

**FIFTH FIVE-YEAR REVIEW REPORT FOR
McCOLL SUPERFUND SITE
Orange County, California**



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U.S. Army Corps of Engineers
Seattle District
FOR
U.S. Environmental Protection Agency Region 9

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Executive Summary

This is the fifth Five-Year Review of the McColl Superfund Site (Site) located in Fullerton, Orange County, 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 Site is located at the southwest corner of Rosecrans Avenue and Sunny Ridge Drive in Fullerton, California. From 1942 to 1946, the 22 acres of what became the McColl Superfund Site served as a disposal area for an estimated 72,600 cubic yards of low-pH refinery waste in twelve unlined sumps. Over time, waste constituents leached from the sumps into underlying perched groundwater and were transported hydraulically downgradient in the dissolved phase. The Site consists of the contamination source area with refinery wastes and contaminated soil and the groundwater beneath and downgradient from the source area. The principal contaminants of concern are benzene, tetrahydrothiophenes, and metals.

The Environmental Protection Agency (EPA) signed the Source Record of Decision in 1993 and selected solidification technology as the remedy for the Site. Due to technical uncertainties that could not be resolved until field implementation, EPA also selected a contingency remedy of capping the source area equivalent to a Resource Conservation and Recovery Act (RCRA) landfill. Following extensive testing of solidification, EPA concluded that the technology was not feasible for the Site and implemented the contingency remedy. The contingency remedy included:

- constructing a multi-layer cap over the untreated sumps with a gas collection and treatment system;
- building vertical cut-off slurry walls around the sumps;
- stabilizing steep slopes on the Site with retaining walls;
- institutional controls; and
- groundwater monitoring.

In 1996, EPA signed the Groundwater Record of Decision and selected the following remedy to protect long-term human health and the environment:

- redirection of surface water off the Site;
- grading of areas adjacent to the containment system;
- lining of on-Site drainage channels with low permeability materials; and
- groundwater monitoring with implementation of additional institutional controls should monitoring results exceed criteria pertaining to tetrahydrothiophenes. (The 2005 Explanation of Significant Differences changed the trigger chemical from tetrahydrothiophenes to benzene and specified that a revised risk assessment be initiated prior to implementing additional remedial actions including additional institutional controls.)

Construction activities for both the Source and Groundwater remedies began in July 1996 and concluded by November 1997.

The gas control treatment system is currently operating effectively with limited off-gas generation. Measures to inhibit surface water recharge within the capped areas are working as intended and depth to the water table in the shallow groundwater zone is stable. The benzene plume is currently limited to one on-Site, shallow well. There have been no exceedances for benzene, the trigger compound, above the drinking water standard of 1 microgram per liter in any off-Site, downgradient monitoring well.

Institutional controls to prevent development of parcel to ensure integrity of source control/capped area are in place and working. Exposure assumptions and remedial action objectives used at the time of the decision documents remain valid.

Tert-butyl alcohol is present in the aquifers beneath the Site at low concentrations in upgradient and cross-gradient wells. Tert-butyl alcohol was not identified as a contaminant of concern in the Record of Decision and has no established drinking water standard. However, the California State Water Resources Control Board has issued a notification level for tert-butyl alcohol of 12 micrograms per liter in public drinking water systems. Samples from the off-Site downgradient compliance wells contain tert-butyl alcohol in concentrations significantly above the notification level.

The remedies at the McColl Superfund Site currently protect human health and the environment. The gas collection and treatment system, surface water and infiltration controls, and institutional controls are functioning as designed. The current extent of the benzene plume is limited to an on-Site, shallow well. The closest municipal drinking water, 6000 feet downgradient, was sampled for benzene and tert-butyl alcohol in 2022 and results were non-detect. However, due to the continued detection of tert-butyl alcohol in monitoring wells downgradient of the source sumps, and the nature of tert-butyl alcohol as more mobile than benzene, completion of the tert-butyl alcohol groundwater delineation, currently underway is necessary to ensure long term protectiveness.

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List of Acronyms and Abbreviations

C2 REM	engineering firm and consultant for the McColl Site Group
EPA	United States Environmental Protection Agency
µg/L	micrograms per liter
McColl Site Group	a group of potentially responsible entities who are implementing the Site remedies
Ppm	parts per million (milligrams per liter)
ROD	Record of Decision
Site	McColl Superfund Site
RCRA	Resource Conservation and Recovery Act
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 U.S. 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 fifth Five-Year Review for the McColl Superfund Site. The triggering action for this statutory review is the completion of the fourth Five-Year Review, conducted in 2017. 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 Site consists of two operable units¹, identified as the Source and the Groundwater, both of which will be addressed in this Five-Year Review. The Source remedy addresses the risk posed by the refinery waste itself. The Groundwater remedy addresses the potential threat posed by the release of hazardous substances to the drinking water aquifer from the refinery waste.

The McColl Superfund Site Five-Year Review was led by SP Davis, Jr., EPA Region 9 Remedial Project Manager. Participants included: Cynthia Wetmore, EPA Region 9 Superfund Five-Year Review Coordinator, and from the U.S. Army Corps of Engineers (USACE): Jayson Osborne, Remediation Biologist; Kristin Addis, Hydrogeologist; Jacob Williams, Project Manager; Helen Sanchez, Civil Engineer. The review began on October 26, 2021.

¹ During cleanup, a site can be divided into distinct areas depending on the complexity of the problems associated with the site. These areas, called operable units, may address geographic areas of a site, specific site problems, or areas where a specific action is required.

Table 1. Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: McColl Superfund Site		
EPA ID: CAD980498695		
Region: 9	State: CA	City/County: Fullerton/Orange
SITE STATUS		
National Priorities List Status: Final		
Multiple Operable Units? Yes	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): SP Davis, Jr.		
Author affiliation: EPA Region 9		
Review period: 10/26/2021 - 7/29/2022		
Date of site inspection: 6/14/2022		
Type of review: Statutory		
Review number: 5		
Triggering action date: 9/27/2017		
Due date (five years after triggering action date): 9/27/2022		

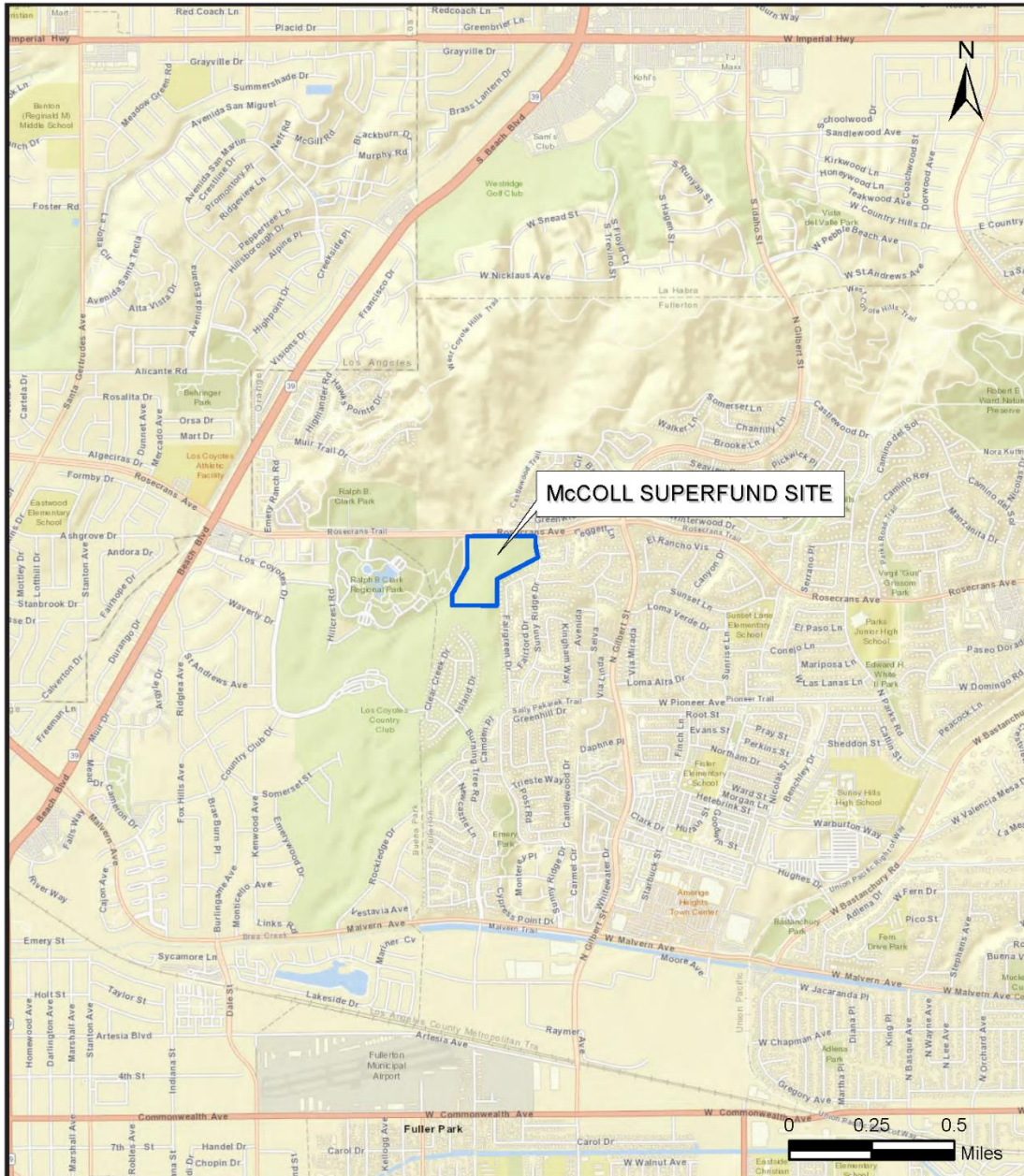
1.1. Background

The Site is located in the City of Fullerton in Orange County, California (Figure 1). The Site is fenced and located entirely within the boundaries of the Los Coyotes Country Club. From 1942-1946, the 22 acres comprising the Site were a disposal area for refinery waste. During that period, an estimated 72,600 cubic yards of waste were disposed in twelve unlined pits or sumps. At the time, the local area was sparsely populated, and refinery operations took place on land located to the north and northwest of the Site. During the 1950s and early 1960s, in an attempt to control Site odors, three sumps in the eastern portion of the Site (part of what is now called the Ramparts Sumps) were covered with drilling mud. In the late 1950s, six sumps at the southern end of the property (now called the Los Coyotes Sumps) were covered with natural fill materials during the construction of the adjacent Los Coyotes Country Club golf course. The Site came to the attention of regulatory agencies when residents complained of odor and health concerns in July 1978. Contaminated waste seeps were present at the ground surface creating unacceptable direct contact and inhalation hazards. Initial sampling by the agencies detected contaminants associated with the refinery waste in Site soil and shallow groundwater. Additional soil cover was placed over the upper Ramparts sumps in September 1983. Residential housing was built on adjacent land during the 1980s. At some time between 1994 and 2003 the golf course expanded by constructing additional fairways within the Site boundaries. The Site continues to be used as a golf course at the present time.

1.2. Physical Characteristics

The Site generally lies at the lower southern face of the east-west trending Los Coyotes Hills. The northeastern corner of the Site is located at the intersection of Rosecrans Avenue and Sunny Ridge Drive. The terrain at the Site slopes gently from the northeast to southwest, with a maximum relief of approximately 70 feet (ft). The Los Coyotes Country Club golf course covers a portion of the Site and so the Site surface cover is predominantly grass-covered and ornamentally landscaped, which is regularly watered and mowed. The climate at the Site and surrounding area is Mediterranean, characterized by hot dry summers and mild winters during which most of the year's light rainfall occurs.

The golf course and surrounding residential areas have altered the natural topography and surface water drainage (Figure 2). Engineered features, including the contoured, vegetated multi-layer cover system, concrete-lined v-ditches, and retention ponds, facilitate the drainage of surface water from the Site. There is one surface water drainage pathway originating off-Site that traverses the Site's northwest corner. This surface water drainage originates on land located directly to the north of the Site across Rosecrans Avenue and predominantly west of the Fullerton Fire Department Station #6. Flow from the surface water drainage is routed into a geosynthetic-lined retention pond located on Site. The retention pond collects 100-year peak flows and overflows through a culvert into a swale, which traverses the course and enters another retention pond downstream.



SITE VICINITY MAP
 McColl Superfund Site



Source: C2 REM. 2021. 2020 Operations, Maintenance and Monitoring Annual Report, McColl Superfund Site, Fullerton, California.

Figure 1. Site Vicinity Map



Source: adapted from C2 REM. 2021. 2020 Operations, Maintenance and Monitoring Annual Report, McColl Superfund Site, Fullerton, California.

