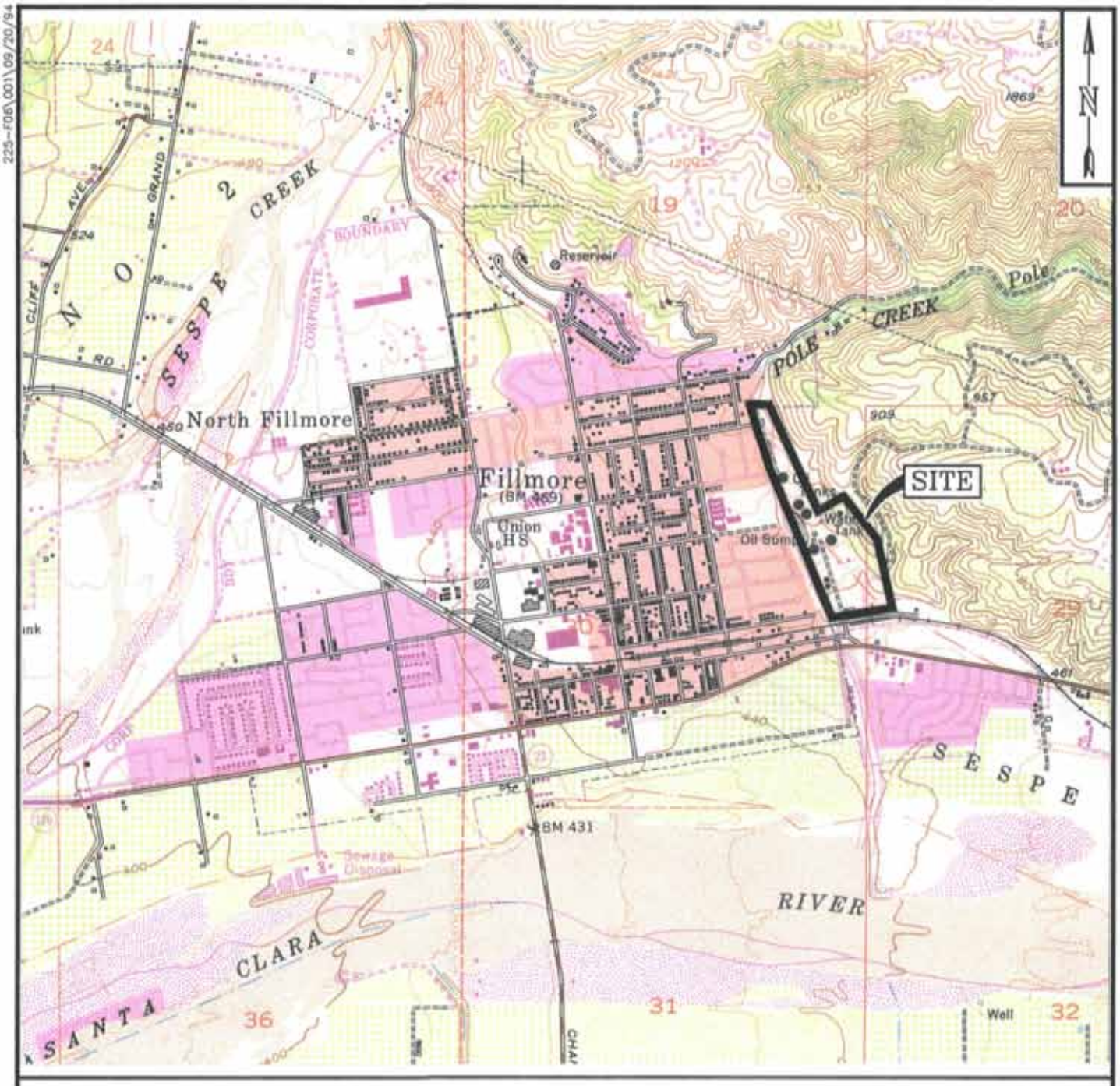


0 2000 4000 FEET

APPROXIMATE SCALE

FIGURE 2-1

SITE LOCATION MAP

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

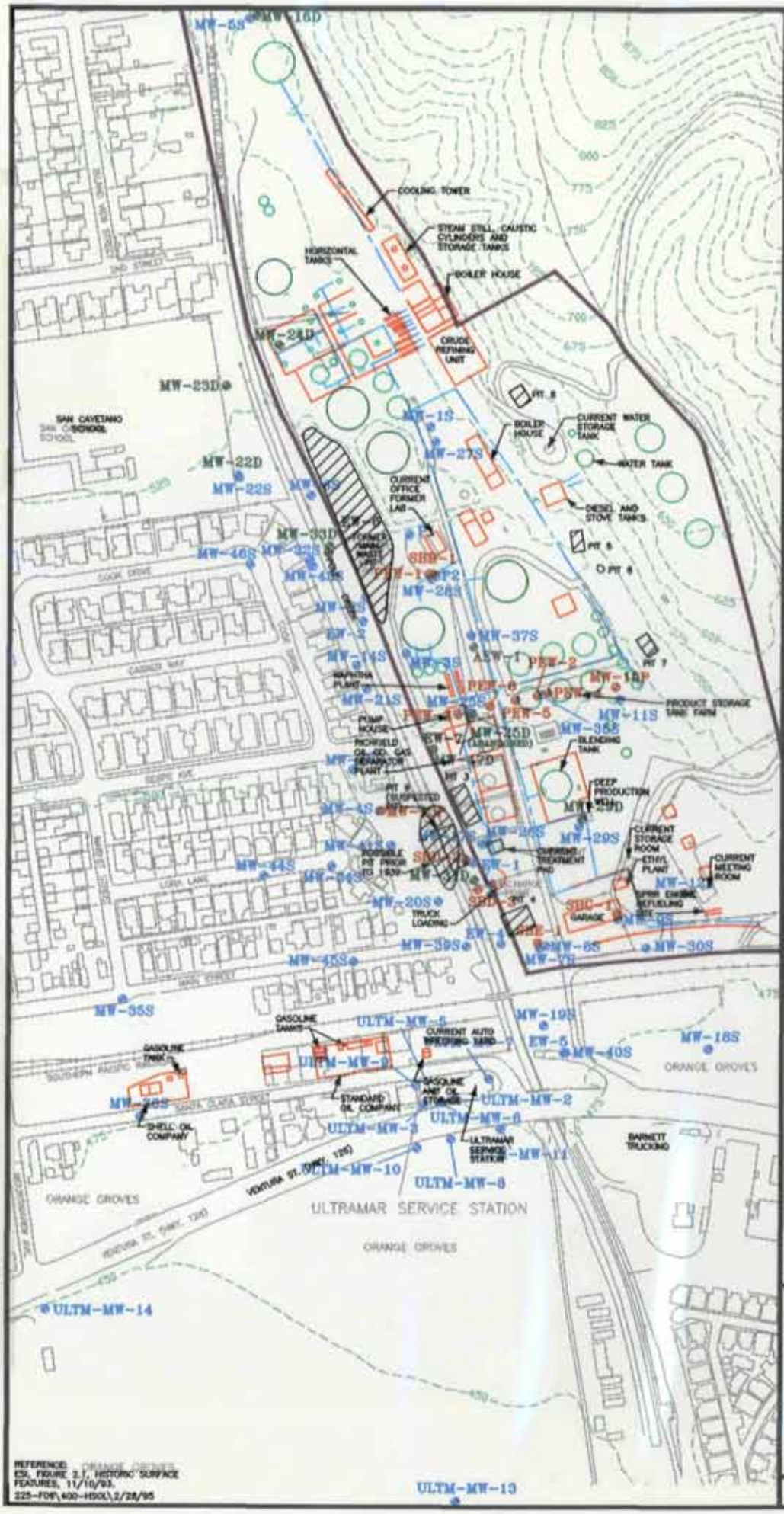
PREPARED FOR

TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

ENGLAND & ASSOCIATES

REFERENCE:
7.5 MINUTE U.S.G.S. TOPOGRAPHIC
MAP OF FILLMORE, CALIFORNIA
DATED: 1951
PHOTOREVISED: 1988

225-F06\001\09/20/94



N

EXPLANATION

- CRUDE OIL OR PRODUCT STORAGE TANKS
- PITS
- BUILDINGS
- ESTIMATED PIPELINE ALIGNMENT

LEGEND

MW-10P	PERCHED AQUIFER WELL LOCATION AND WELL ID.
MW-12S	AQUIFER I WELL LOCATION AND WELL ID.
MW-29D	AQUIFER II WELL LOCATION AND WELL ID.
AEW-1	AIR EXTRACTION WELL LOCATION AND WELL ID.
EW-7	PROPOSED WELL LOCATION
675	GROUND SURFACE ELEVATION CONTOUR (IN FEET ABOVE MEAN SEA LEVEL). CONTOUR INTERVAL 25 FEET.
	PROJECT AREA

NOTES

WELL ID PREFIX DESCRIPTIONS:

MW	MONITORING WELL
P	2-INCH DIAMETER PIEZOMETER
SB	SOIL BORING CONVERTED TO PERCHED ZONE WELL
EW	AQUIFER I EXTRACTION WELL
PEW	PERCHED EXTRACTION WELL
AEW	AIR EXTRACTION WELL
ULTM	ULTRAMAR MONITORING WELL

0 200 400 600 800

FEET

FIGURE 2-2

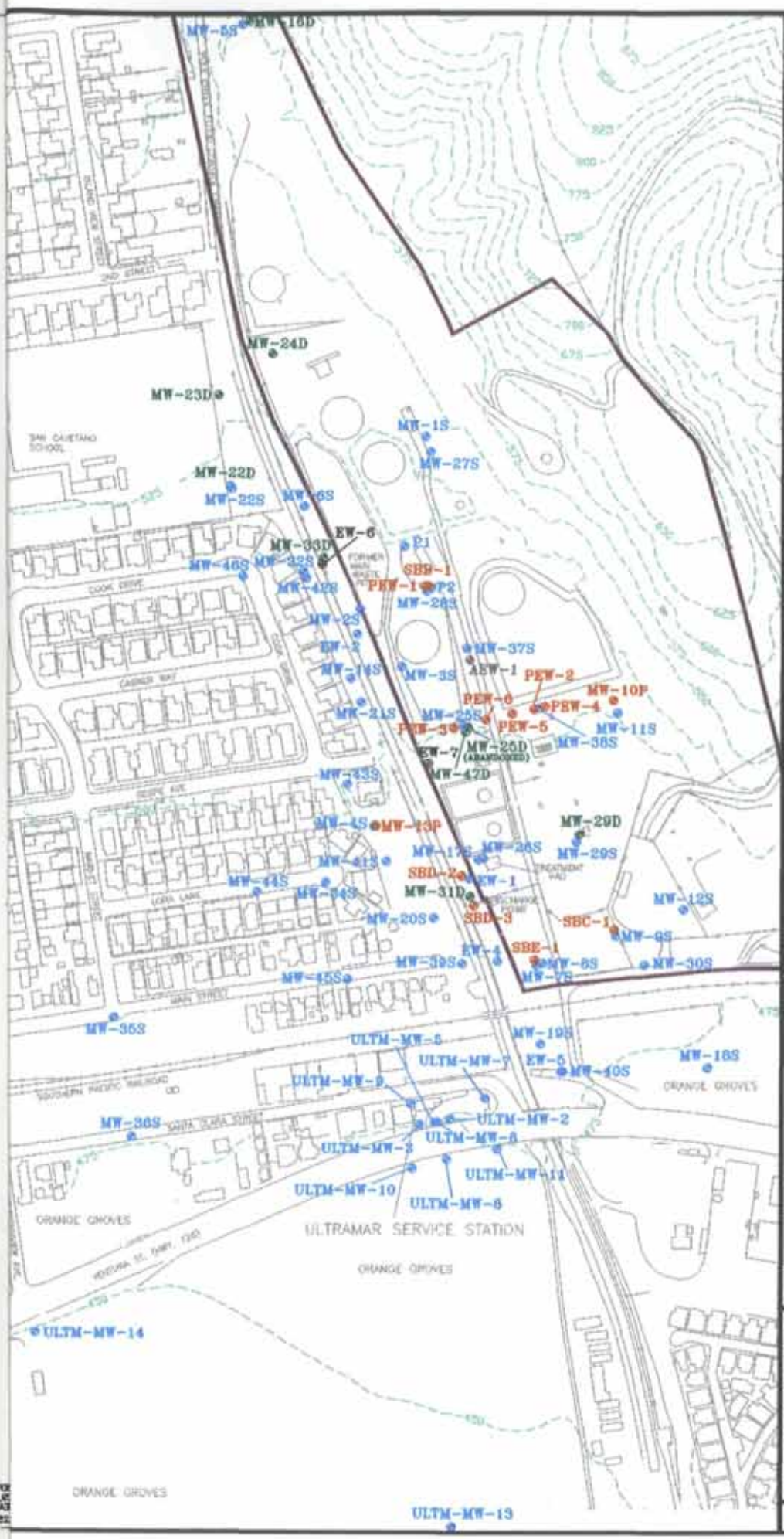
SITE PLAN

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR

TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

ENGLAND & ASSOCIATES



N

LEGEND

MW-10P	PERCHED AQUIFER WELL LOCATION AND WELL ID.
MW-12S	AQUIFER I WELL LOCATION AND WELL ID.
MW-29D	AQUIFER II WELL LOCATION AND WELL ID.
AEW-1	AIR EXTRACTION WELL LOCATION AND WELL ID.
EW-7	PROPOSED WELL LOCATION
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	PROJECT AREA

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EW	AQUIFER I EXTRACTION WELL
PEW	PERCHED EXTRACTION WELL
AEW	AIR EXTRACTION WELL
ULTM	ULTRAMAR MONITORING WELL

0 200 400 600 800

FEET

FIGURE 2-2

SITE PLAN

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR

TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

ENGLAND & ASSOCIATES

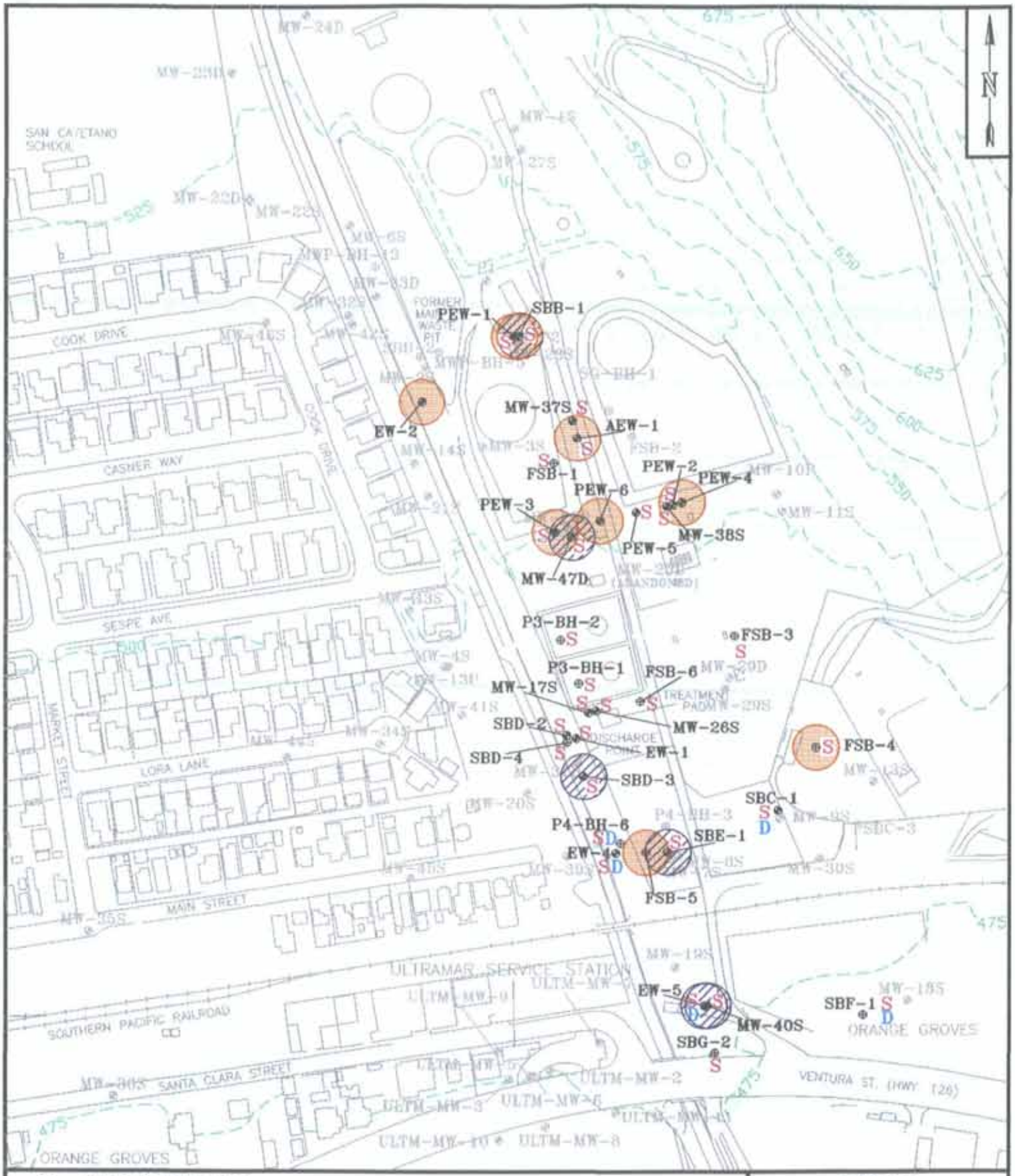


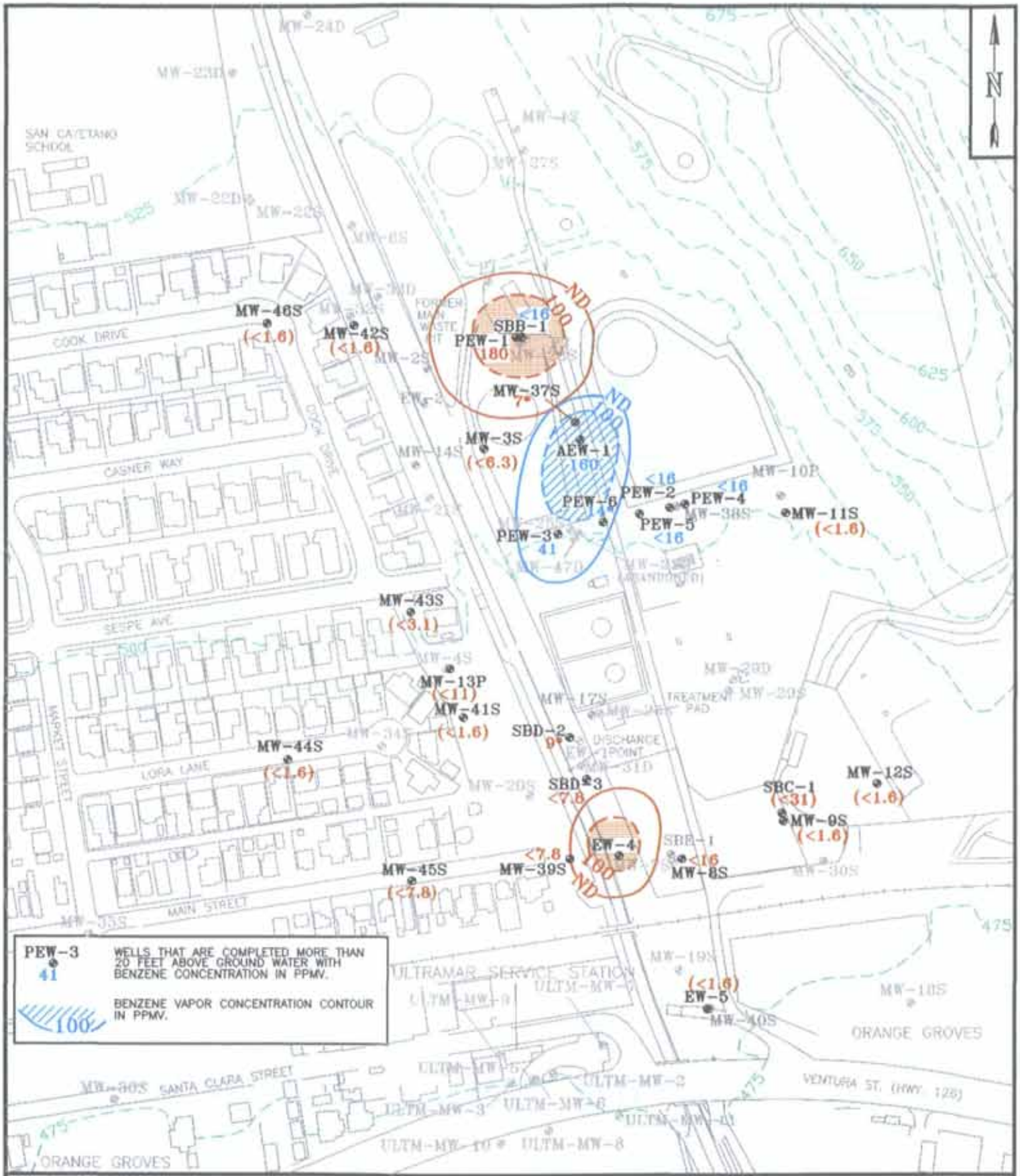
FIGURE 2-3

BENZENE IN SOIL AND LOCATIONS OF OILY SOIL

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR
TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

ENGLAND & ASSOCIATES



NOTES:

1. BENZENE ANALYZED BY GC/MS IN MARCH 1995.
2. NON-DETECTED BENZENE RESULTS MEASURED BY GC-PID IN AUGUST 1994 SHOWN IN PARENTHESIS.
3. BENZENE CONCENTRATION OF 100 PPMV INFERRED AT EW-4 DUE TO BENZENE CONCENTRATIONS FOUND IN GC-PID ANALYSES, LNAPL, AND GROUND WATER.
4. SAMPLES COLLECTED IN A TEDLAR BAG.

FIGURE 2-4

CONFIRMED BENZENE DISTRIBUTION IN SOIL GAS

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR
TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

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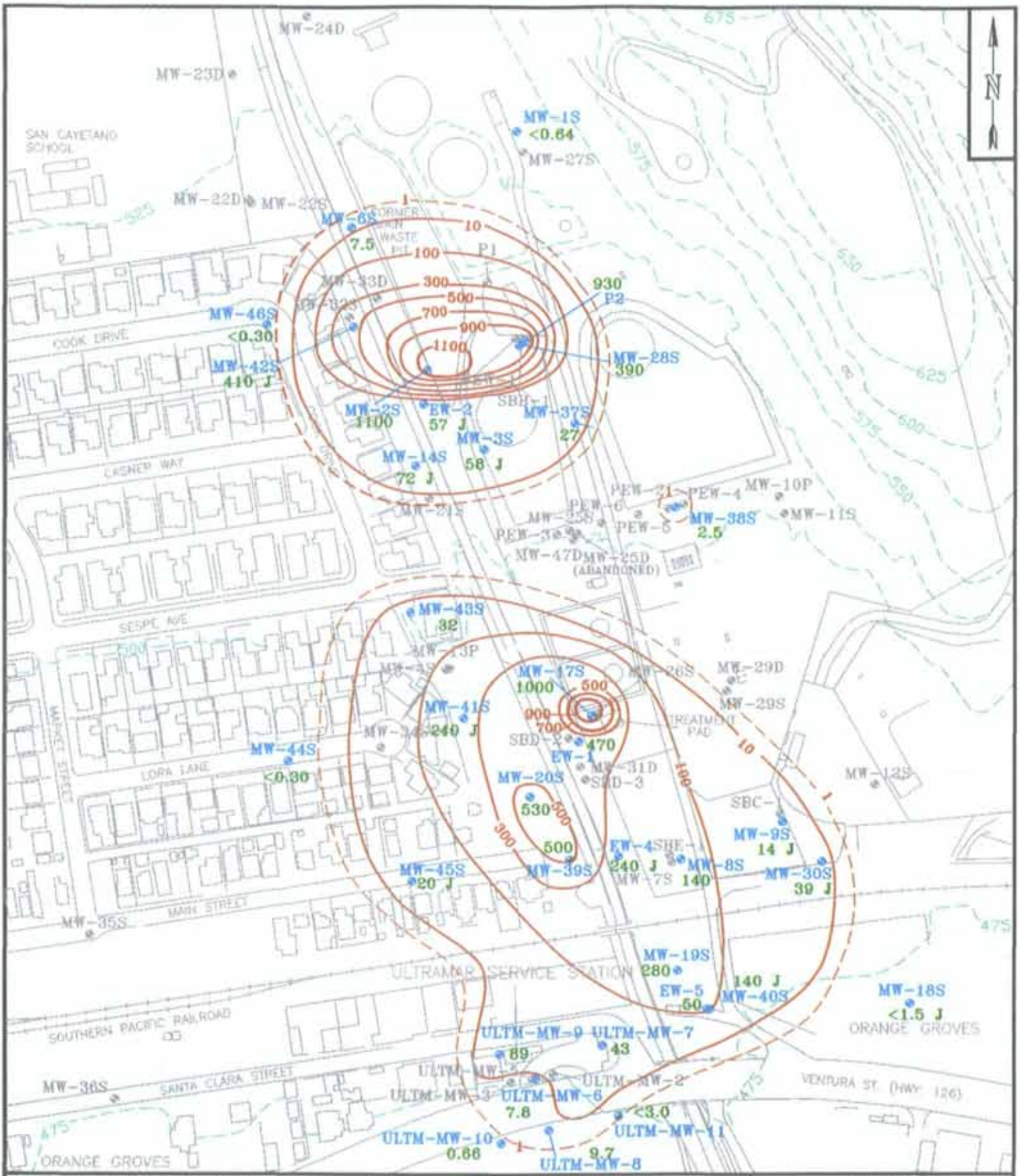


MW-44S <0.30 MONITORING WELL LOCATION WITH WELL NUMBER AND BENZENE CONCENTRATION IN UG/L.

