FINAL CLOSE OUT REPORT

Southern California Edison Visalia Pole Yard Superfund Site
Visalia, Tulare County, California

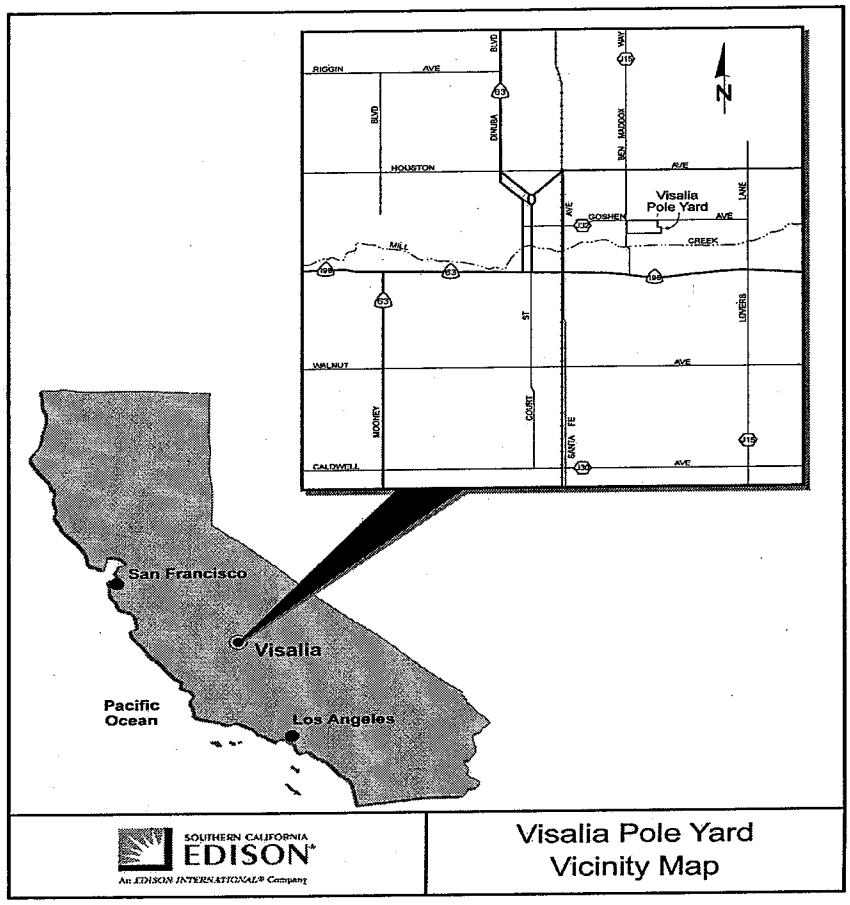
I. INTRODUCTION

This Final Close Out Report documents that the U. S. Environmental Protection Agency (USEPA) completed all response actions for the Southern California Edison Visalia Pole Yard Superfund Site in accordance with *Close Out Procedures for National Priority List Sites* (OSWER Directive 9320.2-09A-P).

II. SUMMARY OF SITE CONDITIONS

Background

The Southern California Edison (SCE), Visalia Pole Yard (VPY) Superfund site is located at 432 North Ben Maddox Way in northeastern Visalia, Tulare County, California. The site is bounded on the north by East Goshen Avenue, and on the west by North Ben Maddox Way. Visalia is approximately midway between Fresno and Bakersfield in the Central Valley of California and is a growing metropolitan area with a population of approximately 110,000. Agriculture is the dominant industry in the region and walnuts, olives, and citrus are the primary crops.



From 1925 to 1980, the Southern California Edison Company operated a fabrication yard (Visalia Pole Yard, VPY) to produce wooden poles for use in the distribution of electricity throughout the utility's service territory. Western red cedar trees were logged and transported to the yard, debarked, sized, shaped, and chemically preserved to resist attack from fungi and insects. The chemical preservation treatment process consisted of immersion of the wooden poles in heated tanks of preservative fluid. The treatment system consisted of two above-grade dip tanks, one in-ground full treatment tank, a fluid heating system, hot and cold fluid storage tanks, and underground product transfer lines. SCE primarily used creosote to treat its utility poles. However, in 1968, SCE began using pentachlorophenol (PCP), since PCP treated poles looked "cleaner" and were felt to be more suitable for use in an urban environment. A solution of pentachlorophenol and diesel (petroleum hydrocarbons) was substituted as the preservative for the wood preservation process, which contained low levels of dioxin and furan byproduct impurities of the PCP manufacturing process.