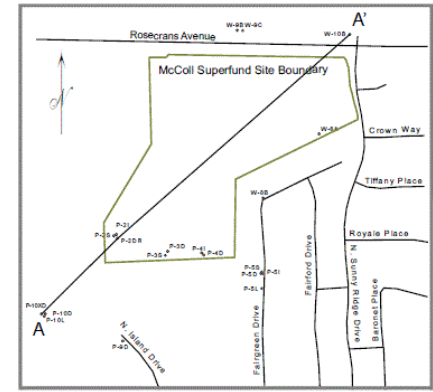
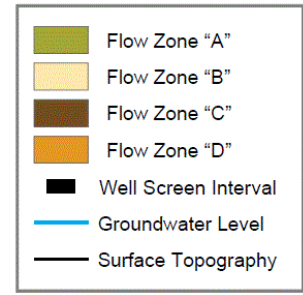
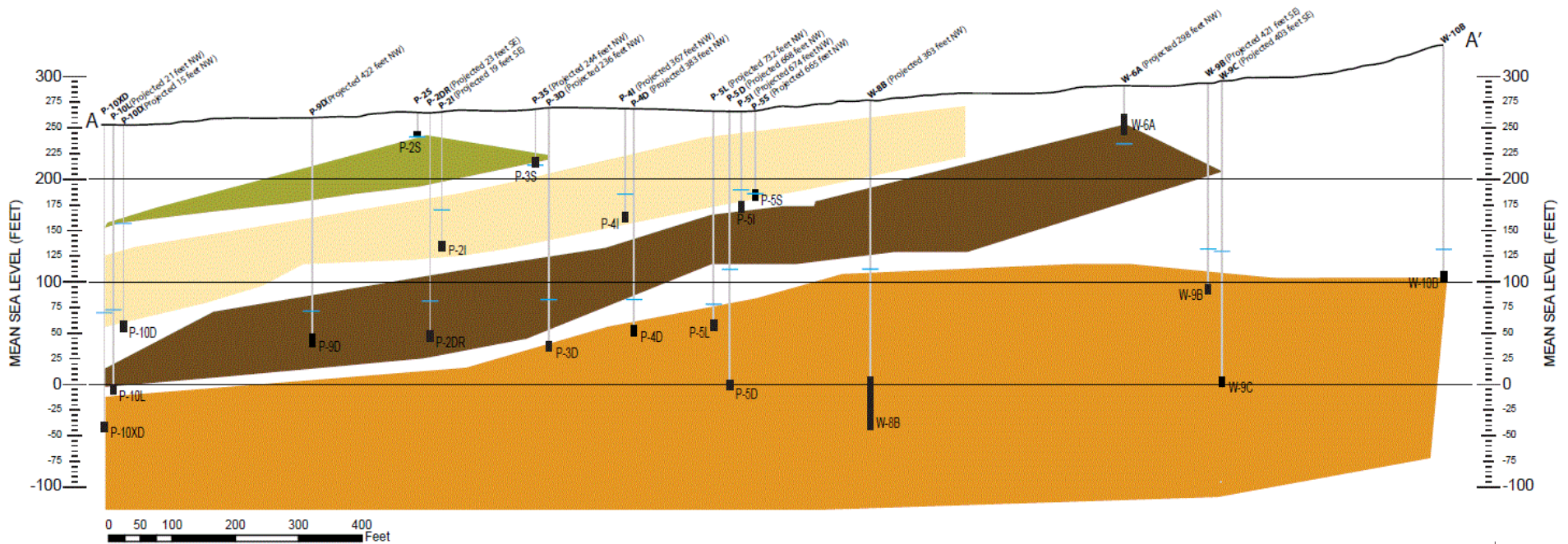
Figure 2. Detailed Location Map

1.3. Hydrology

Alluvial deposits underlie major portions of Orange County, California, including the McColl Superfund Site. Regional hydrologic units consist of three distinct formations: the La Habra Formation; the Coyote Hills Formation; and the San Pedro Formation. The La Habra Formation is closest to the surface and consists of semi-perched aquifers of limited extent. The Coyote Hills Formation is coarser-grained and underlies the La Habra. The San Pedro Formation is the deepest formation and contains at its base the principal aquifer of the Orange County basin.

Shallow groundwater zones at the Site are located within the La Habra Formation (A, B, and C) and Coyote Hills Formation (D) (Figure 3). Zones A, B, and C are capable of producing little water and have a downward vertical gradient. Zone D is capable of producing larger quantities of water and consistently has an upward vertical gradient to Zone C. Zone B contains the highest measured on-Site contaminant concentrations in groundwater at well P-2I. Prior monitoring has detected contaminants at concentrations below drinking water standards in Zones C and D downgradient of the Site. Clay layers separate each of the groundwater zones from one another by serving as barriers to vertical flow, except at the southern boundary where the Zone C intersects the regional principal aquifer. Over 90 percent of groundwater production in the Orange County Water District occurs from wells that are screened within the regional principal aquifer system at depths between 200 and 1,300 feet below ground surface.

One municipal groundwater production well, the Coyote 12A well, is located within 1 mile of the Site. The Coyote 12A well is located 3,000 feet cross-gradient to the Site toward the east - southeast near the intersection of Gilbert Street and Pioneer Avenue. The Coyote 12A well is inactive at this time. The second closest municipal groundwater production well is the Smith-Murphy well, which is located 6,600 feet southwest of the Site. The Smith-Murphy well was sampled in 2022 and was non-detect for tert-butyl alcohol and benzene.



Source: C2 REM, 2021. 2020 Operations, Maintenance and Monitoring Annual Report, McColl Superfund Site, Fullerton, California.

Figure 3. Cross section representing the separate flow zones present beneath the Site.

2. Remedial Actions Summary

2.1. *Basis for Taking Action*

Ingestion or contact with Site waste and contaminated soils would result in unacceptable risks to human health. Similarly, inhalation of volatile organic compounds emitted from the Site waste sumps or wind-borne dust from Site soils would also result in unacceptable risks to human health. Consumption of contaminated groundwater would result in unacceptable risks to human health. Contaminants in the shallow groundwater could migrate into the deeper regional drinking water aquifer. Contaminants in Site waste, soil, and groundwater include volatile organic compounds, including benzene; semi-volatile organic compounds; tetrahydrothiophenes; and metals.

2.2. *Remedy Selection*

In the 1993 Source Record of Decision (ROD), EPA selected solidification technology as the remedy to address the risk posed by the waste and surrounding contaminated soils. The remedial action objectives for the Source included:

- Minimize the seepage of waste materials,
- Eliminate the hazardous characteristic of corrosivity of Site wastes and soils,
- Prevent release of volatile contaminants to the maximum extent practicable,
- Ensure Site waste sumps and contaminated soils possess sufficient internal strength characteristics to support a RCRA-equivalent cap.

While EPA selected solidification technology in the 1993 Source ROD as the remedy for the Site, EPA also designated construction of a RCRA-equivalent cap and slurry walls as a contingency remedy to be implemented if solidification of Site waste and soil was determined to be infeasible. Following extensive testing of solidification, EPA concluded that the solidification technology was not feasible for the Site and implemented the contingency remedy. Components of the contingency remedy included: (1) constructing a multi-layer cap over the untreated sumps with a gas collection and treatment system; (2) building vertical cut-off slurry walls around the sumps; (3) stabilizing steep slopes on the Site with retaining walls; and (4) monitoring groundwater.

Operation and maintenance of the cap and cut-off slurry walls, gas collection and treatment system, and Site security were anticipated to be necessary in perpetuity at the Site. The remedy also included institutional controls, which were designed to prevent construction of structures or addition of materials that could compromise the integrity of the implemented remedy.

The subsequent 1996 Groundwater ROD addresses the potential threat to the regional drinking water aquifer posed by infiltration of surface water at the Site. The remedial action objectives for Groundwater included:

- Protection of groundwater resources
- Minimization of surface water infiltration into waste materials

Components of the Groundwater remedy included the redirection of surface water off the Site, grading of areas adjacent to the containment system, and lining of on-Site drainage channels with low permeability materials. The Groundwater remedy stipulated continuing groundwater monitoring and establishment of additional institutional controls if monitoring in the regional aquifer shows contaminant concentrations above a threshold of 3.6 µg/L total tetrahydrothiophenes or concentrations of any Site contaminant above drinking water standards.

EPA issued an Explanation of Significant Difference for Groundwater on September 1, 2005. The Explanation of Significant Difference removed the contingency trigger thresholds of Site contaminant exceedances above drinking water standards and/or exceedances of 3.6 micrograms per liter (µg/L) total tetrahydrothiophenes and replaced it with the threshold of 1.0 µg/L benzene for future monitoring events. The Explanation of Significant Difference also specifies that if the revised trigger threshold is exceeded, then a revised risk assessment should be completed to inform potential implementation of additional remedial actions, including institutional controls.

Table 2. Source Soil and Waste Contaminants

Organic Contaminants	Metals
Methylene chloride	Antimony
Benzene	Arsenic
Ethyl benzene	Beryllium
Toluene	Cadmium
Xylenes	Copper
Acetone	Lead
2-butanone	Manganese
2-methylnaphthalene	Mercury
Naphthalene	Nickel
Phenanthrene	Tin
Bis(2-ethylhexyl) phthalate	Vanadium
Tetrahydrothiophenes	Zinc
Leachable sulfate	

Table 3. Groundwater Contaminants

Organic Contaminants			Metals	
<u>Thiophenes:</u>	<u>Volatile Organic Compounds:</u>	<u>Semivolatile Organic Compounds:</u>		
Tetrahydrothiophene	Acetone	Bis(2-ethylhexyl)phthalate	Aluminum	Nickel
2-methyltetrahydrothiophene	Benzene	Butylbenzylphthalate	Arsenic	Selenium
3-methyltetrahydrothiophene	2-Butanone	Dimethylphthalate	Barium	Thallium
	Carbon Disulfide	Di-n-butylphthalate	Beryllium	Vanadium
	Chloroform	Isophrone	Cadmium	Zinc
	1,2-dichloroethane	2-Methylphenol	Chromium	
	Ethyl benzene	Nitrobenzene	Cobalt	
	2-hexanone	Phenol	Copper	
	Methylene Chloride	Pyrene	Lead	
	Toluene		Manganese	
	Xylenes		Mercury	

2.3. Remedy Implementation

Parsons Engineering Science, the remediation construction contractor for the McColl Site Group, began implementing both the Source and Groundwater remedies in July 1996. Construction was completed in November 1997 and included:

- Installation of subsurface slurry cut-off walls
- Installation of an impermeable cover
- Grading to facilitate surface water control
- Erosion control measures
- Construction of the gas collection and treatment system
- Landscaping establishment and site restoration
- Installation of monitoring wells and gas probes to verify containment of Site wastes

There are two sump cover systems, one encompassing the Los Coyotes sump area located in the southern portion of the Site, and the other covering the Ramparts sump area located in the eastern portion of the Site. Figure 2 depicts the locations of the sump areas and other Site features. Prior to cap construction, vertical cutoff walls, constructed from a slurry of soil and bentonite clay, were installed encircling each sump area as part of a sump gas containment system. The bottom elevation of both walls is above the static elevation of groundwater; hence, the design of the cutoff walls was primarily for soil vapor containment and not hydraulic isolation, although preventing horizontal movement of minor perched water through the wall was a beneficial byproduct of the design. Twelve sets of gas probes comprised of

two gas sampling probes outside the wall and one gas pressure probe inside the wall monitor the effectiveness of the cutoff walls to contain soil vapors. A single blower draws subsurface gases from both sump areas through an aboveground soil vapor treatment system (two granulated activated carbon vessels operated in series). The blower operated nine hours per day, five days per week from November 1997 until June 2005 when EPA granted approval to reduce blower operation to one day per month.

The property owner, McAuley LCX Corporation, agreed in 1996 to no further construction or placement of fill at the Site and agreed to allow future access for purposes of operation, maintenance, and monitoring of the remedy components. McAuley LCX Corporation further agreed to file with the Orange County Recorder’s Office a certified copy of the 1997 Consent Decree which establishes restrictive environmental covenants on the Los Coyotes property. These deed restrictions run with the land and are binding on any potential future owner of the Site. In a letter from the California Department of Toxic Substance Control dated March 14, 2005, the State determined that the land use restrictions agreed to in the Consent Decree were consistent with the requirements of Land Use Covenant Regulations as well as the land use covenant provisions in California Civil Code Section 1471 (Table 4).

Table 4. Summary of Institutional Controls

Media, Engineered Controls, and Areas	Institutional Controls Called for in the Decision Documents	Impacted Parcel(s)	Objective	Title and Date
Source	Yes	APN 280-201-02	Prevent development of parcel to ensure integrity of source control/capped area.	Consent Decree recorded January 28, 1997
Groundwater	Yes	APN 280-201-02	If benzene is detected above drinking water standards in downgradient off-Site wells, conduct a revised risk assessment; deploy additional institutional controls as indicated by the revised risk assessment.	None currently necessary because benzene is not detected above drinking water standards in downgradient off-Site wells.

2.4. System Operations/Operation and Maintenance

2.4.1. Operations and Maintenance Requirements

Site operation and maintenance consists of three categories of tasks: (1) operation and maintenance of the gas collection and treatment system; (2) inspection of the cap and retaining walls, maintenance of ground

cover, and Site security; and (3) collection of groundwater monitoring data for use in evaluating the groundwater remedy.

