First Five-Year Review Report

For

Pacific Coast Pipeline Superfund Site

Fillmore
Ventura County, California

September 2001

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Pacific Coast Pipeline Superfund Site
Five-Year Review Report

I. Introduction

A. Scope and Intent of Five-Year Review

EPA Region 9 has conducted this five-year review of the remedial actions implemented at the Pacific Coast Pipeline (PCPL) site in Fillmore, Ventura County, California. The purpose of the five-year review is to determine whether the remedy at a site is functioning as intended and is protective of human health and the environment.

This is the first five-year review for the PCPL site and is a Type I policy review, performed for sites where remedial action is ongoing, waste will not remain after the cleanup is completed, and the use of the property will not be restricted or limited, as described in OSWER Directive 9355 7-02A. The triggering action for this review is the completion of site construction in 1996. This review included a review of the ROD, Remedial Design and Preliminary Close Out Report, an ARARs review, a site visit, and phone calls with appropriate Cal EPA DTSC and City of Fillmore personnel.

B. Summary of Review Results

The results of the Five-Year Review of the remedial action at the PCPL site are:

1. The groundwater treatment system continues to operate as designed;
2. The SVE system continues to operate as designed. However, EPA will evaluate alternatives to the thermal oxidation treatment of contaminated soil vapor;
3. Monitoring trends indicate that the groundwater plume is being contained by the treatment system, aided by degradation of benzene that is occurring on the outside edges of the plume;
4. The present monitoring program is adequate and will continue to be regularly assessed. Ongoing evaluation of the trends will be used to determine if any additional wells are required in the future.
5. The original cleanup objectives remain protective of human health and the environment;
6. There are no new ARARs which would make the remedial action insufficient; and
7. Sampling beneath recently removed above ground storage tanks is being conducted by the PRP, Texaco. EPA will evaluate the need for further action based on sampling results.

II. Background

A. Site Location and Description

The Pacific Coast Pipeline site is located just east of the City of Fillmore in Ventura County, California (see Figure 1). The site, owned by Texaco, was formerly an oil refinery which operated from the early 1900's to the early 1950's when it was shut down and dismantled. The site is presently used as a crude oil pumping station.

Site structures include buried pipelines, pumping equipment, aboveground storage tanks, and miscellaneous buildings. Equipment on the property includes the groundwater treatment system (GWTS) and the soil vapor extraction (SVE) treatment system.

The area to the north and east of the site consists of vacant and agricultural land. Across State Highway 126 to the south is Barnett Trucking and a mobile home park.

The Santa Clara River is approximately one half mile to the south of the site. The site slopes generally to the south and west toward the Santa Clara River. Pole Creek runs along the western edge of Texaco’s property. On the other side of Pole Creek is a residential area and San Cayetano Elementary School. Surface water from the site is either channeled along graded roads for collection in bermed storage areas or pits, or it flows into Pole Creek as runoff or through drainage pipes.

The PCPL site lies at the eastern end of the Fillmore Groundwater Basin. Alluvial deposits and the underlying San Pedro Formation are the major water-bearing units. Groundwater flow is to the west following the Santa Clara River. The San Cayetano Thrust Fault that crosses the site is associated with areas of natural hydrocarbon seeps. Crude oil seeps and tar sands are common features in the site vicinity.

There are three water-bearing zones beneath the PCPL site:

- Perched zones - At least three separate areas have been identified, which at various times have contained small amounts of perched water;

- Aquifer I - An unconfined to semi-confined shallow aquifer at 40' below ground surface (bgs) in the southern portion of the site and 100' bgs in the northern portion of the site; and

- Aquifer II - A partially-confined to confined aquifer below Aquifer I; begins at 100' bgs.

Historic groundwater monitoring results indicate that flow occurs in a north-west direction across the site and then turns to the west after passing under Pole Creek. The average gradient across

the site in Aquifer I is approximately 0.006 ft/ft. Water level fluctuations of more than 30 feet were recorded at the PCPL site between April 1990 and April 1993. Changes in water elevation with time for Aquifer II roughly parallel that of Aquifer I, indicating some degree of communication between Aquifer I and Aquifer II.

