FIRST FIVE-YEAR REVIEW REPORT FOR
OMEGA CHEMICAL CORPORATION SUPERFUND SITE
LOS ANGELES COUNTY, CALIFORNIA

PREPARED BY

U.S. Army Corps of Engineers

Seattle District

FOR

U.S. Environmental Protection Agency

Region 9

Approved by: Date:

DANA BARTON

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Dana Barton, Assistant Director
California Site Cleanup and Enforcement Branch
Superfund and Emergency Response Division
U.S. Environmental Protection Agency, Region 9

Errata Sheet

December 29, 2023

1. Page 1, 4th paragraph, 2nd bullet – Replace the sentence "Downgradient Groundwater Operable Unit. This operable unit addresses contaminated groundwater outside and generally downgradient of the former Omega Property." with "Downgradient Groundwater Operable Unit. This operable unit addresses contaminated groundwater outside and generally downgradient of the former Omega Property, much of which has commingled with chemicals released at other locations into a regional plume containing multiple contaminants, which, when considered in total, is more than four miles long and one mile wide."

2. Page 1, 5th paragraph – Replace the sentence "However, an assessment of the remedy will not be performed because the remedy has not yet been implemented for the Downgradient Groundwater area and the remedy has not been selected for the Vapor Intrusion area." with "However, an assessment of the remedy will not be performed because the final remedy has not yet been selected for the Downgradient Groundwater area and the Vapor Intrusion area."

3. Page 4, 7th paragraph – Replace the paragraph beginning with "As a result of the Omega Chemical Corporation operations…" with "As a result of the Omega Chemical Corporation operations, subsurface soil, soil vapor, and groundwater in the Source Area Operable Unit have high concentrations of tetrachlorethylene (PCE). Other volatile organic compounds detected in the subsurface soil, soil vapor, and groundwater in the Source Area Operable Unit include trichloroethylene (TCE), 1,1-dichlorethylene, Freons, and other volatile organic compounds."

4. Page 9, 5th paragraph – Replace the sentence "Twelve production wells are known to exist within this operable unit." with "There are currently no active drinking water production wells located within the Omega Chemical OU-2 operable unit."

5. Page 23, 2nd paragraph – Replace the sentence "The vertical extent of the plume does not currently impact the majority of drinking water production wells located within the Downgradient Groundwater." with "There are currently no active drinking water productionwells located within the Omega Chemical OU-2 operable unit."

6. Page 51, 2nd Paragraph, 4th bullet – Remove 4th bullet "Four monitoring wells installed by OPOG in 2001 at EPA's request in conjunction with early OU1 work: OW4A, OW4B, OW5, and OW6."

Executive Summary

This is the first Five-Year Review of the Omega Chemical Corporation Superfund Site located in Whittier, California in Los Angeles County. 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 includes the location of the former Omega Chemical Corporation, a refrigerant and solvent recycling and treatment facility. The facility operated from approximately 1976 to 1991, handling primarily chlorinated hydrocarbons and chlorofluorocarbons. Drums and bulk loads of waste solvents and chemicals from various industrial activities were processed at the facility. Chemical, thermal, and physical treatment processes were reportedly used to recycle the waste materials. The Environmental Protection Agency (EPA) placed the Site on the National Priorities List in January 1999.

EPA has divided the Site into three areas for investigation and cleanup: the Source Area, the Downgradient Groundwater Area and Indoor Air Area in buildings within or near the Source Area. The Source Area encompasses two parcels formerly owned by Omega Chemical Corporation and three industrial properties immediately adjacent to the southwest of the former Omega Chemical property. The Downgradient Groundwater Area remedy addresses the groundwater plume outside the Source Area and is currently in design. A remedy has not been selected for the Indoor Air area; however, additional work is currently being undertaken.

EPA issued an Action Memorandum for the Source Area groundwater on September 27, 2005, documenting a non-time critical removal action to address contaminated groundwater within Source Area boundaries. The remedial objective of this removal action was to contain the highest level of contamination dissolved in groundwater within Source Area boundaries, so Site contaminants are not migrating off-Site and contributing to the Downgradient Groundwater Area. The primary component of the Source Area groundwater response action is a groundwater extraction and treatment system, which treats extracted water from five extraction wells and the dual extraction wells from the Source Area soil vapor extraction system. This system has been operating since 2009.

In the September 2008, Record of Decision, EPA selected the following remedy for Source Area Soil to protect long-term human health and the environment: soil vapor extraction and treatment and institutional controls to maintain existing pavement during the operation of the soil vapor extraction and treatment. The Omega Chemical Site Potentially Responsible Parties Organized Group, a group of potentially responsible entities who are implementing the Site remedies, installed an interim soil vapor extraction and treatment system in 2010. The full-scale system for the Source Area soil remedy became fully operational in 2014. Institutional controls have not yet been implemented.

In the September 2011 Record of Decision, EPA selected the following interim remedy for the downgradient groundwater to protect long-term human health and the environment: groundwater extraction and treatment. In 2016, EPA issued an Explanation of Significant Differences documenting changes to the 2011 Record of Decision that include treated water end use and an additional chemical to the treated water performance standard.

The Source Area soil vapor extraction system is operating and functioning as intended but may not achieve the remedy's objective for the soil gas component of the remedy within the timeframe estimated in the Record of Decision. The expected outcome of the selected remedy is to achieve cleanup levels that allow unrestricted use of the properties within Source Area boundaries within about five years after startup of the soil vapor extraction system, which started operation in 2015. During the 2021 optimization study when the soil vapor extraction system was shut down, soil vapor and indoor air tetrachloroethylene concentrations in two Source Area buildings increased and exceeded cleanup levels. However, all tetrachloroethylene detections were below the current regional screening levels for industrial use; and therefore, there is no current exposure at unsafe levels. The system has been operating continuously during this review period with only a few significant shutdowns. Effluent concentrations are meeting air discharge requirements.

The Source Area groundwater treatment system is operating and functioning as designed. The groundwater treatment system is containing contaminated groundwater and preventing it from migrating downgradient. The system has been operating continuously during this review period with only a few significant shutdowns. Effluent concentrations in both liquid and vapor streams have met the water and air discharge requirements, respectively, throughout system operations.

The exposure assumptions, risk assessment methods and cleanup levels and remedial action objectives used at the time of the decision documents are still valid. Toxicity data for some Site contaminants have changed since the 2008 Record of Decision. However, the cleanup levels are still within EPA's acceptable risk range. Promulgated standards presented in the decision documents have changed. However, these changes are primarily administrative and do not affect the protectiveness of the remedy. No other information has come to light that calls into the question the protectiveness of the remedy.

The remedy for Source Area Soil is currently protective because the indoor air concentrations are below the industrial indoor air screening levels and there is no residential use in the areas identified for vapor intrusion risk. Although the Source Area remedy is currently protective, the cleanup has yet to achieve the residential indoor air screening levels that EPA selected in the Source Area ROD. The groundwater treatment system is containing contaminated groundwater and preventing it from migrating. To remain protective in the long-term, the soil vapor extraction system needs to be assessed and measures implemented to increase the effectiveness in order to expediate achieving cleanup goals.

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List of Acronyms and Abbreviations

DTSC	California Department of Toxic Substances
EPA	United States Environmental Protection Agency
MCL	maximum contaminant level
$\mu g/L$	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
$\mu g/kg$	micrograms per kilogram
mg/kg	milligrams per kilogram
OPOG	Omega Chemical Site Potentially Responsible Parties Organized Group, a group of potentially responsible entities who are implementing the Site remedies
PCE	tetrachloroethylene
ROD	Record of Decision
Site	Omega Chemical Corporation Superfund Site
TCE	trichloroethylene
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 first Five-Year Review for the Omega Chemical Corporation Superfund Site (Site). The triggering action for this statutory review is the construction start date of the Source Area Soil remedial action in January 2014 . An internal review identified that a Five-Year Review had not been completed as required in 2019, but EPA Region 9 initiated the Five-Year Review shortly after the oversight was identified. 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 three operable units[1].

- The Source Area Operable Unit. This operable unit addresses contaminated soils and groundwater on and near the former Omega property and extending approximately 100 feet southwest of Putnam Street.

- Downgradient Groundwater Area Operable Unit. This operable unit addresses contaminated groundwater outside and generally downgradient of the former Omega Property.

- Vapor Intrusion Area Operable Unit. This operable unit addresses indoor air contamination at buildings resulting from subsurface contamination that has occurred on and near the former Omega property.

The Source Area will be evaluated in this Five-Year Review. A description and work performed of the Downgradient Groundwater Area and the Vapor Intrusion will be included in this Five-Year Review. However, an assessment of the remedy will not be performed because the remedy has not yet been implemented for the Downgradient Groundwater area and the remedy has not been selected for the Vapor Intrusion area.

The Omega Chemical Corporation Superfund Site Five-Year Review was led by Jason Hermening, EPA Remedial Project Manager. Participants included Cynthia Wetmore, EPA Superfund Five-Year Review Coordinator, and from the U.S. Army Corps of Engineers (USACE): Alison Suess, chemist; Marlowe

[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.

Laubach, environmental engineer; Ben McKenna, geologist, and Kevin Yu, project engineer. The review began on November 10, 2021.

Table 1. Five-Year Review Summary Form

<table>
<tr><th colspan="3">SITE IDENTIFICATION</th></tr>
<tr><td colspan="3">Site Name: Omega Corporation Chemical Superfund Site</td></tr>
<tr><td colspan="3">EPA ID: CAD042245001</td></tr>
<tr><td>Region: 9</td><td>State: CA</td><td>City/County: Whittier/Los Angeles</td></tr>
<tr><th colspan="3">SITE STATUS</th></tr>
<tr><td colspan="3">National Priorities List Status: Final</td></tr>
<tr><td>Multiple Operable Units? Yes</td><td colspan="2">Has the site achieved construction completion? No</td></tr>
<tr><th colspan="3">REVIEW STATUS</th></tr>
<tr><td colspan="3">Lead agency: EPA</td></tr>
<tr><td colspan="3">Author name (Federal or State Project Manager): Jason Hermening</td></tr>
<tr><td colspan="3">Author affiliation: EPA</td></tr>
<tr><td colspan="3">Review period: 11/10/2021 – 8/5/2022</td></tr>
<tr><td colspan="3">Date of site inspection: 6/29/2022</td></tr>
<tr><td colspan="3">Type of review: Statutory</td></tr>
<tr><td colspan="3">Review number: 1</td></tr>
<tr><td colspan="3">Triggering action date: 1/1/2014</td></tr>
<tr><td colspan="3">Due date (five years after triggering action date): 1/1/2019</td></tr>
</table>

1.1. Background

The Site includes the location of the former Omega Chemical Corporation, a former refrigerant and solvent recycling and treatment facility located in Whittier, California. The facility operated from approximately 1976 to 1991, handling primarily chlorinated hydrocarbons and chlorofluorocarbons. Drums and bulk loads of waste solvents and chemicals from various industrial activities were processed at the facility. Chemical, thermal, and physical treatment processes were reportedly used to recycle the waste materials.

The facility maintained eleven treatment units comprising distillation columns, reactors, a wipe film processor, a liquid extractor, and a solid waste grinder. The facility also maintained stainless steel tanks with capacities ranging from 500 to 10,000 gallons, and several 5,000-gallon carbon steel tanks.

Between 1984 and 1988, the Omega Chemical Corporation received many notices of violation from the Los Angeles County Department of Health. In the early 1990s, the California Department of Toxic Substances Control (DTSC) and EPA actively pursued the owner/operator of the Omega Chemical Corporation to remove drums of contaminants and cleanup the site.

In 1993, at the request of the DTSC, EPA conducted a site assessment of the Omega facility to evaluate the condition of over 2,900 drums of unprocessed hazardous waste, which took up most of the available storage space on the property. In 1995, DTSC, requested EPA assistance in re-evaluating the condition of the Omega facility. A preliminary assessment was conducted on January 19, 1995.

On May 9, 1995, EPA issued a Unilateral Administrative Order to the owner of the Omega Chemical Corporation and to the generators of the hazardous substances that had shipped 10 or more tons of hazardous substances to the former Omega facility. During 1995 and 1996, a group of potentially responsible entities later known as the Omega Chemical Site Potential Responsible Parties Organized Group (OPOG), with EPA oversight, removed approximately 3,000 drums from the Site and collected subsurface soil and groundwater samples.

There is a plume of groundwater contamination beneath the Site that extends approximately four-and-one-half miles downgradient of the Omega Facility. Groundwater investigations conducted by EPA and DTSC identified additional source areas that have contributed contamination that has comingled with the contamination released from the Omega Facility. Multiple source areas downgradient of the Omega Facility are, or have been, conducting cleanup under the oversight of DTSC or the Los Angeles Regional Water Quality Control Board.

As a result of the Omega Chemical Corporation operations, subsurface soil, soil vapor, and groundwater have high concentrations of tetrachloroethylene (PCE). Other volatile organic compounds detected in the subsurface soil, soil vapor, and groundwater include trichloroethylene (TCE), 1,1-dichloroethylene, Freons, and other volatile organic compounds.

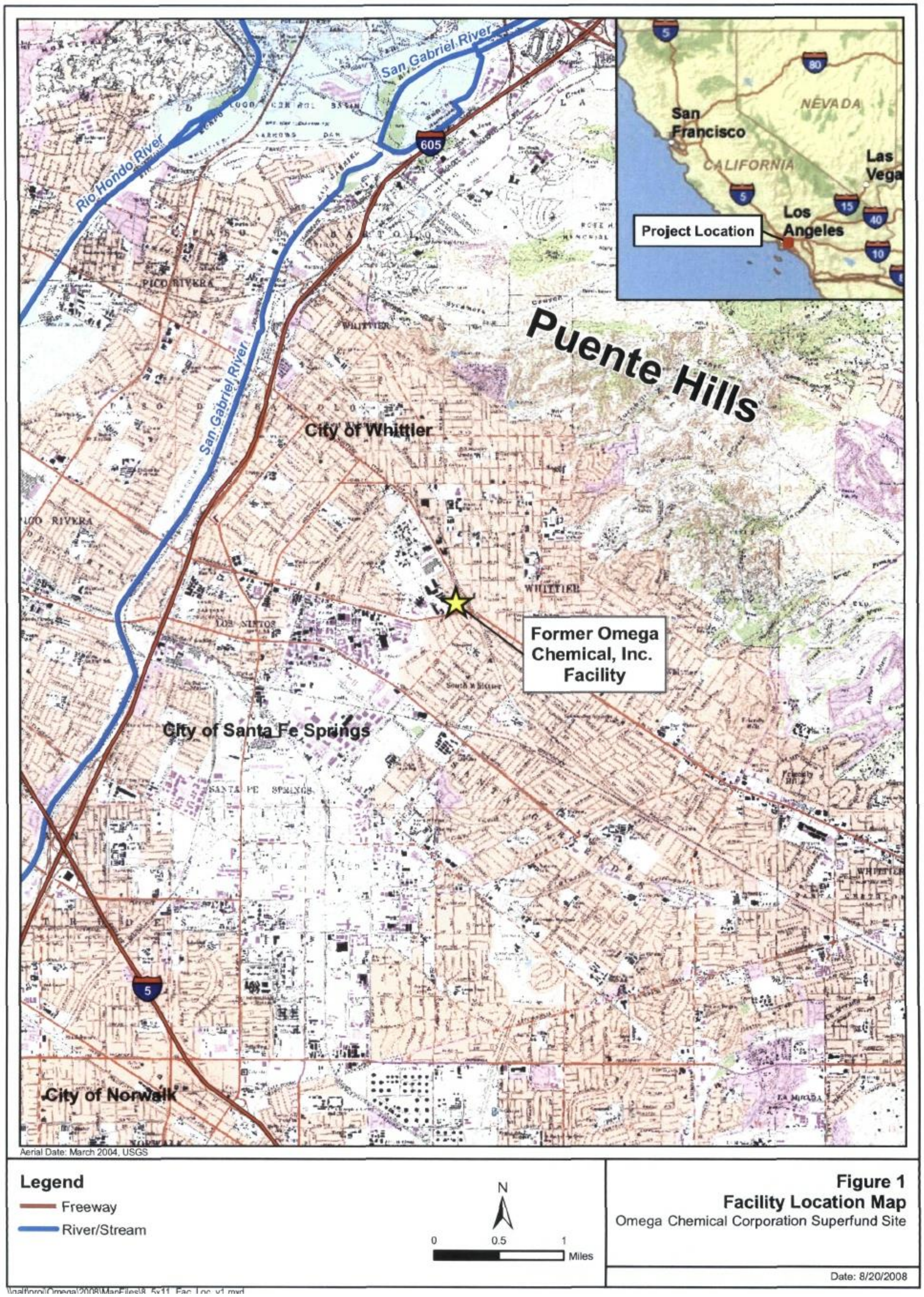
The Site was placed on the National Priorities List in January 1999.

1.2. Physical Characteristics

The Site is in located in Whittier, California in Los Angeles County (Figure 1). The Source Area encompasses two parcels formerly owned by Omega Chemical Corporation at 12504 and 12512 East Whittier Boulevard and three industrial properties immediately adjacent to the southwest of the former Omega Chemical property (Figure 2).

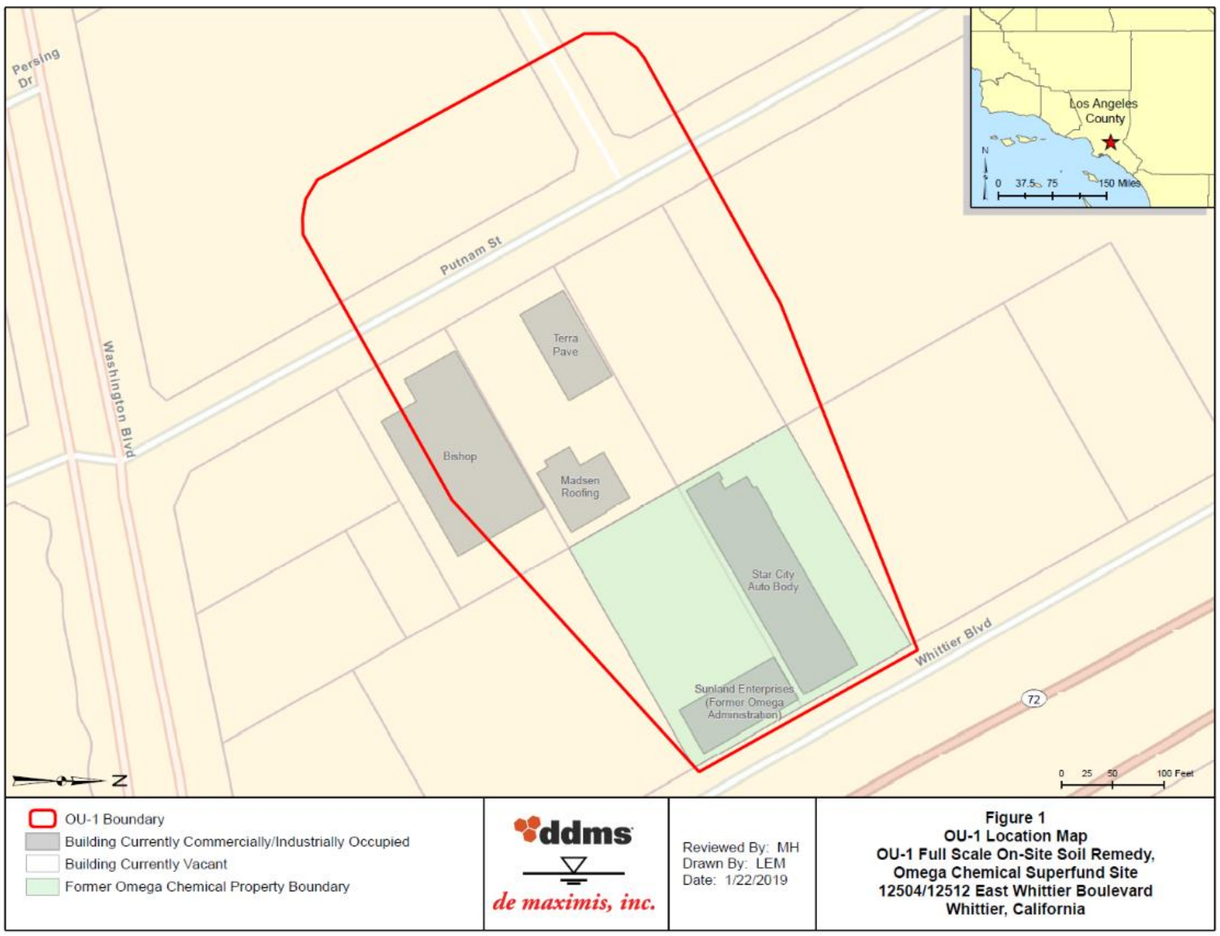
Commercial and industrial properties are immediately adjacent to the former Omega property. Residential land use occurs across Whittier Boulevard to the northeast approximately 250 feet from the former Omega property. Until 2015, the zoning for the Source Area (Whittier Boulevard Specific Zoning District) allowed for business offices, medical and dental offices, live/work units, multi-unit residential development, educational institutions, and commercial and light manufacturing. In 2015, the City of Whittier revised its zoning requirements in the Whittier Boulevard Specific Zoning District; In the revised zoning plan, residential development is limited to specific areas (Residential Overlay Subareas). The former Omega facility is not identified as a Residential Overlay Subarea, and therefore, the area is limited to commercial/industrial use. Residential Overlay Areas are to the north and south of the former Omega facility.

The areas within and surrounding the Downgradient Groundwater area are a mix of predominantly commercial/industrial and minor residential land use. Groundwater within the Downgradient Groundwater area is used as a source of drinking water by several municipal and private water purveyors.



Source: 2008 Source Area Soil Record of Decision

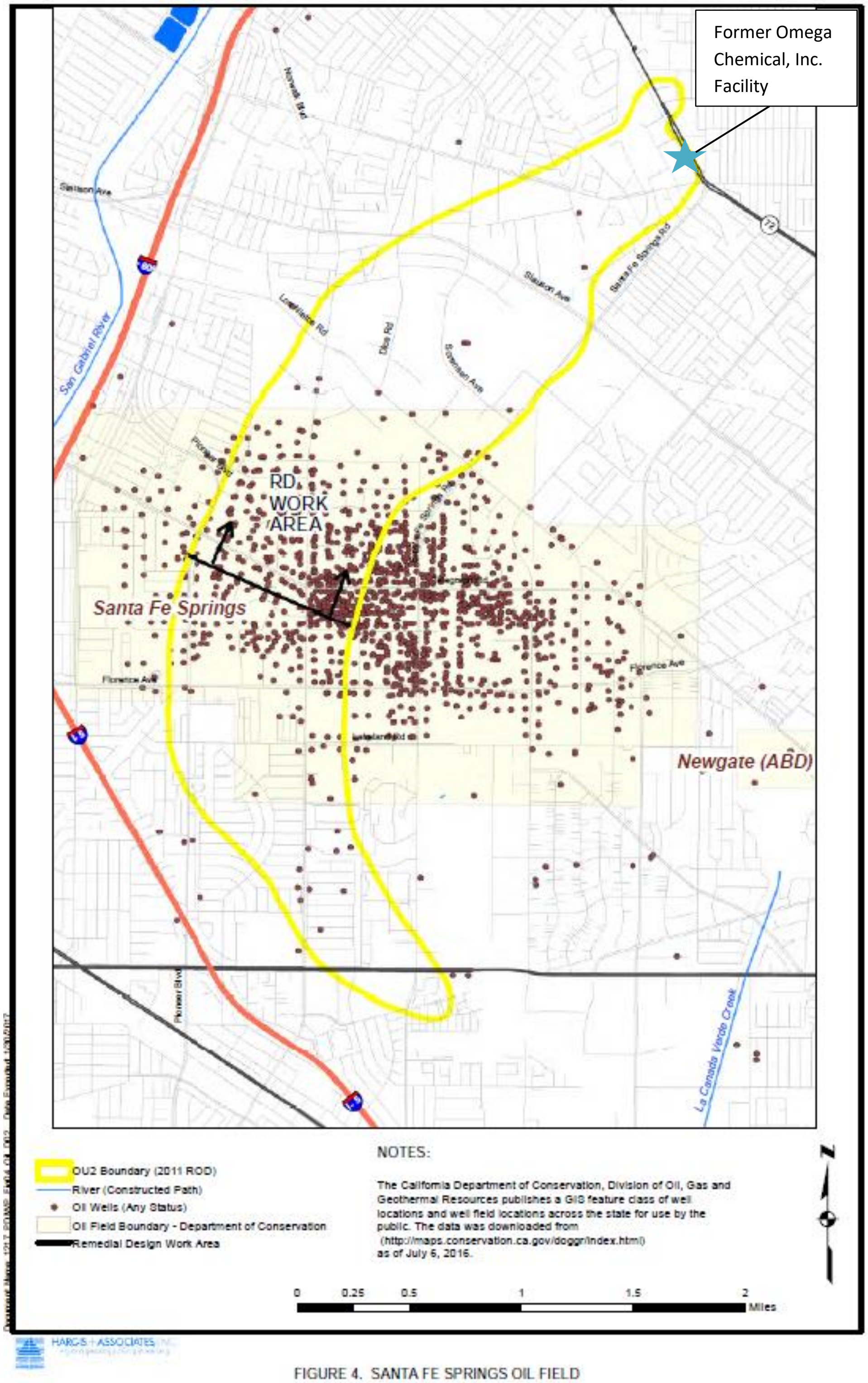
Figure 1. Site Location Map



Source: De Maximus OU-1 Full Scale On-Site Soil Remedy Report, Third Quarter 2021
NOTE: The orientation of the On-Site Soil Remedy is different than the inset. On this figure, the north direction is oriented to the right side of the page compared to a typical orientation with the top of the page as north.

Figure 2. Source Area Location Map

Beginning in 1907, oil and gas wells were installed as part of the Santa Fe Springs Oil Field and reached peak production by 1928. The central portion of the Santa Fe Springs Oil Field overlaps Downgradient Groundwater area and the remedial design work area (Figure 3). The California Department of Conservation, Division of Oil and Gas lists a total of 1,378 wells in the Santa Fe Springs Oil Field. Some of these wells are active, but a majority of them were abandoned. It is possible that oil production wells abandoned prior to about 1965 were not completely sealed (i.e., they were likely pressure grouted in the production interval, but not all the way to the ground surface) and their corroded and collapsed steel casings could provide conduits for downward groundwater flow and contaminant migration.



Source: CDM Smith, 2017 Remedial Design Work Plan

Figure 3. Santa Fe Springs Oil Field Well Locations in Reference to Downgradient Groundwater

1.3. Hydrogeology

The downgradient groundwater area extends from the former Omega facility approximately 4.5 miles south. Water-bearing sediments identified in the Whittier area extend to an approximate depth of at least 1,000 feet below ground surface. The identified geologic units consist of recent alluvium, the Lakewood Formation, and the San Pedro Formation. The marine sediments below the San Pedro Formation generally contain saline water in the Whittier area and are considered non-water-bearing where exposed in the Puente Hills.

The shallowest water bearing units include the semi-perched aquifer, the Gaspur aquifer, and the Bellflower aquitard. The Gaspur aquifer is mainly sand and gravel with a small amount of interbedded clay.

The Lakewood Formation consists of non-marine deposits including the Artesia and Gage aquifers although the Artesia aquifer may only be present to the south of Downgradient Groundwater and therefore is not considered relevant. The Gage aquifer may be absent or unsaturated in areas of Downgradient Groundwater north of the Central Extraction Area and is generally present and saturated within Downgradient Groundwater from near the Central Extraction Area to the south. The Gage aquifer does not appear to be an important source of drinking water in the Whittier area, based on elevated total dissolved solids concentrations measured in groundwater samples collected at Downgradient Groundwater wells.

The San Pedro Formation unconformably underlies the Lakewood Formation. The San Pedro Formation has been subdivided into five named aquifers separated by clay layers. The five aquifers defined within the San Pedro Formation include, from top to bottom, the Hollydale, Jefferson, Lynwood, Silverado, and Sunnyside aquifers.

The known vertical extent of the contamination is up to approximately 420 feet bgs. Twelve production wells are known to exist within this operable unit. Four impacted active production wells are located near the leading edge of Downgradient Groundwater. Five of the other production wells are known to have been impacted by volatile organic compounds. The nearest impacted well is located 1.3 miles to the west-southwest of the former Omega facility.

Although most of the production wells in the study area draw water primarily from deep portions of the aquifer (from depths greater than 200 feet bgs) and are not currently impacted by groundwater contamination, tetrachloroethylene and other volatile organic contaminants have been detected historically at five drinking water supply wells that have screens starting at 200 feet bgs (SFS Well #1, and the Golden State Water Company wells Pioneer #1, Pioneer #2, Pioneer #3, and Dace #1). These wells are currently equipped with wellhead treatment units using granular activated carbon.

The depth to groundwater at and in the vicinity of the Downgradient Groundwater Area has fluctuated over time. The direction of groundwater flow has been evaluated by EPA and subsequent groundwater monitoring reports. Overall, the general direction of groundwater flow has been to the south/southwest in the area north of the Central Extraction Area and to the south-southeast in the area south of the Central Extraction Area.

Vertical hydraulic gradients have been evaluated as part of groundwater monitoring reports based on water levels measured in cluster monitor wells (monitor wells with screened intervals completed at different depths at the same general location). Vertical gradients currently show neutral to moderately downward flow. The current range of depth to water measurements for 2020 reported a range from 40.18 feet below top of casing to 122.8 feet below top of casing.

2. Remedial Actions Summary

2.1. Basis for Taking Action

Past practices by the Omega Chemical Corporation contributed to the presence of volatile organic compounds, primarily PCE and TCE, in the soils at concentrations that potentially impact indoor air spaces for current building occupants and future Source Area residents and at concentrations that pose a direct contact risk. Groundwater at the Site also contains volatile organic compounds, freons, and 1,4-dioxane at concentrations that potentially impact nearby drinking water sources.

2.2. Remedy Selection

In 2005, EPA issued an Action Memorandum for the Source Area groundwater selecting a non-time critical removal action to address contaminated groundwater within Source Area boundaries. The objective of this removal action was to contain the highest level of contamination dissolved in groundwater within Source Area boundaries, so Site contaminants are not migrating off-property and contributing to the Downgradient Groundwater Area

The proposed action included the installation of five extraction wells and a groundwater pump and treatment system. The treatment includes a combination of advanced oxidation process using hydrogen peroxide and ozone to remove 1,4-dioxane, followed by granular activated carbon treatment to remove the remaining contaminants. After treatment, groundwater would be discharged under a National Pollutant Discharge Elimination System permit to the storm drain or sanitary sewer. Re-injection of treated water would be considered if a suitable location could be identified.

In 2006, EPA issued another Action Memo to install a sub-slab pressurization and/or depressurization system at Skateland, located at 12520 Whittier Blvd, to prevent contaminant vapors from entering the building.