The gas collection and treatment system is run in active mode for nine hours per month and in passive treatment mode the remainder of the time. C2 REM, consultant for the McColl Site Group, monitors the gas collection and treatment system monthly using a photoionization detector (calibrated to benzene) at the system's effluent sample location; C2 REM collects confirmation samples annually which are sent to an environmental laboratory for analysis. The maximum effluent resulting from the gas collection and treatment system must be less than 5.95 parts per million (ppm) of benzene over an 8-hour operational period per day in compliance with the South Coast Air Quality Management District permit. Each year, C2 REM also conducts confirmation sampling and laboratory analysis of the gas collection and treatment system's effluent air to assess the effectiveness of the granular activated carbon filter. Additionally, C2 REM completes quarterly gas collection pressure probes monitoring using field instruments to measure influent concentrations of volatile organic compounds, carbon dioxide, oxygen, hydrogen sulfide, and the lower explosive limit and collects annual pressure measurements of the sub-gradient pipes that collect fugitive soil vapor emissions from the sand layer of the cap.

Long term monitoring at the Source includes subsurface soil vapor pressure to assess pressure differentials inside/outside the sump containments. In addition, settlement monuments are surveyed for differential settlement that could affect the integrity of the containment systems. Long term monitoring for groundwater consists of sampling the existing network of monitoring wells to assess potential migration of Site-related contaminants.

The Los Coyotes Country Club grounds staff observe the cap and retaining walls daily. The grounds staff complete detailed inspections following significant rain events and annually. Every five years C2 REM completes a survey of established topographic monuments to determine the degree of horizontal and vertical displacement and settling at Site earthen slopes and capped areas. The next monument survey is due in late 2022.

Since 2005, C2 REM has purged and sampled groundwater semiannually using a low-flow, fixed volume method for volatile organic compounds and metals.

2.4.2. Significant Operations and Maintenance over the Past Five Years

C2 REM recommended the granular activated carbon in the gas collection and treatment system be changed in 2020 based on air monitoring results. Approximately 4,000 pounds of fresh granular activated carbon was installed in each filtration vessel on July 23, 2020. Based on the laboratory analytical results of the spent granular activated carbon, the material was characterized as nonhazardous waste and transported off-Site for recycling and reuse at a granular activated carbon reactivation facility.

Due to hot and dry conditions at the Site, maintaining living groundcover at the Lower Ramparts area has been challenging during the past five years. C2 REM noted in their 2018 inspection ongoing problems with an underperforming irrigation system and the presence of dead or sparse vegetation in the Lower

Ramparts area. Repairs to irrigation were made in 2020 to improve the ability of vegetation to survive during summer heat.

C2 REM was unable to measure the depth of accumulated sediments in 2020 because of an overgrowth of vegetation in the retention pond. C2 REM was able to gauge the sediment depth in June 2021 and estimated the volume of accumulated material at 4,525 cubic yards. The accumulation of material in the pond consisted of vegetation roots, decaying vegetation (sludge) and fine sediments. Since the remaining pond capacity is less than the required 100-year storm water volume, excess accumulated material will be removed in 2022. Excessive growth of pond vegetation may be contributing to difficulties with measurement of pond sediment accumulation and may be causing more frequent removal of accumulated material to maintain the pond's designed retention capacity.

Several dedicated pumps were replaced at key monitoring wells during the past five years. The dedicated pump at monitoring well P-10L was replaced in 2018 during repair of housing around the well head. Monitoring well P-2I was successfully redeveloped in October 2020 to maintain the performance of the well's filter pack and to reduce turbidity in sampled water. New dedicated sampling pumps were installed at monitoring wells P-10L and P-2I during the 2020 sampling event, and at well P-10D during the 2021 groundwater sampling event. C2 REM was able to successfully sample each monitoring well following the installation of the new pumps. C2 REM installed a temporary pump in monitoring well P-10XD in August 2021 because the dedicated pump had failed. Based on the high levels of turbidity observed during sampling, well P-10XD may require redevelopment during the next sampling event.

3. Progress Since the Last Five-Year Review

3.1. *Previous Five-Year Review Protectiveness Statement and Issues*

The sitewide protectiveness statement from the 2017 Five-Year Review for the McColl Superfund Site stated the following:

The remedies at the McColl Superfund Site for both source and groundwater operable units are currently protective of human health and the environment. The Gas and Collection Treatment System (GCTS), control surface water recharge and other institutional controls are functioning as designed. The current extent of the benzene plume is limited to an on-site, shallow well. However, due to the continued detection of tert-butyl alcohol in the wells downgradient of the source sumps and the nature of tert-butyl alcohol as more mobile and volatile than benzene, further delineation and characterization of tert-butyl alcohol in groundwater is necessary to ensure long term protectiveness.

Table 5. Status of Recommendations from the 2017 Five-Year Review

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Groundwater	Tert-butyl alcohol is considered a possible emerging contaminant at the Site and may potentially indicate the leading edge of the contaminant plume within the B and C level aquifers.	Delineate the extent of tert-butyl alcohol in the B and C Zones aquifer.	Ongoing	Due to the COVID pandemic, installation and sampling of new monitoring wells to delineate the tert-butyl alcohol plume were delayed. Some progress towards implementing the recommendation has been made, in that necessary planning steps, such as drafting of work plans and sampling plans have been completed. Because tert-butyl alcohol is more mobile in water than other chemicals of concern at the Site, the tert-butyl alcohol detections in excess of the notification level may potentially indicate migration of the leading edge of the contaminant plume within the B Zone and C Zone aquifers	N/A

4. Five-Year Review Process

4.1. Community Notification and Site Interviews

4.1.1. Five-Year Review Public Notice

A public notice was made available by newspaper posting in the *Orange County Register* on March 22, 2022, stating that there was a Five-Year Review and inviting the public to submit any comments to EPA. No public comments were received. A copy of the public notice is provided in Appendix E. The results of the review and the report will be made available at the Site information repository located online at: www.epa.gov/superfund/mccoll and at the address below:

EPA Superfund Records Center
 75 Hawthorne Street, Room 3110,
 San Francisco, California, 94105
 Phone: (415) 947-8717
 Email: R9records@epa.gov

4.1.2. Site Interviews

During the Five-Year Review process, an interview was conducted to document any perceived problems or successes with the remedy that has been implemented to date. The result of the interview is summarized below.

The McColl Site Group Project Coordinator responded to the Five-Year Review interview questionnaire on 14 April 2022. The Project Coordinator stated that C2 REM, consultant to the McColl Site Group, performs operation, monitoring and maintenance to the site cap, soil gas collection and treatment system, and site vapor probes and monitoring wells in accordance with the approved Site-Specific Operation and

Maintenance Plan. The Project Coordinator stated that the soil cap, gas collection and treatment system, and the site stormwater infiltration controls are all functioning as intended. Consultant personnel are on Site about two to three times a month to perform operation, maintenance and monitoring activities. Operation, maintenance and monitoring proceeded as planned during the past five years and there were no changes to operation, maintenance and monitoring protocols during the past five years.

In response to the question about unexpected maintenance activities that occurred during the past five years, the McColl Group noted redevelopment of well P-2I, repair of security fencing, and removal of trees and vegetation on the cap area. During groundwater monitoring in 2019, high turbidity levels were observed in well P-2I. The well was successfully redeveloped in October 2020 to maintain the longevity of the well and decrease turbidity levels. In September 2019, C2 REM personnel noticed damage to the security fence close to the Site entrance gate; Los Coyote Country Club personnel repaired the fence in June 2020. In September 2020, EPA received a resident letter with concerns about vegetation and tree overgrowth vegetation on the cap area. The vegetation and trees were removed in December 2020.

4.2. Data Review

This data review focuses on the Site monitoring program's compliance. The monitoring program includes groundwater sample collection at eleven of 20 Site monitoring wells, 36 gas pressure probe/gas sampling probes, a vapor extraction system, and settlement survey of the waste sumps.

4.2.1. Soil

C2 REM conducts vertical and horizontal surveys every five years to assure proper drainage of the cap surface. The 2017 survey data showed minor and consistent horizontal displacement, ranging from 4.4 to 6.2 inches. Horizontal displacement of the toe of the slurry wall ranged from 0.2 to 3.2 inches, within the 12-inch design tolerance. All horizontal displacement observed are within the expected design parameters. C2 REM measures vertical settling of the sumps and compared values to the theoretical values. Vertical settling ranged from 0.8 to 11.9 inches. SR-5 (Upper Ramparts Sump) was measured at 5.8 inches, which exceeds the predicted settlement of 3.7 inches. Despite the greater than expected amount of settlement, C2 REM calculated the strain on the geomembrane cap imposed due to the additional settlement was within remedial design tolerance. The remaining sumps are within the total lifetime displacement design tolerance of 12 inches. The estimated duration to achieve 90 percent of the "primary consolidation" is 18.7 years, with the "end consolidation" to be achieved in 22 years, from the time construction was complete in November 1997. After 20 years of monitoring the elevation of the sump caps, the comparison of the actual vertical consolidation to the predicted vertical consolidation indicates that the condition of the cover system remains within the design parameters.

4.2.2. Groundwater

C2 REM conducts groundwater monitoring activities to characterize the contaminants present in the A, B, C, and D Zone aquifers to demonstrate that the infiltration controls are sufficiently preventing migration of the Site contaminants to the regional aquifer. Groundwater monitoring wells have been gauged semi-annually for water levels in twenty wells. C2 REM conducts groundwater sampling for Site chemicals of

concern annually from four well locations (P-2I, P-10D, P-10L and P-10XD) and bi-annually at seven well locations (P-5I, P-5L, P-9D, P-5D, W-9B, W-9C and W-10B).

Water level elevations remained consistent with historical trends. Small changes in seasonal recharge rates, as well as infiltration from golf course irrigation outside of the sump areas, influence water level elevation. Water level elevations in the A Zone wells remained consistent while increases in water level were observed in B, C and D Zone aquifers. The D Zone is considered a regional groundwater zone with regional influences unrelated to Site infiltration rates. The changes in water level elevation do not represent an unexpected condition and suggest that the remedy remains protective by minimizing infiltration into the sump area.

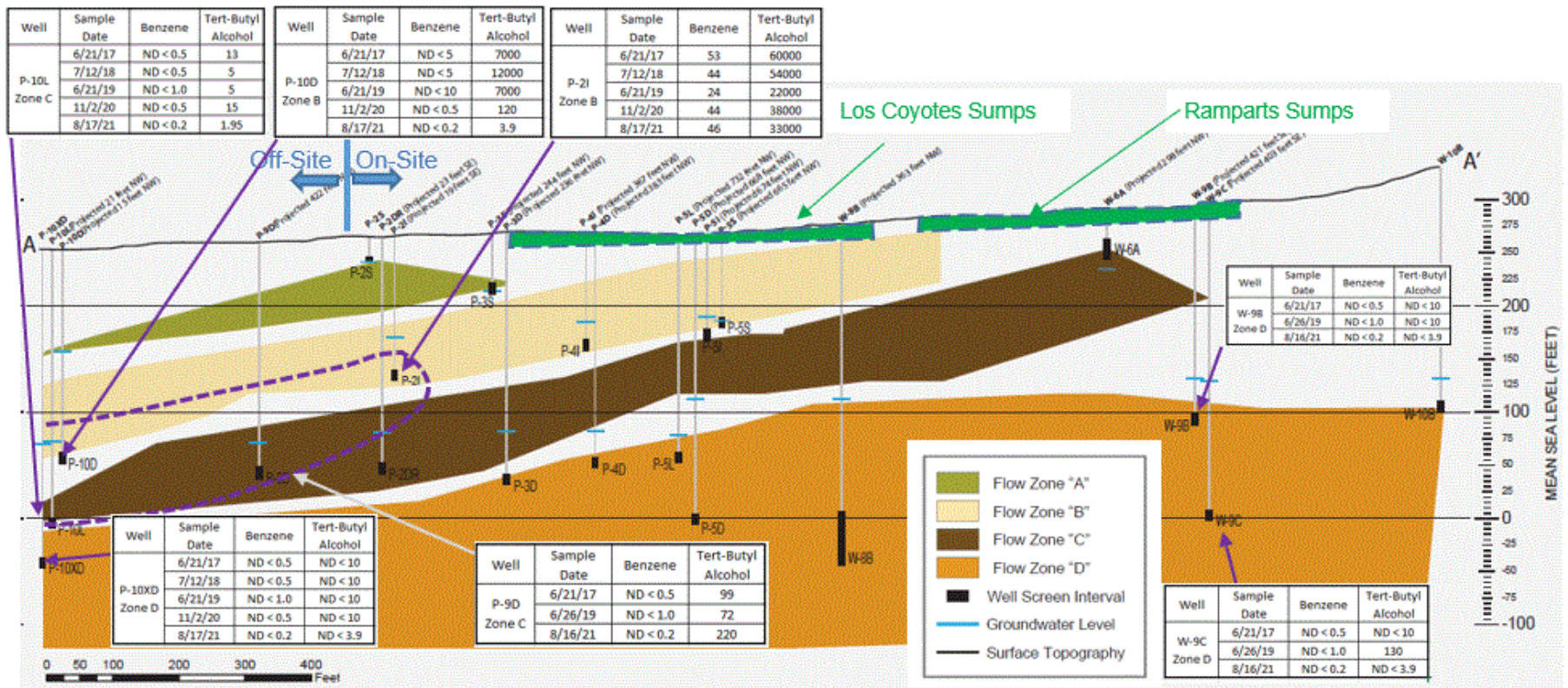
Benzene was found above the trigger level of 1 µg/L in only one on-site, B Zone well, P-2I. Well P-2I is located on-site and contains the highest concentrations of benzene, THTs, Tert-butyl alcohol, and several metals (aluminum, arsenic, beryllium, cadmium, lead and nickel). The benzene concentrations at well P-2I continue to exceed the federal drinking water standard of 5 µg/L and the California drinking water standard of 1 µg/L. Benzene concentration trend was stable during 2017 to 2021 with concentrations between 24 µg/L to 53 µg/L. Long term concentration trends have been decreasing since 2002. Benzene was not detected above the trigger level of 1 µg/L in any other well.

