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**Preliminary Closeout Report for  
Koppers Company, Inc.,  
Superfund Site,  
Oroville, California**

Prepared by  
**U. S. Environmental Protection Agency**

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# Acronyms and Abbreviations

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µg/L	micrograms per liter
Beazer	Beazer East, Inc.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	contaminant of concern
cy	cubic yards
DTSC	Department of Toxic Substances Control
ESD	Explanation of Significant Difference
FS	Feasibility Study
gpm	gallons per minute
IPE	isopropyl ether
KCI	Koppers Company Inc.
KII	Koppers Industries, Inc. (prior to 1988 referred to as Koppers Company Inc.)
L-P	Louisiana Pacific
MNA	monitored natural attenuation
msl	mean sea level
NPL	National Priorities List
O&M	operations and maintenance
P&T	pump and treat
PAH	polynuclear aromatic hydrocarbons
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PCP	pentachlorophenol
ppb	parts per billion
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RI	remedial investigation
ROD	Record of Decision

RWQCB	Regional Water Quality Control Board
Site	Koppers Company, Inc., Superfund Site
TI	Technical Impracticability
TRC	Beazer's consultant
U.S. EPA	U.S. Environmental Protection Agency

# Preliminary Closeout Report

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## 1.0 Introduction

This Preliminary Closeout Report documents that all construction activities for the Koppers Company, Inc. (KII), Superfund Site (Site) (U.S. Environmental Protection Agency [U.S. EPA] Site identification number CAD009112087) have been completed in accordance with Close Out Procedures for National Priorities List Sites (OSWER Directive 9320.2-09A, January 2000). U.S. EPA conducted a pre-final inspection on September 18, 2002, to verify that the potentially responsible party has constructed the remedy in accordance with remedial design (RD) plans and specifications. The potentially responsible party has initiated all activities necessary to achieve Record of Decision (ROD) performance standards and site completion.

## 2.0 Summary of Site Conditions

### 2.1 Background

#### 2.1.1 Location and Geography

The Site is an area of approximately 205 acres located in Butte County, in the southern portion of the City of Oroville. The topography of the Site slopes toward the southwest and is bounded by the former Louisiana Pacific (L-P) Lumber Mill to the west, Georgia Pacific Way to the north, and Bagget-Marysville Road to the south and east (Figures 1 and 2). Remnants of mining dredge operations during the 1900s remain throughout the northern portion of the Site.

The Site is located on the northeastern margin of the Sacramento River Valley, where fluvial deposits adjoin the foothills of the Sierra Nevada mountain range (Dames and Moore, 1988). The site lies within the Feather River Floodplain, which locally is approximately 2.7 miles wide. The Site elevation is approximately 145 feet above mean sea level (msl). A historical mining-tailing pile is present at the northern area of the property at approximately 120 feet msl (U.S. EPA, 1989).

Drainage basins in the vicinity of the Site include: the L-P ditch, the Koppers and Drainage Ditches, the Feather River, and the Wyman Ravine (Figure 2). The Koppers Ditch and Drainage Ditch flow to the L-P ditch (located west of the Site) and then drain to the L-P pond, which has potential to overflow to the Feather River during a 100-year storm (U.S. EPA, 1999). The Feather River is located approximately 3,000 feet west of the Site, trending west-southwest at approximately 130 feet above sea level. During periods of high runoff, some surface runoff from the Site may reach the river. The Wyman Ravine is located approximately 2 miles east of the Site and flows west to Palermo Road, then turns south (Figure 1).

The Wyman Ravine is perennial, flowing only during periods of high runoff, and is topographically separated from the Site by a large bluff (Dames and Moore, 1988). It should be noted that current remedial actions on the property have resulted in modified surface flow locally, yet have maintained the general southwest overland flow direction.

Land use near the Site is a mixture of residential, industrial, commercial, and agriculture. Rural homeowners on 1 to 5 acres of land commonly raise livestock and grow produce for home use. Residential areas are to the south, southeast, west, and northeast of the Site. There are three schools within a 2-mile radius of the Site (U.S. EPA, 1989). There were two National Priorities List (NPL) Sites in the vicinity of the Site: the former L-P Lumber Mill, west of the Site and the Western Pacific Railyard, northeast of the Site. The former L-P Lumber Mill was delisted in 1996, and the Western Pacific Railyard was delisted in 2001. West of the Feather River is public open space, the Oroville Wildlife Area (Dames and Moore, 1988).

Both the soil and ground water remediation are covered under one Operable Unit (001).

### **2.1.2 Site History**

Wood treating operations, intended to prevent wood from deterioration by insects or fungi, were conducted at the Site from 1948 to 2001. Wood treating operations resulted in Resource Conservation and Recovery Act (RCRA) hazardous wastes (40 CFR 261), California hazardous wastes (CAC Title 22), and/or nonhazardous wastes that may contain wood-treating chemicals. The wood treatment process involved the use of chemical preservatives such as pentachlorophenol (PCP) from 1948 to 1988, creosote sludges, and chromated copper arsenate solution. The cellon process used PCP in isopropyl ether (IPE) and butane to treat wood. The non-com exterior process®, discontinued in 1986, used chemicals containing formaldehyde and dicyandiamide. Other chemicals historically used at the Site include creosote, naphthalene, boron, phosphorous, diesel oil, and gasoline (Dames and Moore, 1988).