B. Site History

Texaco operated a petroleum refinery at the site from 1928 to 1950. The primary products of the refinery were gasoline, diesel, and fuel oil. Wastes from the refinery process are believed to have consisted primarily of tank bottoms, filter clays, and sludges.

These refinery wastes were disposed of on-site in a large main waste pit (MWP) located on the western border of the site, and in eight smaller unlined sumps and pits located throughout the site. In 1950, Texaco dismantled and converted the refinery to a crude oil pumping station. It is believed that the on-site refinery waste disposal areas were not used after 1950.

The site was proposed for the National Priorities List (NPL) in 1988 and placed on the NPL in September 1989. Texaco is the responsible party and has assumed responsibility for cleaning up the site. From 1986 to 1989, the California Department of Toxic Substances Control (DTSC) was the lead regulatory agency for the Site. When the Site was listed on the NPL, EPA became the lead agency.

Table 1 lists the chronology of events for the Pacific Coast Pipeline site.

TABLE 1: Chronology of Events

Date	Event
1983	groundwater contamination detected
1986	contaminated soils removed
September 1989	NPL listing
1989 - 1992	Remedial Investigation/Feasibility Study
March 1992	ROD signed
December 1993	Phase 1 groundwater system start
November 1995	Phase 2 groundwater and SVE implemented
September 1996	Construction completion

C. Site Soils

In 1986, under the direction of DTSC, Texaco removed 33,000 cubic yards of waste material and contaminated soils from the main waste pit and other disposal areas. These areas contained contaminants at concentrations considered to be hazardous substances (Dept. Health Services criteria). The contaminants and concentrations are listed in Table 2 below: This soil removal completed the needed soil excavation activities at the site, at that time.

TABLE 2: Soil Contaminants, 1986

Compounds	Maximum Concentration (ppm)
Arsenic (As)	19.0
Barium (Ba)	140.0
Cadmium (Cd)	11.0
Chromium (Cr)	120.0
Lead (Pb)	3,700.0
Mercury (Hg)	None Detected
Selenium (Se)	1.2
Silver (Ag)	None Detected
Benzene	9.3
Toluene	16.0
Ethylbenzene	10.0
Alcohols*	200
Ketones*	100
Aliphatic and Alicyclic Hydrocarbons*	450
Aromatic Hydrocarbons*	140
Alkene and Alkyne Hydrocarbons*	120
*Individual compounds combined and reported in their major hydrocarbon groups.	

Since the PRP has recently removed several above ground storage tanks from the property, soils beneath these tanks will be sampled, and additional action taken if needed.

During the remedial investigation it was determined that soil vapors that could pose a threat to groundwater were present. These vapors contained fuel hydrocarbons and benzene, toluene, ethylbenzene, and xylene (BTEX.).

D. Site Groundwater

Groundwater contamination was originally detected in 1983 with the initial installation of three monitoring wells. Water quality data from these wells indicated VOCs (volatile organic

chemicals) in the parts per billion (ppm) range, with a maximum benzene level of 5 8 ppm. Prior to EPA involvement at the site Texaco installed fourteen additional monitoring wells. As part of the Remedial Investigation 20 more monitoring wells were installed. Table 3 shows the primary contaminants in the groundwater when the site was listed on the NPL.

TABLE 3: Primary VOCS in Groundwater		
Contaminant	**Max. Concentration (ppb)**	**Clean-up Standard (ppb)**
Benzene	720	1
1,2-Dichloromethane	9	0.5
Ethylbenzene	150	680
Methylene chloride	56	5
Toluene	110	100

At the time of NPL listing there were two plumes of groundwater contaminated with VOCS; one beneath the former MWP and one in the southwestern portion of the site. The source of groundwater contamination beneath the MWP most likely was the refinery wastes in the pit. The source of contamination in the southern plume most likely was the refinery waste pits in the southern portion of the site. However, the southern plume may also have been connected with sources in the northern portion of the facility, given the high historical contaminant concentrations beneath the MWP. After the removal of the refinery wastes in the MWP, the concentrations in groundwater decreased.