During the service life of the Visalia Pole Yard, significant volumes of chemical preservatives were released into subsurface soils and groundwater. Groundwater contamination was first discovered in an on-site well in 1966. Hydrogeologic investigations were conducted between 1966 and 1975 to determine the nature and extent of contamination.

The types of chemicals found at the VPY include creosote compounds, PCP, and its associated impurities including octachlorodibenzo-P-dioxin. The sources of chemical release of creosote and PCP were primarily leakage from piping between the storage tanks and treatment tanks and cracks in the treatment tanks.

Early Removal and Remedial Actions

- In 1976, the State issued a Cleanup and Abatement Order, requiring Southern California Edison to abate discharge of treatment fluids into the soil, to contain contaminated soil and water on the property, to pump shallow groundwater under the site before and during construction of an underground slurry wall around the site, to pump and lower the confined aquifer to remove contamination, and to clean up contaminated shallow groundwater off site.

- In 1977, a slurry wall was built to slow contaminant migration in the shallow aquifer. The slurry wall extended to a depth of approximately 60 feet bgs and was keyed into the shallow aquitard to restrict further lateral, chemical migration into the shallow aquifer. Groundwater wells were installed to remove chemically affected groundwater for subsequent discharge into the local POTW sanitary sewer system.

- In 1981, all treating facilities were demolished and approximately 2,300 cubic yards of contaminated soil were removed and disposed of it into an off-site Class 1 disposal facility.

- In 1985, an onsite water treatment plant using filtration and adsorption was constructed. The plant was modified to include additional filtration and gravity separation in 1987,

which optimized plant performance by minimizing hazardous waste generation. The treated effluent was now discharged to Mill Creek under a National Pollutant Discharge Elimination System (NPDES) permit.

- In 1987, Southern California Edison and the State signed an agreement requiring the utility to perform a study to determine the nature and extent of site contamination and to recommend alternatives for final cleanup action.

- In 1989, the VPY was added to the Federal Superfund National Priorities List (NPL) by the United States Environmental Protection Agency (USEPA).

- The 1992 Feasibility Study ((FS) report Geraghty & Miller, 1992b) recommended enhanced in-situ biodegradation (EISB) in addition to continuing the pump-and-treat system as the recommended remedial action alternative.

- In 1994, the State approved a Remedial Action Plan, and a Record of Decision was signed on June 10, 1994. The major components of the selected remedy include: in-situ bioremediation, property access restrictions and deed restrictions. A Preliminary Close-out Report, dated September 25, 2001, documents that the EPA completed construction activities for the Southern California Edison (SCE),

Pilot Study

- In 1997, a pilot study approved by DTSC and concurred by EPA, the Visalia Steam Remediation Project (VSRP), was initiated which used steam injection technique called Dynamic Underground Stripping (DUS) to mobilize COCs. The pilot study operated in two phases, between May 1997 and June 2000. Phase 1 operations focused on the intermediate aquifer, with injection and extraction wells screened between 80 and 100 feet bgs. Phase 2 operations began in November 1998 and included steam injection and extraction below the intermediate aquitard, with injection wells screened between 125 and 145 feet bgs. Phase 2 operations continued until June 2000, when a precipitous drop in the rate of removal of WTCs was measured.

In-Situ Bioremediation

- Following cessation of the VSRP, the enhanced biological degradation system was installed and operated (SCE, 2001) to augment existing physical processes that were initiated by Dynamic Underground Stripping and to encourage natural biological processes to flourish.