During the past five years, tert-butyl alcohol concentrations have exceeded the State of California notification level of 12 µg/L at B Zone wells, P-2I and P-10D, at C Zone wells, P-10L and P-9D, and at D Zone well W-9C (Figure 4).

Well P-2I located in the in the B Zone and just outside of the "on-site" boundaries had the highest concentrations of tert-butyl alcohol, with concentrations between 33,000 µg/L and 60,000 µg/L. Well P-9D, a C Zone well, and also just outside of the "on-site" boundaries, had increasing concentrations of tert-butyl alcohol over the past five years with the highest concentration in 2021 at 220 µg/L.

However, the concentrations in the furthest monitoring wells (P10L, P-10D and P10XD) have been below the notification level of 12 µg/L over the past five years. Well P-10D, in the C Zone, demonstrated a decreasing concentration trend. Well P-10L, located in the C Zone aquifer, demonstrates a stable trend with concentrations near or below the California notification level of 12 µg/L. Tert-butyl alcohol concentrations at well P-10XD have been below the notification level since 2011.

EPA has not established a drinking water standard for tert-butyl alcohol. EPA is currently working on installing additional wells to characterize the extent of the tert-butyl alcohol in downgradient locations.




 Approximate area where TBA exceeds notification level consistently.

Figure 4. Benzene and Tert-Butyl Alcohol Concentrations in Select Wells

4.2.3. Soil Gas/Indoor Air

There are no structures built above the Site waste sumps and groundwater plume, and exposure to contaminants by indoor vapor intrusion is not occurring. Deed restrictions prohibit future construction at the Site without prior review and approval by EPA. The soil gas collection and treatment system operated at an average of 96% efficiency during the past five years. Pressure measurements during the past five years from within and outside of the waste containment sumps show an average differential of 0.013 pounds per square inch. The pressure differential is well below the containment sump and cover design limit of 5 pounds per square inch and indicates that excessive pressures are not being generated by Site wastes and that containment sump waste vapors are being conducted efficiently to the soil gas collection and treatment system. Benzene effluent concentrations from the system were measured at an average of 0.004 parts per million by volume during the past five years. The benzene effluent concentration was well below the permitted benzene air effluent limit of 5.95 parts per million by volume set by the South Coast Air Quality Management District Rule 1401 permit.

4.2.4. Sustainability

In 2019, the Government Accountability Office evaluated risks due to climate change to the McColl Site. No climate change hazards were identified. The Federal Emergency Management Agency has mapped the Site and surrounding area for flood risk and assesses current risk at less than a 0.2% annual chance of flooding. The Fourth Climate Change Assessment for California, Los Angeles Region predicted that ongoing climate change will increase seasonal summertime temperatures and also increase the magnitude of extreme precipitation events and lead to increasing flood risk in the region. While flooding at the site is a low probability event, above ground features of the site such as retaining walls, drainage features, sump capping system, monitoring wells, gas probes, and gas collection treatment system and associated piping potentially could be damaged by flood water. Such flood damage could require repairs to the cap, treatment systems or wells to make them serviceable or, in a worst case, flood damage could necessitate installation of new replacement equipment in order to maintain operation and monitoring of the Site remedy. The most likely point of failure due to an extreme precipitation event would be overflow from the Site's retention pond. The pond is engineered to contain a volume equivalent to a 100-year storm event. As climate change progresses, the Site's 100-year storm event volume is likely to increase and, the capacity of the retention pond may not be adequate to accommodate larger volumes. Ongoing climate change will also increase seasonal summertime temperatures. The increase in Site temperature will also make maintenance of cap vegetation more difficult in the future; and bare soil is more likely to erode or be disturbed than vegetated soil. Erosion of the cap soil would necessitate repairs to add soil to maintain soil depth on the sump capping system.

4.3. *Site Inspection*

The inspection of the Site was conducted on June 14, 2022. In attendance were Helen Sanchez, US Army Corps of Engineers; Edmond Bourke, C2 REM; Mia Zhang, C2 REM; and Manny Lemus, Los Coyotes Country Club. The purpose of the inspection was to assess the condition of the remedy and verify that the remedy is operating as intended. The following components of the contingent remedy were inspected: (1)

multi-layer cap of the waste sumps and the management of the on-Site surface/stormwater management to prevent seepage of waste material; (2) inspect cutoff walls and retaining walls; (3) stormwater drainage from upgradient sources. Ramparts Sumps R-1, R-2, R-3, and R-4 were observed to have a very dry vegetative cover with little vegetation growth. Based on observation during the inspection, other than ongoing issues with maintaining vegetative cover at the Ramparts Sumps, all components are maintained and functioning as intended.

5. Technical Assessment

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

Performance and monitoring results for the Source waste and soils cap indicate the remedy is functioning as intended. The gas collection and treatment system is currently operating effectively in the passive-active mode. Vapor analytical laboratory results confirm the low field measurements of volatile compounds, which indicate off-gas generation is well below regulatory-required levels for protection of human health. The negligible pressure differential inside compared to outside the capped areas indicates gas generation is limited and is easily controlled. Property deed restrictions are effective in preventing new construction or disturbance of the waste containment sumps and cover system.

During the Five-Year Review site inspection, Ramparts Sumps R-1, R-2, R-3, and R-4 were observed to have a very dry vegetative cover with little vegetation growth. The Ramparts Sumps were also observed to have a few animal burrows and some areas of bare or nearly bare soil. The poor vegetation establishment and animal burrowing should be repaired to prevent potential future erosion of the sump cover system.

Groundwater monitoring results indicate that the remedy functions as intended to prevent further release of Site contaminants and to protect regional groundwater. There have been no exceedances for benzene above the trigger level of 1 µg/L in off-Site monitoring wells screened in the regional aquifer (e.g. in C and D Zones). Surface water infiltration controls are effective in diverting rainwater from the site and preventing increased groundwater levels.

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?

Exposure assumptions, toxicity data, and remedial action objectives used at the time of remedy selection are still valid. Applicable or relevant and appropriate requirements identified in the Records of Decision have not changed since the last five-year review. Drinking water standards for benzene have not changed since the previous five-year review. Risk assessment methodologies have not changed in a way that could affect the protectiveness of the remedy. There are no changes in exposure pathways. The combined remedial action objectives are still valid and currently being met.

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

Tert-butyl alcohol concentrations in groundwater exceed the notification level of 12 µg/L established by the California State Water Resources Control Board. Because tert-butyl alcohol is more mobile in water than other chemicals of concern at the Site, the tert-butyl alcohol detections in excess of the notification level may potentially indicate migration of the leading edge of the contaminant plume within the B Zone and C Zone aquifers. Some planning activities such as drafting of work and sampling plans for tert-butyl alcohol have been completed in the past five years. Due to the COVID pandemic, installation and sampling of new monitoring wells to delineate the tert-butyl alcohol were delayed. Additional sampling for tert-butyl alcohol has not occurred and the extent of the tert-butyl alcohol is unknown at this time.

The second closest municipal groundwater production well is the Smith-Murphy well, which is located 6,600 feet southwest of the Site. The Smith-Murphy well was sampled in 2022 and was non-detect for tert-butyl-alcohol.

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): Groundwater	Issue Category: Remedy Performance			
	Issue: Tert-butyl alcohol is considered a possible emerging contaminant at the Site and may potentially indicate the leading edge of the contaminant plume within the B and C level aquifers.			
	Recommendation: Delineate the extent of tert-butyl alcohol in the B and C Zone aquifers.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA	EPA	12/31/2026

6.1. Other Findings

During the Five-Year Review site inspection, Ramparts Sumps R-1, R-2, R-3, and R-4 were observed to have a very dry vegetative cover with little vegetation growth. The Ramparts Sumps were also observed to have a few animal burrows and some areas of bare or nearly bare soil. The animal burrow areas should be repaired, and the irrigation system should be adjusted or the stressed grass and bare soil areas on the Ramparts Sumps should be replaced to maintain living and healthy vegetative cover and prevent potential future erosion of the sump cover system.

7. Protectiveness Statement

Table 7. Protectiveness Statement

Protectiveness Statement(s)	
<i>Operable Unit:</i> Source	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i>	
<p>The Source Waste remedy at the McColl Superfund Site protects human health and the environment because the multi-layer cap, the gas collection and treatment system, surface water and infiltration controls, and institutional controls remain intact and are functioning as designed to break the exposure pathways posing a risk to human health or the environment.</p>	

Protectiveness Statement(s)	
<i>Operable Unit:</i> Groundwater	<i>Protectiveness Determination:</i> Short-term Protective
<i>Protectiveness Statement:</i>	
<p>The groundwater remedy at the McColl Superfund Site currently protects human health and the environment in the short term. The current extent of the benzene plume is limited to an on-Site, shallow well. The closest municipal drinking water, 6000 feet downgradient, was sampled for benzene and tert-butyl alcohol in 2022 and results were non-detect. However, due to the continued detection of tert-butyl alcohol in monitoring wells downgradient of the source sumps, and the nature of tert-butyl alcohol as more mobile than benzene, completion of the tert-butyl alcohol groundwater delineation as recommended in the 2017 Five-Year Review is necessary to ensure long term protectiveness.</p>	

Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Short-term Protective	

Protectiveness Statement:

The remedies at the McColl Superfund Site currently protect human health and the environment. The multi-layer cap, the gas collection and treatment system, surface water and infiltration controls, and institutional controls are functioning as designed. The current extent of the benzene plume is limited to an on-Site, shallow well. The closest municipal drinking water, 6000 feet downgradient, was sampled for benzene and tert-butyl alcohol in 2022 and results were non-detect. However, due to the continued detection of tert-butyl alcohol in monitoring wells downgradient of the source sumps, and the nature of tert-butyl alcohol as more mobile than benzene, completion of the tert-butyl alcohol groundwater delineation, currently underway is necessary to ensure long term protectiveness.

8. Next Review

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

Appendix A: List of Documents Reviewed

- C2 REM. 2018. 2017 Operations, Maintenance and Monitoring Annual Report, McColl Superfund Site, Fullerton, California. September.
- C2 REM. 2019. 2018 Operations, Maintenance and Monitoring Annual Report, McColl Superfund Site, Fullerton, California. July.
- C2 REM. 2021. 2020 Operations, Maintenance and Monitoring Annual Report, McColl Superfund Site, Fullerton, California. June.
- C2 REM. 2022. 2021 Operations, Maintenance and Monitoring Annual Report, McColl Superfund Site, Fullerton, California. March.
- EA Engineering, Science, and Technology, Inc. 2019. Remedial Investigation Work Plan for McColl Superfund Site, Fullerton, California. August.
- EPA (United States Environmental Protection Agency). 1984. Record of Decision, McColl Superfund Site, Fullerton, California. April 11.
- EPA. 1993. Record of Decision for the McColl Superfund Site, Source Operable Unit, Fullerton, California. June 30.
- EPA. 1996. Record of Decision, Groundwater Operable Unit, McColl Superfund Site, Fullerton, California. May 15.
- EPA. 2005. McColl Superfund Site Explanation of Significant Differences. EPA/ESD/R0905/047. September 1.
- Federal Emergency Management Agency (FEMA). 2022. FEMA Flood Map Service Center Website. <https://msc.fema.gov/portal/home> Accessed May 20.
- GAO (Government Accountability Office). 2019. Report to Congressional Requesters, EPA Should Take Additional Actions to Manage Risks from Climate Change. October.
- Hall, Alex, Neil Berg, Katharine Reich. (University of California, Los Angeles). 2018. Los Angeles Summary Report. California's Fourth Climate Change Assessment.
- Orange County Water District. 2015. Orange County Water District Groundwater Management Plan, 2015 Update. June 17.
- U.S. Army Corps of Engineers (USACE). 2017. Fourth Five Year Review Report for McColl Superfund Site, Orange County, California. September 27.