Texaco sampled private production wells within a ½ mile radius of the site during the remedial investigation. Sample results indicated that no contaminants were detected.

III. Remedial Actions

A. Remedy Selection

On March 31, 1992, EPA signed the Record of Decision for the Pacific Coast Pipeline Site. The remedial action objectives are to control further migration of the contaminated groundwater, to prevent further migration of contamination in soil to groundwater, and to recover and treat contaminated groundwater until the aquifer is restored and groundwater contamination is below cleanup levels. The cleanup levels established in the ROD are current drinking water standards. Those standards are listed above in Table 3.

EPA selected a remedy that includes the following:

- construction and operation of a groundwater extraction and treatment system;
- discharge of treated groundwater to the aquifer or reuse in a beneficial manner;
- soil vapor extraction for those soil areas that threaten to contaminate groundwater;
- groundwater monitoring to demonstrate that the extraction system is effectively capturing the contaminant plume; and
- maintenance of perimeter fencing at the site until cleanup standards are met.

At the time the ROD was signed EPA anticipated that the groundwater would be restored to the cleanup standards in a minimum of 30 years.

B. Remedy Implementation

Pursuant to an EPA Administrative Order on Consent for Remedial Investigation and Feasibility Study issued November 1989, Texaco's contractor, England & Associates (now England Geosystem), performed some early remedial design activities. These included: 1) preparation of a Preliminary Remedial Design Work Plan; 2) design, implementation, monitoring, and reporting on a pilot study to determine the effectiveness of soil vapor extraction; 3) design of the soil vapor extraction system; and 4) design of the groundwater extraction and treatment system.

EPA issued the August 1993 Consent Decree after the ROD was signed. This Consent Decree directed Texaco to install a groundwater extraction and treatment system and a soil vapor extraction system as specified in the ROD, in two phases. The objective of Phase 1 was to provide data necessary for the design of the Phase 2 system while achieving some remediation in the interim.

In September 1993 England & Associates submitted the Phase 1 Design Report and in December of 1993 the Phase 1 groundwater treatment system began operating. The extracted groundwater was treated with granular activated carbon and discharged to Pole Creek under a National Pollution Discharge Elimination System (NPDES) permit. In 1994 the Phase 1 soil vapor extraction system was installed and began operating.

In December 1994 England & Associates submitted the Final Phase 2 Design Report, which EPA approved. In 1995 the Phase 2 vapor extraction began using thermal oxidation for the soil vapor treatment. In November 1995, the Phase 2 groundwater treatment system began operating. The Phase 2 system was similar to Phase 1 with increased capacity and the addition of several operational modifications to improve performance. Figure 2 shows the site plan and all site well locations.

The site achieved construction completion status when the Preliminary Close Out Report was signed on September 27, 1996.

C. System Operations

System operations' requirements for the site included quarterly project status reports and monitoring reports. In 1997, EPA approved a reduction in frequency of groundwater monitoring from quarterly to semi-annually (two times a year) for certain wells. Currently, the four extraction wells are sampled quarterly, 23 wells are sampled in May and November, and six wells are sampled annually in November. Figure 3 shows the current groundwater sampling program schedule.

Groundwater

Groundwater contaminated with volatile fuel hydrocarbons is pumped from extraction wells EW-P2, EW-1, EW-4, and EW-5 and treated with granular activated carbon. The granular activated carbon filter is transported to an approved off-site facility for disposal when spent. The treated water is discharged to Pole Creek under an NPDES permit. According to the most recent data for the site, the Second Quarter 2001 Status Report, the average daily discharge from April through June 2001 was 35,140 gallons per day (gpd), or approximately 24 gallons per minute. Discharge quantities were all well below the permitted daily maximum of 252,000 gpd. During this period, approximately 143 pounds of TPHG (total petroleum hydrocarbons as gasoline) and 6.1 pounds of benzene were removed from the treated groundwater.

Slugs of light non-aqueous phase liquid (LNAPL) have periodically flowed into three of the groundwater extraction wells (EW-1, EW-4, and EW-P2). The LNAPL is removed from the extraction wells as necessary using a small vacuum pump or bailer. Small amounts of LNAPL have also entered the groundwater treatment system in water extracted from EW-1 and EW-4. This groundwater flows through an additional oil-absorbing bag filter housing to remove the LNAPL. The LNAPL filter is transported to an approved off site disposal and treatment facility after collection.