100 AQUIFER I BENZENE CONCENTRATION CONTOUR IN UG/L MEASURED FEBRUARY 1995. CONTOUR INTERVAL VARIABLE.

GROUND SURFACE ELEVATION CONTOUR. CONTOUR INTERVAL 25 FEET.

0 250 500 FEET

NOTES:

1. BENZENE AT EW-5 AND MW-40S WERE AVERAGED FOR CONTOURING.
2. P2 DATA USED INSTEAD OF MW-28S.
3. A "J" QUALIFIER NEXT TO THE BENZENE VALUE INDICATES THE VALUE IS ESTIMATED.
4. BENZENE ANALYZED BY EPA 8020.

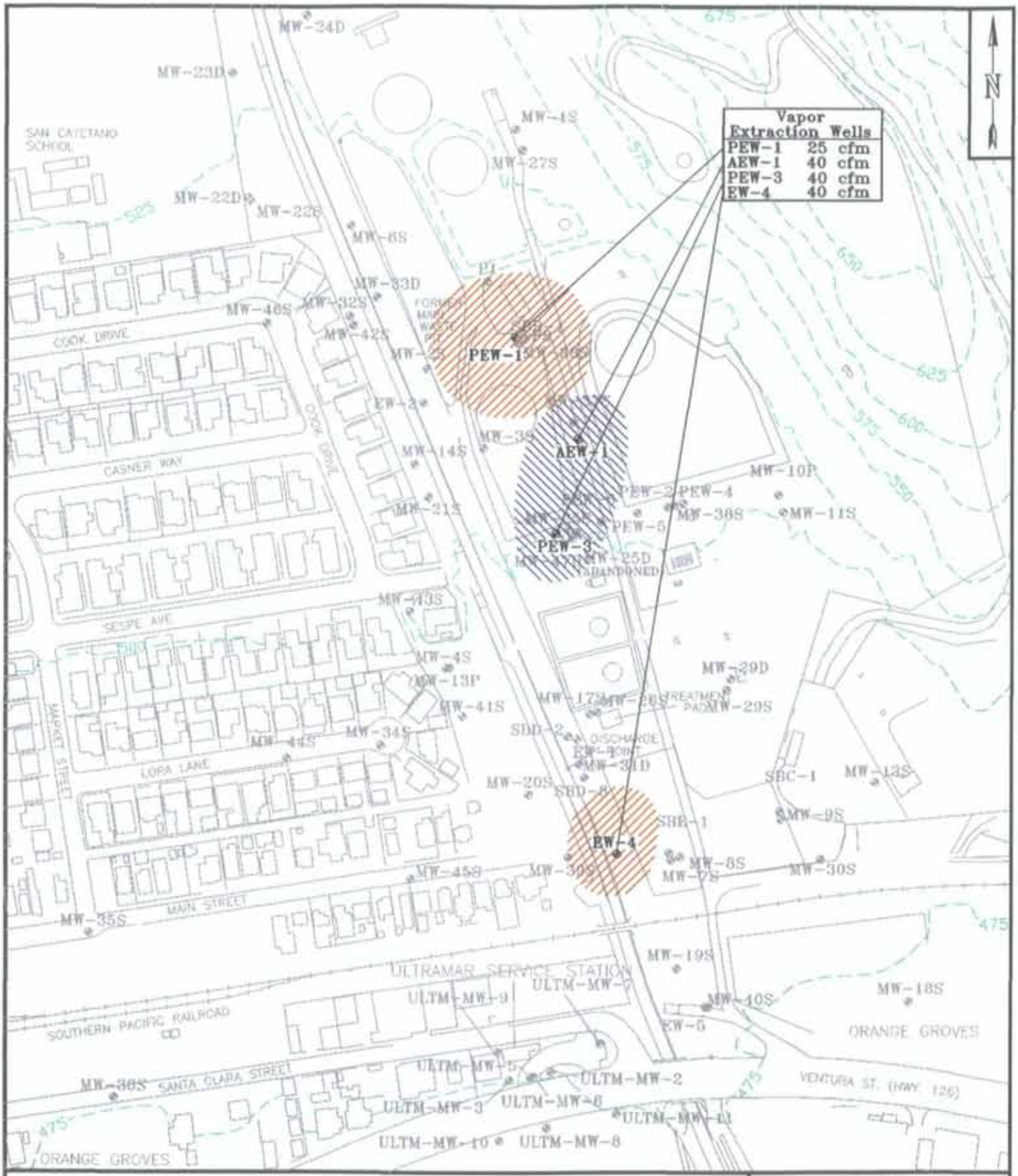
FIGURE 2-5

BENZENE DISTRIBUTION IN AQUIFER I WELLS FIRST QUARTER 1995

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR
TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

ENGLAND & ASSOCIATES



EW-4 VAPOR EXTRACTION WELL LOCATION WITH WELL NUMBER.

475 GROUND SURFACE ELEVATION CONTOUR. CONTOUR INTERVAL 25 FEET.

0 250 500 FEET

VAPOR EXTRACTION TARGET AREA JUST ABOVE AQUIFER I.

VAPOR EXTRACTION TARGET AREA GREATER THAN 20 FEET ABOVE AQUIFER I.

FIGURE 3-1

VAPOR EXTRACTION TARGET AREAS

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR
TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

ENGLAND & ASSOCIATES

DECISION TREE FOR MODIFYING OR SHUTTING OFF SOIL VAPOR EXTRACTION SYSTEM

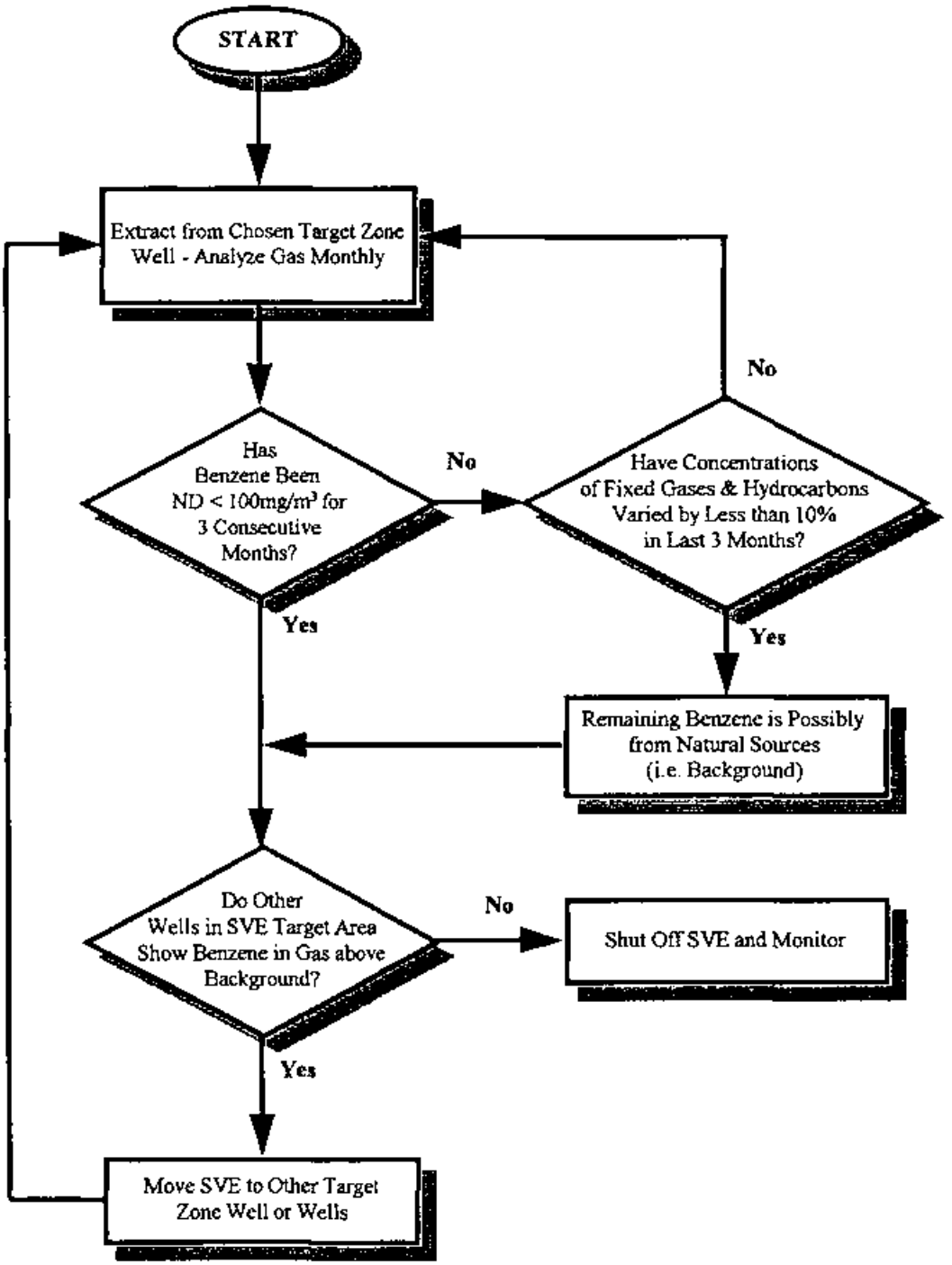


FIGURE 3-2

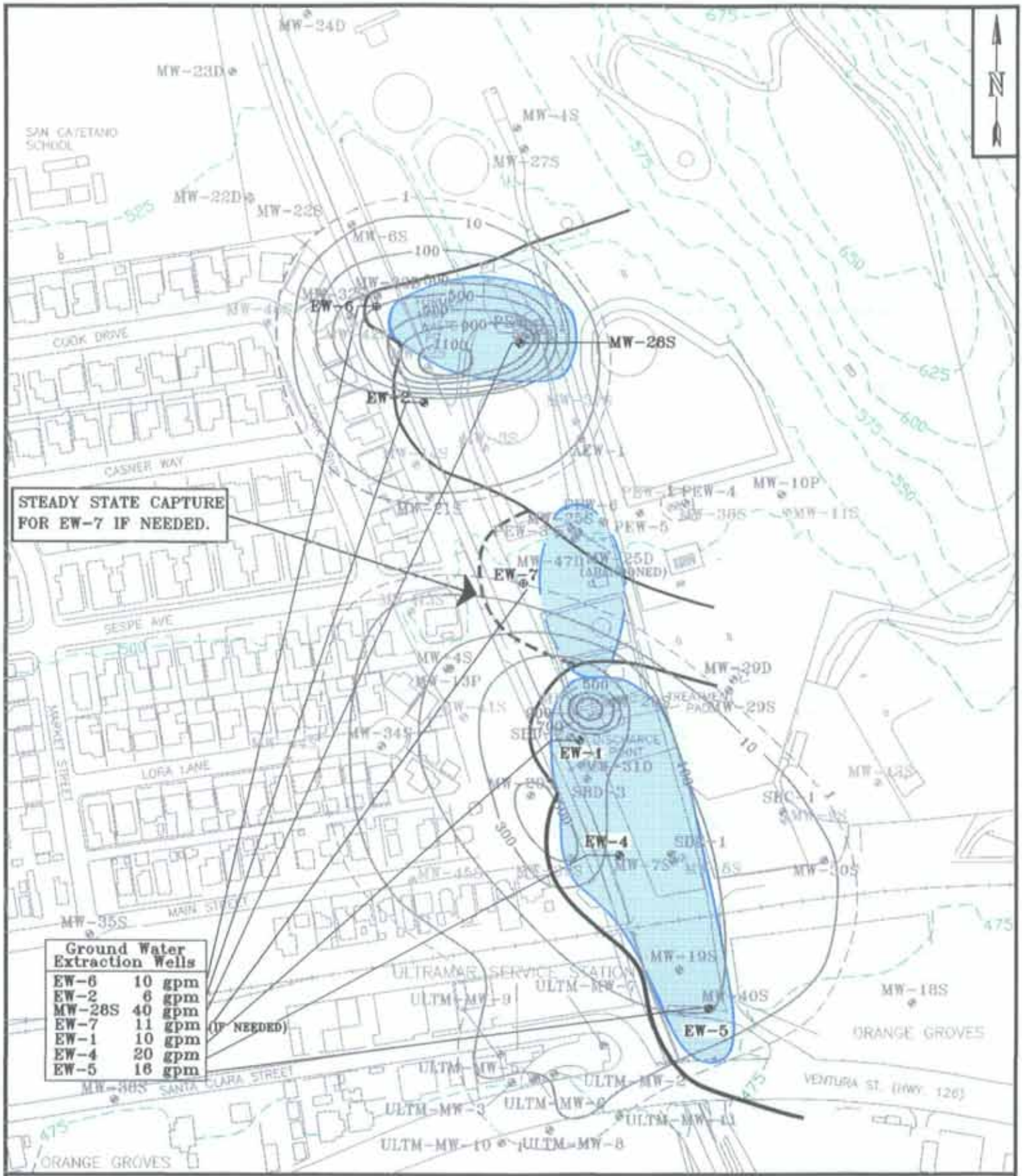


FIGURE 3-3

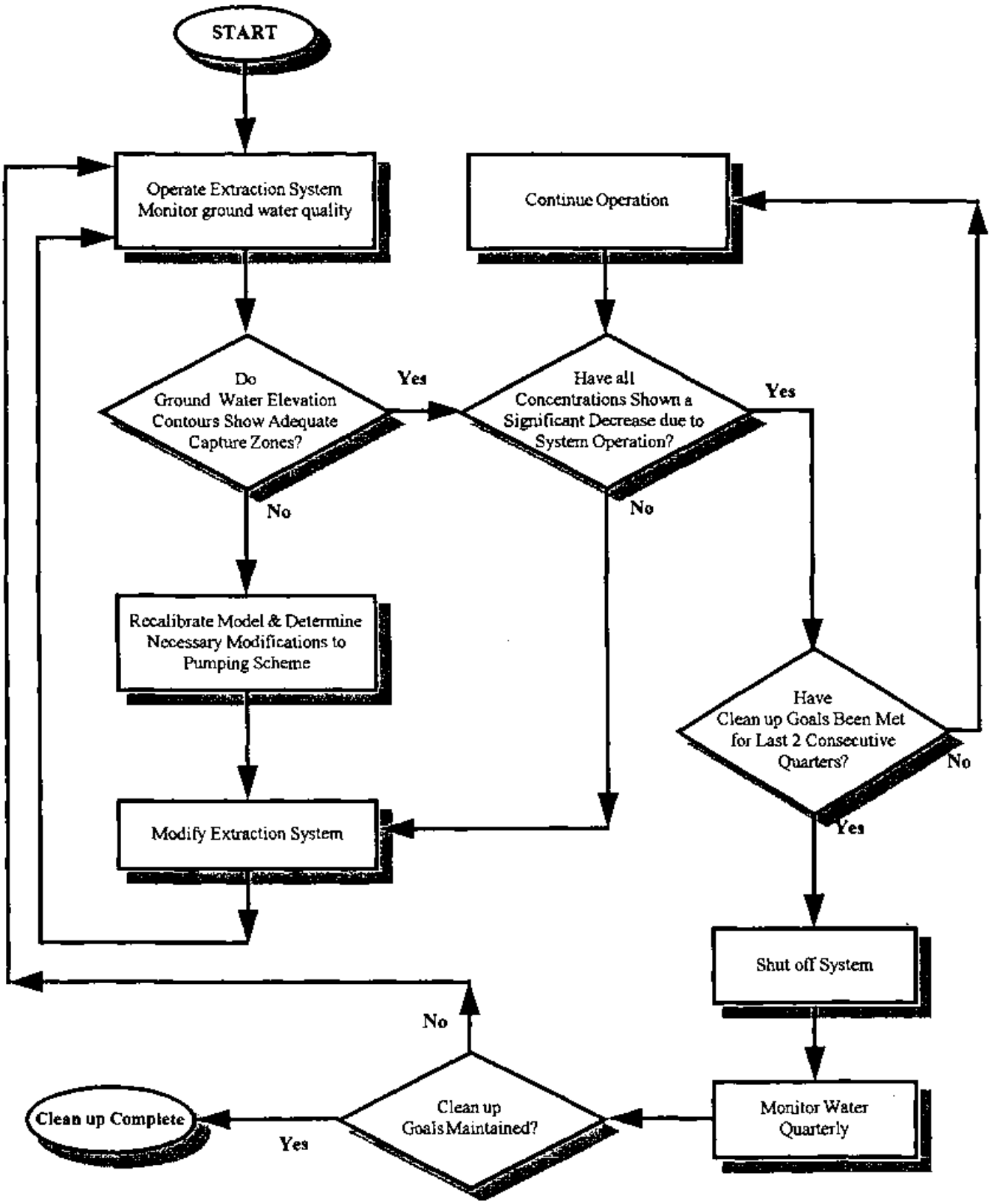
GROUND WATER REMEDIATION TARGET AREAS AND CAPTURE ZONES

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

PREPARED FOR
TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

ENGLAND & ASSOCIATES

DECISION TREE FOR MODIFYING OR SHUTTING OFF GROUND WATER TREATMENT SYSTEM



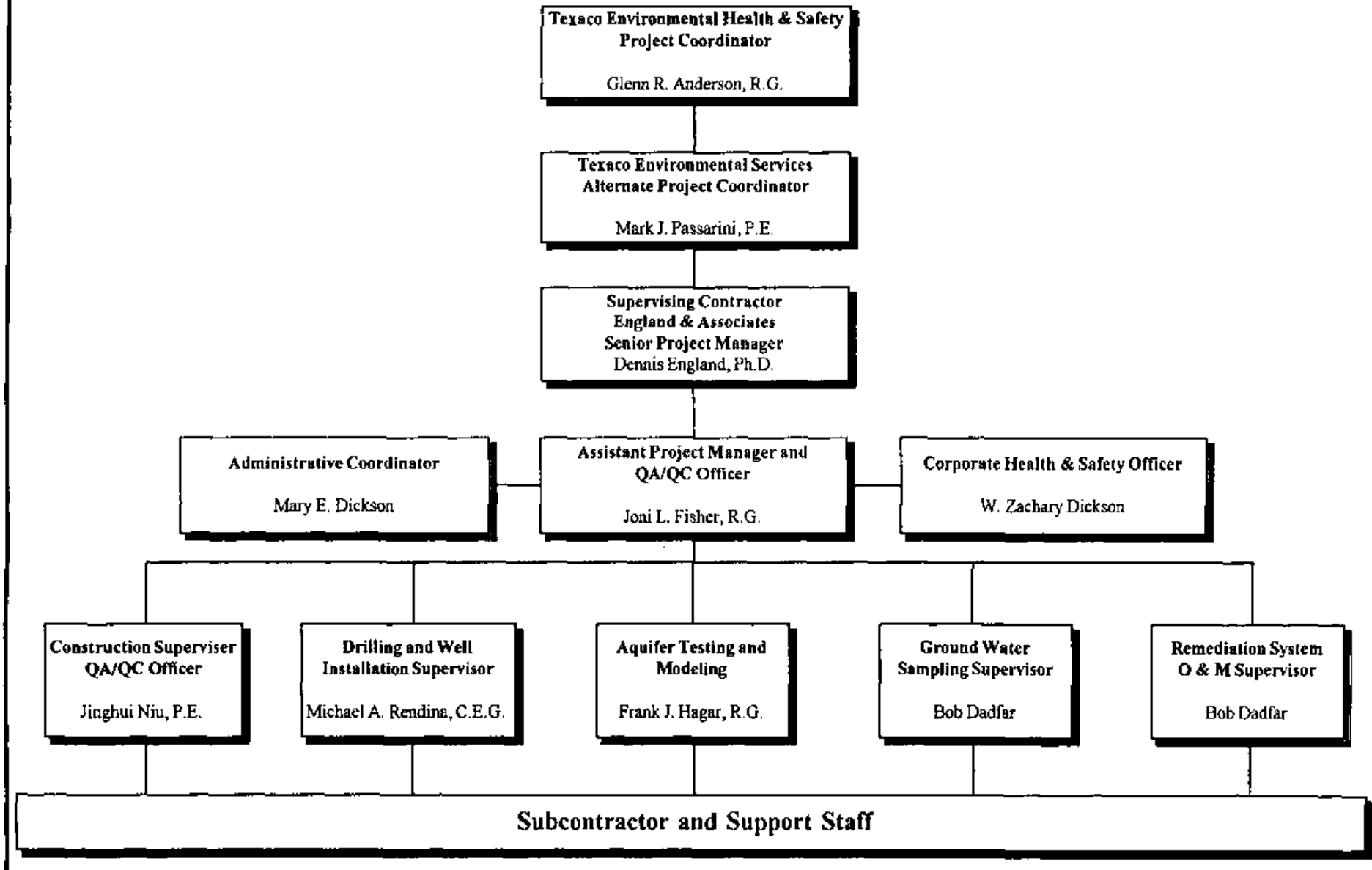
NOTE: NCP and ROD indicate a 5 year review will be conducted after start up of operation.