Chemicals were released to the environment through waste disposal practices, spills, fires, products dripping from treated wood, and storage and handling practices. From approximately 1952 to 1973, unlined creosote settling ponds located west of the former process area were used as evaporator basins for process residuals. Occasionally the creosote pond overflowed to a marsh area southwest of the L-P ditch (Dames and Moore, 1988; HSI Geo Trans, 1999b). Upon discontinued use, this area was later backfilled with soil and dredge tailings. From 1961 to 1973, the cellon process released residual wastes across approximately 1 acre near the western site boundary (Dames and Moore, 1988). From 1963 to 1973, wastewater from a pole-washing unit at the northern portion of the Site was not contained and was released just south of the pole washer. In 1963, a fire occurred at the Site resulting in a release of 20,000 gallons of PCP, and the cellon process plant was destroyed. Combustion of PCP produced polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF). Debris from the 1963 fire was initially buried On Property, but was subsequently removed and disposed of offsite under a Regional Water Quality Control Board (RWQCB) order (HSI Geo Trans, 1998). There was another fire at the Site in 1987.

### **2.1.3 Site Chronology**

A chronology of important Site activities and investigations is presented in Table 1.

**TABLE 1**

## Site Activities and Investigation

*Preliminary Closeout Report for Koppers Company, Inc., Oroville, California*

<b>Event</b>	<b>Date</b>
Mine dredging operations were conducted at the Site.	1900s
Hutchinson Lumber Mill operated at the Site.	1920 to 1948
Wood was treated at the Site with chemicals including, but not limited to, PCP, creosote, and chromated copper arsenate solution to prevent wood deterioration by insects or fungi.	1948 to 2001
Lumber mill facility operated at the Site, concurrently with the wood treatment operations.	1952 to 1962
Process residuals were discharged to unlined creosote settling ponds.	Approximately 1952 to 1973
KCI purchased the property and wood treating operations from the National Wood Treating Company.	1955
Cellon blowdown area was used for residual waste disposal.	1961 to 1973
A fire occurred at the Site; debris was buried On Property and approximately 20,000 gallons of PCP were released from tanks.	1963
Pole-washing unit was used and residual waste was discharged nearby to an unlined surface impoundment.	1963 to 1973
PCP-contaminated ground water was first documented On Property.	1971
PCP was discovered in nearby residential wells.	1972
The RWQCB issued an order for cleanup including (1) the installation of two ground water recovery wells; (2) extraction of contaminated ground water and discharge to spray fields On Property; (3) excavation of buried debris from the 1963 fire for offsite disposal; and (4) construction of wastewater treatment process to discontinue use of unlined ponds.	1973
Waste disposal area in the Eastern Spray Field (fire debris), the two areas in the Western Spray Field (fire debris), and the cellon blowdown area were excavated, and the soils were disposed of at the soil bed of the biological wastewater treatment unit. Associated fire debris was removed to an approved offsite landfill.	1973
Biological wastewater treatment unit was used for the disposal of all residual wastes.	1973 to 1988
KCI installed and began operation of two recovery wells (RW-1 and RW-2) to recover PCP in local ground water in accordance with RWQCB order.	1974
Concentrations of PCP in offsite wells decreased, and the RWQCB order was rescinded.	1974
The RWQCB issued a cease-and-desist order directing KCI to stop discharging PCP into soil at the plant and prepare a work plan detailing: (1) remedial actions to mitigate damage caused by contaminants flowing west; (2) process changes needed to prevent future contamination; and (3) alternatives for treating excavated soil.	1982
The Site was proposed for placement on the NPL.	September 1983
Ground water contamination in residential wells was found more than 1 mile south of the Site.	December 1983
Bottled water was supplied to 45 residences with impacted drinking water supply wells.	March 1984 to 1986
Site was placed on the NPL.	September 1984
Ground water monitoring program was initiated.	June 1985
Use of PCP in the wood treating process was phased out.	1986 to 1988
Private residences within areas of impacted ground water were connected to alternate water supply (Oroville-Wyandotte Irrigation District).	March 1986 to date