Over the years there have been few operation and maintenance problems. The biggest problem at the shakedown period was clogging in the treatment system due to iron precipitation. England & Associates solved this by installing a "Fre-Flo" unit which removes the iron from the groundwater.

In 1998 England & Associates installed two new wells, one to eliminate a data gap and one to replace an earthquake-damaged well. Later in 1998 EPA approved England & Associates' request to abandon numerous monitoring wells that either never had contamination or had low levels of benzene but had been below detection limits for several years.

Soil Vapor Extraction

EPA determined that volatile fuel hydrocarbons (VFH) and BTEX. in the subsurface soil posed a threat to the underlying groundwater. During the remedial design phase of the site cleanup

England Geosystem conducted two pilot studies and tested several different types of vapor extraction treatment equipment in several wells.

England Geosystem installed well PEW-2 and operated it from 1994 to 1995 (see Figure 2). This well was located between the northern and southern plume. In 1995 PEW-1 was installed in the northern plume closer to the source; this well operated until 1997 when it was shut down and replaced by an adjacent well EW-P2, a dual groundwater/SVE well screened closer to the groundwater level in order to improve vapor extraction efforts. During the second phase of the pilot study an SVE well was installed in the southern plume, well EW-P4. This well operated for six months and was shut down when EPA determined it was not an effective well.

During the first pilot study carbon filters were used to capture the contaminants, but the system was quickly overwhelmed by the large quantities of VFH and BTEX. so thermal destruction was used instead.

Since 1996 the only soil vapor extraction system well in use is EW-P2. During the Spring 2001 monitoring, the vapor extraction rate was 38 cubic feet per minute (cfm) and approximately 25,577 pounds of total hydrocarbons and 42 pounds of benzene were removed.

D. Operation and Maintenance Costs

According to Texaco's contractor, England Geosystem, the total operation and maintenance costs for the groundwater and SVE systems averaged $270,000 for the past three years. In 2001 the O&M costs rose significantly due to increased fuel costs in California. From 1998 through Spring 2001 the cost of propane for the SVE system increased 146%.

IV. ARARs Review

The following standards were identified as applicable or relevant and appropriate requirements (ARARs) in the ROD. They were reviewed for changes that could affect protectiveness.

- Section 1412 of the Safe Drinking Water Act (SDWA), 42 U.S.C. §300g-1 "National Drinking Water Regulations"; National Primary Drinking Water Regulations, 40 CFR Part 141

- California Safe Drinking Water Act, California Domestic Water Quality Monitoring Regulations, CAC Title 22 Division 4, Chapter 15

- State Water Resources Control Board (SWRCB) Resolution No. 68-16 "Statement of Policy with Respect to Maintaining High Quality of Waters in California"

- Ventura County Air Pollution Control District Rules 26.2 (for soil vapor

extraction system emissions)

- Los Angeles Regional Water Quality Control Board's Water Quality Control Plan

Standards for the contaminants of concern have not become more stringent since the signing of the ROD in 1991.

ARARs in the ROD that address injection of treated water into an aquifer are not applicable because the treatment system at the site discharges the treated groundwater into Pole Creek. There were no location-specific requirements identified in the ROD.

V. Site Inspection

Holly Hadlock, EPA Remedial Project Manager, conducted a site inspection on September 20, 2001. Also participating in the site inspection were:

Bob Conlon, Project Coordinator, Texaco Group, Inc.

Joni Fisher, Project Manager, England Geosystem

Bob Dadfar, Site Engineer, England Geosystem

The groundwater treatment system and SVE system were observed to be still operating as designed. Texaco's property is fenced and all access on and off the Texaco property is controlled.

During the site visit it was observed that six crude oil storage tanks that had been on the site for over 50 years had been removed. England Geosystem oversaw the dismantling and removal of four 80,000 barrel tanks and two 7,400 barrel tanks during August to November 2000. As stated previously, England Geosystem is in the process of preparing a soil sampling plan for the soil under the tanks in order to determine if there is any contamination and whether any hazardous substances are present that would require action under CERCLA.

