SIXTH FIVE-YEAR REVIEW REPORT FOR KOPPERS COMPANY, INC. (OROVILLE PLANT) SUPERFUND SITE BUTTE COUNTY, CALIFORNIA

PREPARED BY

U.S. Army Corps of Engineers

Seattle District

FOR

U.S. Environmental Protection Agency

Region 9

Approved by:
DANA BARTON

Date:
Digitally signed by DANA BARTON
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Dana Barton, Assistant Director
California Site Cleanup and Enforcement Branch
Superfund and Emergency Response Division
U.S. Environmental Protection Agency, Region 9

Executive Summary

This is the sixth Five-Year Review of the Koppers Company, Inc. (Oroville Plant) Superfund Site located in Oroville, California. The purpose of this Five-Year Review is to review information to determine if the remedy is and will continue to be protective of human health and the environment.

The approximately 205-acre Site is located within Butte County, in the southern portion of the City of Oroville, California, east of Highway 70. Residual waste from wood-treatment operations was historically discharged to unlined evaporation basins located on the Site. Product handling and two fires (in 1963 and 1987) also contributed to Site contamination. Contaminants of concern include pentachlorophenol, isopropyl ether, polycyclic aromatic hydrocarbons, polychlorinated dibenzo-p-dioxins/ polychlorinated dibenzofurans, arsenic, barium, boron, chromium, creosote, and copper.

To address soil and groundwater contamination and to protect long-term human health and the environment, the United States Environmental Protection Agency selected a remedy in the Record of Decision, signed in September 1989. Subsequent changes to the Record of Decision were documented in an Explanation of Significant Differences (January 1991) and two Record of Decision Amendments (August 1996 and September 1999). In accordance with those documents, the following remedy was implemented: excavation of contaminated soils, debris, and sediments; disposal into on-Site landfill cells and capping; extraction and treatment of groundwater contamination with enhanced in situ bioremediation; product recovery; providing an alternate domestic water supply to downgradient impacted community members; and implementing institutional controls, which restrict use of the property. The Environmental Protection Agency signed the Preliminary Close Out Report in 2003 documenting the completion of construction of the selected remedy.

Historically, three contaminated groundwater plumes were present at the Site.

- Eastern On-Property plume – primary contaminant pentachlorophenol.
- Western On-Property plume – primary contaminant creosote.
- Off-Property plume – primary contaminant pentachlorophenol.

The two on-property plumes were within the Koppers property boundary. The on-property groundwater treatment system is still operating with routine operations and maintenance tasks ongoing to control the migration of remaining groundwater contaminants until cleanup levels are achieved. Concentrations of pentachlorophenol are decreasing on-site while concentrations of boron are increasing. The off-property groundwater treatment system was removed in 2007 after the pentachlorophenol groundwater plume was remediated and the aquifer was restored to beneficial use as a drinking water supply.

The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives remain valid. While changes to drinking water standards, the toxicity factors of contaminants, and other Applicable or Relevant and Appropriate Requirements have occurred, none of the changes have impacted the protectiveness of the remedy.

On-property institutional controls restrict groundwater extraction and limit land use to industrial/commercial. Fencing at the property controls access and prevents tampering with and vandalism to the remedy. However, there is no annual inspection requirement for confirming compliance with the land use covenant. Within the last five years, the City of Oroville issued a building permit that violated the land use covenant. The property owner constructed a building on a restricted parcel; thus, the existing process for enforcing the land use covenant is insufficient.

The remedy at the Koppers Company, Inc. Superfund Site is currently protective of human health and the environment because all exposure pathways that could result in unacceptable risk are being controlled. However, in order for the remedy to be protective in the long term, the Department of Toxic Substances Control needs to take additional steps to ensure the land use covenant is complied with, including implementing a Land Use Covenant Monitoring Plan; and Environmental Protection Agency should determine whether the remedy can achieve boron cleanup standards.

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List of Acronyms and Abbreviations

ARAR	Applicable or relevant and appropriate requirement
Beazer	Beazer East, Inc.
EPA	United States Environmental Protection Agency
Koppers	Koppers Company, Inc.
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
PCP	pentachlorophenol
RCRA	Resource Conservation and Recovery Act
Site	Koppers Company, Inc (Oroville Plant) Superfund Site
TI	Technically Impracticable
USACE	United States Army Corps of Engineers

1. Introduction

The purpose of a Five-Year Review is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act Section 121, 40 Code of Federal Regulation Section 300.430(f)(4)(ii) of the National Contingency Plan and EPA policy.

This is the sixth Five-Year Review for the Koppers Company Inc. Superfund Site (Site). The triggering action for this statutory review is the completion date of the previous Five-Year Review. The Five-Year Review has been prepared because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The Koppers Company, Inc. (Oroville Plant) Superfund Site (Site) Five-Year Review was led by Kelia Liang, EPA Region 9 Remedial Project Manager. Participants included Cynthia Wetmore, EPA Region 9 Superfund Five-Year Review Coordinator, Cynthia Ruelas, EPA Region 9 Superfund Five-Year Review Coordinator, and from the U.S. Army Corps of Engineers (USACE): Dan Carlson, Physical Scientist; Jeff Weiss, Hydrogeologist, and Matt Wetter, Environmental Engineer. The review began on November 9, 2022.

Table 1. Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Koppers Company, Inc. Superfund Site		
EPA ID: CAD009112087		
Region: 9	**State:** CA	**City/County:** Oroville, Butte County
SITE STATUS		
National Priorities List Status: Final		
Multiple Operable Units? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Kelia Liang, EPA Remedial Project Manager		
Author affiliation: EPA Region 9		
Review period: 11/9/2022 - 5/19/2023		
Date of site inspection: 3/15/2023		
Type of review: Statutory		
Review number: 6		
Triggering action date: 9/26/2018		
Due date *(five years after triggering action date)*: 9/26/2023		

1.1. Background

Beginning in 1920, Hutchison Lumber operated at the property which later became Site (Figures 1 and 2). In 1948, National Wood Treating Company purchased the property and initiated wood treatment operations with ammoniacal copper arsenate, pentachlorophenol-in-oil mixture and creosote. In 1955, Koppers Company, Inc. (Koppers) purchased the property and expanded wood treatment operations using chemical preservatives such as: pentachlorophenol (PCP), polycyclic aromatic hydrocarbons, creosote, chromated copper arsenate solution, and boron. Chemical fires, wood treatment operations, product and chemical handling methods, and wastewater handling procedures released contamination into soil at the property, which further spread into groundwater.

Historically, three contaminated groundwater plumes were present at the Site (Figure 3). The on-property plumes were within the Koppers property boundary.

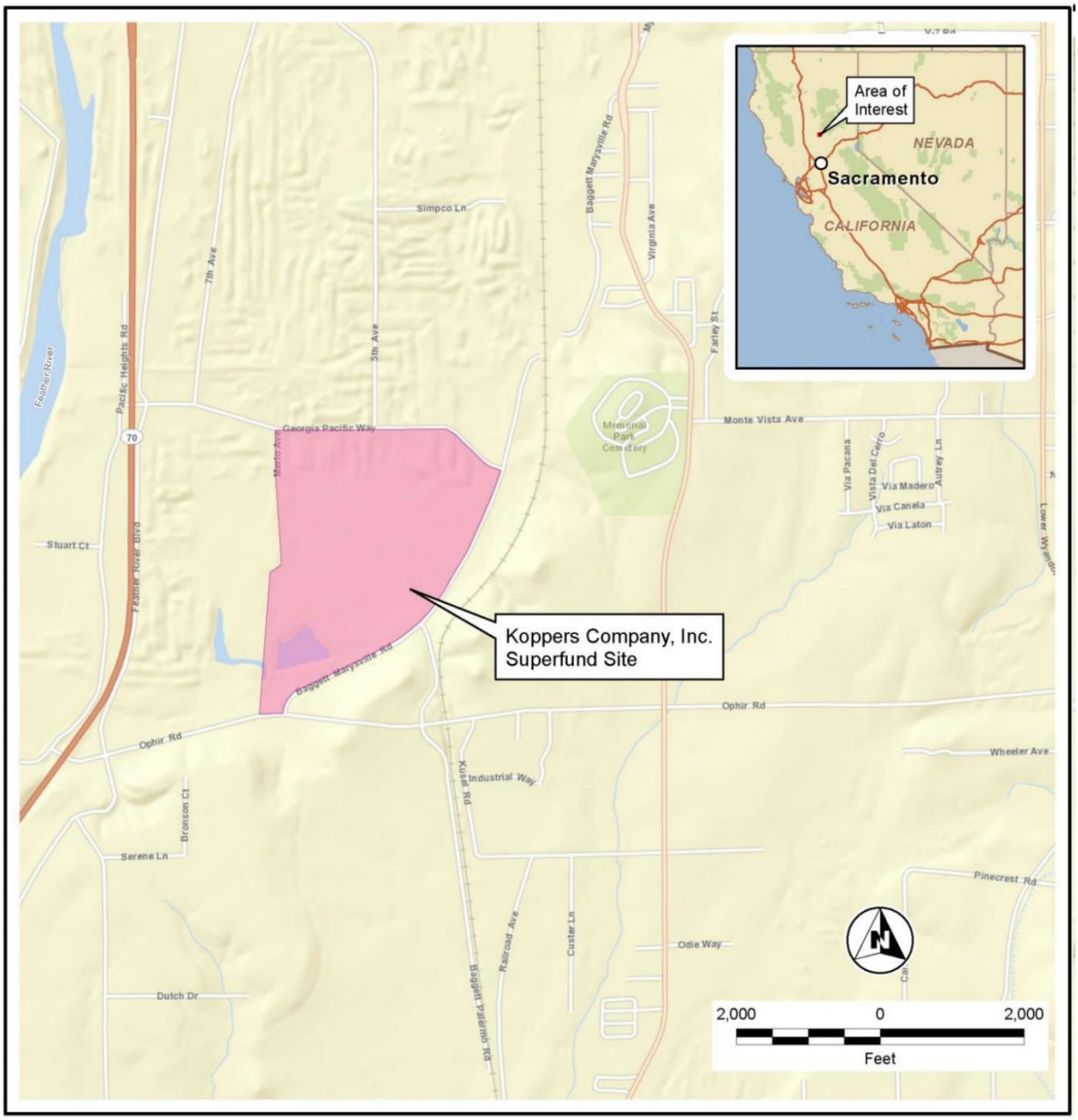
- The Eastern On-Property plume – primary contaminant PCP.
- Off-Property plume – primary contaminant PCP.
- Western On-Property plume – primary contaminant creosote.

In 1988, Beazer East, Inc. (Beazer) assumed responsibility for contamination resulting from Koppers' historical wood treatment operations and continues to conduct remedial response actions at the Site. Prior to assuming responsibility in 1986, PCP was reported in off-property residential wells. Beazer began providing an alternate water supply through the South Feather Water and Power Agency to homes in the affected area of the off-property groundwater plume. Koppers continued to operate the wood treatment facility at the Site until 2001.

1.2. Physical Characteristics

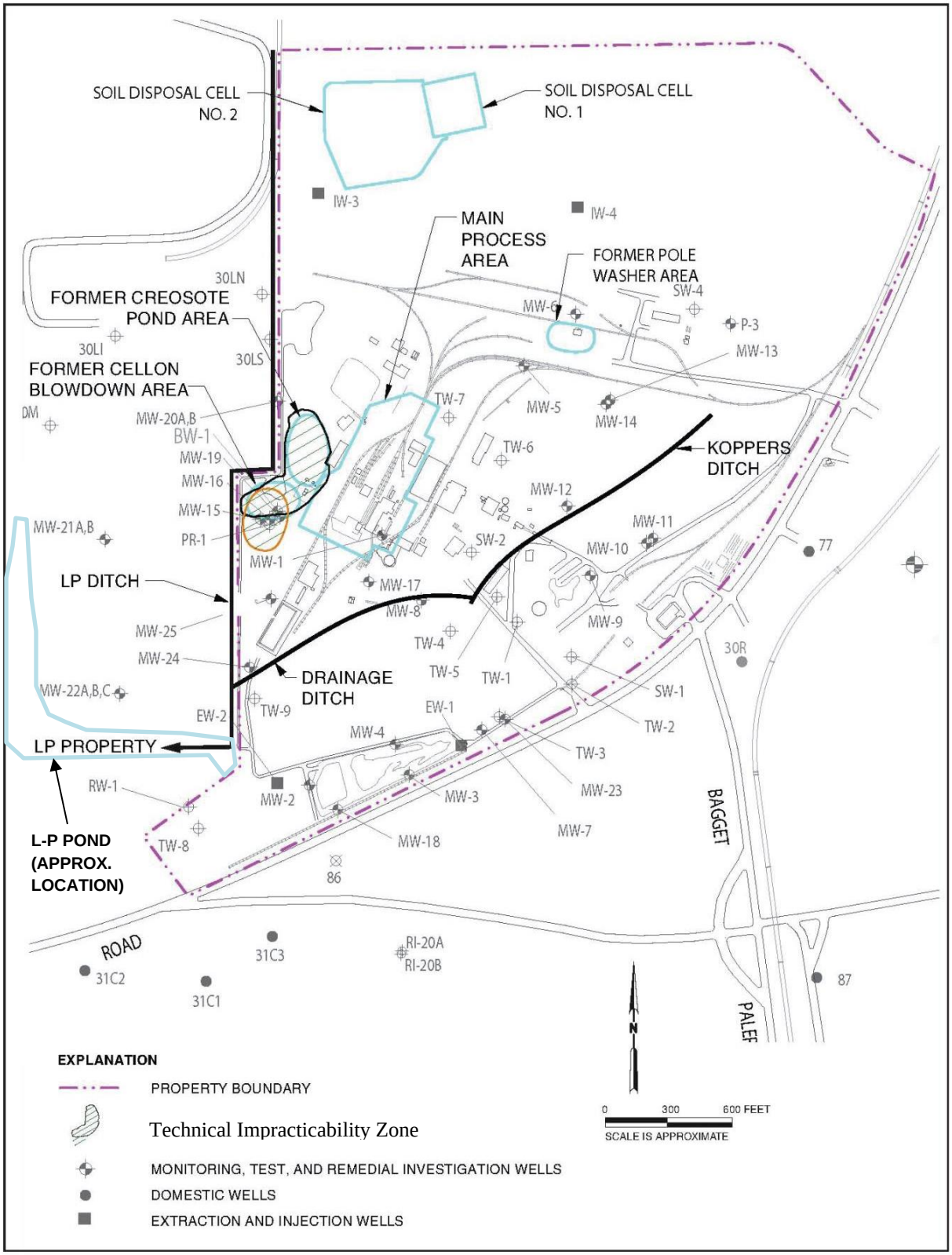
The approximately 205-acre Site is located in Oroville, the county seat of Butte County, California, off Highway 70 on Baggett-Marysville Road (Figure 1). As of 2020, the population of Oroville was approximately 20,042 with over 10,000 people living within a three-mile radius of the Site. Land near the Site is zoned for a mixture of residential, industrial, commercial, and agricultural uses. Many residents raise livestock and grow produce for personal use. There are three schools within a 2-mile radius of the Site (EPA, 1989).

The western boundary of the Site is roughly 3,000 feet east of the Feather River and the Site lies within the Feather River flood plain and an area prone to flood every 500 years. The Oroville Wildlife Area occupies the area west of the Feather River. To the south of the Site the Yuba River flows into the Feather River near Marysville, California. The Feather River then joins the Sacramento River approximately ten miles north of the City of Sacramento.



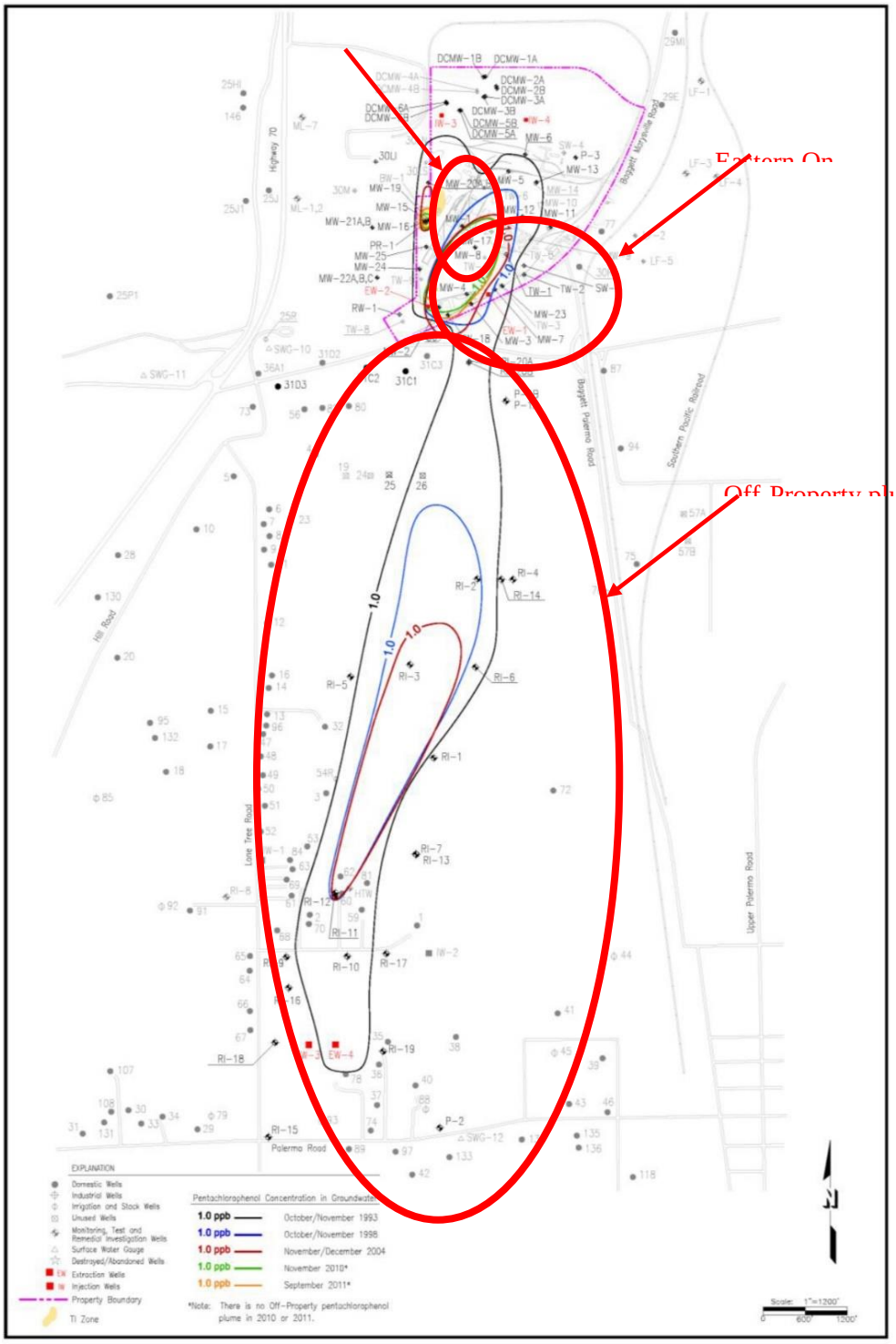
Source: EPA 2013. Fourth Five-Year Review Report for Koppers Company, Inc. Superfund Site. Oroville, Butte County, California.