FIGURE 3-4

Figure 7-1

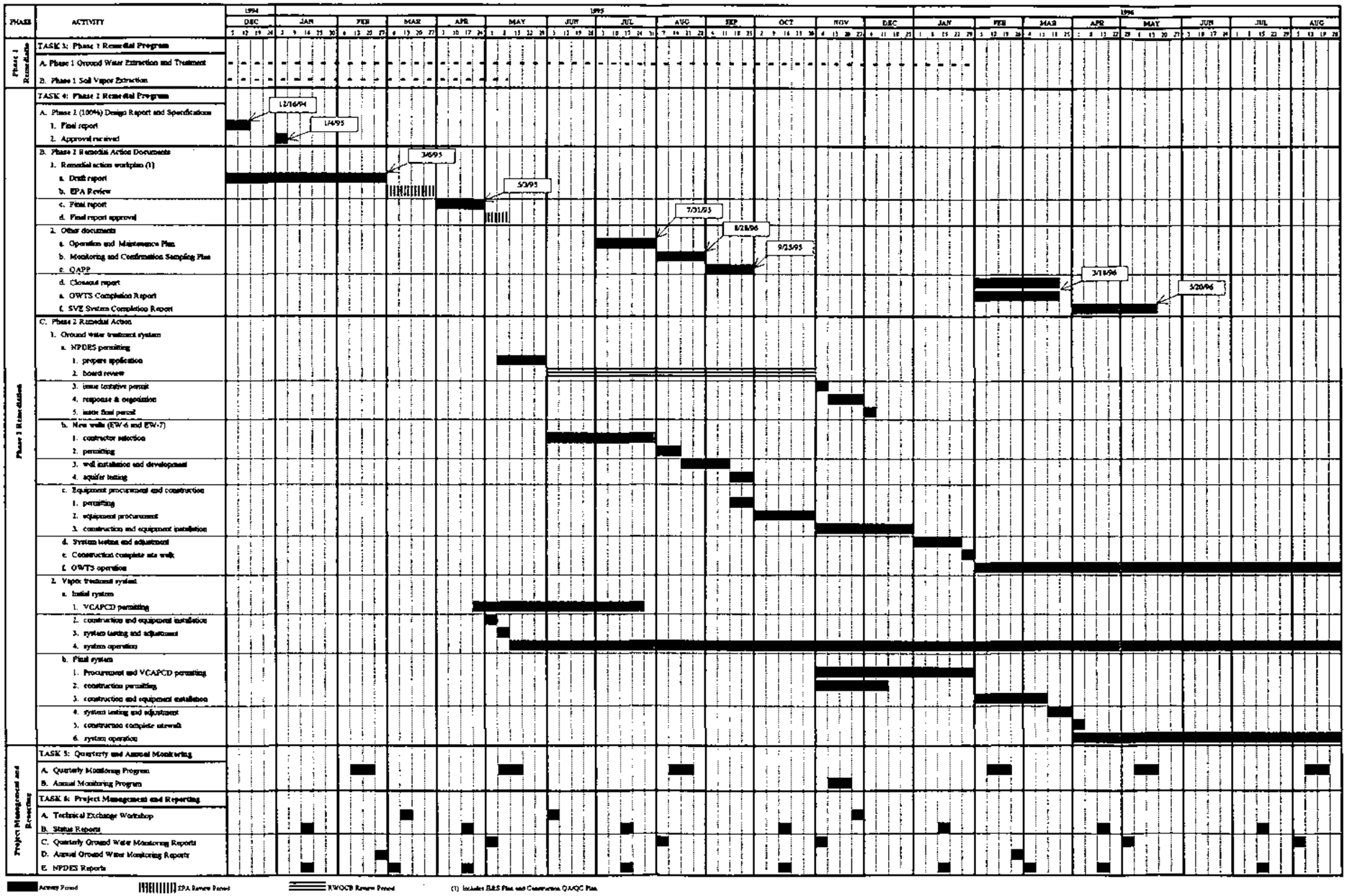
PROJECT TEAM ORGANIZATION CHART

Pacific Coast Pipeline Superfund Site Remedial Activities



ENGLAND & ASSOCIATES

Figure 8-1
Site Remediation Schedule
Pacific Coast Pipeline



Drawings

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

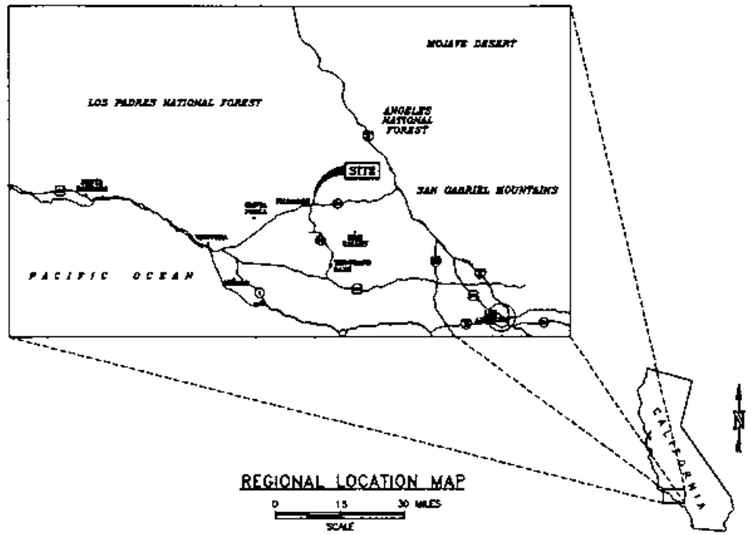
PREPARED FOR

TEXACO ENVIRONMENTAL SERVICES
UNIVERSAL CITY, CALIFORNIA

INDEX OF DRAWINGS

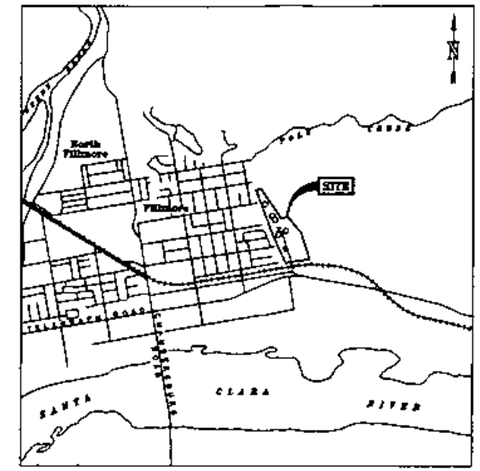
SHEET NO.	TITLE
M-1	SITE LOCATION MAP AND GENERAL NOTES
M-2	GROUND WATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM
M-3	GROUND WATER TREATMENT SYSTEM EQUIPMENT LAYOUT
M-4	GROUND WATER TREATMENT SYSTEM PIPING LAYOUT
M-5	VAPOR EXTRACTION SYSTEM PIPING AND INSTRUMENTATION
M-6	VAPOR EXTRACTION PIPING LAYOUT
M-7	VAPOR EXTRACTION SYSTEM AND PIPING DETAILS
M-8	EXTRACTION WELL DETAILS
E-1	SINGLE-LINE DIAGRAM, LOAD SCHEDULE, AND GENERAL NOTES
E-2	SCHEMATIC WIRING DIAGRAM

ENGLAND & ASSOCIATES



REGIONAL LOCATION MAP

0 15 30 MILES
SCALE



SITE LOCATION MAP

0 1000 2000 FEET
SCALE

LEGEND

LINE AND PIPING IDENTIFICATION

- PROCESS PIPING LINE AND STREAM NUMBER
- DOUBLE WALL PIPING
- PROCESS INSTRUMENT LINE
- INSTRUMENT AIR LINE
- INSTRUMENT AND/OR ELECTRICAL LEAD
- CONTROL/OPERATION LOGIC

PIPING SYMBOLS

- TIE-IN NUMBER
- Y-TYPE STRAINER
- FLEX HOSE
- ROTAMETER OR POSITIVE DISPLACEMENT TYPE FLOW INDICATOR
- REDUCTION IN LINE SIZE
- BLIND FLANGE
- QUICK CONNECT OR HOSE FITTING
- CAPPED LINE

MANUALLY OPERATED VALVES

- GLOBE VALVE
- GATE VALVE
- CHECK VALVE
- BALL VALVE
- THREE-WAY VALVE (BALL)
- BUTTERFLY VALVE

CONTROL VALVES

- PNEUMATIC CONTROL VALVE
- SOLENOID VALVE
- PRESSURE REGULATOR
- MOTOR (ELECTRIC) OPERATED CONTROL VALVE
- PRESSURE SAFETY VALVE
- AIR VENT
- VACUUM BREAKER

EQUIPMENT IDENTIFICATION SYMBOLS

AS	AIR STRIPPER
B	BLOWER
C	COLUMN
EW	EXTRACTION WELL
F	FILTER
FB	FLUIDIZED BIOTOWER
M	MOTOR
MX	MIXER
P	PUMP
T	TANK
WP	WELL PUMP

ELECTRICAL SYMBOLS
(SEE SHEET E-1 FOR ADDITIONAL SYMBOLS)

- MOTOR START/STOP STATION (AUTO/OFF/MANUAL)
- MOTOR START/STOP STATION (OFF/MANUAL)
- MOTOR OPERATION INDICATOR LIGHT
- MOTOR

INSTRUMENT IDENTIFICATION SYMBOLS

AAH	ANALYZER ALARM HIGH
AE	ANALYZER ELEMENT
AT	ANALYZER (POTASSIUM PERMANGANATE)
BFR	BACK FLOW (PREVENTOR) REGULATOR
DL	DATA LOGGER
FAL	FLOW ALARM LOW
FCV	FLOW CONTROL VALVE
FE	FLOW ELEMENT
FQI	FLOW TOTALIZER/INDICATOR
FRC	FLOW RECORDER/CONTROLLER
FRQ	FLOW RECORDER/TOTALIZER
FSL	FLOW SWITCH LOW
FT	FLOW TRANSMITTER
LAH	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
LCV	LEVEL CONTROL VALVE
LE	LEVEL ELEMENT
LG	LIGHT GREEN
LI	LEVEL INDICATOR
LIC	LEVEL INDICATOR/CONTROLLER
LPU	LOCAL PROCESSING UNIT
LSH	LEVEL SWITCH HIGH
LSHH	LEVEL SWITCH HIGH HIGH
LSL	LEVEL SWITCH LOW
LT	LEVEL TRANSMITTER
MCC	MOTOR CONTROL CENTER
PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
PE	PRESSURE ELEMENT
PI	PRESSURE INDICATOR
PIT	PRESSURE INDICATOR TRANSMITTER
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
PSV	PRESSURE SAFETY VALVE
PT	PRESSURE TRANSMITTER
PTD	PRESSURE TRANSDUCER

ABBREVIATIONS

AC	ASPHALTIC CONCRETE
AEW	AIR EXTRACTION WELL
AG	ABOVEGROUND
BOP	BOTTOM OF PIPE
CS	CARBON STEEL
CI	CAST IRON
℄	CENTER LINE
DI	DUCTILE IRON
DIA	DIAMETER
DISCH	DISCHARGE
DRN	DRAIN
DW	DOUBLE WALL
EL	ELEVATION
ELL	ELBOW
EW	EXTRACTION WELL
EXIST	EXISTING
FDN	FOUNDATION
FL	FLOW LINE
FRP	FIBERGLASS REINFORCED PLASTIC
FS	FINISHED SURFACE
FT	FOOT
GAL	GALLON(S)
GPM	GALLONS PER MINUTE
GV	GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
HLL	HIGH LIQUID LEVEL
HORIZ	HORIZONTAL
Hp	HORSE POWER
HP	HIGH POINT
IAS	INSTRUMENT AIR SUPPLY
IE	INVERT ELEVATION
LBS	POUNDS
LLL	LOW LIQUID LEVEL
LP	LOW POINT
MW	MONITORING WELL
NIP	NIPPLE
NLL	NORMAL LIQUID LEVEL
NO	NUMBER
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
PE	POLYETHYLENE
PEW	PERCHED WATER EXTRACTION WELL
PS	PIPE SUPPORT
PVC	POLYVINYL CHLORIDE (PIPE)
REF	REFERENCE
REQ'D	REQUIRED
RS	RESET
SBD	SOIL BORING (AREA D)
SCH	SCHEDULE
SP	SAMPLE POINT
SS	STAINLESS STEEL
SS/ES	SAFETY SHOWER/EYE WASH
SCRD	SCREWED
STD	STANDARD
SUPT	SUPPORT
TC	TOP OF CURB
THD	THREADED
THK	THICK
TOS	TOP OF STEEL
TPH	TOTAL PETROLEUM HYDROCARBONS
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
UG	UNDERGROUND
UL	ULTRAMAR
VERT	VERTICAL
WT	WEIGHT

REV	DATE	BY	DESCRIPTION

SCALE: AS NOTED

DESIGNED DATE
DRAWN DATE
CHECKED DATE

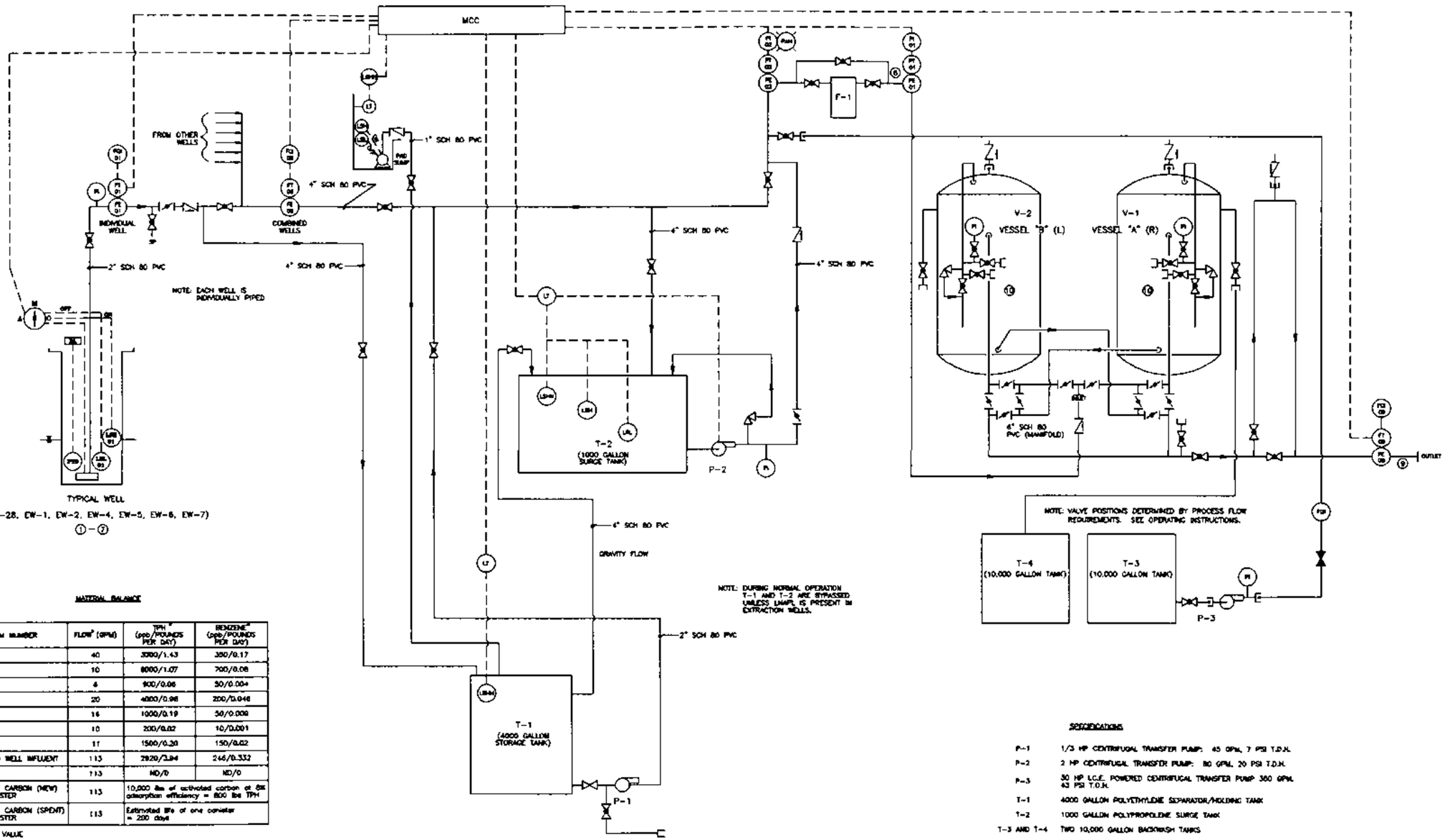
SUBMITTED
PROJECT ENGINEER R.E.E. NO. DATE
ENGLAND & ASSOCIATES R.E.E. NO. DATE

ENGLAND & ASSOCIATES

APPROVED DATE
APPROVED DATE

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA
SITE LOCATION MAP AND GENERAL NOTES

SHEET M-1



MATERIAL BALANCE

STREAM NUMBER	FLOW* (GPM)	TPH* (ppb/POUNDS PER DAY)	BENZENE* (ppb/POUNDS PER DAY)
① MW-28S	40	3000/1.43	350/0.17
② EW-1	10	8000/1.07	700/0.08
③ EW-2	4	900/0.06	30/0.004
④ EW-4	20	4000/0.96	200/0.048
⑤ EW-5	16	1000/0.19	30/0.006
⑥ EW-6	10	200/0.02	10/0.001
⑦ EW-7	11	1500/0.20	150/0.02
⑧ COMBINED WELL INFLUENT	113	2920/3.94	246/0.332
⑨ EFFLUENT	113	ND/0	ND/0
⑩ ACTIVATED CARBON (NEW) ONE CANISTER	113	10,000 lbs of activated carbon at 5% adsorption efficiency = 500 lbs TPH	
⑩ ACTIVATED CARBON (SPENT) ONE CANISTER	113	Estimated life of one canister = 200 days	

* ESTIMATED VALUE

SPECIFICATIONS

P-1	1/3 HP CENTRIFUGAL TRANSFER PUMP: 45 GPM, 7 PSI T.D.H.
P-2	2 HP CENTRIFUGAL TRANSFER PUMP: 80 GPM, 20 PSI T.D.H.
P-3	30 HP I.C.E. POWERED CENTRIFUGAL TRANSFER PUMP 300 GPM, 43 PSI T.D.H.
T-1	4000 GALLON POLYETHYLENE SEPARATOR/HOLDING TANK
T-2	1000 GALLON POLYPROPOLENE SURGE TANK
T-3 AND T-4	TWO 10,000 GALLON BACKWASH TANKS
V-1 AND V-2	TWO 10,000 POUND GRANULAR ACTIVATED CARBON VESSELS. 250 GPM AND 75 PSI MAX.
F-1	HIGH FLOW BAG FILTRATION SYSTEM. CARBON STEEL FILTER HOUSING. 2 TO 24 - BAG CAPACITY. 200 GPM AND 150 PSI MAX.