Appendix B: Site Chronology

Event	Date
Disposal of refinery waste at the Site	1942-1946
Adjacent Los Coyotes Country Club constructed	Late 1950s
Adjacent residential neighborhoods initially developed	1960s
First odor and health complaints from residents	1978
Public hearing on Site held by California Department of Toxic Substances Control	1980
Site proposed for listing on federal Superfund National Priorities List	1982
EPA and California Department of Toxic Substances Control proposal to excavate and dispose waste off-Site is blocked in State court	1984
McColl Action Group (community organization) active	1985-1991
EPA concludes preparation of feasibility study, proposes waste incineration, but field testing fails	1989
Fullerton Hills Community Association active	1991-1997
EPA concludes feasibility study revisions, proposes waste solidification	1992
Source Operable Unit Record of Decision is signed; includes contingency remedy of Resource Conservation and Recovery Act (RCRA)-equivalent cap	1993
When waste solidification pilot fails, EPA decides to implement contingency remedy, which was the RCRA-equivalent cap	1995
The McColl Site Group oil companies conduct the Site groundwater remedial investigation/feasibility study	1993-1996
Groundwater Operable Unit Record of Decision is signed; includes further measures to reduce surface water infiltration and groundwater monitoring	1996
First Amended Consent Decree for the McColl Site recorded with the Orange County Assessor's Office. The consent decree establishes the terms of the deed restrictions and grants EPA and the state of California access to the Site to conduct monitoring, sampling and oversight for compliance with terms of the deed restrictions.	1/28/1997
On-Site construction of RCRA cap begins, and triggers Five-Year Review process	3/31/1997
Final inspection of remedial action	11/13/1997

Event	Date
Issuance of Remedial Action Report	5/28/1998
Issuance of Preliminary Close Out Report	6/30/1998
New golf fairways (over Site) of Los Coyotes golf course open	1998
Issuance of first Five-Year Review	9/30/2002
Issuance of California Department of Toxic Substances Control letter finding that land use controls outlined in the 1997 consent decree are consistent with the requirements of the California Code of Regulations, title 22, section 67391.1, and with the land use covenant provisions of Section 1471 of the California Civil Code.	3/14/2005
Issuance of Explanation of Significant Differences revising groundwater remedy	9/1/2005
Second Five-Year Review completed	9/25/2007
Third Five-Year Review completed	9/28/2012
Fourth Five-Year Review completed	9/27/2017

Appendix C: Data Review

This data review analyzes the concentrations and contaminant trends of the identified chemicals of concern from 2017 to 2021. The McColl remedy has structured the groundwater monitoring program to evaluate groundwater quality and the effectiveness of the vapor extraction system, containment of the waste within the sumps and the protection of regional aquifers. The monitoring program includes 11 wells, 34 gas pressure probe/gas sampling probes, a vapor extraction system, and settlement survey of the sumps. This data review evaluates the monitoring program’s compliance with the remedial action objectives established in the Records of Decision and Explanation of Significant Differences.

Historical well groundwater elevation data, including elevations measured during the past five years are presented in Figure C-1. The well locations in relation to their respective aquifer are presented in Figure C-2. Groundwater flow is generally towards the west for A and B Zone aquifers and southwest for C and D Zone aquifers. Vertical gradients for all zones are downward. Groundwater elevations have remained consistent with historical levels or cyclic patterns as observed in P-10XD. Groundwater elevations in all zones have shown stability over time, indicating that infiltration controls are effective in preventing surface water from infiltrating and raising Site groundwater levels.

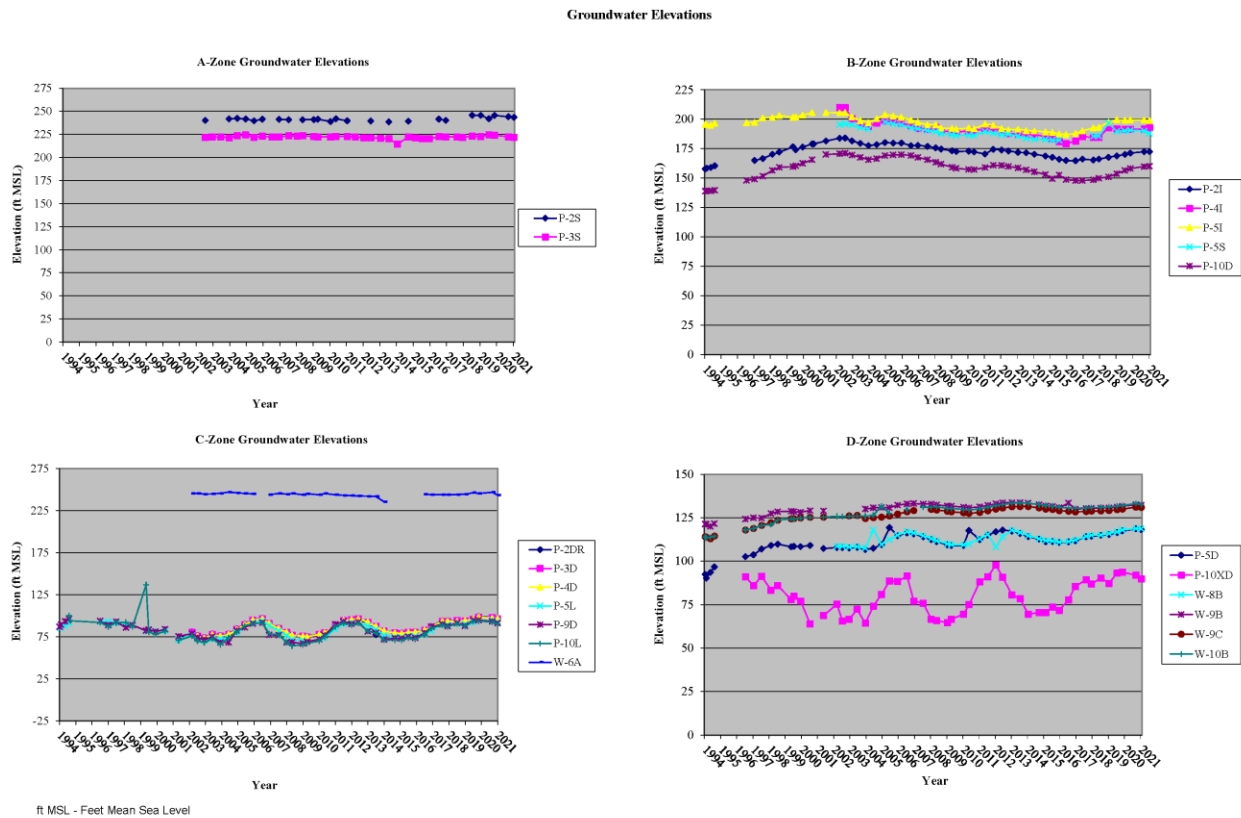


Figure C-1. Historical groundwater elevations of the McColl Superfund Site monitoring wells

USACE performed Mann-Kendall trend analysis on wells where there were sufficient detections of contaminants of concern for the five-year review period and the long-term trends. Trends for both benzene and tert-butyl alcohol were evaluated. Two separate time periods are utilized due to lack of sufficient data and to evaluate short- and long-term changes within the dataset.

Review Period 2017 – 2021 Trend Analysis

USACE performed trend analysis for benzene at well location P-2I. Results indicate a stable trend and concentrations are elevated above the federal drinking water standard of 5 µg/L. Benzene concentrations at well P-2I ranged from 24 µg/L to 53 µg/L.

USACE performed trend analysis for tert-butyl alcohol at three out of the four well locations. Well P-9D did not have enough data to calculate a trend during the review period.

Well P-2I, located in the B Zone aquifer, demonstrated a stable trend and groundwater concentrations at this location are significantly elevated above the California notification level for tert-butyl alcohol of 12 µg/L. Well P-10D demonstrated a probable decreasing trend with a range of concentrations of non-detect to 12,000 µg/L. Well P-10L, located in the C Zone aquifer, demonstrates a stable trend with concentrations near or below the California notification level of 12 µg/L.

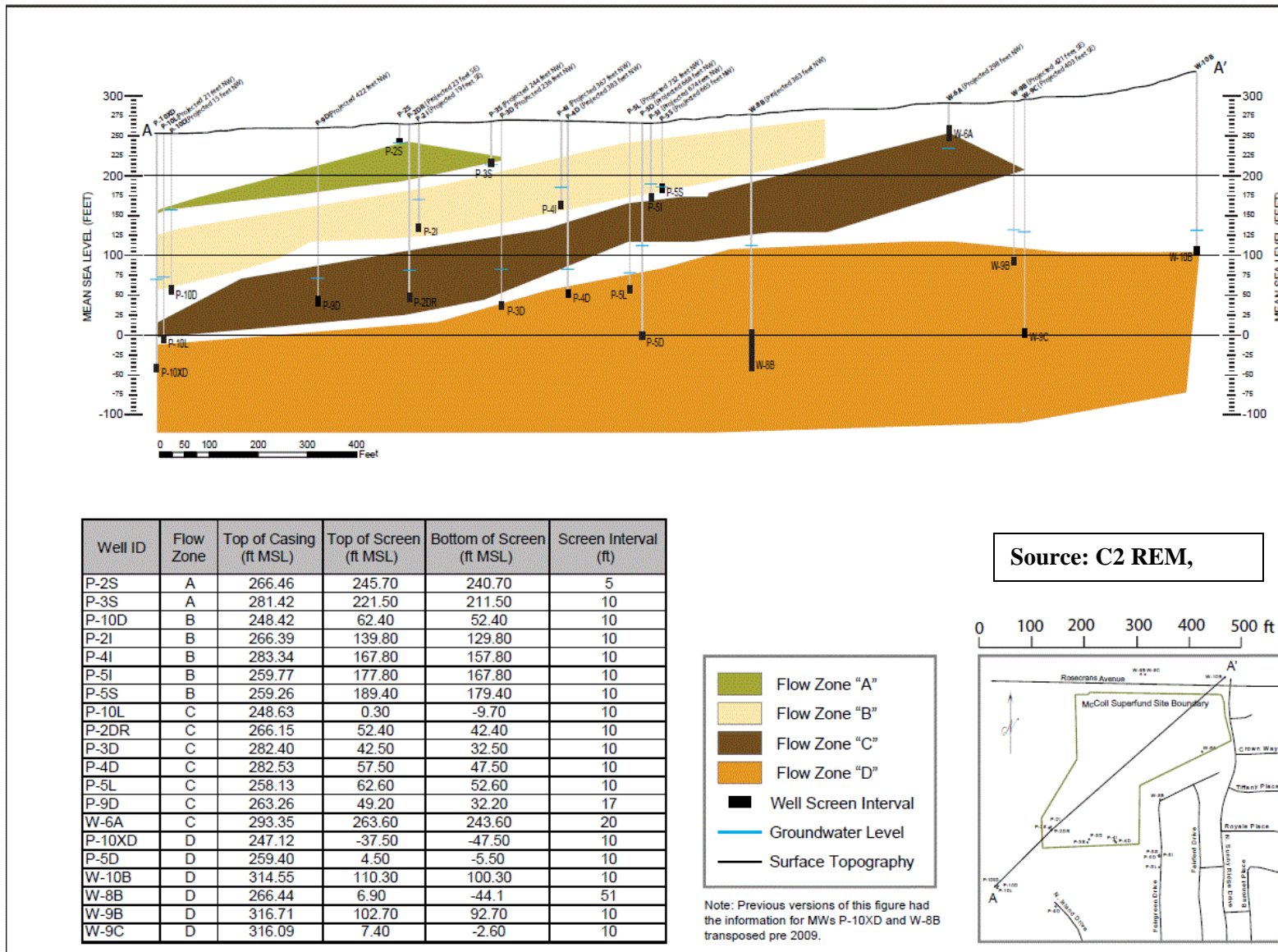
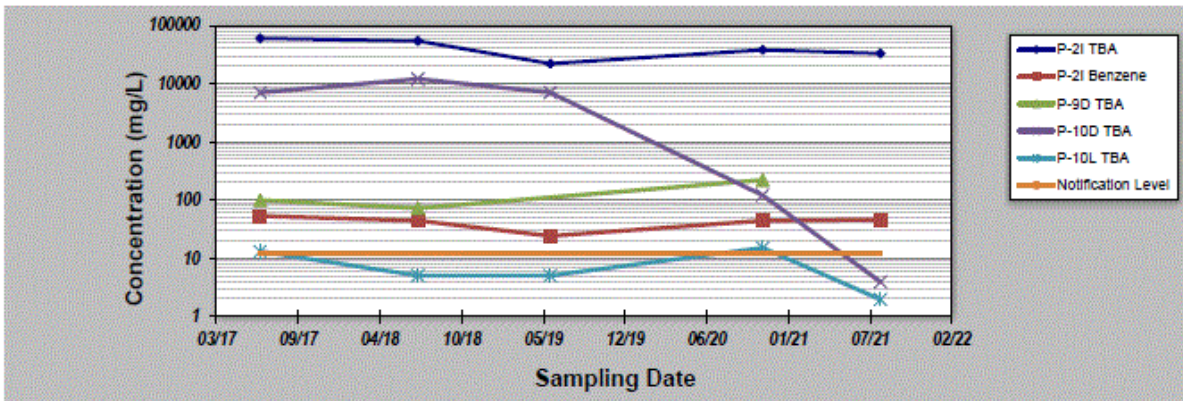


Figure C-2. Cross section of the McColl Superfund Site showing relative positions of groundwater monitoring wells

GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 11-Apr-22	Job ID: McColl
Facility Name: McColl	Constituent: P-2I
Conducted By: K.A.	Concentration Units: µg/L

Sampling Point ID:		P-2I TBA	P-2I Benzene	P-9D TBA	P-10D TBA	P-10L TBA	Notification Level
Sampling Event	Sampling Date	P-2I CONCENTRATION (mg/L)					
1	21-Jun-17	60000	53	99	7000	13	12
2	12-Jul-18	54000	44	72	12000	5	
3	1-Jun-19	22000	24		7000	5	
4	2-Nov-20	38000	44	220	120	15	
5	17-Aug-21	33000	46		3.9	1.95	12
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
Coefficient of Variation:		0.37	0.26	0.60	0.98	0.71	0.00
Mann-Kendall Statistic (S):		-6	-1	1	-7	-3	0
Confidence Factor:		88.3%	50.0%		92.1%	67.5%	
Concentration Trend:		Stable	Stable		Prob. Decreasing	Stable	



- Notes:**
- At least four independent sampling events per well are required for calculating the trend. Methodology is valid for 4 to 40 samples.
 - 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.
 - 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.

DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.
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Figure C-3. Mann-Kendall trend results for the review period 2017 – 2021.

Due to the limited data collected during the review period, long period trends were also calculated. Results are presented in Table C-1 along with descriptive statistics from other wells that do not have enough data for trend analysis.

Benzene is trending down at well P-2I within the B Level aquifer. No other wells showed detections of benzene above the California drinking water standard of 1 µg/L.

Tert-butyl alcohol is decreasing in two wells, P-2I and P-10L. However, the concentrations observed at P-2I are three magnitudes greater than the California notification level of 12 µg/L.

Table C-1. Mann-Kendall Trend Analysis Results, 2003 to 2020

Well ID	Contaminant	# of Data Points	# of Non-detects	Minimum Value	Maximum Value	Mann Kendall Statistic (S)	Test Statistic (Z)	Trend at 90% Confidence
P-2I	Benzene	21	0	44	150	-110	-3.3	Decreasing
P-2I	TBA	20	0	22,000	100,000	-111	-3.6	Decreasing
P-5D ¹	TBA	11	10	100	100	--	--	--
P-5I ¹	TBA	11	10	26	26	--	--	--
P-5L	TBA	11	5	11	700	--	--	--
P-9D	TBA	10	2	16	150	22	1.9	Increasing
P-10D	TBA	20	5	49	12,000	13	0.4	No trend (Not stable)
P-10L	TBA	20	3	13	1800	-98	-3.1	Decreasing
P-10XD ¹	TBA	21	18	30	66	--	--	--
W-10B ¹	TBA	12	12	--	--	--	--	--
W-9B ¹	TBA	12	12	--	--	--	--	--
W-9C ¹	TBA	12	10	110	130	--	--	--

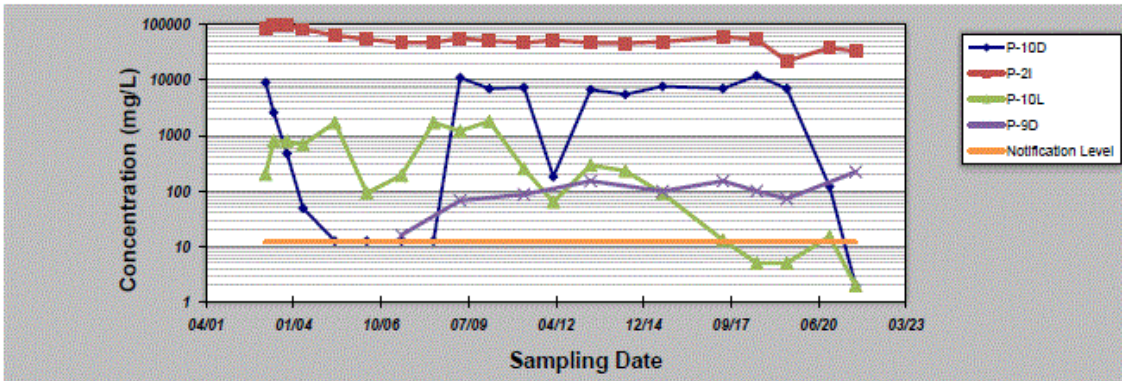
Notes:

¹Mann-Kendall Test not appropriate when number of non-detects exceeds 50% of data points.

GSI MANN-KENDALL TOOLKIT for Constituent Trend Analysis

Evaluation Date: 11-Apr-22	Job ID: McColl
Facility Name: McColl	Constituent: TBA
Conducted By: K.A.	Concentration Units: µg/L

Sampling Point ID:		P-10D	P-2I	P-10L	P-9D	Notification Level			
Sampling Event	Sampling Date	TBA CONCENTRATION (mg/L)							
1	1-Mar-03	9000	86000	200		12			
2	1-Jun-03	2600	100000	790					
3	1-Nov-03	470	98000	780					
4	1-May-04	49	82000	680					
5	1-May-05	12.5	64000	1700					
6	1-May-06	12.5	54000	92					
7	1-Jun-07	12.5	47000	190	16				
8	1-Jun-08	12.5	47000	1700					
9	1-Apr-09	11000	57000	1200	67				
10	1-Mar-10	7000	51000	1800					
11	1-Apr-11	7300	47000	250	86				
12	1-Mar-12	180	52000	63					
13	1-May-13	6700	47000	290	150				
14	1-Jun-14	5500	46000	230					
15	1-Aug-15	7700	49000	90	99				
16	21-Jun-17	7000	60000	13	150				
17	12-Jul-18	12000	54000	5	99				
18	21-Jun-19	7000	22000	5	72				
19	21-Oct-20	120	38000	15					
20	16-Aug-21	1.95	33000	1.95	220	12			
21									
22									
23									
24									
25									
Coefficient of Variation:		1.01	0.36	1.23	0.56	0.00			
Mann-Kendall Statistic (S):		13	-111	-98	18	0			
Confidence Factor:		65.0%	>99.9%	99.9%	96.2%				
Concentration Trend:		No Trend	Decreasing	Decreasing	Increasing				



Notes:

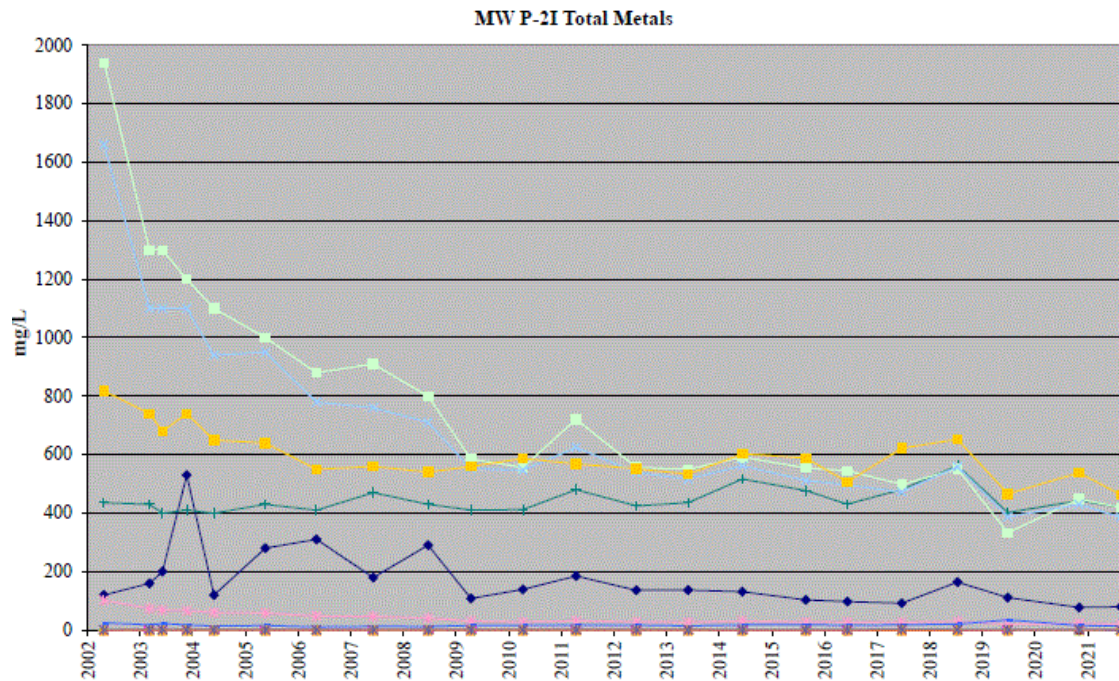
- At least four independent sampling events per well are required for calculating the trend. Methodology is valid for 4 to 40 samples.
- Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
- 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.

DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.

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Figure C-4. Mann-Kendall results for TBA at select wells, 2002 to 2021.

Several metals continue to exceed to Federal drinking water standards and/or California drinking water standards including aluminum, arsenic, beryllium, cadmium, chromium, lead, and nickel. The occurrence and magnitude of the exceedances of these metals have remained consistent with historical metal results. Monitoring well P-2I (B flow unit), located directly downgradient from the sumps and P-10XD (D flow unit) located further down gradient show total metals time trend plots are shown in Figure C-5.



Source: C2 REM, 2021

- ◆ Aluminum
- ◆ Antimony
- ◆ Arsenic
- ◆ Barium
- ◆ Beryllium
- ◆ Cadmium
- ◆ Calcium
- ◆ Chromium
- ◆ Cobalt
- ◆ Copper
- ◆ Iron
- ◆ Lead
- ◆ Magnesium
- ◆ Manganese
- ◆ Molybdenum
- ◆ Nickel
- ◆ Potassium
- ◆ Selenium
- ◆ Silver
- ◆ Sodium
- ◆ Thallium
- ◆ Vanadium
- ◆ Zinc

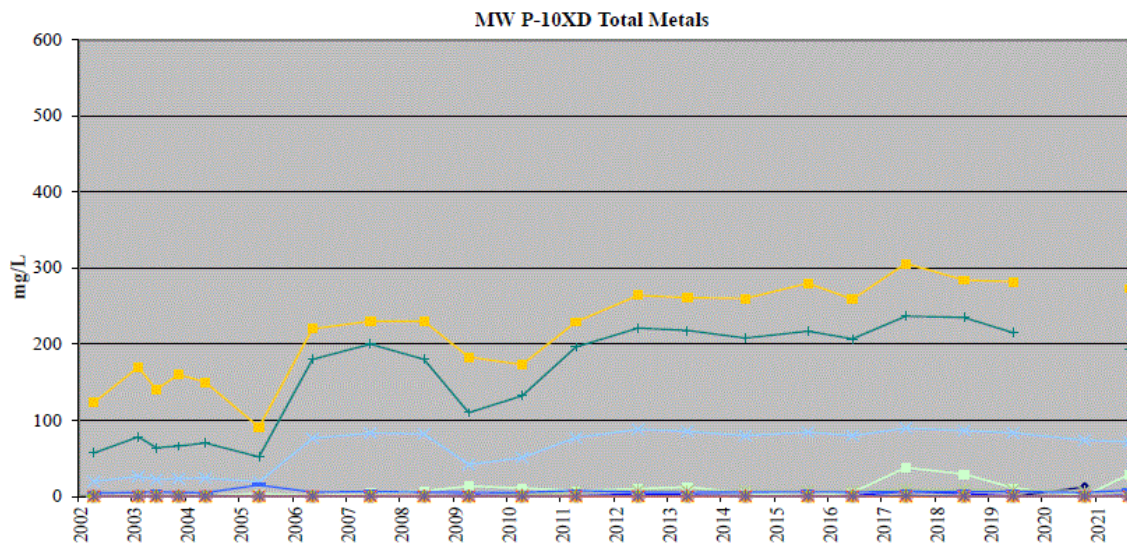


Figure C-5. Total metals for representative wells P-2I and P-10XD downgradient of the source area.

Soil Gas Data Review

The soil gas concentrations of volatile organic compounds (VOCs) including benzene are measured at the gas collection and treatment system inlet and effluent to verify that the system is functioning and meets air quality standards as required by the South Coast Air Quality Management District. Benzene effluent concentrations from the system consistently measures below the South Coast Air Quality Management District permitted level of 5.95 parts per million by volume. The soil gas concentrations are measured by field instrumentation monthly and verified by laboratory analysis annually. Soil gas annual confirmation laboratory results are summarized in Table C-2. Both the monthly soil gas monitoring results and annual confirmation results indicate that the soil gas collection and treatment system is functioning as designed to collect and remove benzene and VOCs generated by wastes contained in the Site sumps and that the system effluent meets the South Coast Air Quality Management District air quality requirements. Pressure is measured quarterly at twelve locations within the waste containment sumps and at corresponding locations immediately outside the containment sumps. The pressure readings are a measure of whether unacceptable excess gas generation is occurring within the waste containment sumps. Pressure measurements during the past five years from within and outside of the waste containment sumps show an average differential of 0.013 pounds per square inch. The pressure differential is well below the containment sump and cover design limit of 5 pounds per square inch and indicates that excessive pressures are not being generated by Site wastes and that containment sump waste vapors are being conducted efficiently to the soil gas collection and treatment system.

Table C-2. . Soil Gas Annual Confirmation Laboratory Results

Sample Collection Date	Annual Confirmation Soil Gas Lab Results				Annual Average GCTS Efficiency	Average pressure differential (pounds per square inch) inside vs outside the cap.
	Inlet Benzene (ppmv)	Inlet Total VOC (ppmv)	Effluent Benzene (ppmv)	Effluent Total VOC (ppmv)		
15 Dec. 2017	0.4	0.54	ND (<0.00065)	0.011	89.51%	0.011
28 Nov. 2018	5.8	7.013	ND (<0.0005)	0.1204	97.54%	0.017
12 Nov. 2020	4.8	6.23	0.0052	0.017	96.92%	0.009
7 Dec. 2021	1.6	1.799	0.011	0.027	100%	0.015
5-Year Average	3.15	3.9	0.0081	0.044	96%	0.013

ND = not detected

ppmv = parts per million by volume

GCTS = gas collection and treatment system

Effluent limit in accordance with SCAQMD Rule 1401 permit is 5.95 ppmv benzene.