Figure 1. Location Map



Source: EPA 2003. Preliminary Closeout Report for Koppers Company, Inc., Superfund Site, Oroville, California.

Figure 2. Detailed Map of the Koppers Company Inc. Superfund Site



Source: Tetra Tech GEO, 2013. On-Property Groundwater Remedy Attainment Evaluation Response, EPA letter dated June 14, 2013. Koppers Company, Inc. Superfund Site (Feather River Plant). Oroville, California.
Note: Plume comparison is from 1993 and 2011

Figure 3. On-Property and Off-Property PCP Plume

1.3. Hydrology and Hydrogeology

Site storm water runoff flows into the Koppers Ditch and Drainage Ditch, both leading into the L-P Ditch, located at the western property boundary. The L-P Ditch then drains to the L-P pond west of the Site. The Feather River is located approximately 3,000 feet west of the Site, trending west-southwest at approximately 130 feet above sea level. Groundwater flows to the south at an average velocity of 500 feet per year toward the confluence of the Feather and Yuba Rivers.

The geology underlying the Site consists of gravel, sand, and clay deposits from the Feather River and its ancestral river systems. Three interconnected geologic units or zones, referred to as the A-zone, the B-zone, and the C-zone, occur both on and off-property. The A-zone is primarily mixed gravels that are not saturated at the Site but are water-bearing in areas south of the Site. Beneath the A-zone, confined B-zone and C-zone aquifers, which have varying degrees of hydraulic connectivity, are both present on-property and off-property. The B-zone aquifer is further subdivided into the upper B- and lower B-zone, at approximately 50 to 80 feet below ground surface by discontinuous clay layers. The C-zone aquifer is separated from the lower B-zone by a discontinuous clay zone at approximately 125 feet below ground surface, and the C-zone aquifer extends to an irregular discontinuous silty clay layer at approximately 165 feet below ground surface.

2. Remedial Actions Summary

2.1. Basis for Taking Action

Koppers operated a wood treating facility that injected preservatives under pressure into wood products such as railroad ties and telephone poles to prevent deterioration by insects and fungi. Chemical fires, wood treatment operations, product and chemical handling methods, and wastewater handling procedures released contaminants of concern, specifically PCP, polycyclic aromatic hydrocarbons, metals, and polychlorinated dibenzo-p-dioxins/ polychlorinated dibenzofurans (dioxins) into soil on-property, and groundwater both on- and off-property.

The primary human health risks associated with soil was via incidental ingestion or inhalation of soil contaminated with PCP, creosote, polycyclic aromatic hydrocarbons, metals, and polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (dioxins). The Site was proposed for the National Priorities List in 1983 after the California Department of Health Services and Regional Water Quality Control Board directed investigation of contamination. Later that same year, groundwater contaminated with PCP was found in residential wells over one mile south of the Site. EPA finalized the addition of the Site to the National Priorities List in 1984.

2.2. Remedy Selection

EPA selected remedies for the Site in a Record of Decision, dated September 13, 1989, to address contamination in four separate on-property soil units (designated S1 through S4), and one combined groundwater unit for on- and off-property groundwater. The soil component of the remedy consisted of various in-situ treatment technologies (Table 2). The groundwater component of the remedy included extraction and treatment of the contaminated groundwater and providing an alternative water supply to residents with contaminated drinking water wells.

Table 2. Soil Areas Units and Selected Remedy in 1989 ROD

Soil Unit Number	Area	Technology Selected
S1	Former pole-wash area and areas along the drip track leading to the process area, areas east and south of the process area, the fire debris site at the eastern side of the western spray field, and the surface soils throughout the treated wood transport areas.	In-situ biodegradation
S2	Former creosote pond and cellon blowdown areas, an area of creosote-contaminated soil along the L-P ditch, and sediments in offsite drainage ditches and ponds southwest of the Site.	Excavation and soil washing
S3	Wood-treating process area used in normal production operations at the Site	Capping
S4	East and south of the process area, where wood treated with metals was stored.	Excavation and soil fixation

In 1991, EPA modified the soil remedy in an Explanation of Significant Differences which clarified that the soil remedial objectives applied only to soils from the ground surface to five feet below ground surface and that EPA would establish future cleanup levels for soils deeper than five feet below ground surface to protect groundwater. EPA also required institutional controls, including land use restrictions prohibiting residential use of the plant property (among other things), until EPA determined that the Site was clean enough to remove those restrictions.

In the 1996 Record of Decision Amendment No. 1, EPA changed the soil cleanup levels originally based on residential use to cleanup levels based on industrial use. Additionally, EPA added a requirement to implement deed restrictions that prohibit future residential use at the Site. Under Record of Decision Amendment No. 1, EPA also selected a new remedy for soil. Instead of various in-situ treatment/stabilizations selected for each soil unit, all contaminated soils, from the four soil units as well as soil from other contaminated areas not accessible at that time, were to be disposed in an engineered landfill (Soil Disposal Cell). EPA determined that development of cleanup levels for subsurface soils deeper than five feet below ground surface was not needed, except in the former Pole Wash area and the former Creosote Pond area. The selected remedy required removal of the source material. EPA determined that remaining soil concentrations deeper than five feet at the time would not impact

groundwater. The 1996 Record of Decision Amendment No. 1 also included long-term management and maintenance of the landfill cover and groundwater monitoring around the landfill.

In 1999, EPA issued Record of Decision Amendment No. 2 modifying the groundwater remedy to include a Technical Impracticability Waiver for a 4-acre area of the Western On-Property groundwater plume (Figure 2– 'Technical Impracticability Zone') encompassing the former creosote pond and cellon blowdown areas. EPA determined a need for the Technical Impracticability Waiver because it is technically impracticable from an engineering perspective to achieve the groundwater cleanup levels in the Technical Impracticability Zone due to the presence of dense non-aqueous phase liquid.

The 1999 Record of Decision Amendment No. 2 also augmented the pump-and-treat remedy for the Eastern On-Property groundwater plume, by adding enhanced in-situ bioremediation (i.e., injecting nutrients) into selected on-property wells. EPA additionally selected a contingency remedy of monitored natural attenuation. Finally, EPA selected the implementation of institutional controls through deed restrictions to prevent access to groundwater, surface disturbances, and the addition of new sources of surface water to groundwater in the Technical Impracticability Zone. Future development could create pathways, such as stormwater ponds or ditches, that would cause increased surface water infiltration in the Technically Impractical (TI) zone.

The final remedial action objectives, although not explicitly listed, as such but were implied, in the Record of Decision, Record of Decision amendments or Explanation of Significant Differences, are as follows:

- Containment of contaminated groundwater within the Technical Impracticability Zone.
- Restoration of groundwater to beneficial uses outside the Technical Impracticability Zone.
- Prevention of exposure to contaminated soil and groundwater.

The remedy also requires maintenance and monitoring of the landfill to assure that the landfill does not release any contaminants to groundwater. Table 3 presents the soil and groundwater cleanup levels for the Site.

Table 3. Cleanup Levels

Media	Contaminant of Concern	Cleanup Levels	Basis and Source of Clean-up Level[1]
Soil	Arsenic	7.15 mg/kg	Background; 1996 Record of Decision Amendment 1
	Chromium	181 mg/kg	Background; 1996 Record of Decision Amendment 1
	Carcinogenic Polycyclic Aromatic Hydrocarbons	2.6 mg/kg	1×10^{-5} cancer risk for industrial worker; 1996 Record of Decision Amendment 1
	Dioxins	1 µg/kg	1×10^{-5} cancer risk for industrial worker; 1996 Record of Decision Amendment 1

Media	Contaminant of Concern	Cleanup Levels	Basis and Source of Clean-up Level[1]
	PCP	79 mg/kg	1 x 10^{-5} cancer risk for industrial worker; 1996 Record of Decision Amendment 1
Groundwater	Benzene	1 µg/L	State drinking water standard; 1989 Record of Decision
	Ethylbenzene	680 µg/L	State drinking water standard; 1989 Record of Decision
	Total Xylenes	1,750 µg/L	State drinking water standard; 1989 ROD
	Isopropyl Ether	2,800 µg/L	Cancer risk; 1999 Record of Decision Amendment 2
	Carcinogenic Polycyclic Aromatic Hydrocarbons	7 ng/L	10^{-6} excess cancer risk; 1989 Record of Decision
	Dioxins[3]	5.3 x 10^{-7} µg/L	10^{-6} excess cancer risk; 1989 Record of Decision
	PCP	1 µg/L	Federal drinking water standard; 1999 Record of Decision Amendment 2
	Arsenic	27 µg/L	Background; 1999 Record of Decision Amendment 2
	Barium	1,000 µg/L	State drinking water standard; 1999 Record of Decision Amendment 2
	Boron	1,200 µg/L	Protection of sensitive crops if used for long-term irrigation; 1999 Record of Decision Amendment 2
	Chromium	50 µg/L	State drinking water standard; 1999 Record of Decision Amendment 2
	Copper	1,000 µg/L	State drinking water standard; 1999 Record of Decision Amendment 2

Notes:

[1] The more stringent of the Federal or State drinking water standard was selected as the basis for the groundwater cleanup level.

[2] Carcinogenic PAHs include: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-c,d)pyrene

[3] Formalized in EPA's 1998 Approach for Addressing Dioxin in Soil at Comprehensive Environmental Response, Compensation, and Liability Act, and Resource Conservation and Recovery Act Sites, industrial soil cleanup level.

mg/kg = milligrams per kilogram

µg/kg = micrograms per kilogram

µg/L = micrograms per liter

2.3. Remedy Implementation

2.3.1. Soil Remedial Actions

Soil treatability studies were conducted by Beazer in 1993 (soil washing), 1994 (soil fixation), and 1995 (bioremediation) to evaluate the effectiveness and implementability of the Record of Decision-specified treatment remedy. Upon completion of these studies, EPA found that the proposed remedy was not effective in removing contaminants and thus the technologies were not implementable.

EPA ordered removal of soils in unit S1 after high levels of dioxins were discovered in the bioremediation test plots in 1995. This contaminated soil was landfilled by Beazer in a Resource Conservation and Recovery Act (RCRA)-designated Class I landfill, later referred to as Soil Disposal Cell No. 1. The following year EPA issued Record of Decision Amendment No. 1, which changed the soil remedy for all four soil units to on-property soil disposal.

Beazer placed 146,930 cubic yards of excavated contaminated soil and building materials from the former cellon blowdown area, former pond, former pole washer area, and wood treatment plant operations area in the newly constructed Soil Disposal Cell No. 2, a RCRA-designated Class I landfill, adjacent to Soil Disposal Cell No. 1, near the northern boundary of the Site between 1996 and 2002. Final soil remediation activities at the Site and Soil Disposal Cell No. 2 closure occurred in September 2002. The Site achieved construction completion when EPA signed the Preliminary Close Out Report on September 4, 2003. This report documented completion of all remedial construction activities for Koppers Superfund Site in accordance with closeout procedures for National Priorities List sites.

In September 2003, Beazer and the Department of Toxic Substances Control completed negotiations on the land use covenant intended to protect current and future users of the Site, required by Record of Decision Amendment No. 1 (Figure 4). The land use covenant incorporates restrictions that prohibit certain uses of the property and prohibit certain activities.

2.3.2. Groundwater Remedial Actions

Beginning in March 1986, Beazer began connecting 34 residences downgradient of the Site affected by PCP contaminated groundwater to the Oroville-Wyandotte Irrigation District (now South Feather Water and Power Agency) water supply. Although this remedial action predated the decision document, the 1989 Record of Decision formalized the provision of an alternative water supply to those affected by groundwater contamination.

Beazer constructed two groundwater pump-and-treat systems (one on-property and one off-property) in 1993 and 1994. The groundwater pump-and-treat system for the Eastern on-property plume includes two extraction wells (EW-1 and EW-2/replaced by EW-2R), and two injection wells (IW-3 and IW-4) for re-injecting treated water. Groundwater treatment utilizes air stripping, multimedia filters, and granular activated carbon to achieve the removal of contaminants. Beazer constructed the off-property groundwater treatment system approximately two miles south of the Site. The system included two extraction wells (EW-3 and EW-4), a treatment plant, two injection wells (IW-1 and IW-2), and

approximately 1,500 feet of pipelines. Initially, treated water was discharged to Wyman Ravine, but was later reinjected via injection wells IW-1 and IW-2.

In September 1994, Beazer installed a product recovery well (PR-1) in the former cellon blowdown area and former creosote pond area (i.e., Western Plume) to evaluate whether the subsurface pools of creosote at the Site could be effectively remediated by draining the fluid into the recovery well.

On December 28, 1995, EPA approved suspension of the off-property groundwater pump-and-treat system. Ongoing monitoring demonstrated that concentrations of contaminants in groundwater had been reduced below cleanup standards near the extraction wells, and further pumping of EW-3 and EW-4 would draw contamination downgradient. Analysis of monitoring results determined that more than 95% of the residual plume attenuated during the time the off-property extraction wells operated. EPA approved the deconstruction and removal of the off-property groundwater extraction and treatment system in 2007, 12 years after the system was shut down because of the significant decline in PCP concentrations.

In April 1998, Beazer stopped paying for municipal water (through the alternative water supply) at 26 of the original 34 homes with contaminated residential wells because concentrations of contaminants in the groundwater in the wells of those residences met the cleanup standards in the Record of Decision.

In August 1998, Beazer added in-situ bioremediation of off-property groundwater to augment degradation of PCP. Enhancements (magnesium peroxide and di-ammonium phosphate) were added intermittently to wells 26, RI-11, and RI-20A.

Beazer completed the construction of well MW-8, near the center of the Eastern On-Property Plume, in 2002. This additional well allows the remedial system to contain and extract groundwater with elevated boron concentrations from the former Dri-Con and chromated copper arsenate Tank Area. Since treatment of boron is not possible with granular activated carbon or air stripping, extraction and blending of groundwater from well MW-8 with other influent to the treatment system is the de facto remedy for boron.

EPA approved ending the off-property in-situ bioremediation program in September 2009. Afterwards, each of the wells where enhancements had been added were sampled for four consecutive sampling events. PCP was not detected in the analytical sampling results collected from any of these wells during the four quarterly events.

2.3.3. Institutional Controls

Institutional controls involve controlling exposure to contaminated media by controlling access, implementing administrative policies such as groundwater use restrictions, educating the public, and providing compliance and enforcement mechanisms. Butte County officially recorded a *Covenant to Restrict Use of Property* for the Koppers Company, Inc. Superfund Site on November 12, 2003 (Butte County official records serial no. 2003- 7930, Table 4). The covenant, generally:

- Restricts future Site uses to industrial/commercial uses.

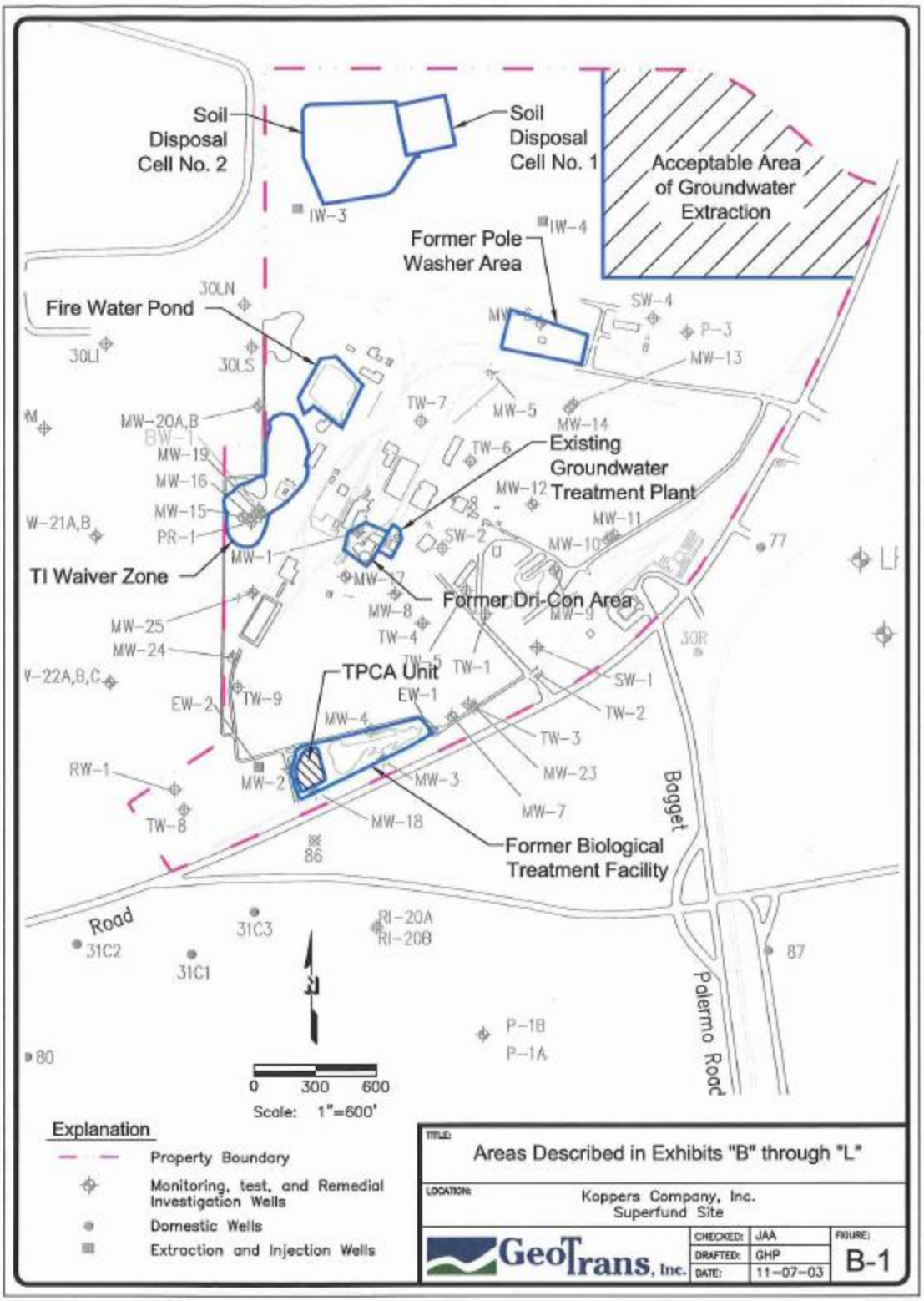
- Requires soil management whenever excavation occurs.
- Restricts access to, and use of, contaminated groundwater beneath the Site.
- Requires that effective drainage patterns be maintained property-wide.
- Prohibits irrigation or other activities that introduce water to subsurface soils.
- Provides right of entry and access for implementing remediation and operation and maintenance.
- Prohibits interference with remedial systems or system components.