The following individuals were contacted by telephone as part of the five-year review:

Jessy Philip, Project Manager, California Department Toxic Substances Control

John Kozar, Public Works Superintendent, City of Fillmore

Phyllys Lloyd, Principal, San Cayetano Elementary School

Ms. Philip said DTSC would review the Five-Year Review after it is completed and contact EPA with any concerns regarding the site. Mr. Kozar and Ms. Lloyd said they are not aware of any

problems with the Pacific Coast Pipeline site. The community has not raised any issues of concern to EPA, DTSC or the local agencies. Texaco regularly calls Mr. Kozar whenever any action beyond routine treatment system maintenance takes place.

VI. Data Review

A. Groundwater

Currently the only contaminants detected in groundwater are benzene, toluene, ethylbenzene, and xylene. Table 4 shows the maximum concentrations detected during the Spring 2001 monitoring.

Table 4: Maximum Contaminant Concentrations in Groundwater (ppb)

Contaminant	Concentration	MCL	Well
Benzene	570	1	EW-P2
Toluene	160	100	EW-P2
Ethylbenzene	170	680	EW-P2
Xylene	200	1,750	EW-P2

The groundwater extraction system continues to capture water from the two plumes of contaminated groundwater. Well EW-P2 captures groundwater from the northern benzene plume and wells EW-1, EW-4, and EW-5 capture groundwater from the southern benzene plume.

Figure 4 shows the benzene distribution in the upper aquifer wells from the Spring 2001 groundwater monitoring. In the northern plume benzene concentrations range up to 570 ppb east of the former main waste pit. The well with the highest benzene concentration continues to be EW-P2. Concentrations in EW-P2 declined significantly after the dual phase groundwater and vapor extraction began in 1997, with levels dropping from 2,400 ppb to the current 570 ppb.

The southern benzene plume is larger than the northern plume. The highest benzene concentration detected in the southern plume during Spring 2001 was 480 ppb in monitoring well MW-39S.

The data show that contaminant concentrations have steadily decreased since 1991 in both the northern and southern plumes. The graphs in Figures 5-A through 5-D were constructed using historic benzene data to show changes in benzene concentration in each well over time. The concentrations (Y-axis) are shown on a log scale so that concentration trends for wells with lower values can easily be observed. Figure 6 shows the changes in the benzene plumes in groundwater from 1994 to 2001.

Toluene was reported in groundwater samples for Spring 2001, with levels ranging from non-detect to 160 ppb (EW-P2). Well EW-P2 is the only well with toluene exceeding the ROD cleanup level of 100 ppb.

All ethylbenzene concentrations were below the ROD cleanup level of 580 ppb. Well EW-P2 had the highest levels at 170 ppb.

All xylene concentrations were well below the ROD cleanup level of 1,750 ppb, with EW-P2 again having the highest levels at 200 ppb.

B. Soil Vapor Extraction

Routine monthly soil vapor sampling includes analyses for volatile fuel hydrocarbons (VFH), BTEX., fixed gases, and hydrocarbon distribution. England Geosystem conducted vapor extraction and sampling at one well EW-P2. Table 5 summarizes the monthly VFH/BTEX. results from the vapor samples collected during Spring 2001.

Table 5: VFH/BTEX. Results for Vapor Samples (in ppmv) - Spring 2001

Date	VFH	Benzene	Toluene	Ethylbenzene	Xylene
37009	7,600	13	3.8	1.6	9.1
37038	9,100	55	18	14	20
37068	15,000	76	18	11	12

Since vapor extraction began at EW-P2 in February 1997, approximately 551,658 pounds of total hydrocarbons and 1,140 pounds of benzene have been removed. As with the contaminants in the groundwater, the contaminants in the soil are also decreasing. Table 6 summarizes estimated SVE contaminant removal through Spring 2001.