**TABLE 1**

## Site Activities and Investigation

*Preliminary Closeout Report for Koppers Company, Inc., Oroville, California*

<b>Event</b>	<b>Date</b>
Consent Order signed between KCI and U.S. EPA, requiring completion of the Remedial Investigation and Feasibility Study (RI/FS).	April 1986
Explosion and fire at the Site. U.S. EPA issued a unilateral removal order for the cleanup, removal, and stabilization of soil.	April 1987
Temporary chip-seal cap was constructed over process area.	1987 to 1988
Site was bought by Beazer East, Inc. (Beazer).	1988
Operations ceased at the Former Biological Treatment Facility (soil) On Property.	1988
Department of Health Services sampled neighboring properties and found elevated dioxins in chicken eggs; an advisory was issued and the source of area wide trace dioxin was not determined.	March 1988
RI Report completed.	June 1988
Risks evaluated by the U.S. EPA and reported in an Endangerment Assessment Report.	November 1988
Beazer sold the Site to KII; however, Beazer retained responsibility for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) matters at the Site.	December 1988
FS completed.	May 1989
ROD for cleanup of ground water and soil was issued for the Site.	September 1989
Explanation of Significant Difference (ESD) issued for the Site that limited soil remediation to 5 feet unless a potential contaminant source to ground water was found.	January 1991
Consent Decree between U.S. EPA and Beazer agreeing that Beazer will conduct remedial action work.	February 1992
Completed bench-scale treatability test for soil washing.	1992
Two concrete drip pads were installed in the process area.	1992
Completed full-scale pilot testing for soil washing. (Not effective in removing all ROD constituents.)	1993
Concentrations of PCDDs/PCDFs above industrial standards for workers, as cited in ROD, were detected in surface soil.	1993
Off Property ground water remediation system started.	March 1993
On Property ground water remediation system started.	February 1994
Shallow ground water investigation completed.	June 1994
Soil Removal Memorandum Action performed to selectively remove impacted dioxin-contaminated soil and place in Cell No. 1 (13,000 cubic yards [cy] of soil).	September 1994
Product recovery well (PR-01) installed.	1994
Soil Fixation Treatability Study completed. (Not implementable as a remedy.)	1994
Hot-water Flushing Treatability Study of Contained Recovery of Oily Wastes performed. (Not a cost-effective remedial action.)	1994
Long-term ground water pilot bioremediation system initiated in the former creosote pond area.	July 1995
Construction of onsite landfill, Cell No. 1, completed.	August 1995
Off Property ground water remedial system was taken offline because the plume retreated upgradient of the extraction wells. The extraction wells were no longer effective in capturing the plume.	December 1995

**TABLE 1**

## Site Activities and Investigation

*Preliminary Closeout Report for Koppers Company, Inc., Oroville, California*

<b>Event</b>	<b>Date</b>
ROD Amendment No. 1 issued for the Site, changing the soil remedy to an onsite landfill. Cell No. 2 was constructed and partially filled (completed in 2002).	August 1996
Former creosote pond was excavated to 14 feet below ground surface (bgs) (approximately 11,216 cy of soil). Soil placed in Cell No. 2.	1996
Excavated pole washer area (Area 5) to depths of up to 20 feet bgs, 4,830 cy removed. Backfilled with plastic, low-permeability soils beneath and coarse, gravelly onsite soils on top.	September 1997
First five-year review completed. Remedy deemed protective.	December 1997
Excavated former cellon blowdown area to 10 feet bgs (approximately 11,130 cy of soil).	1997
Implemented onsite enhanced PCP bioremediation program in the eastern part of the On Property PCP plume.	March 1998
Restriction for domestic drinking water for 26 residences removed.	April 1998
Implemented Off Property ground water PCP in situ bioremediation program.	August 1998
ROD Amendment No. 2 issued, modifying the ground water remedy to provide for: (1) 4-acre Technical Impracticability (TI) Zone; (2) adding enhanced in situ bioremediation to the remedy; (3) providing monitored natural attenuation as a contingency remedy; and (4) ground water standards changed for PCP (1 part per billion [ppb]) and barium (1,000 ppb).	September 1999
KII ceased operations and began work on RCRA closure, overseen by Department of Toxic Substances Control (DTSC).	March 2001
Restriction for domestic drinking water for one residence removed (seven remaining).	April 2001
In situ bioremediation for polynuclear aromatic hydrocarbons (PAH) in the area of the former creosote pond was terminated at the request of Beazer, because additives apparently resulted in increased mobility of PAHs.	June 2001
Pre-final site inspection. Soil removal completed. Approximately 40,000 cy of material removed from former process areas and new Dri-Con source site.	September 2002
Beazer purchased Site property from KII.	November 2002
Second Five-year Review completed. Remedial actions were deemed protective.	February 2003
Consent Decree amended (incorporated land use covenants restricting access to ground water. The Consent Decree was signed by Region 9 Division Director in June 2003.).	June 2003

### 2.1.4 Site Discovery and Remedial Activities

PCP-contaminated ground water was first identified On Property in 1971 and identified the following year Off Property in residential drinking water supply wells to the southwest of the Site. In 1973, KCI installed a biological wastewater treatment unit for all process residuals, thereby ceasing discharge to the unlined areas. In 1974, KCI installed and began operating two ground water recovery wells (RW-1 and RW-2). Ground water was extracted from these wells and discharged On Property via irrigation (spray fields) to inhibit plume migration. The RWQCB issued a cease-and-desist order to KCI in 1982, directing KCI to end discharge of PCP into the soil and prepare a work plan detailing: (1) activities to mitigate damage caused by offsite contaminants to the southwest; (2) process changes needed to prevent additional contamination; and (3) alternatives for treating excavated soils. In 1984,

KCI began supplying bottled water to 45 residences and completed a Phase I and Phase II hydrogeologic ground water investigation. Results indicated a plume of PCPs, PAHs, and IPE moving southwest.