The current landowner of parcels 035-470-034 and 035-470-035 entered into a voluntary agreement with Department of Toxic Substances Control on May 2, 2021, to have the land use covenant removed from a portion of their property. The landowner provided Department of Toxic Substances Control with evidence that no contamination remained on the property. On May 27, 2022, Department of Toxic Substances Control issued a memo recording the termination of the covenant to restrict use for a portion of parcels 035-470-034 and 035-470-035. The parcel boundaries were changed and labelled 035-470-038 and 035-470-039 and the covenant was removed from parcel 038.

Table 4. Summary of Implemented Institutional Controls

Media, Engineered Controls, and Areas	Institutional Controls Called for in the Decision Documents	Impacted Parcel(s) 035-470-xxx[1]	Objective	Title and Date (or planned)
Soil and Groundwater	Yes	005, 008, 009, 022, 028, 029, 030, 031, 032, 033, 036, 037, 039	As noted in bullet points above	Land Use Covenant - Environmental Restriction 12 November 2003

[1]In May 2022, Parcels 034 and 035 were divvied up with new boundaries as parcels 038 and 039, and the covenant restricting property use was terminated for parcel 038.

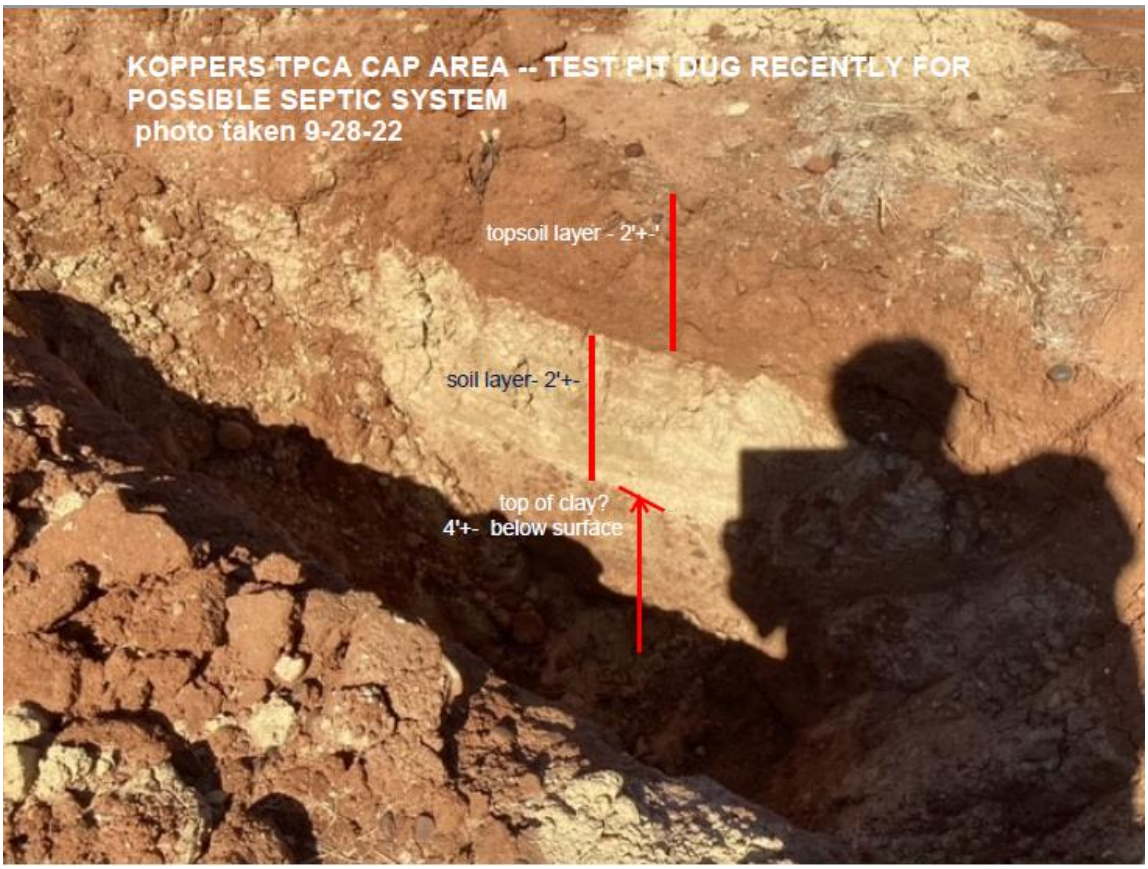


Source: Covenant and Agreement between Beazer East and State of California

Figure 4. Key Site Features in Land Covenant

A violation of the land use covenant occurred at parcel 035-470-005 when a storage shed was constructed on the property and a test pit for a future septic system was excavated. The Toxic Pits Cleanup Act clay cap[1] ("TPCA Unit") is located on the same parcel as the former biological treatment facility. Photos from the test pit (**Error! Reference source not found.**) show a clay layer at approximately 4 feet below ground surface that may be associated with the cap. The footings for the storage shed were excavated approximately 4 feet based on discussion with the property owner (Appendix I). There are no photos or descriptions about what was encountered in the footing excavation. Site grading was also completed for the storage shed and driveway, altering the drainage of the property which also violates the land use covenant.

EPA notified The City of Oroville Planning and Development Department on September 1, 2022, of the violation and the Department of Toxic Substances Control notified the property owner on September 28, 2022. The City of Oroville responded to the EPA with details about the development at the site including pictures of the structure, engineering drawings and a photo of the test pit (**Error! Reference source not found.**).



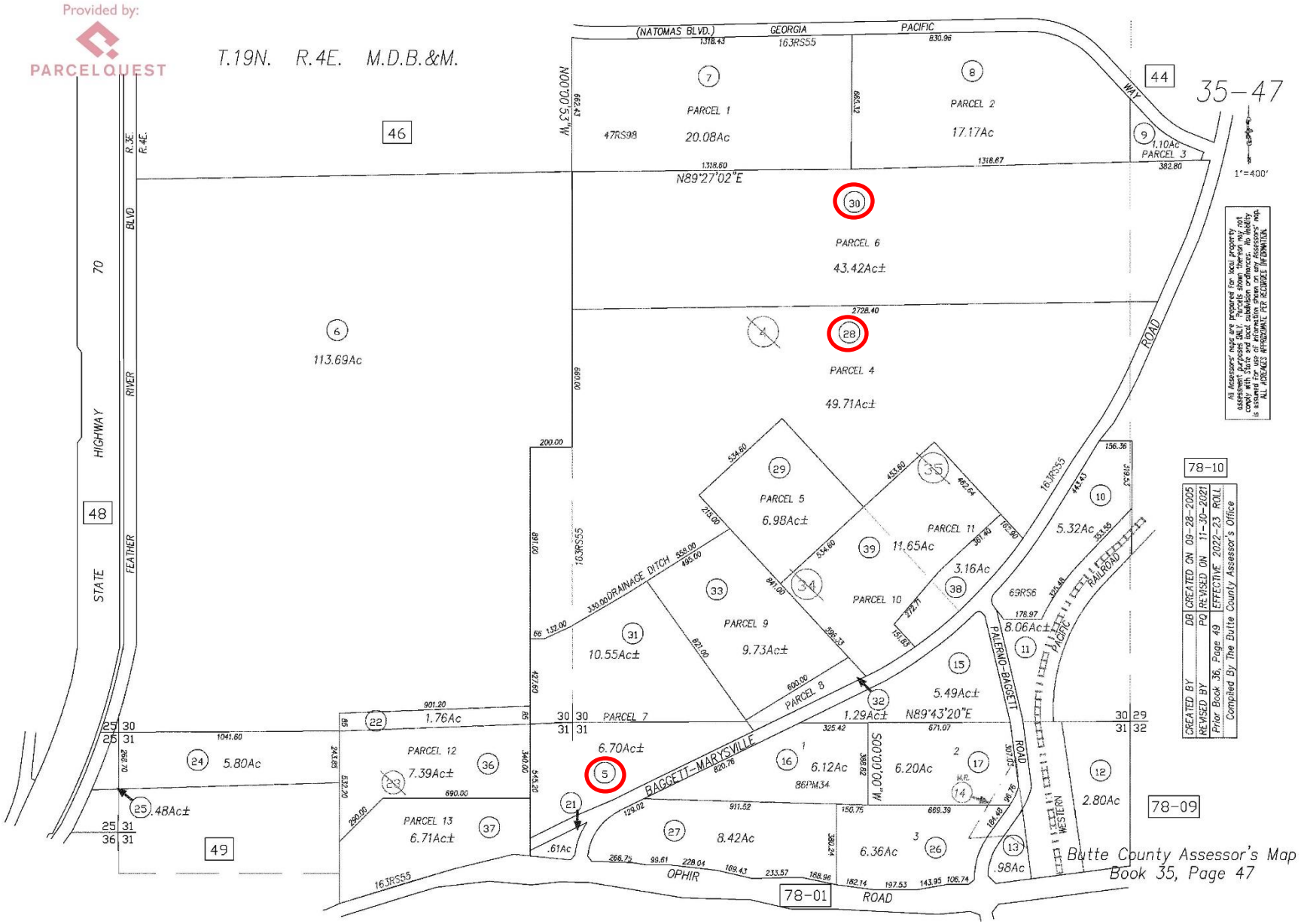
[1] The 1997 Closure Report for the former Biological Treatment Facility, which was located on parcel 035-470-005, describes that the Biological Treatment Facility was a RCRA unit used to treat biological waste associated with wood treatment activities. The Biological Treatment Facility ceased operations in 1988. A Toxic Pits Cleanup Act facility was also located on the parcel and was closed in 1992. A clay cap has been placed over the area previously occupied by the former Biological Treatment facility and Toxic Pits Cleanup Act facility.

Source: City of Oroville Planning and Development Letter to EPA, RE: Storage Shed on Koppers Site in Oroville, APN 035-470-005.

Figure 5. Test Pit at Parcel 035-470-005

The Department of Toxic Substances Control has the primary role for enforcement of the institutional controls for the Site. The City of Oroville is responsible for ensuring the Department of Toxic Substances Control and EPA have the opportunity to review and approve of any applications for building permits on affected parcels before the City of Oroville grants approval of those building permits. There is currently not a requirement for annual inspection to ensure compliance with the land use covenant.

A title search was completed on parcels with contaminated soils covered that are covered by a cap (035-470 -030 and 035-470-005) and the parcel 035-047-028 which overlies the technical impracticability zone. The results of the title search met the requirements of the consent decree. **Error! Reference source not found.** includes the location of the parcels and the complete title searches are in Appendix J.



Source: Butte County Assessor's web site.

Figure 6. Parcel Map

2.4. System Operations/Operation and Maintenance

2.4.1. Operations and Maintenance Requirements

Operations and maintenance requirements are limited to the upkeep of groundwater monitoring wells, groundwater extraction, treatment and reinjection systems, Soil Disposal Cells, fencing to prevent public access, and the product recovery well located on the property. As noted above, Beazer deconstructed and removed the off-property treatment system in 2007 and stopped sampling off-property monitoring wells in 2013.

In 2017, a small electrical fire broke out in Koppers. There was no damage done to the Site or any of the existing treatment facilities. As a result of this fire, EPA updated the August 2009 Preparedness, Prevention and Contingency Plan to include updated emergency numbers, implementation plans, and safety sheets.

2.4.2. Operations and Maintenance Activities over the Past Five Years

The groundwater treatment system was down periodically for short periods for routine maintenance, repairs, and electrical outages. A long period of down time occurred during the First Quarter of 2021, when the treatment system was shut down due to a power outage on January 27, 2021, and remained inoperative for the rest of the quarter due to subsequent equipment malfunctions and rehabilitation activities performed at the three extraction wells. Rehabilitation activities included mechanical and chemical well rehabilitation of extraction wells EW-1, EW-2R, and MW-8. The treatment system resumed operation on April 5, 2021.

3. Progress Since the Last Five-Year Review

3.1. Previous Five-Year Review Protectiveness Statement and Issues

The protectiveness statement from the 2018 Five-Year Review for the Koppers Company Inc. Superfund Site stated the following:

> *The remedy at the Koppers Company, Inc. Superfund Site is protective of human health and the environment because all exposure pathways that could result in unacceptable risk are being controlled. A deed restriction restricts the property to industrial/commercial use only. The Off-Property groundwater has been restored to beneficial use. Current data indicate that the groundwater remediation is progressing and that the remedy is functioning as required to achieve groundwater cleanup standards.*

The 2018 Five-Year Review did not identify any issues or recommendations.

3.2. Work Completed at the Site During this Five-Year Review Period

No significant work, outside of regular groundwater monitoring and operations and maintenance of the groundwater treatment system, was completed during the review period.

4. Five-Year Review Process

4.1. Community Notification, Involvement, and Site Interviews

4.1.1. Five-Year Review Public Notice

A public notice was made available by newspaper posting in the Oroville Mercury-Register on January 13, 2023, stating that there was a Five-Year Review and inviting the public to submit any comments to EPA. No public comments were received. The results of the review and the report will be made available at the Site information repository located at the Butte County Public Library, 1829 Mitchell Avenue, Oroville, CA, 95966 and at https://www.epa.gov/superfund/koppersoroville.

4.1.2. Site Interviews

During the Five-Year Review process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The results of these interviews are summarized below.

EPA solicited written responses to questions from the Department of Toxic Substances Control, the Butte County and City of Oroville Permits Department, the technical consultant working on the cleanup (Tetra Tech, Inc.), and the groundwater treatment system operator (FTS, LLC). The specific responses of individuals from each group can be seen in Appendix F

The Department of Toxic Substances Control provided written responses to questions about the Site in January 2023. They stated that while the land use covenant requires that the Department of Toxic Substances Control and EPA be notified if a restricted property is sold, many parcels have been sold and records could not be found of the required notifications having taken place. They discussed their discovery of the violation of the land use covenant at parcel 035-470-005 (discussed in detail in Appendix E) and they recommended that the responsible party should conduct periodic inspections at least annually to ensure that the land use covenant is not further violated. They also suggested that the Technical Impracticability zone be revaluated to determine if there are any alternative remedies for groundwater restoration in that area.

The City of Oroville provided written responses to questions about the Site in January 2023. They stated that the owner [of parcel 035-470-005] was planning to build two other buildings. They also stated that the Department of Toxic Substances Control gave approval to construct a building and install a septic system on parcel 035-470-035. As noted in Section 2.2.3, on May 27, 2022, Department of Toxic Substances Control issued a memo recording the termination of the covenant to restrict use for a portion of parcel 035-470-035.

Tetra Tech, Inc. provided written responses to questions about the Site in January 2023. They stated that the groundwater remedy is performing well, as contaminant concentrations continue to decline. They suggested shutting down the groundwater treatment system and implementing the contingency remedy of

monitored natural attenuation at the Site. They also suggested assessing whether the active on-property bioremediation program should continue.

FTS, LLC provided written responses to questions about the Site in January 2023. They stated that the system is performing well and that there have been no significant changes to operations and maintenance in the past five years. The only difficulties reported were the rehabilitation of the extraction wells to improve pumping rates (discussed in section 2.4.2.).

4.2. Data Review

Contamination at the Site is currently limited to on-property sources including the Eastern Plume, Western Plume (Technical Impracticability Zone) and Soil Disposal Cells. Off-property groundwater achieved the remediation objective of restoring groundwater to its beneficial use, as a drinking water supply, prior to this current Five-Year Review period and the off-property groundwater monitoring ceased in June 2013.

4.2.1. Eastern On-Property Plume

The remediation of the On-Property Plume has almost achieved its remedial action objective to restore groundwater to beneficial use. Currently, PCP concentrations are below the cleanup goal of 1 µg/L, with the exception of MW-8 (**Error! Reference source not found.**). MW-8 is located near the center of the PCP plume and was converted from a monitoring well to an extraction well in August 2002, primarily to increase the removal of boron, which has remained above the cleanup standard of 1,200 µg/L. During this review period, the PCP concentrations in MW-8 remained above the drinking water standard of 1 µg/L, ranging from 250 µg/L in February 2017 to 1.3 µg/L in October 2021. MW-8 was also the only well with boron concentrations exceeding the cleanup level of 1,200 µg/L with concentrations ranging from 640 µg/L in December 2019 to 2,000 µg/L in August 2017. Mann-Kendall trend analyses using the PCP and boron data from MW-8 indicates that PCP is decreasing while boron is increasing (Appendix C).

Boron was introduced into the groundwater upgradient of extraction well MW-8 in 1998 during the RCRA closure process. The boron plume was originally 7,000 to 12,000 µg/L when first detected in the early 2000s and has decreased overtime. Boron is not removed from the groundwater by the treatment system. Water from MW-8 is blended with water from EW-1 and EW-2R, which have no boron. By blending the water the injected water is below the cleanup level of 1,200 µg/L. Since boron is not being removed from groundwater the concentrations of boron will reach asymptotic levels at MW-8 as boron is circulated through the aquifer.

The on-property remediation system prevents migration of the plume and is making progress toward achieving federal drinking water standards of 1 µg/L for PCP. The treatment system consists of three extraction wells (EW-1, EW-2R and MW-8), a treatment component, two injection wells (IW-3 and IW-4), and in-situ bio-enhancement added quarterly at monitoring wells MW-1, MW-2 and MW-4 (Figure 7). Extraction wells EW-1 and EW-2R are located down gradient of the source area and each pump approximately 150 gallons per minute. Within the past five years, PCP concentrations from extraction wells EW-1 and EW-2R have been below the reporting limit of 0.48 µg/L, and therefore, are not

removing significant PCP mass. However, these extraction wells do provide hydraulic control. Most of the contaminant mass reduction is from extraction well MW-8 and in-situ bioremediation.

The hydraulic capture is verified by comparing groundwater flow direction and gradients over time. The flow direction and gradient were compared over time using groundwater contour maps that were based on groundwater elevations collected from 34 on-property wells. The most recent groundwater contour map from February 2022 had a similar flow direction and gradient as the contour maps from the same time of year during the previous five years (Appendix C), indicating that groundwater capture has not changed.

In addition to monitoring the PCP concentrations at the extraction wells, two monitoring wells (MW-3, and 86) are sampled for PCP along the downgradient property line. PCP concentrations have been non-detect at MW-3 during the previous five years. Well 86 is the furthermost downgradient monitoring well for the PCP plume and concentrations were non-detect during three of the four sampling events during the previous five years with the only detection of 1.3 µg/L in December 2017.