In 2008, EPA issued a Record of Decision for the Source Area Soil to address contaminated soil within the Source Area boundaries. The selected remedy includes soil vapor extraction, partial capping, and institutional controls. The remedial action objectives for the Source Area Soil are:

- Reduce or eliminate the vapor intrusion risk associated with volatile organic compounds in contaminated soils
- Reduce or eliminate the risk associated with direct exposure to, contact with, and/or ingestion of contaminated soils.
- Reduce or eliminate contaminant migration to groundwater to levels that protect the groundwater resource.

The selected remedy for soil uses a network of soil vapor extraction wells and a treatment system to remove and treat contaminated soil vapors from below the ground surface. The soil vapors are then treated using granular activated carbon filters to remove contaminants, so that treated air complies with the limits specified by the South Coast Air Quality Management District before it is released to the environment. Condensate from the soil vapor extraction system is pumped to the response action groundwater treatment system.

EPA selected cleanup levels for soil gas, indoor air and for PCE in soil based on the risk-based preliminary remediation goals (10^{-6} excess cancer risk) for residential land use developed in the 2007 Human Health Risk Assessment (Table 2). EPA did not select a cleanup level for other contaminants in soil but required that levels be set in the remedial design that would protect the groundwater.

The soil vapor extraction system will be operated until asymptotic mass removal rates have been achieved at each extraction well. If post-rebound concentrations within the upper 30 feet of soil remain above cleanup levels for soil gas, or if post-rebound concentrations below 30 feet remain above cleanup levels protective of groundwater, then contingencies for increasing the effectiveness of the soil vapor extraction, including hot air injection and/or dual phase extraction will be implemented. The expected outcome of the soil vapor extraction system is to achieve cleanup levels that allow unrestricted use of the properties within Source Area boundaries within five years after startup of the soil vapor extraction system.

Institutional controls would be implemented to require the existing pavement be maintained during the operation of the soil vapor extraction system.

Table 2. Soil Gas and Indoor Air Cleanup Levels from 2008 ROD

Chemical	Soil Gas Cleanup Level (μg/m³)[1]	Indoor Air Cleanup Level (μg/m³)	Basis for Performance Standard[1]
1,2-Dichloroethane	83	0.74	Risk-based for residential use
1,1-Dichlorethene	110,000	88	Risk-based for residential use
cis-1,2-Dichloroethene	22,000	29	Risk-based for residential use
trans-1,2-Dichloroethene	45,000	58	Risk-based for residential use
1,1,1-Trichloroethane	1,300,000	1,800	Risk-based for residential use
Trichloroethylene	1,300	0.96	Risk-based for residential use
Tetrachloroethylene	470	0.33	Risk-based for residential use
Trichlorofluoromethane (Freon 11)	390,000	310	Risk-based for residential use

μg/m³ – micrograms per cubic meter; mg/kg – milligrams per kilogram
[1] The soil gas cleanup levels are applicable to the upper vadose zone (0 – 30 feet below ground surface).

In 2011, EPA issued an interim Record of Decision to address contaminated groundwater downgradient of the former Omega Chemical facility.

The remedial action objectives for the Downgradient Groundwater Area are:

- Prevent unacceptable human exposure to groundwater contaminated by contaminants of concern;
- Prevent lateral and vertical spreading of contaminants of concern in groundwater to protect current and future uses of groundwater; and
- Prevent lateral and vertical migration of groundwater with high concentrations of contaminants of concern into zones with currently lower concentrations of contaminants of concern to optimize the treatment of extracted groundwater.

The selected remedy described in the 2011 interim Record of Decision is a groundwater pump and treat system with extraction wells at three locations along the downgradient plume and treatment of the contaminated groundwater for drinking water use or reinjection of the water into the aquifer if agreements with water purveyors cannot be reached in a timely manner. The remedy also includes informational institutional controls to reduce the possibility that production wells in the vicinity of the downgradient groundwater area could become contaminated and to prevent operation of the wells from interfering with the containment objectives of this interim remedy. These informational institutional controls include (1) annual notifications to all water rights holders and other stakeholders in the Central Basin, (2) periodic meetings with State and local agencies with jurisdiction over well drilling and groundwater use within the Central Basin, and (3) contemporaneous notifications by such agencies regarding groundwater extraction and well drilling.

In 2016, EPA issued an Explanation of Significant Differences that documents four changes to the 2011 Record of Decision. These changes are:

- Adds two possible end-uses of groundwater after it has been pumped to the surface and contaminants removed: 1) delivery to an existing “reclaimed” water system for irrigation and industrial use (“reclaimed use”); and 2) return to the groundwater basin using an existing “spreading basin”. The reclaimed and spreading end-uses would occur off-Source Area.
- Removes a preference established in the Record of Decision for a drinking water use.
- Adds the 10 micrograms per liter (µg/L) State of California drinking water standard for hexavalent chromium, as a potential treatment requirement.
- Updates the EPA’s cleanup cost estimates to reflect the new treatment requirement for hexavalent chromium, the more stringent treatment requirement for 1,4-dioxane described in the 2011 Record of Decision, and to correct an error in the 2011 cost estimate.

The 2011 interim Record of Decision does not include in-situ cleanup goals for contaminated groundwater at the Source Area. In-situ cleanup goals will be addressed in a subsequent decision document. Performance standards for treated groundwater were provided based on drinking water end use. However, for the drinking water end use, the water will be treated to the lowest concentration required by the California Department of Public Health, the precursor to the Division of Drinking Water, permit. Performance values for treated groundwater would be determined by the results of an Anti-Degradation Analysis if the end use is injection.

Performance criteria described in the interim Record of Decision are to provide sufficient hydraulic control both laterally and vertically in three areas of the plume preventing the spread of the plume into clean portions of the aquifers and the movement of groundwater from high concentrations zones into less contaminated zones. The performance of the interim remedy will be determined by demonstrating continued hydraulic control and a decrease in contaminant concentrations in compliance wells over time.

2.3. Additional Work

In 2009, EPA and OPOG entered into an Agreement on Consent for OPOG to conduct a short-term action to address elevated indoor air volatile organic compound levels at two buildings within the Source Area, Terra Pave and Bishop Company. The additional work also required semi-annual indoor air sampling at five additional buildings: Medlin & Sons, Star City Auto Body, Madsen Roofing, Oncology Care Medical Association and Los Angeles Carts Manufacturing (LA Carts). The removal action prioritized expedited initiation of the soil vapor extraction system selected in the ROD the 2008 ROD remedy to control vapor intrusion at the Terra Pave and Bishop buildings.

EPA modified the agreement’s Scope of Work several times between 2010 and 2022, requiring more work to be performed that largely focused on the geographic area in the vicinity of Source Area but beyond the defined Source Area established by EPA. The number of buildings monitored increased to 27, and a second Soil Vapor Extraction system (SVE2) was installed to address vapor intrusion in five off-

Source Area buildings. The remaining modifications required routine indoor air monitoring and soil vapor monitoring outside of the Source Area.

The target for this removal action is to achieve contaminant concentrations in indoor air that are below the Industrial Air Regional Screening Levels. PCE accounts for 91% of the potential human health risk; the Industrial Air Regional Screening Levels at the time of the agreement for PCE was 2.1 micrograms per cubic meter (µg/m^3).

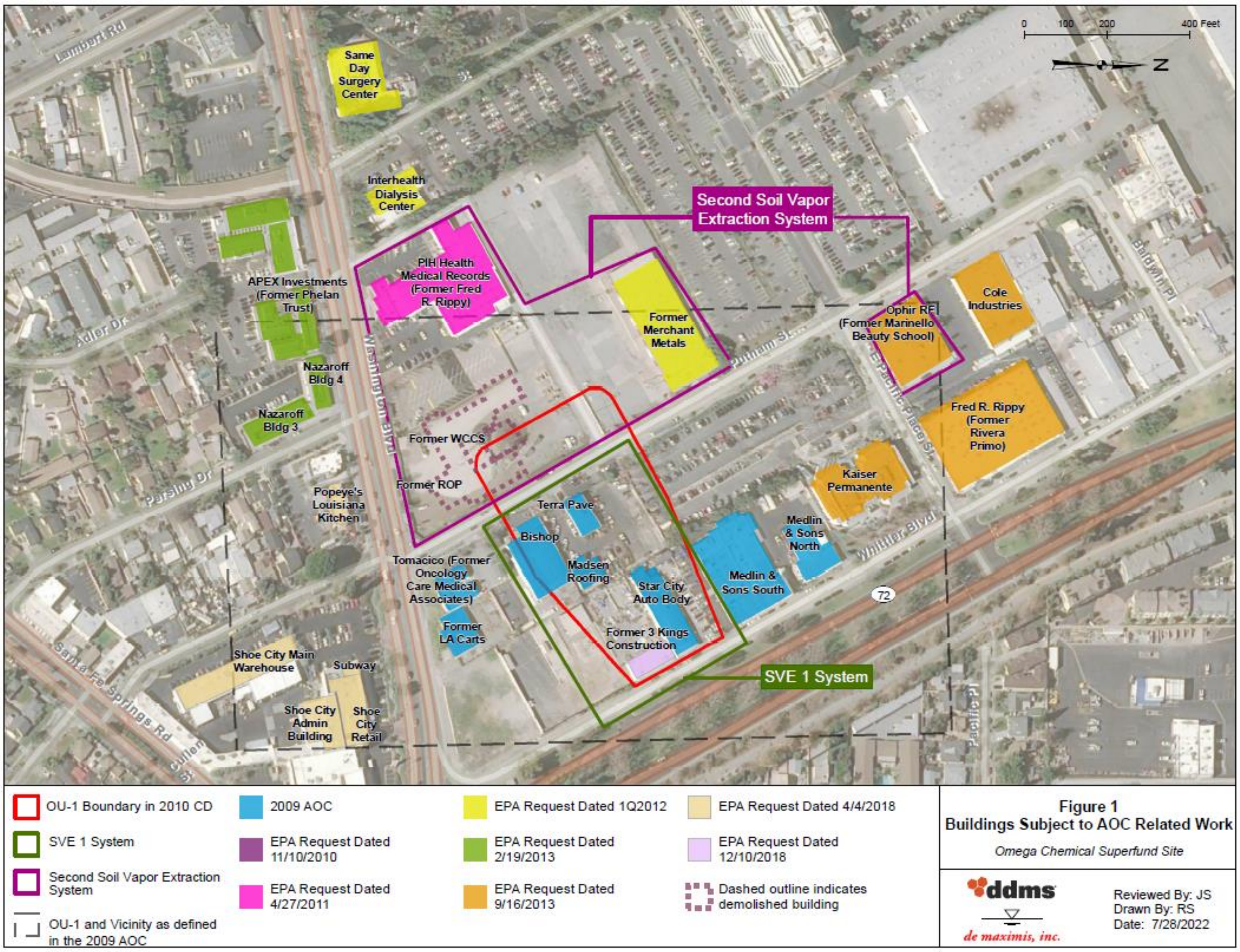


Figure 4. Additional Work (Indoor Air) Area

2.4. Remedy Implementation

In July 2006, the OPOG contractor installed five groundwater extraction wells. In January 2008, construction began on the groundwater extraction and treatment system including pipelines, treatment system building, and equipment installation. In July 2009, completion of the groundwater extraction and treatment system construction occurred to include commissioning. The fully automated 24-hour operation of the groundwater extraction and treatment system began July 24, 2009. This system is currently operating to extract and treat groundwater from the five extraction wells and the dual phase extraction wells of the Source Area soil vapor extraction system.

Starting in 2004, OPOG collected indoor air samples from buildings located within the Source area boundaries. Three buildings, Skateland, TerraPave and Bishop Company, had PCE sample results above EPA's health-protective criteria for long-term industrial exposure, but below EPA's short-term exposure criteria. In 2006, Skateland was sold, and the building demolished after EPA’s decision to install a sub-slab pressurization and/or depressurization system. In 2009, EPA and OPOG entered into an agreement for OPOG to install an interim soil vapor extraction system, to conduct regular indoor air sampling for several on-Source Area buildings and evaluate and implement short-term mitigation measures at TerraPave and Bishop Company buildings. This system began continuous operation on June 14, 2010.

The indoor air monitoring program was expanded to cover a total of 27 buildings in the vicinity of the Source Area but outside the official boundary. Based on those results, OPOG installed a soil vapor extraction system expansion to address vapor intrusion (SVE2) in three buildings (Regional Occupational Program, Women’s & Children’s Crisis Shelter, and Fred R. Rippy), two of which were demolished in 2015 (Regional Occupational Program and Women’s & Children’s Crisis Shelter). OPOG further expanded the new system to address soil vapor at two additional buildings (Merchant Metals and Marinello). In 2019, OPOG shutdown the second soil vapor extraction system with EPA approval.

In January 2014, construction of the full-scale soil vapor extraction system began with the construction of five dual phase extraction wells, three shallow zone vapor extraction wells, and four deep zone vapor extraction wells. A couple vapor extraction wells from the interim system were converted into dual phase extraction wells. The off-gas treatment systems installed for the interim soil vapor extraction system were re-used for the full-scale system. The dual phase extraction wells extract vapor and groundwater. The treated vapor is discharged to the atmosphere from the effluent stack and monitored in accordance with South Coast Air Quality Management District requirements. The full-scale soil vapor extraction system began continuous operation in June 2015.

The Downgradient Groundwater remedy is currently in the remedial design phase and has not yet been implemented.

Institutional controls have not yet been fully implemented. EPA has been attending biannual meetings with Water Replenishment District, informing the District of the status of the plume and the design.

2.5. System Operation and Maintenance

2.5.1. Operations and Maintenance Requirements

2.5.1.1 Source Area Soils

The soil vapor extraction treatment system for Source Area Soil continues to operate in accordance with the 2019 Operations, Maintenance and Monitoring Manual. The manual includes operational monitoring to ensure the soil vapor extraction and treatment system is operating as intended. System performance is documented in quarterly reports.

Contractors for the OPOG conduct system inspections and maintenance regularly; either weekly, monthly, quarterly, or annually depending on the system component.

Operational monitoring includes the soil vapor extraction system monitoring of the influent, mid-point and effluent of the vapor granular activated carbon vessels, soil gas monitoring at the vapor extraction and dual phase extraction wells, and system inspections of the equipment and infrastructure. The frequency of monitoring is listed below.

- Continuous monitoring of the overall system, flowrate at the combined system influent and blower discharge, and temperature at the blower discharge.
- Monthly monitoring of volatile organic compounds at the influent (lead vessel), midpoint and effluent of the granular activated carbon vessels.
- Weekly monitoring of volatile organic compounds using a photoionization device at the combined influent of the system and at the influent (lead vessel), midpoint and effluent of the granular activated carbon vessels.
- Weekly monitoring of pressure at the combined influent of the system and at the influent (lead vessel), midpoint and effluent of the granular activated carbon vessels.
- Weekly monitoring of temperature at the combined influent of the system.
- Weekly monitoring of relative humidity at the combined influent of the system and the lead granular activated carbon vessel.

In addition, the Operations, Maintenance, and Monitoring Manual includes indoor air sampling of the neighboring buildings, which are occupied by commercial and industrial businesses, and soil gas sampling from a network of vapor monitoring probes. Indoor and ambient air sampling occurs either semi-annually or annually depending on the building. Prior to 2018, indoor and ambient air sampling occurred quarterly or semi-annually, depending on the building. The vapor monitoring probes are monitored quarterly to collect pressure data. Soil vapor concentrations of volatile organic compounds are collected either semi-annually or annually depending on the probe.

2.5.1.2 Source Area Groundwater

The response action groundwater treatment system is operated and maintained in accordance with the 2019 Operations, Maintenance, and Monitoring Manual. System performance is documented in quarterly reports.

OPOG contractors conduct regular inspections and maintenance of the system either weekly, monthly, quarterly, or annually depending on the system component.

Operational and performance monitoring is conducted to confirm performance criteria are being met and demonstrate compliance with the sewer discharge permit and South Coast Air Quality Management District requirements. The operational and performance monitoring includes:

- Quarterly groundwater levels monitored in 11 monitoring wells, 5 piezometers, and 5 extraction wells, 5 dual extraction wells, and 2 vapor extraction wells.
- Semi-annual water quality sampling in 11 monitoring wells, 5 extraction wells, 5 dual extraction wells, and 2 vapor extraction wells. Water sampled from these locations are analyzed for volatile organic compounds and 1,4-dioxane.
- Quarterly compliance samples of treated water for performance criteria compounds.
- Monthly monitoring for volatile organic compounds of air stripper exhaust, between carbon vessels, and carbon effluent
- Weekly monitoring with a photoionization device at the air stripper exhaust, between carbon vessels, and carbon effluent
- Monthly process water monitoring at the treatment system influent, air stripper influent, and treated groundwater discharge to assess process performance.

2.5.2. Significant Operations and Maintenance over the Past Five Years

Within this five-year review period, the soil vapor extraction system (SVE1) has been operating continuously with minimal down times at an average run time of 96% with only two major shutdowns. In January 2019, the system shutdown due to a failure with an auto alarm within the air-water separator. This alarm failure caused water to enter the vapor granular active carbon vessels. Repairs were performed and the system was back online in March 2019. The system was shut down in July 2021 to evaluate rebound of contaminants in the soil. The system was turned back on in February 2022.

The soil vapor extraction and treatment system (SVE1) has removed 9,705 pounds of contamination from 2010 to June 2021 (Figure 5). During this five-year review period, the soil vapor extraction system removed approximately 163 pounds of contaminants. The second soil vapor extraction system (SVE2) removed 2,262 pounds.

The Source Area groundwater treatment system has been operating continuously with minimal down times at an average run time of 91%. Major system down times occurred in 2021. These shutdowns were attributed to low levels of anti-scalant (used to prevent scaling in the air stripper), the installation of a new alarm for low anti-scalant, effluent discharge flow meter sensor replacement, flooding caused by a ruptured sprinkler line, and system optimization testing.

Since startup of the remedy, the Source Area groundwater treatment system processed over 49 million gallons of water and removed 993 pounds of contaminant mass. The removal of contaminant mass has decreased over this five-year review period (Figure 6). This corresponds with a decrease in influent concentrations over time (Figure 6). The effluent concentrations in both liquid and vapor streams have met the water and air discharge requirements, respectively, throughout system operations.

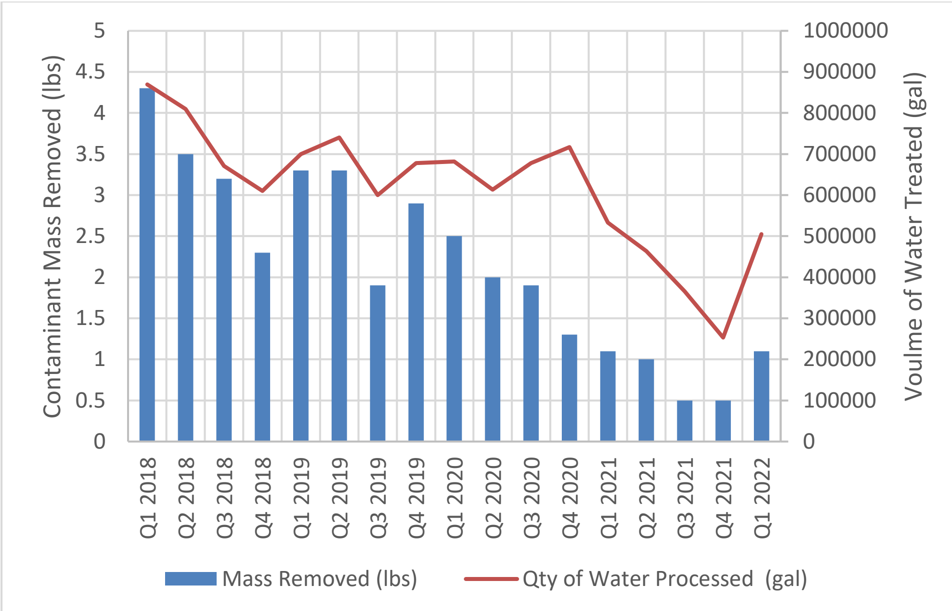


Figure 5. Five-Year Review Period Mass Removal and Volume Water Processed

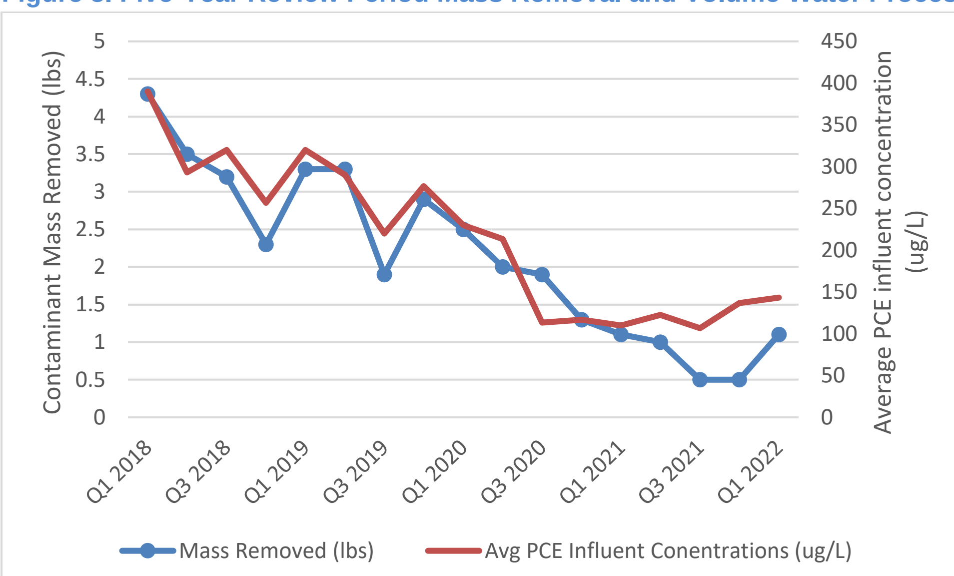


Figure 6. Five-Year Review Period Groundwater Mass Removal and Average Tetrachloroethylene Influent Concentrations

In addition to the five extraction wells, six dual-phase extraction wells are extracting groundwater on Source Area. Although installed as part of the Source Area soil remedy to increase subsurface vapor removal, the dual phase extraction wells are currently extracting most of the water and contaminant mass. Pumping from the dual phase extraction wells accounted for approximately 98% of groundwater extracted in the First Quarter 2022.

3. Progress Since the Last Five-Year Review

3.1. Previous Five-Year Review Protectiveness Statement and Issues

This is the first Five-Year Review for this Site.

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

In July 2021, the OPOG turned off the soil vapor extraction to collect data for the optimization. Soil, soil gas, and indoor air samples were collected during this time. In addition, a membrane interface probe was deployed in the unsaturated zones to obtain current site conditions for comparison to remedial investigation conditions. The soil vapor extraction system was restarted in February 2022.

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 posting in the *Whittier Daily News* on December 3, 2021, stating that there was a Five-Year Review and inviting the public to submit any comments to the EPA. No comments were received. The results of the review and the report will be made available at the Site information repository located at the Superfund Record Center, 75 Hawthorne Ste, Room 3100, San Francisco, California, 94105. The report will also be posted on EPA's webpage for this Site: www.epa.gov/superfund/omegachemical.

4.1.2. Site Interviews

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

Ed Modiano with De Maximus, on behalf of the OPOG, submitted a written response to interview questions. Mr. Modiano states that it has been a collaborative effort between EPA, OPOG, and other stakeholders to achieve project objectives to meet the remedial action objectives. The remedy is functioning as expected achieving the ROD cleanup level in soils. However, soil gas and indoor air samples have exceeded the ROD cleanup levels for both those media. No unexpected operations and maintenance difficulties, or costs have occurred in the last five years. There have been several opportunities to optimize the soil vapor extraction system and monitoring leading to greater efficiencies and a decrease in operation and maintenance costs in the last five years.

4.2. Data Review

4.2.1. Soil

Three remedial objectives for Source Area Soils presented in the 2008 ROD are:

- Reduce or eliminate the vapor intrusion risk associated with volatile organic compounds in contaminated soils
- Reduce or eliminate the risk associated with direct exposure to, contact with, and/or ingestion of contaminated soils.
- Reduce or eliminate contaminant migration to groundwater to levels that protect the groundwater resource.

Soil samples collected during this five-year review period met the ROD cleanup level for tetrachloroethylene, the only volatile organic compound with a ROD cleanup level in soil (1.2 mg/kg] or 1,200 micrograms per kilogram [μg/kg]). During the 2021 optimization study, soil samples were collected from 11 soil boring locations (Figure 7) at depths ranging from 5 to 90 feet below ground surface. Volatile organic compounds were detected in all soil samples at low levels (Appendix C – Table C-1). PCE concentrations in the soil ranged from non-detect to 47 μg/kg.

The soil borings on the former Omega Chemical Facility had PCE concentrations greater than 1 μg/kg at all depths samples were collected. Soil boring SB-2108, near Sun City Autobody, had the highest PCE concentration of 47 μg/kg at a depth of 25 feet below ground surface. Soil boring SB-2108 had PCE concentrations greater than 1 μg/kg at depths from 15 to 75 feet below ground surface and concentrations greater than 5 μg/kg from 15 to 42 feet below ground surface. Soil boring SB-2109 had PCE concentrations greater than 10 μg/kg at 10 and 30 feet below ground surface, PCE concentrations greater than 5 μg/kg at 15 and 40 feet below ground surface, and PCE concentrations greater than 1 μg/kg at the remaining depths (45 to 90 feet below ground surface). Soil boring SB-2110 had PCE concentrations greater than 1 μg/kg, but less than 5 μg/kg from 10 to 55 feet below ground surface.

Figure 7. 2021 Soil Sample Locations

4.2.2. Groundwater

Source Area Groundwater

Six dual-phase extraction wells are extracting groundwater on Source Area (Figure 8). Although installed as part of the Source Area Soil remedy to increase subsurface vapor removal, the dual phase extraction wells are currently extracting most of the water and contaminant mass. Pumping from the dual phase extraction wells accounted for approximately 97% of groundwater extracted in the Third Quarter 2021.

The efficiency of groundwater extraction through the pump and treat system in combination with the dual phase extraction system has resulted in the lowering of the local groundwater table. The lowering of the groundwater table has contributed to many of the Source Area groundwater monitoring wells going dry and not having sufficient groundwater for periodic monitoring. For deeper wells that did contain sufficient groundwater for sampling USACE conducted groundwater concentration trend analysis.

USACE conducted the trend analysis for a select set of groundwater monitoring wells. The results of the trend analysis showed Stable and Decreasing concentration trends for all contaminants of concern. Concentration trends of 1,4-dioxane were not able to be fully evaluated due to laboratory data qualification errors but numerically show decreasing concentrations in tandem with all other contaminants.

The groundwater extraction system along with the dual phase extraction system are successfully preventing the migration of contaminated groundwater off-property and are contributing to the reduction of contaminants in Source Area groundwater.

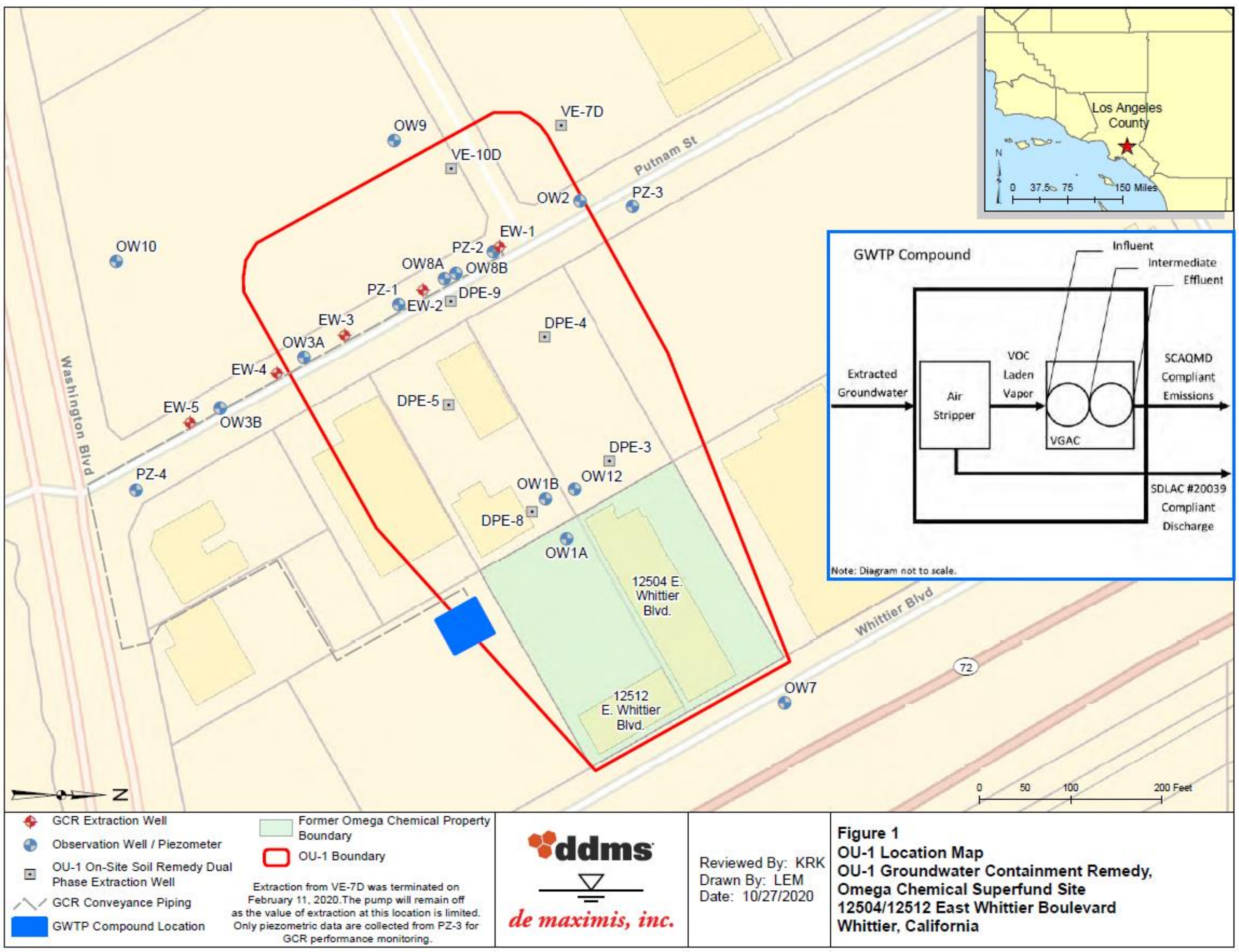


Figure 8. Source Area Well Locations

Downgradient Groundwater

The selected remedy for Downgradient Groundwater is currently in the remedial design phase and has not yet been implemented. In the absence of an operational remedy to evaluate USACE conducted an evaluation of groundwater concentration trends in wells along the boundary of Downgradient Groundwater from 2016 to 2020.