Note:

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. Applicable or relevant and appropriate requirements 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 applicable or relevant and appropriate requirements are evaluated to determine if the changes affect the protectiveness of the remedy. Each applicable or relevant and appropriate requirement and any change to the applicable standard or criterion are discussed below.

The applicable or relevant and appropriate requirements identified for the regional groundwater at the McColl Site are the federal and state drinking water standards. However, at the time of the groundwater Record of Decision issuance, chemicals of concern in the regional aquifer either already met drinking water standards, had background concentrations above drinking water standards, or appeared as localized occurrences. Detections of chemicals of concern in perched groundwater appeared at concentrations exceeding drinking water standards, however the perched groundwater is not subject to the drinking water standards as applicable or relevant and appropriate requirements.

There are no cleanup standards or performance criteria identified in the source control Record of Decision (EPA, 1993). The main performance criteria selected in the 1996 groundwater Record of Decision for evaluating the effectiveness of the remedy was not a state or federal drinking water standard, but rather a preliminary remediation goal concentration of 3.6 ppb total tetrahydrothiophenes. The preliminary remediation goal for total tetrahydrothiophenes was selected on the basis of the low odor threshold of tetrahydrothiophene compounds and for the prevention of aesthetic degradation of the water. Neither the federal government nor the State of California had promulgated drinking water standards for tetrahydrothiophenes at finalization of the groundwater Record of Decision in 1996, nor have they established drinking water standards for tetrahydrothiophenes in the time since. Because benzene is more toxic than tetrahydrothiophenes and because there is a drinking water standard established for benzene, in 2005 EPA changed the indicator for triggering the contingency action from the preliminary remediation goal concentration of 3.6 µg/L total tetrahydrothiophenes to the state drinking water standard of 1 µg/L for benzene (EPA, 2005). Since the 2005 Explanation of Significant Differences, there have been no changes to the drinking water standards for benzene.

Federal and State laws and regulations other than the chemical-specific applicable or relevant and appropriate requirements that have been promulgated or changed since the decision documents were

finalized are described in Table D-1. There have been no revisions to laws or regulations that affect the protectiveness of the remedy.

The following action- or location-specific applicable or relevant and appropriate requirements have not changed in the past five years, and therefore do not affect protectiveness:

- Resource Conservation and Recovery Act – Groundwater Maximum Concentration Limits (40 CFR 264.94)
- Resource Conservation and Recovery Act – Groundwater Protection (40 CFR 264.90-99)
- Resource Conservation and Recovery Act – Closure and Post-Closure (40 CFR 264.110-120)
- Resource Conservation and Recovery Act – Land Treatment Unsaturated Zone Monitoring (40 CFR 264.278)
- Resource Conservation and Recovery Act – Surface Impoundments (40 CFR 264.220-228)
- Clean Air Act – Fugitive Emissions Sources (40 CFR 61.240)
- Clean Air Act – Benzene Waste Operation Standards: Surface Impoundments (40 CFR 61.344)
- California Hazardous Waste Control Act – Porter-Cologne Water Quality Act (WC 13000-13806) as administered by the Water Resources Control Board and the Regional Water Quality Control Board (23 CCR 2510-2836)
- California Hazardous Waste Control Act – Surface Impoundments, Closure and Post Closure (22 CCR, 66264.220-228)
- Porter-Cologne Water Quality Act – Water Quality Monitoring for Classified Waste Management Units (23 CCR 2550)
- South Coast Air Quality Management District – Nuisance (Regulation IV, Rule 402)
- South Coast Air Quality Management District – Liquid and Gaseous Air Contaminants (Regulation IV, Rule 407)
- South Coast Air Quality Management District – Sulfur Compounds (Regulation IV, Rule 53)
- South Coast Air Quality Management District – Control of Gaseous Emissions (Regulation XI, Rule 1150.2)
- South Coast Air Quality Management District – Organic Gas Emissions from Decontamination of Soil (Regulation XI, Rule 1166)
- South Coast Air Quality Management District – Requirements (Regulation XIII, Rule 1303)
- South Coast Air Quality Management District – Emissions Calculations (Regulation XIII, Rule 1306)
- South Coast Air Quality Management District – Emissions Calculations (Regulation XIV, Rule 1401)

Table D-1. Summary of Applicable or Relevant and Appropriate Requirements Changes for Site in the Past Five Years

Requirement and Citation	Document	Description	Effect on Protectiveness	Comments	Recent Amendment Date
Clean Water Act - National Pollutant Discharge Elimination System; 40 CFR 122-125	1993 Source Record of Decision	On-site and off-site discharges from Comprehensive Environmental Response, Compensation, and Liability Act sites to surface waters are required to meet the substantive Clean Water Act - National Pollutant Discharge Elimination System requirements, including discharge limitations, monitoring requirements, and best management practices.	Changes do not affect protectiveness.	The following minor updates and clarifications of the National Pollutant Discharge Elimination System regulations were finalized in 2019: new regulatory definitions regarding new dischargers and pesticide application; modernization of the permit application and public notice processes; and update of references and electronic contact information and addresses.	June 12, 2019
California Hazardous Waste Control Act, Health and Safety Code Section 25100-25395	1993 Source Record of Decision	The Hazardous Waste Control Act provides the state law for the management of hazardous waste including the state criteria for the identification of hazardous waste and standards for the design, operation and closure of hazardous waste treatment, storage, and disposal facilities.	Changes do not affect protectiveness.	Changes establish a Board of Environmental Safety to review hazardous waste facility permitting decisions and make numerous revisions related to budgetary administration of the waste facility permitting program by the California Department of Toxic Substances Control.	July 12, 2021
California Hazardous Waste Control Act, Closure and Post-Closure for Interim Status and Permitted Facilities, 22 CCR 66264.110-120	1993 Source Record of Decision	A facility shall be closed in a manner that minimizes the need for further maintenance and controls, minimizes, or eliminates post-closure escape of hazardous waste, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or the atmosphere. At facilities where hazardous waste will remain after closure, post-closure care shall continue for 30 years after the date of completing closure and shall consist of at least monitoring and reporting and maintenance, post-closure care and monitoring of waste containment systems.	Changes do not affect protectiveness.	22 CCR § 66264.110: New subsection (c) that clarifies the use of the term “permit” in the regulatory language. 22 CCR § 66264.121: New section that specifies post-closure requirements for facilities that obtain enforceable documents in lieu of post-closure permits.	October 31, 2018,

Requirement and Citation	Document	Description	Effect on Protectiveness	Comments	Recent Amendment Date
South Coast Air Quality Management District, National Emission Standards for Hazardous Air Pollutants (Regulation X)	1993 Source Record of Decision	Implements the provisions of Part 61, Chapter 11 Title 40 of the CFR. The only NESHAP standard that would serve as an ARAR for the McColl Site is "Benzene Waste Operation Standards for Surface Impoundments (40 CFR 61.344). A cover for a surface impoundment should be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background.	Changes do not affect protectiveness.	Update to technical details of test methods for air emissions of hazardous air pollutants.	July 12, 2019

Appendix E: Public Notice

LAW ENFORCEMENT

Sheriff's deputy, Costa Mesa officer cleared in two separate officer-involved shootings

By Caitlin Anderson
 costain@grandcountypublisher.com

Two reports regarding separate officer-involved shootings were released Thursday by Orange County Sheriff's Associate Todd Spivey's office, clearing both officers in their respective cases.

The shooting involving an Orange County deputy occurred on Monday, Sept. 13, 2020. Deputy David Leathers, a 34-year veteran of the department, is called out to the site of a shooting on a residential street in Stanton where he saw the license plate of a white Ford Fiesta and another car had been stolen out of Orange County. A pursuit ensued, but the driver, Nigro, was able to evade the deputy. Leathers saw Nigro speeding through an intersection and continued the pursuit. Nigro was crashing an estimated speed of 100 mph in a residential area when observed from the driveway of New Line Auto Living Realty and was headed to Leathers' police vehicle. Nigro

attempted to back out of the driveway and hit the front of the police vehicle. According to video footage of the shooting and the report, Leathers opened his door and was just about to step out of his car when the vehicle happened.

Leathers told investigators he did not know if Nigro in the vehicle got hit by the "two distinct shots" investigators compared Leathers' account with the police video and Leathers did not mention the shot, but did wear his seat belt on his second shot, the report said.

Nigro was arrested at Leathers' driveway before an arresting, Leathers said investigators did not find any weapons or evidence. Nigro was released on bail at the same by Orange County Fire Authority pursuant to an arrest report filed eight months later. A technology examination also found traces of various prescription drugs and THC in his system.

The second shooting involved Costa Mesa Police Deputy Scott Johnson on the scene on May 25, 2021. According to Johnson, the day Officer James Carlson, an eight-year veteran of the department, followed

a traffic stop of 2018 black Toyota pickup truck that Carlson observed and stopped on May 25. The driver may have been intoxicated. The report said it did not appear investigators confirmed the driver was intoxicated at the time.

The truck turned into parking lot on 225 West 20th Street in Costa Mesa and was followed by Carlson's police vehicle. Through a rearview mirror, Carlson found the driver, Keith Alan Riggert II, was a minor of age looking forward and unresponsive and had a possible arrest warrant out of San Bernardino.

Riggert looked like he was looking at the vehicle while the officer was still in the vehicle. Carlson got out of his car and repeatedly told Riggert to step, according to Johnson's account of the encounter.

The truck backed into the police vehicle again, and Riggert was not in control of the vehicle. As the truck began accelerating forward, Carlson reported that he Riggert drove away.

Riggert was located after he fled the scene and arrested with a right shoulder gunshot wound and later was taken into police custody.

Whales

It was a year to the day that a whale was spotted in the area of the San Juan Islands. The whale was seen on the coast of San Juan Island. The whale was seen on the coast of San Juan Island. The whale was seen on the coast of San Juan Island.



A view of the large pod of blue whale spotted off the San Juan Islands on Sunday. They were seen about 100 miles off the coast of San Juan Island.

kill whale were reported. But those in local waters. Presumably they had been spotted off Orange County about 200 miles when they made national news when the giant whale was spotted off the coast of San Juan Island.

It was a year to the day that a whale was spotted in the area of the San Juan Islands. The whale was seen on the coast of San Juan Island. The whale was seen on the coast of San Juan Island.

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Appendix F: Interview Forms

Five-Year Review Interview Record					
Site:	McColl Superfund Site			EPA ID No:	CAD98049869 5
Interview Questionnaire					
Date: April 14, 2022					
Name	Organization	Title	Telephone	Email	
Edmond Bourke	C2 REM	MSG Coordinator / Consultant	949-261-8098	ebourke@c2rem.com	
<p>1) What is your role in the project (e.g. property owner, groundwater user, drinking water provider, impacted adjacent property, consultant)?</p> <p>McColl Site Group (MSG) Project Coordinator / Consultant</p> <p>2) How do you interact with the Superfund Project Manager regarding concerns with the cleanup?</p> <p>Mainly via phone and/or email, occasionally in-person communication when U.S. Environmental Protection Agency (USEPA) oversee the groundwater monitoring activities on-site</p> <p>3) Do you review groundwater monitoring data or reports and what is your overall impression of the project?</p> <p>Yes, we implement the USEPA-approved groundwater monitoring program, which includes sample collection, laboratory analysis, data review, and report preparation. The Site remedy is functioning as designed and Operation, Maintenance, and Monitoring (OM&M) activities are performed according to the Site-Specific Operation and Maintenance Plan. The remedy is protective of human health and environment. Significant amount of data related to the soil gas and groundwater conditions has been collected. This data confirms a reduction or steady state in the extent and concentration of constituents of potential concern (COPC), which supports a reduction to monitoring activities going forward.</p> <p>4) Based on your review of monitoring data and/or your understanding of the site, are there any indications that contamination is reaching regional groundwater?</p> <p>Soil gas monitoring data confirms that COPC concentrations have been consistently low, indicating successful containment of Site COPC. As recognized by USEPA that at the time of the Record of Decision (ROD) issuance, COPC in the regional aquifer either already met Federal and State Maximum Contaminant Levels (MCLs), had background concentrations above MCLs, or appeared as localized occurrences. Detections of COPC in perched groundwater appeared at concentrations exceeding MCLs for some chemicals; however, the perched groundwater is not subject to the MCLs as applicable or relevant and appropriate requirements (ARARs). Groundwater data supports the same conclusion with improving conditions as it showed a reduction or steady state in the extent and concentration of COPC over the last five years, there are no data indicating increasing concentrations or vertical/lateral migration of groundwater COPC.</p> <p>5) Can you describe progress or the status of the tert-butyl alcohol (TBA) supplementary investigation? Are there any nearby drinking water wells? And if so, to your knowledge have any of these been affected by TBA or any other site contaminant?</p> <p>TBA was not identified as a COPC in the ROD and USEPA has concluded that the MSG is not accountable for assessing TBA under CERCLA.</p> <p>USEPA is designing and implementing the TBA investigation and is in the process of installing monitoring wells specifically for this investigation. In February 2020, C2 REM, on behalf of the MSG, prepared a Groundwater TBA Well Drilling Considerations Technical Memorandum in an effort to support the USEPA's investigation of TBA for the placement of groundwater monitoring wells.</p> <p>There are two municipal production wells located within 1.5-miles of the Site. The Coyote 12A well is located approximately 3,000 feet hydraulically cross-gradient (southeast) of the Site and the Smith-Murphy well is located approximately 7,000 feet hydraulically southwest of the Site. Both of these production wells are located well beyond the extent of Site COPC detected in groundwater and we are unaware of these wells being affected by TBA or any other Site COPC. In addition, we have no knowledge of any private-use groundwater supply wells in the immediate vicinity of the Site.</p>					

6) Is the remedy to contain site wastes and isolate them from groundwater functioning as expected and how well is it performing? Yes. The Source Operable Unit (OU) remedy of Gas Collection Treatment System (GCTS) and RCRA-equivalent cap is functioning as intended with limited observable system component degradation that are being managed and maintained through the OM&M activities. Additionally, the Groundwater OU selected remedy of engineered control is functioning as intended. The Groundwater OU remedy is implemented outside of the Source OU and, in conjunction with the Source OU remedy, includes infiltration controls to significantly (order of magnitude) reduce surface water infiltration from baseline estimates.