In 1984, the Site was placed on the NPL, and the following year ground water monitoring was initiated at the Site. During 1986, KCI signed a Consent Order with the U.S. EPA, agreeing to conduct the RI/FS. Downgradient residences with PCP-affected drinking water supply wells were connected to the Oroville-Wyandotte Irrigation District in 1986. The 1987 fire at the Site resulted in the U.S. EPA issuing a unilateral removal order for the cleanup, removal, and stabilization of impacted soils. A temporary cap was constructed over the process area in 1987 to protect workers from potential exposure to dioxins and furans that may have been created during the fire. In 1992 concrete drip pads were installed to prevent spills from ongoing operations in the vicinity of the chemical cylinders.

The remedial investigation and endangerment assessment were completed in 1988 (Dames and Moore, 1988). Later that year, Beazer sold the Site to KII, yet Beazer retained all CERCLA responsibilities. During 1989, the FS was completed, followed by the ROD. Beazer signed a Consent Decree in 1992, agreeing to perform remedial action under Superfund at the Site. The property owner, KII, continued to operate the wood treating facility under RCRA requirements.

### 2.1.5 Remedies Selected

This section presents a summary of the remedies selected for the Site and an overview of ROD and post-ROD activities. The document that governs these activities is the Consent Decree for Remedial Action at the Site (between U.S. EPA and Beazer, signed February 1992.) The Consent Decree Amendment was signed by the EPA Region 9 Division Director in June 2003, and includes land use covenants that restrict access to ground water. The selected remedies, as stated in the ROD and ROD Amendments, are intended to reduce contamination to health protective levels consistent with potential future industrial exposure.

**Summary of 1989 ROD.** The potentially responsible parties completed an FS of the Site in 1989. The U.S. EPA used the results of this study to select methods for addressing contamination, specifically principle public health and environmental threats resulting from historical Site operations. The actions selected were to address both the contaminated soils and ground water. The major components of the selected remedy included the following:

- Removing and treating contaminated ground water with a carbon adsorption process to restore ground water to drinking water standards.
- Treating the contaminated soil in place (proposed treatment technologies included soil washing, soil fixation, and bioremediation), at the time of the ROD, this excluded soil within the wood-treating process area, which was to be addressed when the area became accessible, preferentially when operations ceased at the Site.
- Capping the wood treating area.
- Providing a permanent water supply of sufficient volume to those residents with contaminated wells until remedial objectives are met.
- Discharging treated ground water to the aquifer.

**Summary of Explanation of Significant Difference.** The Explanation of Significant Difference (ESD) was prepared for U.S. EPA in January 1991, to supplement the 1989 ROD. The ESD specified that the existing remedial objectives for soil remain in effect for surface soils down to a total depth of 5 feet bgs only, unless excavation deeper would prevent extending appreciably the groundwater remedy. This conclusion was based upon the evaluations presented in the *Revised Leachability and Degradation Study*, which recommends that the subsurface soils (soils between 5 feet bgs and the water table) impacts be controlled as potential sources of additional ground water impacts.

**Summary of Soil Removal Action.** While conducting the field bioremediation treatability study in 1993, PCDDs/PCDFs (dioxins) above industrial standards for workers, as per the 1989 ROD, were detected in onsite surface soils. U.S. EPA ordered a soil removal action for these soils and those from the former pole wash area and required that the soil be excavated and disposed onsite in Cell No. 1.

In August 1995, soil disposal Cell No. 1 (RCRA-designated Class I landfill) was constructed On Property. The landfill was double-lined with 60-milliliter flexible membrane and equipped with leachate monitoring equipment and an unsaturated-zone monitoring apparatus.

**Summary of ROD Amendment No. 1-Soil.** The original selected remedy for soil was to treat in place, and the following technologies were investigated and found not to be effective or acceptable as a selected remedy:

- A treatability study for soil washing was conducted in 1992 to 1993 for Unit S2. Soil washing was found to be ineffective at treating all ROD constituents to meet ROD standards, and left residuals in soil wash water that were not treatable.
- A soil fixation treatability study was completed in 1994 for Unit S4. Soil fixation failed to successfully reduce the leachability of PAHs and PCP on a consistent basis.
- Laboratory soil bioremediation treatability studies of cancerous PAHs and PCPs were completed during 1992 and 1994 for Unit S1. Although soil bioremediation was shown to enhance the biodegradation of PCP, it was ineffective in treating PCDD/PCDF.

Results from the treatability tests for soils showed that ROD-selected technologies were not capable of reducing contaminant levels to less than ROD-selected standards for residential land use, particularly given the widespread dioxin contamination discovered in 1993. ROD Amendment No. 1 was issued for the Site in August 1996, revising the original ROD soil remedy. The amendment changed the soil remedy to an onsite landfill and revised soil cleanup standards from residential to industrial, thus requiring deed restriction on the property. Onsite soil disposal Cell No. 2 was constructed (also a RCRA-designated Class I landfill). Cell No. 2 was filled with 146,930 cy of material from 1996 to 2002 (see Table 2).