Remedial Investigation (RI) and Feasibility Study (FS) Results

The Remedial investigation ((RI) Geraghty & Miller, 1992a) found a distribution of the wood treating chemicals in both the vadose zone and saturated zone at the VPY. Additionally, at that time, the non- aqueous phase diesel hydrocarbon plume covered a horizontal area approximately 2.1 acres in size and extended vertically to approximately 125 feet below ground surface (bgs).

The geologic strata underlying the VPY are composed of alluvial-fan deposits from the Kaweah River and its distributaries. The three hydrostratigraphic units beneath the site include: a shallow aquifer (30 to 50 feet bgs; dewatered since the 1980s), a shallow aquitard (50 to 75 feet bgs), an intermediate aquifer (75 to 100 feet bgs), an intermediate aquitard (100 to 125 feet bgs), and a deep aquifer (125 to about 180 feet bgs). Both aquitards generally consist of silty sand and clay materials, whereas the aquifers are composed primarily of fine-grained and coarse-grained sands. When saturated, the shallow aquitard restricts vertical groundwater movement. Aquifer testing of the intermediate hydrostratigraphic unit indicated a transmissivity of approximately 50,000 gallons per day per foot (gpd/ft). Short-term pumping from the deeper aquifer affects hydrostatic water elevation levels in the intermediate aquifer.

Wood treating chemicals (WTCs) were present in the vadose zone and were found to be concentrated near points of release (immersion tanks and piping). Some horizontal-radial dispersion of these chemicals in the shallow vadose zones occurred by capillary action of fine grained soils and flat-lying stratigraphy. Transport of WTCs laterally from the source area occurred during times when the vadose zone was saturated. Historical water tables levels were about 30 feet bgs and are currently measured at approximately 80 feet bgs. Depression of the regional water table levels initially occurred during the state-wide drought of the 1980's, and continues to decline from increased regional groundwater pumping for residential, agricultural, and industrial uses.

The Feasibility Study ((FS) report Geraghty & Miller, 1992b) recommended enhanced in-situ biodegradation (EISB) in addition to continuing the pump-and-treat system as the recommended remedial action alternative.

ROD Findings

In 1994, the State approved a Remedial Action Plan, and a Record of Decision was signed on June 10, 1994. The major components of the selected remedy include: in-situ bioremediation, pilot test of steam remediation, property access restrictions and deed restrictions.

Cleanup Activities Performed

As noted earlier, cleanup activities were first initiated in 1975, with the installation of extraction wells to remove contaminated groundwater and discharge to POTW. This action was followed by construction of the slurry wall in 1976-77, to prevent further downgradient migration of WTCs in groundwater. Additionally, an onsite water treatment plant (WTP) consisting of filtration and adsorption system was built in 1985 and was successful in removing the chemicals of concern (COC) from the treated groundwater. The WTP was modified with additional filtration and gravity separation in 1987, which optimized plant performance by minimizing hazardous waste generation. The WTP pumped, treated, and discharged an average of 0.36 million gallons per day between 1985 before the construction and operation of the Visalia Steam Remediation Project (VSRP) in March of 1997 when the volume of water treated increased to approximately 0.5 million gallons per day.

The VSRP system consisted of the following elements:

- A steam injection system including four 50,000 lb/hr steam boilers connected to eleven injection wells placed around the periphery of the WTC plume;
- A vacuum extraction system consisting of four vapor and liquid extraction wells, with follow-on liquid and vapor separation, liquid cooling, and vapor and liquid treatment; and
- An ERT and thermocouple-based thermal monitoring array completely surrounding the steam injection-vacuum extraction systems.

The VSRP operated in two phases, between May 1997 and June 2000. Phase 1 operations focused on the intermediate aquifer, with injection and extraction wells screened between 80 and 100 feet bgs. Phase 2 operations began in November 1998 and included steam injection and extraction below the intermediate aquitard, with injection wells screened between 125 and 145 feet bgs. Phase 2 operations continued until June 2000, when a precipitous drop in the rate of removal of WTCs was measured.