The Groundwater OU remedy was selected based on a comparative analysis of the alternatives presented within the Groundwater OU ROD and provides the best balance of trade-offs with respect to the nine evaluation criteria. Specifically,

Chemicals of concern in the regional aquifer either already meet MCLs, have background concentrations above MCLs, or appear as localized occurrences.

Chemicals of concern have been detected in perched groundwater at concentration exceeding MCLs. The perched groundwater would provide insufficient yield to be used as a sole source of groundwater and as a result is not considered to be subject to the MCLs as ARARs.

Because there are no current exposure pathways and concentrations of contaminants in the regional aquifer fall within the acceptable risk range, all of the alternatives are sufficiently protective of human health (including the No Further Action Alternative).

The selected remedy will maintain compliance with chemical-specific ARARs by reducing migration of contaminants to the regional aquifer.

7) Is there a continuous operations and maintenance presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

The OM&M activities are not continuous. Personnel are on Site about two to three times a month to perform routine and non-routine OM&M activities, and when not on-Site the GCTS is monitored by the effluent in-line PID sensor to prevent any effluent COPC breakthrough.

C2 REM prepared a Proposed OM&M Modification TM for USEPA's consideration, which would convert the passive/active system to a passive operation while still maintaining the overall Remedial Action Objectives (RAOs) and reducing the carbon footprint/greenhouse gas generation. The overall goal is to continue to comply with the RAOs while reducing the impact on the environment.

8) Have there been any significant changes in the operations and maintenance requirements, maintenance schedules, or sampling routines in the last five years? Please describe changes and impacts.

There have been no significant changes in the last five years. However, based on the abundance of available data and Site conditions, C2 REM prepared a Proposed OM&M Modification TM for USEPA's consideration, which documents proposed changes to all these categories going forward.

9) Have there been unexpected operations and maintenance difficulties at the site in the last five years (e.g. fence damage, vandalism, storm damage)? If so, please give details.

In September 2019 C2 REM noticed damage to the security fence close to the Site entrance gate and informed the Los Coyotes Country Club (LCCC) superintendent and the fence was repaired in June 2020.

In 2020 groundwater monitoring well P-2I was redeveloped due to observed high turbidity levels during the 2019 groundwater monitoring event.

In September 2020 USEPA received a resident letter with concerns about overgrowth vegetation and some trees on the cap area. The situation was assessed, and the vegetation/trees were removed in December 2020.

10) Have there been opportunities to optimize operations and maintenance or sampling efforts? Please describe changes and desired results or improved efficiency (e.g. better warning system for groundwater wells, repair/replace outdated equipment). Changes to optimize the OM&M activities were not performed in the last five years. However, an assessment of opportunities for optimization was assessed in 2021 and C2 REM prepared a Proposed OM&M Modification TM for USEPA's consideration. Please see further discussion in response to Question 12.

11) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the recovery of the existing contamination or how the remedy will be operated?

Not aware of any changes that may impact the Site remedy.

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

Yes. In March 2022, C2 REM submitted a Proposed OM&M Modification TM for USEPA's consideration to modify the operations and maintenance requirements for the GCTS and Groundwater Monitoring Program. The proposed modifications are as follows:

1. GCTS OM&M Program Modification:

- Implementation of a GCTS passive operation pilot study.
- Based on the results of the GCTS passive operation pilot study, determine if the GCTS can continue to operate passively and reduce monitoring scope (i.e., annual flow indicator monitoring, GCTS monitoring, and Gas Pressure Probes/Gas Sampling Probes [GPP/GSP] monitoring).

These proposed GCTS OM&M modifications are expected to reduce associated greenhouse gas (GHG) emissions from the current GCTS OM&M program by 55%, saving 1.63 metric tons of carbon dioxide equivalent (CO₂e) annually.

2. Groundwater Monitoring Program Modification:

- Reduce groundwater monitoring frequency from annually to every five years (conducted the year prior to each Five-Year Review).
- Reduce groundwater well gauging frequency from semi-annually to annually.
- Remove tetrahydrothiophenes (THTs), metals (calcium, cobalt, iron, magnesium, manganese, molybdenum, potassium, silver, sodium, vanadium, and zinc), inorganic ions (chloride, nitrate, and nitrite), and tert-Butyl alcohol (TBA) from the groundwater monitoring analytical list.

These proposed groundwater monitoring modifications are expected to reduce associated GHG emissions from the current Groundwater Monitoring program by 74%, saving 10.3 metric tons of CO₂e every 5 year.

Appendix G: Site Inspection Report and Photos

- a. Date of Visit: 14 June 2022
- b. Location: Fullerton, 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. Participants:

Helen Sanchez	USACE, Civil Engineer	626-347-3763 (inspector)
Edmond Bourke	C2 REM, Engineer	714-313-4530
Mia Zhang	C2 REM, Engineer	714-313-4530
Manny Lemus	O&M Manager	909-762-3350

SUMMARY

A site visit to the McColl Superfund Site was conducted on 14 June 2022. The inspection included visual observation of overall site conditions and inspection of various components of the site. The participants received an overview of the site and the remedial history. The inspection evaluated the gas collection treatment systems, vegetative cover, surface water drainage channels, settlement monuments, representative groundwater monitoring wells, fencing, and the retention pond.

DISCUSSION

On 14 June, Ms. Sanchez arrived at the McColl site at 0900 hrs. Mr. Bourke, Mia Zhang, and Manny Lemus met at the site. Mr. Bourke presented a safety overview before commencement of the site tour of the McColl site. Mr. Bourke also highlighted the background and the current status of the site. Afterwards, Mr. Bourke proceeded to provide a tour of the McColl site.

The weather was sunny, and approximately 81 degrees Fahrenheit. The participants first proceeded to inspect the remediation enclosure of the Gas Collection and Treatment System (GCTS) and the GCTS equipment. Remediation enclosure was securely maintained with appropriate signage displayed on the outside fencing surrounding the GCTS equipment inside.

The Ramparts Sumps were inspected next on the tour. The cover system appeared to be well maintained with no signs of erosion, ponding water, or subsidence. However, Ramparts Sumps R-1, R-2, R-3, and R-4 showed a very dry vegetative cover with small presence of vegetation growth. The surface drainage system with landscaping sprinkler system over the Ramparts Sump area appeared to be in good condition. However, some minor areas of the drainage system, such as the drainage ditches, surrounding the perimeter of the Sumps area had some weeds collected in the drainage ditches. The Ramparts Sumps were also observed to have a few animal burrows. The team then observed the

Ramparts Vaults which appeared to be in good condition and secure with a catwalk for operation safety. Ramparts Sumps R-5 and R-6 were toured next which appeared to be well maintained with a good vegetative cover.

Afterwards, the team headed to the retention pond, which is located in the northwest portion of the site. The retention pond appeared to be in good condition with no blockages or damages. The riprap outlet also looked to be functioning as designed, with no damage, blockages, or excess vegetation growth.

The Los Coyotes Sumps were observed next and appeared to be in good condition with no signs of erosion, ponding of water or subsidence. The vegetative cover over the sump areas also appeared to be healthy. Groundwater monitoring wells of P-2S, P-2I, P-2D, P-3D, P-3S, P-4I, P-4D were seen to be maintained. The Los Coyotes Vault manifold was opened to show the piping and valves inside; it showed that water had accumulated inside the manifold.

Afterwards, the team headed to a building on the site for a short presentation on the site's background and history. Next, Ms. Sanchez proceeded with Mr. Lemus to inspect the condition of the access roadway. It appeared to be in a good state with some brush overgrowth towering near the end of the road. The access gate was also seen to be undamaged and properly secured the site. In addition, the site perimeter fencing was also observed to be well maintained with no signs of damage or gaps present.

Mr. Lemus and Ms. Sanchez then proceeded to inspect the well monuments and settlement monuments across the site. The monuments showed no signs of damage, erosion, or of water surrounding them; also, the well caps were inspected to be locked.

The site tour concluded after visiting all site components and Ms. Sanchez departed the site at 1330 hrs.

All components of the remedial action for the McColl Superfund site appear to be in good condition and are currently operating as intended. All systems were found to be well secured and with no vandalism. No indication of trespassing was noted.

Site Visit Photos – McColl



Remediation enclosure of the Gas Collection and Treatment System (GCTS)



Remediation enclosure securely maintained with signage displayed on the outside fencing



Ramparts sumps and cap with dry vegetative cover



Another view of the Ramparts sumps and cap with dry vegetative cover



Drainage ditch on perimeter of Ramparts sumps



Surface drainage system for Ramparts sumps, with landscaping sprinkler system



Sampling platform in Ramparts Sump area.



Ramparts Vault for the Gas Collection Treatment System (GCTS)



Valves and piping for the Ramparts Vault appeared to be in good condition



Los Coyotes sumps and cap with good vegetative cover



Drainage ditch surrounding perimeter of site



Well monuments in good condition on site; P-3D, P-3S



Retention pond situated on northwest portion of the site.



Well monument near the Los Coyotes sump area, P-2S



Well monument near the Los Coyotes sump area, P-2I



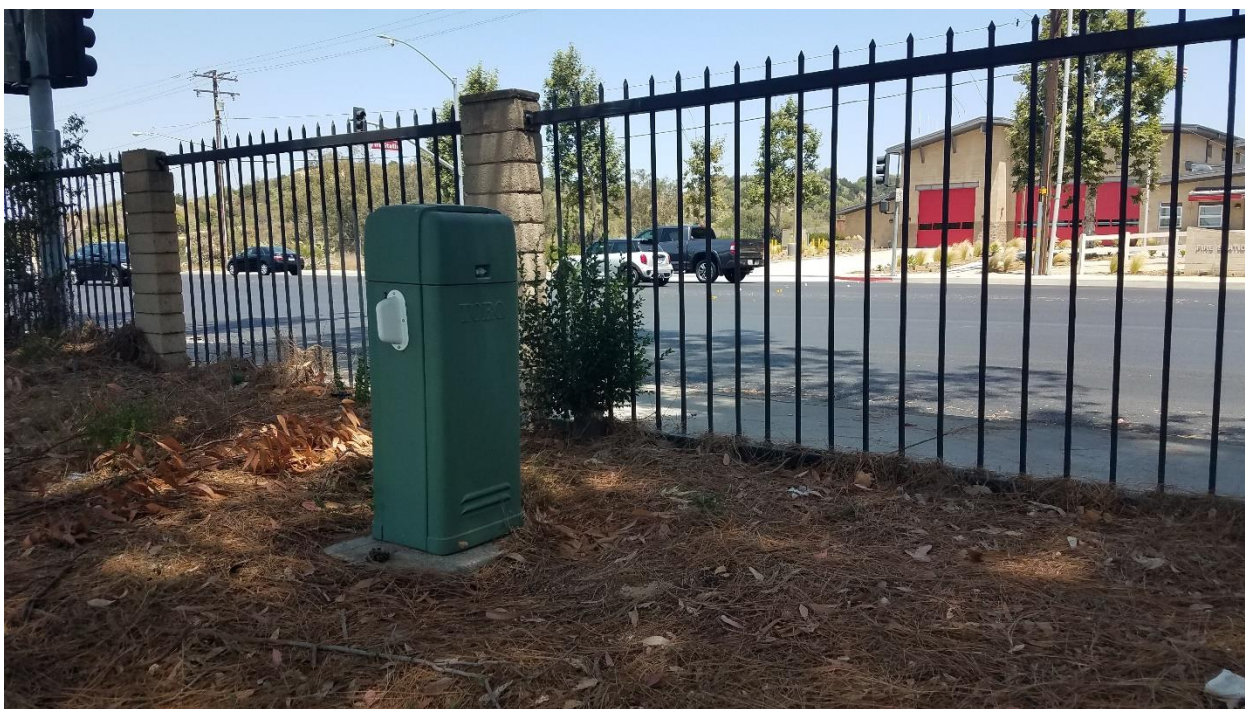
Well monument near the Los Coyotes sump area, P-2D



Los Coyotes Vault for the gas Collection Treatment System (GCTS)



Valves and piping for the Ramparts Vault



Site perimeter fencing observed to be well maintained



Drainage ditch on perimeter of Ramparts sumps



Drainage ditch on perimeter of Ramparts sumps



Access gate was also seen to be undamaged and secure for the site



Riprap outlet also appeared to be functioning as designed



Access roadway with some brush growth toward end of road



Settlement monument in Ramparts sump area



Settlement monument in Ramparts sump area



Animal burrows in Ramparts area