ROD Amendment No. 1 also addressed the following areas not included in the 1989 ROD:

- Drums of debris from the 1987 fire
- The soil filter bed of the biological treatment unit
- Sediments in the fire pond

Figure 3 shows the disposal cell locations and areas of site remediation.

## Summary of ROD Amendment No. 2-On Property and Off Property Ground Water.

**On Property.** A product recovery well, PR-1, was installed adjacent to the former creosote pond in Unit S2 during 1994 for dense nonaqueous phase liquid recovery. While PR-1 accomplishes some mass removal, the viscous nature of the residual creosote prevents removal of appreciable quantities of material from the creosote pond and cellon blowdown area, where an estimated 1 million gallons of free creosote exists over an area of approximately 4 acres. Since 1994, PR-1 has removed 1,270 gallons of product and emulsion (TRC, 2003b).

ROD Amendment No. 2 was issued in September 1999, which modified the ground water remedy for On Property to provide for the following:

- A 4-acre TI Zone, including the area of the former creosote pond and cellon blowdown areas. The major components of the TI Waiver included: (1) sampling for chemicals of concern within the TI Zone and downgradient; (2) provision for future installation of a new well downgradient of the TI Zone for monitoring; and (3) continuation of product recovery at PR-1 and PAH in situ bioremediation at well BW-1 until the creosote recovery at well PR-1 is less than 1 gallon per year.
- Adding enhanced in situ bioremediation as a ground water remedy.
- Providing monitored natural attenuation as a contingency remedy.
- Revised ground water standards for PCP from 2.2 to 1.0 ppb and for barium from 680 to 1,000 ppb.

The ROD Amendment No. 2 stipulated the following for enhanced in situ bioremediation of PCP On Property:

- Nutrient addition (oxygen, nitrogen, and phosphorus) to onsite wells with downgradient monitoring.
- Continued operation of onsite ground water extraction and treatment system.
- Annually evaluate and enhance program accordingly.

**Off Property.** The ROD Amendment No. 2 stipulated the following for enhanced in situ bioremediation Off Property:

- Nutrient addition (oxygen, nitrogen, and phosphorus) to offsite wells with downgradient monitoring.
- Annually evaluate and enhance program accordingly.
- Well RI-11 was proposed for nutrient addition; therefore, alternate water supply termination criteria were modified for wells 59, 60, 61, 62, and 81 (U.S. EPA, 1999). PCP verification sampling for these wells cannot take place until nutrient addition at RI-11 has ceased for 1 year to allow for the return of background levels. After this time, if PCP concentrations are less than 0.5 ppb for four consecutive quarters, then the use of the alternate water supply can cease.

## 2.2 Remedial Construction Activities

In response to and in compliance with the 1989 ROD, Consent Decree, ESD, and ROD Amendment Nos. 1 and 2, the following remedial construction activities have been conducted at the site.

### 2.2.1 Ground Water

**On Property.** Beazer constructed the On Property ground water remediation system and began treating ground water extracted from two wells, EW-1 and EW-2, in February 1994. Ground water is treated using air stripping and granular activated carbon. The system is designed to pump 200 gallons per minute (gpm) from each well for a combined capacity of 400 gpm. Treated ground water is reinjected into the aquifer through injection wells IW-3 and IW-4. The onsite ground water remediation system is currently operating and has treated more than 1.7 billion gallons of water to date (GeoTrans, 2003).

Ground water sampling for each contaminant of concern (COC) within the TI Zone and downgradient has continued both On Property and Off Property since 1985. Frequency of sampling is dependent upon the location and contaminant history. A new monitoring well downgradient of the TI Zone is proposed but has not yet been installed; and is not required until 1 year prior to the shutdown of the On Property treatment system.

The product recovery well PR-1 was installed in 1994, in response to Consent Decree requirements. The well is a passive recovery system installed in the center of the creosote dense nonaqueous-phase liquid. Through December 2002, 1,270 gallons of product and emulsion have been recovered (GeoTrans, 2003). Product recovery is continuing at PR-1 and monitored every 2 weeks.

Product recovery was augmented in July 1995 by in situ bioremediation. The intent was to remediate the aqueous-phase PAH impacts resulting from creosote in the saturated zone. The in situ bioremediation was discontinued in June 2001 because the treatment was found to increase the mobility of the PAHs. Currently, treatment in the TI Zone is to be reviewed annually for applicable new biotechnology.

The onsite in situ bioremediation program of the eastern PCP plume began in March 1998. Oxygen-releasing compounds and di-ammonium phosphate additions are made to monitoring wells MW-1, MW-4, MW-6, MW-12, MW-13, and MW-23 on a quarterly basis. Downgradient monitoring wells corresponding to these in situ bioremediation locations are MW-3, MW-5, MW-7, MW-8, and TW-1. Figure 4 shows the extent of the current onsite PCP plume.