The PCP concentrations at MW-8 will likely be below the cleanup level of 1 µg/L in the next five to ten years based on the trends from the previous ten years (Figure 7). The boron concentrations are likely asymptotic and will stay near the cleanup level of 1,200 µg/L.

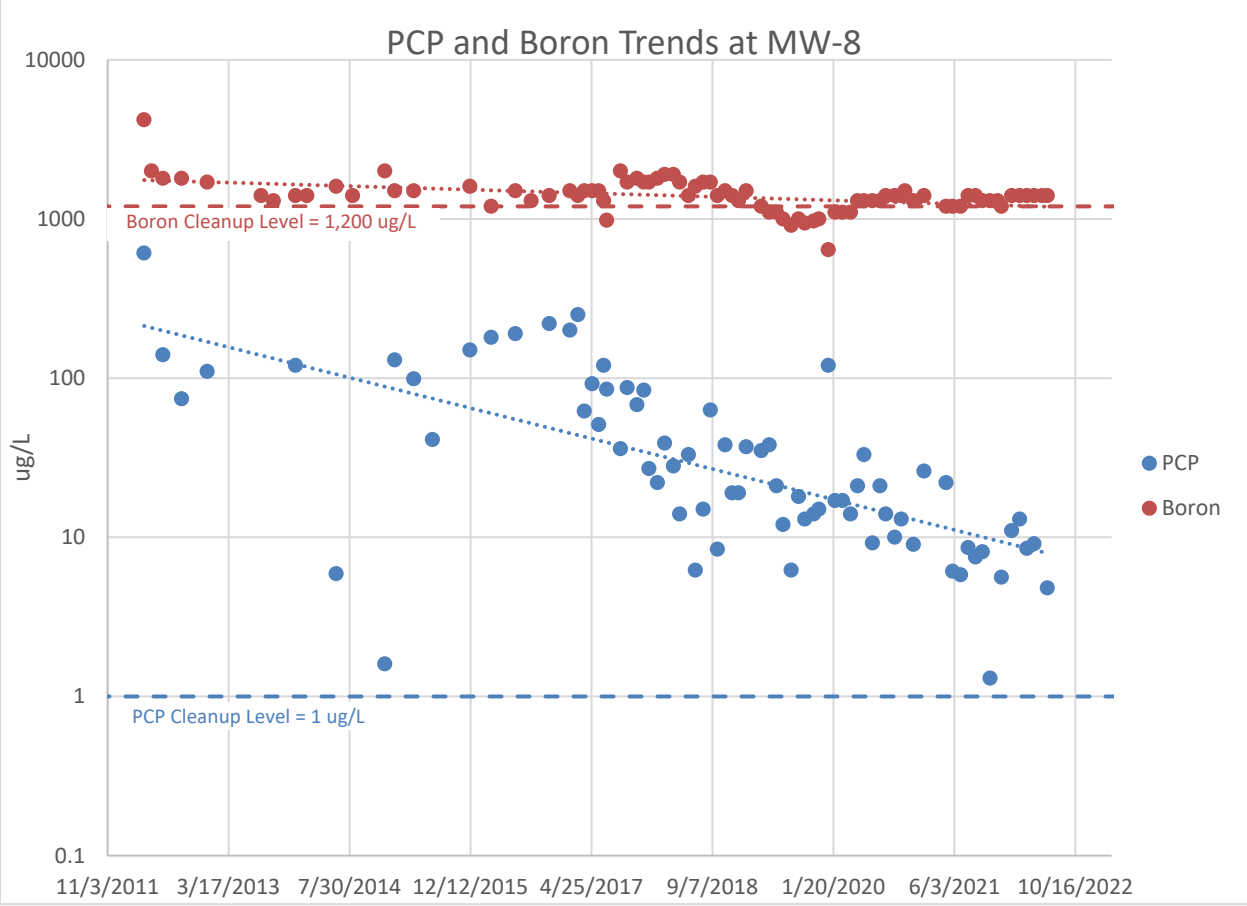


Figure 7. PCP and Boron Trends at MW-8

4.2.2. Western On-Property Plume (TI Zone)

The contamination within the Technical Impracticability (TI) Zone has not migrated outside the TI Zone over the past five years. Groundwater samples are collected annually from well MW-24, which is located downgradient of the TI Zone and used to monitor containment. PCP concentrations have been non-detect in MW-24 during the previous five years.

A product recovery well (PR-1) removes creosote from the TI Zone, as required in Record of Decision Amendment No. 2. According to the annual reports from the previous five years approximately 50 to 100 gallons of free product is removed from PR-1 each quarter. The Record of Decision Amendment No. 2 estimates that approximately one million gallons of free product may be within the TI Zone footprint. Although the creosote removed from the product recovery well is not significantly reducing the overall quantity of creosote, its continued operation meets the Record of Decision Amendment No.2 requirement that PR-1 operate until creosote recovery is less than one gallon per year at PR-1.

Table 5. Summary of Product Removal

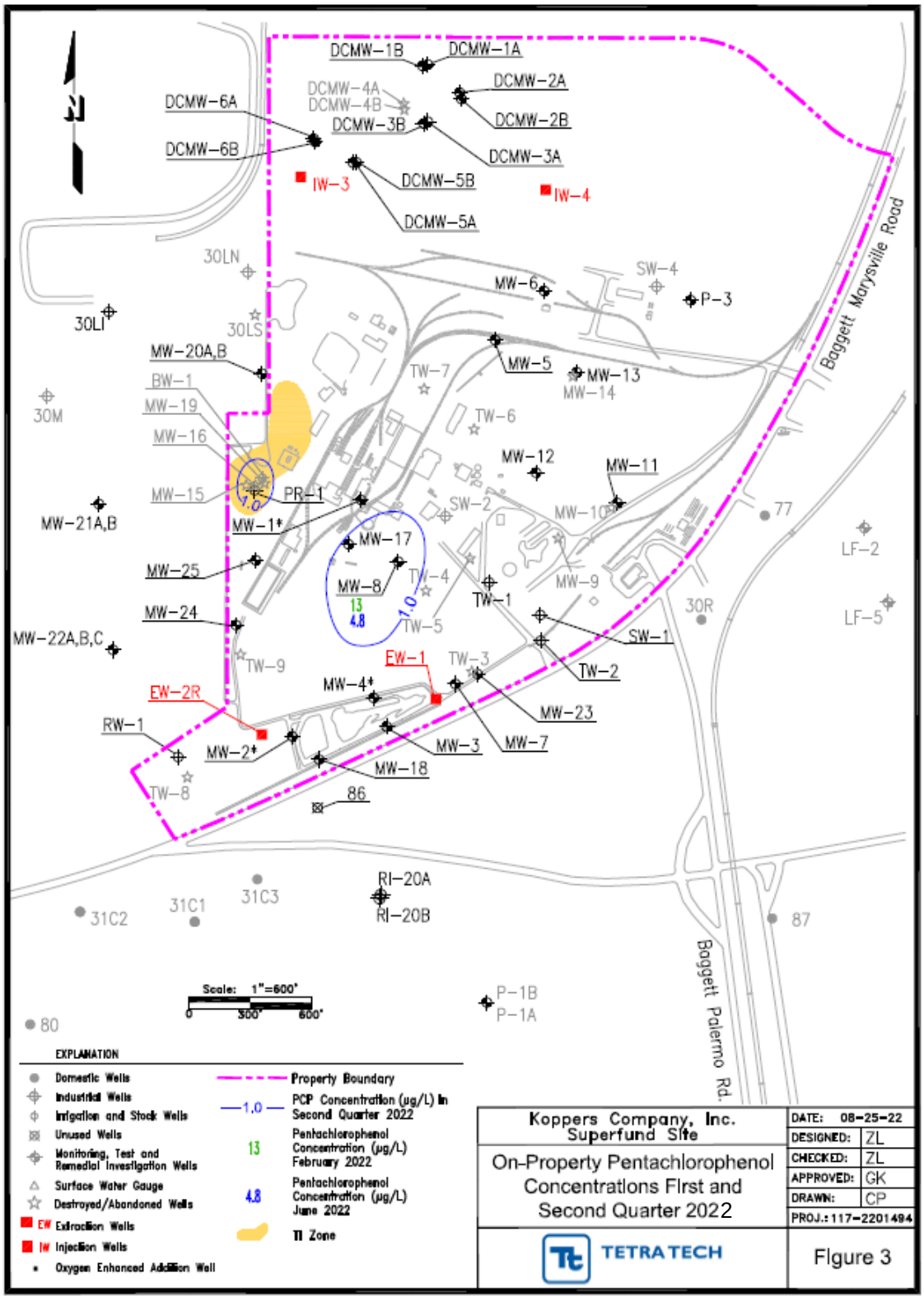
Year	Creosote Product Removal (gallons)	Creosote Emulsion Removal (gallons)	Total Creosote Removed (gallons)
2017	111	91	202
2018	121	88	209
2019	115	90	205
2020	60	50	110
2021	113	96	209
2022 [1]	58	48	106

[1] January through June

4.2.3. On-Property Soil Disposal Cell

The On-Property Soil Disposal Cells are lined and capped. All components appear to be in good condition based on annual inspections and there is no indication of any contaminant containment issues. Review of elevation monument survey data for the Soil Disposal Cells indicate no settlement has occurred during the review period, which could potentially compromise cell integrity and allow infiltration into or out of the Soil Disposal Cells.

Groundwater analytical data were collected annually by Tetra Tech on behalf of Beazer from six pairs of monitoring wells installed around the perimeter of the cells. There were no detections of contaminants above cleanup levels during the review period, further supporting that the disposal cells are effective in containing the contaminated soils.



Source: Tetra Tech. 2022. Semiannual 2022 Remedial Action Groundwater Monitoring Report. Koppers Company, Inc. Superfund Site (Feather River Plant). Oroville, California.

Figure 8. PCP Concentrations from First and Second Quarter 2022

4.2.4. Sustainability

The U.S. Government Accountability Office released a report in October 2019 that evaluated all Superfund sites for risks natural hazards posed to each site (e.g., floods, wildfires) and whether additional actions should be taken to mitigate those risks in light of potential exacerbation from climate change. No hazards were identified for the Site.

The 1989 Record of Decision states that the Site lies in the Feather River Flood Plain. The lowest areas of the site lie at approximately 145 feet above sea level while the stretch of Feather River to the west of the Site lies at approximately 120 feet above sea level. Flood plain maps with the Federal Emergency Management Agency, which are regulatory flood plains used for official planning and insurance purposes, show the site to be outside of 100-year and 500-year flood plains with that agency. An online flood plain mapping resource called Best Available Maps by the California Department of Water Resources shows the Site to lie within an alternative 500-year flood plain according to a "Regional/Special Study" dated January 7, 2008. Taken together, the Site appears to have a low risk of flooding on any given year, with less than a 0.2% chance according to the regulatory flood plain maps or an approximately 0.2% chance according to the 2008 regional/special study.

4.3. Site Inspection

The inspection of the Site was conducted on March 15, 2023. In attendance were Kelia Liang, EPA Remedial Project Manager; Matt Wetter, USACE; Andy Reimanis, Department of Toxic Substances Control; Mike Bolinger, Beazer; Devin Fischer, Beazer; Casey Wilmunder, FTS; Jennifer Abrahams, Tetra Tech; Jerome Johnson, Property Owner; and Wes Ervin, Oroville City Planner. The purpose of the inspection was to assess the condition of the remedy and verify that the remedy is operating as intended. The inspection included visual observation of overall site conditions and inspection of various components of the remedy, including the groundwater treatment system (plant and well network), land disposal unit caps, and extraction, injection, and monitoring wells. The site inspection report and photographs are included in Appendix I.

At the time of the site visit, the treatment plant was shut-down due to electrical issues. The plant had been down for less than 24 hours and was scheduled to be returned to normal service in the next week. All portions of the system appeared to be in reasonably good repair. The treatment plant was fairly well secured, with barbed wire fencing, monitoring cameras, and motion detector lights. Theft and vandalism were reported to have decreased in recent years and it was believed to be due to the hiring of a night watchman at the adjacent property.

The two soil disposal cells were observed to be in good condition. A few woody plants on a soil cell were cut down and several burrowing animal holes were observed, which are reportedly filled with bentonite to discourage use. No significant runnels or erosion were observed. There was one minor but well vegetated gully on the north side of the disposal cells. Beazer indicated that the cover soil was recently resurveyed to determine whether significant settlement or erosion was occurring.

The new building constructed on top of the Toxic Pits Cleanup Act cap was also observed and photographed. Further discussion of observations of the new building is included in Appendix E.

5. Technical Assessment

5.1. Question A: Is the remedy functioning as intended by the decision documents?

Yes, the remedy at the Koppers Company, Inc Superfund Site is functioning as intended. However, the process for ensuring compliance with the land use covenant needs to be improved.

The on-property groundwater extraction and treatment remedy continues to operate to control the potential migration of the remaining Eastern Plume contamination. The on-property groundwater outside the Technical Impracticability Zone has been restored to federal drinking water standards, except for the area near MW-8.

MW-8 is located near the center of the PCP plume. During this review period, the PCP concentrations in MW-8 remained above the drinking water standard; however, Mann-Kendall trend indicates that PCP concentrations are decreasing. Boron concentrations in MW-8 are above the cleanup level and the trend is increasing concentration. Boron is not removed from the groundwater by the treatment system. Water from MW-8 is blended with water other extraction wells from, which have no boron. By blending the water the injected water is below the cleanup level of 1,200 µg/L. Since boron is not being removed from groundwater the concentrations of boron will reach asymptotic levels at MW-8 as boron is circulated through the aquifer.

Groundwater monitoring results downgradient of the Technical Impracticability Zone are below cleanup levels for contaminants of concern, demonstrating that contaminants are not migrating from the Technical Impracticability Zone. The product recovery well continues to remove creosote product from groundwater. The off-property PCP groundwater plume has been remediated to below the cleanup level and the aquifer restored to its beneficial use as a drinking water supply.

Contaminated soils were previously excavated and transported to On-Property Soil Disposal Cells that meet RCRA requirements to reduce Site exposure risks from contaminated soils to acceptable levels. All components of the soil disposal cells appear to be in good condition and there is no indication of contaminant containment issues with any of the disposal cells.

The land use covenant with environmental restrictions that was recorded in 2003 generally prevents exposure to soil and groundwater contamination that remains above levels allowing for unlimited use or unrestricted exposure at the Site. However, the process for ensuring compliance with the land use covenant needs to be improved. In 2022 there was a violation of the land use covenant when the landowner of Butte County Assessor's Parcel Number 035-470-005 constructed a storage shed on top of the Toxic Pits Cleanup Act clay cap at the former biological treatment facility, installing a foundation and disturbing soil down to approximately 4 feet below grade. This action was completed without notifying the Department of Toxic Substances Control or EPA and it violated the soil management requirement of the land use covenant. The excavations have been backfilled and there is not current risk of exposure. EPA and Department of Toxic Substances Control approved the removing the land use covenant from a

portion of parcels 035-470-035 and 035-470-034. There is not currently a requirement for annual inspections of the properties under the land use covenant to ensure they are compliant.

5.2. Question B: Are the exposure assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of Remedy Selection Still Valid?

The exposure assumptions used at the time of the remedy selection are still valid. Drinking water standards have changed for ethylbenzene, arsenic, and copper since the 1999 Record of Decision amendment but these changes do not impact the protectiveness of the remedy since the concentrations of those contaminants in groundwater at the Site are below the current drinking water standards. No changes to applicable or relevant and appropriate requirements or toxicity factors of contaminants that would affect the protectiveness of the remedy was identified. The remedial action objectives of containment of contaminants in groundwater in the Technical Impracticability Zone and restoration of groundwater to beneficial use outside the Technical Impracticability Zone remain valid and are being met or progressing. The remedial action objective of preventing exposure to contaminated groundwater and soil is being met since there is no current exposure to either. There was the potential for exposure to contaminated soil when a structure was installed on parcel 035-470-005 however the soil has since been replaced and land use covenants are being enforced.

5.3. Question C: Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No.

6. Issues/Recommendations

Table 6. Issues and Recommendations Identified in the Five-Year Review

Issues and Recommendations Identified in the Five-Year Review:				
OU(s):	**Issue Category: Institutional Controls**			
	Issue: A storage shed was constructed on parcel 035-470-005 in 2022 violating the land use covenant.			
	Recommendation: Develop and implement a Land Use Covenant Monitoring Plan and require annual inspections of each parcel under the land use covenant to ensure compliance with the covenant and report the inspection results to the Department of Toxic Substances Control.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	State	EPA	9/30/2024

Issues and Recommendations Identified in the Five-Year Review:				
OU(s):	**Issue Category: Remedy Performance**			
	Issue: Boron concentrations are increasing in well MW-08.			
	Recommendation: Evaluate whether the remedy can achieve the remedy cleanup levels for boron.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/30/2026

7. Protectiveness Statement

Table 7. Protectiveness Statement

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Koppers Company, Inc. Superfund Site is currently protective of human health and the environment because all exposure pathways that could result in unacceptable risk are being controlled. However, in order for the remedy to be protective in the long term, the Department of Toxic Substances Control needs to take additional steps to ensure the land use covenant is complied with, including implementing a Land Use Covenant Monitoring Plan; and EPA should determine whether the remedy can achieve boron cleanup standards.

8. Next Review

The next Five-Year Review report for the Koppers Company Inc. Superfund Site is required five years from the completion date of this review.

Appendix A: List of Documents Reviewed

Dames and Moore, 1988. Final Endangerment Assessment, Koppers Company Feather River Plant Superfund Site. November 1988.

Dames and Moore, 1996. Site-Wide Soils Remedy Report. March 1996.

City of Oroville. 2022. Re: Storage Shed on Koppers Site in Oroville, APN 035-470-005. October 2022.

California Department of Water Resources. Best Available Maps. Best Available Map (BAM) (ca.gov). Accessed April 4, 2023.

Department of Toxic Substances Control. 2022. Violation of a Land Use Covenant, Koppers, Inc. Superfund Site, Oroville, Butte County, California. Certified Mail #: 7017 3040 0000 4252 9505. September 28, 2022.

Environmental Protection Agency (EPA). 1989. EPA Superfund Record of Decision: Koppers Co., Inc. (Oroville Plant) EPA ID: CAD009112087 OU1. Oroville, CA. September 13, 1989.

EPA. 1991. EPA Superfund Explanation of Significant Differences: Koppers CO., Inc. (Oroville Plant) EPA ID: CAD009112087 OU01. Oroville, CA. January 29, 1991.

EPA. 1996. EPA Superfund Record of Decision Amendment: KOPPERS Co., Inc. (Oroville Plant) EPA ID: CAD009112087 OU01. Oroville, California. August 29, 1996.