The results of the trend analysis were somewhat inconclusive due to a majority of the wells along the boundary of Downgradient Groundwater being dry for the entirety of the evaluation period. Given the extended drought conditions for California these wells are not expected to contain sufficient groundwater for sampling in the near future. Wells that did contain sufficient groundwater for sampling largely showed non-detectable concentrations for their respective contaminants.

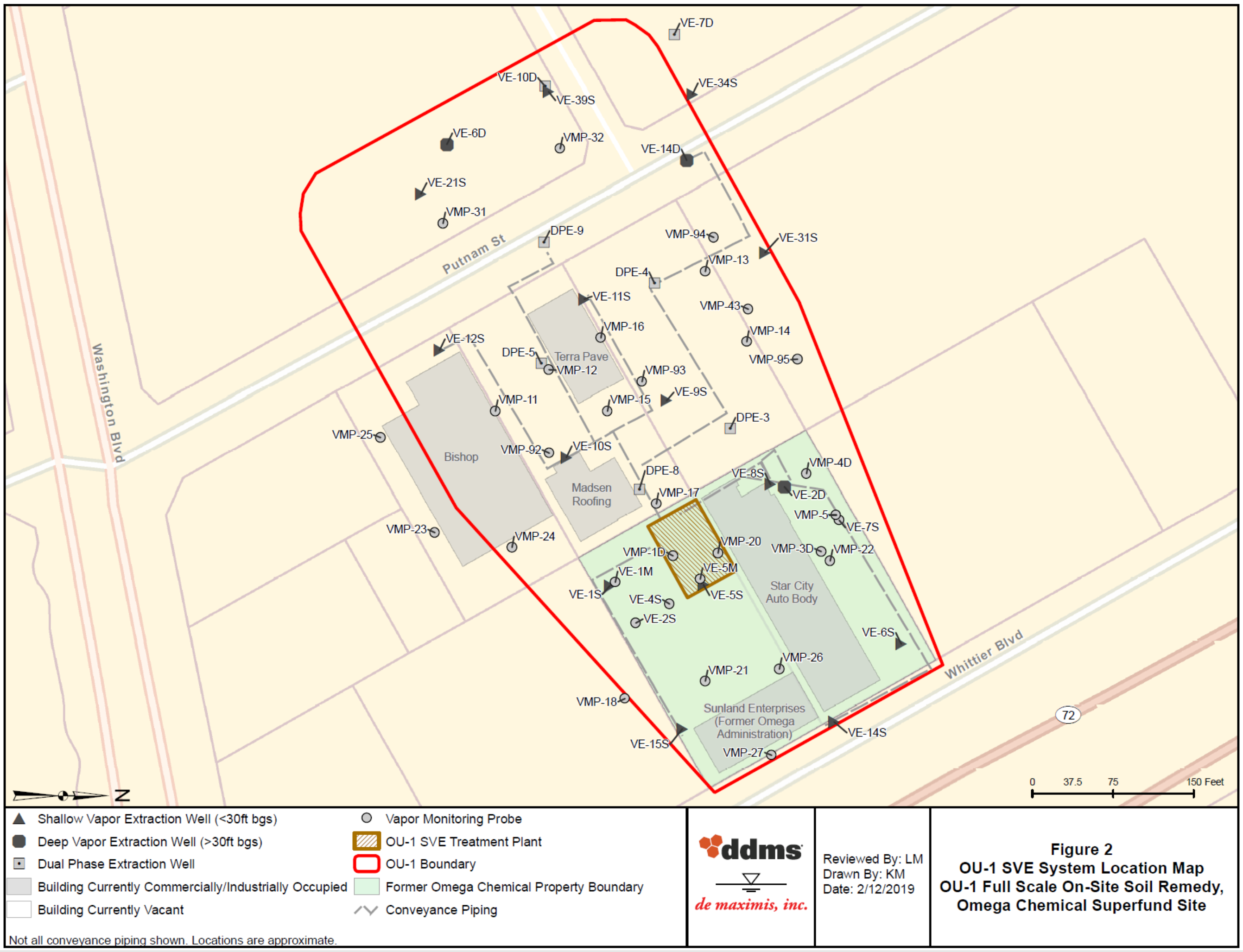
The lateral extent of the Downgradient Groundwater plume appears to be consistent with the previously mapped extent in 2010. The non-detectable results in the perimeter monitoring wells indicate that the plume may in fact be shrinking but a more detailed investigation may be needed to confirm the plume status. The vertical extent of the plume does not currently impact the majority of drinking water production wells located within the Downgradient Groundwater. For the few production wells that have historically reported impacts, each well is equipped with a wellhead treatment system protecting drinking water.

4.2.3. Soil Gas

Vapor monitoring probes are used to monitor soil gas levels in the shallow soils (0 to 30 below ground surface) to determine whether soil gas concentrations meet the ROD cleanup levels during system operation. Only PCE and TCE were detected in the soil gas. Detected TCE concentrations were below the ROD cleanup level of 1,300 $\mu g/m^3$. Vapor monitoring probe VWP-11, near the Bishop building, exceeded the PCE ROD cleanup level of 470 $\mu g/m^3$ in January 2020, July 2020 and January 2021 with concentrations ranging from 630 to 1,500 $\mu g/m^3$. All other vapor monitoring points with detected PCE concentrations were below ROD cleanup levels.

During the optimization study conducted in the last half of 2021, OPOG turned off the soil vapor extraction system off during this time. Of the samples collected during this period, PCE was detected in most of the samples collected in the shallow vadose zone (53 samples out of 75 total samples collected). Of these samples 12 samples exceeded the ROD cleanup level of 470 $\mu g/m^3$ (Table 3). These samples were located at vapor extraction wells VE-8 and VE-9 and vapor monitoring points VMP-11, VMP-117, and VMP-118. The soil gas exceedances at VE-9 and VMP-11 are near the TerraPave and Bishop buildings, respectively. The soil gas exceedance at VE-8 and VMP-118 are near the Star City Auto building. The remaining soil gas exceedance at VMP-117 is not near any building. Generally, the PCE concentrations increased in the vapor monitoring points when soil vapor system was shut off compared to concentrations during operational quarterly sampling.

During operation, ROD cleanup levels are being met except in one vapor monitoring probe. When the system is shut-off, PCE concentrations increased with twelve locations exceeding the ROD cleanup levels.



Source: De Maximus 2021. 2021 3rd Quarter Full-Scale Soil Remedy Report.

Figure 9. Full-Scale Soils Vapor Extraction and Treatment System Layout

Table 3. 2021 Optimization Study Result Statistics

Chemical	# of Detections	Minimum Concentration (µg/m³)	Maximum Concentration (µg/m³)	ROD Cleanup Level (µg/m³)	Current risk-based value for industrial use (µg/m³)	# of samples greater than ROD Cleanup Level
1,1-Dichloroethylene	18/75	4.20	90	110,000		0
1,1,1-Trichloroethane	8/75	7.60	610	1,300,000		0
Trichloroethylene	30/75	5.50	200	1,300		0
Tetrachloroethylene	53/75	10	26,000	470		12
Freon 11	37/75	5.70	73	390,000		0

4.2.4. Indoor Air

The 2008 ROD cleanup levels for PCE and TCE are 0.33 μg/m^3 and 0.96 μg/m^3, respectively and were selected based on residential land use at the time of the ROD. Currently, the EPA regional screening levels for residential air for PCE and TCE are 11 μg/m^3 and 0.48 μg/m^3, respectively.

Under EPA's removal authority, OPOG has operated an interim soil vapor extraction system and a second soil vapor extraction system to address indoor concentrations in buildings within and adjacent to the Source Area (Figure 4). The buildings are all commercial or industrial. The current EPA regional screening levels for industrial air for PCE and TCE are 47 μg/m^3 and 3 μg/m^3, respectively.

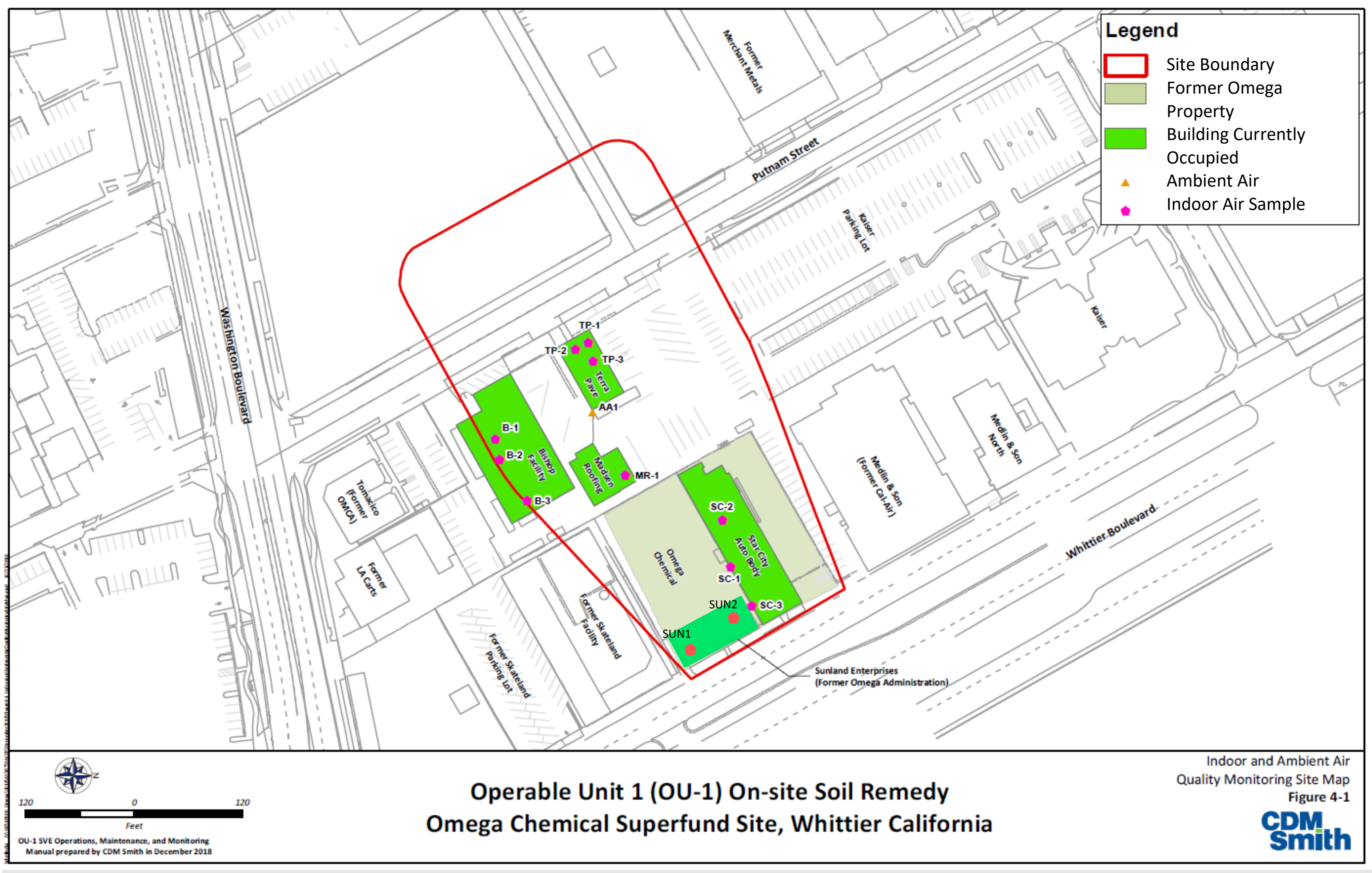
Source Area Indoor Air

PCE has been detected in all buildings with concentrations ranging from 0.24 to 4.8 μg/m^3. PCE exceedances in the Bishop building occurred in January 2019, January 2020, and January 2021 with concentrations ranging from 0.35 to 0.88 μg/m^3, with no detections in July 2021. In addition, the soil gas exceedances of PCE are located near the Bishop building, possibly the source of the indoor air exceedances. TCE was not detected above the ROD cleanup level in any samples.

PCE exceedances above the ROD cleanup level in the TerraPave building occurred in all sample events from January 2019 through July 2021 with concentrations ranging from 0.53 to 4.8 μg/m^3. PCE was detected above the ROD cleanup level in the Sun City Autobody and Madsen building in January 2019, but not detected in 2020 or 2021. PCE was detected above the ROD cleanup level in the Sunland Enterprises building in January 2020 and Jan 2021, but not detected in January TCE was not detected above the ROD cleanup level in any samples.

Between July 2021 and February 2022, OPOG turned off the soil vapor extraction system as part of the optimization study. In October 2021 and January 2022, OPOG collected indoor air samples while the soil vapor extraction system was shutdown. Trichloroethylene was not detected above the ROD cleanup level in any samples. PCE concentrations increased in the Bishop building and the TerraPave building. (Table 4). These concentrations were greater than the ROD cleanup level but were below the current industrial Regional Screening Levels for the current building use (industrial). The system was re-started in February 2022. TCE was not detected above the ROD cleanup level in any samples

PCE concentrations have exceeded the cleanup standard in all Source Area buildings and have consistently exceeded the cleanup levels at the TerraPave and Bishop buildings. The operation of the soil vapor system did not appear to reduce the indoor air over time. The expected outcome of the selected remedy is to achieve cleanup levels that allow unrestricted use of the properties within Source Area boundaries within five years after startup of the soil vapor extraction system, which started operation in 2015. Although, the indoor air concentrations in the Source Area buildings exceed the 2008 ROD cleanup standards, the concentrations are below the current industrial Regional Screening Levels for the current building use (industrial).



Source: CDM 2019. Operations, Maintenance and Monitoring Manual On-Site Soil.

Figure 10. Source Area Indoor Air Sample Locations

Table 4. Detected Indoor Air Concentrations for PCE and Trichloroethylene

	Bishop Building			TerraPave Building		Sun City Autobody			Madsen	Sunland Enterprises	
	B1	B2	B3	TP 1	TP 3	SC1	SC2	SC3	MR1	SUN1	SUN2
PCE Concentrations (µg/m^3) ROD cleanup standard is 0.33 µg/m^3. Current Regional Screening Level for Industrial Use for a 10^{-6} excess cancer risk is 47 µg/m^3											
Nov 2017	0.23 U	0.58 U	0.23 U	0.18 U	0.39 U	NS	NS	NS	0.23 U	NS	NS
Mar-2018	0.21 U	0.22 U	0.22 U	0.21 U	0.41 U	0.22 U	0.43 U	0.21 U	0.21 U	NS	NS
Jun 2018	0.2U	0.31	0.23 U	0.21 U	0.46 U	NS	NS	NS	NS	NS	NS
Sep 2018	0.17 U	0.4	0.23 U	0.22 U	0.22 U	0.46 U	2.2 U	0.21 U	0.23 U	NS	NS
Nov 2018	0.24 J	0.41 J	0.23 UJ	0.25 J	0.69 UJ	NS	NS	NS	NS	NS	NS
Jan 2019	**0.87**	**0.88**	**0.72**	**0.55**	2.1 U	**0.73**	1.1 U	**0.58**	**0.67**	NS	NS
Jan 2020	**0.37**	0.3	0.21 U	**0.53**	**4.8**	0.22 U	0.22 U	0.22 U	0.28	**0.47**	0.23 U
Jul 2020	0.23 U	0.31	0.22 U	**0.66**	**1.9**	NS	NS	NS	NS	NS	NS
Jan 2021	0.25	**0.35**	0.35	**0.8**	**2**	0.27	0.44 U	0.24	0.25	**0.45**	**0.45**
Jul 2021	0.20 U	0.20 U	0.19 U	0.19 U	**3.4**	NS	NS	NS	NS	NS	NS
Oct 2021	**0.45**	**1.6**	0.19 U	**1.1**	**0.56**	0.20 U	0.20 U	0.20 U	0.21 U	0.20 U	0.20 U
Jan 2022	**3.3**	**2.8**	**0.67**	**2.3**	**5.1**	0.18 U	0.17 J	0.18 U	0.18 U	0.18 U	0.18 U
Trichloroethylene Concentrations (µg/m^3) ROD cleanup standard is 0.96 µg/m^3. Current Regional Screening Level for Industrial Use for a 10^{-6} excess cancer ROD cleanup standard is 3 µg/m^3.											
Nov 2017	0.18 U	0.46 U	0.18 U	0.15 U	0.31 U	NS	NS	NS	0.18 U	NS	NS
Mar 2018	0.16 U	0.17 U	0.2	0.17 U	0.32 U	0.18 U	0.34 U	0.16 U	0.17 U	NS	NS
Jun 2018	0.15 U	0.2 U	0.18 U	0.17 U	0.36 U	NS	NS	NS	NS	NS	NS
Sep 2018	0.21 U	0.19 U	0.18 U	0.45	0.45	0.36 U	1.8 U	0.17	0.18 U	NS	NS
Nov 2018	0.17 UJ	0.45 J	0.20 J	0.17 UJ	0.55 UJ	NS	NS	NS	NS	NS	NS
Jan 2019	0.17U	0.19	0.17 U	0.32 U	1.7 U	1.7 U	0.85 U	1.1	0.17 U	NS	NS
Jan 2020	0.18 U	0.17 U	0.17 U	0.17 U	0.84 U	0.18 U	0.17 U	0.18 U	0.18 U	0.17 U	0.18 U
Jul 2020	0.18 U	0.23	0.18 U	0.18 U	0.31 U	NS	NS	NS	NS	NS	NS
Jan 2021	0.18	0.18 U	0.18 U	0.18 U	0.18 U	0.17 U	0.35 U	0.16 U	0.17 U	0.18 U	0.18 U
Jul 2021	0.16 U	0.16 U	0.15 U	0.16 U	0.31 U	NS	NS	NS	NS	NS	NS
Oct 2021	0.15 U	0.31 U	0.15 U	0.15 U	0.23 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Jan 2022	0.16	0.17	0.14 U	0.15 U	0.28 U	0.16 U	0.45 U	0.14 U	0.14 U	0.14 U	0.14 U

Near Source Area Indoor Air

Starting in 2009, OPOG started an indoor air sampling program for six buildings near the Source Area. PCE and TCE were detected in three buildings above industrial indoor air screening levels at Merchant Metals Warehouse and North Annex, Fred R. Rippy Building and Marinello Building (Figure 4). The remaining three buildings detected TCE and PCE but below the industrial indoor air screening levels, with the exception of a one-time elevated concentration of TCE in the Medlin & Sons (South) Building. After OPOG started operating the second soil vapor extraction system, concentrations of TCE and PCE dropped to levels well below the industrial indoor air screening levels in all buildings while the system was in operation. OPOG stopped operating the seconded soil vapor extraction system in February 2019. Indoor air concentrations in those six buildings have remained well below the industrial indoor air screening levels and in many cases non-detect.

Between 2010 and 2020, OPOG expanded its indoor air monitoring program by sampling sixteen additional buildings/businesses near the Source Area: Apex (formerly Phelan included four buildings), Nazaroff (included two buildings), Cole, Rivera Primo, Magnetic Resonance Imaging Center, Kaiser Permanente, Popeyes, Same Day Surgery, Shoe City, and Subway. All PCE and TCE results were below the industrial indoor air screening levels for all sampling events.

OPOG also sampled the Regional Occupational Program building in 2010, which had elevated concentrations of PCE slightly above the industrial indoor air screening levels and a one-time exceedance for TCE. In August 2010, OPOG installed a subslab depressurization system at the Regional Occupational Program, and subsequent indoor air sampling results were well below its industrial indoor air screening levels. The Women’s and Children’s Shelter building had a one-time exceedance of the TCE industrial indoor air screening level in 2011; subsequent samples were below the industrial indoor air screening level for TCE. Although the indoor air results at the Women's and Children's Crisis Shelter Building were below the PCE industrial indoor air screening levels, OPOG also installed a subslab pressurization in August 2011. Both these buildings were subsequently demolished in 2015.

Table 5. Additional Work Indoor Air Results

Building	**Indoor Air Sampling Frequency**	**TCE Concentration range ($\mu g/m^3$)**	**PCE Concentration range ($\mu g/m^3$)**
Buildings within the range of the second soil vapor extraction system			
Former Merchant Metals Warehouse and North Annex	Annual (2012 - 2022)	Pre-SVE: <1 to ~ 14 Post-SVE: <~1	Pre-SVE: ~ 1 to ~ 65 Post-SVE: <~1
Former Fred R. Rippy	Annual (2010 - 2022)	Pre-SVE: <1 to ~ 990 Post-SVE: <~1	Pre-SVE: ~ 2 to ~ 85 Post-SVE: <~1
Former Marinello	Annual (2014 - 2022)	Pre-SVE: <1 to <2 Post-SVE: <1	Pre-SVE: ~ 20 to ~ 40 Post-SVE: <~3
Buildings outside the range of the second soil vapor extraction system			
Medlin & Sons (South)	Annual (2009 - 2022)	Pre-SVE: <1 to ~11 Post-SVE: <1	Pre-SVE: <1 to ~ 22 Post-SVE: non-detect
Medlin & Sons (North)	Periodic (2010, 2011, 2013, 2018)	Pre-SVE: <1 Post-SVE: <1	Pre-SVE: <1 Post-SVE: <1
Former Oncology Care Medical Associates	Annual (2012 - 2022)	Pre-SVE: <1 to 7 Post-SVE: <1	Pre-SVE: <1 to ~ 10 Post-SVE: <1

4.2.5. Sustainability

The Government Accountability Office published a study in 2019 summarizing risks to EPA Superfund sites across the country. The Omega Chemical Corporation Superfund Site was identified as having a flooding risk. Flooding at the Site would impact the operation of the groundwater and soil vapor extraction systems in the form of physical damage to system components and power interruption. These impacts would result in the mobilization of contaminants in soil and groundwater beyond the influence of the treatment systems.

4.3. Site Inspection

The inspection of the Site was conducted on June 29, 2022. In attendance were Jason Hermening, EPA, Kevin Yu of the USACE, Los Angeles District, Khalid Azhar, JHA Environmental, Inc., Chris Ross, Engineering Analytics, Edward Modiano, de Maximis, Jillian Ly, Los Angeles Regional Water Quality Control Board, Tina Liu, Geosyntec, and Cesar Rangel, City of Whittier. The purpose of the inspection was to assess the condition of the remedy and verify that the remedy is operating as intended.

The site inspection verified site building usage. The Bishop building is currently occupied and is used as a warehouse with some office space. The TerraPave building is an office building and is currently vacant. However, this building is available for use. The concrete on the former Omega Administration property has some cracking but was otherwise in good condition. All components of the remedial action for the Omega Chemical Superfund Site appear to be in good condition and are currently operating as intended.

5. Technical Assessment

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

The Source Area soil vapor extraction system is operating and functioning as intended but may not achieve the remedy’s timeframe estimated in the ROD. The expected outcome of the selected remedy was to achieve cleanup levels that allow unrestricted use of the properties within Source Area boundaries within about five years after startup of the soil vapor extraction system, which started operation in 2015. During operation of soil vapor extraction system, indoor air PCE concentrations exceeded the cleanup standard in all Source Area buildings and consistently at the TerraPave and Bishop buildings during this Five-Year Review period. Although, the indoor air concentrations in the Source Area buildings exceed the 2008 ROD cleanup standards, the concentrations are below the current industrial Regional Screening Levels for the current building use (industrial). The TerraPave building is currently vacant. The Bishop building is currently used as a shopping warehouse with some office space.

Between July 2021 and February 2022, OPOG shut off the soil vapor extraction system to assess potential rebound. During soil vapor extraction system operation, ROD cleanup levels were being met except in one vapor monitoring probe. When the system is shut-off, PCE concentrations increased with twelve locations exceeding the ROD cleanup levels. In addition, indoor air concentrations increased in on-site buildings.

Institutional controls have not yet been implemented. Institutional controls would be implemented to require the existing pavement be maintained during the operation of the soil vapor extraction system. The site inspection found the concrete pavement on the former Omega property generally in good shape.

The on-property groundwater treatment system is operating and functioning as designed. The groundwater treatment system is containing contaminated groundwater from migrating and contributing to downgradient groundwater. The system has been operating continuously during this review period with only a few significant shutdowns. Effluent concentrations in both liquid and vapor streams have met the water and air discharge requirements, respectively, throughout system operations.

The vapor intrusion additional work has sampled 27 buildings on or near the Source Area and operated a second soil vapor extraction system to mitigate soil gas concentrations near a few buildings. The latest indoor air contaminant concentrations are below the current industrial Regional Screening Levels for the current building use.

The downgradient groundwater remedy has not been implemented. The lateral extent of the Downgradient Groundwater plume appears to be consistent with the previously mapped extent in 2010. The vertical extent of the plume does not currently impact the majority of drinking water production wells located within the Downgradient Groundwater. For the few production wells that have historically reported impacts, each well is equipped with a wellhead treatment system protecting drinking water.

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

The exposure assumptions, risk assessment methods and cleanup levels (Appendix E) and remedial action objectives used at the time of the decision documents are still valid. Toxicity data for some Site contaminants have changed since the 2008 ROD. While the current residential indoor air regional screening levels for 1,2-Dichloroethane and trans-1,2-Dichloroethene are less than the cleanup standard, a review of sampling results during the reporting period found that results for these chemicals were non-detect. Sample results from this reporting period for TCE were mostly non-detect; detected concentrations were less than the May 2022 regional screening level. Therefore, the changes do not affect the protectiveness of the remedy.

The applicable or relevant and appropriate requirements selected in the Records of Decision have changed. However, these changes were primarily administrative and do not affect the protectiveness of the remedy. Appendix D summarizes the analysis of changes in these standards.

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

No other information has come to light that could call into the question the protectiveness of the remedy.

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): Source Area Soil	**Issue Category: Remedy Performance**			
	Issue: The soil vapor intrusion system has not achieved the cleanup levels in the timeframe estimated in the ROD.			
	Recommendation: The soil vapor extraction system needs to be assessed and measures implemented to increase the effectiveness in order to expedite achieving cleanup goals.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/31/2025

6.1. Other Findings

In addition, the following are recommendations that will improve future five-year review assessments and remedy performance but do not affect current and/or future protectiveness and were identified during the Five-Year Review:

- Produce annual reports with comprehensive data tables summarizing quarterly findings.
- Create annual plume maps for the Downgradient Groundwater Area to show plume conditions over time.
- Continue to evaluate the effectiveness of the existing monitoring well network in light of the extended regional drought conditions.

7. Protectiveness Statement

Table 7. Protectiveness Statement

Protectiveness Statement(s)	
Operable Unit: Source Area Soil	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The remedy for Source Area Soil is currently protective because a soil vapor extraction system is in place and operating to reduce concentrations in both soil gas and indoor air. Indoor air concentrations are below the industrial indoor air screening levels, and there is no residential use in the areas identified for vapor intrusion risk. However, the remedy has not achieved EPA's ROD cleanup timeframe anticipated by the ROD. The groundwater treatment system is containing contaminated groundwater and preventing it from migrating. To remain be protective in the long-term, the soil vapor extraction system needs to be assessed and measures implemented to increase the effectiveness in order to expedite achieving cleanup goals.	

8. Next Review

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

Appendix A: List of Documents Reviewed

CDM Smith. 2007. Final On-Site Soils Remedial Investigation Report. November 14.

CDM Smith. 2010. Interim Soil Vapor Extraction System Operations, Maintenance and Monitoring Manual (Revised Draft), Omega Chemical Superfund Site On-Site Soils Remedy. June 25.

CDM Smith. 2010. Removal Action Completion Report (FINAL), Omega Chemical Superfund Site, Non-Tim Critical Removal Action, Groundwater Remedy. April 7.

CDM Smith. 2013. Full-Scale On-Site Soils Remedy Preliminary Design Report (Revised Draft) Operable Unit 1, Omega Chemical Superfund Site, Whittier, California. August 1.

CDM Smith. 2018. Remedial Action Construction Complete Report, Omega Full-Scale On-Site (OU-1) Soil Remedy. August 1.

CDM Smith. 2019. Groundwater Containment System Operations, Maintenance, and Monitoring Manual, Omega Chemical Superfund Site, Whittier, California. July 3.

CDM Smith. 2019. Operation Unit 1 Soil Vapor Extraction Systems Operations, Maintenance, and Monitoring Manual, Omega Chemical Superfund Site, Whittier, California. December 31.

CDM Smith. 2019. Groundwater Containment System Operations, Maintenance and Monitoring Manual, Omega Chemical Superfund Site, Whittier, California. July 3.

City of Whittier, 2015. Whittier Boulevard Specific Plan, July.

De maximus, Inc. 2018. Interim Groundwater Containment Remedy, Quarterly Performance Evaluation Report, Second Quarter 2018, Omega Chemical Superfund Site, OU-1. August 15.

De maximus, Inc. 2018. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Third Quarter 2018, Omega Chemical Superfund Site, OU-1. November 15.

De maximus, Inc. 2019. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Fourth Quarter 2018, Omega Chemical Superfund Site, OU-1. February 15.

De maximus, Inc. 2019. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, First Quarter 2019, Omega Chemical Superfund Site, OU-1. May 15.

De maximus, Inc. 2019. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Second Quarter 2019, Omega Chemical Superfund Site, OU-1. August 15.

De maximus, Inc. 2019. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Third Quarter 2019, Omega Chemical Superfund Site, OU-1. November 15.

De maximus, Inc. 2020. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Fourth Quarter 2019, Omega Chemical Superfund Site, OU-1. February 15.

De maximus, Inc. 2020. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, First Quarter 2020, Omega Chemical Superfund Site, OU-1. May 15.

De maximus, Inc. 2020. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Second Quarter 2020, Omega Chemical Superfund Site, OU-1. August 15.

De maximus, Inc. 2020. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Third Quarter 2020, Omega Chemical Superfund Site, OU-1. November 15.

De maximus, Inc. 2021. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Fourth Quarter 2020, Omega Chemical Superfund Site, OU-1. February 15.

De maximus, Inc. 2021. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, First Quarter 2021, Omega Chemical Superfund Site, OU-1. May 15.

De maximus, Inc. 2021. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Second Quarter 2021, Omega Chemical Superfund Site, OU-1. August 15.

De maximus, Inc. 2021. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Third Quarter 2021, Omega Chemical Superfund Site, OU-1. November 15.

De maximus, Inc. 2022. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Fourth Quarter 2021, Omega Chemical Superfund Site, OU-1. February 15.

De maximus, Inc. 2018. Quarterly Performance Evaluation Report, First Quarter 2018, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. May 15.

De maximus, Inc. 2018. Quarterly Performance Evaluation Report, Second Quarter 2018, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. August 15.

De maximus, Inc. 2018. Quarterly Performance Evaluation Report, Third Quarter 2018, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. November 15.

De maximus, Inc. 2019. Quarterly Performance Evaluation Report, Fourth Quarter 2018, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. February 15.

De maximus, Inc. 2019. Quarterly Performance Evaluation Report, First Quarter 2019, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. May 15.

De maximus, Inc. 2019. Quarterly Performance Evaluation Report, Second Quarter 2019, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. August 15.