The TI Waiver was presented in ROD Amendment No. 2 in September 1999. The TI Waiver states the following will apply to the On Property Pump and Treat (P&T) facility (located downgradient of the TI Zone) once the ground water outside the TI Zone is remediated:

- Six months prior to placing the P&T facility on standby reserve, a detailed contingency plan will be submitted to the U.S. EPA for approval.

- The TI Zone contingency plan will describe activities necessary to maintain the On Property P&T facility in good working order with the ability to resume normal operations within 1 month of determination that any COC is leaving the TI Zone (P&T operations must resume if 95 percent of the upper confidence limit of the mean for four consecutive sampling events for a COC exceeds the ROD standard).

ROD Amendment No. 2 also approved monitored natural attenuation (MNA) as a contingency on the basis of the following criteria:

- The intended effects of enhanced in situ bioremediation, a reduction of PCP concentrations in ground water to below the ROD standard, are not adequately achieved.
- If other active restoration measures are proven not necessary.
- Site data indicate that PCP degradation is occurring.
- Within a reasonable timeframe, natural attenuation is expected to achieve cleanup levels similar to that of a treatment remedy.

These criteria have not been met; therefore, MNA has not been implemented at the site.

Performance and results of the enhanced in situ bioremediation program are reported annually in the Annual Remedial Action Ground Water Monitoring Report, and future recommendations are provided. Hydrographs presented for onsite wells in monitoring reports show PCP concentrations declining or remaining constant for all downgradient wells except MW-2.

During the final soil cleanup of process Area 8C, boron and PCP were released to the ground water beneath the former Dri-Con/CCA Area. This release has impacted the ground water near and downgradient of the former Dri-Con Area. MW-8 is located approximately 200 feet downgradient of the Dri-Con Area. Boron and PCP concentrations in samples from MW-8 have been as high as 12,000 micrograms per liter ( $\mu\text{g}/\text{L}$ ) and 1,100  $\mu\text{g}/\text{L}$ , respectively (collected April 2002). As of July 2003, the boron and PCP concentration in samples from MW-8 had decreased to 1,530  $\mu\text{g}/\text{L}$  and 250  $\mu\text{g}/\text{L}$ . MW-8 is sampled on a monthly basis. Figure 5 shows the current extent of the plume.

The current approach to maintain the ROD standard for boron is to pump MW-8 at a rate of approximately 35 gpm and add that flow to the treatment plant influent from extraction wells EW-1 and EW-2 for a total flow of 400 to 435 gpm. The combined influent is then treated for PCP and is diluted to below the ROD standard of 1,200  $\mu\text{g}/\text{L}$  prior to reinjection at upgradient wells IW-3 and IW-4. This reinjection is approved by the state RWQCB.

The extent of the boron and PCP resulting from the 2001 release is relatively limited. Other On Property wells have shown a consistent decrease in PCP concentrations. Off Property wells are consistently below 20  $\mu\text{g}/\text{L}$  for PCP (with the exception of well 86). It is anticipated that the On Property ground water cleanup completion will take significantly longer than the Off Property. Upon completion of Off Property and On Property ground water cleanup, DTSC will assume the role of oversight for long-term operations and maintenance (O&M).

**Off Property.** Beazer continues to provide an alternate water supply for seven affected residences. Five residences have impacted wells near the residual Off Property plume

(wells 59, 60, 61, 62, and 81), and two residences are near monitor well 86 (31C2 and 31D3), which has shown periodic PCP readings. In situ bioremediation is being used to remediate the residual Off Property ground water plume. Monitoring is being conducted for comparison against ROD-selected standards to gauge remedial performance.

The Off Property ground water remedial system began operation in March 1993. This system includes two extraction wells, EW-3 and EW-4, designed to pump at 300 gpm each for a combined capacity of 600 gpm. Ground water was filtered and treated with granular activated carbon to remove PCP and other ROD constituents. During operation, the remediation system extracted 626,578,940 gallons (Geo Trans, 2002). This system was taken offline in December 1995, as the original plume retreated north of the Off Property capture zone.

The revised offsite in situ bioremediation program began in August 1998. Thirteen additions of oxygen-releasing compounds and di-ammonium phosphate have been made to wells 26, RI-11, and RI-20A. Downgradient monitoring points corresponding to these locations include RI-2, RI-10, RI-12, and RI-16B. With exception of well 86, located just south of the On Property boundary along Bagget Marysville Road, PCP readings continue to decline. Figure 6 shows the extent of the current Off Property PCP plume.

Well 86 is subject to periodic detections of PCP ranging as high as 100 µg/L. The source PCP and transport mechanism for this PCP is not clearly understood, but appears to be related elevated water levels in the A-zone. Water level data indicate that well 86 is located within the capture zone of EW-2. No PCP has been detected in downgradient well 31C1, which further suggests the PCP is being captured. The current approach is to monitor both well 86 and downgradient well 31C1 on a quarterly basis until PCP concentrations decline at well 86 for a minimum of 1 year. At that time, this approach will be re-evaluated.