EPA. 1999. Amendment #2 to the Record of Decision for the Soil and Ground Water Operable Unit, KOPPERS Company, Inc. Superfund Site. Oroville, California. September 23, 1999.

EPA. 2003. Preliminary Closeout Report for Koppers Company, Inc., Superfund Site, Oroville, California. September 2003.

EPA, 2013. Fourth Five-Year Review Report for Koppers Company, Inc. Superfund Site. Oroville, Butte County, California. August 28, 2013.

EPA, 2018. Fifth Five-Year Review Report for Koppers Company, Inc. Superfund Site. Oroville, Butte County, California. September 26, 2018.

HIS GeoTrans, 1999. Final Evaluation of Technical Impracticability of Groundwater Restoration in the Former Creosote Pond and Cellon Blowdown Area, Koppers Company, Inc. Superfund Site (Feather River Plan). March 8, 1999.

Tetra Tech GEO, 2013. On-Property Groundwater Remedy Attainment Evaluation Response, EPA letter dated June 14, 2013. Koppers Company, Inc. Superfund Site (Feather River Plant). Oroville, California. August 30, 2013.

Tetra Tech. 2019. Groundwater Recovery Well MW-8 Rehabilitation Evaluation Koppers Company, Inc. Superfund Site (Feather River Plant), Oroville, California. June 26, 2019.

Tetra Tech. 2021. Annual 2020 Remedial Action Groundwater Monitoring Report. Koppers Company, Inc. Superfund Site (Feather River Plant). Oroville, California. March 29, 2021.

Tetra Tech. 2021. Semiannual 2021 Remedial Action Groundwater Monitoring Report. Koppers Company, Inc. Superfund Site (Feather River Plant). Oroville, California. September 24, 2021.

Tetra Tech. 2022. Annual 2021 Remedial Action Groundwater Monitoring Report. Koppers Company, Inc. Superfund Site (Feather River Plant). Oroville, California. March 21, 2022.

Tetra Tech. 2022. Semiannual 2022 Remedial Action Groundwater Monitoring Report. Koppers Company, Inc. Superfund Site (Feather River Plant). Oroville, California. September 12, 2022.

Appendix B: Site Chronology

Event	Date
Site contamination was discovered in drinking water supply wells	1986
34 residences downgradient of the Site affected by contaminated groundwater were connected to the Oroville-Wyandotte Irrigation District (now South Feather Water and Power Agency) water supply	1986
Beazer East, Inc. (Beazer) assumed responsibility for historical contamination caused by Koppers' operations	1988
Record of Decision completed, containing soil and groundwater remedy	1989
Explanation of Significant Differences completed	1991
Soil treatability studies completed	1993 – 1995
Construction of two groundwater pump-and-treat systems (one on-property and one off-property)	1993 – 1994
Installation of a product recovery well (PR-1) for creosote product removal	1994
Removal action for soil completed with soil landfilled onsite in Soil Disposal Cell No. 1.	1995
EPA approved suspension of the off-property groundwater pump-and-treat system, following reduction of contaminants to below cleanup levels	December 28, 1995
Record of Decision Amendment No. 1 completed	1996
Contaminated soil and building materials excavated and placed in Soil Disposal Cell No. 2.	1996-2002
Addition of in-situ bioremediation of off-property groundwater to augment degradation of PCP	August 1998
Record of Decision Amendment No. 2 completed	1999
Construction completion achieved with signature of Preliminary Close Out Report	September 4, 2003
Signature and acknowledgement of land use covenant intended to protect current and future users of the Site	October 23, 2003
EPA approved the deconstruction and removal of the off-property groundwater pump-and-treat system (12 years after the system was shut down)	2007
EPA approved ending the off-property in-situ bioremediation program	September 2009
Completion of Optimization evaluation of the existing remedy resulting in recommendations to remove monitoring wells and/or reduce the frequency of sampling.	2013
Ten of the 36 Off-Property wells and three on-property monitoring wells were abandoned.	2015 – 2016
Rehabilitation of MW-8, EW-1, and EW-2 via overnight settling and granular acid cleaner treatment along with brushing of the screens allowed for pumping rates to re-achieve their flow.	May 2021

Appendix C: Data Review

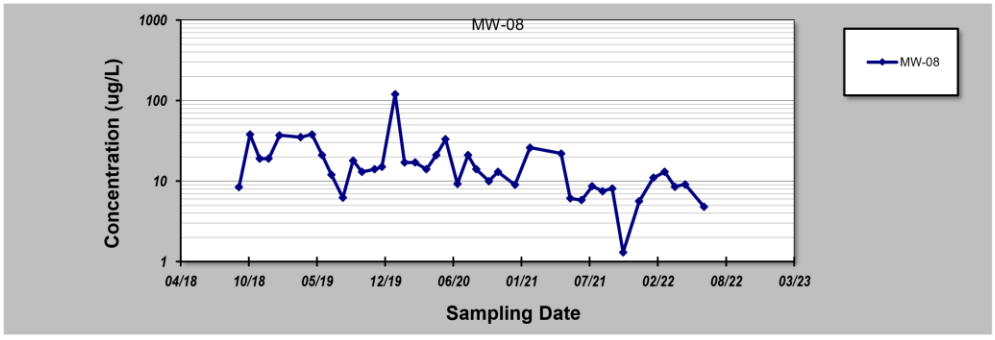
The data review included Mann-Kendall trend analyses of PCP and boron concentrations at MW-8 and a review of groundwater flow directions during the review period. This appendix includes the data and results from the Mann-Kendall trend analyses and groundwater contour maps from the beginning and end of the review cycle. A discussion of the results is provided in the Data Review Section.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 15-Jan-23
Facility Name: Koppers
Conducted By: Jeffrey Weiss
Job ID:
Constituent: PCP
Concentration Units: ug/L

Sampling Point ID: MW-08

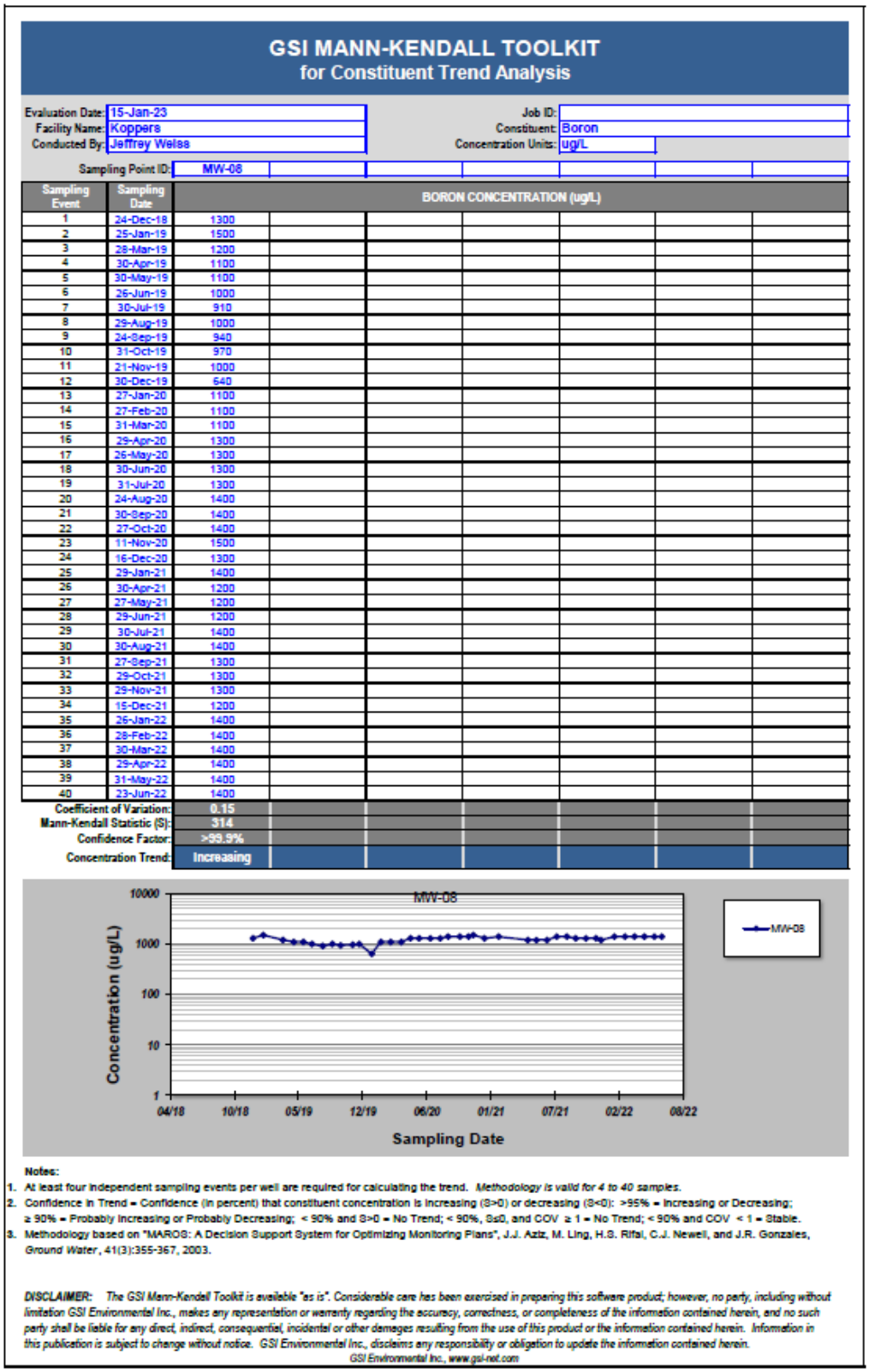
Sampling Event	Sampling Date	PCP CONCENTRATION (ug/L)
1	28-Sep-18	8.4
2	30-Oct-18	38
3	28-Nov-18	19
4	24-Dec-18	19
5	25-Jan-19	37
6	28-Mar-19	35
7	30-Apr-19	38
8	30-May-19	21
9	26-Jun-19	12
10	30-Jul-19	6.2
11	29-Aug-19	18
12	24-Sep-19	13
13	31-Oct-19	14
14	21-Nov-19	15
15	30-Dec-19	120
16	27-Jan-20	17
17	27-Feb-20	17
18	31-Mar-20	14
19	29-Apr-20	21
20	26-May-20	33
21	30-Jun-20	9.2
22	31-Jul-20	21
23	24-Aug-20	14
24	30-Sep-20	10
25	27-Oct-20	13
26	16-Dec-20	9
27	29-Jan-21	26
28	30-Apr-21	22
29	27-May-21	6.1
30	29-Jun-21	5.8
31	30-Jul-21	8.6
32	30-Aug-21	7.5
33	27-Sep-21	8.1
34	29-Oct-21	1.3
35	15-Dec-21	5.6
36	26-Jan-22	11
37	28-Feb-22	13
38	30-Mar-22	8.5
39	29-Apr-22	9.1
40	23-Jun-22	4.8
Coefficient of Variation:		1.05
Mann-Kendall Statistic (S):		-334
Confidence Factor:		>99.9%
Concentration Trend:		Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Figure C-1. Mann-Kendall trend plot of PCP from December 2018 to June 2022. The Mann-Kendall spreadsheet only allows 40 rows of data, so the most recent data was used for analysis.



GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 15-Jan-23
Facility Name: Koppers
Conducted By: Jeffrey Weiss
Job ID:
Constituent: Boron
Concentration Units: ug/L
Sampling Point ID: MW-08

Sampling Event	Sampling Date	BORON CONCENTRATION (ug/L)
1	24-Dec-18	1300
2	25-Jan-19	1500
3	28-Mar-19	1200
4	30-Apr-19	1100
5	30-May-19	1100
6	26-Jun-19	1000
7	30-Jul-19	910
8	29-Aug-19	1000
9	24-Sep-19	940
10	31-Oct-19	970
11	21-Nov-19	1000
12	30-Dec-19	640
13	27-Jan-20	1100
14	27-Feb-20	1100
15	31-Mar-20	1100
16	29-Apr-20	1300
17	26-May-20	1300
18	30-Jun-20	1300
19	31-Jul-20	1300
20	24-Aug-20	1400
21	30-Sep-20	1400
22	27-Oct-20	1400
23	11-Nov-20	1500
24	16-Dec-20	1300
25	29-Jan-21	1400
26	30-Apr-21	1200
27	27-May-21	1200
28	29-Jun-21	1200
29	30-Jul-21	1400
30	30-Aug-21	1400
31	27-Sep-21	1300
32	29-Oct-21	1300
33	29-Nov-21	1300
34	15-Dec-21	1200
35	26-Jan-22	1400
36	28-Feb-22	1400
37	30-Mar-22	1400
38	29-Apr-22	1400
39	31-May-22	1400
40	23-Jun-22	1400
Coefficient of Variation:		0.15
Mann-Kendall Statistic (S):		314
Confidence Factor:		>99.9%
Concentration Trend:		Increasing

Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Figure C-2. Mann-Kendall trend plot of Boron from December 2018 to June 2022. The Mann-Kendall spreadsheet only allows 40 rows of data, so the most recent data was used for analysis.

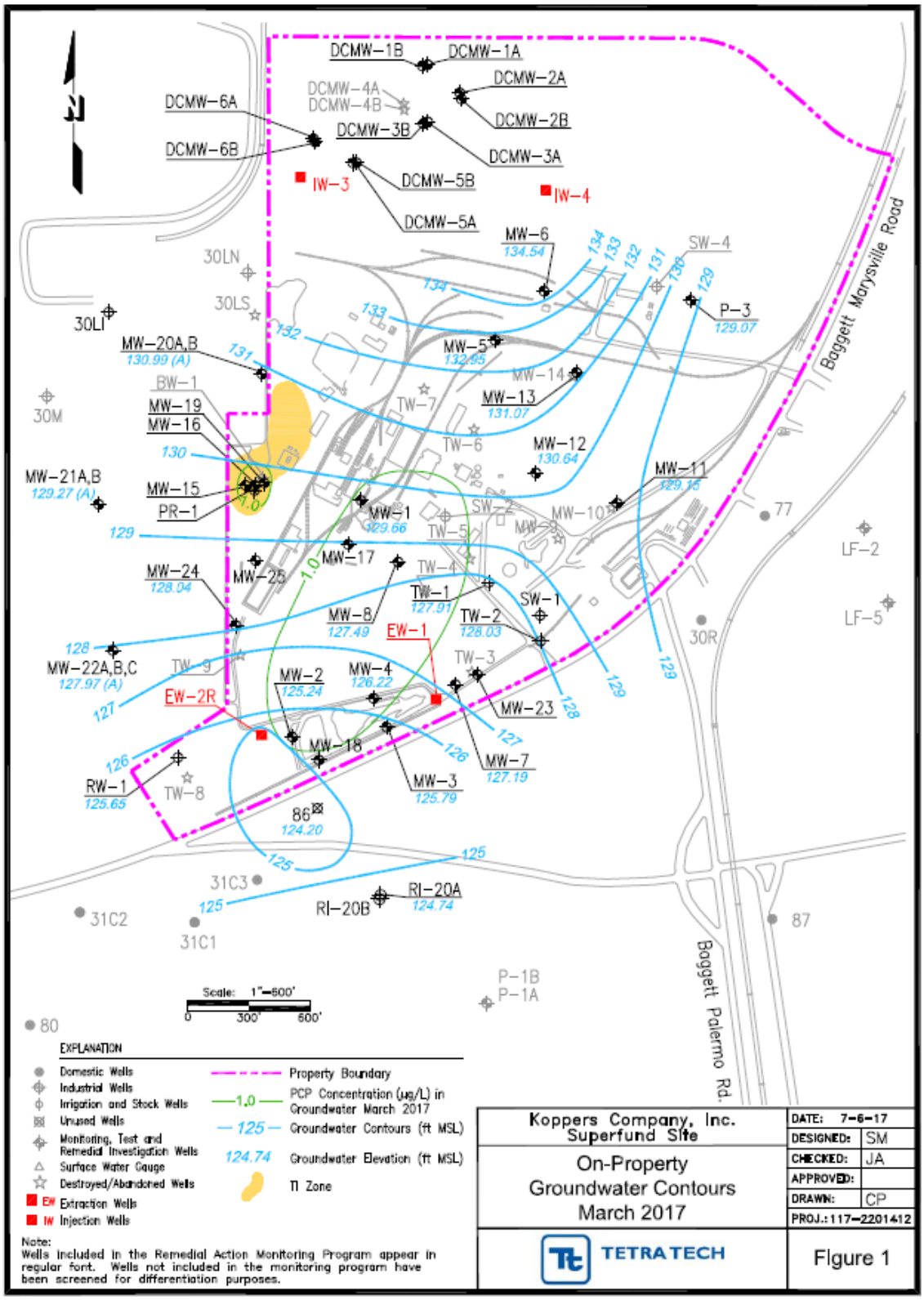


Figure C-3. Groundwater elevations from the beginning of the review period.

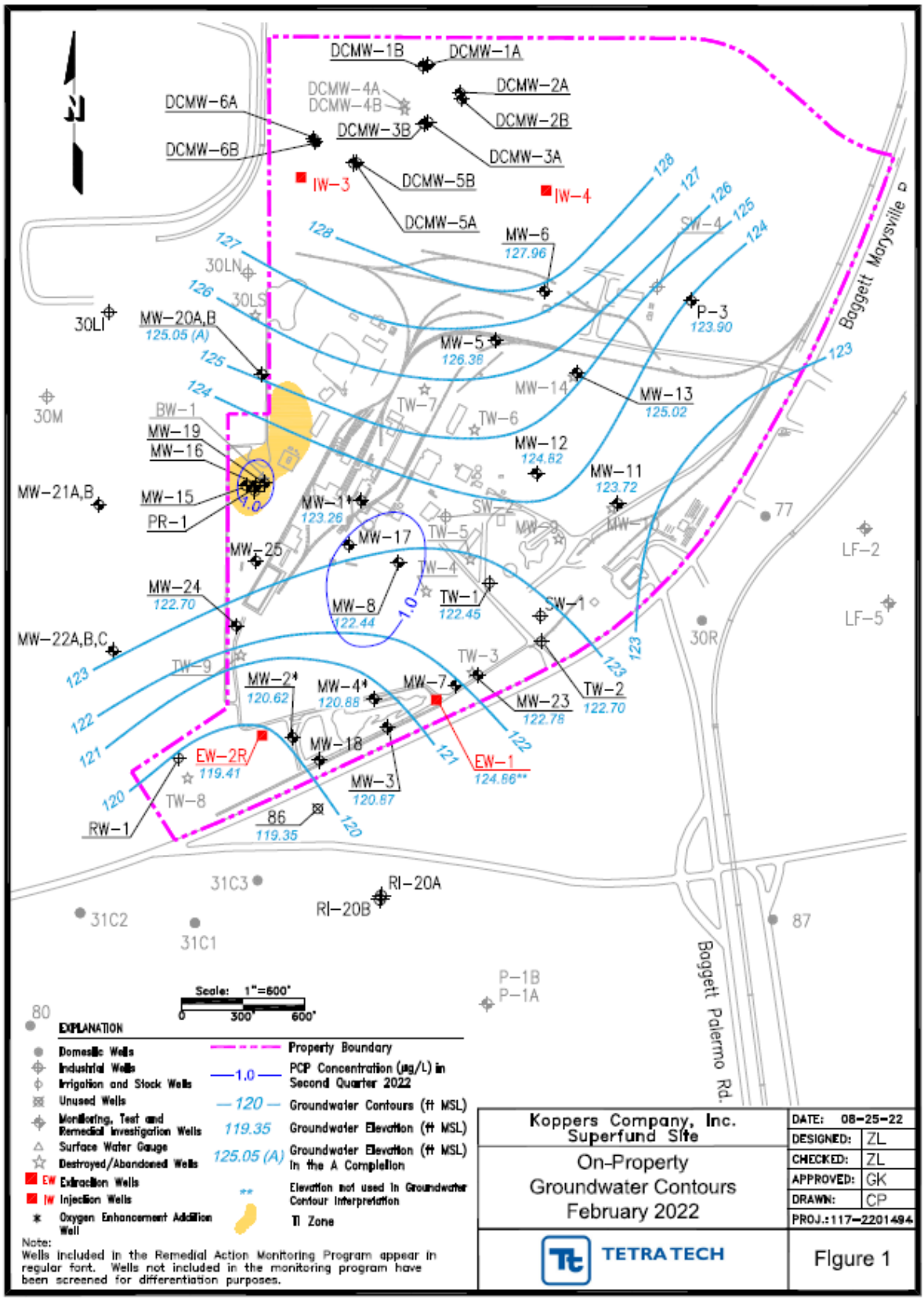


Figure C-4. Groundwater elevations from the end of the review period.