De maximus, Inc. 2020. Quarterly Performance Evaluation Report, Fourth Quarter 2019, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. February 10.

De maximus, Inc. 2020. Quarterly Performance Evaluation Report, First Quarter 2020, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. May 15.

De maximus, Inc. 2020. Quarterly Performance Evaluation Report, Second Quarter 2020, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. August 14.

De maximus, Inc. 2020. Quarterly Performance Evaluation Report, Third Quarter 2020, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. November 17.

De maximus, Inc. 2021. Quarterly Performance Evaluation Report, Fourth Quarter 2020, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. February 16.

De maximus, Inc. 2021. Quarterly Performance Evaluation Report, First Quarter 2021, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. May 17.

De maximus, Inc. 2021. Quarterly Performance Evaluation Report, Second Quarter 2021, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. August 16.

De maximus, Inc. 2021. Quarterly Performance Evaluation Report, Third Quarter 2021, Full Scale On-Site Soil Remedy, Omega Chemical Superfund Site, Operable Unit 1, Whittier, California. November 15.

De maximums, Inc. 2021. Interim Groundwater Containment Remedy, Annual Performance Evaluation Report, Third Quarter 2021, Omega Chemical Superfund Site, OU-1. November 15.

Engineering Analytics. 2022. OU1 Data Collection Program, Operable Unit 1 Report, Omega Chemical Corporation Superfund Site, Whittier California. April 22.

EPA (United States Environmental Protection Agency). 2005. Action Memorandum, Omega Chemical Superfund Site, Whittier, Los Angeles County, California. September 27.

EPA. 2006, Action Memorandum for Vapor Intrusion, Omega Chemical Superfund Site, Whittier, Los Angeles County, California, April 6.

EPA. 2008. Record of Decision, Operable Unit 1 (Soils), Omega Chemical Corporation Superfund Site, Whittier, California. September 30.

EPA. 2011. Interim Record of Decision, Omega Chemical Corporation Superfund Site, Operable Unit 2, Los Angeles County, California. September 20.

EPA. 2016. Explanation of Significant Differences, Omega Chemical Corporation Superfund Site, Operable Unit 2. June 10.

Hargis + Associates, Inc. 2019. Draft Pre-Design Investigation Evaluation Report, Northern Extraction and Central Extraction Areas, Operable Unit 2, Omega Chemical Corporation Superfund Site, Los Angeles County, California. June 11.

Moore, Toby. 2009. Email Communication. Production well data for the three wells owned by the Golden State Water Company. June 9, 2009.

Appendix B: Site Chronology

Event	Date
The Omega Chemical Corporation receives Notices of Violations from the Los Angeles County Department of Health	1984-1988
EPA conducts assessment of the Omega Chemical Corporation facility	1993
EPA conducts a second assessment of the Omega Chemical Corporation facility	January 19, 1995
EPA issues Unilateral Administrative Order to the owner of the Omega Chemical Corporation	May 9, 1995
Drum removal and subsurface soil and groundwater samples are collected from Omega Chemical facility	1995/1996
The Omega Chemical Corporation Site placed on the National Priorities List	January 1999
EPA begins investigations to determine extent of groundwater contamination	2001
An Engineering Evaluation/Cost Analysis was prepared for Source Area groundwater	2005
EPA issues an Action Memorandum for Source Area groundwater	September 27, 2005
EPA issues an Action Memorandum to address indoor air at the Skateland roller rink	April 2006
Skateland roller rink building is demolished	2006
A remedial investigation completed for Source Area soils	2007
A feasibility study completed for Source Area soil	2008
EPA issues a Record of Decision for Source Area soil	September 30, 2008
Source Area groundwater extraction and treatment system operational	July 24, 2009
EPA issues an Order on Consent for Source Area soils	2009
OPOG constructed an interim soil vapor extraction system	2010
The Remedial Investigation/Feasibility Study is completed for Downgradient Groundwater	2010
EPA issues a Proposed Plan for Downgradient Groundwater	2010
EPA issues an interim Record of Decision for Downgradient Groundwater	September 20, 2011
OPOG constructs an expansion to the interim soil vapor extraction system	2012
Full-scale operation of the soil vapor extraction system begins	2014
Pre-Design Investigation for Downgradient Groundwater completed	2019
The first Five-Year Review commences	2021

Appendix C: Data Review

Soil

Table C-1. 2021 Optimization Study Soil Results

Sample Location	Sample Date	Sample Top Depth (ft bgs)	Modifier	1,1,1-Trichloroethane (TCA)	1,1-Dichloroethene	1,2-Dichloroethane	Acetone	Benzene	Bromobenzene	Bromodichloromethane	Bromoform	Carbon disulfide	Dibromochloromethane	Ethylbenzene	Freon 11	Freon 113	m,p-Xylene	Methyl ethyl ketone	Methyl isobutyl ketone	Methylene chloride	Tetrachloroethene (PCE)	Toluene	Trichloroethene (TCE)
SB-2101	9/16/2021	5	N	<1.0	<1.0	<1.0	**19J**	**1**	<1.0	<1.0	<5.1	<10	<2.0	**0.23J**	<10	<10	<2.0	<20	<20	<10	<1.0	**0.87J**	<2.0
		15	N	<1.1	<1.1	<1.1	**21J**	**0.98J**	<1.1	<1.1	<5.5	<11	<2.2	<1.1	<11	<11	<2.2	<22	<22	<11	<1.1	<1.1	<2.2
		15	FD	<1.0	<1.0	<1.0	**28**	**0.87J**	<1.0	<1.0	<5.0	<10	<2.0	<1.0	<10	<10	<2.0	<20	<20	<10	<1.0	<1.0	<2.0
		25	N	<1.3	<1.3	<1.3	<25	**1.1J**	<1.3	<1.3	<6.3	<13	<2.5	<1.3	<13	<13	<2.5	<25	<25	<13	<1.3	<1.3	<2.5
		35	N	<0.91	<0.91	<0.91	**16J**	**1.9**	<0.91	<0.91	<4.5	<9.1	<1.8	<0.91	<9.1	<9.1	<1.8	<18	<18	<9.1	**0.35J**	**0.7J**	<1.8
		45	N	<0.91	<0.91	<0.91	**12J**	**1.7**	<0.91	<0.91	<4.6	<9.1	<1.8	<0.91	<9.1	<9.1	<1.8	<18	<18	<9.1	**0.63J**	**0.84J**	<1.8
		45	FD	<0.86	<0.86	<0.86	<17	**1.8**	<0.86	<0.86	<4.3	<8.6	<1.7	<0.86	<8.6	<8.6	<1.7	<17	<17	<8.6	**0.63J**	**0.7J**	<1.7
		60	N	<1.1	<1.1	<1.1	<22	**0.58J**	<1.1	<1.1	<5.5	<11	<2.2	**0.24J**	<11	<11	**0.93J**	<22	<22	<11	<1.1	**1.3**	<2.2
		65	N	<0.99	<0.99	<0.99	**12J**	<0.99	<0.99	<0.99	<5.0	<9.9	<2.0	<0.99	<9.9	<9.9	<2.0	<20	<20	<9.9	<0.99	<0.99	<2.0
		75	N	<0.74	<0.74	<0.74	<15	<0.74	<0.74	<0.74	<3.7	<7.4	<1.5	<0.74	<7.4	<7.4	<1.5	<15	<15	<7.4	<0.74	<0.74	<1.5
		85	N	<0.82	<0.82	<0.82	<16	<0.82	<0.82	<0.82	<4.1	<8.2	<1.6	<0.82	<8.2	<8.2	<1.6	<16	<16	<8.2	**0.39J**	<0.82	<1.6
SB-2102	9/14/2021	5	N	<1.2	<1.2	<1.2	**31**	**0.81J**	<1.2	<1.2	<6.0	<12	<2.4	<1.2	<12	<12	<2.4	<24	<24	<12	<1.2	<1.2	<2.4
		15	N	<0.89	<0.89	<0.89	<18	<0.89	<0.89	<0.89	<4.5	<8.9	<1.8	<0.89	<8.9	<8.9	<1.8	<18	<18	<8.9	**0.32J**	<0.89	<1.8
		15	FD	<1.1	<1.1	<1.1	<23	**0.43J**	<1.1	<1.1	<5.7	<11	<2.3	<1.1	<11	<11	<2.3	<23	<23	<11	**0.56J**	<1.1	<2.3
		25	N	<0.88	<0.88	<0.88	<18	**2.3**	<0.88	<0.88	<4.4	<8.8	<1.8	<0.88	<8.8	<8.8	<1.8	<18	<18	<8.8	**0.51J**	**1.2**	<1.8
		35	N	<0.98	<0.98	<0.98	<20	**1.3**	<0.98	<0.98	<4.9	<9.8	<2.0	<0.98	<9.8	<9.8	<2.0	<20	<20	<9.8	**0.86J**	<0.98	<2.0
		50	N	<0.84	<0.84	<0.84	<17	**2.2**	<0.84	<0.84	<4.2	<8.4	<1.7	<0.84	<8.4	<8.4	<1.7	<17	<17	<8.4	**0.91**	**0.99**	<1.7
		60	N	<0.92	<0.92	<0.92	**26**	**0.4J**	<0.92	<0.92	<4.6	<9.2	<1.8	<0.92	<9.2	<9.2	<1.8	<18	<18	<9.2	<0.92	<0.92	<1.8
		65	N	<1.3	<1.3	<1.3	<26	<1.3	<1.3	<1.3	<6.5	<13	<2.6	<1.3	<13	<13	<2.6	<26	<26	<13	<1.3	<1.3	<2.6
		80	N	<0.76	<0.76	<0.76	<15	**0.32J**	<0.76	<0.76	<3.8	<7.6	<1.5	<0.76	<7.6	<7.6	<1.5	<15	<15	<7.6	<0.76	<0.76	<1.5
		80	FD	<0.73	<0.73	<0.73	<15	**0.38J**	<0.73	<0.73	<3.7	<7.3	<1.5	<0.73	<7.3	<7.3	<1.5	<15	<15	<7.3	<0.73	<0.73	<1.5
		85	N	<0.86	<0.86	<0.86	<17	**0.38J**	<0.86	<0.86	<4.3	<8.6	<1.7	**0.38J**	<8.6	<8.6	<1.7	<17	<17	<8.6	<0.86	<0.86	<1.7
		95	N	<0.75	<0.75	<0.75	<15	**0.28J**	<0.75	<0.75	<3.8	<7.5	<1.5	<0.75	<7.5	<7.5	<1.5	<15	<15	<7.5	**1.4**	<0.75	**0.64J**
		105	N	<0.86	<0.86	<0.86	<17	**0.41J**	<0.86	<0.86	<4.3	<8.6	<1.7	<0.86	<8.6	**1.1J**	<1.7	<17	<17	<8.6	**1.9**	<0.86	<1.7
SB-2103	9/15/2021	5	N	<1.2	<1.2	<1.2	**26**	**0.93J**	<1.2	<1.2	<6.1	<12	<2.4	<1.2	<12	<12	<2.4	<24	<24	<12	**0.27J**	<1.2	<2.4
		15	N	<0.89	<0.89	<0.89	<18	**1.5**	<0.89	<0.89	<4.4	<8.9	<1.8	<0.89	<8.9	<8.9	<1.8	<18	<18	<8.9	**0.42J**	**0.57J**	<1.8
		25	N	<0.82	<0.82	<0.82	<16	**0.66J**	<0.82	<0.82	<4.1	<8.2	<1.6	<0.82	<8.2	<8.2	<1.6	<16	<16	<8.2	**0.22J**	<0.82	<1.6
		25	FD	<0.98	<0.98	<0.98	<20	**0.84J**	<0.98	<0.98	<4.9	<9.8	<2.0	<0.98	<9.8	<9.8	<2.0	<20	<20	<9.8	**0.52J**	<0.98	<2.0
		35	N	<1.1	<1.1	<1.1	<22	**0.75J**	<1.1	<1.1	<5.6	<11	<2.2	<1.1	<11	<11	<2.2	<22	<22	<11	**0.53J**	<1.1	<2.2
		45	N	<1.0	<1.0	<1.0	<20	**0.9J**	<1.0	<1.0	<5.1	<10	<2.0	<1.0	<10	<10	<2.0	<20	<20	<10	**1.1**	<1.0	<2.0
		55	N	<1.0	<1.0	<1.0	**24**	**0.61J**	<1.0	<1.0	<5.2	<10	<2.1	<1.0	<10	<10	<2.1	<21	<21	<10	**0.48J**	<1.0	<2.1
		65	N	<1.0	<1.0	<1.0	<21	<1.0	<1.0	<1.0	<5.1	<10	<2.1	<1.0	<10	<10	<2.1	<21	<21	<10	<1.0	<1.0	<2.1
		65	FD	<1.2	<1.2	<1.2	<23	<1.2	<1.2	<1.2	<5.9	<12	<2.3	<1.2	<12	<12	<2.3	<23	<23	<12	<1.2	<1.2	<2.3
		80	N	<0.94	<0.94	<0.94	**18J**	**0.25J**	<0.94	<0.94	<4.7	<9.4	<1.9	<0.94	<9.4	<9.4	<1.9	<19	<19	<9.4	<0.94	<0.94	<1.9
		85	N	<1.2	<1.2	<1.2	<24	<1.2	<1.2	<1.2	<5.9	<12	<2.4	<1.2	<12	<12	<2.4	<24	<24	<12	<1.2	<1.2	<2.4
SB-2104	8/3/2021	15	N	<1.0	<1.0	<1.0	<20	<1.0	<1.0	<1.0	<5.1	<10	<2.0	<1.0	<10	<10	<2.0	<20	<20	<10	**0.41J**	<1.0	<2.0
		19	N	<0.83	<0.83	<0.83	**8.2J**	**0.68J**	<0.83	<0.83	<4.1	<8.3	<1.7	<0.83	<8.3	<8.3	<1.7	<17	<17	<8.3	**0.37J**	<0.83	<1.7
		19	FD	<0.81	<0.81	<0.81	<16	**0.7J**	<0.81	<0.81	<4.1	<8.1	<1.6	<0.81	<8.1	<8.1	<1.6	<16	<16	<8.1	**0.59J**	<0.81	<1.6
SB-2104	8/3/2021	30	N	<0.91	<0.91	<0.91	**16J**	**0.48J**	<0.91	<0.91	<4.6	<9.1	<1.8	<0.91	<9.1	<9.1	<1.8	<18	<18	<9.1	**0.85J**	<0.91	<1.8
		35	N	<0.80	<0.80	<0.80	<16	**1.3**	<0.80	<0.80	<4.0	<8.0	<1.6	<0.80	<8.0	<8.0	<1.6	<16	<16	<8.0	**0.9**	**0.54J**	<1.6
		52	N	<0.91	<0.91	<0.91	**11J**	**0.53J**	<0.91	<0.91	<4.6	<9.1	<1.8	<0.91	<9.1	<9.1	<1.8	<18	<18	<9.1	**0.51J**	<0.91	<1.8
		52	FD	<1.1	<1.1	<1.1	**14J**	**0.42J**	<1.1	<1.1	<5.3	<11	<2.1	<1.1	<11	<11	<2.1	<21	<21	<11	**0.37J**	<1.1	<2.1
		60	N	<1.1	<1.1	<1.1	<21	<1.1	<1.1	<1.1	<5.3	<11	<2.1	<1.1	<11	<11	<2.1	<21	<21	<11	<1.1	<1.1	<2.1
		65	N	<0.75	<0.75	<0.75	<15	**0.27J**	<0.75	<0.75	<3.8	<7.5	<1.5	<0.75	<7.5	<7.5	<1.5	<15	<15	<7.5	**0.94**	<0.75	<1.5
		75	N	<1.0	<1.0	<1.0	**15J**	<1.0	<1.0	<1.0	<5.0	<10	<2.0	<1.0	<10	<10	<2.0	<20	<20	<10	<1.0	<1.0	<2.0
		85	N	<0.77	<0.77	<0.77	**9.1J**	<0.77	<0.77	<0.77	<3.9	<7.7	<1.5	<0.77	<7.7	<7.7	<1.5	<15	<15	<7.7	**2**	<0.77	<1.5

Sample Location	Sample Date	Sample Top Depth (ft bgs)	Modifier	1,1,1-Trichloroethane (TCA)	1,1-Dichloroethene	1,2-Dichloroethane	Acetone	Benzene	Bromobenzene	Bromodichloromethane	Bromoform	Carbon disulfide	Dibromochloromethane	Ethylbenzene	Freon 11	Freon 113	m,p-Xylene	Methyl ethyl ketone	Methyl isobutyl ketone	Methylene chloride	Tetrachloroethene (PCE)	Toluene	Trichloroethene (TCE)
SB-2105	9/8/2021	10	N	<1.5	<1.5	<1.5	**30**	**1.3J**	<1.5	<1.5	<7.4	<15	<3.0	<1.5	<15	<15	<3.0	<30	<30	<15	<1.5	<1.5	<3.0
		20	N	<0.83	<0.83	<0.83	<17	**1.8**	<0.83	<0.83	<4.2	<8.3	<1.7	<0.83	<8.3	<8.3	<1.7	<17	<17	<8.3	**0.23J**	**0.83**	<1.7
		30	N	<0.93	<0.93	<0.93	<19	**0.37J**	<0.93	<0.93	<4.7	<9.3	<1.9	<0.93	<9.3	<9.3	<1.9	<19	<19	<9.3	**0.49J**	<0.93	<1.9
		40	N	<0.80	<0.80	<0.80	**9.4J**	**1.3**	<0.80	<0.80	<4.0	<8.0	<1.6	<0.80	<8.0	<8.0	<1.6	<16	<16	<8.0	**0.76J**	<0.80	<1.6
		50	N	<0.85	<0.85	<0.85	<17	**0.69J**	<0.85	<0.85	<4.2	<8.5	<1.7	<0.85	<8.5	<8.5	<1.7	<17	<17	<8.5	**0.52J**	<0.85	<1.7
		50	FD	<1.0	<1.0	<1.0	<20	**1.1**	<1.0	<1.0	<5.0	<10	<2.0	<1.0	<10	<10	<2.0	<20	<20	<10	**1.1**	<1.0	<2.0
		55	N	<0.97	<0.97	<0.97	**26**	**0.37J**	<0.97	<0.97	<4.9	<9.7	<1.9	<0.97	<9.7	<9.7	<1.9	**5J**	<19	<9.7	**0.39J**	<0.97	<1.9
		65	N	<1.2	<1.2	<1.2	**35**	**0.42J**	<1.2	<1.2	<5.8	<12	<2.3	<1.2	<12	<12	<2.3	<23	<23	<12	**0.48J**	<1.2	<2.3
		65	FD	<0.96	<0.96	<0.96	**12J**	<0.96	<0.96	<0.96	<4.8	<9.6	<1.9	<0.96	<9.6	<9.6	<1.9	<19	<19	<9.6	**0.3J**	<0.96	<1.9
		75	N	<1.1	<1.1	<1.1	**14J**	<1.1	<1.1	<1.1	<5.4	<11	<2.2	<1.1	<11	<11	<2.2	<22	<22	<11	<1.1	<1.1	<2.2
		85	N	<0.81	<0.81	<0.81	**8.2J**	<0.81	<0.81	<0.81	<4.1	<8.1	<1.6	<0.81	<8.1	<8.1	<1.6	<16	<16	<8.1	**0.83**	<0.81	<1.6
SB-2106	9/9/2021	5	N	<0.81	<0.81	<0.81	**17**	**0.66J**	<0.81	<0.81	<4.0	<8.1	<1.6	<0.81	<8.1	<8.1	<1.6	**4J**	<16	<8.1	<0.81	<0.81	<1.6
		15	N	<0.97	<0.97	<0.97	**14J**	**0.25J**	<0.97	<0.97	<4.9	<9.7	<1.9	<0.97	<9.7	<9.7	<1.9	<19	<19	<9.7	**0.34J**	<0.97	<1.9
		25	N	<1.0	<1.0	<1.0	**10J**	**0.77J**	<1.0	<1.0	<5.0	<10	<2.0	<1.0	<10	<10	<2.0	<20	<20	<10	**0.41J**	<1.0	<2.0
		40	N	<0.96	<0.96	<0.96	**14J**	**1.1**	<0.96	<0.96	<4.8	<9.6	<1.9	<0.96	<9.6	<9.6	<1.9	<19	<19	<9.6	**1.2**	<0.96	<1.9
		50	N	<1.2	<1.2	<1.2	**14J**	**2**	<1.2	<1.2	<6.0	<12	<2.4	<1.2	<12	<12	<2.4	<24	<24	**21**	**3**	**0.81J**	<2.4
		60	N	<0.92	<0.92	<0.92	**25**	**1.3**	<0.92	<0.92	<4.6	<9.2	<1.8	<0.92	<9.2	<9.2	<1.8	**5.4J**	<18	**17**	**1.8**	**0.64J**	<1.8
		70	N	<1.3	<1.3	<1.3	**23J**	**0.67J**	<1.3	<1.3	<6.4	<13	<2.5	<1.3	<13	<13	<2.5	<25	<25	**28**	**2**	<1.3	<2.5
		70	FD	<1.3	**0.39J**	<1.3	**17J**	**1J**	<1.3	<1.3	<6.4	<13	<2.6	<1.3	<13	<13	<2.6	<26	<26	**42**	**3.4**	<1.3	<2.6
		80	N	<0.84	<0.84	<0.84	**16J**	**0.27J**	<0.84	<0.84	<4.2	<8.4	<1.7	<0.84	<8.4	<8.4	<1.7	<17	<17	<8.4	**0.46J**	<0.84	<1.7
		90	N	<0.95	<0.95	<0.95	<19	<0.95	<0.95	<0.95	<4.7	<9.5	<1.9	<0.95	<9.5	<9.5	<1.9	<19	<19	<9.5	**3.8**	<0.95	<1.9
		90	FD	<0.84	<0.84	<0.84	**9.7J**	**0.35J**	<0.84	<0.84	**1.8J**	<8.4	<1.7	<0.84	<8.4	<8.4	<1.7	<17	<17	<8.4	**5.3**	<0.84	<1.7
SB-2107	9/10/2021	5	N	<0.88	<0.88	<0.88	**24**	**0.48J**	<0.88	<0.88	<4.4	<8.8	<1.8	<0.88	<8.8	<8.8	**0.45J**	<18	<18	<8.8	**0.37J**	<0.88	<1.8
		15	N	<1.0	<1.0	<1.0	<20	**0.42J**	<1.0	<1.0	<5.0	<10	<2.0	<1.0	<10	<10	<2.0	<20	<20	<10	**0.99J**	<1.0	<2.0
		20	FD	<0.87	<0.87	<0.87	**11J**	**0.34J**	<0.87	<0.87	<4.3	<8.7	<1.7	<0.87	<8.7	<8.7	<1.7	<17	<17	<8.7	**0.69J**	<0.87	<1.7
		25	N	<0.79	<0.79	<0.79	<16	**0.49J**	<0.79	<0.79	<3.9	<7.9	<1.6	<0.79	<7.9	<7.9	<1.6	<16	<16	<7.9	**0.67J**	<0.79	<1.6
		35	N	<0.91	<0.91	<0.91	<18	**1.5**	<0.91	<0.91	<4.6	<9.1	<1.8	<0.91	<9.1	<9.1	<1.8	<18	<18	<9.1	**2.2**	<0.91	<1.8
		45	N	<0.87	<0.87	<0.87	**11J**	**1.5**	<0.87	<0.87	<4.3	<8.7	<1.7	<0.87	<8.7	<8.7	<1.7	<17	<17	**3.7J**	**2**	<0.87	<1.7
		55	N	<1.0	<1.0	<1.0	**18J**	**5.5**	<1.0	<1.0	<5.0	<10	<2.0	<1.0	<10	<10	<2.0	**7.4J**	<20	**24**	**4.6**	**2.1**	<2.0
		62	N	<0.92	<0.92	**0.32J**	**22**	**2.8**	<0.92	<0.92	<4.6	<9.2	<1.8	<0.92	<9.2	<9.2	<1.8	**5.5J**	<18	**46**	**4.3**	**1.1**	<1.8
SB-2107	9/10/2021	62	FD	<0.92	<0.92	<0.92	**22**	**3.2**	<0.92	<0.92	<4.6	<9.2	<1.8	<0.92	<9.2	<9.2	<1.8	**5.8J**	<18	**22**	**2.8**	**1.6**	<1.8
		75	N	<0.85	<0.85	<0.85	**13J**	**0.48J**	<0.85	<0.85	<4.3	<8.5	<1.7	<0.85	<8.5	<8.5	<1.7	<17	<17	**17**	**2.2**	<0.85	<1.7
		85	N	<0.93	<0.93	<0.93	<19	<0.93	<0.93	<0.93	**4.8**	<9.3	<1.9	<0.93	<9.3	<9.3	<1.9	<19	<19	<9.3	**2.8**	<0.93	<1.9
	9/13/2021	96	N	<0.91	<0.91	<0.91	<18	**0.37J**	<0.91	<0.91	<4.5	<9.1	<1.8	<0.91	<9.1	**3.9J**	<1.8	<18	<18	<9.1	**15**	<0.91	<1.8
		105	N	<0.75	<0.75	<0.75	<15	**2.5**	<0.75	<0.75	<3.7	<7.5	<1.5	<0.75	**1.6J**	**3.1J**	<1.5	<15	<15	<7.5	<0.75	**0.98**	<1.5

Sample Location	Sample Date	Sample Top Depth (ft bgs)	Modifier	1,1,1-Trichloroethane (TCA)	1,1-Dichloroethene	1,2-Dichloroethane	Acetone	Benzene	Bromobenzene	Bromodichloromethane	Bromoform	Carbon disulfide	Dibromochloromethane	Ethylbenzene	Freon 11	Freon 113	m,p-Xylene	Methyl ethyl ketone	Methyl isobutyl ketone	Methylene chloride	Tetrachloroethene (PCE)	Toluene	Trichloroethene (TCE)
SB-2108	8/19/2021	5	N	<1.0	<1.0	<1.0	**30**	**0.41J**	<1.0	<1.0	<5.1	<10	<2.0	<1.0	<10	<10	<2.0	**5J**	<20	<10	**0.99J**	<1.0	<2.0
		15	N	<0.86	<0.86	<0.86	<17	**0.35J**	<0.86	<0.86	<4.3	<8.6	<1.7	<0.86	<8.6	<8.6	<1.7	<17	<17	<8.6	**6.9**	<0.86	<1.7
		25	N	<0.90	<0.90	<0.90	<18	**0.67J**	<0.90	<0.90	<4.5	<9.0	<1.8	<0.90	<9.0	<9.0	<1.8	<18	<18	<9.0	**47**	<0.90	<1.8
		35	N	<0.90	<0.90	<0.90	**8.8J**	**1.7**	<0.90	<0.90	**2J**	<9.0	<1.8	<0.90	<9.0	<9.0	<1.8	<18	<18	<9.0	**18**	**0.55J**	**0.35J**
		42	N	<0.80	<0.80	<0.80	<16	**2.5**	<0.80	**0.23J**	**170E**	**0.5J**	**1.4J**	<0.80	<8.0	<8.0	<1.6	<16	<16	**2.8J**	**8.3**	<0.80	<1.6
		42	FD	<0.67	<0.67	<0.67	<13	**0.54J**	<0.67	<0.67	**160E**	<6.7	**1.1J**	<0.67	<6.7	<6.7	<1.3	<13	<13	<6.7	**1.2**	<0.67	<1.3
		50	N	<0.92	<0.92	<0.92	**9.5J**	**0.49J**	<0.92	<0.92	**5.1**	<9.2	<1.8	<0.92	<9.2	<9.2	<1.8	<18	<18	**4.8J**	**2.5**	<0.92	<1.8
		61	N	<0.81	<0.81	<0.81	**13J**	**1.3**	<0.81	<0.81	<4.1	<8.1	<1.6	<0.81	<8.1	<8.1	<1.6	**4.2J**	<16	**12**	**2.9**	**0.79J**	<1.6
		75	N	<0.86	<0.86	<0.86	<17	<0.86	**0.4J**	<0.86	**250E**	<8.6	**1.7**	<0.86	<8.6	<8.6	<1.7	<17	<17	<8.6	**1.2**	<0.86	<1.7
		84	N	<0.83	<0.83	<0.83	<17	<0.83	<0.83	<0.83	**44**	<8.3	<1.7	<0.83	<8.3	<8.3	<1.7	<17	<17	<8.3	**0.9**	<0.83	<1.7
		84	FD	<0.83	<0.83	<0.83	<17	<0.83	<0.83	<0.83	**140**	<8.3	**1.1J**	<0.83	<8.3	<8.3	<1.7	<17	<17	<8.3	**0.92**	<0.83	<1.7
SB-2109	8/18/2021	10	N	**0.28J**	<0.79	<0.79	**16**	**0.83**	<0.79	<0.79	<3.9	<7.9	<1.6	**0.16J**	<7.9	<7.9	<1.6	<16	<16	<7.9	**13**	**0.65J**	<1.6
		15	N	<0.73	<0.73	**0.39J**	**15**	**0.85**	<0.73	<0.73	<3.6	<7.3	<1.5	<0.73	<7.3	<7.3	<1.5	<15	<15	**3.3J**	**7.3**	<0.73	<1.5
		30	N	**0.65J**	<0.91	<0.91	**17J**	**2.1**	<0.91	<0.91	<4.5	<9.1	<1.8	<0.91	<9.1	<9.1	<1.8	<18	<18	<9.1	**16**	**0.91**	<1.8
		30	FD	**0.58J**	<0.77	**0.29J**	**9.2J**	**0.91**	<0.77	<0.77	<3.8	<7.7	<1.5	<0.77	<7.7	<7.7	<1.5	<15	<15	<7.7	**16**	<0.77	<1.5
		40	N	**0.26J**	<0.79	**0.51J**	**12J**	**1.7**	<0.79	<0.79	**3.8J**	<7.9	<1.6	<0.79	<7.9	<7.9	<1.6	<16	<16	**3.6J**	**5**	**0.76J**	<1.6
		45	N	<0.94	<0.94	**0.49J**	**16J**	**2**	<0.94	<0.94	**4.6J**	<9.4	<1.9	<0.94	<9.4	<9.4	<1.9	<19	<19	**9.8**	**4.2**	**0.95**	<1.9
		55	N	**0.39J**	<0.76	**0.64J**	**13J**	**2.7**	<0.76	<0.76	<3.8	<7.6	<1.5	<0.76	<7.6	<7.6	**0.45J**	<15	<15	**25**	**7.1**	**1.1**	<1.5
		65	N	<0.81	<0.81	**0.5J**	**31**	**2.9**	<0.81	<0.81	<4.0	<8.1	<1.6	**0.19J**	<8.1	<8.1	**0.56J**	**5.4J**	<16	**24**	**4.4**	**1.5**	<1.6
		80	N	<0.77	<0.77	<0.77	<15	<0.77	<0.77	**0.21J**	**220E**	**0.65J**	**1.8**	<0.77	<7.7	<7.7	<1.5	<15	<15	<7.7	**0.86**	<0.77	<1.5
		90	N	<0.82	<0.82	<0.82	<16	**0.25J**	<0.82	**0.44J**	**240E**	**0.52J**	**2.6**	<0.82	<8.2	<8.2	<1.6	<16	<16	<8.2	**1.4**	<0.82	<1.6
SB-2110	8/17/2021	10	N	<0.85	<0.85	<0.85	**31**	**1.1**	<0.85	<0.85	<4.3	<8.5	<1.7	**0.21J**	<8.5	<8.5	<1.7	**4.8J**	**2.8J**	<8.5	**1.1**	**0.79J**	<1.7
		15	N	<0.86	<0.86	<0.86	**17**	**0.96**	**0.19J**	<0.86	**110**	<8.6	**1J**	<0.86	<8.6	<8.6	<1.7	<17	<17	<8.6	**1.8**	<0.86	<1.7
		25	N	<0.83	<0.83	<0.83	<17	**1.6**	<0.83	<0.83	**170E**	**0.43J**	**2.2**	<0.83	<8.3	<8.3	<1.7	<17	<17	<8.3	**2.7**	<0.83	<1.7
		35	N	<0.93	<0.93	<0.93	<19	**0.46J**	<0.93	<0.93	**56**	<9.3	<1.9	<0.93	<9.3	<9.3	<1.9	<19	<19	<9.3	**3.9**	<0.93	<1.9
		40	N	<0.81	<0.81	<0.81	<16	**0.98**	<0.81	<0.81	**4**	<8.1	<1.6	<0.81	<8.1	<8.1	<1.6	<16	<16	**3.2J**	**2.1**	<0.81	<1.6
		50	N	<0.83	<0.83	<0.83	<17	**1.8**	<0.83	<0.83	**38**	<8.3	**0.53J**	<0.83	<8.3	<8.3	<1.7	<17	<17	**9.5**	**3.9**	**0.77J**	<1.7
		55	N	<0.96	<0.96	<0.96	**9.4J**	**1.5**	<0.96	<0.96	<4.8	<9.6	<1.9	<0.96	<9.6	<9.6	<1.9	<19	<19	**17**	**2.2**	**0.64J**	<1.9
		55	FD	<1.2	<1.2	**2.5**	**12J**	**1.6**	<1.2	<1.2	<5.8	<12	<2.3	<1.2	<12	<12	<2.3	<23	<23	**22**	**3**	<1.2	<2.3
		80	N	<0.80	<0.80	**0.4J**	**8.5J**	**0.22J**	<0.80	<0.80	<4.0	<8.0	<1.6	<0.80	<8.0	<8.0	<1.6	<16	<16	<8.0	**0.79J**	<0.80	<1.6
		80	FD	<0.87	<0.87	**0.5J**	**17**	<0.87	<0.87	<0.87	<4.4	<8.7	<1.7	<0.87	**0.27J**	<8.7	<1.7	<17	<17	<8.7	**0.75J**	<0.87	<1.7
		90	N	<1.1	<1.1	<1.1	<23	**0.6J**	<1.1	<1.1	<5.7	<11	<2.3	<1.1	<11	<11	<2.3	<23	<23	<11	**0.58J**	<1.1	<2.3