REV	DATE	BY	DESCRIPTION

SCALE: AS NOTED

DESIGNED DATE
DRAWN DATE
CHECKED DATE

SUBMITTED
PROJECT ENGINEER R.C.E. NO. DATE
ENGLAND & ASSOCIATES R.C.E. NO. DATE

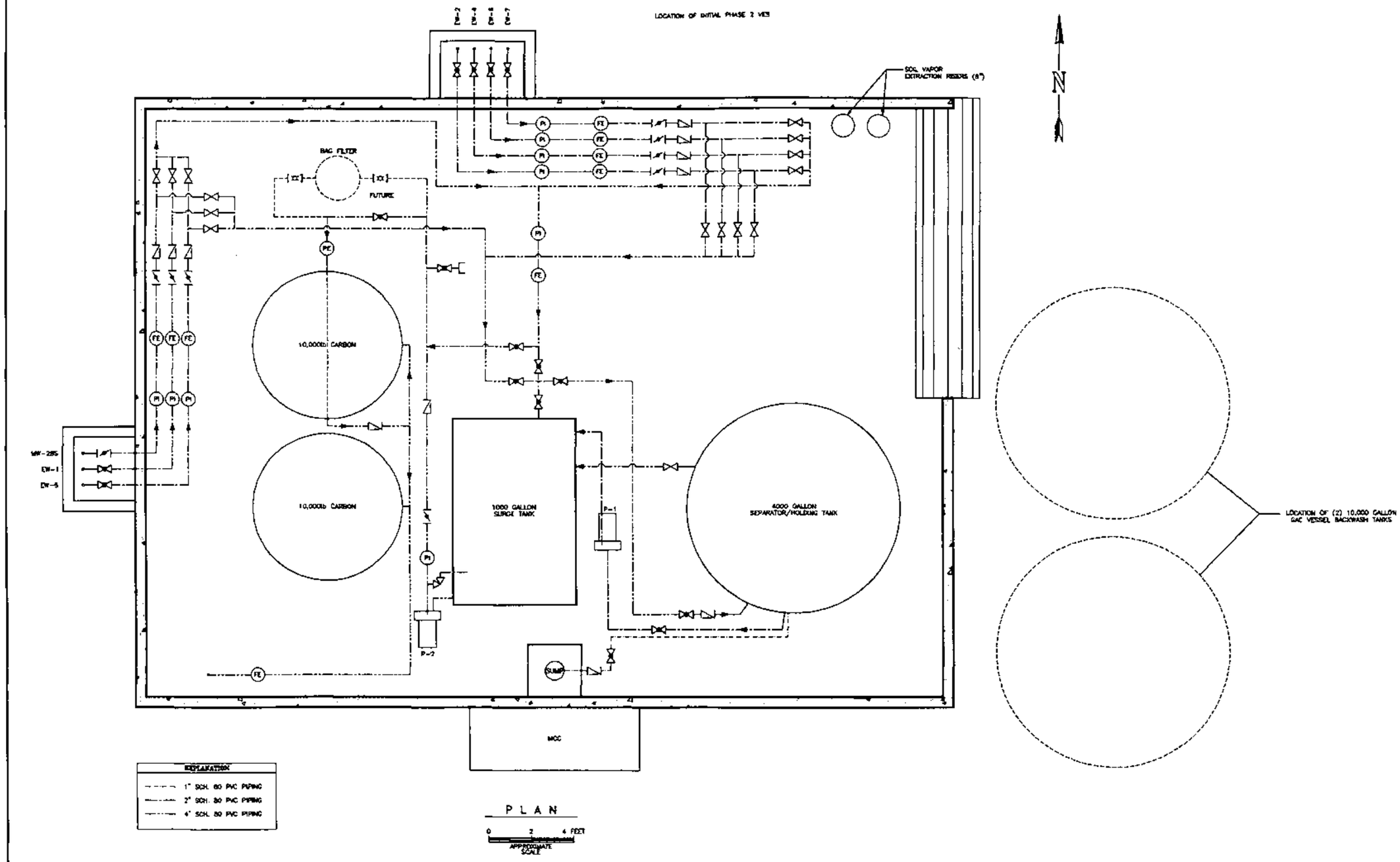
ENGLAND & ASSOCIATES

APPROVED DATE
APPROVED DATE

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

GROUND WATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM

SHEET M-2



REV	DATE	BY	DESCRIPTION

SCALE: AS NOTED

DESIGNED DATE
DRAWN DATE
CHECKED DATE

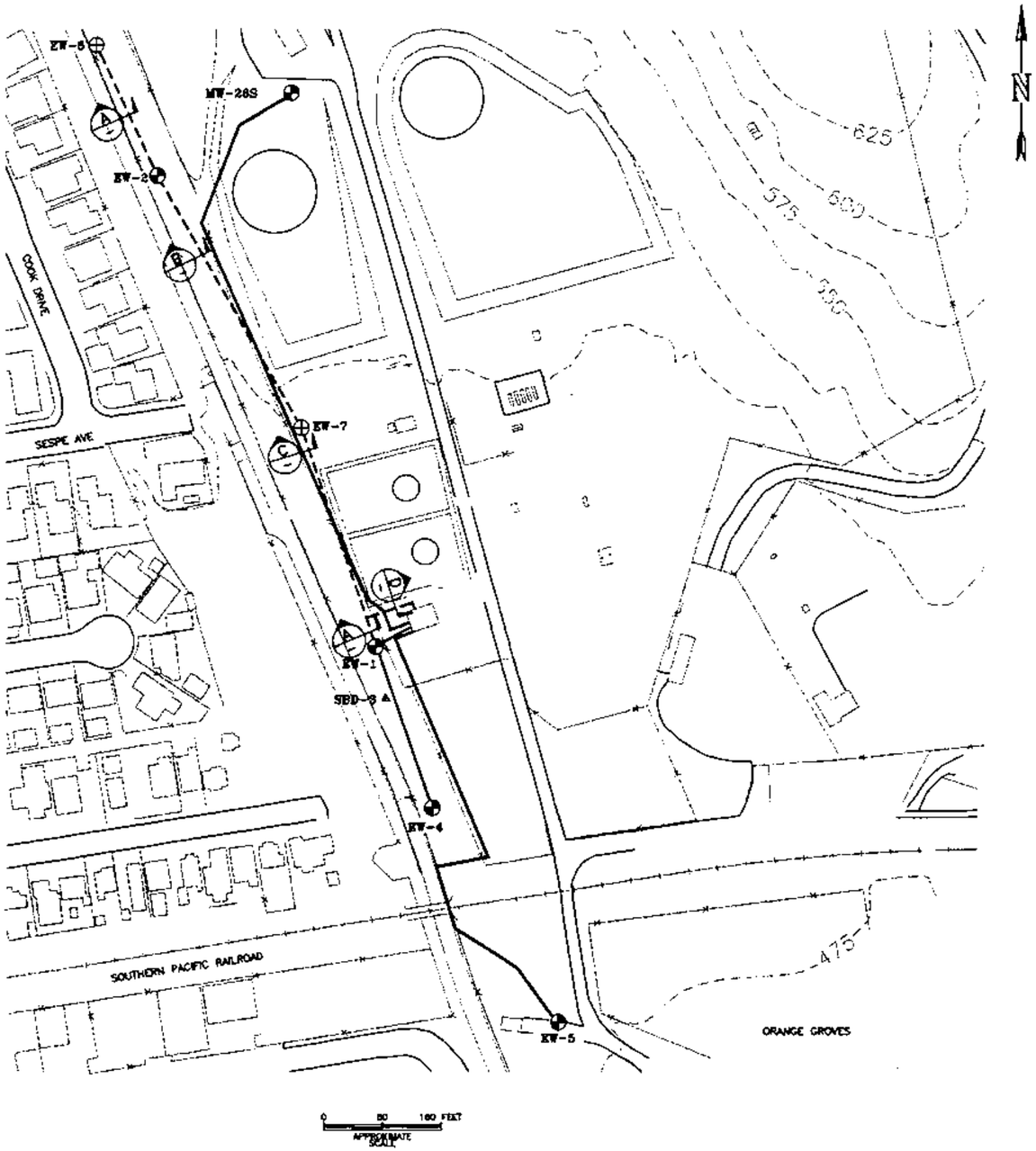
SUBMITTED
PROJECT ENGINEER R.C.E. NO. DATE
ENGLAND & ASSOCIATES R.C.E. NO. DATE

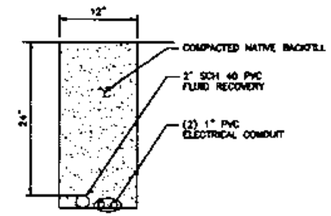
ENGLAND & ASSOCIATES

APPROVED DATE
APPROVED DATE

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA
GROUND WATER TREATMENT SYSTEM
EQUIPMENT LAYOUT

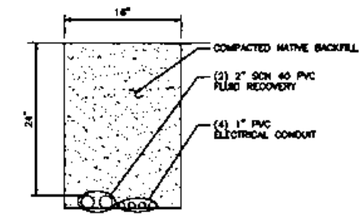
SHEET M-3





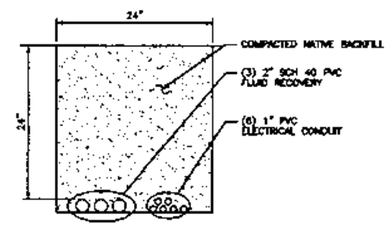
SECTION A

NTS



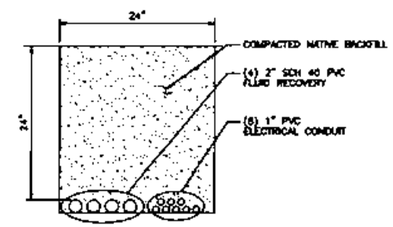
SECTION B

NTS



SECTION C

NTS

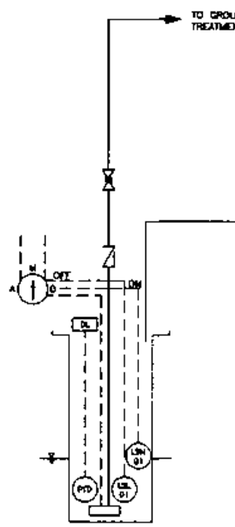


SECTION D

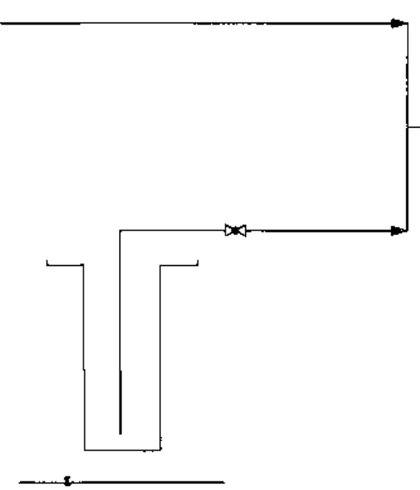
NTS

EXPLANATION	
———	EXISTING PIPING
- - - - -	PROPOSED PIPING
EW-7 ⊕	NEW EXTRACTION WELLS

REV	DATE	BY	DESCRIPTION	SCALE: AS NOTED	1/2	DESIGNED DATE	SUBMITTED: PROJECT ENGINEER R.C.E. NO. DATE	ENGLAND & ASSOCIATES	APPROVED DATE	PACIFIC COAST PIPELINE SUPERFUND SITE	SHEET
						DRAWN DATE				FILLMORE, CALIFORNIA	
						CHECKED DATE	ENGLAND & ASSOCIATES R.C.E. NO. DATE		APPROVED DATE	GROUND WATER TREATMENT SYSTEM PIPING LAYOUT	M-4

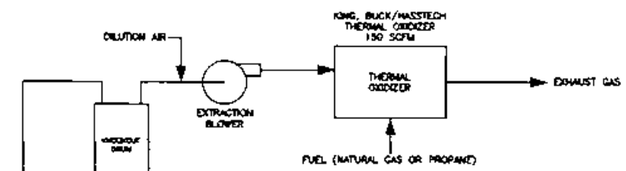


TYPICAL DUAL WATER/VAPOR EXTRACTION WELL
TYPICAL WELL

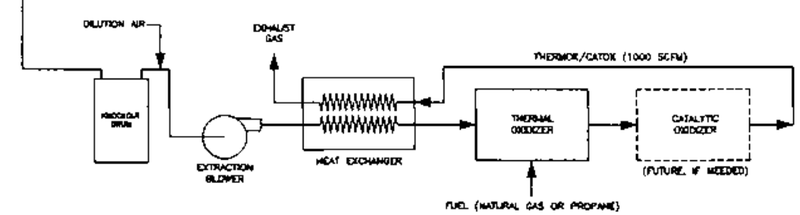


TYPICAL VAPOR EXTRACTION WELL

INITIAL PHASE 2 VAPOR EXTRACTION SYSTEM

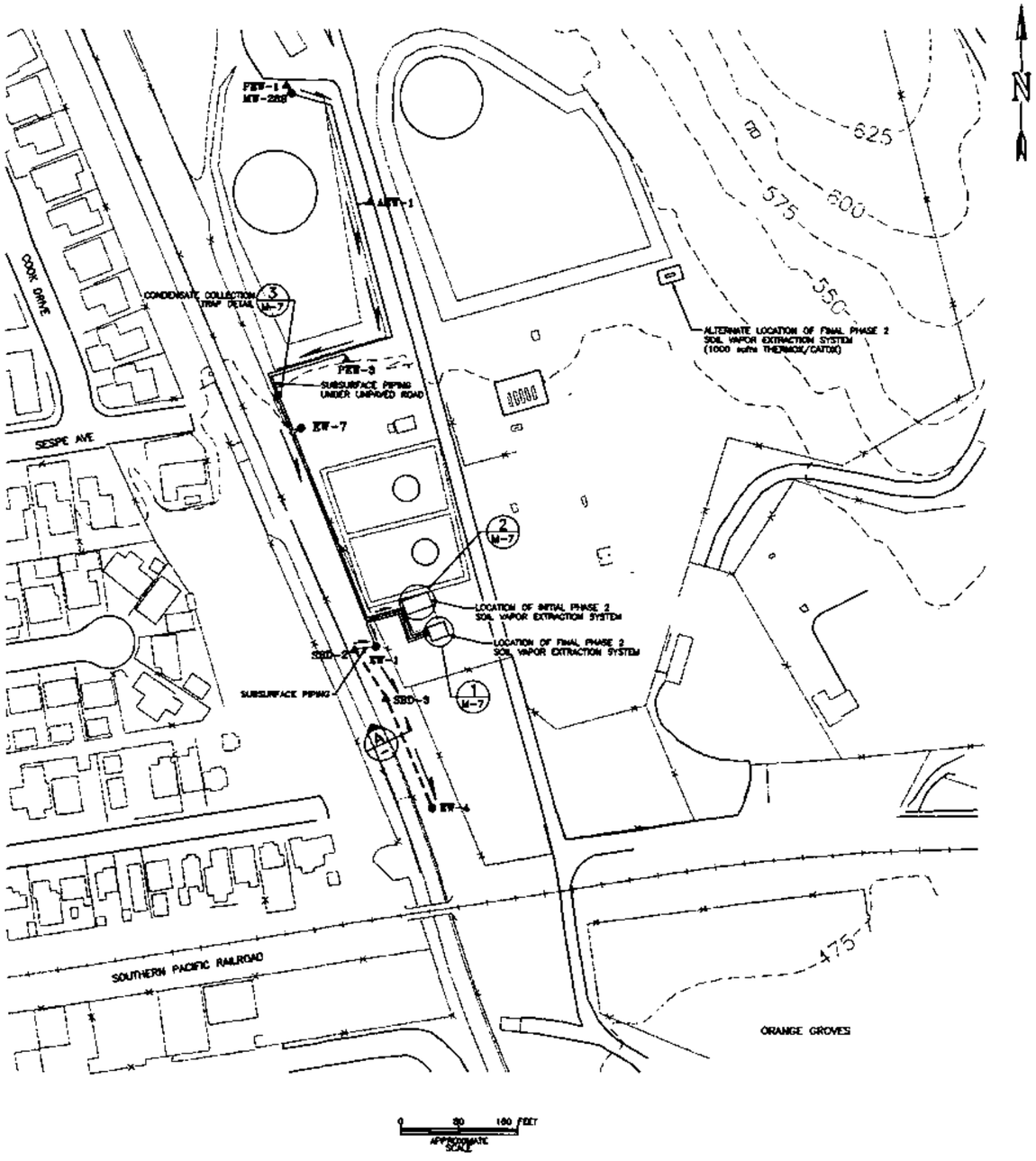


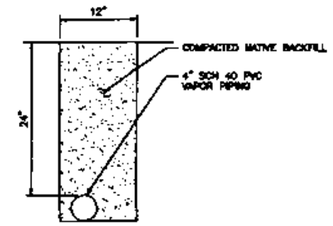
FINAL PHASE 2 VAPOR EXTRACTION SYSTEM



NOTE: FINAL PHASE 2 SYSTEM WILL REPLACE INITIAL PHASE 2 SYSTEM.

REV	DATE	BY	DESCRIPTION	SCALE	DESIGNED	DATE	SUBMITTED PROJECT ENGINEER	R.C.E. NO.	DATE	ENGLAND & ASSOCIATES	APPROVED	DATE	PACIFIC COAST PIPELINE SUPERFUND SITE	SHEET
				AS NOTED	DRAWN	DATE							FILLMORE, CALIFORNIA	M-5
					CHECKED	DATE	ENGLAND & ASSOCIATES	R.C.E. NO.	DATE		APPROVED	DATE	VAPOR EXTRACTION SYSTEM PIPING AND INSTRUMENTATION	

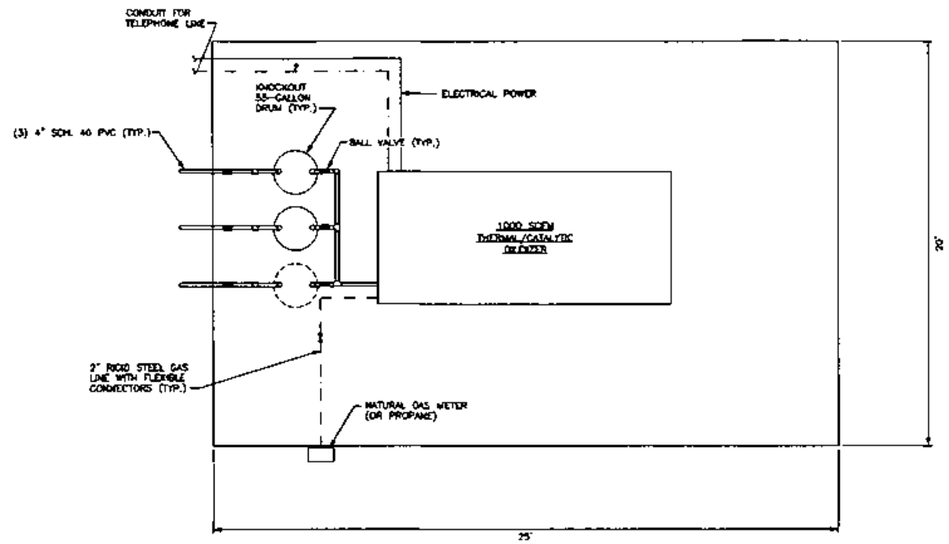




SECTION A
TRENCH DETAIL
NTS

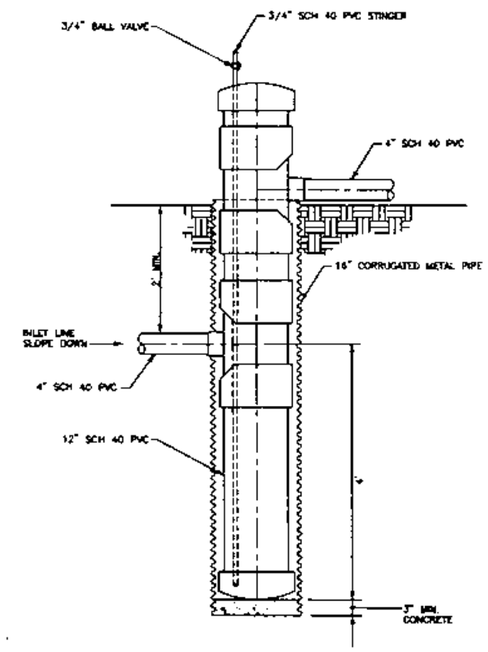
EXPLANATION	
	SLOPE DIRECTION
	ABOVE GROUND PIPING
	SUBSURFACE PIPING

REV	DATE	BY	DESCRIPTION	SCALE	DESIGNED	DATE	SUBMITTED PROJECT ENGINEER	R.C.E. NO.	DATE	ENGLAND & ASSOCIATES	APPROVED	DATE	PACIFIC COAST PIPELINE SUPERFUND SITE	SHEET
				AS NOTED	DRAWN	DATE							FILLMORE, CALIFORNIA	M-6
					CHECKED	DATE	ENGLAND & ASSOCIATES	R.C.E. NO.	DATE		APPROVED	DATE	VAPOR EXTRACTION PIPING LAYOUT	

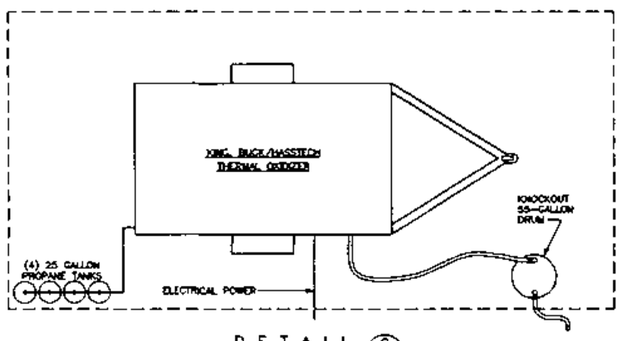


DETAIL 1 M-8
FINAL PHASE 2
VAPOR EXTRACTION SYSTEM (VES)
N T S

NOTE:
ELECTRICAL AND TELEPHONE SERVICE WILL FIELD ROUTED

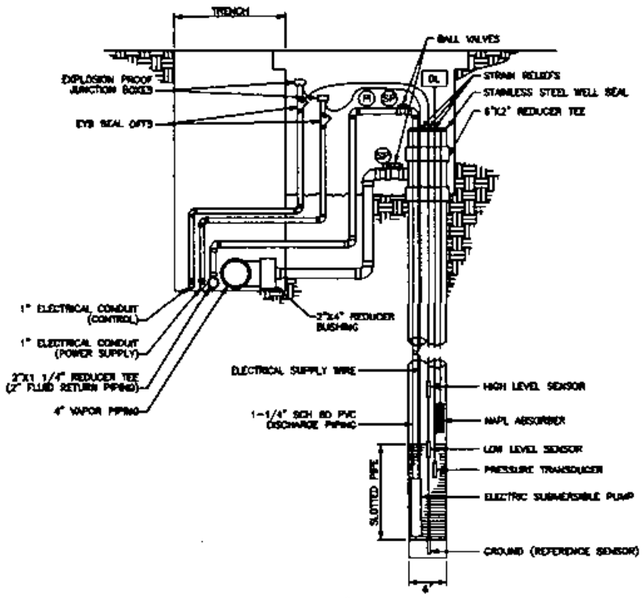


DETAIL 3 M-8
CONDENSATE COLLECTION TRAP
N T S

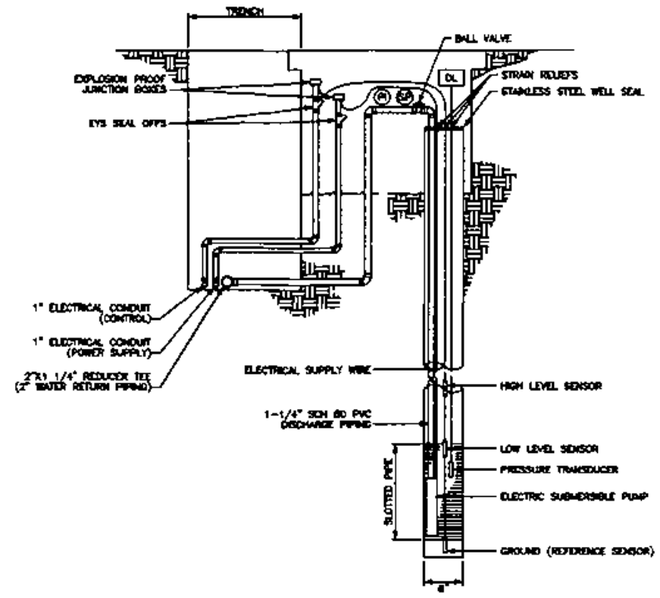


DETAIL 2 M-8
INITIAL PHASE 2
VAPOR EXTRACTION SYSTEM
N T S

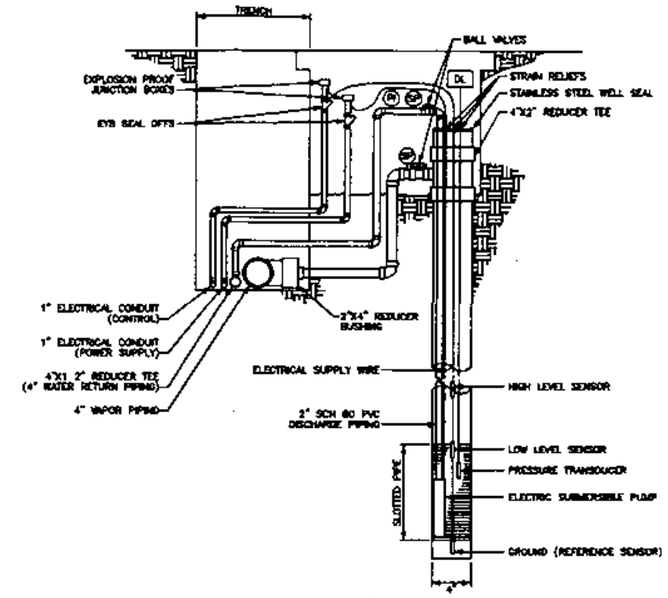
REV	DATE	BY	DESCRIPTION	SCALE		DESIGNED DATE	SUBMITTED PROJECT ENGINEER R.C.E. NO. DATE	ENGLAND & ASSOCIATES	APPROVED DATE	PACIFIC COAST PIPELINE SUPERFUND SITE	SHEET
				N T S	1/2	DRAWN DATE	CHERLAND & ASSOCIATES R.C.E. NO DATE		APPROVED DATE	FILLMORE, CALIFORNIA	M-7
						CHECKED DATE				VAPOR EXTRACTION SYSTEM AND PIPING DETAILS	



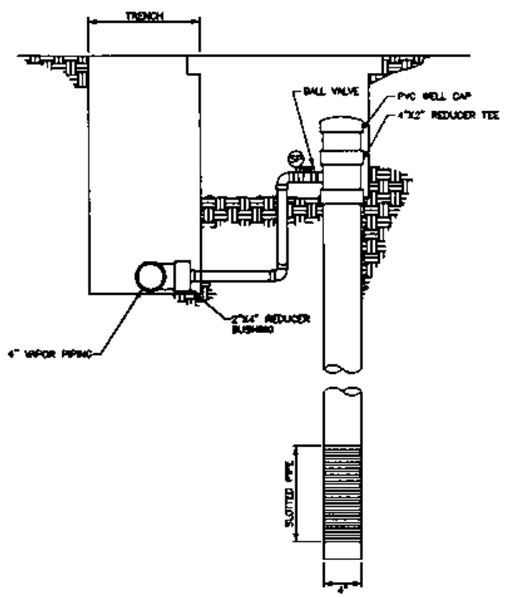
WATER/VAPOR EXTRACTION WELL
EW-1 ,EW-4 AND EW-7
NTS



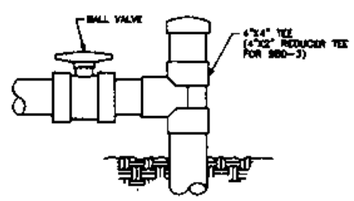
WATER EXTRACTION WELL
EW-2, EW-5 AND EW-6
NTS



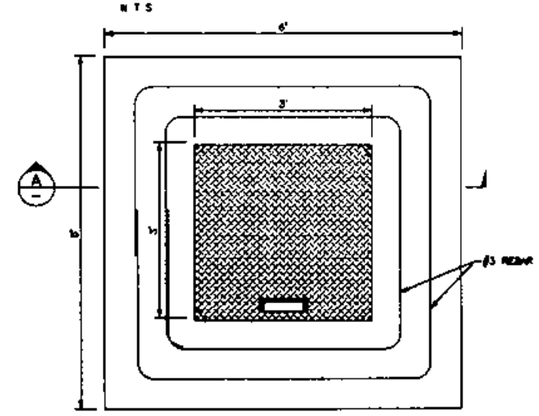
WATER/VAPOR EXTRACTION WELL
MW-28S
NTS



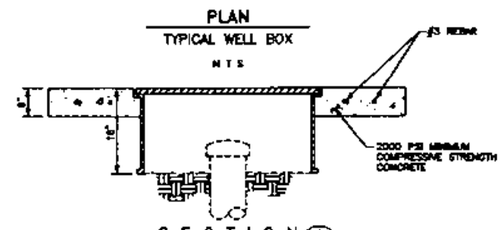
VAPOR EXTRACTION WELL
SBD-2, AEW-1 AND PEW-1
NTS



VAPOR EXTRACTION WELL
PEW-2, PEW-3 AND SBD-3
NTS



PLAN
TYPICAL WELL BOX
NTS



SECTION A
TYPICAL WELL BOX
NTS

Extraction Well	Total Depth in Feet (bgs)	Depth to Pump Inlet	Casing Diameter in Inches	Screen Interval	Water and or Vapor
EW-1	95	88	6	65–90	Water/Vapor
EW-2	116	100	6	80–85, 103–113	Water
EW-4	107.5	98	6	46.3–67, 81.5–94 102–104.5	Water/Vapor
EW-5	97	81	6	45–50, 82–94	Water
EW-6*	138	130	6	97–117, 125–133	Water
EW-7*	106	98	6	80–100	Water/Vapor
MW28S	120	110	4	98–118	Water/Vapor
PEW-1	74.5	–	4	46–74	Vapor
PEW-2	46.1	–	4	20–45	Vapor
PEW-3	63.5	–	4	10–46	Vapor
AEW-1	43	–	4	12–43	Vapor
SBD-2	48.4	–	4	15–30	Vapor
SBD-3	50.2	–	2	32–46	Vapor