Following cessation of the VSRP, the enhanced biological degradation system was installed and operated (SCE, 2001) to augment existing physical processes that were initiated by Dynamic Underground Stripping (DUS) and to encourage natural biological processes to flourish. This system was in operation from June 2000 until March 2004. It included vadose zone bioventing and saturated zone biosparging, coupled with continued groundwater pump-and-treat operation. Construction completion of the enhanced biological degradation system was documented in the 2001 Preliminary Close Out Report (PCOR).

A post-remediation soil investigation of the surface soils was conducted at this site in November 2004. Tetrachlorodibenzo-p-dioxin (TCDD) was detected slightly above the cleanup standards at four locations. As a result of the 2005 Five-Year Review, contaminated surface soil (soil between zero and ten feet below grade) was removed in July 2006 and verified with confirmatory sampling to be below the cleanup standards prescribed in the ROD.

Community Relations Activities

Community involvement activities included the development of a Community Relations Plan (CRP), prior to initiation of the RI/FS activities. The CRP included development of a community profile and a list of key local contacts. The community profile indicated the surrounding area was mainly businesses that had little interest in the site cleanup activities. Copies of the Draft ROD were made available at the local public library, DTSC and USEPA Region IX Record Center. Notification of the issuance of the Draft ROD was made. A Public Notice was also placed in the local newspaper. A Public Meeting was held in Visalia, California on October 13, 1993, to provide information on the proposed cleanup. There were no members of the public in attendance at the meeting. A meeting was also held with members of the Visalia City Council, to apprise them of the proposed site cleanup activities. The Council members were supportive of the proposed cleanup actions.

Notification to the public of the initiation and completion of the 2005 Five-Year Review was made through a Public Notice in the Visalia Times-Delta newspaper. A copy of the completed Five-Year Review was placed in the Tulare County Library, USEPA Region IX record center.

Site Redevelopment Plans

There are no specific redevelopment plans currently planned for the site. The City of Visalia, which has purchased all of the surrounding property, formerly owned by SCE, has indicated an interest in purchasing the subject property (Site) after it is deleted from National Priorities List (NPL). It is understood the City would expand their current General Services operations to include the Site.

III. QA/QC PROTOCOLS

The QA/QC program used throughout the design, construction, operation of the remediation systems, and cleanup standard attainment period was outlined in the Quality Assurance Project Plan (QAPP) approved by DTSC and EPA. The program enabled EPA to determine that all analytical results reported were accurate and adequate to ensure satisfactory execution of the remedial action, in a manner consistent with the requirements of the ROD.

Duplicate soil and groundwater samples were collected in accordance with the QAPP. Matrix spike, duplicate, and blank samples were analyzed by the laboratory, and the resulting data provided to DTSC and EPA. The QA/QC program was also used for the on-going quarterly groundwater monitoring program and cleanup standard attainment demonstration period.

IV. MONITORING RESULTS

Visalia Steam Remediation Project

During the VSRP operations, the various forms of WTC removal or destruction were documented through continuous monitoring systems and regular volume measurements. These included:

- Free Product recovery
- Vapor-phase removal
- Liquid-phase removal

Free product was recovered from both dissolved air flotation and oil-water separation and transferred to storage tanks where the volume measurements were made. Vapor-phase recovery was measured as both total hydrocarbons and CO_2 equivalents of oxidized hydrocarbons via continuous emissions analyzer systems. Liquid phase removal was measured through a total organic carbon analyzer.

Quarterly groundwater monitoring was conducted from 1985 through June 2007 both within, as well as outside, the boundaries of the area subjected to steam remediation operations. Monitoring of extraction wells within and on the edge of the WTC plume was used as a tool to assess the success of WTC removal. Monitoring of offsite wells was conducted to ensure WTCs were not escaping the groundwater extraction system.

Groundwater monitoring data from June 2004 through June 2007 demonstrate that all groundwater cleanup standards have been met.

Demonstration of Attainment of RAP/ROD Cleanup Standards

The Remedial Action Completion Report (SCE, 2008) documents the post-remediation monitoring of groundwater and confirmation of soil removal actions performed to meet the RAP/ROD cleanup standards. The report also includes the demonstration of attainment of groundwater cleanup standards.