Sample Location	Sample Date	Sample Top Depth (ft bgs)	Modifier	1,1,1-Trichloroethane (TCA)	1,1-Dichloroethene	1,2-Dichloroethane	Acetone	Benzene	Bromobenzene	Bromodichloromethane	Bromoform	Carbon disulfide	Dibromochloromethane	Ethylbenzene	Freon 11	Freon 113	m,p-Xylene	Methyl ethyl ketone	Methyl isobutyl ketone	Methylene chloride	Tetrachloroethene (PCE)	Toluene	Trichloroethene (TCE)
SB-2111	8/2/2021	10	N	<0.76	<0.76	<0.76	**13J**	**0.44J**	<0.76	<0.76	<3.8	<7.6	<1.5	<0.76	<7.6	<7.6	<1.5	<15	<15	<7.6	<0.76	<0.76	<1.5
SB-2111	8/2/2021	20	N	<0.75	<0.75	<0.75	<15	**1.2**	<0.75	<0.75	<3.8	<7.5	<1.5	<0.75	<7.5	<7.5	**0.61J**	<15	<15	<7.5	**0.2J**	**0.74J**	<1.5
		25	N	<0.73	<0.73	<0.73	**12J**	**0.35J**	<0.73	<0.73	<3.6	<7.3	<1.5	<0.73	<7.3	<7.3	<1.5	<15	<15	<7.3	**0.19J**	<0.73	<1.5
		40	N	<0.65	<0.65	<0.65	<13	**0.46J**	<0.65	<0.65	<3.3	<6.5	<1.3	<0.65	<6.5	<6.5	**0.38J**	<13	<13	<6.5	**0.38J**	<0.65	<1.3
		50	N	<0.88	<0.88	<0.88	**9.4J**	**0.61J**	<0.88	<0.88	<4.4	<8.8	<1.8	<0.88	<8.8	<8.8	**0.51J**	<18	<18	**3J**	**0.93**	<0.88	<1.8
		60	N	<0.75	<0.75	<0.75	**20**	**0.33J**	<0.75	<0.75	<3.8	<7.5	<1.5	<0.75	<7.5	<7.5	**0.43J**	<15	<15	<7.5	**0.63J**	<0.75	<1.5
		60	FD	<0.80	<0.80	<0.80	**25**	**0.49J**	<0.80	<0.80	<4.0	<8.0	<1.6	<0.80	<8.0	<8.0	<1.6	<16	<16	**2.7J**	**1.2**	<0.80	<1.6
		70	N	<0.82	<0.82	<0.82	**18**	**1.5**	<0.82	<0.82	**1.6J**	<8.2	<1.6	<0.82	<8.2	<8.2	<1.6	<16	<16	<8.2	**2.3**	**0.58J**	<1.6
		75	N	<0.71	<0.71	<0.71	**16**	**0.29J**	<0.71	<0.71	<3.5	<7.1	<1.4	<0.71	<7.1	<7.1	<1.4	<14	<14	<7.1	**0.75**	<0.71	<1.4
		90	N	<0.74	<0.74	<0.74	**15**	**0.37J**	<0.74	<0.74	<3.7	<7.4	<1.5	<0.74	<7.4	<7.4	<1.5	<15	<15	<7.4	**0.72J**	<0.74	**0.37J**

Notes:

All results reported in micrograms per kilogram
Modifiers: N = Original Sample; FD = Field Duplicate Sample
ft bgs = feet below ground surface
J = Estimated value
NS = Not specified for soil matrix in OU-1 ROD

Groundwater

Operable Unit 1

USACE performed Mann-Kendall groundwater concentration trend analysis on OU1 wells that resulted in sufficient detections of contaminants of concern for the five-year review period and the long-term trends. Mann-Kendall trend evaluations are presented in figures C-3 through C-9.

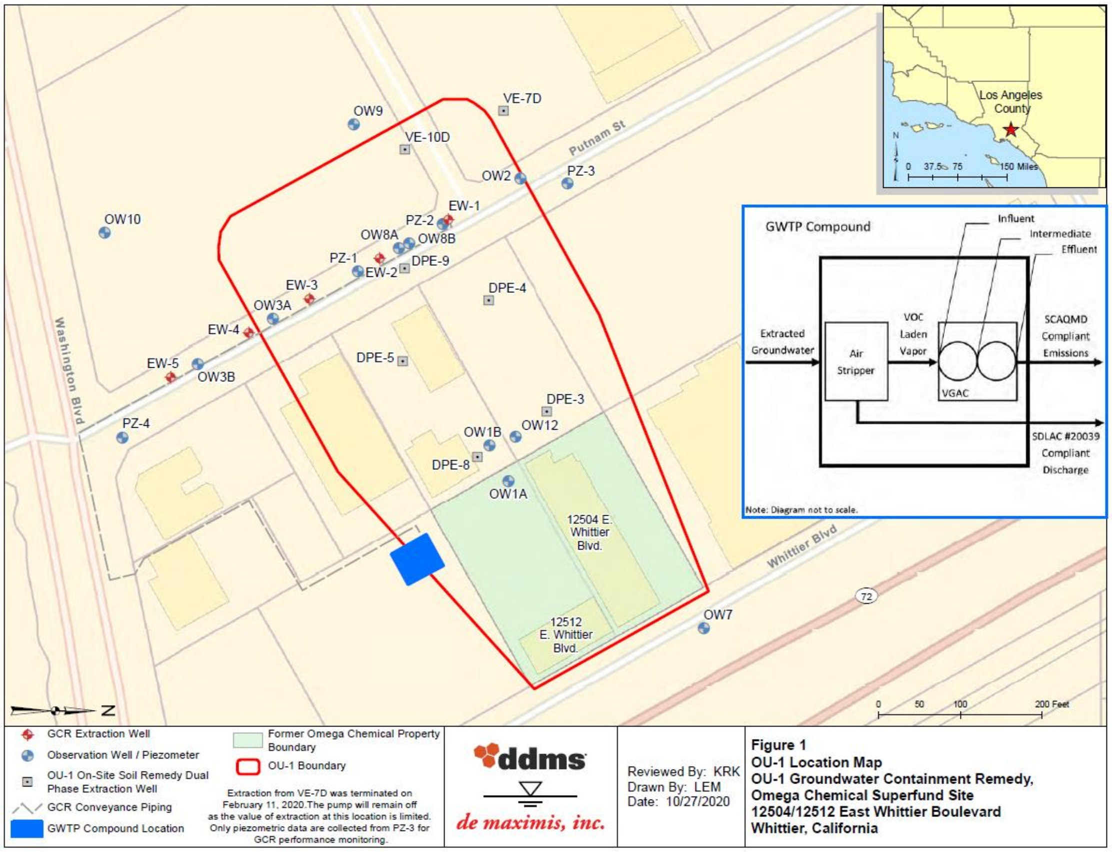


Figure C-1. Source Area Well Locations

Figure C-2. Additional Source Well Locations

Groundwater concentration trends for the on-site wells showed Stable to Decreasing trends for all COCs analyzed. Several wells could not be assessed for trend analysis due to all concentrations being below detectable limits. The overall trend analysis for groundwater shows that the remedy is successfully meeting the Remedial Action Objectives.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	26-May-22
Facility Name:	Omega Chemical OU1
Conducted By:	USACE
Job ID:	Omega Chemical Five Year Review
Constituent:	PCE
Concentration Units:	µg/L

Sampling Point ID:		OW-3B	OW-9	OW-10	OW-11	OW-12	OW-13B	PZ-9
Sampling Event	Sampling Date	PCE CONCENTRATION (µg/L)						
1	13-Feb-18	9.7	5000	15	220	2700	15	900
2	22-Aug-18	9.2	4000	19	220	2400	25	1300
3	11-Feb-19	7.8	4700	19	210	5600	21	410
4	16-Aug-19	8.9	4200 J+	22 J+	160	2500	21	230
5	20-Jan-20	12	4000	19	200	1500	23	290
6	14-Jul-20	12	2500	15	190	360	19	140
7	11-Jan-21	8.9	1500	12	170	220	20	100
8	16-Jul-21	12	1800	12	150	340	21	58
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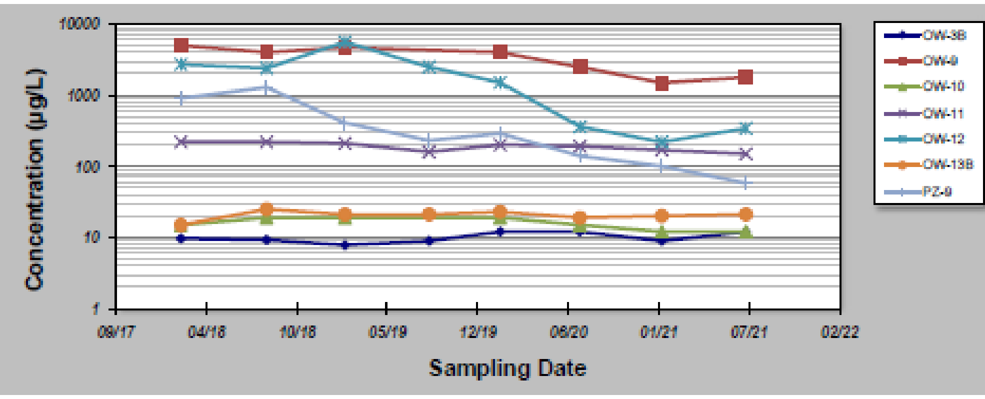
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.55	0.60	0.79	0.55	1.14	0.54	1.44
Mann-Kendall Statistic (S):		-11	-23	-42	-38	-37	-16	-58
Confidence Factor:		81.0%	99.9%	>99.9%	>99.9%	>99.9%	90.7%	>99.9%
Concentration Trend:		Stable	Decreasing	Decreasing	Decreasing	Decreasing	Prob. Decreasing	Decreasing



Notes:

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

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Figure C-3. Mann-Kendall Groundwater Concentration Trend Analysis for PCE

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	26-May-22	Job ID:	Omega Chemical Five Year Review
Facility Name:	Omega Chemical OU1	Constituent:	TCE
Conducted By:	USACE	Concentration Units:	µg/L

Sampling Event	Sampling Date	OW-3B	OW-9	OW-10	OW-11	OW-12	OW-13B	PZ-9
		TCE CONCENTRATION (µg/L)						
1	13-Feb-18	1.0 U	220	1.1	40	830	1.0 U	99
2	22-Aug-18	1.0 U	200	1.4	41	540	1.0 U	96
3	11-Feb-19	1.0 U	240	1.3	43	1000	1.0 U	41
4	16-Aug-19	1.0 U	220 J+	1.6 J+	37 J-	260	1.0 U	19
5	20-Jan-20	1.0 U	150	2	33	150	1.0 U	21
6	14-Jul-20	1.0 U	140	1.1	36	77	1.0 U	14
7	11-Jan-21	1.0 U	93	0.82 J	36	57	1.0 U	9.5
8	16-Jul-21	0.50 U	84	0.81	37	21	0.50 U	6.3
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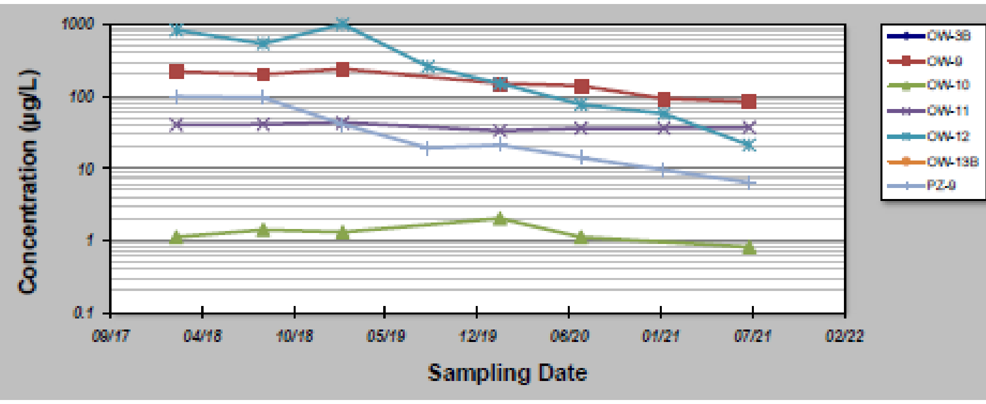
20								
Coefficient of Variation:			0.38	0.31	0.09	1.03		1.00
Mann-Kendall Statistic (S):			-17	-4	-4	-24		-26
Confidence Factor:			99.5%	70.3%	66.7%	99.9%		100.0%
Concentration Trend:			Decreasing	Stable	Stable	Decreasing		Decreasing



Notes:

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

Figure C-4. Mann-Kendall Groundwater Concentration Trend Analysis for Trichloroethylene

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	26-May-22	Job ID:	Omega Chemical Five Year Review
Facility Name:	Omega Chemical OU1	Constituent:	1,1-DCE
Conducted By:	USACE	Concentration Units:	µg/L

Sampling Event	Sampling Date	OW-3B	OW-9	OW-10	OW-11	OW-12	OW-13B	PZ-9
		1,1-DCE CONCENTRATION (µg/L)						
1	13-Feb-18	1.0 U	330	8.3	31	430	1.0 U	150
2	22-Aug-18	1.0 U	310	11	39	210	1.0 U	220
3	11-Feb-19	1.0 U	410	13	27	340	1.0 U	78
4	16-Aug-19	1.0 U	280 J+	16	27 J	85	1.0 U	31
5	20-Jan-20	1.0 U	210	13	34	51	1.0 U	37
6	14-Jul-20	1.0 U	220	5.2 J	36	24	1.0 U	21
7	11-Jan-21	1.0 U	140	4.6	24 J	12	1.0 UJ	15
8	16-Jul-21	0.50 U	94	1	22	6.3	0.50 U	6.3
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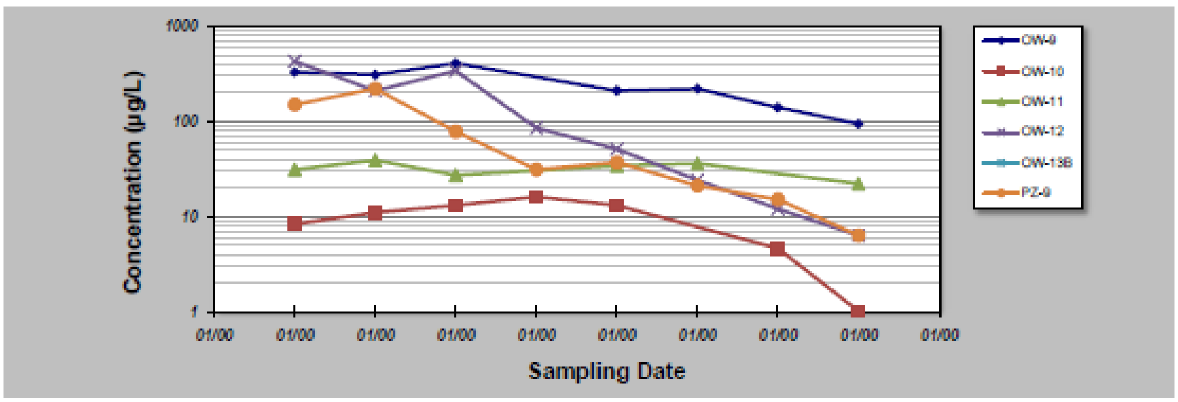
20								
Coefficient of Variation:			0.45	0.55	0.20	1.13		1.10
Mann-Kendall Statistic (S):			-15	-4	-3	-26		-24
Confidence Factor:			98.5%	66.7%	64.0%	100.0%		99.9%
Concentration Trend:			Decreasing	Stable	Stable	Decreasing		Decreasing



Notes:

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

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Figure C-5. Mann-Kendall Groundwater Concentration Trend Analysis for 1,1-DCE

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 26-May-22
Facility Name: Omega Chemical OU1
Conducted By: USACE

Job ID: Omega Chemical Five Year Review
Constituent: 1,2 DCA
Concentration Units: µg/L

Sampling Event	Sampling Date	OW-3B	OW-9	OW-10	OW-11	OW-12	OW-13B	PZ-9
		1,2 DCA CONCENTRATION (µg/L)						
1	13-Feb-18	1.0 U	88	1.0 U	1.0 U	27	1.0 U	17
2	22-Aug-18	1.0 U	78	1.0 U	1.0 U	11	1.0 U	16
3	11-Feb-19	1.0 U	85	1.0 U	1.0 U	13 J	1.0 U	9.8
4	16-Aug-19	1.0 U	94 J+	1.0 U	1.0 UJ	10 U	1.0 U	7.8
5	20-Jan-20	1.0 U	61 J	1.0 U	1.0 U	25 U	1.0 U	8.2
6	14-Jul-20	1.0 U	60	1.0 U	1.0 U	1.3	1.0 U	5.6
7	11-Jan-21	1.0 U	47	1.0 U	1.0 U	1.1	1.0 U	3.5
8	16-Jul-21	0.50 U	31	0.50 U	0.50 U	0.24 J	0.50 U	2.1
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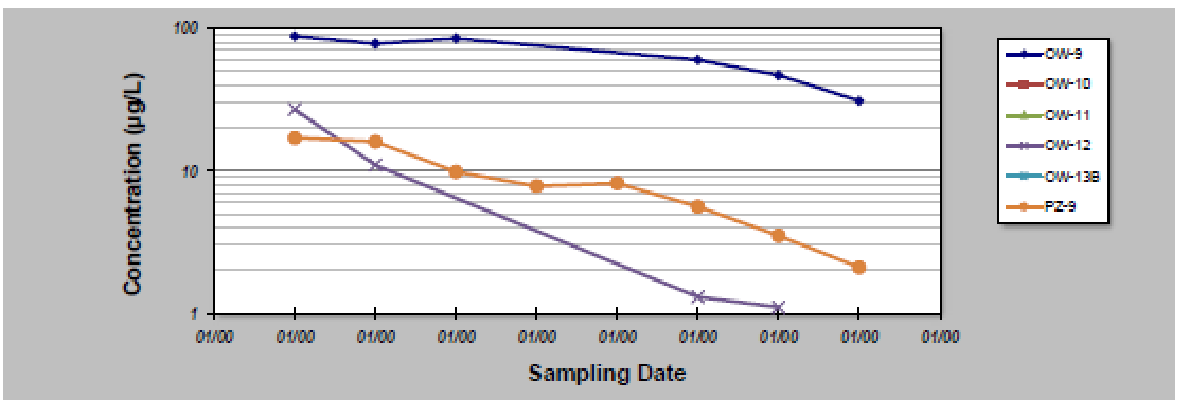
Coefficient of Variation:			0.35			1.21		0.62
Mann-Kendall Statistic (S):			-13			-6		-26
Confidence Factor:			99.2%			95.8%		100.0%
Concentration Trend:			Decreasing			Decreasing		Decreasing



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

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Figure C-6. Mann-Kendall Groundwater Concentration Trend Analysis for 1,2-DCA

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	26-May-22	Job ID:	Omega Chemical Five Year Review
Facility Name:	Omega Chemical OU1	Constituent:	1,4 Dioxane
Conducted By:	USACE	Concentration Units:	µg/L

Sampling Event	Sampling Date	OW-3B	OW-9	OW-10	OW-11	OW-12	OW-13B	PZ-9
	Sampling Point ID:	1,4 DIOXANE CONCENTRATION (µg/L)						
1	13-Feb-18	0.49 UJ	980 J-	0.49 UJ	0.49 UJ	9.2 J-	0.50 UJ	84 J
2	22-Aug-18	0.49 UJ	780 J-	0.12 J-	0.50 UJ	6.4 J-	0.49 UJ	140 J
3	11-Feb-19	0.49 UJ	620 J-	0.66 J-	0.49 UJ	8.7 J-	0.48 U	93 J-
4	16-Aug-19	0.50 UJ	480 J-	0.16 J-	0.53 UJ	5.0 J-	0.30 J-	240 J-
5	20-Jan-20	0.49 UJ	850 J-	0.20 UJ	0.49 UJ	3.2 J-	0.50 UJ	280 J-
6	14-Jul-20	0.48 UJ	620 J-	0.77 J	1.4 J-	2.9 J-	2.6 J-	270 J-
7	11-Jan-21	0.49 UJ	480 J-	0.54 J-	0.43 J-	1.6 J-	0.48 UJ	200 J-
8	16-Jul-21	0.10 UJ	400 J-	0.10 UJ	0.10 UJ	4.1 J	0.10 UJ	150 J-
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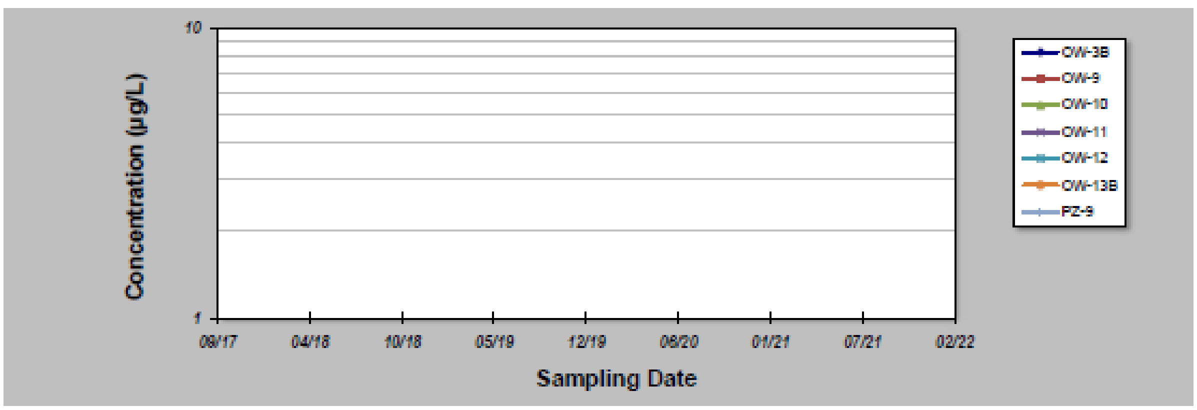
20								
Coefficient of Variation:								
Mann-Kendall Statistic (S):								
Confidence Factor:								
Concentration Trend:								



Notes:

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

Figure C-7. Mann-Kendall Groundwater Concentration Trend Analysis for 1,4-Dioxane

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	26-May-22	Job ID:	Omega Chemical Five Year Review
Facility Name:	Omega Chemical OU1	Constituent:	Freon 113
Conducted By:	USACE	Concentration Units:	µg/L

Sampling Event	Sampling Date	OW-3B	OW-9	OW-10	OW-11	OW-12	OW-13B	PZ-9
		FREON 113 CONCENTRATION (µg/L)						
1	13-Feb-18	5.0 U	130	2.9 J	54	1700	5.0 U	230
2	22-Aug-18	5.0 U	130	1.6 J	57	1900	5.0 U	510
3	11-Feb-19	5.0 U	180	3.5 J	46	3900	5.0 U	140
4	16-Aug-19	5.0 U	230 J+	7.1 J+	30 J	1600	5.0 U	45
5	20-Jan-20	0.67 J	140 J	7.2	50	1300	5.0 U	53
6	14-Jul-20	5.0 U	110	5.2	57	190	5.0 U	28
7	11-Jan-21	5.0 U	60	1.4 J	38 J+	66	5.0 U	27
8	16-Jul-21	0.50 U	81	1.9	30	400	0.50 U	16
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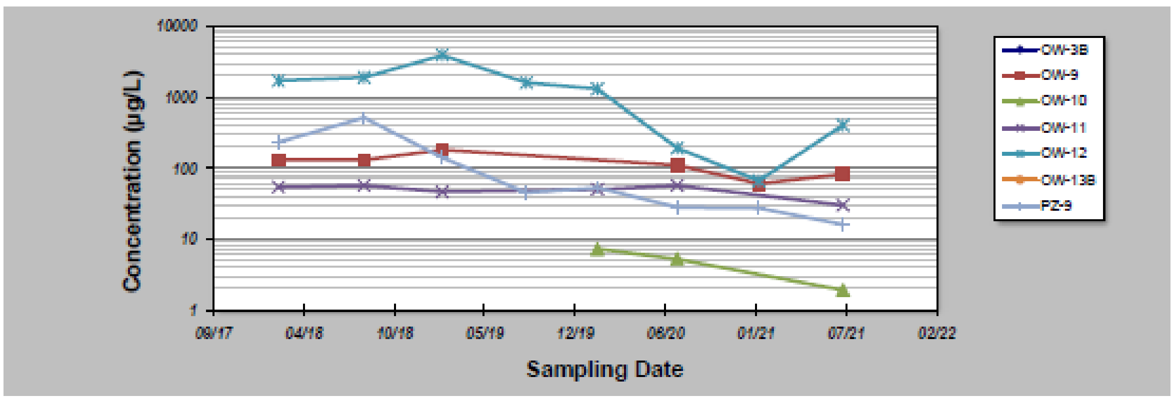
20								
Coefficient of Variation:			0.37	0.56	0.21	0.90		1.29
Mann-Kendall Statistic (S):			-8	-3	-4	-18		-24
Confidence Factor:			89.8%		70.3%	98.4%		99.9%
Concentration Trend:			Stable		Stable	Decreasing		Decreasing



Notes:

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

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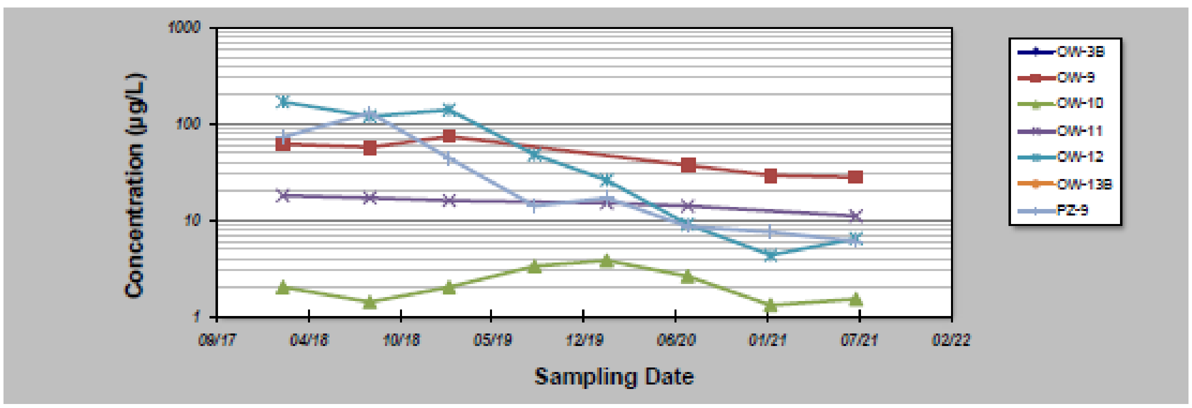
Figure C-8. Mann-Kendall Groundwater Concentration Trend Analysis for Freon 113

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 26-May-22
Facility Name: Omega Chemical OU1
Conducted By: USACE
Job ID: Omega Chemical Five Year Review
Constituent: Freon 11
Concentration Units: µg/L

Sampling Event	Sampling Date	OW-3B	OW-9	OW-10	OW-11	OW-12	OW-13B	PZ-9
		FREON 11 CONCENTRATION (µg/L)						
1	13-Feb-18	1.0 U	62	2	18	170	1.0 U	73
2	22-Aug-18	1.0 U	57	1.4	17	120	1.0 U	130
3	11-Feb-19	1.0 U	74	2	16	140	1.0 U	44
4	16-Aug-19	1.0 U	100 J+	3.3	8.6 J+	48	1.0 U	14
5	20-Jan-20	1.0 U	53 J	3.8	15	26	1.0 U	17
6	14-Jul-20	1.0 U	37	2.6	14	9	1.0 U	8.6
7	11-Jan-21	1.0 U	29	1.3	11 J+	4.3	1.0 U	7.5
8	16-Jul-21	0.50 U	28	1.5	11	6.4	0.50 U	6
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:			0.40	0.41	0.16	1.03		1.17
Mann-Kendall Statistic (S):			-11	-1	-15	-24		-24
Confidence Factor:			97.2%	50.0%	99.9%	99.9%		99.9%
Concentration Trend:			Decreasing	Stable	Decreasing	Decreasing		Decreasing



Notes:

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

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Figure C-9. Mann-Kendall Groundwater Concentration Trend Analysis for Freon 11

Operable Unit 2

The locations of ten of the twelve known production wells are shown in Figure C-10. The approximate locations of the remaining two production wells could not be determined after searching the California Water Board GAMA Groundwater Information System database. The five wells that were identified with screens beginning at or near 200 feet bgs have historically been impacted by volatile organic compounds. The five that have reported historical volatile organic compound concentrations in groundwater are currently equipped with wellhead treatment systems to address the volatile organic compound impacts and therefore do not present an exposure risk to human health.