### **2.2.2 Soil**

In compliance with ROD Amendment No. 1, all excavations have been completed, including the former process area. Soil excavation for Cell No. 2 commenced in 1996 and was completed in September 2002 when process Area 8C became available after the facility closure. All excavated soil was disposed of in Cell No. 2, and the final cap was constructed in accordance with approved work plans. Table 2 summarizes soil removal and remedial actions from 1995 to 2002.

### **2.2.3 Institutional Controls**

As part of the selected remedy stated in ROD Amendment No. 2 for this Site, implementation of institutional controls is required to prevent exposure to principal threat contamination remaining in the TI Zone. These institutional controls are to be implemented by Beazer, with input from the U.S. EPA and the DTSC through a land use covenant deed, which will restrict the entire site to industrial use and prohibit drilling of wells within the TI Zone for purposes other than monitoring or remedial activities. Use of ground water within the TI Zone would be prohibited except for wood-treating operations. Future land use will be limited to industrial uses only.

These institutional controls have not yet been implemented. The language of the deed restriction has been approved by DTSC, and is to be implemented by the 2003 amended

Consent Decree between Beazer and the U.S. EPA. Completion is expected by December 2003.

**TABLE 2**

Summary of Soil Removal and Remedial Actions from 1995 to 2002<sup>a</sup>

*Preliminary Closeout Report for Koppers Company, Inc., Oroville, California*

Area	Description	Soil Removal Period	Approximate Volume of Soil Removed (cy)	Location of Soil Disposal
Removal Action (Part of 5 and 7e)	Part of Former Pole Washer Area and Former Log Drying Area	1995	13,000	Cell No. 1
1	Former Biological Treatment Facility	1996	21,000	Cell No. 2
2	Soil Storage Building	1996	3,100	Cell No. 2
3	Fire Debris Storage Area	1996	600	Cell No. 2
4	Former Creosote Pond and Cellon Blowdown Area	1996 to 1997	20,500	Cell No. 2
5	Former Pole Washer Area (remainder)	1997	4,830	Cell No. 2
6A	Former Drip Track Area	1997	15,200	Cell No. 2
6B	Former Drip Track Area	1997		Cell No. 2
7A	Former Log Drying Area	1997	28,300	Cell No. 2
7B	Former Log Drying Area	1997		Cell No. 2
7C	Former Log Drying Area	1996 to 1997		Cell No. 2
7D	Former Log Drying Area	1997		Cell No. 2
7E	Former Log Drying Area (remainder)	1997		Cell No. 2
8A	Former Process Area	1997	41,000	Cell No. 2
8B	Former Process Area	1997		Cell No. 2
8C	Former Process Area	1997 and 2002		Cell No. 2
8D	Former Process Area	1997		Cell No. 2
9	Fire Water Pond	1997	3,600	Cell No. 2
10	Biological Test Plots	1997	1,800	Cell No. 2
	Dri-Con Area	2002	6,000	Cell No. 2
	Miscellaneous Materials from KII RCRA Closure	2002	1,000	Cell No. 2
	Total		159,930 <sup>b</sup>	13,000 cy in Cell No. 1 146,930 cy in Cell No. 2

<sup>a</sup>TRC 1999, and personal communication 2002.

<sup>b</sup>Volumes are estimated, based on load counts from each soil removal area.

## 2.2.4 Redevelopment Potential

A portion of the property (205 acres) that has been remediated is currently for sale. It is zoned as industrial and may be divided into multiple parcels. Amenities include electrical power, a city water supply, and two existing buildings, an office and a warehouse with railway access.

The potentially responsible party intends to develop the Site as an industrial park and/or trucking facility over the next few years using state tax incentives for the Oroville area.

### **3.0 Demonstration of Cleanup Activity Quality Assurance and Quality Control**

Activities at the Site were performed in accordance with the requirements of the ROD, ROD Amendments, and Consent Decree, and with RD plans and specifications. The RD Report includes a Quality Assurance Project Plan that incorporates U.S. EPA quality assurance and quality control (QA/QC) procedures and protocol. U.S. EPA analytical methods were used for all samples collected during remedial action activities and for data validation. Reports detailing construction of Cell 2, demolition, soil removal and backfill activities have been prepared by TRC (Beazer's consultant) and submitted to U.S. EPA. The most recent report was submitted in January 2003 (TRC, 2003).

The typical procedures used to assure quality for the ground water remediation and soil removal activities documented in this and other reports are as follows:

- Preconstruction meetings and overview of construction requirements.
- During construction activities, routine observation/inspection and audits by TRC and Beazer representatives to assure conformance to the Construction QA Plan and the Quality Assurance Project Plan.
- Weekly meetings attended by representatives from Beazer, KII, Envirocon, SESI, and TRC.
- Meetings, as needed, particularly for problem resolution and communication of project requirements to other parties.
- Interface and updates to regulatory personnel.
- Routine interface and updates to Beazer personnel.
- Routine interface between the design engineers and construction management team for clarification and/or other variances.
- Field documentation.
- Periodic status review meetings between representatives from regulatory agencies, Beazer, TRC, and other consultants, as appropriate.
- Validation of analytical results.
- Preparation of monthly status reports, monthly discharge reports, and semi-annual and annual ground water monitoring reports.