* PROPOSED WELL

REV	DATE	BY	DESCRIPTION

DATE: AS NOTED

DESIGNED DATE
DRAWN DATE
CHECKED DATE

SUBMITTED
PROJECT ENGINEER R.C.E. NO. DATE
ENGLAND & ASSOCIATES R.G.E. NO. DATE

ENGLAND & ASSOCIATES

APPROVED DATE
APPROVED DATE

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

EXTRACTION WELL DETAILS

SHEET M-8

PANEL SCHEDULE

MOUNTING MCC — PANEL "LA" — MAIN 25A

120/208 VOLTS — 3 PHASE — 4 WIRE — A.I.C.RATING 10,000 — BUS 100A

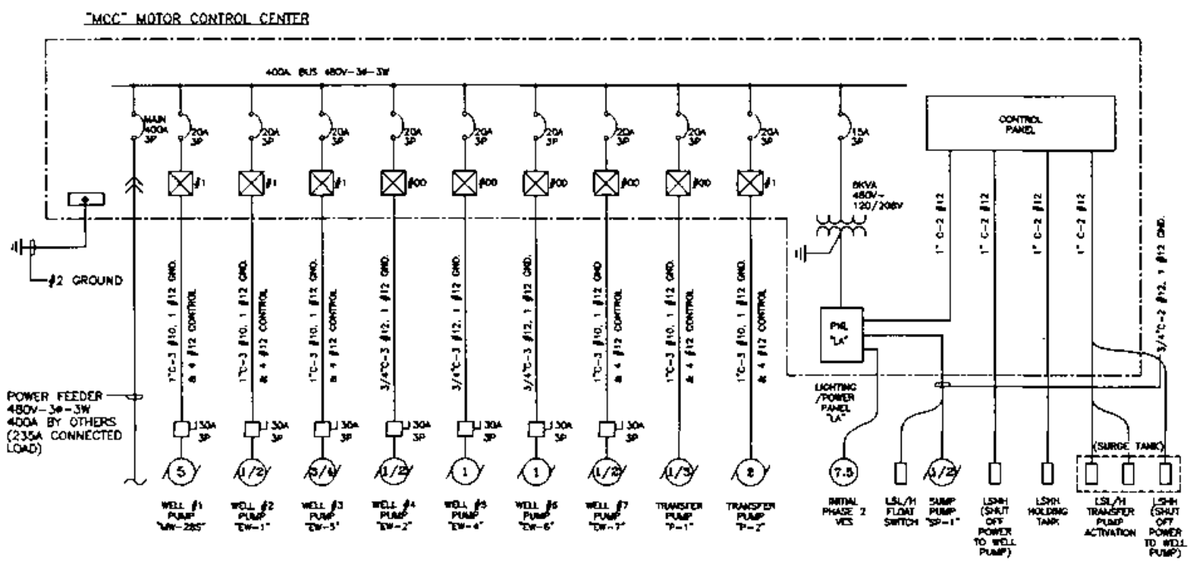
LOCATION	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LTG	REC	MISC	BKR	CIRC			CIRC	BKR	MISC	REC	LTG	WATTAGE ØA	WATTAGE ØB	WATTAGE ØC	LOCATION
SUMP PUMP	1035			–	–	1	20/1	1			2	30/1	–	–	–	–			SPARE
CONTROL PANEL		500		–	–	1	20/1	3			4	20/1	–	2	–		360		CONV. RECPT.
FLOW INSTRUMENT			100	–	–	5	20/1	5			6	20/1	–	–	2			400	AREA LIGHTING
INITIAL PHASE 2 VES	4500			–	–	–	60/1	7			8	20/1	2	–	–	40			PRESSURE INST.
		4500		–	–	–	60/1	9			10	20/1	–	–	–		–		SPARE
–			–	–	–	–	–	11			12	20/1	–	–	–			–	SPARE
–	–			–	–	–	–	13			14	15/1	–	–	–	–			SPARE
–		–		–	–	–	–	15			16	–	–	–	–		–		SPACE
–			–	–	–	–	–	17			18	–	–	–	–			–	SPACE

WATTS — ØA = 5675 — ØB = 5460 — ØC = 500

TOTAL WATTS = 11,635+LCL= 11,735 — AMPS = 32 — LCL = 400x.25= 100

HIGH Ø WATTS = 5675 — HIGH Ø AMPS = 47 — HIGH Ø LCL = –

SINGLE-LINE DIAGRAM



SOURCE:
OMB ELECTRICAL ENGINEERS, INC.
DWG. 318100

ELECTRICAL SYMBOLS LIST

- POLE MOUNTED HLD AREA LIGHTING FIXTURE.
- STANDARD 20A, 120/277V-1Ø SPST TOGGLE SWITCH MOUNTED AT +4" A.F.F.-U.O.N.
- STANDARD 20A, 120V-1Ø GROUNDING TYPE DUPLEX RECEPTACLE MOUNTED AT +24" A.F.F. - U.O.N.
- DISCONNECT SWITCH. AMPS - VOLTS & POLES AND FUSED OR NON-FUSED AS INDICATED.
- MAGNETIC MOTOR STARTER. NEMA SIZE - VOLTS & POLES AS INDICATED PROVIDE COMPLETE WITH THERMAL OVERLOAD PROTECTION PER MOTOR NAMEPLATE DATA AND COIL VOLTAGE PER EQUIPMENT CONTROL REQUIREMENTS.
- JUNCTION BOX. SIZED BY THIS CONTRACTOR PER ACTUAL NUMBER OF CONDUITS AND / OR CONDUCTORS PASSING THRU.
- MOTOR H.P. OR F.L.A. - VOLTS & PHASE AS INDICATED. VERIFY ELECTRICAL CHARACTERISTICS AND CONNECTION REQUIREMENTS WITH INSTALLED EQUIPMENT MANUFACTURER PRIOR TO ANY ROUGH-IN WORK.
- BRANCH CIRCUIT PANELBOARD, FLUSH OR SURFACE MOUNTED AS INDICATED.
- TRANSFORMER AS SPECIFIED.
- CONDUIT ROUTED EXPOSED ABOVE GRADE. TICK MARKS INDICATE QUANTITY OF #12 THWN / THHN CONDUCTORS - U.O.N. CONDUIT SHOWN WITH NO TICK MARKS INDICATE 2 #12 THWN / THHN CONDUCTORS - U.O.N. CONDUIT SHALL BE 3/4" MINIMUM - U.O.N. INCLUDE CODE SIZED COPPER BOND CONDUCTOR (NOT SHOWN ON PLAN) IN ALL NON-METALLIC CONDUIT RUNS.
- CONDUIT ROUTED UNDERGROUND BELOW FINISHED GRADE. TICK MARKS INDICATE QUANTITY OF #12 THWN / THHN CONDUCTORS - U.O.N. CONDUITS SHOWN WITH NO TICK MARKS INDICATE 2 #12 THWN / THHN CONDUCTORS - U.O.N. CONDUIT SHALL BE 3/4" MINIMUM - U.O.N. INCLUDE CODE SIZED COPPER BOND CONDUCTOR (NOT SHOWN ON PLAN) IN ALL NON-METALLIC CONDUIT RUNS.
- HOMERUN TO DESTINATION AS INDICATED. REFER TO CONDUIT SYMBOL ABOVE.

SCHEMATIC LEGEND

- CIRCUIT BREAKER (AMPERE TRIP RATING AND NUMBER OF POLES)
- POWER TRANSFORMER, RATING AS NOTED
- GROUND
- HAND-OFF-AUTO SELECTOR SWITCH
- MOMENTARY PUSH BUTTON, NORMALLY OPEN OR CLOSED AS INDICATED.
- CONTROL RELAY COIL
- CONTROL RELAY NORMALLY OPEN CONTACT
- CONTROL RELAY NORMALLY CLOSED CONTACT
- LEVEL SWITCH
- PRESSURE SWITCH
- PILOT LIGHT. LENS COLOR INDICATED BY LETTER IN CENTER. G - GREEN, R - RED.
- TERMINAL IN STARTER CUBICLE, MOTOR CONTROL CENTER
- LIQUID LEVEL CONTROLLER TERMINAL
- PANEL WIRING
- FIELD WIRING
- CONTROL PANEL, TERMINAL BLOCK

GENERAL NOTES & SPECS.

1. PROVIDE ALL MATERIALS AND LABOR AS REQUIRED TO ACHIEVE A COMPLETE AND OPERATING SYSTEM.
2. INSTALL RACEWAY SYSTEMS AS FOLLOWS:
   a. USE RIGID GALVANIZED STEEL IN ALL AREAS EXPOSED TO WEATHER OR PHYSICAL DAMAGE.
   b. USE FLEXIBLE METALLIC CONDUIT, SEAL-TYE WHERE INDICATED ON DRAWINGS.
   c. USE P.V.C. CONDUIT UNDERGROUND WITH CODE SIZED GROUND. CONDUIT RISERS AND STUBS ABOVE GRADE SHALL BE I.M.C. WITH KALF-LAPPED TAPE COVERING OR P.V.C. COATING.
3. ALL NEW WIRING SHALL BE COPPER WITH TYPE "THWN/THHN" INSULATION - U.O.N.
4. ALL FIXTURE, DEVICE, ETC... LOCATIONS SHALL BE VERIFIED WITH MECHANICAL AND PLUMB DRAWINGS AS WELL AS EQUIPMENT SUPPLIER'S REQUIREMENTS PRIOR TO ANY ROUGH-IN WORK.
5. ALL LIGHTING FIXTURES SHALL BE MOUNTED AND SUPPORTED IN ACCORDANCE WITH OSHA STANDARDS AND ALL NATIONAL AND LOCAL ELECTRICAL CODES.
6. THESE DRAWINGS ARE DIAGRAMMATIC AND REPRESENT THE INTENT OF EQUIPMENT, DEVICES, ETC... TO BE CONNECTED AND THE CIRCUITS TO WHICH THEY ARE TO BE CONNECTED. CONTRACTOR SHALL INSTALL ALL CONDUIT, J-BOXES, ETC... AS REQUIRED FOR A COMPLETE AND OPERATING SYSTEM.
7. ALL EXTERIOR EQUIPMENT SHALL BE WEATHERPROOF.
8. CONTRACTOR SHALL PERFORM ALL WORK IN STRICT ACCORDANCE WITH ALL LOCAL AND NATIONAL GOVERNING CODES.
9. ALL EQUIPMENT SHALL BE NEW AND BEAR A "U.L." LABEL - U.O.N..
10. ALL EQUIPMENT ELECTRICAL CHARACTERISTICS, LOCATIONS, AND CONNECTION REQUIREMENTS SHALL BE VERIFIED PRIOR TO ANY ROUGH-IN WORK.
11. ELECTRICAL CONTRACTOR SHALL FURNISH THE FOLLOWING SHOP DRAWINGS FOR PRIOR APPROVAL:
    a. LIGHT FIXTURES.
    b. ALL ELECTRICAL MOTOR CONTROL CENTER, CONTROL PANELS AND PANELBOARDS.
    c. OTHER ITEMS AS SPECIFICALLY INDICATED.

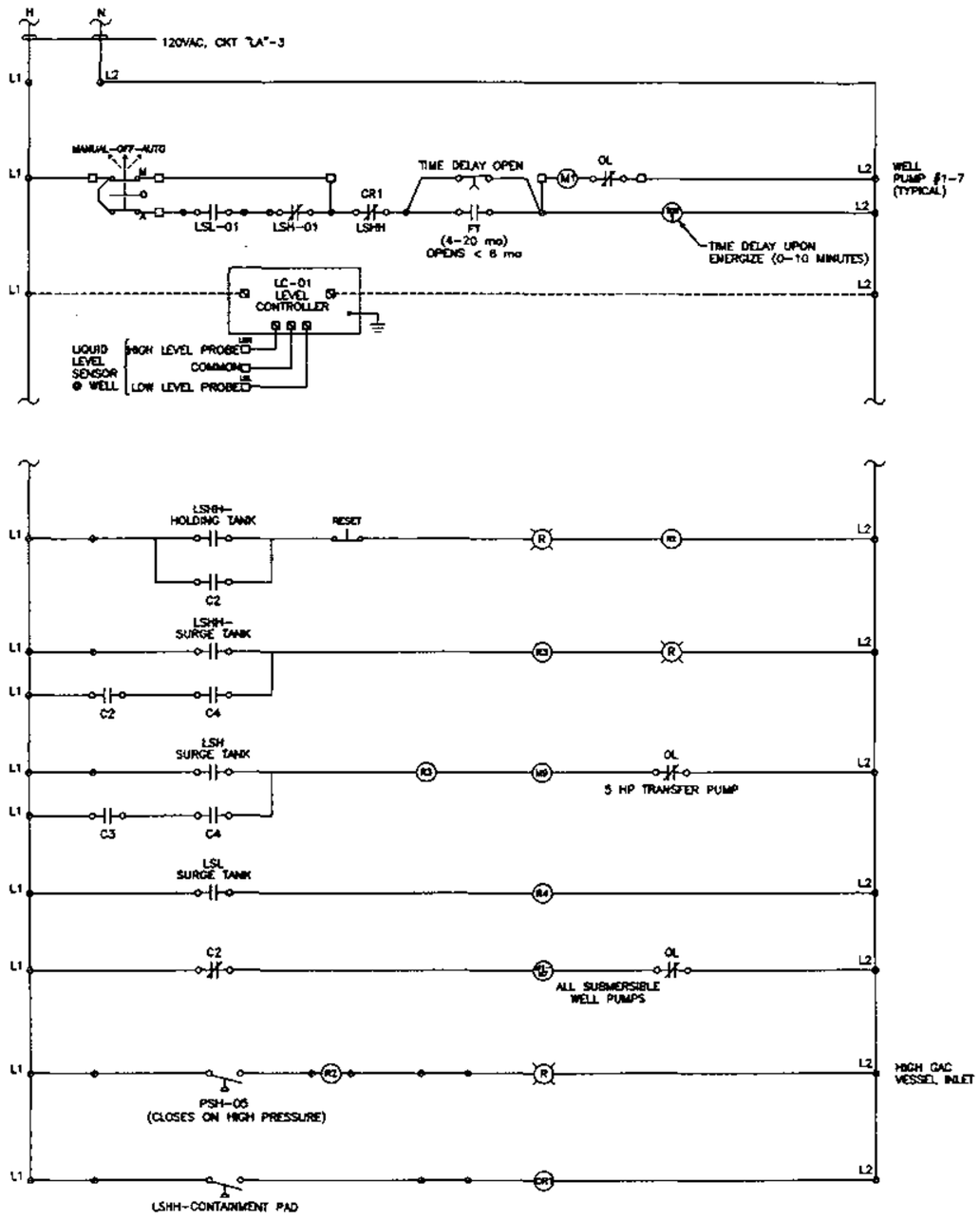
    THESE ITEMS SHALL BE APPROVED BY THIS OFFICE PRIOR TO ANY COMMENCEMENT OF PLACING ORDERS OR PERFORMING ANY ROUGH-IN WORK.
12. COMPLETE ELECTRICAL SYSTEM SHALL BE GROUNDED IN ACCORDANCE WITH THE PRESENTLY ADOPTED EDITION OF THE N.E.C. ART. 250.
13. PROVIDE ENGRAVED PLASTIC NAMEPLATES FOR ALL MAJOR ELECTRICAL EQUIPMENT.
14. PROVIDE THE OWNER AND THIS ENGINEER WITH ONE SET OF ELECTRICAL "AS-BUILT DRAWINGS" AT THE COMPLETION OF JOB.

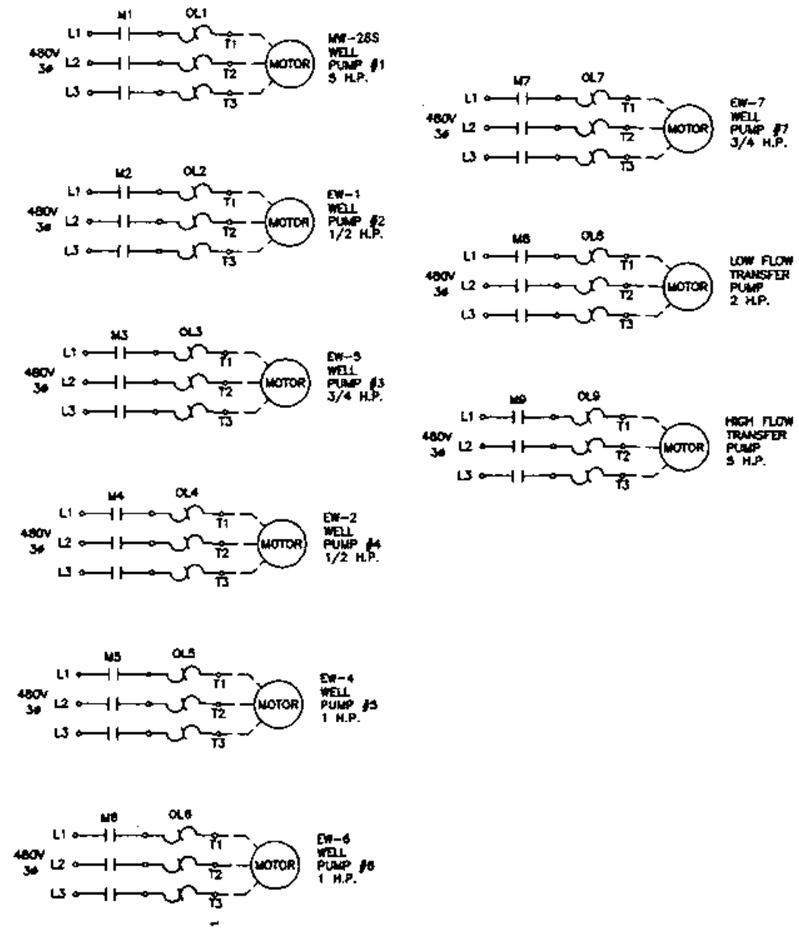
REFERENCES & ABBREVIATIONS

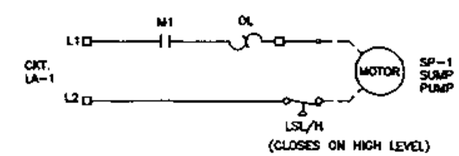
	LIGHTING FIXTURE DESIGNATION	M.C.B.	MAIN CIRCUIT BREAKER
	DETAIL REFERENCE	F.L.A.	FULL LOAD AMPS
	KEYNOTE REFERENCE	C.	CONDUIT
	MECHANICAL EQUIPMENT DESIGNATION	V.	VOLTS
A.	AMPERES	G.F.I.	GROUND FAULT INTERRUPTER
A.I.C.	AMPERES INTERRUPTING CAPACITY	V.L.	VERIFY LOCATION
A.F.G.	ABOVE FINISH GRADE	A.C.	ABOVE COUNTER
BKR	BREAKER	N.L.	NIGHT LIGHT
U.O.N.	UNLESS OTHERWISE NOTED	EM.	EMERGENCY
CIRC	CIRCUIT	2/C	2 CONDUCTOR INSTRUMENT CABLE
C.O.	CONDUIT ONLY W/PULL ROPE	(#)	NUMBER INDICATE QUANTITY
W.P.	WEATHER PROOF	P	POLES
C.U.	COPPER	N.F.	NON-FUSED
LCL	LOAD CONTINUOUS LOAD	MCC	MOTOR CONTROL CENTER
LTG	LIGHTING	TYP	TYPICAL
M.L.O.	MAIN LUGS ONLY	INSTR.	INSTRUMENT
REC	RECEPTACLE	O.L.	OVERLOAD
RGS	RIGID GALVANIZED STEEL	TDR	TIME DELAY RELAY
XFMR	TRANSFORMER		

REV.	DATE	BY	DESCRIPTION	SCALE AS NOTED	DESIGNED / DRAWN / CHECKED	SUBMITTED PROJECT ENGINEER / ENGLAND & ASSOCIATES	ENGLAND & ASSOCIATES	APPROVED / APPROVED	PACIFIC COAST PIPELINE SUPERFUND SITE FILLMORE, CALIFORNIA SINGLE LINE DIAGRAM, LOAD SCHEDULE AND GENERAL NOTES

SHEET E-1







SOURCE:
OMB ELECTRICAL ENGINEERS, INC.
DWG. 318100

REV	DATE	BY	DESCRIPTION

SCALE: AS NOTED

REVIEWED DATE
DRAWN DATE
CHECKED DATE

SUBMITTED
PROJECT ENGINEER P.E.'S. NO. DATE
ENGLAND & ASSOCIATES P.E.'S. NO. DATE

ENGLAND & ASSOCIATES

APPROVED DATE
APPROVED DATE

PACIFIC COAST PIPELINE SUPERFUND SITE
FILLMORE, CALIFORNIA

SCHEMATIC WIRING DIAGRAM

SHEET E-2

Appendix A

A.1 BACKGROUND

The PCPL site is located at 67 East Telegraph Road on the eastern edge of the City of Fillmore. The site, which covers approximately 20 acres, was formerly an oil refinery which has since been dismantled. In 1928, Texaco purchased the refinery and operated it until the early 1950s. An early reference indicates that Richfield Oil Co. operated a gas separator plant on a portion of the site in the early 1950s. Since closure of the refinery, a portion of the site has been used by Texaco as a pumping station for crude oil produced from local oil fields.

While the refinery was in operation, miscellaneous hydrocarbon wastes believed to consist primarily of tank bottoms, filter cake, and sludge were disposed of onsite in a large pit, referred to as the Main Waste Pit and in several smaller pits located throughout the property.

Soil and ground water assessment programs indicated TPHG and BTEX in the soil and ground water at the site. Contaminated soil from the main waste pit and other disposal pits was excavated and removed in 1986. Ground water extraction and treatment began in late 1993. Soil vapor treatment began in early 1994.

A.2 OBJECTIVE

This health & safety plan has been developed to cover a variety of remediation work objectives that will be performed by England & Associates (E&A) employees or contractor work to be performed under the direct supervision of designated E&A employees. E&A is not responsible for work performed by subcontractors hired by Texaco to perform non-E&A supervised work at the PCPL facility.

The following activities are likely to be performed:

- Drilling and excavating;
- Piping and conduit installation;
- Ground water pump installation and testing;
- Soil, ground water, and vapor sampling;
- Aquifer testing; and
- Remediation system operation and maintenance (ground water and vapor).

A.3 GENERALIZED SITE SAFETY PROCEDURES AND REQUIREMENTS

The procedures and precautions presented below are general and apply to all E&A on-site personnel and E&A supervised contractors regardless of the task to be performed.

- Review the site health & safety plan prior to the performance of any field activity. All personnel must indicate acceptance of the plan requirements by completing and signing the sheet attached to the document (Section A.12)

- The PCPL facility is active, be aware of general site traffic, project location specific traffic conditions and Texaco's requirements relating to travel on unpaved areas.

- Above ground appurtenances are found throughout the site. These include but are not limited to above ground piping and storage tanks, secondary containment structures, power lines and poles, monitoring well monuments and protective structures. Familiarity with the locations of these structures is extremely important.

- To avoid vehicle collisions with above ground structures, drivers should walk completely around their vehicles and observe locations of all structures prior to moving the vehicle. Emphasize this requirement to drillers and their support help.

- Any unsafe condition or safety concern should be brought to the attention of E&A's acting site safety officer. An E&A site safety officer will be designated for each phase of the project and he/she will be identified to all personnel during the daily safety meetings. If there is a change of the site safety officer during a project this change will be addressed during the daily safety meeting.

- Level D personal protective equipment (PPE) is required when performing any field work (on or off-site) related to the PCPL project. Level D protection at a minimum consists of long pants, boots, hard hat, safety glasses and orange safety vest.

- Any elevated work which requires a person to be greater from six feet from the ground or within six feet from the edge of an excavation or roof edge will require fall protection. E&A's Health & Safety Director will approve the fall protection devices on a case by case basis.

A.4 SITE CHEMICAL HAZARD EVALUATION

Soil and ground water samples collected during multiple facility investigations have indicated that the vadose and saturated zones beneath the PCPL facility have been impacted primarily by hydrocarbon constituents. Several ground water monitoring wells contain measurable

amounts of free floating hydrocarbons (light non-aqueous phase liquids [LNAPL]). Extensive laboratory analysis of the hydrocarbon matrix attributes its composition to gasoline and naphtha constituents and, in some areas, to heavier hydrocarbons consistent with crude oil. TPHG concentrations in the soil range from <1 mg/kg to 84,000 mg/kg, while benzene concentrations range from <0.005 mg/kg to 94 mg/kg. Concentrations of TPHG and benzene in ground water have ranged from < 50 ug/l to 75,000 ug/l and < 0.3 ug/l to 2,200 ug/l, respectively.

A.4.1 Suspect Substances

Generally when working in an area with known hydrocarbon contamination, benzene, toluene, ethyl benzene, and total xylenes (BTEX) are the main substances of concern. Exposure to these substances is regulated by the Occupational Safety and Health Administration (OSHA). In addition, the National Institute for Occupational Safety & Health (NIOSH) publishes recommended exposure levels (RELs). The RELs and the OSHA Permissible Exposure Limits (PELs) for these substances in air are shown in a table below.