Table C-1. Production Well Details

Well ID	Well Owner	Screen Interval (feet bgs)	Hydraulic Unit	Pumping Rate (gallons per minute)
02S11W30-R30/SFS No. 1	City of Santa Fe Springs	200-288 300-9000	Gaspur Lakewood	900
3S/11W-07E01S/GSWC Pioneer #1	Golden State Water Company	193-216	Alluvium	540
3S/11W-07E02S/GSWC Pioneer #2	Golden State Water Company	196-206 460-472	Alluvium Lakewood	388
3S/12W-12A02S/GSWC Pioneer #3	Golden State Water Company	194-218	Alluvium	520
3S/11W-18G05S/GSWC Dace #1	Golden State Water Company	200-260 266-402	Gaspur Alluvium/Lakewood	310

The Downgradient Groundwater monitoring well network consists of the following wells:

- MW1 through MW32, installed by EPA as part of Downgradient Groundwater investigations between 2002 and 2012;
- The Koontz and Hawkins wells, installed by the WRD in 2014;
- 55 monitoring wells installed as part of the LEI and PDI programs; and
- Four monitoring wells installed by OPOG in 2001 at EPA's request in conjunction with early OU1 work: OW4A, OW4B, OW5, and OW6.

The network monitoring well locations that are part of the Downgradient Groundwater data review are shown in Figure C-11.

USACE performed Mann-Kendall groundwater concentration trend analysis on Downgradient Groundwater wells along the Downgradient Groundwater boundary that resulted in sufficient detections of contaminants of concern for the five-year review period and the long-term trends. Mann-Kendall trend evaluations are presented in Table C-2.

The results of the trend analysis show largely stable to decreasing trends. The trend shown in monitoring well MW-31 showed a Probably Increasing trend for Trichloroethylene. Monitoring Well MW-31 is located upgradient from the source area and not in proximity to any production wells. could be an indication of an off-site source. The increasing trend in groundwater concentrations in MW-31 are not expected to impact exposure to human health as any potential migrating contaminants will be mitigated by the onsite systems before reaching any production wells.

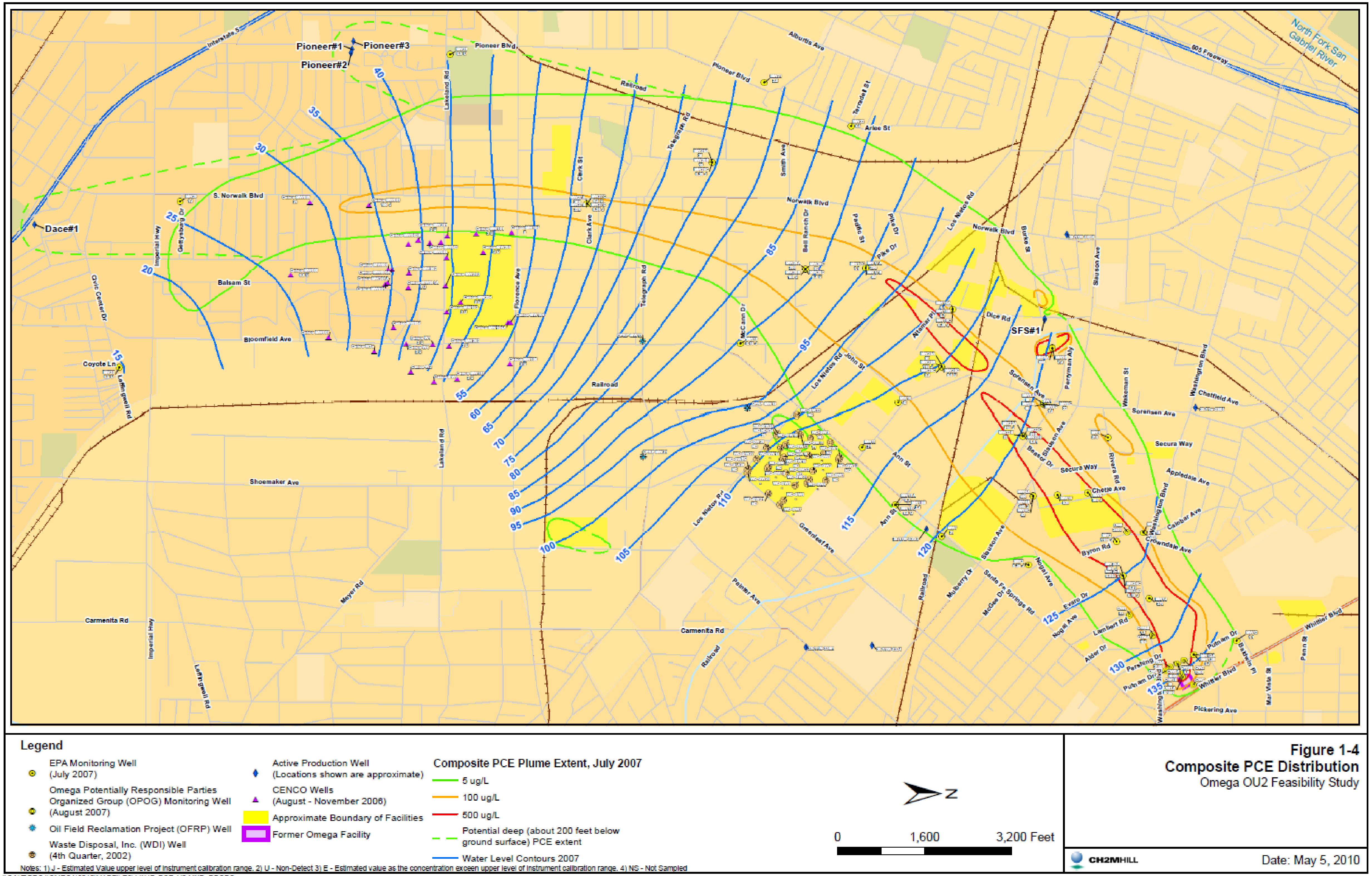


Figure C-10. Production Well Location and Groundwater Elevation, Operable Unit 2

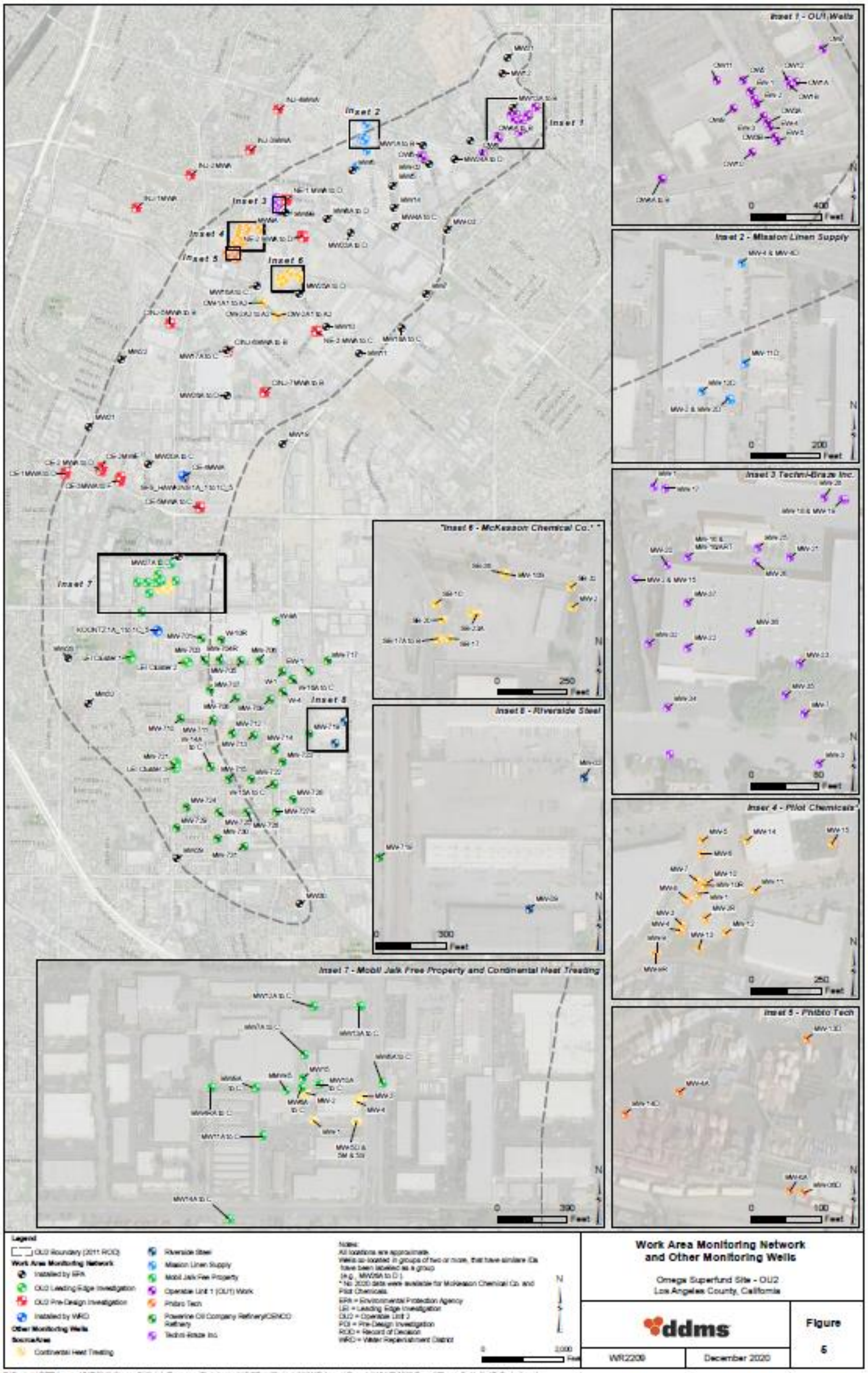


Figure C-11. Well Location Map, Operable Unit 2

Table C-2 - Mann-Kendall Trend Analysis Results for Downgradient Groundwater, 2016 to 2020

Well ID	Contaminant	# of Data Points	# of Non-detects	Minimum Value	Maximum Value	Mann Kendall Statistic (S)	Confidence Factor	Concentration Trend
MW-03	All	0	0	--	--	--	--	Dry/Insufficient Data
MW-06	All	0	0	--	--	--	--	Dry/Insufficient Data
MW-07	Hexavalent Chrome	4	1	2.3	3.5	-2	62.5%	Stable
MW-11	All	0	0	--	--	--	--	Dry/Insufficient Data
MW-12	All	0	0	--	--	--	--	Dry/Insufficient Data
MW-18A	Hexavalent Chrome	5	0	3.0	6.2	-6	88.3	Stable
MW-18B	Hexavalent Chrome	5	0	5.7	6.4	-1	50.0%	Stable
MW-19	All	0	0	--	--	--		Dry/Insufficient Data
MW-21	All	0	0	--	--	--	--	Dry/Insufficient Data
MW-22	All	0	0	--	--	--	--	Dry/Insufficient Data
MW-28	Trichloroethylene	5	0	0.7	1.0	-5	82.1%	Stable
MW-29	Hexavalent Chrome	4	1	2.0	2.7	-2	62.5%	Stable
MW-30	1,2-DCA	4	1	1.0	9.7	2	62.5%	No Trend
MW-31	Trichloroethylene	5	0	730	1100	7	92.1%	Probably Increasing
MW-31	Hexavalent Chrome	4	1	8.2	9.6	3	72.9%	No Trend

<u>Notes:</u>

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

Soil Gas

TableC-3. Detected Soil Gas Concentrations from Quarterly Sampling

Location	2018 Q2	2018 Q3	2019 Q1	2019 Q2*	2020 Q1	2020 Q3	2021 Q1
PCE Concentrations (μg/m^3)							
VMP-11-30	12	44 J	R	53 U	**630 J**	**1500**	**640**
VMP-12-30	33	24 J	49		47 J	87 U	8.4 U
VMP-15-30	18	240 J	45 J,N		51 J,N	57 U	38
VMP-16-30	250	55 J	170		7.8 U	R	8.3
VMP-17-30	8.1 U	250 J	95		16 J,N	17 U	8.7 U
VMP-18-30	38	150 J	150		47 J	150	380
VMP-20-30	48	330 J	64		10 J,N	10	8.1 U
VMP-21-30	22	96 J	120 J,N	95	61 J,N	41	82
VMP-22-30	39	110 J	99		21 J,N	58	43
VMP-24-30	15	130 J	550 J,N		250 J	110	510
VMP-26-30	8.2 U	42 J	12		7.8 UJ	9.8	8.3 U
VMP-27-30	7.5 U	55 J	7.9 J,N		7.9 UJ	8.1 UJ	8.0 U
VMP-31-24	15	38 J	17		8.3 U	8.2 U	8.8
VMP-32-24	8.2 U	55 J	R	18	6.3 U	21	16
VMP-43-24	8.1 U	45 J	46 J,N		7.9 UJ	86	11
VMP-94-24	7.6 U	87 J	9.4		7.9 UJ	7.9 UJ	8.8 U
Trichloroethylene Concentrations (μg/m^3)							
VMP-11-30	6.5 U	6.6 U	R	42 U	24	99	34 J
VMP-12-30	6.3 U	6.5 U	5.8 U		5.8 U	69 U	6.6 UJ
VMP-15-30	6.5 U	6.2 U	6.2 J,N		6.3 UJ	45 U	6.3 UJ
VMP-16-30	6.2	6.3 U	6.3 U		6.2 U	R	6.5 UJ
VMP-17-30	6.4 U	6.2 U	6.6 U		6.3 UJ	13 U	6.9 UJ
VMP-18-30	10	39	34 J,N		8.9	29	50 J
VMP-20-30	6.6 U	11 U	6 U		6.4 UJ	8 U	6.4 UJ
VMP-21-30	6.5 U	19	17 J,N		11 J,N	11	10 J
VMP-22-30	6.5 U	6.4 U	14		6.4 UJ	14	6.6 UJ
VMP-24-30	6.2 U	6.3 U	14 J,N		6.2 U	8.5	7.0 J,N
VMP-26-30	6.5 U	6.6 U	6.4 U		6.2 UJ	6.5 U	6.6 UJ
VMP-27-30	5.9 U	6.9 U	6.2 UJ		6.3 UJ	6.4 UJ	6.4 UJ
VMP-31-24	6.5 U	6.6 U	6 U		6.6 U	6.5 U	7.0 UJ
VMP-32-24	6.5 U	6.2 U	R	6.5 U	6.3 U	6.5 U	6.8 UJ
VMP-43-24	6.4 U	6.3 U	6.4 UJ		6.3 U	8.7	6.8 UJ
VMP-94-24	6 U	6.4 U	6.2 U		6.3 U	6.3 UJ	6.9 UJ

U – Not detected above the value presented; J – Estimated value R – Result is rejected; N – Estimated value
Bold text denote ROD cleanup level exceedance
* Sampling of vapor monitoring probes are typically not sampled in this quarter. However, resampling of specific probes was conducted.

Indoor Air (Source Area)

Table C-4. Detected Indoor Air Concentrations

	Bishop Building			TerraPave Building		Sun City Autobody			Madsen	Sunland Enterprises	
	B1	B2	B3	TP 1	TP 3	SC1	SC2	SC3	MR1	SUN1	SUN2
PCE Concentrations (mg/m^3)											
Nov 2017	0.23 U	0.58 U	0.23 U	0.18 U	0.39 U	NS	NS	NS	0.23 U	NS	NS
Mar-2018	0.21 U	0.22 U	0.22 U	0.21 U	0.41 U	0.22 U	0.43 U	0.21 U	0.21 U	NS	NS
Jun 2018	0.2U	0.31	0.23 U	0.21 U	0.46 U	NS	NS	NS	NS	NS	NS
Sep 2018	0.17 U	0.4	0.23 U	0.22 U	0.22 U	0.46 U	2.2 U	0.21 U	0.23 U	NS	NS
Nov-18	0.24 J	0.41 J	0.23 UJ	0.25 J	0.69 UJ	NS	NS	NS	NS	NS	NS
Jan-19	**0.87**	**0.88**	**0.72**	**0.55**	2.1 U	**0.73**	1.1 U	**0.58**	**0.67**	NS	NS
Jan-20	**0.37**	0.3	0.21 U	**0.53**	**4.8**	0.22 U	0.22 U	0.22 U	0.28	0.47	0.23 U
Jul-20	0.23 U	0.31	0.22 U	**0.66**	**1.9**	NS	NS	NS	NS	NS	NS
Jan-21	0.25	**0.35**	0.35	**0.8**	**2**	0.27	0.44 U	0.24	0.25	0.45	0.45
Jul-21	0.20 U	0.20 U	0.19 U	0.19 U	**3.4**	NS	NS	NS	NS	NS	NS
Oct-21	**0.45**	**1.6**	0.19 U	**1.1**	**0.56**	0.20 U	0.20 U	0.20 U	0.21 U	0.20 U	0.20 U
Trichloroethylene Concentrations (mg/m3)											
Nov-17	0.18 U	0.46 U	0.18 U	0.15 U	0.31 U	NS	NS	NS	0.18 U	NS	NS
Mar-18	0.16 U	0.17 U	0.2	0.17 U	0.32 U	0.18 U	0.34 U	0.16 U	0.17 U	NS	NS
Jun-18	0.15 U	0.2 U	0.18 U	0.17 U	0.36 U	NS	NS	NS	NS	NS	NS
Sep-18	0.21 U	0.19 U	0.18 U	0.45	0.45	0.36 U	1.8 U	0.17	0.18 U	NS	NS
Nov-18	0.17 UJ	0.45 J	0.20 J	0.17 UJ	0.55 UJ	NS	NS	NS	NS	NS	NS
Jan-19	0.17U	0.19	0.17 U	0.32 U	1.7 U	1.7 U	0.85 U	1.1	0.17 U	NS	NS
Jan-20	0.18 U	0.17 U	0.17 U	0.17 U	0.84 U	0.18 U	0.17 U	0.18 U	0.18 U	0.17 U	0.18 U
Jul-20	0.18 U	0.23	0.18 U	0.18 U	0.31 U	NS	NS	NS	NS	NS	NS
Jan-21	0.18	0.18 U	0.18 U	0.18 U	0.18 U	0.17 U	0.35 U	0.16 U	0.17 U	0.18 U	0.18 U
Jul-21	0.16 U	0.16 U	0.15 U	0.16 U	0.31 U	NS	NS	NS	NS	NS	NS
Oct-21	0.15 U	0.31 U	0.15 U	0.15 U	0.23 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
1,2-DCA Concentrations (mg/m^3)[1]											
Nov-17	0.14 U	0.35 U	0.14 U	0.13 U	0.23 U	NS	NS	NS	0.14 U	NS	NS
Mar-18	0.12 U	0.34	0.13 U	0.13U	0.24 U	0.13 U	0.26 U	0.12 U	0.13 U	NS	NS
Jun-18	0.12 U	0.15 U	0.14 U	0.13 U	0.27 U	NS	NS	NS	NS	NS	NS
Sep-18	0.12 U	0.14 U	0.14 U	0.13 UJ	0.13U	0.27 U	1.3 U	0.4	0.14 U	NS	NS
Nov-18	0.13 UJ	0.12 UJ	0.14 UJ	0.24 U	0.41 UJ	NS	NS	NS	NS	NS	NS
Jan-19	0.13 U	0.12 U	0.21	0.24 U	1.3 U	0.13 U	0.64 U	0.24 U	0.13	NS	NS
Jan-20	0.13 U	0.13 U	0.13 U	0.14 U	0.64 U	0.13 U	0.13 J	0.13 U	0.14 U	0.13 U	0.14 U
Jul-20	0.14 U	0.12 U	0.13 U	0.14 U	0.23 U	NS	NS	NS	NS	NS	NS

	Bishop Building			TerraPave Building		Sun City Autobody			Madsen	Sunland Enterprises	
	B1	B2	B3	TP 1	TP 3	SC1	SC2	SC3	MR1	SUN1	SUN2
Jan-21	0.14 U	0.14 U	0.13 U	0.12 U	0.13 U	0.13 U	0.26 U	0.12 U	0.13 U	0.14 U	0.14 U
Jul-21	0.12 U	0.12 U	0.12 U		0.23 U	NS	NS	NS	NS	NS	NS
1,1-DCE Concentrations (mg/m3) 1											
Nov-17	0.067 U	0.17 U	0.067 U	0.054 U	0.11 U	NS	NS	NS	0.068 U	NS	NS
Mar-18	0.061 U	0.063 U	0.063 U	0.062 U	0.12 U	0.065 U	0.13 U	0.061 U	0.063 U	NS	NS
Jun-18	0.057 U	0.072 U	0.067 U	0.062 U	0.13 U	NS	NS	NS	NS	NS	NS
Sep-18	0.061 U	0.070U	0.066 U	0.064 U	0.065 U	0.13U	0.65 U	0.063 U	0.067 U	NS	NS
Nov-18	0.063 UJ	0.059 UJ	0.066 UJ	0.064 UJ	0.20 UJ	NS	NS	NS	NS	NS	NS
Jan-19	0.12	0.065	0.064 U	0.12 U	0.62 U	0.062 U	0.31 U	0.12 U	0.063 U	NS	NS
Jan-20	0.065 U	0.064 U	0.063 U	0.063 U	0.31 U	0.065 U	0.063 U	0.065 U	0.066 U	0.063 U	0.066 U
Jul-20	0.067 U	0.061 U	0.065 U	0.067 U	0.11 U	NS	NS	NS	NS	NS	NS
Jan-21	0.068 U	0.067 U	0.065 U	0.42	0.065 U	0.064 U	0.13 U	0.059 U	0.064 U	0.067 U	0.067 U
Jul-21	0.058 U	0.059 U	0.057 U	0.059 U	0.11 U	NS	NS	NS	NS	NS	NS
Freon Concentrations (mg/m3) 1											
Nov-17	1.1	1.1 J	1.1	1.1	1.2	NS	NS	NS	1.1	NS	NS
Mar-18	1.2	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	NS	NS
Jun-18	1.2	1.3	1.3	1.3	1.3	NS	NS	NS	NS	NS	NS
Sep-18	1.4	1.4	1.4	1.4	1.4	1.4 J	1.8 U	1.4J	1.4	NS	NS
Nov-18	1.3 J	1.4 J	1.4 J	0.13 UJ	0.41 UJ	NS	NS	NS	NS	NS	NS
Jan-19	1.5	1.6	1.5	1.5	1.8 U	1.5	1.5	1.5	1.5	NS	NS
Jan-20	1.3	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Jul-20	1.3	1.3	1.2	1.2	1.2	NS	NS	NS	NS	NS	NS
Jan-21	1.3	1.2	1.3	1.3 J	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Jul-21	1.1	1.1	1.1	1.1	1.1	NS	NS	NS	NS	NS	NS

1 – October 2021 data results not available for these contaminants

U – non-detect; value denotes reporting limit; J- estimated value; NS – not sampled

Bold text denote values greater than the ROD cleanup level.

Indoor Air (Off-Source Area)

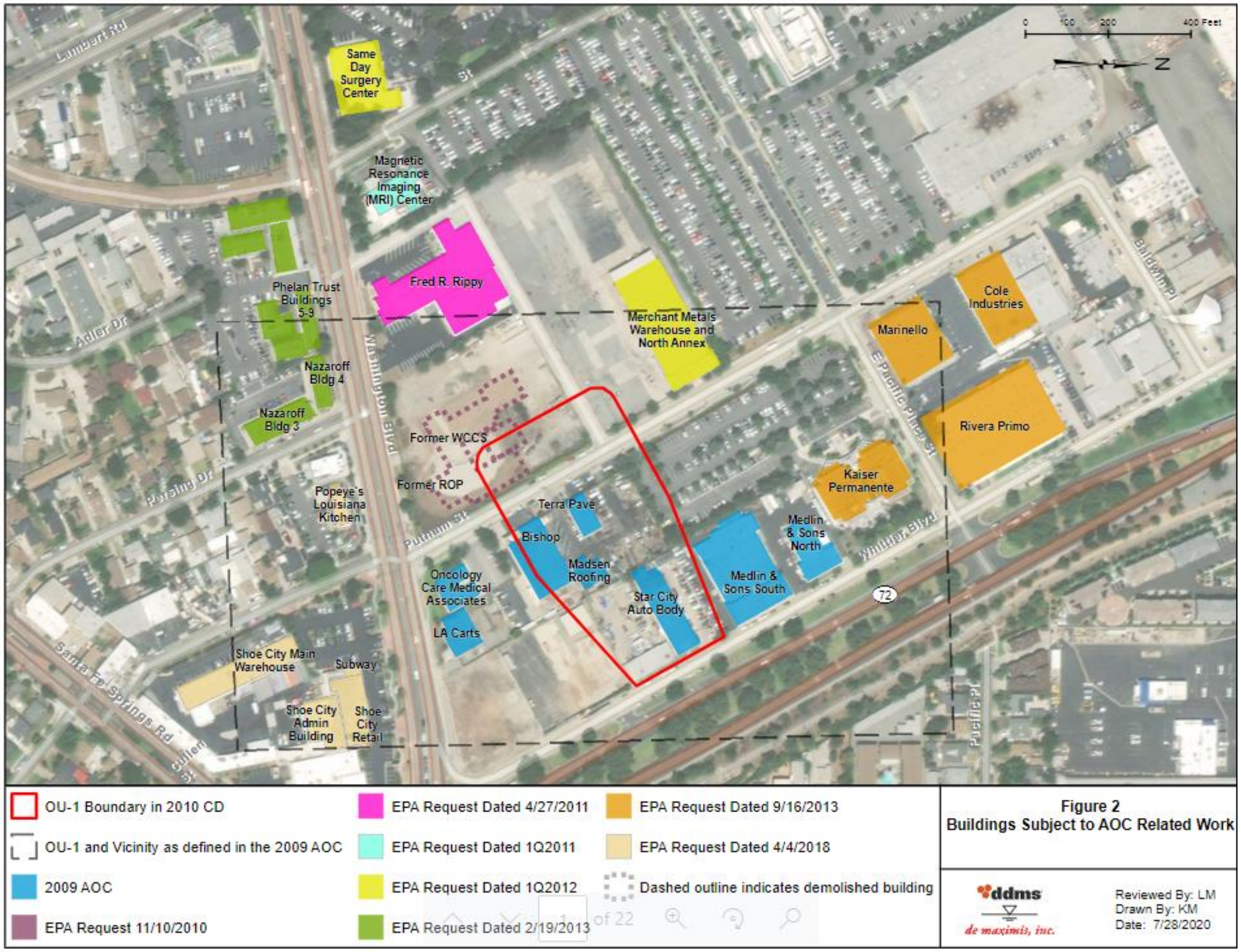
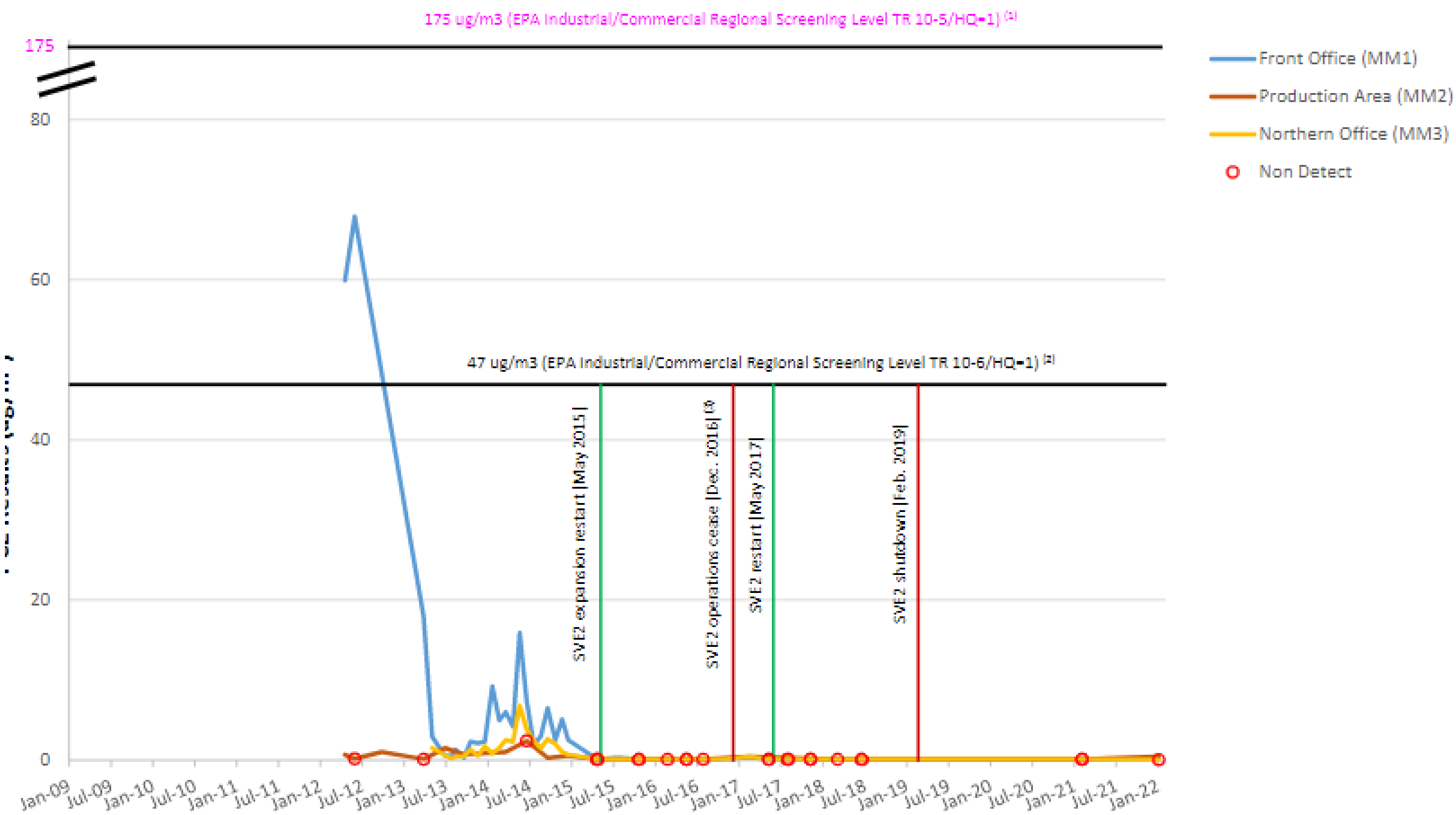


Table 2
AOC Buildings Covered By Indoor Air Quality Sampling

Building	IAQ Sampling Frequency (Duration)	Comment
Terra Pave	Semi-Annual (2009 - 2022)	Subject to 2010 CD Requirements; IAQ Sampling Included in OU1 Quarterly Reports
Bishop	Semi-Annual (2009 - 2022)	Subject to 2010 CD Requirements; IAQ Sampling Included in OU1 Quarterly Reports
Star City Auto Body	Annual (2009 - 2022)	Subject to 2010 CD Requirements; IAQ Sampling Included in OU1 Quarterly Reports
Madsen Roofing	Annual (2009 - 2022)	Subject to 2010 CD Requirements; IAQ Sampling Included in OU1 Quarterly Reports
Medlin & Sons (South)	Annual (2009 - 2022)	
Medlin & Sons (North)	Irregular Schedule per EPA (2010, 2011, 2013, 2018)	
Former Oncology Care Medical Associates[1] (OCMA)	Annual (2012 - 2022)	Since January 2020, the owner has denied request for access
Former LA Carts	Discreet Sampling (2010)	Building demolished in 2021 in support of the City of Whittier's redevelopment plans
Former Magnetic Resonance Imaging (MRI) Center[2]	Discreet Sampling (2011)	
Same Day Surgery (SDS)	Discreet Sampling (2012)	
Women's & Children's Crisis Shelter (WCCS) Building[3]	Quarterly (2010 - 2014)	Building demolished in 2015
Regional Occupational Program (ROP) Building[3]	Quarterly (2010 - 2014)	Building demolished in 2015
Former Fred R. Rippy (FRR)[3]	Annual (2010 - 2022)	
Former Merchant Metals Warehouse and North Annex[4]	Annual (2012 - 2022)	Became vacant in 2015. Even though vacant, sampling resumed in January 2021, per EPA January 28, 2021 Agreement.
Former Marinello[5]	Annual (2014 - 2022)	
Nine (9) Buildings South of Washington Blvd[6]	Discreet Sampling (2015, 2018, 2019, 2021)	
Cole Industries	Discreet Sampling (2013)	Owner denied access for second sampling event in 2014
Former Rivera Primo[7]	Discreet Sampling (2013, 2018)	
Kaiser Permanente	Discreet Sampling (2014, 2015, 2018)	

1. The Former OCMA building is now owned and operated as Tomedics.
2. The Former MRI Center is now owned and operated as Interhealth Dialysis Center (IDC).
3. The WCCS & ROP Buildings were sold to Presbyterian Interhealth Hospital (PIH) in 2015 & demolished that year. The Former FRR Building was sold to PIH in 2017 and is currently used as a Medical Records Building.
4. The Former Merchant Metals Warehouse and North Annex are currently owned by PIH, have been vacant since 2015, and redevelopment plans are still in flux.
5. The Former Marinello building was vacated in 2017 and sold to OPHIR in 2018.
6. The identified buildings included a building and vacant lot owned by the Yun's (access was denied), Nazaroff Buildings (3&4), and Phelan Trust Buildings (5 - 9). At EPA's request, a subset of these buildings were re-sampled in 2019 where access was granted. In 2018 and 2021, newly constructed buildings in this area were sampled at EPA's request where access was granted.
7. The former Rivera Primo Building was vacated in 2018, sold to FRR, is currently used for FRR operations, and was resampled in September 2018.