Table 6: Estimated Contaminant Removal from Soil Vapor Extraction			
Vapor Extraction Well	**Date**	**Total Hydrocarbons**	**Benzene**
PEW-2	6/94 - 2/95	95,000 lbs.	40 lbs.
PEW-1	3/95 - 1/97	612,000	911
EW-4	5/96 - 11/96	545,000	6
EW-P2	2/97 - 6/01	551,658	1,140
Total	**6/94 - 6/01**	**1,313,158 lbs.**	**2,097 lbs.**

VII. Assessment/Issues

A. Groundwater

In 1998 the State of California Department of Toxic Substances Control expressed concern about the adequacy of the groundwater monitoring program at the site, specifically that the existing extraction wells might not be fully capturing contaminated groundwater and that contaminated groundwater might be flowing beneath lower aquifer (Aquifer II) wells. DTSC requested EPA evaluate whether additional monitoring wells were needed to assess this possibility.

EPA has evaluated DTSC's concerns. Historically, nine wells have monitored Aquifer II. The wells ranged in depth from 130' to 160' below ground surface. These wells were monitored regularly for a number of years and in most years benzene was never detected. After years of no detections, all but one Aquifer II well was abandoned in 1998. EPA believes that if any vertical migration of benzene were occurring, it would have been detected by the lower aquifer wells.

As far as lateral migration is concerned, while the extraction system is not capturing 100% of the contaminated groundwater, degradation of benzene at the plume edges is occurring faster than plume migration outward. EPA believes that additional wells are not necessary at this time. EPA will continue to evaluate groundwater monitoring trends and will make any needed changes based on the ongoing evaluation, to protect human health.

The groundwater flow at the site is predominantly to the west/northwest. In the southern plume benzene has never been detected in three downgradient wells, MW-44S, MW-35S and MW36-S. In the northern plume, downgradient wells MW-48S and MW-49S have historically been below the MCL for benzene. However, during the past year the benzene concentration in MW-49S showed an increase to 1.7 ppb. EPA will monitor this situation and determine if this is an anomaly or a change in the benzene plume. If there is a change in the behavior of the benzene plume, EPA will investigate the cause and make any necessary changes to the remedial action.

EPA believes the remedial action, including the current monitoring program at the site is protective of human health and the environment based on the following factors:

- The lateral extent of contamination has remained stable for many years and has reached an equilibrium. Figure 6 shows that the plume of benzene has not grown since groundwater monitoring began.

- Benzene levels have steadily declined over the years. Well MW-2S had 5,792 ppb benzene in 1986; the current maximum concentration at the site is 570 ppb. The size of the areas with benzene levels above 100 ppb has decreased substantially.

- Biodegradation of benzene at the edges of the plumes is occurring faster than plume migration. Biodegradation parameters such as dissolved oxygen, oxidation reduction potential, nitrate, sulfate, and sulfide levels support evidence that biodegradation of benzene is occurring.

- Drinking water for the area is supplied by the City of Fillmore groundwater wells, which are not threatened by the site contamination, as they are not downgradient.

B. Soil Vapor Extraction

This upcoming year EPA will evaluate the efficiency of the thermal oxidizer that is currently in use with the soil vapor extraction system. EPA and England Geosystem choose to use thermal destruction for the hydrocarbons and benzene because carbon treatment was inadequate to handle the volume. Due to reduced contamination levels, increased fuel costs and nationwide concerns about the environmental safety of thermal treatment of chlorinated wastes, EPA will determine if another technology is more appropriate for this site.

VIII. Deficiencies

There are no significant deficiencies with regard to the remedial action at the site. The groundwater treatment system and the SVE system are both functional and operating as designed. Additional trend observations from the monitoring program will be assessed to assure that the remedy is effective as designed.

IX. Statement of Protectiveness

Based on a review of all of the data, the groundwater treatment system is operating as designed. The remedial action selected in the ROD signed March 31, 1992, for the Pacific Coast Pipeline Superfund site remains protective of human health and the environment. There are currently no uses of the groundwater contaminated at the PCPL site. EPA will continue to monitor the

cleanup at the site to determine when the site achieves cleanup levels specified in the ROD. If there is a change in the current trend of decreasing benzene concentrations, EPA will determine the appropriate response action.

X. Next Review

The next five-year review will be conducted in Fiscal Year 2006.