Permissible and Recommended Exposure Limits

Compound	OSHA PELs		NIOSH RELs	
	8-HOUR TWA	STEL	10-HOUR TWA	STEL
Benzene	1 ppm	5 ppm	0.1 ppm	1 ppm
Toluene	100 ppm	150 ppm	100 ppm	150 ppm
Xylenes	100 ppm	150 ppm	100 ppm	150 ppm
Ethyl benzene	100 ppm	125 ppm	100 ppm	125 ppm

Notes: Concentrations are in parts per million by volume in air.
PEL = permissible exposure limit (8-hour TWA);
REL = recommended exposure limit (10-hour TWA);
TWA = time weighted average;
STEL = short term exposure limit (15-minute TWA).

A.4.2 Air Quality Monitoring

During drilling, excavation, or ground water sampling, Volatile Organic Compound (VOC) emissions will be monitored with a Photo Ionization Detector (PID) Organic Vapor Meter (OVM) calibrated to a benzene standard (isobutylene). Monitoring of the breathing space and excavated material during drilling will be performed at 15 to 30 minute intervals or whenever hydrocarbon odors are sensed. The times and concentrations during monitoring will be recorded on the appropriate air quality monitoring log (attached). Specification sheets for each unit that may be utilized on the job site are attached. The breathing space

will be monitored during ground water purging and sampling activities and noted on the Purging and Sampling Form (see Appendix D).

Benzene is the target contaminant since it has the lowest exposure limits. Laboratory analyses of vapor samples collected from site wells have indicated the benzene concentrations average approximately 1.4% of the total organic vapor concentration under steady state conditions. Based on this information, 100 ppm hydrocarbon vapor would contain 1.4 ppm benzene, thus at 70 ppm, less than 1 ppm benzene will be present. We believe that the 70 ppm value for total organic vapor will provide an adequate factor of safety.

A perimeter survey will be conducted using the OVM prior to the start of work in order to establish baseline air concentration levels. If initial OVM readings register over 35 ppm, a Dräger tube will be used to establish baseline levels of BTEX compounds.

In the event that the OVM registers over 70 ppm for an extended duration (15 minutes), drilling will cease and Dräger tubes will be used to sample air in the breathing space specifically for benzene. Although the benzene Dräger tube is susceptible to interference from toluene, ethyl benzene, and xylenes, a Dräger "hit" of 1 ppm will cause work to cease while workers don respiratory protection and the need for Level C dermal protection is evaluated. During drilling or excavation operations, if the OVM registers low or non-detectable levels of hydrocarbons, at least one Dräger tube will be used to confirm the absence of benzene. The detection limit for the benzene Dräger tube is 0.5 ppm.

Precautionary procedures which shall be taken during the field investigation are summarized in the table below:

Action Levels and Procedures

Time or Action Level	Action
Initial site arrival	Perimeter survey with OVM and Dräger tube if OVM reads over 35 ppm
During drilling/excavation operations	OVM monitoring at 15-30 minute intervals, at least 1 Dräger tube to confirm benzene
During ground water purging and sampling	OVM monitoring
Strong odor	Dräger tube
OVM > 70 ppm	Dräger tube
Dräger tube > 1 ppm	Stop work; don respirators evaluate necessity to upgrade to Level C dermal protection

To approach the NIOSH STEL of 1 ppm benzene, a 70 ppm total organic vapor concentration would need to be present in the breathing space for 15 minutes. Upon reaching the NIOSH

STEL respirators are required. To approach the NIOSH REL of 0.1 ppm benzene, employees wearing properly fitted half-face respirators would need to be exposed to 70 ppm total organic vapor concentrations for a continuous 10-hour period. To approach the OSHA PEL of 1 ppm benzene using the suggested respiratory protection, a 700 ppm total organic vapor concentration would need to be present in the breathing space for a continuous 8-hour period (Section A.6.1 provides respirator protection factors and maximum use limitations) .

All ancillary activities will be located upwind of the drilling activity as determined by a flag or other wind-direction indicating device mounted on the rig mast.

A.5 Physical Hazards

Physical hazards of concern include but are not limited to:

- Underground and overhead utility lines (please note: Underground Service Alert and Texaco Transportation & Trading Inc. will be notified of all work locations and activities prior to work commencement),
- electrical hazards associated with equipment and local power supply,
- heavy equipment associated with drilling and well development activities,
- fire (hydrocarbons are flammable and many wells contain methane gas),
- equipment falling from overhead,
- local area traffic, and
- noise (hearing protection will be available).

A.5.1 Medical Hazards

- **Chemical exposures (BTEX)** - Hydrocarbon vapors are irritating to the eyes, nose and throat. If a person becomes dizzy, experiences eye irritation or nausea, they will be removed from the area.
- **Heat cramps, stroke and exhaustion** (especially if in Level C protection) -
  - *Heat Cramps Symptoms and Signs* - Severe muscle cramps (usually in the legs or abdomen), exhaustion, sometimes dizziness or periods of faintness.

- *Heat Stroke Symptoms and Signs* - Rapid shallow breathing, weak pulse, cold and clammy skin, heavy perspiration, total body weakness, dizziness that may lead to unconsciousness.

- *Heat Exhaustion Symptoms and Signs* - Deep breaths then shallow breathing, rapid strong pulse, then rapid weak pulse, dry hot skin, dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching may be seen.

- *Required action for heat cramps, stroke and exhaustion* - Call for medical attention (911). Move person to nearby cool place. Allow person to rest. Provide water for the person, let them drink under their own power (note; do not administer water to an unconsciousness person). If person becomes unconsciousness cool the person by removing clothing and wrapping in wet towels and sheets, pour water over the these wrappings. Ensure emergency medical attention is on its way.

- **Electrical shock and/or burns** - call 911.

- **Sun burn (UVa/UVb exposure)** - wear sunscreen.

- **Insect and snake bites** - call 911.

A.5.2 Other Hazards

Other hazards may be identified at a job specific location. Each area will be evaluated for any site specific hazard prior to the morning safety meeting. If a specific hazard is identified it shall be addressed during morning safety meetings.

- Be aware of the general public and their natural curiosity, ensure that no unauthorized personnel are allowed within the work areas.

All field personnel and subcontractors shall be briefed on all identifiable site specific hazards in daily morning safety meetings.

A.6 PERSONAL PROTECTIVE EQUIPMENT

We will initially be using level D personal protective equipment (PPE) which includes: long pants, boots, hard hat, safety glasses and orange safety vest. Chemical resistant gloves are required when handling ground water or soil samples or performing decontamination

procedures. Steel-toe boots are required during drilling or working with heavy equipment. Hearing protection will be worn when working in close proximity to drilling rigs or otherwise as necessary.

A complement of Level C dermal and respiratory protection will be available on-site should monitoring as described below mandate a PPE upgrade. Level C PPE will consist of Tyvek coveralls, nitrile steel toe/shank boots, chemical resistant gloves, hard hat, safety glasses and half-face Air Purifying Respirators (APR) fitted with organic vapor/acid gas cartridges.

A.6.1 Level C Respiratory Protection Upgrade Guidelines

In the event Level C PPE upgrade becomes necessary work operations will be shut down and the following will occur:

- All personnel as directed by the site safety officer (SSO) will inspect their half-face respirators, Tyvek suits and clean as necessary, ensure proper function and don.
- All personnel shall perform both negative and positive pressure respirator fit tests. If a respirator failure is noticed, it shall be immediately reported to the SSO and the defective respirator repaired or replaced.
- In the event a repair or replacement cannot be made, the affected employee shall be removed from the work area until such time as a properly functioning and fitting respirator has been acquired.
- Each employee shall ensure that his/her individual respirator is equipped with organic vapor chemical cartridges or organic vapor/acid gas chemical cartridges. Replacement cartridges shall be available. E&A is not responsible for providing any respiratory equipment to approved subcontractors. Subcontractors must be prepared for possible respirator use and provide their employees with the appropriate equipment.
- Once all employees have upgraded to level C PPE and indicate to the SSO that all PPE is in place and properly functioning, work operations will resume.
- Air quality monitoring will continue as prescribed in Section A.4.2.

The following shall be considered by the SSO in the event a level C PPE upgrade occurs.

Respirators protect the wearer from inhaling toxic contaminants. Different respirator systems provide different levels of protection. Protection factors (PF) for different respiratory protection devices are presented in the following table.

Selected Respirator Protection Factors

Type of Respirator	*Protection Factor (PF)
Air Purifying - Half Face	10x
Air Purifying - Full Face	50x
Supplied Air Pressure Demand Full Face (Airline)	200x
Self-Contained Breathing Apparatus (Positive Pressure)	10,000x

* Protection factors for the respirator types presented above were assigned by OSHA (OSHA Handbook Guidelines).

A PF is the ratio of the contaminant concentration inside the respirator face piece to that of the outside ambient atmosphere. Protection factors may be used to calculate the Maximum Use Limit (MUL) of a properly fit-tested respirator. E&A only requires that subcontractors and employees be equipped with properly fitted half-face respirators. Thus our maximum protection factor is 10 times (x).

Utilizing this information and having identified benzene as the target contaminant, the MUL of the half face respirator used in an atmosphere containing benzene can be calculated. The OVM PID measures total organic vapor concentrations, and that the average benzene concentration constitutes 1.4% of the measured total organic vapor concentrations. If a PID OVM reading of 70 ppm contains less than 1ppm benzene, then a half face air-purifying respirator has a MUL of 700 ppm. The following table presents the MUL for several different respirators.

Site Specific MUL's by Respirator Type

Type of Respirator	*MUL (PPM)
Air Purifying - Half Face	700
Air Purifying - Full Face	3,500
Supplied Air Pressure Demand Full Face (Airline)	14,000
Self-Contained Breathing Apparatus (Positive Pressure)	700,000

* The MUL presented in this table is site specific and based on extensive analytical testing of vapors collected during steady state conditions. Benzene has been identified as the target chemical based on its low exposure criteria. This table assumes benzene comprises 1.4% of the total organic vapor present.

Review of the above table shows that the half face respirator has a MUL of 700 ppm. Thus if total organic vapor readings exceed 700 ppm work would cease and would not resume until an detailed evaluation of the exposure situation has been made. The evaluation may recommend use of respiratory protection with a higher PF. Implementation of engineering controls to reduce or eliminate the exposure hazard, or a combination of these two procedures. If the MUL of the half-face respirator is exceeded work will cease until a remedy for the exposure has been decided upon and implemented.

A.6.2 Air Purifying Respirator Limitations

All site workers are reminded that air purifying respirators (APRs) are subject to several important limitations.

- Be sure the respirator is properly fitted and positive and negative fit tested. Improperly sealed and fitted respirators provide little or no protection.
- Be sure that the appropriate chemical cartridge is installed within the respirator. Improperly installed or chosen chemical cartridges provide inadequate protection.
- Chemical breakthrough of a cartridge will occur. The breakthrough rate varies by individual breathing rate, chemical concentration in the atmosphere and a multitude of other environmental and individual factors. All personnel must replace their chemical cartridge when breakthrough is suspected. At a minimum the chemical cartridge will be replaced each day during work which requires respirator use.
- APRs may not be used in oxygen deficient atmospheres.

A.7 DESIGNATED WORK AREAS

To control unauthorized access of the public to any work area an exclusion zone will be set up which will consist of temporary barriers. Absolutely no unauthorized personnel are allowed within the exclusion zone, PPE as designated in Section A.6 will be required and no eating or drinking shall be allowed.

Exclusion zones will be maintained and relocated as necessary.

A.8 DECONTAMINATION PROCEDURES

Decontamination procedures will be performed within the exclusion zone using a portable decontamination station or at the site's decontamination pad. The portable decontamination

station will consist of two sets of decontamination buckets and associated ancillary equipment. One bucket is for washing sampling equipment and one is for personnel decontamination. These stations will be maintained within the exclusion zone and will be placed on top of a thick plastic liner secured from possible wind disturbance. In addition, a self-contained steam cleaning unit will be provided for drilling equipment decontamination. Appropriate receptacles for disposal of miscellaneous equipment, PPE and decontamination water and rinsate will be provided. Decontamination procedures are presented below:

A.8.1 Personnel

- Gloves shall be worn at all times within the exclusion zone.
- Personnel leaving the exclusion zone will wash, rinse and remove gloves and wash hands in clean water using soap.
- If wearing Level C dermal and respiratory protection, prior to exiting the exclusion zone personnel will wash, rinse and remove gloves and boots. Remove Tyvek and place in plastic trash bag. Wash hands and face in clean water using soap.

A.8.2 Equipment

- All down-hole sampling and monitoring equipment will be washed prior to use with potable water and Liquinox (non-phosphate soap) rinsed twice without soap in potable water, once with bottled, deionized water and wiped down with isopropanol and allowed to air-dry.
- Gloves shall be worn during decontamination of sampling equipment.
- All down-hole drilling equipment will be steam-cleaned between borings and prior to leaving the work area.
- All sample containers will be thoroughly cleaned and bagged during the sample packaging and logging operations. Sample containers will be wiped down with potable water and final wiped with bottled, deionized water.

A.8.3 Other Personnel Protective Procedures

- There will be no eating, drinking or smoking within the exclusion zone.

- Personnel are requested to drink plenty of fluids, a drinking station will be provided and maintained.

- Facial hair is not allowed for level C work.

- Gloves will be worn during the performance of any sampling (soil, water, or vapor) procedure.

A.9 DISPOSAL PROCEDURES

Soil cuttings, purge and decontamination water and drilling muds and fluids will be placed in DOT-rated 17H 55-gallon liquid tight-drums or stored in covered soil storage bins. All containers will be appropriately labeled prior to leaving the site. Each location will be thoroughly cleaned at the end of each work day. No garbage, or debris will remain on-site overnight.

A.10 PROJECT PERSONNEL

All site personnel, including subcontractors, will have successfully completed a 40-hour, and annual 8-hour refresher course in health & safety for hazardous waste site operations in accordance with 29 CFR 1910.120 and will have been determined to be physically fit and capable of wearing respiratory protection by a medical doctor on an annual basis before being permitted to work at the site: All E&A employees are trained and monitored in accordance with E&A's Respirator Protection Program which is detailed in our *Employee Injury Illness Prevention Program* (dated March 7, 1995). Sub-contractors should consult their individual respiratory protection programs prior to placing their employees in any potentially hazardous environment. The corporate Health & Safety Director will be responsible for personnel document verification and follow up activities related to accident loss reports submitted by the project manager.

The project manager will be responsible for the technical aspects of the project and to assure that project health & safety requirements are implemented.

The on-site safety officer is responsible for conducting daily safety meetings for all site personnel (subcontractors and regulatory personnel included) addressing hazard assessment, personnel equipment and implementation of the Health & Safety (H&S) Plan.

Field personnel, including all subcontract personnel and regulatory agents, are responsible for understanding and complying with the H&S plan. Field personnel will be required to acknowledge and sign (Section A.12) a copy of the H&S plan and attend daily safety briefings prior to beginning the days activities.

Personnel with special personal health conditions which prohibit compliance with any or all parts of the H&S plan will not be allowed within the work areas.

A.11 EMERGENCY PROCEDURE

Should an accident occur in the field, the nearest appropriate facility (i.e., medical facility, fire department, police department) will be notified immediately. General procedures are as follows:

- In the event of fire or other emergency dial 911.
- Get medical attention for the injured person immediately.
- Notify the Onsite Health & Safety Officer and/or Site Health & Safety Officer, Project Manager, and the injured person's personnel office.
- Prepare an incident report. The Project Manager is responsible for its completion and submittal to the Health & Safety Director and the Corporate personnel office within 24 hours.
- The Onsite Health & Safety Officer will assign duties and coordinate with emergency response personnel as required.

The location of the nearest facilities, their addresses, and phone numbers are presented below. Figure A-1 shows the nearest hospital in relationship to the site.

- **Nearest Hospital - Santa Paula Memorial Hospital**
  825 North 10th Street
  Santa Paula, California
  (805) 525-7171

  To reach the Hospital, follow highway 126 west to Santa Paula. Exit Highway 126 at 10th Street (Highway 150) and travel north (right). Travel north approximately 1 mile to a split in the road, and remain to the left (west). This is 10th Street. Follow this road to its end and the hospital will be on the right (east).

- **Ventura County Medical Center**
  3291 Loma Vista Road
  Ventura, California
  (805) 652-6000

- **Fillmore Volunteer Fire Department and**
  Ventura County Sheriff's Office
  524 Sespe Avenue
  Fillmore, California
  (805) 524-3701

A.12 ACKNOWLEDGEMENT AND UNDERSTANDING OF PLAN

This health & safety plan was prepared by the undersigned, having successfully completed OSHA standard 29 CFR 1910.120 40-hour hazardous materials health & safety training.

Health & Safety Director: _____
W. Zachary Dickson

Site Health & Safety Officer: _____

Project Manager: _____
Dennis C. England

I UNDERSTAND AND AGREE TO THE ABOVE PLAN.

Contractors: _____

_____

_____

Geologist/Field Technicians: _____

_____

_____

I UNDERSTAND AND AGREE TO THE ABOVE PLAN.

Contractors: _____

_____

_____

_____

_____

Geologist/Field Technicians: _____

_____

_____

_____

_____

Other: _____

_____

_____

_____

_____

I UNDERSTAND AND AGREE TO THE ABOVE PLAN.

Contractors: _____

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Geologist/Field Technicians: _____

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Other: _____

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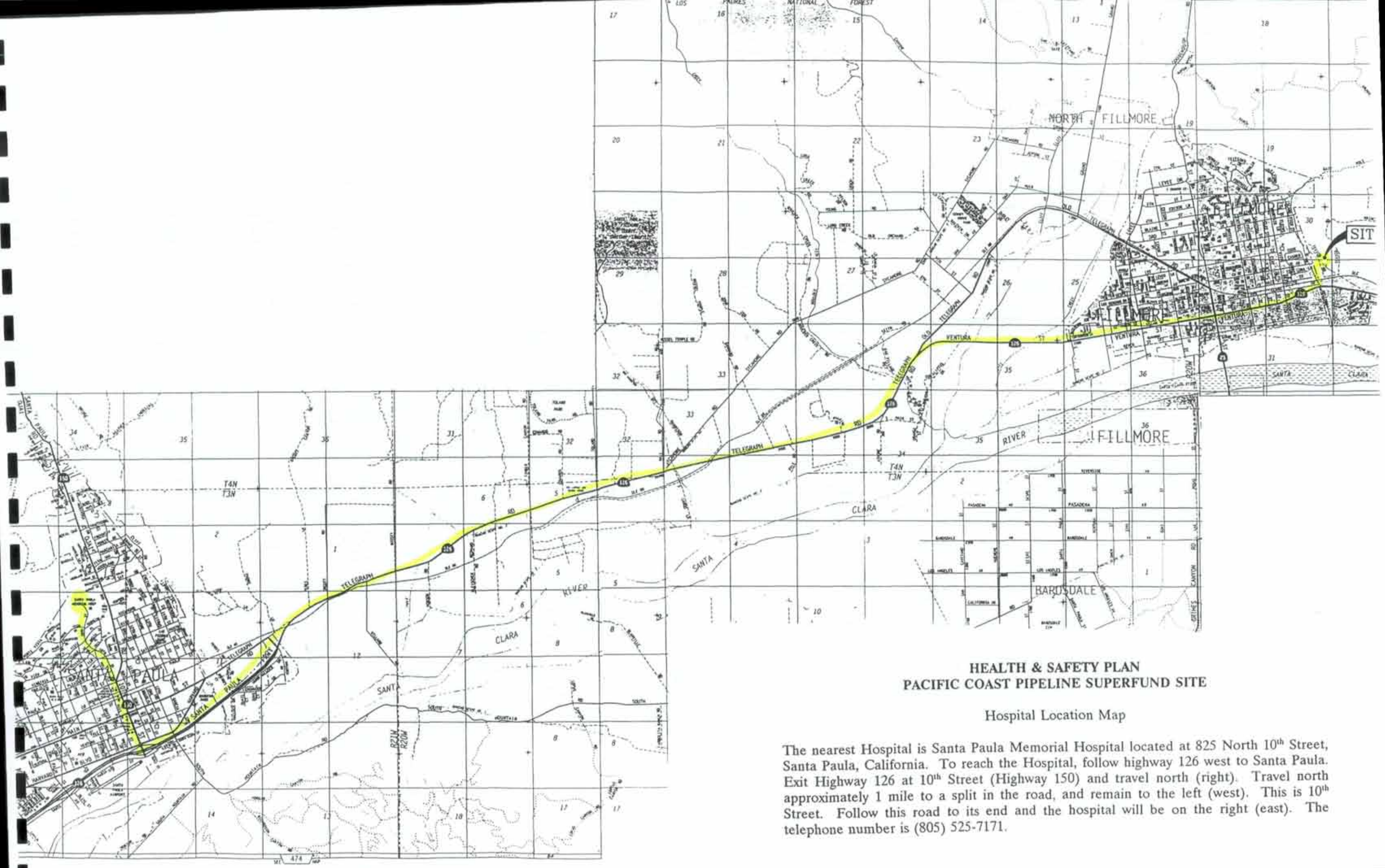

HEALTH & SAFETY PLAN
PACIFIC COAST PIPELINE SUPERFUND SITE

Hospital Location Map

The nearest Hospital is Santa Paula Memorial Hospital located at 825 North 10th Street, Santa Paula, California. To reach the Hospital, follow highway 126 west to Santa Paula. Exit Highway 126 at 10th Street (Highway 150) and travel north (right). Travel north approximately 1 mile to a split in the road, and remain to the left (west). This is 10th Street. Follow this road to its end and the hospital will be on the right (east). The telephone number is (805) 525-7171.

AIR QUALITY MONITORING LOG

Project Number: _____ Sheet ____ of ____

Project Name: _____ Date: _____

Monitoring Technician: _____ Project Location: _____

Monitoring Criteria: _____

Monitoring Instrument(s): _____

CALIBRATION LOG:

Date/Method: _____

Calibration Gas: _____

Instrument Response: _____ _____ _____ _____ _____ _____

Excavation Designation	Time	Results (ppm)		Notes
		3-inches Above Excavation	Breathing Space	

ENGLAND & ASSOCIATES

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
RULE 1166 SOIL MONITORING RECORDS

SITE INFORMATION

Owner: _____

Address: _____

City: _____

Zip Code: _____

Date of Excavation: _____

MONITORING INFORMATION

Company: ENGLAND & ASSOCIATES

Name of Person: _____

Monitor Mfg.: Thermo Environmental Instruments

Model No.: 580A

Calibration Gas: Isobutylene 100 ppm

TIME	VOC CONCENTRATION (ppmV)		COMMENTS
	EACH LOAD AS REMOVED	STOCKPILE SURFACE	

ENGLAND & ASSOCIATES

Specifications

Measurement:

Technique:	Photoionization Detection of most organic vapors and some inorganic gases are possible — See OSHA Chart.
Ranges:	Digital Readout (LCD) — Auto Ranging 0-200 ppm (resolution to 0.1 ppm) 200-2000 ppm (resolution to 1.0 ppm)
Minimum Detectable:	0.1 ppm benzene in air matrix.
Sensitivity:	0.1 ppm benzene on 0-200 ppm scale.
System Time Constant:	2.0 sec. at 400 ml/min. sample flow
Sampling Rate:	Nominal Flow 400 ml/min.
Sample Conditioning:	Changeable ten micron filter on inlet.

Power Requirements:

Battery:	Internally rechargeable (external charger provided with unit).
Service Life:	8 hours per internal battery charge, operates from charger indefinitely.
Charger Requirements:	115/220 VAC, 60/50 Hz, 4 watts maximum.

Controls, Panel:

Readout:	Two line alphanumeric display with bargraph.
Keypad:	Seven Touch Pads : PWR, MODE, RESET, LIGHT, +, -, SPKR.

Other Features:

Audible Alarm:	80 db audible alarm mounted on front panel.
Earphone:	For operation in noisy environment.

Physical

Case Size:	6.75" x 5.75" x 10.0" (HWD).
Weight:	6.0 lbs.

Communication: RS-232 port.

Available Options

- Intrinsically Safe (Model 580S) OVM
- Carrying case
- IBM-PC and compatible Communications Software
- Calibration Kit
- Dilution Probe
- Headspace Analysis Cap
- Water Trap

For Price and Delivery Information, Contact:

Thermo Environmental Instruments Inc.