V. SUMMARY OF OPERATION AND MAINTENANCE

A "Covenant to Restrict Use of Property, Environmental Restriction", between Southern California Edison and the Department of Toxic Substances Control (DTSC), was recorded in Tulare County, California on May 23, 2007. This Covenant satisfies the ROD/RAP requirement for property access restrictions and a deed restriction. The Covenant outlines use restrictions (as well as Site operation and maintenance (O&M) activities). As remedial action objectives are based on industrial cleanup standards, prohibited Site Uses include: residences, human hospitals, schools, and day care centers for children. Prohibited Activities include: soil disturbance greater than ten feet below grade, and the installation of water wells for any purpose. The Covenant requires the Site owner to conduct an annual inspection of the property and prepare an Annual Inspection Report, describing how all of the site restrictions are being complied with. The Annual Report must certify that the property is being used in a manner consistent with the Covenant, and must be submitted to DTSC by June 15th of each year.

VI. SUMMARY OF REMEDIATION COSTS

Table 1 provides a summary of labor and capital costs differential of the actual project costs with the estimated costs included in the ROD. The cost estimates were based on the selected (FS derived) remedial alternative of enhanced in-situ bioremediation and steam remediation. The estimates presented below are a summary of soil and groundwater treatment costs which were recorded in the 1994 ROD.

TABLE 1 – COST SUMMARY

	ROD Estimate (NPV 1994, 30 yrs)	RA Cost (Actual $$ 1996-2006)
Capitol	$6,567,000	$7,100,000
O&M	$2,254,000 (annual)	$22,770,000
Total	**$45,200,000**	**$29,870,000**

The implemented Remedial Action at Visalia cost approximately $29.87 million from 1996 through 2006. Approximately $7.1 Million were capital cost for the project hardware including boilers (rental), piping, valving, instrumentation, heat exchangers, cooling towers, pumps, vacuum system, wells, water treatment plant up-grades, carbon adsorbers, and thermal imagery. The remaining $22.77 million was expended for labor and O&M cost of fuel, electricity, hazardous waste disposal, adsorption media, filter media, and laboratory analyses, to operate the steam injection system, vapor and liquids recovery system, thermal imagery, and water treatment plant operation.

VII. PROTECTIVENESS

This site meets all the site completion requirements as specified in OSWER Directive 9320.2-09-A-P, Close Out Procedures for National Priorities List Sites. Specifically, the following actions specified in the ROD have been implemented: 1) SCE applied an aggressive steam remediation technology to remove the chemicals of concern in soil and ground water beneath the site; 2) as a result of post-remediation soil investigation of the surface soils, soil contaminated with TCDD was removed in July 2006 and verified with confirmatory sampling to be below the cleanup standards prescribed in the ROD; 3) groundwater has been monitored on a site-wide basis, and the monitoring results from June 2004 through June 2007 show the cleanup standards specified in the ROD have been met, and; 4) a Land Use Covenant between DTSC and SCE has been recorded with Tulare County that restricts site uses and activities, as outlined in Section V.

These actions provide assurance that the site no longer poses any threats to human health or the environment. The only remaining activities to be performed are an annual site inspection and report prepared by the Site owner, as outlined in Section V, and Five- Year Reviews.

VIII. FIVE-YEAR REVIEW

A statutory Five-Year Review was completed in September 2005 (DTSC/USEPA, 2005), pursuant to EPA's *Comprehensive Five-Year Review Guidance* (OSWER No. 9355.7-03B-P, June 2001). The Five-Year Review concluded that remedial actions taken at the site were protective of human health and the environment in the short term, and that institutional controls were needed in order to ensure long term protectiveness. A "Covenant to Restrict Use of Property, Environmental Restriction", between Southern California Edison and the Department of Toxic Substances Control (DTSC), was later recorded in Tulare County, California (May 23, 2007).

The Five-Year Review also recommended an evaluation of contaminated surface soil, which was later removed and verified with confirmatory sampling to be below the cleanup standards prescribed in the ROD. The next Five-Year Review will be completed by September 2010.

Approved By:

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5/19/09
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