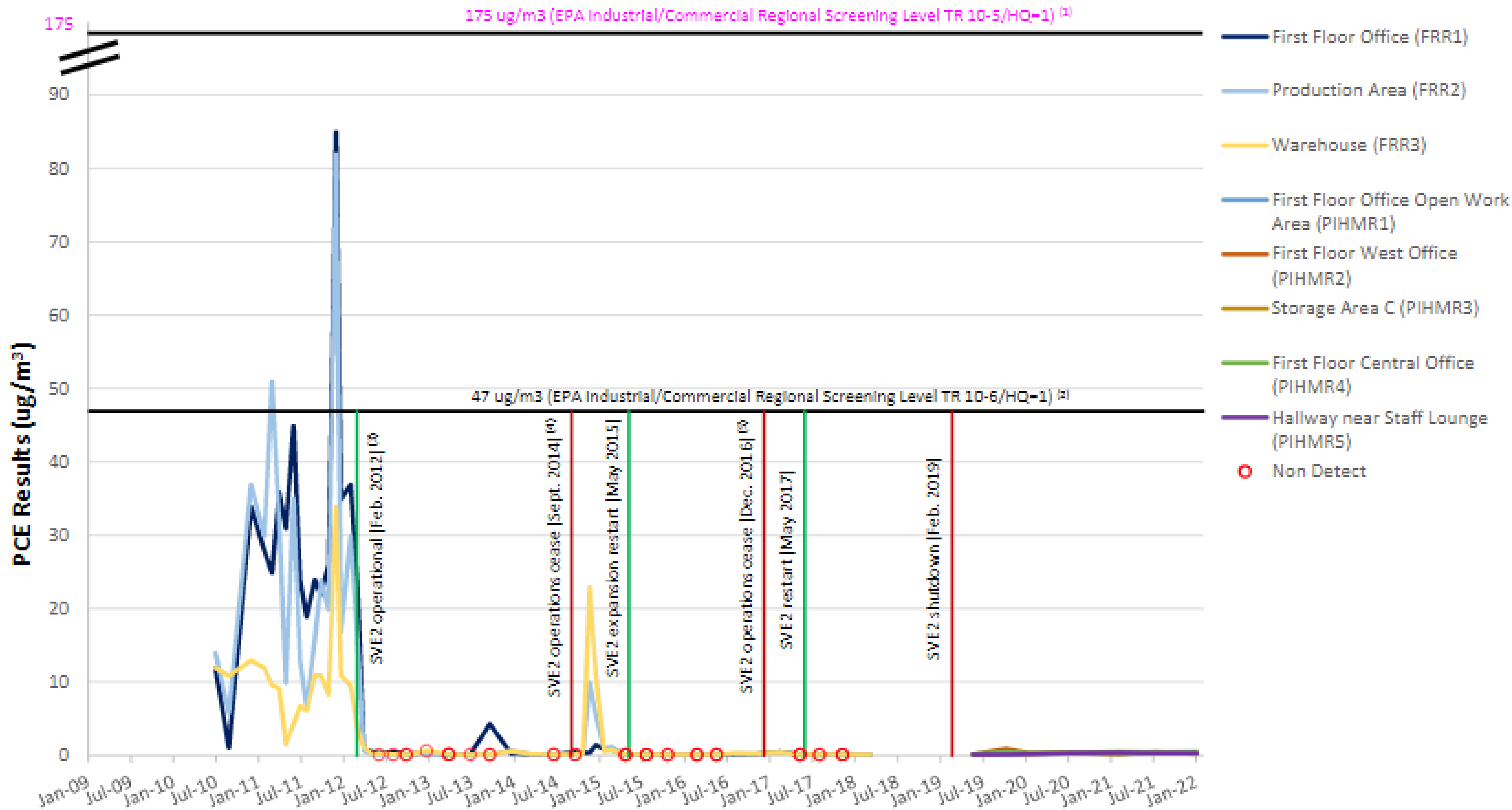
Figure 7A
Indoor Air Quality Sampling
Former Merchant Metals Building and North Annex
PCE (ug/m3)



)TE: Initial IAQ sampling results represent pre-mitigation
mples, and nondetect results are shown at the reporting
iit and presented with open symbols in the graph.

[1] Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).
[2] http://www.epa.gov/region9/superfund/prg/
[3] SVE2 operations cease in December 2016 for troubleshooting and implementation of corrective actions.

Figure 7B
Indoor Air Quality Sampling
Former Fred R. Rippy
PCE (ug/m3)



NOTE: Initial IAQ sampling results represent pre-mitigation samples, and nondetect results are shown at the reporting limit and presented with open symbols in the graph.

(1) Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).
(2) http://www.epa.gov/region9/superfund/prg/
(3) SVE2 operation included influence of Former ROP, Former WCCS, and Former Fred R. Rippy buildings.
(4) SVE2 operations cease for expansion to Former Merchant Metals and Former Marinello buildings.
(5) SVE2 operations cease in Dec. 2016 for troubleshooting and implementation of corrective actions.

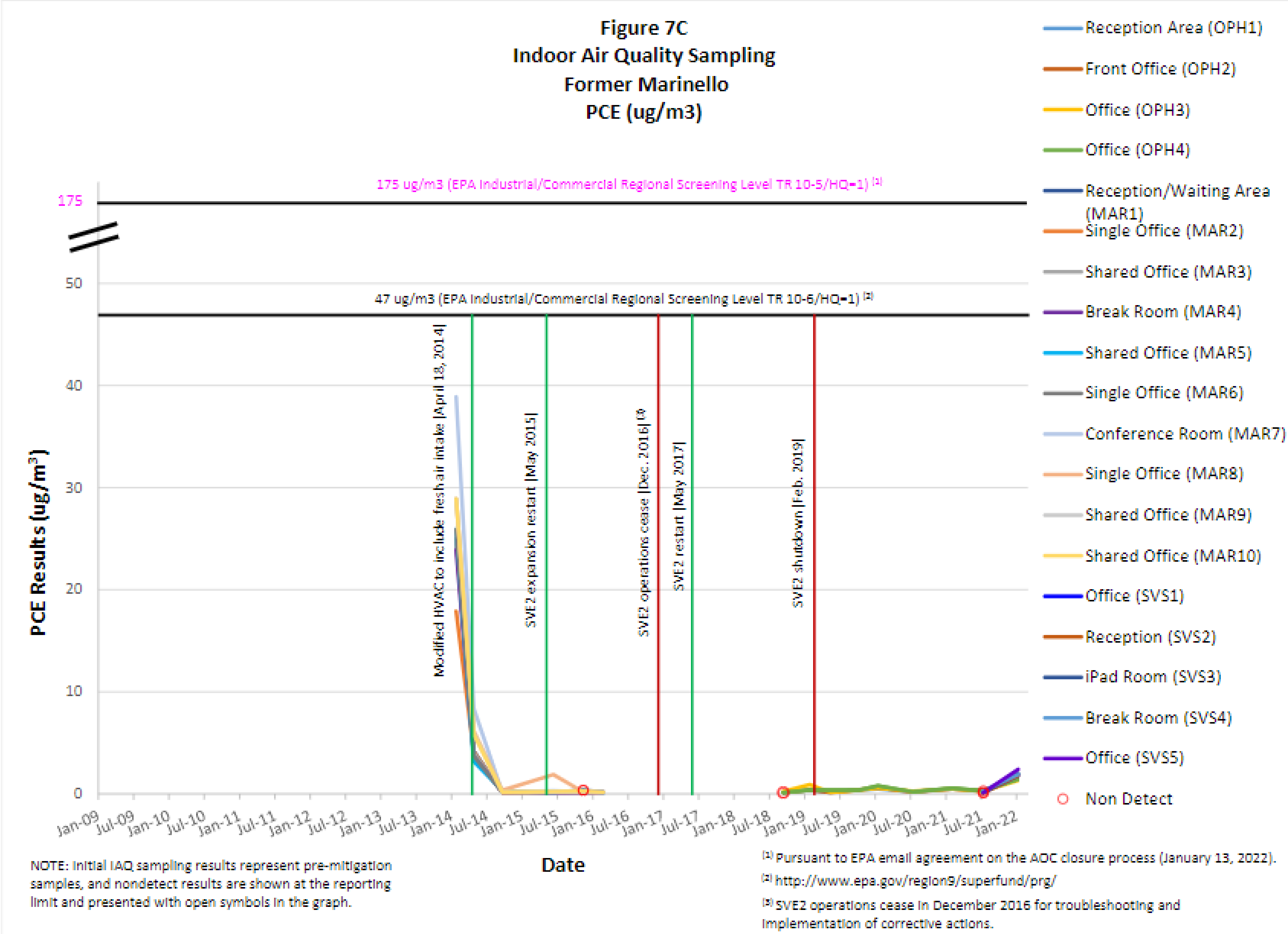


Figure 7C
Indoor Air Quality Sampling
Former Marinello
PCE (ug/m3)

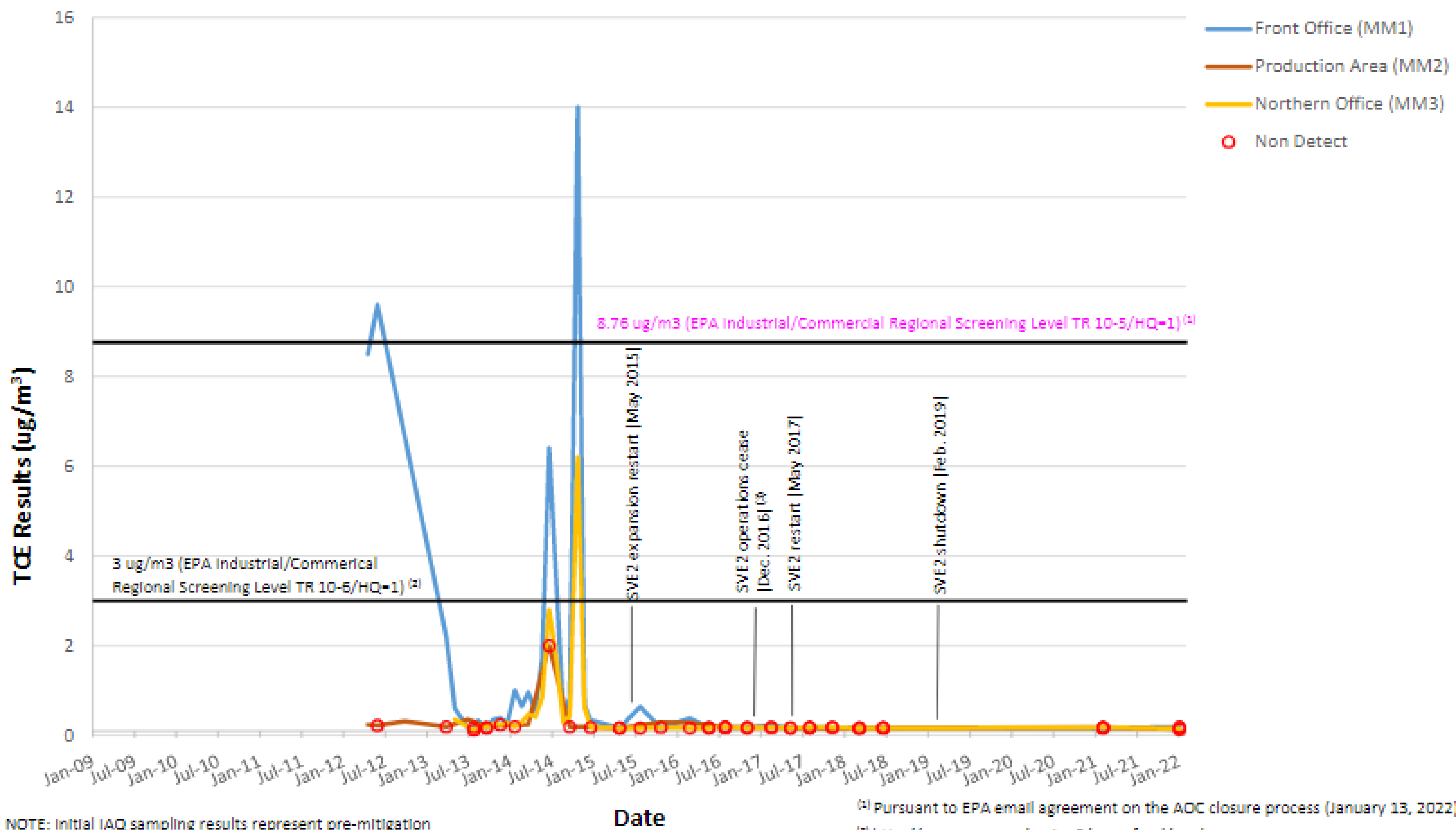
NOTE: Initial IAQ sampling results represent pre-mitigation samples, and nondetect results are shown at the reporting limit and presented with open symbols in the graph.

[1] Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

[2] http://www.epa.gov/region9/superfund/prg/

[3] SVE2 operations cease in December 2016 for troubleshooting and implementation of corrective actions.

Appendix D, Figure D-5
Indoor Air Sampling
Former Merchant Metals Building and North Annex
TCE (ug/m3)



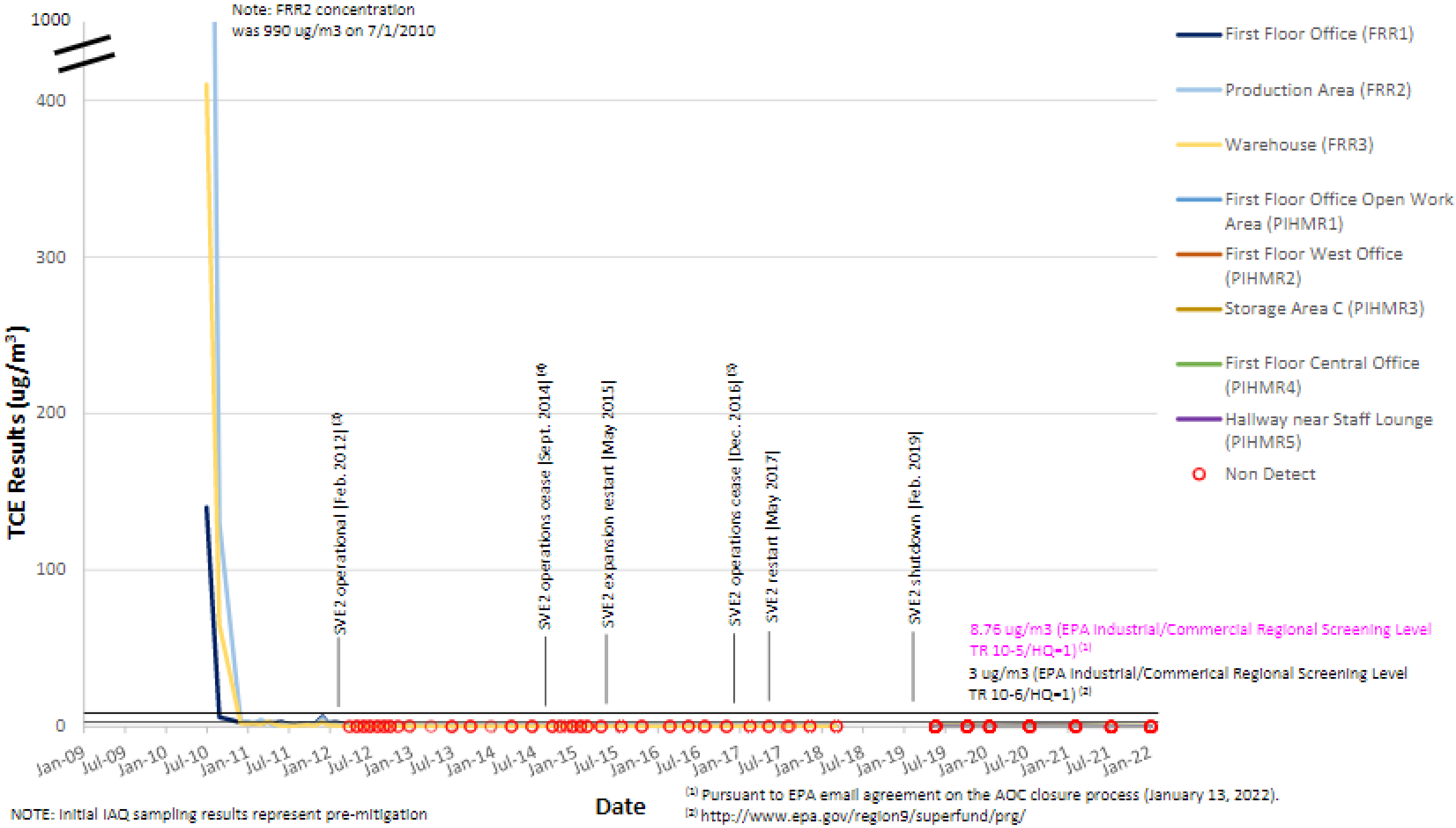
NOTE: Initial IAQ sampling results represent pre-mitigation samples, and nondetect results are shown at the reporting limit and presented with open symbols in the graph.

[1] Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

[2] http://www.epa.gov/region9/superfund/prg/

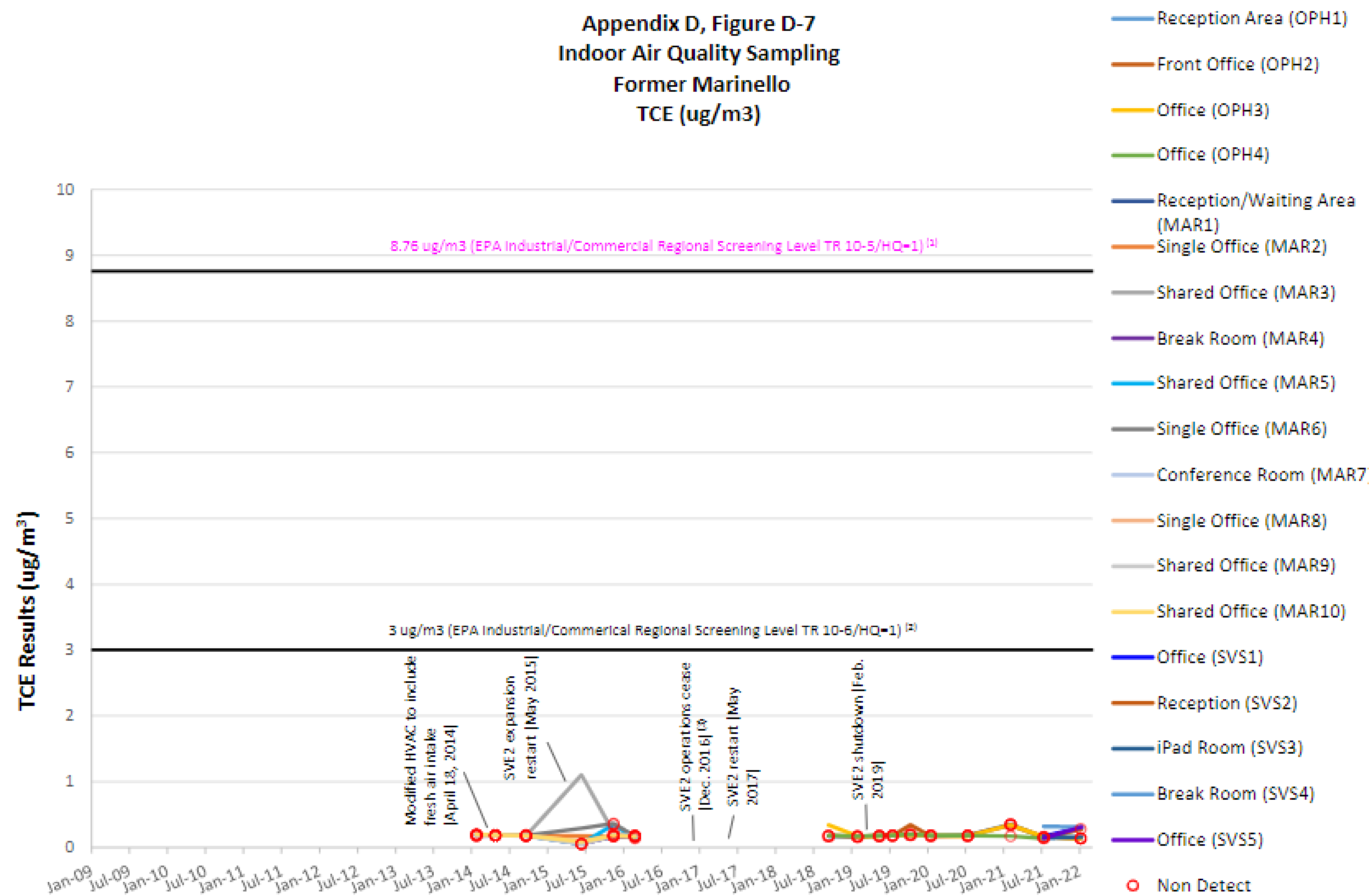
[3] SVE2 operations cease in December 2016 for troubleshooting and implementation of corrective actions.

Appendix D, Figure D-6
Indoor Air Quality Sampling
Former Fred R. Rippy
TCE (ug/m3)



NOTE: Initial IAQ sampling results represent pre-mitigation samples, and nondetect results are shown at the reporting limit and presented with open symbols in the graph.

[1] Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).
[2] http://www.epa.gov/region9/superfund/prg/
[3] SVE2 operation included influence of Former ROP, Former WCCS, and Former Fred R. Rippy buildings.
[4] SVE2 operations cease for expansion to Former Merchant Metals and Former Marinello buildings.
[5] SVE2 operations cease in Dec. 2016 for troubleshooting and implementation of corrective actions.

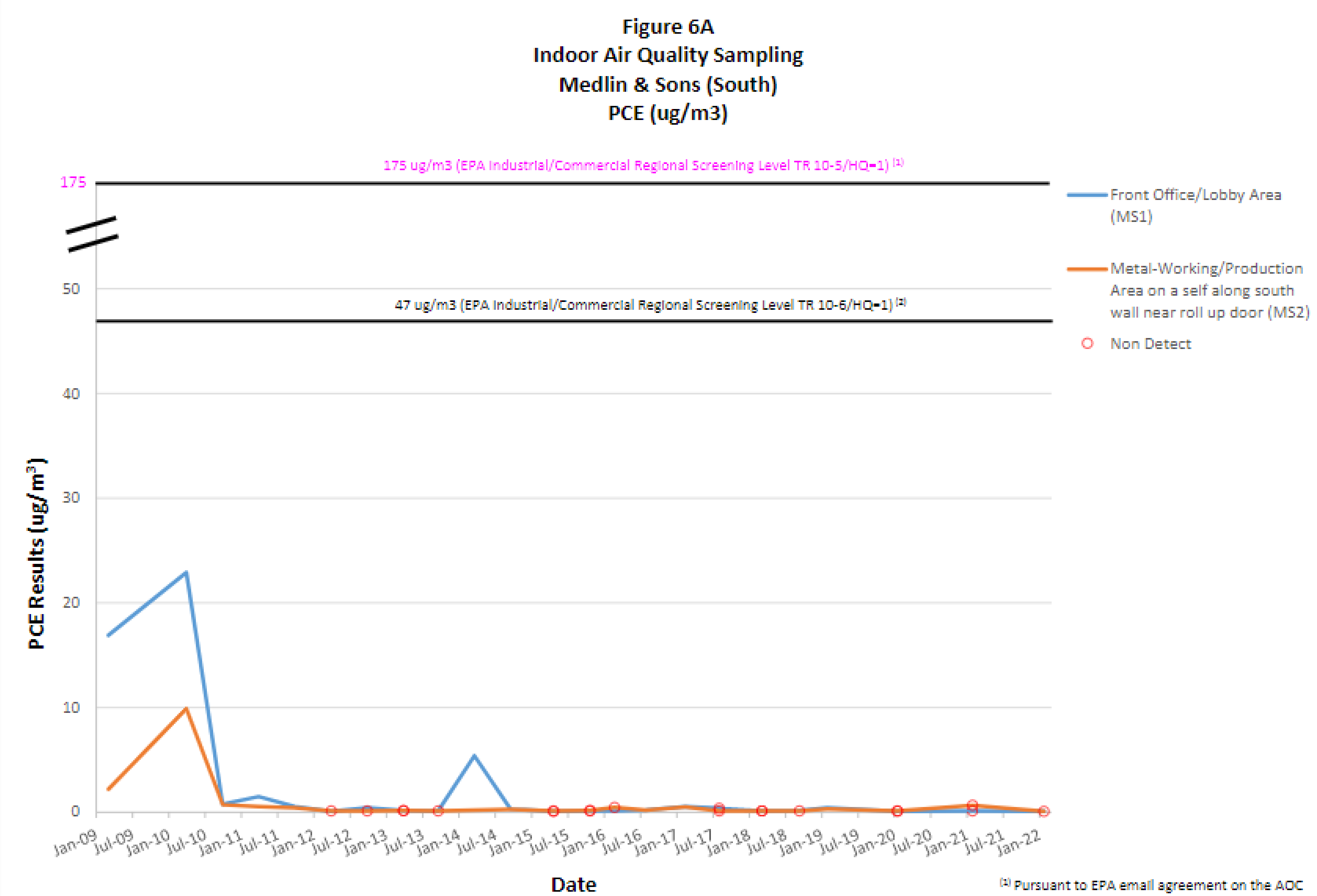


NOTE: Initial IAQ sampling results represent pre-mitigation samples, and nondetect results are shown at the reporting limit and presented with open symbols in the graph.

(1) Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

(2) http://www.epa.gov/region9/superfund/prg/

(3) SVE2 operations cease in December 2016 for troubleshooting and implementation of corrective actions.