Thermo Electron (U.K.) Ltd., Analytical Division, 830 Birchwood Blvd., Warrington, Cheshire, WA3 7QZ, ENGLAND / Telephone 0925 / 81 36 00

Thermo Instrument Systems GMBH, Martenerstrasse 539, 4600 Dortmund 70, WEST GERMANY / Telephone 231 / 6170 78

Thermo Instrument Systems BV, Heerbaan 220, 4817 Breda, HOLLAND / Telephone: 76 / 713717

8 West Forge Parkway
Franklin, MA 02038

(508) 520-0430
Telex: 200205 THEMO UR

FAX: (508) 520-1460

Features:

Lightweight and Compact
Weighs under 18 ounces and can provide both immediate measurement or continuous monitoring for 10 hours on a single charge. Separate rechargeable batteries for pump and display that are field replaceable without losing stored data.

Interchangeable Lamps
Supplied with electrodeless 10.2 eV discharge lamp. Interchangeable 11.7 eV lamps for extended sensitivity and chlorinated compound monitoring.

Unattended Sampling
Toxics monitoring for confined space and perimeter monitoring for permit compliance applications. Dedicated "memory-less" lead-acid battery. Pump runs for full shift on a single charge

Convenient Data Download
PC compatible control software for Windows™ environment to download stored data through parallel printer port for manipulation, graphics display, or permanent record storage.

Programmable Alarm Thresholds
Simultaneously updates TWA, STEL, and Peak exposures. Activates both audio buzzer and flashing LED visual display when alarm threshold levels are exceeded.

Leak Detection Mode Software Option
Records up to 100 single readings with real time measurement display plus variable audio signal based upon selected detection limit.

Hazardous Site Survey Mode Software Option
Records readings with site number and alarm setting

MiniRAE Ordering Information (see specifications)

PGM-75K/IH:	Basic Kit with Industrial Hygiene Mode Software
PGM-75K/LD:	Basic Kit with Leak Detection Mode Software
PGM-75K/SV:	Basic Kit with Survey Mode Software
Accessories:	Backup battery 6V, 500 mAh
	Electrodeless discharge lamp 10.2 eV
	Electrodeless discharge lamp 11.7 eV
	50 ppm isobutylene cal gas bottle
	100 ppm isobutylene cal gas bottle
	Remote access probe assembly (8 ft.)
	Backup pump assembly
	Automotive adapter cable 12V DC
	Analog interface adapter
	Audio interface adapter
	Gas outlet port adapter
	Replacement 2-5 micron filter pack (5)

Specifications

Size:	7.1"L x 2.7"W x 1.8"H (18.0 cm x 6.9 cm x 4.6 cm)
Weight:	18 ounces with batteries (0.510 kg)
Detector:	Interchangeable 10.2 eV electrodeless ultraviolet discharge lamp with Teflon™/stainless steel chamber
Operating hours:	10 hours continuous
Battery:	Two rechargeable 6V, 500 mAh sealed lead-acid. Field replaceable.
Battery Charging:	Built-in charger with LED status indicators
Gas Sampling:	Piston pump with >400 ml/min intake flow rate
Gas Inlet Probe:	6" flexible, 5/32" diameter
Gas Outlet Connection:	5/32" barb fitting
Attachment:	Pocket clip/wrist strap
Display:	7 digit LCD with LED backlight
Analog output:	0 to 1 V
Range:	0 to 999.9 ppm with 0.1 ppm resolution
Accuracy:	±2 ppm or ±10% of reading calibrated to 100 ppm isobutylene equivalent
Response time:	< 3 sec. to 50% point when exposed to 100 ppm isobutylene
Key pads:	Two operation keys, two programming keys and ON/OFF key
Protection:	Password protected calibration settings, alarm limits and current data
Alarm setting:	Separate alarm limit settings for TWA, STEL, and Peak
Alarm:	95 dB buzzer and flashing red LED to indicate exceeded preset limits, low battery, or lamp failure
Calibration:	Two point field calibration for zero and standard reference gas
Temperature:	32° F to 104° F (0° C to 40° C)
Humidity:	0% to 100% relative humidity (non-condensing)

MiniRAE PID Kit PGM-75K:

- Professional PID unit with 10.2 eV lamp
- 110V AC charging adapter
- Calibration adapter with flow controller
- 100 ppm isobutylene cal gas bottle (1)
- Organic vapor zeroing kit
- 2-5 micron filter pack (5)
- Computer interface adapter
- Hard transport case
- Operation and Maintenance Manual
- Replacement Parts List

1165 O Bordeaux Drive, Sunnyvale California 94089
(408) 745 • 7595 fax (408) 745 • 7590

Appendix B

B.1 INTRODUCTION

This document comprises the Construction Quality Assurance/Quality Control (QA/QC) Plan for Phase 2 remedial action construction at the Pacific Coast Pipeline (PCPL) Superfund Site in Fillmore, California. This document is prepared in accordance with the EPA Superfund Remedial Design and Remedial Action Handbook Guidance Document (OSWER, August 1993). A brief discussion of the background and planned remediation construction activities are included in this report. For more detailed descriptions, refer to the *Final Phase 2 Design Report* dated December 16, 1994 or the *Final Phase 2 Remedial Action Work Plan* dated May 2, 1995.

B.1.1 Background

The PCPL site is located at 67 East Telegraph Road on the eastern edge of the City of Fillmore, California. The site, which covers approximately 20 acres, was formerly an oil refinery which has since been dismantled. In 1928, Texaco purchased the existing refinery and operated it until the early 1950s. An old site map indicates that Richfield Oil Co. operated a gas separator plant on a portion of the site in the early 1950s. Since closure of the refinery, a portion of the site has been used by Texaco as a pumping station for crude oil produced from local oil fields.

While the refinery was in operation, miscellaneous hydrocarbon wastes believed to consist primarily of tank bottoms, filter cake, and sludge were disposed of onsite in a large pit, referred to as the Main Waste Pit and in several smaller pits located throughout the property.

B.1.2 Previous Investigations

In 1980, Texaco submitted a proposal to the California Regional Water Quality Control Board (RWQCB) - Los Angeles Region to remove waste material from the pits and apply it to site roads. Chemical evaluation of the waste indicated that portions of the wastes were hazardous and additional investigations were requested. From 1983 through 1989, Texaco voluntarily conducted ground water and soil assessment programs under the direction of the California Department of Health Services (DOHS) and the RWQCB. In 1986, Texaco excavated and removed 38,000 tons of waste and contaminated soil from the former Main Waste Pit and other small waste disposal areas.

In June 1989, the site was added to the United States Environmental Protection Agency (EPA) National Priorities List (NPL). Between 1990 and 1992, a Remedial Investigation/ Feasibility Study (RI/FS) was conducted by Texaco to delineate the nature and extent of contamination in the soil and ground water at the site and develop a remedial plan. The

RI/FS reports (ENSR, 1990-1992) identified total petroleum hydrocarbons (TPH) and benzene, toluene, ethyl benzene, and xylenes (BTEX) in ground water at various locations. Moreover, concentrations of TPH were detected in the vadose zone, but very little evidence of BTEX was found in the vadose zone. The RI/FS concluded that ground water pump-and-treat coupled with limited soil vapor extraction (SVE) in the vadose zone were the appropriate remediation technologies for the site.

In February 1992, the EPA issued a Proposed (Cleanup) Plan outlining the remedial action alternatives for the site and a public hearing was held in March 1992 to obtain comments from interested parties on the plan. The EPA *Record of Decision* (ROD)(USEPA, 1992a) was then issued in March 1992 followed by the *Statement of Work* (SOW)(USEPA, 1992b) in August 1992 outlining the work required for designing and implementing remedial activities at the site. A *Preliminary Design Workplan* (PDW)(ESI, 1992) was submitted and approved by the EPA in December 1992.

The *Consent Decree* (CD) (USEPA, 1993) was entered in August 1993. During CD negotiations, it was agreed that the remedial design would be completed in phases. The *Phase 1 Design Report* (ESI, 1993) was completed in September 1993 and the Phase 1 remedial program was implemented in December 1993.

Based on the results of the Phase 1 remedial efforts, modeling, and testing, the *Final Phase 2 Design Report* (E&A, 1994) and the *Final Phase 2 Remedial Action Work Plan* (E&A 1995) were developed.

B.1.3 Site Remediation Remedy

B.1.3.1 Soil Vapor Extraction

The selected remedy described in the ROD calls for "Soil Vapor Extraction for those areas that threaten to contaminate ground water at levels above site cleanup standards..." Target zones for soil vapor extraction are shown in Figure 3-1 in the *Final Phase 2 Remedial Action Work Plan*. The southern target area and the northern half of the northern target area are in the lower vadose zone. The southern half of the northern target area is in the upper vadose zone, but, there appears to be a vertical pathway near wells MW-25D (abandoned) and MW-47D. Therefore, this portion of the upper zone is included as a target area. Ground water generally flows to the west- northwest, so relatively low concentrations of benzene in ground water wells MW-37S and MW-38S indicate that there is no major migration pathway from the upper zone to the lower zone in the eastern portion of the vadose zone benzene plumes. Therefore, the vicinity of well AEW-1 is considered a secondary target area.

Wells selected to address these target areas include PEW-1, EW-4, PEW-3, and AEW-1. Several other wells are already connected to the vapor extraction piping system near the ground water treatment system (GWTS). These include SBD-2 and EW-1 in the southern target area and MW-28S in the northern area. These wells are not designated as target wells, but one or more may be used if subsequent monitoring indicates the need.

Initially, a King, Buck/Hasstech (KB/H) thermal oxidizer unit capable of handling up to 150 scfm total gas and 80 lb/hr hydrocarbons will be used for extraction from well PEW-1. A larger unit capable of handling 1,000 scfm total gas, but lower hydrocarbon concentrations than the KB/H unit, will replace the smaller unit when it becomes available and after PEW-1 concentrations have decreased considerably and well EW-4 water levels have dropped sufficiently to allow extraction. Vapor extraction unit are planned to be located near the ground water treatment system for ease of connection to the electric power supply.

The vapor extraction system operation will continue until monitoring results indicate the goals have been met, or that benzene vapors are entering the vadose zone from natural sources, or other authorization is given by the EPA.

B.1.3.2 Ground Water Treatment

The selected remedy in the ROD calls for ". . . a ground water extraction and treatment system to treat extracted ground water to levels that meet the cleanup standard . . ." and, "Ground water monitoring to demonstrate that the extraction system is effectively capturing the contaminant plume and ultimately, to demonstrate achievement of the cleanup standards throughout the aquifer . . ." The approach to ground water remediation is to (1) extract from wells located such that the hot spots are within the capture zones, and (2) rely on natural forces to degrade benzene to its cleanup standard in areas beyond the capture zones. Quarterly monitoring will be used to evaluate effectiveness of the capture zones and reduction of benzene concentrations throughout the area.

Ground water target areas are shown on Figure 3-3 in the *Final Phase 2 Remedial Action Work Plan*. Selection of the north and south target areas are based primarily on high benzene concentrations in the ground water, but are also influenced by areas of high benzene concentrations in the soil and soil gas. The central target area will be included only if elevated benzene concentrations are encountered in ground water after installation of well EW-7. Wells for ground water extraction were selected to address the identified target areas based on results of ground water pumping tests and ground water modeling. These are wells MW-28S, EW-2 and EW-6 for the northern target area; wells EW-1, EW-4 and EW-5 for the southern target area; and well EW-7 for the central target area.

There currently are no plans for the treatment of perched water since most of the perched wells are normally either dry or contain little water. If ground water reappears in the perched ground water wells and remains in the wells for extended periods, extraction of perched water may be incorporated into the ground water treatment system. Perched ground water would then be treated above ground in the same manner as ground water from the deeper aquifer.

The chosen remedial method for ground water is extraction using submersible pumps and activated carbon treatment. Except for treatment capacity, the design for the Phase 2 remediation system is similar to that for Phase 1. The system consists of six (or seven, if EW-7 is used for extraction) ground water extraction wells using electric submersible pumps for extraction, and two activated carbon vessels installed in series for ground water treatment.

Experience shows that solids continue to precipitate from extracted ground water throughout the treatment system. The existing bag filter housing will be used with extended life filters to minimize solids entering the carbon vessels. These may be supplemented or replaced with additional bag filters if the filter bag replacement frequency becomes unacceptable at higher flow rates. In order to remove suspended solids that may accumulate on the top layers of the granular activated carbon (GAC) vessels, the vessels will be backwashed periodically. This will be performed by reversing the flow of the lead GAC vessel and backwashing with clean water at 300 gpm for 30 minutes. The process will require a portable high flow transfer pump powered by an internal combustion (IC) engine, two 10,000-gallon polytanks (clean and dirty water), and 4-inch diameter flexible pipe with cam-lock fittings.

LNAPL has been observed in extraction wells EW-1 and EW-4 and may appear in the proposed extraction wells. In wells where LNAPL is detected, LNAPL absorbers will be installed. In addition, pump shutoff sensors will be installed at sufficient distances above the pump to prevent the introduction of LNAPL into the pumps and the GWTS. As a secondary check for LNAPL, all pumping wells that may have LNAPL will be monitored weekly for the presence of LNAPL. In the event that LNAPL entrainment is apparent, extracted ground water from wells with significant LNAPL will be directed to the holding tank which will act as a oil/water separator. The water will then flow to the surge tank and be directed through the bag filters and treated through the carbon. LNAPL retained in the holding tank will be removed and properly disposed of. For operational flexibility, each individual influent well line will be manifolded to pump either directly to the surge tank and holding tank or the GAC vessels.

The necessary modifications to the Phase 1 system will consist of installing additional piping to new and existing extraction wells, upgrading the piping in the equipment area for higher

flow capacity, installing additional extraction wells, and upgrading the electrical controls for additional pumps. Components of the Phase 1 system will be incorporated into the Phase 2 system whenever possible, although modification may be required for some components.

The piping will be modified to allow injection of scale inhibiting chemicals into the influent and to provide gas blanketing of the tanks with nitrogen or carbon dioxide to minimize oxygen contact with the water. Chemical injection and gas blanketing will then be implemented if necessary to limit solids precipitation.

The length of system operation will depend on how quickly cleanup goals are met or alternate closure is approved by the EPA. If operating data show inadequacies in the capture zone, system capacities, etc., the system may require modification.

B.2 CONSTRUCTION QUALITY ASSURANCE (QA) PLAN

A Construction Quality Assurance (QA) Plan for the Pacific Coast Pipeline (PCPL) Superfund site has been prepared for the Phase 2 remedial construction in accordance with the EPA Superfund Remedial Design and Remedial Action Handbook guidance document (OSWER, August 1993). The Construction QA Plan outlines the procedures to be used to assure that field construction activities are provided in a reliable manner and contains the following elements:

- Personnel responsibility and authority;
- Construction Quality Assurance personnel qualifications;
- Inspection activities; and
- Reporting documentation.

B.2.1 Personnel Responsibility and Authority

The responsibility and authority of all parties and key personnel involved in the construction of the components of the remedial action are presented in the Project Team Organizational Chart, Figure 7-1 in the Remedial Action Work Plan. Implementation of the Phase 2 remedial construction will be managed by Texaco Environmental Services (TES). Mr. Mark Passarini of TES will be involved in the day-to-day management of the Phase 2 remedial construction.

As a supervising contractor, England & Associates (E&A) will oversee all phases of the implementation of the Phase 2 construction. Mr. Jinghui Niu of E&A will serve as the

construction QA/QC officer. Mr. Niu will direct each phase of the remediation system construction, coordinate construction activities with all parties, and assist the construction project manager with all phases of construction management. Mr. Richard Solomon and Bob Dadfar of E&A will serve as field quality assurance officers conducting or supervising the quality assurance inspections and testing during the remedial construction.

England & Associates will provide construction services for the Phase 2 remedial construction. Qualified contractors specializing on specific tasks will be selected in accordance with the guidance set-forth in Section 8.1 - Contractor Selection, in the Remedial Action Work Plan. The selected construction contractors will provide specialized construction services following the Remedial Action Work Plan and under the supervision of TES and E&A. Once selected, the contractors shall designate a QA/QC officer for assuring the quality of the remedial construction.

B.2.2 Personnel Qualifications

The following table lists project personnel and their respective qualifications. Personnel qualifications are based on education, years of experience, professional registrations and relevant project experience.

Personnel	Affiliation	Education (Discipline)	Yrs. Experience	Professional Registrations
Jinghui Niu	England & Associates	M.S. Civil Engr.	10	P.E.
Richard Solomon	England & Associates	B.S. Mechanical Engr	5	P.E.
Bob Dadfar	England & Associates	B.S. Mechanical Engr	4	--

The resumes of the above listed personnel and other key personnel are included in Appendix E in the *Final Phase 2 Remedial Action Work Plan*.

B.2.3 Inspections

Following the completion of each phase of the remedial construction, an inspection will be conducted to verify the operational capabilities of the system components. Inspections will be performed for work completed involving well construction, system piping and trenching, the vapor extraction system and the ground water treatment system.

Following the drilling and installation of the additional vapor and ground water extraction wells, existing and newly-installed wells will be piped to the remediation system. All subsurface pipe and conduit shall be installed with a minimum burial of 24 inches. Field inspection of all piping and pipe connections will be conducted prior to the backfilling and compaction to ensure no leaks are present.

As indicated in the Final Phase 2 Design Report, vapor extraction units equivalent to three VR Systems Model V4 will be used for site remediation. Once the vapor extraction system has been constructed and is operational, individual system components will be inspected and checked according to the system manufacturer specifications.

Upon completion of the remediation system construction, each newly installed ground water well will undergo an aquifer pumping test to establish the optimum pumping rate and capture zones for that well. Vapor extraction wells will be tested at various extraction rates and influent vapor concentrations to establish optimum benzene removal rates. The following table summarizes the Phase 2 construction QA inspections.

Table B-1
Summary of Construction QA Inspections

Inspection/Test Item	Schedule	Criteria and Procedures	Acceptance Criteria
Well Construction Inspection	During well construction	Well seal inspection will be conducted by a Registered Inspector as directed by the Ventura County Public Works Agency Water Resources Division	Acceptance criteria are specified in the well permit
Trenching Inspection	During trenching	Trenching dimensions and locations will be checked in accordance with design drawings and specifications	Meeting requirements in design drawings and specifications
Piping and Fittings Inspection	During pipe installation	Piping material, size, and installation workmanship will be inspected	Meeting requirements in design drawings and specifications
Vapor Extraction System Inspection	Within 7 days of system delivery to the site	System components will be inspected in accordance with the approved manufacturer specifications for its accuracy and workmanship	Meeting requirements in approved manufacturer specifications
Ground Water Treatment System Inspection: Newly Installed Well Pump	Prior to pump installation	Pumps will be inspected in accordance with the approved manufacturer specifications for their accuracy and workmanship	Meeting requirements in approved manufacturer specifications
Ground Water Treatment System Inspection: Treatment System Components	Prior to installation	System components will be inspected in accordance with the design drawings and specifications for their accuracy and workmanship	Meeting requirements in the design drawings and specifications

Inspection/Test Item	Schedule	Criteria and Procedures	Acceptance Criteria
Ground Water Treatment System Inspection: Electrical Control System	During Installation	Components will be inspected in accordance with the design drawings and specifications for their accuracy and workmanship	Meeting requirements in the design drawings and specifications

B.2.4 Documentation

All field activities and collected data related to the construction quality assurance will be documented and maintained for the duration of the site remediation. These records include the following items:

- *Daily Field Activity Report Form*: Summarizes daily site field activities and includes information pertaining to the location and description of activities and the equipment used on the project (attached);

- *Equipment Installation Checklist*: Any equipment installation checklist provided by the equipment manufacturer or supplier will be used during installation activities. Records of these checklists will be maintained together with the Daily Field Activity Reports and filed for potential inspection;

- *Construction QA Inspection Checklist*: The inspection checklist will be used during all field inspections related to the Phase 2 construction. Records of these checklists will be maintained together with the Daily Field Activity Reports and filed for future reference (attached);

- *Problem Identification and Corrective Measure Report*: If any problem be identified during the remedial construction period, evaluation will be performed for assessing the problem and selecting a corrective method. Any proposed corrective measure that addresses material noncompliance with drawing and specifications will be submitted to EPA for approval. A report documenting the details of problem identification and EPA approved corrective measures will be prepared and submitted to the EPA within 60 days of the completion of such corrective actions; and

- *Construction Completion Report:* Upon completion of the field construction of the Phase 2 remediation system, a construction completion report will be prepared and submitted to the EPA. This report will contain details of system construction, testing results, and all necessary field documentation. Any modifications to the design will be documented and presented in this report. A set of as-built drawings will also be included in the report.

B.3 CONSTRUCTION QUALITY CONTROL (QC) PLAN

The Construction Quality Control (QC) Plan for the Pacific Coast Pipeline (PCPL) Superfund site has been prepared for the Phase 2 remedial construction in accordance with the EPA Superfund Remedial Design and Remedial Action Handbook guidance document (OSWER, August 1993). The Construction QC Plan describes the QC procedures to be used during the course of remedial construction activities and includes the description of the following:

- QC organization;
- QC testing; and
- documentation and reporting.

The objectives of this Construction QC Plan are to assure quality of field construction activities and to prevent or minimize potential problems related to system operation.

B.3.1 Construction Quality Control Organization

Responsibility and authority for construction quality control is the same as described in construction quality assurance (Section B.2.1).

B.3.2 Quality Control Testing

Following the completion of each phase of the remedial construction, an inspection will be conducted to verify the operational capabilities of the system components. Component testing will also be performed to ensure that all equipment specifications are met.

Following the drilling and installation of the additional vapor and ground water extraction wells, existing and newly-installed wells will be piped to the remediation system. To ensure no fluid leaks are present in the piping prior to backfilling and compaction, all newly-installed piping will be pressure tested at three times the working pressure for a minimum of one hour.

As indicated in the Final Phase 2 Design Report, vapor extraction units equivalent to three VR Systems Model V4 will be used remediate the vadose zone soils beneath the site. A gas line may be installed to the system area to provide auxiliary fuel required for system operation. Based on a cost comparison, natural gas may be used instead of propane. Integrity pressure testing of the fuel gas line will be performed to ensure no gas leaks are present.

Once the vapor extraction system has been constructed and is operational, soil gas samples will be collected at the extraction wellhead, system influent and effluent to ensure manufacturer specified hydrocarbon destruction efficiencies are achieved. Should the results of soil gas samples indicate that the vapor extraction systems are not performing at their optimum status, necessary system adjustments will be made following manufacturer's instructions. If necessary, a manufacturer representative will be scheduled to perform the treatment system optimization tasks at the site.

Upon completion of the remediation system construction for the ground water treatment system, system components will be tested, including flow meters, pressure gages, telemetry system, and automatic control systems. Testing of automatic control system will be performed at normal operational conditions as well as special conditions including flooding, discharge line clogging, bag filter clogging, and well and transfer pump failure. Should the component testing indicate the existence of any potential operational problems for the ground water treatment system, necessary system adjustments or modifications will be made. The following table summarizes the Phase 2 construction QC testing.