The final soil removal and cleanup of Area 8C, completed by KII, was a RCRA closure that occurred between summer 2000 and summer 2003. In California, RCRA authority is delegated to the state (DTSC) and employs a self-monitoring approach. DTSC was provided with a copy of the RCRA closure work plan and its subsequent revision.

Independent QA activities were performed by TRC. Complete reports and work plans documenting all procedures used to verify construction activities were performed in accordance with approved specifications and ROD standards. QA activities are recorded in the following documents:

- *Closure Report for the Former Biological Treatment Facility, Koppers Company, Inc., Superfund Site, Feather River Plant, Oroville, California (TRC, 1997a).*
- *Revised RD/RA Workplan for the Expanded Phase Soil Remedy, Koppers Company, Inc., Superfund Site, Feather River Plant, Oroville, California (TRC, 1997b).*
- *Soil Removal Addendum No. 6 - Remaining Shallow Soils Areas, Koppers Company, Inc., Superfund Site, Feather River Plant, Oroville, California (TRC, 1997).*
- *Construction Documentation and Closure Report for Cell No. 2 and Associated Soil Removal Activities, Volume 1 of 3, Koppers Company, Inc., Superfund Site, Feather River Plant, Oroville, California (TRC, 1999).*
- *Soil Remediation Work-Plan Dri-Con/CCA Area, Koppers Company, Inc., Superfund Site, Feather River Plant, Oroville, California (TRC, 2002).*
- *Construction Documentation and Closure Report for Cell No. 2 and Associated Soil Removal Activities, (2002 Addendum), Koppers Company, Inc., Superfund Site, Feather River Plant, Oroville, California (TRC, 2003).*
- *Annual GW Monitoring reports for MW under Cell Nos. 1 and 2. 1995 through 2001 (submitted to date).*

Health and safety protocols were performed in accordance with the Site Health and Safety Program (Dames and Moore, submitted to the U.S. EPA on November 29, 2001.) and other addenda to the Health and Safety Program such as Dust Monitoring Revision 1.0 (TRC, 1997).

## 4.0 Activities and Schedules for Site Completion

The activities that remain to be completed for the Site are summarized in Table 3.

## 5.0 Summary of Remediation Costs

The total cost of the selected remedy as of 2003 is approximately \$43.2 million. Estimated costs are as follows:

1989 ROD estimated capital O&M	\$77.7 million
Total RA cost to PCOR	\$43.2 million
Current estimate annual O&M	\$230,000

**TABLE 3**  
 Completion Schedule  
*Preliminary Closeout Report for Koppers Company, Inc., Oroville, California*

<b>Task</b>	<b>Estimated Date of Completion</b>	<b>Responsible Organization</b>
Deed restrictions: a legal description of the site and the interior areas to be restricted are required and the deed restrictions must be recorded	December 2003	Beazer
Annual review of current On Property and Off Property programs and applied technologies for ground water remediation	April 2004	U.S. EPA, Beazer
Prepare Third Five-Year Review	February 2008	U.S. EPA
Final RA complete report	December 2024	U.S. EPA
Final Close-out Report	December 2024	
Deletion from NPL	September 2025 <sup>a</sup>	U.S. EPA

<sup>a</sup>Ground water completion estimate.

## 6.0 Five-Year Review

CERCLA requires that statutory five-year reviews be conducted at the Site if upon completion of the remedial action, hazardous substances, pollutants, or contaminants will remain onsite above levels that will prevent unlimited an unrestricted exposure. The Site is restricted for industrial use and a TI waiver was granted in 1999 for four of the sites 205 acres requiring five-year review of the remedy protectiveness.

Five-year reviews were completed in December 1997 and February 2003. Both five-year reviews concluded the remedy was protective. The next, or third, review is due February 2008.

## 7.0 Works Cited

Dames & Moore. 1996. *Soil Removal Action Closure Request, Koppers Company, Inc., Superfund Site*. August.

Dames & Moore. 1988. *RI/FS Remedial Investigation Report, Koppers, Feather River Plant, Oroville, California*. June 27.

Environmental Solutions, Inc. 1994. *Engineering & Design Report Onsite Soil Disposal Cell, Koppers, Company, Inc*. July.

GeoTrans. 2003. *Annual 2002 Remedial Action Groundwater Monitoring Report, Koppers Company, Inc., Superfund Site (Feather River Plant), Oroville, California*. April.

GeoTrans. 2002. *Annual 2001 Remedial Action Ground water Monitoring Report, Koppers Company, Inc., Superfund Site (Feather River Plant), Oroville, California*. April.

GeoTrans. 2001. *Annual 2000 Remedial Action Ground water Monitoring Report, Koppers Company, Inc., Superfund Site (Feather River Plant), Oroville, California*. March.

HSI Geo Trans. 1999. *Final Evaluation of Technical Impracticability of Ground water Restoration in the Former Creosote Pond and Cellon Blowdown Areas, Koppers Company, Inc., Superfund Site (Feather River Plant) Oroville, California*. March 8.