Appendix D: Applicable or Relevant and Appropriate Requirements Assessment

Section 121(d)(2)(A) of Comprehensive Environmental Response, Compensation, and Liability Act specifies that Superfund remedial actions must meet any Federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). ARARs are those standards, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Comprehensive Environmental Response, Compensation, and Liability Act site.

Changes (if any) in ARARs are evaluated to determine if the changes affect the protectiveness of the remedy. Each ARAR and any change to the applicable standard or criterion are discussed below.

Chemical-specific ARARs identified in the 1989 Record of Decision, 1996 Record of Decision Amendment 1, and 1999 Record of Decision Amendment 2 for groundwater were evaluated (Table D-1). There were no changes to the chemical-specific ARARs within the past five years. The current state drinking water standard for ethylbenzene (300 µg/L) remains more stringent than the cleanup level at the Site for ethylbenzene (680 µg/L); however, ethylbenzene concentrations at the Site remain below the state drinking water standard.

Some cleanup levels for soil and groundwater are toxicity-based, not ARAR-based, and are evaluated in the Toxicity Analysis (Appendix F).

Table D-1. Summary of Groundwater Chemical-Specific ARARs

Chemical	Cleanup Levels (µg/L)*	Basis for Cleanup Level	Current Regulations (µg/L)		ARARs More or Less Stringent than Cleanup Levels?
			State	Federal	
Benzene	1	State MCL	1	5	Same
Ethylbenzene	680	State MCL	300	700	More stringent
Total Xylenes	1,750	State MCL	1,750	10,000	Same
PCP	1	Federal MCL	1	1	Same
Barium	1,000	State MCL	1,000	2,000	Same
Chromium	50	State MCL	50	100	Same
Copper	1,000	State MCL	1,300	1,300	Less stringent

Notes:
*Cleanup levels from the 1989 Record of Decision and 1996/1999 Record of Decision Amendments
MCL = Maximum Contaminant Level, which is a federal or state drinking water standard
PCP = pentachlorophenol

Federal and State laws and regulations other than the chemical-specific ARARs discussed in Table D-1 that have been promulgated or changed since the 1989 Record of Decision and 1996/1999 Record of

Decision Amendments are described in Table D-2. There have been no revisions to laws or regulations that affect the protectiveness of the remedy.

There have been no changes in the following action- or location-specific ARARs in the past five years, and therefore do not affect protectiveness:

- Title 27 CCR, Section 20410, and Title 23 CCR, Section 2550.6
- State Water Resources Control Board Resolution 92-49 (as amended April 21, 1994) (Subparagraph IIIG)
- SDWA 40 CFR 144, including section 144.13 (4) I Underground Injection Control
- Title 22, 66264.301(a)(1)(B)
- 40 CFR 264.301(c) as implemented through Title 22, 66264.301(c)
- 40 CFR 264.303(g)-(i) as implemented through Title 22, 66264.301(a)
- 40 CFR 264.310(a) as implemented through Title 22, 66264.310(a)
- 40 CFR 264.14 as implemented through Title 22 66264.14
- 40 CFR 264.15 as implemented through Title 22, 66264.15
- 40 CFR 264.314 and 264.316 as implemented through Title 22, 66264.314 and 66264.316
- 40 CFR 624.117 and 624.118 as implemented through Title 22 66264.117 and 66264.118
- 40 CFR 264.91(a), 264.94, 64.97 and 264.98 as implemented through Title 22, 66264.91(a), 66264.94, 66264.97, and 66264.98
- 40 CFR 264.303(b) as implemented through Title 22, 66264.303(b)
- 40 CFR 264.552 as implemented through Title 22, 66264.552
- 27 CCR, Division 2 Subdivision 1
- 40 CFR 264.70; Subpart E
- Occupational Health and Safety Act, 29 USC Sections 651-678
- Hazardous Materials Transportation Act, 49 USC Sections 18–2 - 1813
- Title 22 CCR 66265.1030-66265.1035
- Butte County Air Pollution Control District Rules 201, 202, 203, and 207
- 40 CFR 6.302(a) and Appendix A; Executive Order 11990
- California Safe Drinking Water Act CCR Title 22, Division 4, Chapter 15, Articles 4, 5.5, and 16
- California State Water Resources Control Board Resolution 88-63
- California State Water Resources Control Board Resolution 68-16
- 40 CFR 264.18 as implemented through California EPA, Department of Toxic Substances Control, Hazardous Waste Regulations, Title 22, Chapter 14 22") 66264.18
- 40 CFR 264.301(c) as implemented through Title 22, 66264.301(c)
- Title 22, CCR, Chapter 39, Section 67391.1

Table D-2. Summary of ARAR Changes for Site in the Past Five Years

Requirement and Citation	Document	Description	Effect on Protectiveness	Comments	Recent Amendment Date
Hazardous Materials Transportation Regulations, 49 CFR Parts 107, and 1–1 - 177	1989 Record of Decision	Regulates transportation of hazardous materials. Applicable when carbon (used for on-site treatment) is shipped off-site.	Changes do not affect protectiveness.	171.2 (g) Fees increased as of Jan 6, 2023	January 6, 2023
Safe Drinking Water Act Regulations, (40 U.S.C. 300 et seq.) National Primary Drinking Water Standards (40 CFR Part 141)	1999 Record of Decision Amendment #2	Federal MCLs are ARARs for the site and were used to establish groundwater cleanup levels.	Changes do not affect protectiveness.	Greater and more effective protection of public health by reducing exposure to lead and copper in drinking water. The Rule will better identify high levels of lead, improve the reliability of lead tap sampling results, strengthen corrosion control treatment requirements, expand consumer awareness and improve risk communication.	January 5, 2021

Appendix E: Institutional Control Assessment

In September 2022, the Department of Toxic Substances Control became aware that a violation of the 2003 land use covenant occurred on Butte County Assessor's Parcel Number 035-470-005, where a storage shed had been constructed. The land use covenant prohibits the alternation of drainage patterns and the interference with Remedial Systems on the Site without prior written approval from EPA. The Remedial System identified as the Toxic Pits Cleanup Act cap is located on the Property, and the Department of Toxic Substances Control determined that grading work and construction of a building on the property without prior written approval from EPA violated articles 4.02, 4.03(b), 4.03(e), 4.04 and 4.06 of the land use covenant.

The storage shed, which was constructed on parcel 035-470-005 had a footprint of 3,600 square feet, was constructed on top of the Toxic Pits Cleanup Act clay cap at the former biological treatment facility. The City of Oroville inspected the construction and building plans, determining that the foundation of the building appeared to be installed to a depth of four feet below grade. A test hole for a potential septic system was dug to the northwest of the building, but the exact location and depth of the test hole could not be confirmed. Photographs of the test hole show what appeared to be a clay layer starting a few feet below grade, but no liner was visible (see photos 37 and 38 of Appendix I).

The property owner was instructed by the City of Oroville not to add to the structure, remove any soils, dig any further, alter any drainage patterns, irrigate, or install a septic system until/unless EPA and the Department of Toxic Substances Control have a chance to review any plans.

The City of Oroville stated they have taken procedural steps to ensure that no other structures are erected, and that no new excavation occurs on any of the parcels of the Site without first requiring review by EPA and the Department of Toxic Substances Control.

A requirement to complete inspections to ensure compliance with land use covenants does not exist within either the California codes nor within the decision documents for the Site. The most recent decision document, the 1999 Record of Decision Amendment, simply stated that the land use covenant was being prepared and the restriction language was being developed by the Department of Toxic Substance Control. When the land use covenant was completed in 2003, language requiring regular inspections was not included.

While the land use covenant requires that the Department of Toxic Substances Control and EPA be notified if a restricted property is sold, the Department of Toxic Substances Control noticed that many parcels have been sold but that records could not be found of the required notifications having taken place.

The land use covenant was removed from a portion of parcels 035-470-034 and 035-470-035 in 2022. The parcel boundaries were changed and labelled 035-470-038 and 035-470-039 and the covenant was removed from parcel 038.

Appendix F: Toxicity Assessment

The soil and groundwater cleanup levels identified in the 1989 Record of Decision and 1996/1999 Record of Decision Amendments that were based on risk were evaluated below (Tables E-1 and E-2). EPA selected soil cleanup levels based on industrial exposure (1996 Record of Decision Amendment 1) and groundwater cleanup levels based on residential exposure (1989 Record of Decision and 1999 Record of Decision Amendment 2). EPA adopted Regional Screening Levels (RSLs) for some soil and groundwater cleanup levels. EPA's Integrated Risk Information System (IRIS) updates toxicity values used by EPA in risk assessment when newer scientific information becomes available, and the most recent update available used for this analysis was the November 2022 update.

The RSLs for carcinogens are chemical-specific concentrations that correspond to an excess lifetime cancer risk (ELCR) of $1x10^{-6,}$ which is the lower boundary of the Superfund protective range for cancer risks (ELCR = 10^{-6} to 10^{-4}) as defined in the National Oil and Hazardous Substances Contingency Plan. RSLs for contaminants posing non-cancer health hazards are concentrations corresponding to a Hazard Quotient = 1.0 (HQ=1). HQ=1 RSLs represent "concentration levels to which the human population, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety", as specified in the National Oil and Hazardous Substances Contingency Plan.

Groundwater

Four contaminants of concern for groundwater had cleanup levels based on risk and are listed below in Table E-1.

Changes have occurred to some RSLs since the 1989 Record of Decision and 1999 Record of Decision Amendment 2 (Table E-1). The current RSLs for isopropyl ether and dioxins are more stringent than the groundwater cleanup levels. However, all RSL changes leave the cleanup levels of their associated contaminants falling within EPA's generally acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6} as discussed in the National Oil and Hazardous Substances Contingency Plan, so the changes do not affect protectiveness.

Table F-1. Summary of Water Toxicity Changes

Chemical	Groundwater Cleanup Level (µg/L)	Basis for Cleanup Level	Current Tap Water RSL (µg/L) c = cancer (ELCR = 1 x 10^{-6}) N = noncancer (HQ = 1.0)	RSLs More or Less Stringent than Cleanup Levels?
Isopropyl Ether	2,800	Cancer risk as determined from ARARs; 1999 ROD Amendment 2	1,500 (n)[1]	More stringent

Chemical	Groundwater Cleanup Level (µg/L)	Basis for Cleanup Level	Current Tap Water RSL (µg/L) c = cancer (ELCR = 1 x 10^{-6}) N = noncancer (HQ = 1.0)	RSLs More or Less Stringent than Cleanup Levels?
Carcinogenic PAHs[2]	0.007	Cancer risk as determined from ARARs; 1999 ROD Amendment 2	0.025 (c)	Less stringent
Dioxins	5.3 x 10^{-7}	1 x 10^{-6} excess cancer risk; 1989 ROD	1.2 x 10^{-7} (c)	More stringent
Boron	1,200	Protection of sensitive crops if used for long-term irrigation; 1999 ROD Amendment	4,000 (n)[1]	Less stringent

Notes:
c = cancer
n = noncancer
ELCR = Excess lifetime cancer risk
HQ = Hazard Quotient
RSL = Regional Screening Level
µg/L = micrograms per liter
ROD = Record of Decision
[1] Cancer RSL is not available, only non-cancer RSL
[2] Carcinogenic PAHs include: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-c,d)pyrene

Soil

Changes have occurred to some RSLs since the 1996 Record of Decision Amendment 1 (Table E-2). The current RSLs for carcinogenic polycyclic aromatic hydrocarbons, dioxins, and PCP are more stringent than the soil cleanup levels.

The RSL changes for carcinogenic polycyclic aromatic hydrocarbons and PCP leave their respective cleanup levels falling within EPA's generally acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6} as discussed in the National Oil and Hazardous Substances Contingency Plan, so the change does not affect protectiveness.

The RSL change for dioxins leaves the soil cleanup level for dioxins falling outside of EPA's generally acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6}. However, after soil excavation had been completed, confirmation samples were collected and analyzed, along with previous samples where excavation was not required. A total of 182 samples were used to calculate the residual dioxin concentration using the upper 95% confidence level of the mean. The residual concentration of dioxin was calculated to be 0.0006 mg/kg. This is less than the non-hazard risk screening level (0.00072 mg/kg) and within EPA's cancer risk range of 10-4 to 10-6 excess cancer risk for industrial use (0.000022 – 0.0022 mg/kg), so the change does not affect protectiveness.

Table F-2. Summary of Soil Toxicity Changes

Chemical	Soil Cleanup Level (mg/kg)	Basis for Cleanup Level	Current Industrial RSL (mg/kg) (1×10^{-6}) c = cancer n = noncancer	RSLs More or Less Stringent than Cleanup Levels?
Carcinogenic PAHs[1]	2.6	1×10^{-5} cancer risk for industrial worker; 1996 ROD Amendment 1	2.1 (c)	More stringent
Dioxins	0.001	1×10^{-5} cancer risk for industrial worker;1996 ROD Amendment 1	0.000022 (c)	More stringent
PCP	79	1×10^{-5} cancer risk for industrial worker; 1996 ROD Amendment 1	4.0 (c)	More stringent

Notes:
c = cancer
n = noncancer
RSL = Regional Screening Level
mg/kg = milligrams per kilogram
PAH = polycyclic aromatic hydrocarbon
ROD = Record of Decision
[1] Carcinogenic PAHs include: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-c,d)pyrene

Appendix G: Public Notice

CLIMATE

Report: 2022 was fifth or sixth warmest year on record

By Seth Borenstein
The Associated Press

EMILIO MORENATTI — THE ASSOCIATED PRESS FILE

People cool off in the water on a hot and sunny day at the beach in Barcelona, Spain, on July 15.

DENVER » Earth's fever persisted last year, not quite spiking to a record high but still in the top five or six warmest on record, government agencies reported Thursday.

But expect record-shattering hot years soon, likely in the next couple years because of "relentless" climate change from the burning of coal, oil and gas, U.S. government scientists said.

Despite a La Niña, a cooling of the equatorial Pacific that slightly reduces global average temperatures, the U.S. National Oceanic and Atmospheric Administration calculates 2022's global average temperature was 58.55 degrees, ranking sixth hottest on record. NOAA doesn't include the polar regions because of data concerns, but soon will.

If the Arctic — which is warming three to four times faster than the rest of the world — and Antarctic are factored in, NOAA said it would be fifth warmest. NASA, which has long factored the Arctic in its global calculations, said 2022 is essentially tied for fifth warmest with 2015. Four other scientific agencies or science groups around the world put the year as either fifth or sixth hottest.

NOAA and NASA records go back to 1880.

NASA Administrator Bill Nelson said global temperature is "pretty alarming ... What we're seeing is our warming climate, it's warming all of us. Forest fires are intensifying. Hurricanes are getting stronger. Droughts are wreaking havoc. Sea levels are rising. Extreme weather patterns threaten our well-being across this planet."

Berkeley Earth, a nonprofit group of independent scientists, said it was the fifth warmest on record and noted that for 28 countries it was the hottest year on record, including China, the United Kingdom, Spain, France, Germany and New Zealand.

Another group, whose satellite-based calculations tend to run cooler than other science teams, said it was the seventh hottest year.

Last year was slightly toastier than 2021, but overall the science teams say the big issue is that the last eight years, from 2015 on, have been a step above the higher temperatures the globe had been going through. All eight years are more than 1.8 degrees (1 degree Celsius) warmer than pre-industrial times, NOAA and NASA said. Last year was 2 degrees (1.1 degrees Celsius) warmer than the mid-19th century, NASA said.

"The last eight years have clearly been warmer than the years before," said NOAA analysis branch chief Russ Vose.

In a human body an extra 2 degrees Fahrenheit is considered a fever, but University of Oklahoma meteorology professor Renee McPherson, who wasn't part of any of the study teams, said the global warmth is actually worse than the equivalent of a planetary fever because fevers can be treated to go down quickly.

"You can't take a pill for it so the fixes aren't easy," McPherson said. "It's more what you consider a chronic illness like cancer."

Like a fever, "every tenth of a degree matters and things break down and that's what we're seeing," Climate Central Chief Meteorologist Bernadette Woods Placky.

The likelihood of the world shooting past the 1.5 degrees Celsius (2.7 degrees Fahrenheit) warming threshold that the world adopted in 2015 is increasing with every year, said the World Meteorological Organization. The United Nations weather agency said the last 10 years average 1.14 degrees Celsius warmer than pre-industrial times. Vose said there's a 50-50 chance of hitting 1.5 degrees Celsius temporarily in the 2020s.

Vose and NASA Goddard Institute of Space Studies Director Gavin Schmidt both said there are hints of an acceleration of warming but the data isn't quite solid enough to be sure. But the overall trend of warming is rock solid, they said.

"Since the mid-1970s you've seen this relentless increase in temperature and that's totally robust to all the different methodologies," Schmidt said.

The La Niña, a natural process that alters weather worldwide, is in its third straight year. Schmidt calculated that last year the La Niña cooled the overall temperature by about a tenth of a degree and that last year was the hottest La Niña year on record.