Table B-2
Summary of Construction QC Testing

Inspection/Test Item	Schedule	Criteria and Procedures	Acceptance Criteria
Aquifer Testing for Newly Installed Pumping Wells	Within 3 months following well installation	New extraction wells will be tested for their sustainable flow rate	Not applicable
Vapor Extraction Testing for Newly Installed Vapor Extraction Wells	Within 3 months following well installation	• Hydrocarbon vapor concentrations; • Vapor flow; • wellhead vacuum.	Not applicable
Pressure Testing for Fluid Return Piping	Within 7 days following completion of pipe installation	Pressure testing will be conducted at the following conditions: • Testing pressure: 50 psi; • Duration: 60 minutes • A certified pressure gauge in accordance with ANSI B40.1 Grade A Standard will be used.	Less than 2% pressure reduction
Pressure Testing for Vapor Extraction Piping	Within 7 days following completion of pipe installation	Pressure testing will be conducted at the following conditions: • Testing pressure: 50 psi; • Duration: 60 minutes • A certified pressure gauge in accordance with ANSI B40.1 Grade A Standard will be used.	Less than 2% pressure reduction

Inspection/Test Item	Schedule	Criteria and Procedures	Acceptance Criteria
Pressure Testing for Vapor Extraction Supplemental Fuel Piping	Within 7 days following completion of pipe installation	Pressure testing will be conducted at the following conditions: • Testing pressure: 10 psi; • Duration: 60 minutes • A certified pressure gauge in accordance with ANSI B40.1 Grade A Standard will be used.	Less than 2% pressure reduction
Ground Water Treatment System Components Testing: Flow Meters	Within one month following installation	Flow meters will be volume tested	Greater than 98% accuracy
Ground Water Treatment System Components Testing: Pressure Gauges	Within one month following installation	Pressure gauges will be tested using certified gauges in accordance with ANSI B40.1 Grade A Standard	Greater than 98% accuracy
Ground Water Treatment System Startup Testing: Control System	Within one month following completion of system installation	Control system will be tested at following operating conditions: • normal operation • maximum flow rate • surge tank over flow • treatment compound flooding • discharge line clogging • bag filter clogging	Successful operation at all testing conditions
Ground Water Treatment System Startup Testing: Telemetry System	Within one month following completion of system installation	Telemetry system will be tested transmitting information to main office at following operating conditions: • normal operation • system shut down	Successful transmitting correct information at all operating conditions
Vapor Extraction System Source Testing	Within one month following completion of system installation	Source testing will be conducted verify hydrocarbon destruction efficiency in accordance with VCAPCD guidelines	System specific in accordance with VCAPCD permitting requirements

All testing equipment will either be manufacturer calibrated and certified or field calibrated.

B.3.3 Documentation and Reporting

All field activities and collected data related to the construction quality control will be documented and maintained for the duration of the site remediation. These records include the following items:

- *Daily Field Activity Report Form*: Summarizes daily site field activities and includes information pertaining to the location and description of activities and the equipment used on the project (attached);

- *Equipment Installation Checklist*: Any equipment installation checklist provided by the equipment manufacturer or supplier will be used during installation activities. Records of these checklists will be maintained together with the Daily Field Activity Reports and filed for potential inspection;

- *Construction QC Testing Checklist*: The testing checklist will be used during all quality control testing related to the Phase 2 construction. Records of these checklists will be maintained together with the Daily Field Activity Reports and filed for future reference (attached);

- *Summary Reports of QC Testing*: Upon completion of QC testing, a summary report will be prepared documenting results of all QC testings and any adjustment and modifications made to the vapor extraction and ground water treatment systems. All laboratory analytical reports generated during the QC testing will also be included in this report;

- *Problem Identification and Corrective Measure Report*: If any problem be identified during the remedial construction period, evaluation will be performed for assessing the problem and selecting a corrective method. Any proposed corrective measure that addresses material noncompliance with drawing and specifications will be submitted to EPA for approval. A report documenting the details of problem identification and EPA approved corrective measures will be prepared and submitted to the EPA within 60 days of the completion of such corrective actions; and

- *Construction Completion Report:* Upon completion of the field construction of the Phase 2 remediation system, a construction completion report will be prepared and submitted to the EPA. This report will contain details of system construction, testing results, and all necessary field documentation. Any modifications to the design will be documented and presented in this report. A set of as-built drawings will also be included in the report. In addition data for the first three weeks of operation will be included in the report.

B.4 REFERENCE

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DAILY FIELD ACTIVITY REPORT

Client Name:_____ Project No.:_____

Project Name:_____ Date:_____

Contractor:_____ Arrival Time:_____

Weather:_____ Departure Time:_____

Time Breakdown: Drive_____ Work_____ Stand-by_____

Location And Description Of Activities:_____

Equipment Used On Project:_____

Activity Summary And General Remarks:_____

Technician Signature:_____ Date:_____

ENGLAND & ASSOCIATES

15375 Barranca Parkway F-106 - Irvine, California 92718 - (714)453-8085 - Fax (714)453-0733

Distribution: White - Project File, Yellow - Project Manager, Pink - Field File, Canary - Contractor

CONSTRUCTION QUALITY ASSURANCE INSPECTION CHECKLIST
PCPL Superfund Site
Fillmore, California

Date:_____ **Inspector:**_____ **Project No.:**_____

Inspection Items:
Inspection Method:
Equipment Used:
Acceptance Criteria:
Inspection Results:
Comments:

Inspector's Signature:_____

ENGLAND &
ASSOCIATES

CONSTRUCTION QUALITY CONTROL TESTING CHECKLIST
PCPL Superfund Site
Fillmore, California

Date:_____ **Tested By:**_____ **Project No.:**_____

Testing Items:
Testing Method:
Equipment Used:
Acceptance Criteria:
Testing Results:
Comments:

Signature:_____

ENGLAND &
ASSOCIATES

Appendix C

APPENDIX C - GAC VESSEL BACKWASH PROCEDURE

1. Treated discharge water is diverted to the clean water backwash tank by attaching the backwash hose to the cam lock fitting above valve #15 and connecting to the top of the clean water backwash tank. The system is in normal series operation.

2. Valve #15 is opened and Valve #16 is closed in that order.

3. When the supply water backwash tank has approximately 9,000 gallons, valve #16 is opened and valve #15 is closed, in that order. This process is completed while the system is in normal operation. The water in this tank will be used to backwash the "A" GAC vessel.

4. The system is then shut down and the valves on the carbon manifold are set for backwash as shown on the manifold schedule on the attached drawing C-1.

5. The supply water hose is connected from the bottom discharge connection of the supply water tank to the inlet of the backwash pump. From the outlet of the backwash pump, the supply water hose is connected to the cam lock fitting attached to valve #13.

6. The backwash hose is then attached to cam lock fitting below valve #11 and connected to the top of "dirty" water backwash water tank.

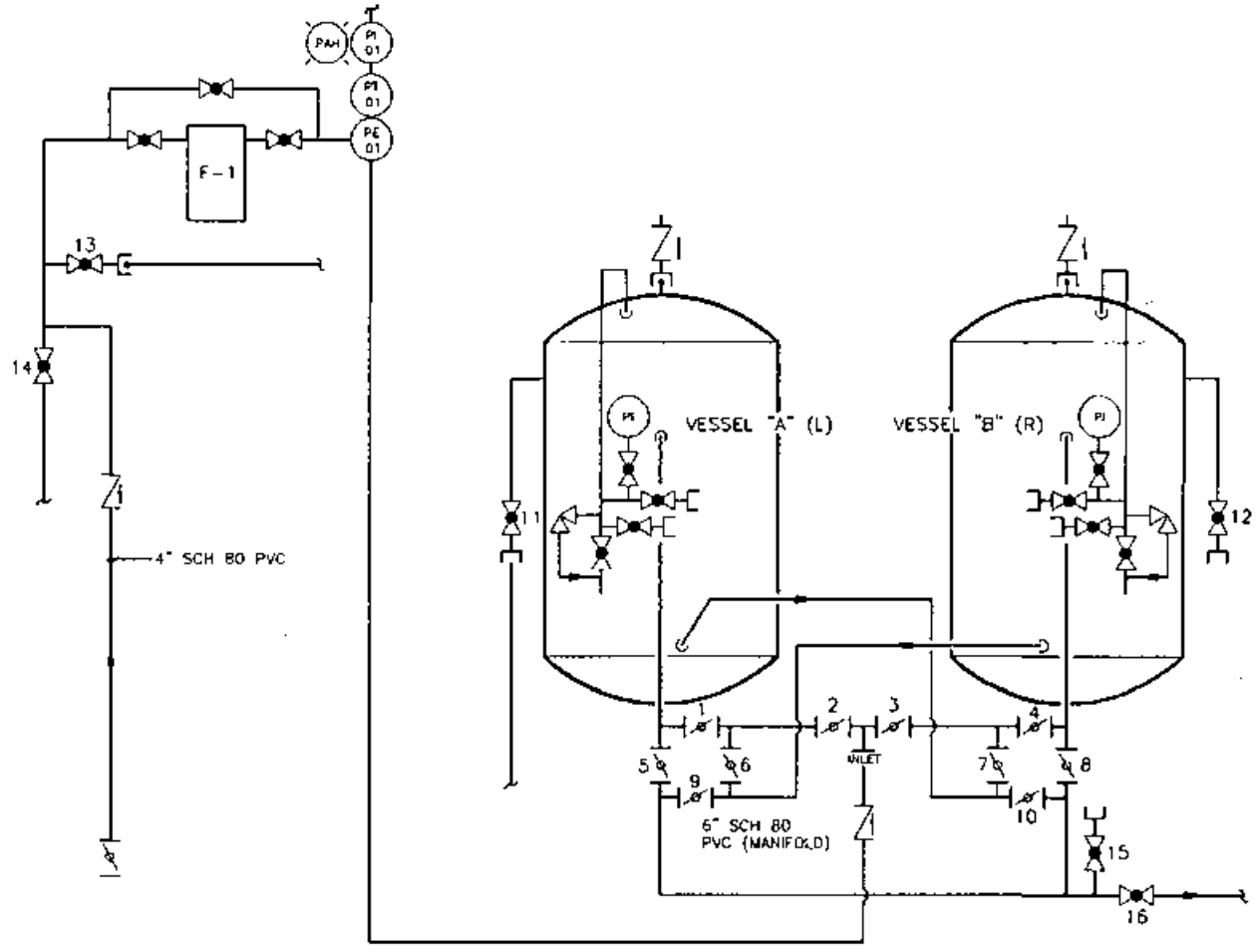
7. The backwash pump is started. A gate valve installed on the outlet of the pump is used to control the flow rate at approximately 300 gpm. An inline flow meter is used to verify the flow rate.

8. After 30 minutes, the pump is shut off and the system is returned to normal operation. The valves are set for normal series operation.

9. Pressure readings are taken to verify the effectiveness of the backwash treatment. If the pressure drop is high across the "B" vessel, this vessel should also be backwashed.

10. The solids are allowed to settle to the bottom of the used water tank. The decanted water is then pumped from the top of the tank into the surge tank or 4,000 gallon tank to be treated in the GWTS.

11. The settled solids are removed by vacuum truck for disposal or temporarily stored on site.



GAC VESSEL MANIFOLD SCHEDULE

OPERATION TYPE	VALVE NUMBER															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SERIES FLOW "A" THEN "B"	O	O	C	O	C	C	O	C	O	C	C	C	C	O	C	O
SERIES FLOW "B" THEN "A"	O	C	O	O	C	O	C	C	C	O	C	C	C	O	C	O
BACKWASH "A" ONLY	C	C	O	C	C	C	O	C	C	C	O	C	O	C	C	C
BACKWASH "B" ONLY	C	O	C	C	C	O	C	C	C	C	C	O	O	C	C	C

FIGURE C-1

GAC VESSEL BACKWASH SCHEMATIC

UNOCAL SERVICE STATION 0326
BREA, CALIFORNIA

PREPARED FOR

UNOCAL CORPORATION
BREA, CALIFORNIA

ENGLAND & ASSOCIATES

Appendix D

DAILY FIELD ACTIVITY REPORT

Client Name:_____ Project No.:_____

Project Name:_____ Date:_____

Contractor:_____ Arrival Time:_____

Weather:_____ Departure Time:_____

Time Breakdown: Drive_____ Work_____ Stand-by_____

Location And Description Of Activities:_____

Equipment Used On Project:_____

Activity Summary And General Remarks:_____

Technician Signature:_____ Date:_____

ENGLAND & ASSOCIATES

15375 Barranca Parkway F-106 - Irvine, California 92718 - (714)453-8085 - Fax (714)453-0733

Distribution: White - Project File, Yellow - Project Manager, Pink - Field File, Canary - Contractor

THERMAL/CATALYTIC OXIDIZER VAPOR EXTRACTION SYSTEM DATA SHEET
PCPL, FILLMORE, CALIFORNIA

Date:	Personnel:	Arrival Status (on/off):
Time of Day:	Destruction Mode (Thermal/Catalytic):	Departure Status (on/off):

PROCESS INLET VAPOR FLOW STREAM

Vapor Source	Time (24-hr)	VOC total (ppm)	Methane (ppm)	ROC (ppm)	VAC (in. wc)	Flow (scfm)	Syst. Temp. (°F)	COMMENTS
Initial Readings:								
Well Influent *								
System Influent								
System Effluent								
ID of Wells On-line:								ID of Wells off-line:
Individual Extraction Wells:								
Final Readings:								
Well Influent								
System Influent								
System Effluent								
ID of Wells On-line:								ID of Wells off-line:

SYSTEM INFORMATION

System Operating Hours:	OVM Type:	Calibration Gas:
Blower RPM:	Amps:	Vapor samples collected ☐ Yes ☐ No
Knockout water total (gal):	Propane Tank (%):	Fuel Consumption (ft^3/hr):

MAINTENANCE PERFORMED:

- ☐ Check blower oil
- ☐ Fill blower oil
- ☐ Lube blower
- ☐ Replace belts
- ☐ Check well gas air filter
- ☐ Replace well gas air filter
- ☐ Change chart paper
- ☐ Check dilution air filter
- ☐ Replace dilution air filter
- ☐ Check knockout drum
- ☐ Drain Knockout drum

Safety Systems Check: ☐ Hi-temp shutdown ☐ Low-temp shutdown ☐ Flame-out shutdown ☐ Low flow shutdown

Comments:

* Before dilution

Ground Water Treatment System Field Data Sheet, PCPL

Date: _____ Measured By: _____ Project No. _____

Time	Pressure Before Filter (psi)	Pressure After Filter (psi)	Pressure Between Vessels (psi)	Discharge Flow Rate (gpm)	Discharge Totalizer Reading (gal)	Comments
MW-28S EW-1 EW-2 EW-4 EW-5 EW-6 EW-7						
MW-28S EW-1 EW-2 EW-4 EW-5 EW-6 EW-7						
MW-28S EW-1 EW-2 EW-4 EW-5 EW-6 EW-7						
MW-28S EW-1 EW-2 EW-4 EW-5 EW-6 EW-7						

MONITORING WELL PURGE AND SAMPLE FORM

Page__of__

PROJECT NAME: PCPL - FILLMORE ___ PROJECT NO: 225-G01__

WELL NO:_____ TESTED BY:_____ DATE:_____

Measuring Point Description:_____

Static Water Depth (ft):_____ Sample Method:_____

Water Level Measurement Instrument:_____ Time Sampled:_____

Purge Method:_____ Depth to Water at Sampling:_____

Time Start Purge:_____Time End Purge:_____ Field Preservation:_____

Comments:_____

_____

_____

_____

_____

_____

Well Volume Calculation (fill in before purging)	Total Depth (ft)	-	Depth to Water (ft)	=	Water Column (ft)	x	Multiplier for Well Size			=	Volume (gal) (one well)
							2 inch casing	4 inch casing	6 inch casing		
							0.17	0.66	1.47		

Time							
Volume Purged (Gallons)							
Purge Rate (gpm)							
Temperature (F°)							
pH							
Specific Conductivity (µmhos/cm) x 1000							
Odor							
Color / Clearness							
Number of Casing Volumes Removed							

PCPL Superfund Site - Ground Water Depths - 2nd Quarter 1995

Measured By:_____

Well No.	Date	Time	Depth to Water (Feet)	1st Qtr 95 Depth to Water (Feet)	TOC Elev. (Feet MSL)	Measured Well Depth From TOC (Feet)	Perf. Depth (Feet)	Odor	LNAPL (Feet) or Sheen	Comments
MW-5S				157.93	572.89	160.64	155-165			
MW-16D				156.68	570.56	180.36	160-180			
MW-24D				116.47	533.50	165.27	143-163			
MW-23D				108.00	524.92	141.01	122-142			
MW-22D				104.92	522.29	159.85	150-160			
MW-22S				97.58	521.99	137.40	117-137			
MW-32S				87.04	513.12	124.67	105-125			
MW-46S				89.35	515.50	105.58	60-105			
MW-14S				77.08	504.38	91.11	70-90			
MW-21S				74.37	502.29	113.30	93-113			
MW-4S				69.54	498.17	103.16	95-105			
MW-13P				54.65	498.22	65.72	47-67			
MW-44S				66.38	492.63	106.88	57-107			
MW-34S				65.18	491.95	114.71	95-115			
MW-35S				59.61	484.73	98.44	80-97			
MW-36S				50.21	476.00	85.79	70-85			

Well No.	Date	Time	Depth to Water (Feet)	1st Qtr 95 Depth to Water (Feet)	TOC Elev. (Feet MSL)	Measured Well Depth From TOC (Feet)	Perf. Depth (Feet)	Odor	LNAPL (Feet) or Sheen	Comments
MW-6S				91.36	517.47	117.16	104-114			
MW-33D				95.88	514.48	150.26	140-150			
MW-31D				66.54	488.52	135.98	125-135			
MW-47D				79.88	501.43	137.47	120-135			
MW-25S				70.38	502.86	103.54	81-101			
MW-29D				71.95	494.59	131.27	120-130			
MW-29S				59.50	494.02	99.33	77-97			
PEW-3				43.46	502.78	46.10	10-45			
MW-11S				67.43	501.78	89.05	65-86.5			
MW-10P				42.85	502.61	49.64	38-48			
MW-38S				69.72	503.07	88.12	56-86			
PEW-2				41.46	502.21	45.10	20-45			
PEW-4				40.11	501.18	44.38	20-45			
PEW-5				40.73	501.60	44.35	20-45			
PEW-6				40.51	500.75	44.82	20-45			
MW-37S				76.41	507.80	95.17	65-95			
MW-27S				103.28	530.92	137.18	115-135			
MW-1S				104.47	532.72	117.88	104-114			

Well No.	Date	Time	Depth to Water (Feet)	1st Qtr 95 Depth to Water (Feet)	TOC Elev. (Feet MSL)	Measured Well Depth From TOC (Feet)	Perf. Depth (Feet)	Odor	LNAPL (Feet) or Sheen	Comments
SBC-1				38.93	483.69	45.33	25-45			
MW-12S				50.50	486.31	61.35	45-65			
MW-30S				46.96	482.83	87.17	65-85			
EW-5*				51.87	476.14	97.3	45-50			
MW-40S				43.23	476.58	63.18	32-62			
MW-18S				33.21	470.41	70.52	45-69			
MW-19S				44.41	478.76	77.17	58-78			
SBB-1				Dry	512.32	50.33	30-50			
PEW-1				72.63	513.85	74.27	49-74			
MW-28S*				89.42	511.69	117.69	98-118			
MW-42S				89.06	515.04	105.77	75-105			
MW-43S				72.45	499.50	106.04	65-105			
MW-41S				67.24	496.33	86.73	65-85			
MW-39S				53.17	485.78	74.49	53-73			
MW-45S				58.04	485.36	96.23	45-95			
MW-3S				79.26	508.66	87.40	72.5-82.5			
MW-26S				58.17	491.53	92.57	70-90			
EW-1				56.66	489.79	94.46	65-90			

Well No.	Date	Time	Depth to Water (Feet)	1st Qtr 95 Depth to Water (Feet)	TOC Elev. (Feet MSL)	Measured Well Depth From TOC (Feet)	Perf. Depth (Feet)	Odor	LNAPL (Feet) or Sheen	Comments
EW-4*				52.98	483.40	107.12	49.5-67.5			
SBE-1				46.89	484.17	50.37	25-50			
MW-8S				49.75	484.34	72.17	45-71			
MW-7S				49.78	484.11	57.33	63-73			
MW-2S				88.14	515.50	96.12	82.5-92.5			
EW-2				79.28	506.57	115.66	80.3-95.3			
SBD-2				Dry	488.83	49.09	15-50			
SBD-3				52.29	487.75	55.98	32-55			
P2				84.91	512.78	102.39	92-102			
MW-9S				48.47	483.60	69.90	48-68.5			
MW-20S				57.02	488.58	91.33	73-93			
MW-17S				57.86	490.97	75.45	53-73			
AEW-1				Dry	-	53.10	458-453			
EW-6**				-	-	-	-			
EW-7**				-	-	-	-			

* Pumping Wells
**Proposed Wells

PCPL Superfund Site - Ground Water Depths at Ultramar - 2nd Quarter 1995
May 9, 1995

Sampled By: _____

Well No.	Time	Depth to Water (Feet)	1st Qtr 95 Depth to Water (Feet)	TOC Elev. (Feet MSL)	Measured Well Depth From TOC (Feet)	Perf. Depth (Feet)	Odor	NAPL (feet) or Sheen	Amount Purged (Gallons)	Comments
ULTM-MW-2			40.34	475.65	44.49	36-61				
ULTM-MW-3			36.41	472.67	44.55	32-52				
ULTM-MW-5			36.54	474.48	44.45	36-51				
ULTM-MW-6			40.70	474.63	59.07	30-60				
ULTM-MW-7*			43.04	477.70	56.94	30-60				
ULTM-MW-8			33.84	468.03	57.52	30-60				
ULTM-MW-9*			42.85	474.20	77.52	60-80				
ULTM-MW-10			34.10	465.93	72.28	45-75				
ULTM-MW-11			37.04	470.68	71.58	40-75				
ULTM-MW-13			12.48	444.95	45.33	20-50				
ULTM-MW-14			20.56	447.02	47.88	18-50				

* Sample these wells for TPH (gasoline) and BTEX
If there is an NAPL in the well, measure thickness and try to collect a sample in a 40 ml vial.

PCPL Superfund Site - LNAPL Monitoring Form

Measured By: _____

Well No.	Date	Time	Depth to Water (Feet)	1st Qtr 95 Depth to Water (Feet)	TOC Elev. (Feet MSL)	Measured Well Depth (Feet) (From TOC)	Perf. Depth (Feet)	LNAPL (Feet) or Sheen	SoakEase™			Comments
									Size (inches)	Weight (lbs.)	Increase in Weight (lbs.)	
PUMPING WELLS - (WEEKLY)												
EW-1				56.66	489.79	94.46	65-90		2"			
EW-4				52.98	483.40	107.98	49.5-67.5		2"			
MONITORING WELLS - (MONTHLY)												
MW-9S				48.47	483.60	69.90	48-68.5		4"			
MW-17S				57.86	490.97	75.45	53-73		4"			
MW-20S				57.02	488.58	91.33	73-93		4"			
PEW-6				40.51	500.75	44.82	20-45		4"			
SBE-1				46.89	484.17	50.37	25-50		2"			

BAG FILTER CHECK (BI-WEEKLY) COMMENTS:

GENERAL COMMENTS:

CHAIN OF CUSTODY

PROJECT MANAGER:

COMPANY: ENGLAND & ASSOCIATES

ADDRESS: 15375 Barranca Parkway, Suite F-106
Irvine, California 92718
Phone: 714-453-8085 Fax: 714-453-0733

BILL TO:

COMPANY:

ADDRESS :

SAMPLERS SIGNATURE

PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1	Oil and Grease 413.2	Gasoline (MOD 8015/DDHS)	Diesel (MOD 8015/DDHS)	Gasoline/BTXE (MOD 8015/8020)	Petroleum Distillates (C6-C25)	BTXE (8020)	Chlorinated Hydrocarbons (8010)	Aromatic Hydrocarbons	Chlorinated/Aromatic Hydrocarbons (8010/8020)	Organic Pb		Pesticides/PCB (8080)	Base/NEU/Acid Cmpds GC/MS (8270)	Volatile Cmpds GC/MS (8240)	Polynuclear Aromatic (8310)	CCR Metals	Priority Pollutant Metals								Number of Containers
					1L (H_2SO_4)/100g	1L (H_2SO_4)/100g	4 oz (HCL)/50g	4 oz (HCL)/50g	4 oz (HCL)/50g	4 oz (HCL)/50g	2X40ml (HCL)/50g	2X40ml (HCL)/50g	2X40ml (HCL)/50g	2X40ml (HCL)/50g	500ml/50g		1L/50g	1L/100g	2X40ml (HCL)/100g	1L/100g	500ml/100g	500ml/100g								

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NUMBER:	TOTAL NUMBER OF CONTAINERS	
PROJECT NAME:	CHAIN OF CUSTODY SEALS Y/N/NA	
PURCHASE ORDER NUMBER:	INTACT? Y/N/NA	
VIA	RECEIVED GOOD COND./COLD	
TAT:	LAB NUMBER	

SAMPLE DISPOSAL INSTRUCTIONS

COMMENTS:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature Time	Signature Time	Signature Time
Printed Name Date	Printed Name Date	Printed Name Date
Company ENGLAND SHAHN & ASSOCIATES	Company	Company
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature Time	Signature Time	Signature Time
Printed Name Date	Printed Name Date	Printed Name Date
Company	Company	Company

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