"The La Niña years of today aren't the La Niña years of yesterday," said North Carolina state climatologist Kathie Dello. "Historically, we could rely on La Niña turning down the global thermostat. Now, heat-trapping gases are keeping the temperature cranked up, and handing us another top-10 warmest year on record."

With La Niña likely dissipating and a possible El Niño on the way — which adds to warming — Schmidt said this year will likely be warmer than 2022. And next year, he said, watch out if there's an El Niño.

"That would suggest that 2024 would be the record warmest year by quite a large amount," Schmidt said in an interview with The Associated Press.

Scientists say about 90% of the heat trapped by greenhouse gases goes into the upper 6,561 feet of the ocean (2000 meters), and figures released Wednesday show 2022 was another record year for ocean heat.

In the United States, global warming first grabbed headlines when Schmidt's predecessor, climate scientist James Hansen, testified about worsening warming in 1988. That year would go on to be the record warmest at the time.

Now, 1988 is the 28th hottest year on record.

The last year that the Earth was cooler than the 20th century average was 1976, according to NOAA.

EPA WANTS TO HEAR FROM YOU ABOUT THE KOPPERS COMPANY INC. SUPERFUND SITE CLEANUP

The U.S. Environmental Protection Agency (EPA) has started reviewing the cleanup plan for the Koppers Company, Inc. Superfund site. The site is in Oroville, California. This review will show if the cleanup plan is working as EPA intended.
Federal law requires EPA to review its cleanup plans every five years if:
- a cleanup takes more than five years to complete; or
- hazardous waste is still on site.

EPA did the last review in 2018 and found the cleanup plan was working as intended.

What is included in the review?

- An inspection of the site and technologies used for the cleanup
- A review of site data and maintenance records
- A review of any new laws or requirements that could affect the cleanup

EPA Would Like to Hear from You!
We would like to interview community members about how you think the site cleanup is going. If you want to learn more about the site and/or be interviewed, please call **Ms. Wetmore before May 30, 2023:**
- Cynthia Wetmore, EPA Project Manager (415) 972-3059 or wetmore.cynthia@epa.gov

Where can I learn more?
Visit epa.gov/superfund/koppers for more information about the site. EPA has also set up information repositories with a copy of the site's Administrative Record (which includes key documents and reports for the cleanup) at:

EPA Superfund Records Center	Butte County Public Library
75 Hawthorne Street Room 3100	1820 Mitchell Avenue
San Francisco, CA 94105	Oroville, CA 95966
Phone: (415) 947-8717	(530) 538-7642
Hours: 8:00 a.m.-5:00 p.m., Mon.-Fri.	Please call for current hours of operation. Please call for current hours of operation.

EPA will complete the Five-Year Review report no later than September 30, 2023. When complete, EPA will post a copy on the site's webpage and send a copy to the site information repositories listed above.

Background

The Koppers Company, Inc. Superfund site is a former wood-treating facility. It covers an area of approximately 205 acres, located three miles south of Oroville, Calif. Chemical fires, wood treatment operations, product and chemical handling methods, and wastewater handling procedures contaminated soil on-property and groundwater on and off-property.

REPORT ON HUMAN RIGHTS

Group: Many crises in 2022, also good signs

By Edna Tarigan and David Rising
The Associated Press

JAKARTA, INDONESIA » Widespread opposition to Russia's invasion of Ukraine demonstrates the strength of a unified response against human rights abuses, and there are signs that power is shifting as people take to the streets to demonstrate their dissatisfaction in Iran, China and elsewhere, a leading rights group said Thursday.

A "litany of human rights crises" emerged in 2022, but the year also presented new opportunities to strengthen protections against violations, Human Rights Watch said in its annual world report on human rights conditions in more than 100 countries and territories.

"After years of piecemeal and often half-hearted efforts on behalf of civilians under threat in places including Yemen, Afghanistan, and South Sudan, the world's mobilization around Ukraine reminds us of the extraordinary potential when governments realize their human rights responsibilities on a global scale," the group's acting executive director, Tirana Hassan, said in the preface to the 712-page report.

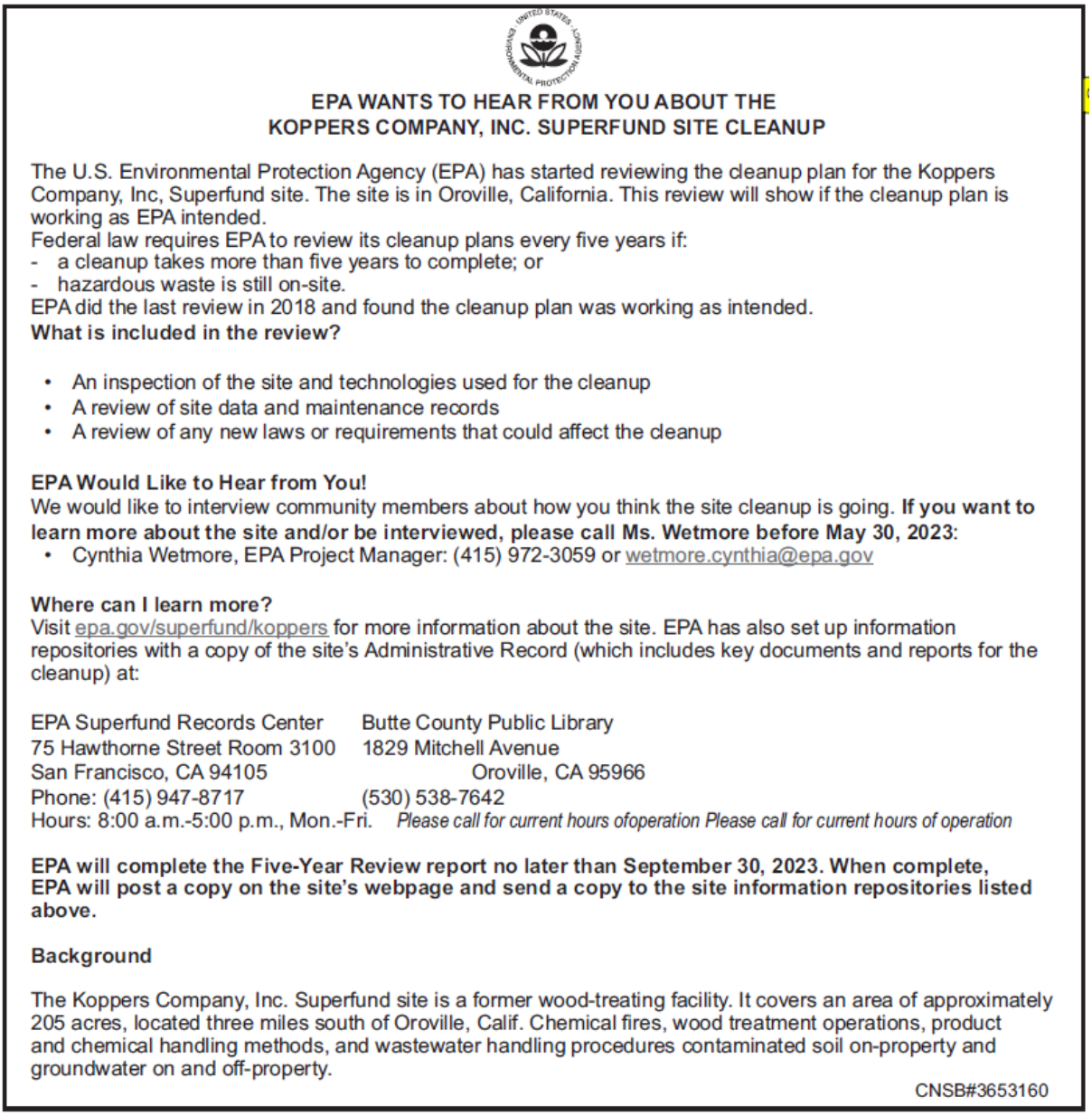
"All governments should bring the same spirit of solidarity to the multitude of human rights crises around the globe, and not just when it suits their interests," she said.

Following Russia's invasion of Ukraine, a broad group of nations imposed wide-ranging sanctions while rallying to Kyiv's support, while the United Nations Human Rights Council and the International Criminal Court both opened investigations into abuses, HRW said.

Countries now need to ask themselves what might have happened if they had taken such measures after Russia's annexation of Crimea in 2014, or applied the lessons elsewhere like Ethiopia, where two years of armed conflict has contributed to one of the world's worst humanitarian crises, Hassan said.

The New York-based organization highlighted the demonstrations in Iran that erupted in mid-September when Mahsa Amini died after being arrested by the country's morality police for allegedly violating the Islamic Republic's strict dress code, as well as protests in Sri Lanka that forced the government of President Gotabaya Rajapaksa to resign, and the democratic election in Brazil of President Luiz Inácio Lula da Silva over far-right Jair Bolsonaro.

Close-up of the public notice within the newspaper clipping above:



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- A review of any new laws or requirements that could affect the cleanup

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- Cynthia Wetmore, EPA Project Manager: (415) 972-3059 or wetmore.cynthia@epa.gov

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Background

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CNSB#3653160

Appendix H: Interview Forms

Five-Year Review Interview Record				
Site: Koppers Company, Inc. Superfund Site			**EPA ID No: CAD009112087**	
Interview Type: E-mail correspondence				
Interviewees				
Name	**Organization**	**Title**	**Telephone**	**Email**
Andrew Reimanis	DTSC	Hazardous Substances Engineer	(916)255-49	

1) What is your role on the project? How often do you carry out inspections at the site? What types of activities do you oversee and what features do you inspect as part of the inspection? Please provide the latest inspection report.
I am the Department of Toxic Substances Control (DTSC) Project Manager for the site. DTSC intends to conduct annual inspections of the site but due to Covid-19, this became impractical. I have conducted two inspections since July 2020 when I took over responsibility as the project manager for the site. I oversee all of the site activities for DTSC. The focus of my inspections was to confirm that the restrictions prescribed by the Land Use Covenant were being adhered to.

2) What is your overall impression of the project?
Portions of the project are well managed. One notable exception is the land use restrictions. Per the Land Use Covenant (LUC), DTSC and U.S. Environmental Protection Agency (USEPA) are to be notified if a restricted property is sold. DTSC is unable to find any records of notification, yet many parcels have been sold and some have been resold. In 2022, a property owner constructed a building on top of the Toxic Pits Cleanup Act (TPCA) cap which was in direct violation of the LUC for the property. This incident was not reported to USEPA or DTSC by the Responsible Party (RP).

3) Is the remedy (pump and treat, water treatment system, groundwater monitoring, landfill cap inspections, ongoing O&M, ECs/ICs) functioning as expected? How well is the remedy performing?
The groundwater extraction and treatment process are somewhat effective in reducing the contaminant loading of the groundwater. Levels of Pentachlorophenol and Boron in monitoring well MW-8 have been stable. The occasional detection of Chromium and Copper in monitoring wells DCMW-1A and DCMW-2A is concerning and should be explained in the annual reports. Other contaminants of concern in groundwater are generally below the cleanup standards outlined in the 1989 Record Of Decision and subsequent amendments. The cap inspections are inadequate. Creosote Dense Non-Aqueous Phase Liquid (DNAPL) is likely still present at various locations at the site.

4) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy in the past five years? The “Toxicity Criteria Rule”; Title 22, California Code of Regulations, sections 68400.5, 69020-69022 effective September 4, 2018, may impact assessment of the site remediation and should be reviewed.

5) Are you aware of the Land Use Covenant violation on parcel (035-470-005)?
Yes, I am aware. I discovered it during a site visit on August 20, 2022. Neither the RP nor their on-site contractor reported the violation to DTSC or USEPA. The LUC prohibits the alteration of drainage patterns and the interference with Remedial Systems on the Site without prior written approval from USEPA. The Remedial System identified as the TPCA cap is located on the Property, and DTSC determined that grading work and construction of a building the owner performed on the Property without prior written approval from the USEPA violates articles 4.02, 4.03(b), 4.03(e), 4.04 and 4.06 of the LUC.

6) Do you know the current status at parcel 035-470-005?
Yes, we are waiting for USEPA to determine the extent of damage, if any, to the TPCA cap. DTSC will review that assessment and discuss with USEPA as to what action is required, if any, to restore the cap.

7) Are you aware of any other activities that may impact the Land Use Covenant?
The City of Oroville stated that they have been encouraging the development of the property. Several property owners have contacted DTSC regarding the restrictions and how to have those restrictions removed.

8) What is the current process in place to prevent Land Use Covenant violations? Is it considered adequate to prevent additional Land Use Covenant violations in the future or are there suggestions for improving it?
We are depending upon the City of Oroville, as the construction permitting agency, to refrain from issuing permits for construction at properties covered by the Land Use Covenant without approval from DTSC. In addition, the property owner should be aware of the restrictions and should not violate them. The RP should conduct periodic inspections, at least annually, to ensure that the LUC is not being violated and the regulatory agencies should provide adequate oversight.

9) Do you have any comments, suggestions, or recommendations regarding the project?
I would suggest that the Responsible Party conduct periodic inspections of the properties covered by the Land Use Covenant and report any activity the USEPA and DTSC immediately A waiver was approved in 1999 for the Technical Impracticability of Groundwater Restoration in the Former Creosote Pond and Cellon Blowdown Areas at the site. I suggest that this Technical Impracticability Waiver be reviewed again to determine if there are any alternative remedy for groundwater restoration in the creosote DNAPL areas.

Five-Year Review Interview Record				
Site: Koppers Company, Inc. Superfund Site			**EPA ID No:**	CAD009112087
Interview Type: E-mail correspondence				
Interviewees				
Name	**Organization**	**Title**	**Telephone**	**Email**
Wes Ervin	**City Of Oroville**	**Planner**	**530-538-2408**	**WERVIN@CITYOFOROVILLE.ORG**

1) Are you familiar with the Koppers Company Inc. Superfund Site?
YES

2) What is your overall impression of the project?
Was a long-time creosote pressure plant, one of many across the country that became superfund sites and needed significant soil & groundwater remediation.

3) Are you aware of the Land Use Covenant violation on parcel (035-470-005)?
Yes, it also applies to several other parcels.

4) Do you know the current status at parcel 035-470-005?
Yes. Pending DTSC/EPA evaluation of damage to clay cap.

5) Are you aware of any other construction activities or otherwise in and around the site that may impact the Koppers Site (Covenant to Restrict Use of Proper–y - Environmental Restriction document# 2003-0079930)?
Yes- owner Jerome Johnson is planning two other building there. Gary Sandher also has DTSC/EPA approval to construct a building and install septic on APN 035-470-035

6) What agencies are responsible for issuing permits for property improvements? How are these agencies coordinating with EPA personnel overseeing the Koppers Superfund Site?
City of Oroville. Yes, we are coordinating.

7) What is the current process in place to prevent Land Use Covenant violations? Is it considered adequate to prevent additional Land Use Covenant violations in the future or are there suggestions for improving it?
We have placed a restriction on all parcels affected, requiring DTSC/EPA consultation prior to any city approvals.

8) Do you have any comments, suggestions, or recommendations regarding the project?
No.

Five-Year Review Interview Record				
Site: Koppers Company, Inc. Superfund Site			**EPA ID No:**	CAD009112087
Interview Type: E-mail correspondence				
Interviewees				
Name	**Organization**	**Title**	**Telephone**	**Email**
Jennifer Abrahams, PG	Tetra Tech, Inc.	Project Manager	916.704.4711	Jennifer.abrahams@tetratech.com

Site Specific Questions

1) What is your role on the project?
I am the Site Project Manager.

2) What is your overall impression of the project?
Remediation of the residual groundwater plume continues.

3) Is the remedy functioning as expected? How well is the remedy performing?
Yes, the remedy is performing well as constituent concentrations continue to decline.

4) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
Pentachlorophenol is the only Site constituent detected in the treatment plant influent at concentrations that periodically exceed the remediation standard; this constituent has been documented to naturally attenuate at this Site. The Site pentachlorophenol plume has been monitored since the mid-1980s and the combination of source removal, extraction and treatment, enhanced bioremediation, and natural attenuation has reduced the extent of the On-Site pentachlorophenol plume to a residual plume that is defined by three monitoring wells.

5) Is there a continuous O&M presence? If so, please describe staff and frequency and description of O&M activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.
The site O&M subcontractor is at the Site during the following schedule: weekly to collect treatment plant readings; every two weeks to pump fluid from the product recovery well; quarterly to collect depth to water readings; quarterly to sample the treatment plant; and, annually to collect groundwater samples.

6) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? If so, do they affect protectiveness of the remedy? Please describe changes and impacts.
Extraction well MW-8 was rehabilitated in February 2019, and extraction wells EW-1, EW-2R, and MW-8 were rehabilitated in March 2021 to restore extraction rates at the wells. The well screens had been occluded with mineral fouling.

7) Please provide a status update on declining pumping rates associated with MW-8. Please also provide status of abandonment of EW-2 and/or other wells in the past five years.
The rehabilitation procedures implemented in February 2019 and March 2021 at MW-8 successfully removed the mineral fouling built up in the well screen and restored the extraction rate.

Well EW-2 was replaced in 2016, as documented in the 7/19/2016 Abandonment of Extraction Well EW-2 and Installation of EW-2R letter submitted to the EPA.

8) Has vandalism been an issue on the site? If so, describe the vandalism activities that have taken place. Has it potentially impacted the remedy including the pump and treat system, landfill cap or monitoring wells?
Apart from the Land Use Covenant violation discussed in Question #12, I am unaware of vandalism at the site.

9) Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details.
The On-Property groundwater remediation plant has remained operational during the last five years, with the exception of shutdowns required for: routine operation and maintenance, electrical power outages, and the periodic need to replace equipment and rehabilitate extraction wells.

10) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.
Beazer East, Inc. (Beazer) has discussed the possibility of implementing the contingency remedy of monitored natural attenuation (MNA) at the Site with the EPA, which would result in shutting down the active On-Property groundwater extraction and treatment system. Beazer will submit a technical memorandum to the EPA in 2023 that outlines the applicability of implementing MNA at this Site.

11) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy?
No

12) Are you aware of the Land Use Covenant violation on parcel (035-470-005)?

Yes, the DTSC Project Manager notified me in August 2022 that the TPCA cap appeared to have been graded and/or disturbed when a structure was constructed over a portion of the cap.

13) Do you know the current status at parcel 035-470-005?
No, I understood that the DTSC PM was considering starting an enforcement action, but I do not know if that occurred.

14) Are you aware of any other activities in the past five years that may have impacted the Land Use Covenant?
No

15) Do you have any comments, suggestions, or recommendations regarding the project?
We think it is appropriate to shut down the groundwater extraction and treatment system and implement the contingency remedy of MNA at the Site. The active On-Property bioremediation program should be evaluated to assess whether it should continue.

Five-Year Review Interview Record				
Site: Koppers Company, Inc. Superfund Site			**EPA ID No:**	CAD009112087
Interview Type: E-mail correspondence				
Interviewees				
Name	**Organization**	**Title**	**Telephone**	**Email**
Hank Pappert	FTS, LLC	Project Manager	412-498-2602	hpappert.2006@f-ts.com

Site Specific Questions

1) What is your role on the project?

- General O&M project oversight

2) What is your overall impression of the project?

- The onsite groundwater treatment system has continued to operate with maintenance being performed on a scale that would be considered typical for treatment system of this type and age.

3) Is the remedy functioning as expected? How well is the remedy performing?

- Yes, the system is performing well and based on interface with the site consultant performance is to be as expected.

4) Is there a continuous O&M presence? If so, please describe frequency, staff, and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

- The Site O&M operator conducts system inspections on average three days per week. During routine O&M site visits system operational data such as flow rates and operating pressures are monitored across treatment system and at each extraction well location. Quarterly and Annual effluent monitoring, as well as monthly, quarterly, semi-annual and annual groundwater sampling are performed. Backwashing of the carbon vessels and multi-media filter are conducted as needed. Product is recovered from PR-01 every two weeks.

5) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? If so, do they affect protectiveness of the remedy? Please describe changes and impacts.

- No

6) Has vandalism been an issue on the site in the past five years? If so, has it potentially impacted the remedy including the pump and treat system, landfill cap or monitoring wells?

- No

7) Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details.

- Reduction in flow rate observed at MW-8 required rehabilitation (acidification followed by mechanical surging and purging) which was performed in February 2019. The system extraction wells (EW-1, EW-2R and MW-8) were observed to have reductions in pumping rates resulting from screen fouling which was address through a acidification and mechanical surging rehabilitation effort which began in February 2019 and concluded in April 2021. The redevelopment efforts were successful in increasing pumping rates observed at each extraction well.

8) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

- There are no optimizations to report for the O&M or sampling programs of the past 5 years.

9) Please provide a status update on declining pumping rates associated with MW-8. Please also provide status of abandonment of EW-2 and/or other wells in the past five years.

- MW-8 well was rehabilitated in February 2019, and outfitted with a new groundwater pump. Performance observed following rehabilitation indicated the effort was successful.
- EW-2 was abandoned in the spring of 2016 with EPA approval.

10) Are you aware of the Land Use Covenant violation on parcel (035-470-005)?

- Yes

11) Do you know the current status at parcel 035-470-005?

- Based on discussions with the site consultant, FTS understands that DTSC PM was considering pursuing an enforcement action against the current parcel owner.

12) Are you aware of any other activities that may impact the Land Use Covenant?

- No

13) Do you have any comments, suggestions, or recommendations regarding the project?

- As the site O&M contractor we have no comments, suggestions or recommendations at this time.

Appendix I: Site Inspection Report and Photos

Report Date: March 28, 2023

Koppers Co. (Oroville Plant) Superfund Site

a. Date of Visit: March 15, 2023

b. Location: South side of Oroville, CA

c. Purpose: A site visit was conducted to visually inspect and document the conditions of the remedy, the site, and the surrounding area for inclusion into the Five-Year Review Report.

d. Inspector: Matthew Wetter US Army Corps of Engineers, Env. Engineer

e. Participants:

Kelia Liang	US EPA (Regulatory Oversight)
Andy Reimanis	Dept of Toxic Substances Control (Regulatory Oversight)
Mike Bolinger	Beazer East Inc (Beazer, Responsible Party [RP])
Devin Fischer	Beazer
Casey Wilmunder	FTS (O&M/Plant Operator)
Jennifer Abrahams	Tetra Tech (PRP Consultant)
Jerome Johnson	Property Owner
Wes Ervin	Oroville City Planner

A site visit to the Koppers former wood treating facility was conducted on March 15, 2023. The inspection included visual observation of overall site conditions and inspection of various components of the remedy including groundwater treatment system (GWTS) (plant and well network), land disposal unit caps, and extraction, injection and monitoring wells. The participants received an overview of the site and a brief remedial history.

On March 15, 2023, Mr. Wetter arrived at the Kopper Superfund Site and met up with all participants except Messrs. Johnson and Ervin who only participated in the last portion of the visit at the Toxic Pits Control Act (TPCA) Unit area.

The weather was sunny, with a slight breeze, and approximately 60 degrees Fahrenheit.

At the time of the site visit, the treatment plant was shut-down due to electrical issues; the multi-media filter pump had been running continuously which prevented the surge tank from filling. The plant had been down since March 14, 2023, at approximately 18:00 and is scheduled to be returned to normal

service in the next week or so once an electrician can be mobilized to the site, and unless additional issues are identified.

Extraction and Injection Wells and Conveyance Piping:

Three extraction wells (EW-1, EW-2R and MW-8) and two injection wells (IW-3 and IW-4) were observed during the site visit. While they were not operating at the time of the visit as an indirect function of the shutdown, Beazer indicated they are normally working well and all of them appeared to be in working order, with pressure gauges, flow totalizers and sampling ports on each one. All visible piping appeared to be structurally sound, and evidence of leaks was not observed.

Each well was secured with a six-foot chain link fence. Average annual pumping totals were not available at the time of the site visit but are available in the annual monitoring reports.

See pictures 1 through 6 for photographic documentation.

Product Recovery Well:

One product recovery well (PR-1) in the Technical Impracticability Waiver was observed during the site visit. According to Beazer, the plant operator manually pumps approximately 13 gallons of DNAPL from the well approximately every two weeks; associated records are available upon request and are likely included in annual O&M reports. Based on the subsequently provided flow diagram and further clarification from Beazer[2], the mixture of DNAPL and DNAPL emulsion is pumped out of PR-1 into a mobile 50-gallon tank. The mixture is then transferred from the mobile tank to a 650-gallon Tank T-3 where the mixture settles and separates in the GWTP yard.

Tank T-3 is in a separate secondary containment area and is labeled similar to all equipment in the yard. After settling, the supernatant from Tank T-3 is pumped to the Settling Tank (also shown in the flow diagram) to combine with the Settling Tank supernatant being returned to the treatment process Inflow Tank. According to Beazer, therefore, the holding tank is considered part of the "process" and is not subject to the 90-day hazardous waste storage limit. The DNAPL is transferred annually to an off-site disposal location.

See pictures 7 through 9 for photographic documentation and Attachment 1 for GWTS Flow Diagram.

In Situ Remediation Wells:

MW-1, MW-2 and MW-4 are monitoring wells that are equipped with an oxidizing sock. The sock is an approximately two-foot piece of oxidizing material containing calcium peroxide that hangs in the well to encourage in situ-remediation. The wells are not used to "inject" material. All monitoring wells were observed to have a metal lock box over the top.

See picture 10 for MW-2 and 11 for the oxidizing sock shipping label. Additional details are available in the annual report and various planning documents.

[2] Electronic mail from Mike Bollinger (Beazer) to Matt Wetter (USACE) dated 2March 28, 2023.

Groundwater Treatment Plant (GWTP):

The participants toured the GWTP. The GWTP control room is a small (approximately 450 square feet) metal sided building. The building includes control systems, sampling equipment storage, and some project files. Files included a Health and Safety Plan (Revised June 2017), Operations and Maintenance Manual (May 1998), and a Post-Closure Completion Plan, Preparedness, Prevention and Contingency Plan for Management of Recovered Dense Non-Aqueous Phase Liquid (September 2003)

The building was in reasonably good repair and reasonably well organized and well kept, especially considering its age. Most of the treatment system is contained in an outdoor fenced-in yard. All treatment units are within secondary containment. On the day of the site visit much of the secondary containment contained moderate levels of standing water due to the extremely heavy rain of the past several days. Liquid in the secondary containment areas is pumped to the equalization tank and treated as extracted groundwater.

The GWTP "treatment train" (in order of treatment) includes:

1. Equalization tank
2. Air stripper. The air stripper vents to the atmosphere (e.g., no air treatment)
3. Sand pre-filter
4. Two tower granular activated carbon (GAC) towers in series, with two standby filters available and piped in parallel
5. Reinjection system to two injection wells

All portions of the system appeared to be in reasonably good repair. They showed expected levels of fading and staining from exposure to weather but no leaking pipes, structural deterioration, or significant rusting/flaking of paint or metal components was observed. Beazer staff indicated that the air stripper media had been changed out in approximately 2013 and the GAC had last been changed out in approximately 2019. The changeout schedule is primarily based on the monitoring of pressure and effluent sample results, though a specific sampling schedule was not discussed in detail.

Throughput from the GWTP is measured using individual extraction well flow totalizers and effluent flow is measured and sampled at the location labeled FIQ 11A. Average annual flow throughput was not known at time of site visit but is available in recent annual reports.

The GWTP is fairly well secured by a 6-foot fence with 3 strands of barbed wire at the top and several vehicle and person gates. Security is supplemented with monitoring cameras (two or more) and motion detector lights. Also, the Plant Operator indicated that theft and vandalism had decreased over the last few years, which he associated with hiring of a night watchman at the adjacent museum property. There have not been any significant impacts to plant operation due to natural disasters. A plan associated with natural disaster preparation may be available upon request, but Beazer was not certain if such a plan was required.

See pictures 12 through 18 for photographic documentation of conditions.

Soil Disposal Cell:

The two soil disposal cells were observed during the site walk. The entire perimeter of the disposal cells was walked and observed. The entire cell was well vegetated with mostly grasses and some medium size (knee high) flowered and leafy plants. Two or three woody plants were observed on the north side of the disposal cell; However, these plants had been cut down to near ground height. According to Beazer those are the only significant woody plants that require removal. Several burrowing animal holes were observed, approximately two to three inches in diameter. These are most prevalent along the slight shelf a third of the way up the disposal cells. According to Beazer burrowing animal holes are filled with bentonite to discourage their continued use. No areas of visible liner were observed, and Beazer indicated they have not found any either. No significant runnels or erosion was observed. There is one minor but well vegetated gully on the north side of the disposal cells. Beazer indicated that the cover soil was recently resurveyed to demonstrate if significant settlement or erosion was occurring.

Surface water was observed flowing off the south side from a 4-inch flexible hose that is presumably connected to the drainage layer between the cover soil and the liner material. Flow was approximately 3 gallons per minute and followed a small well vegetated drainage ditch along the inside edge of the access road.

Two sets of leachate recovery pipes were observed, one for each soil disposal cell. The leachate recovery pipes are gauged and pumped out quarterly. Beazer was not certain how much leachate is pumped out on average but the primary under liner consistently has the most water and the secondary and tertiary liners have progressively less. Associated sampling protocols were not discussed. The leachate that is pumped out is transported in a storage tank to the GWTP for treatment.

There are 10 monitoring wells around the perimeter of the soil disposal units. The 10 monitoring wells had metal lockable casings that were closed and locked as observed from a distance. DCMW-5A was the only perimeter well that was unlocked and opened; it had appropriate watertight cap on the 2-inch riser pipe and was in good condition. It was assumed to be representative of all wells.

See photos 19 through 25 for photographic documentation of conditions.

New Building built at Toxic Pits Control Act (TPCA) Unit:

The site visit team met Mr. Johnson (Property Owner) and Mr. Ervin (Oroville City Planner) at the TCPA Unit area to assess the construction that had occurred in the area. Mr. Johnson built an open (walls on three sides only) equipment storage building in the area that appears to coincide with the TPCA unit (based on comparison to the site overview map). The building appears to be on the east side of the TPCA unit and a chain link fenced area covers much of the west side of the TPCA unit. The building is approximately 100 x 50 feet and has a dirt and gravel floor. Presumably some light grading was done to flatten the floor area and the area in front of the building. All gravel was imported. There is also a chain link fence around the building "yard" to the west of the building. Mr. Wetter inquired about photos taken during construction or inspection that might show the footing trenches when they are still open. Mr. Johnson's construction contractor sent several pictures (see

Photos 26 and 27), but none of them show the trench when it is still open. Current condition photos are included as Photos 28 through 31.

Mr. Johnson indicated he had also done some minor grading along the entrance road to reestablish the drainage ditch immediately north of the road. The drainage ditch appears to collect water from the culvert just east of the driveway, which appears to originate on the other side of the road. Mr. Johnson rerouted the drainage ditch slightly so that it now allows the drainage ditch to empty into the Former Biological Treatment Facility Pond. See Photos 32 through 34.

MW-18 was damaged by a vehicle. See Photo 35.

The aerial photo (Photo 36) shows the approximate location of the fence and building corners.

Mr. Johnson indicated that building plans are available, but the only below grade activity conducted was a four-foot trench dug at the building perimeter for the concrete footer and support posts. He also indicated that a test pit for a potential septic system was dug to the northwest of the building, but he was not certain of the specific location. Based on the pictures (Photos 37 and 38) of the test pit provided by the City of Oroville Planner, it does not appear that the test pit reached a TPCA liner of any kind. Presumably the test pit was at least four feet deep. Presumably a trench log was prepared as well but it was not provided to Mr. Wetter for the purposes of this report.

According to Mr. Johnson there were no signs or fencing specifically delineating this area as different than the rest of the property. There is a monitoring well (MW-18) on the south side of the TPCA area and several bollards and a pond to the east (the Former Biological Treatment Facility).

Conclusion:

All components of the remedial action for the Koppers Site remediation appeared to be in reasonably good condition, especially considering their age. Except for the current temporary shutdown, Mr. Wetter reasonably assumes that the system is normally operating as intended.

Both Mr. Johnson and Beazer indicated that there is some transient camping in the area of the remedy. However, by chance, it is generally concentrated in the northeast corner of the property in the area that is demarcated for acceptable area of groundwater extraction.

Photo No.	Photograph and Description
1.	 Photo–1 - Overview of EW-1 (typical of extraction wells). Facing east.
2.	 Sample port at EW-2 (typical of extraction wells).

Photo No.	Photograph and Description
3.	 Pressure gauge at EW-2 (typical of extraction wells).
4.	 Totalizer at gauge at EW-2 (typical of extraction wells).

Photo No.	Photograph and Description
5.	 Totalizer at IW-4 (typical of injection wells).
6.	 Pressure gauge at IW-4 (typical of injection wells).

Photo No.	Photograph and Description
7.	 Overview of product recovery well (PR-1).
8.	 DNAPL storage tank. Secondary storage area contains approximately four inches of water and six to eight inches of freeboard, but presumably would spill to larger additional secondary containment area on right and foreground of photo. Facing northwest.

Photo No.	Photograph and Description
9.	 650-gallon DNAPL stoarage tank. Approxiamtely 4 inches of water in secondary containment associated with recent rainfall. Facing west.
10.	 Monitoring well (MW-02). Typical. Facing east.

Photo No.	Photograph and Description
11.	 Oxidizer sock (in situ remediation product) shipping label.
12.	 Interior control panels for GWTP located along southwest wall.

Photo No.	Photograph and Description
13.	 Interior main control panels for GWTP located along northeast wall.
14.	 Sampling port located between equalization tank and air stripper (representative of combined influent concentrations), facing north

Photo No.	Photograph and Description
15.	 GAC tower and security camera, facing north
16.	 GAC influent sampling port and pressure gauge, facing east.

Photo No.	Photograph and Description
17.	 Effluent flow totalizer. Facing south.
18.	 Fence/gate on northeast side of GWTP yard.

Photo No.	Photograph and Description
19.	 Gate and access road to leachate collection pipes at base of Soil Disposal cell. Facing east.
20.	 Burrowing animal holes along access road/shelf.

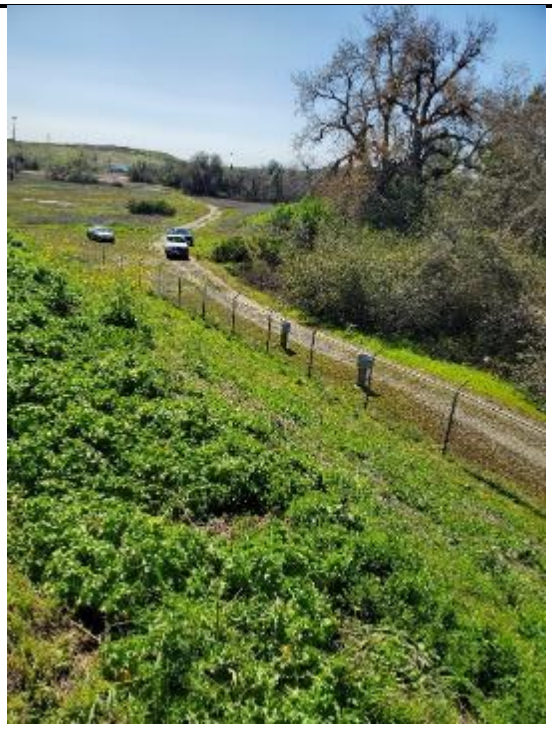
Photo No.	Photograph and Description
21.	 West side of Soil Disposal Cell No. 2. Facing South.
22.	 Northeast corner of Soil Disposal Cell No. 1. Facing south.

Photo No.	Photograph and Description
23.	 Woody plant remains, cut down to ground level. Approximately three-inch diameter. Facing west.
24.	 Surface draiange ditch along access road, at base of Soil Disposal Cell No. 2 in foreground and leachate collection piping in background. Facing east.

Photo No.	Photograph and Description
25.	 Six-inch leachate collection system pipe. Pipe is approximately 30 degree angle (vertical) into hillside.
26.	 During construction (July 2022) photo of equipment storage shed footing on TPCA Unit. Facing north.

Photo No.	Photograph and Description
27.	 During construction (July 2022) photo of equipment storage shed on TPCA Unit. Facing northeast.
28.	 Current photo of equipment storage shed on TPCA Unit. Facing northwest.

Photo No.	Photograph and Description
29.	 Current photo of equipment storage shed on TPCA Unit of open west wall. Facing north.
30.	 Current photo of interior of equipment storage shed on TPCA Unit. Facing north.

Photo No.	Photograph and Description
31.	 Sideyard of equipment storage shed area on TPCA Unit. Facing west.
32.	 Drainage ditch just east of equipment shed driveway, culvert goes beneath Baggett Marysville Road. Facing south.

Photo No.	Photograph and Description
33.	 Drainage ditch just east of equipment shed driveway, along Baggett Marysville Road. Facing northeast.
34.	 Drainage ditch just east of equipment shed driveway, where it crosses access road before entering Former Biological Treatment Facility pond. Facing south.

Photo No.	Photograph and Description
35.	 Damaged monitoring well MW-18. Storage shed fenced area is in background.

Photo No.	Photograph and Description
36.	 Aerial photo of TPCA area, prior to storage shed construction. Pink line is approximate location of storage building fenced area and four red markers are approximate location of storage shed building corners. Global positioning system files available upon request.

Photo No.	Photograph and Description
37.	 Septic tank test pit. Date, depth and specific location unknown.
38.	 Septic tank test pit. Date, depth and specific location unknown.

Appendix J: Title Search