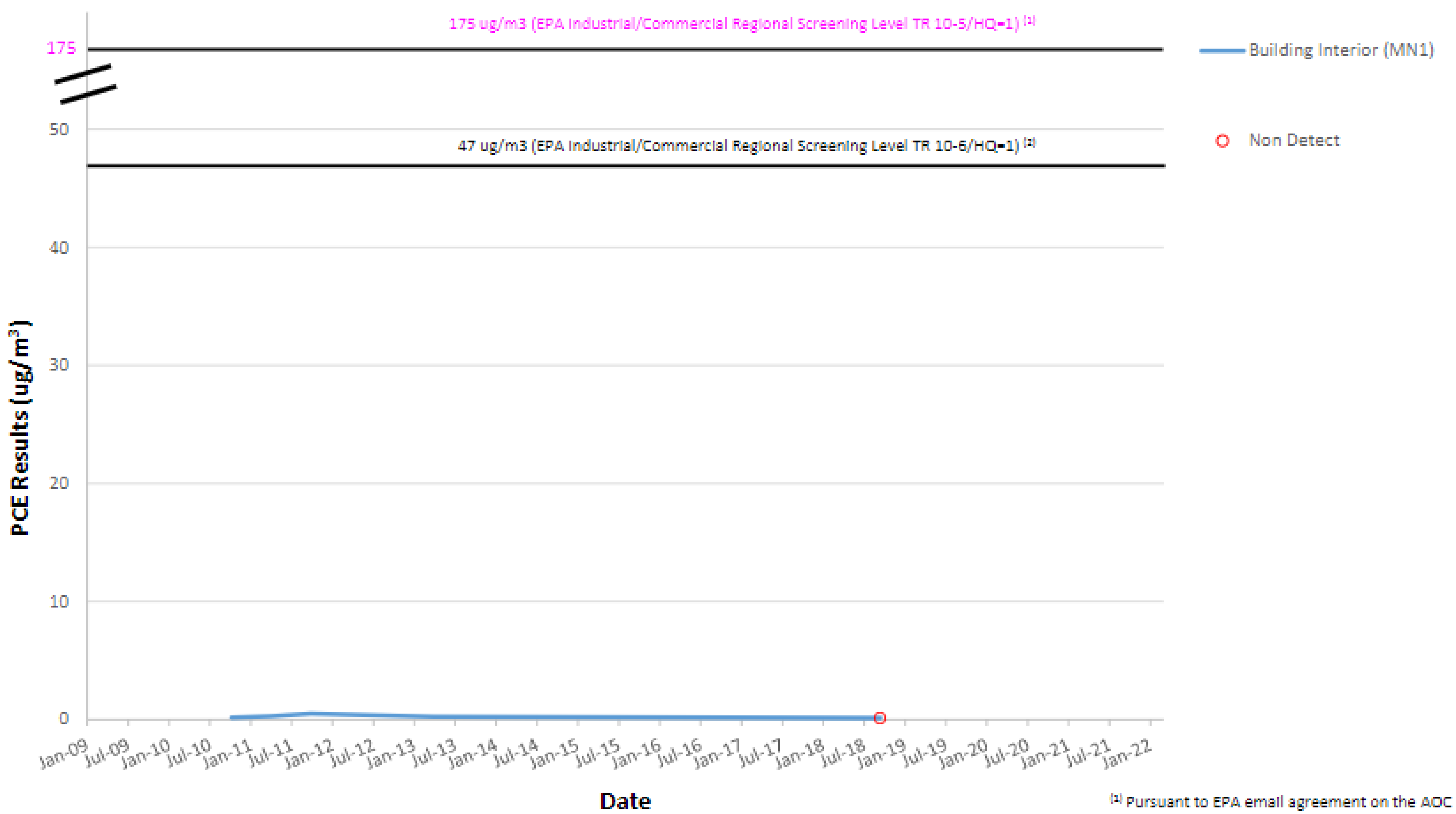


NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.

(1) Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

(2) http://www.epa.gov/region9/superfund/prg/

Figure 6B
Indoor Air Quality Sampling
Medlin & Sons (North)
PCE (ug/m3)

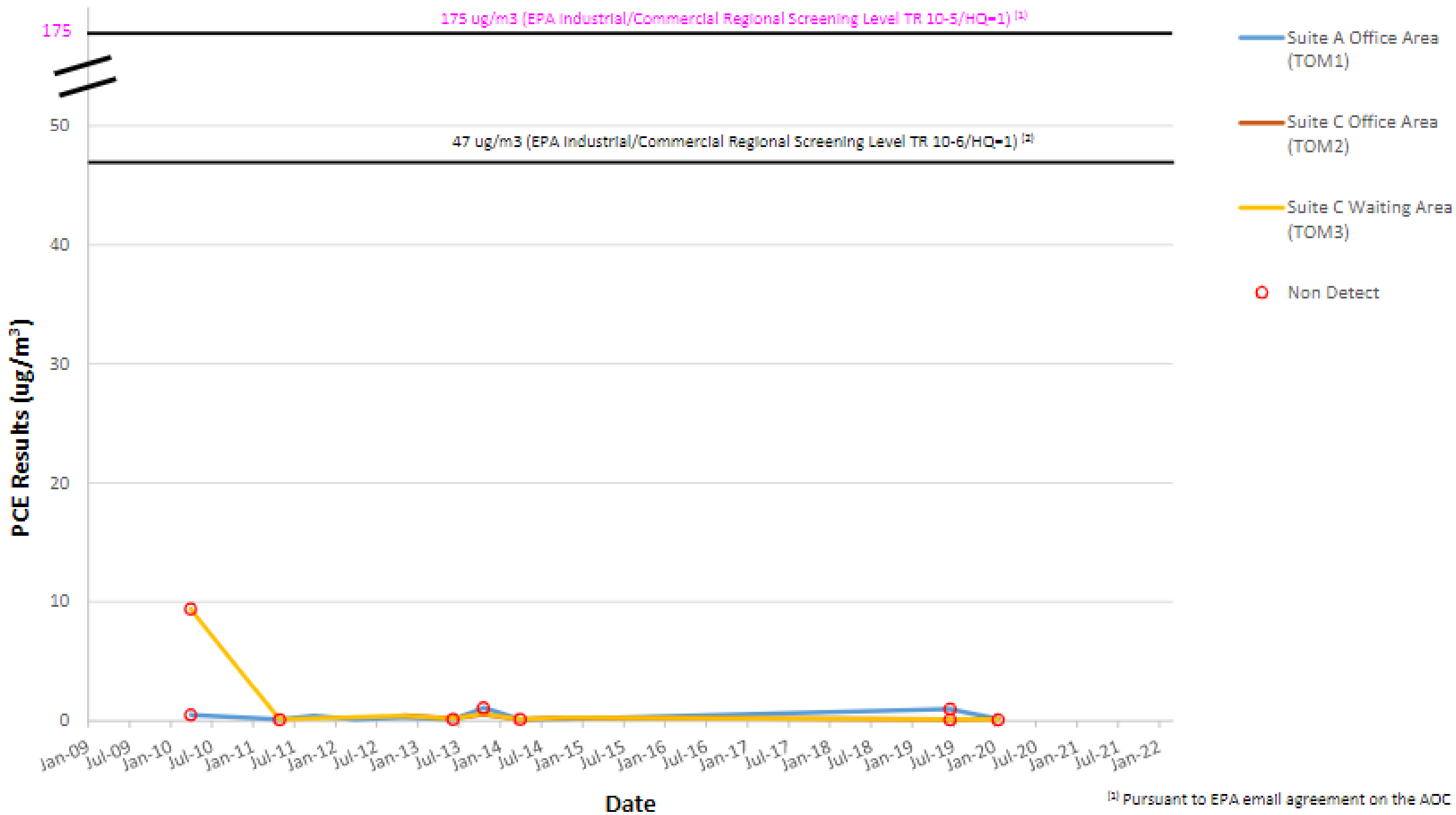


[1] Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

[2] http://www.epa.gov/region9/superfund/prg/

NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.

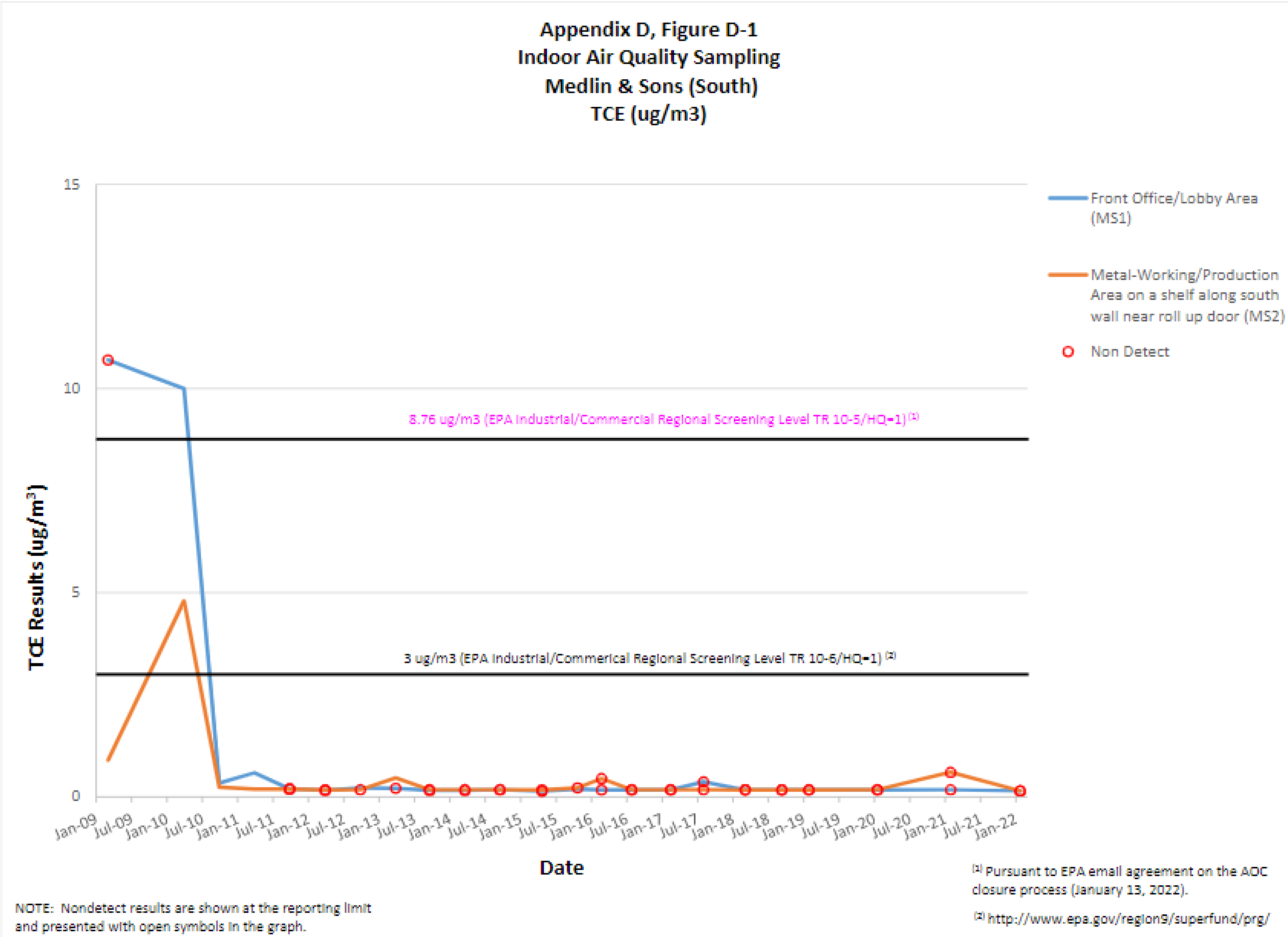
Figure 6C
Indoor Air Quality Sampling
Oncology Care Medical Associates
PCE (ug/m3)



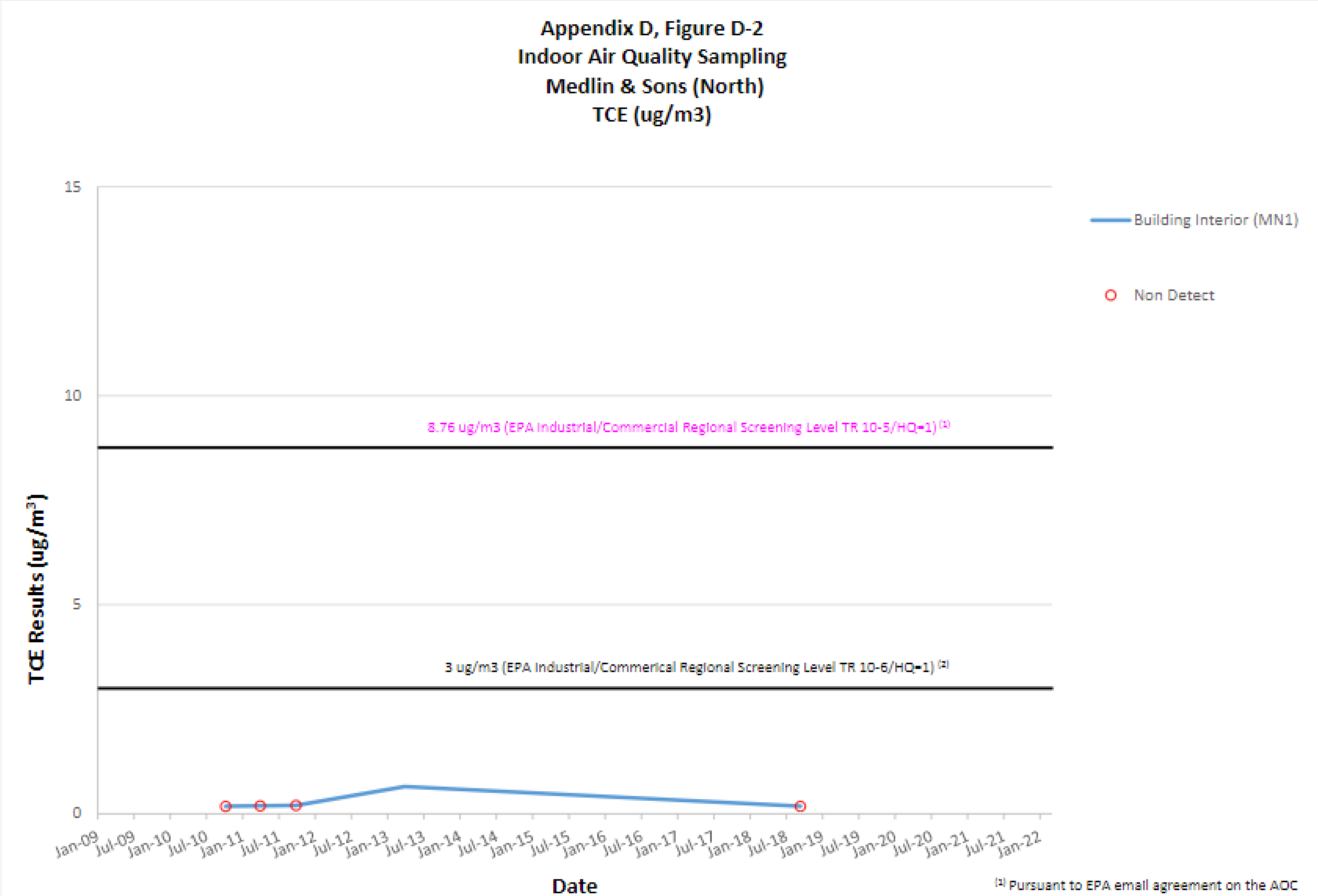
[1] Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

[2] http://www.epa.gov/region9/superfund/prg/

NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.



Appendix D, Figure D-1
Indoor Air Quality Sampling
Medlin & Sons (South)
TCE (ug/m3)
15
10
5
0
TCE Results (ug/m3)
8.76 ug/m3 (EPA Industrial/Commercial Regional Screening Level TR 10-5/HQ=1) (1)
3 ug/m3 (EPA Industrial/Commerical Regional Screening Level TR 10-6/HQ=1) (2)
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Date
Front Office/Lobby Area (MS1)
Metal-Working/Production Area on a shelf along south wall near roll up door (MS2)
Non Detect
NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.
(1) Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).
(2) http://www.epa.gov/region9/superfund/prg/



NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.

[1] Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

[2] http://www.epa.gov/region9/superfund/prg/

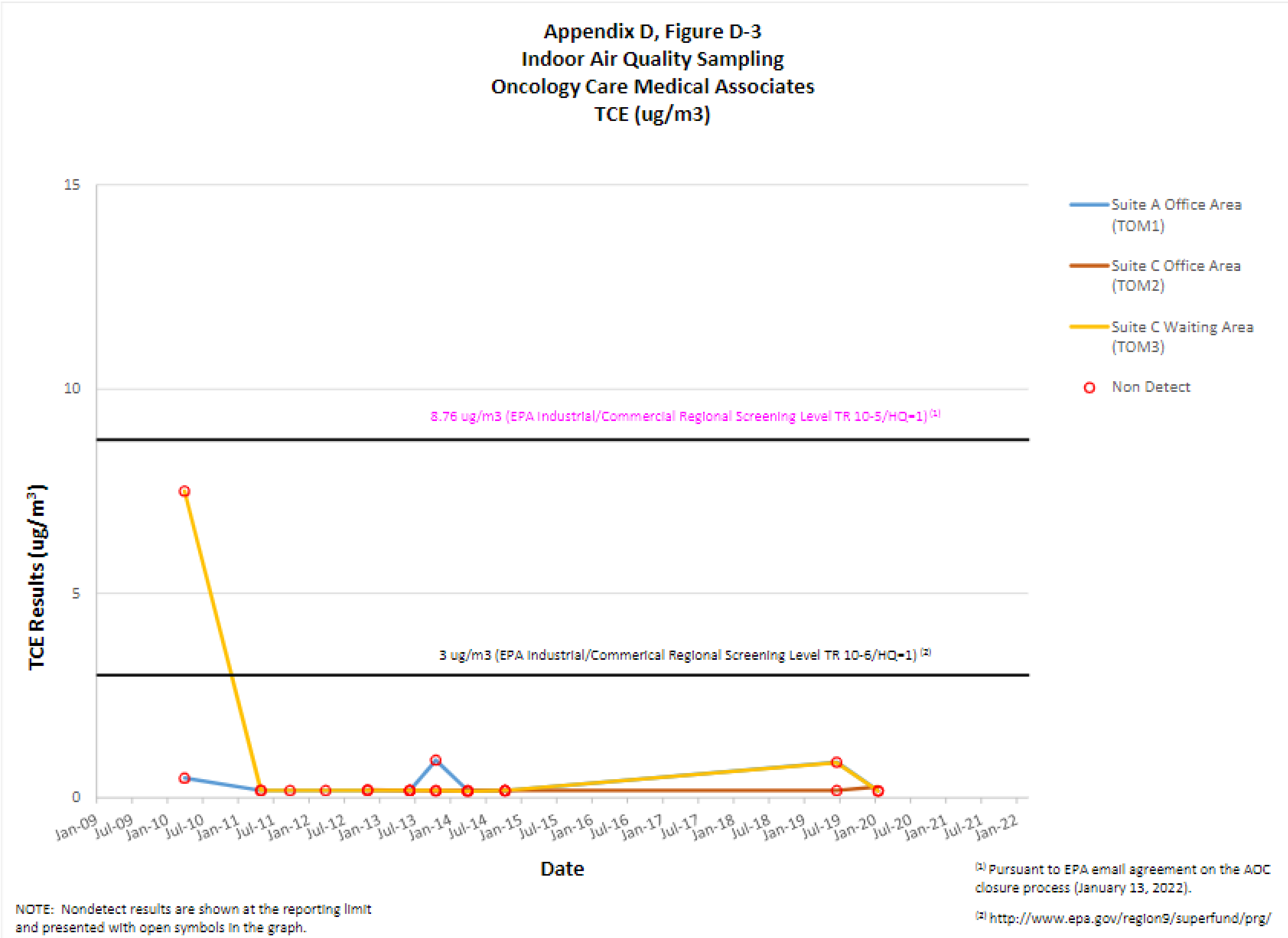
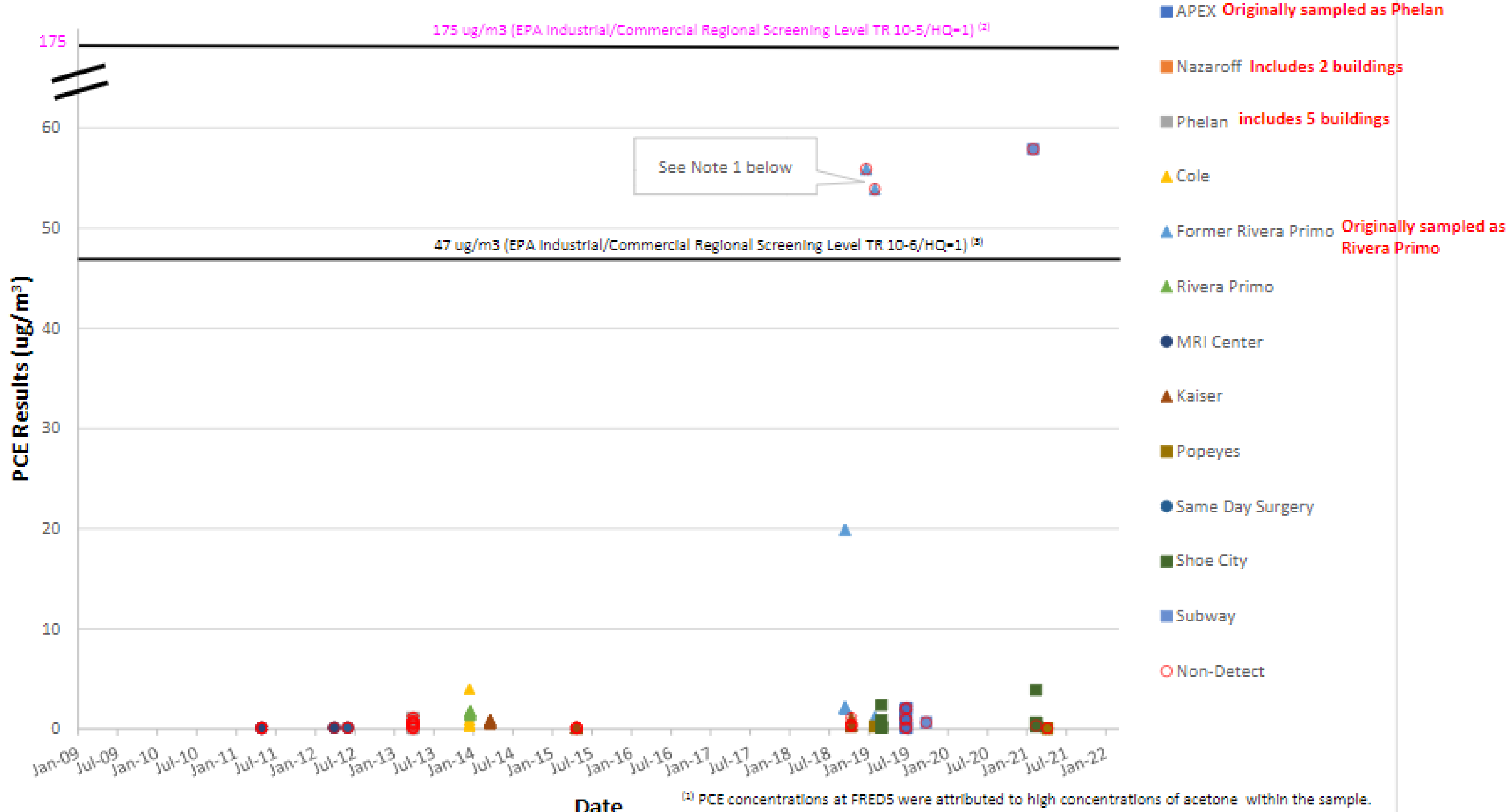

Appendix D, Figure D-3
Indoor Air Quality Sampling
Oncology Care Medical Associates
TCE (ug/m3)
15
10
5
0
TCE Results (ug/m³)
8.76 ug/m3 (EPA Industrial/Commercial Regional Screening Level TR 10-5/HQ=1) (1)
3 ug/m3 (EPA Industrial/Commerical Regional Screening Level TR 10-6/HQ=1) (2)
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
Jul-16
Jan-17
Jul-17
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Date
Suite A Office Area (TOM1)
Suite C Office Area (TOM2)
Suite C Waiting Area (TOM3)
Non Detect
NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.
(1) Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).
(2) http://www.epa.gov/region9/superfund/prg/

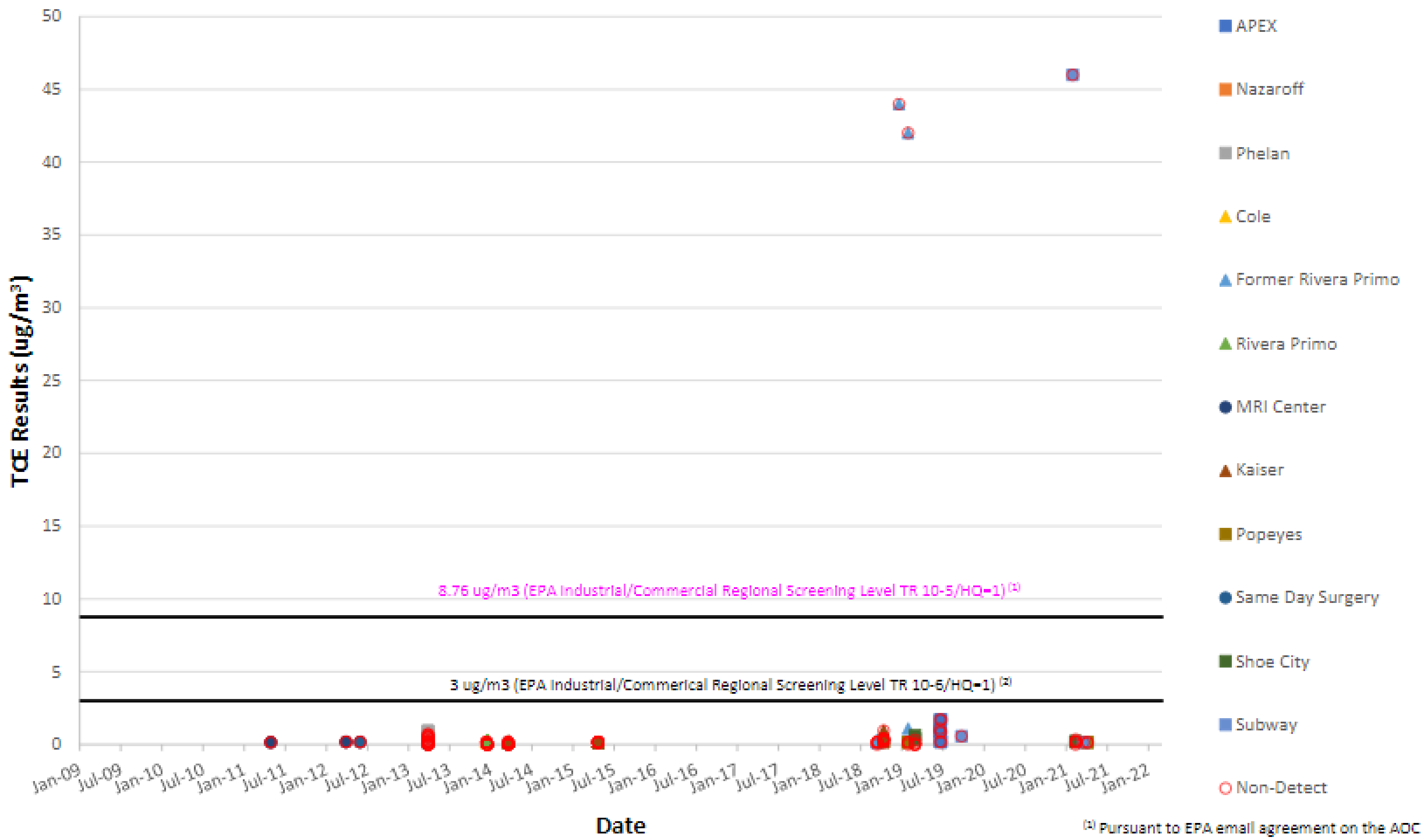
Figure 6D
Indoor Air Quality Sampling
AOC Buildings with Limited Number of EPA-Required Sampling Events
PCE (ug/m3)



NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.

(1) PCE concentrations at FRED5 were attributed to high concentrations of acetone within the sample. Additional details can be found in OPOG's July 31, 2020 submittal to EPA.
(2) Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).
(3) http://www.epa.gov/region9/superfund/prg/

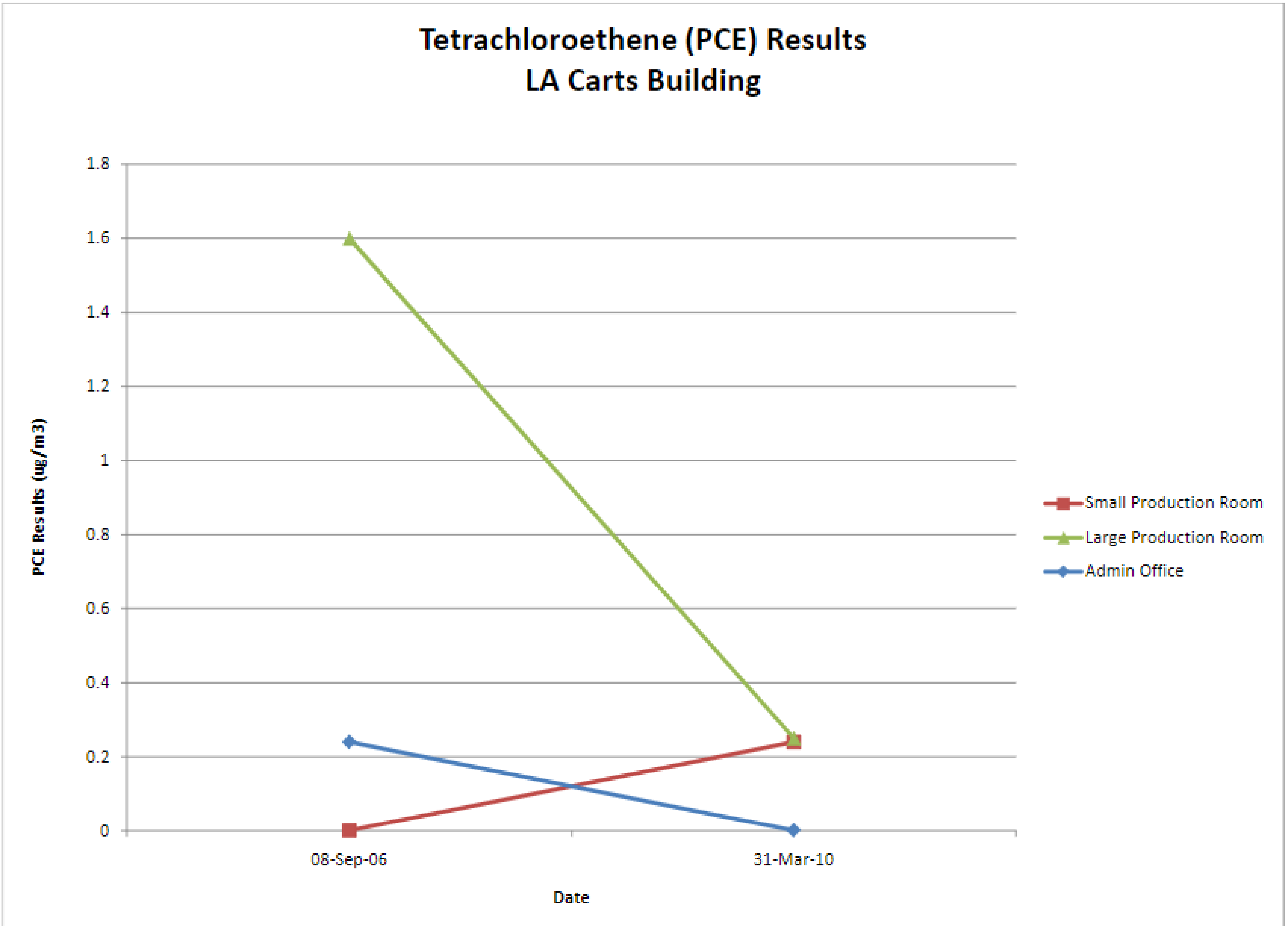
Appendix D, Figure D-4
Indoor Air Quality Sampling
AOC Buildings with Limited Number of EPA-Required Sampling Events
TCE (ug/m3)

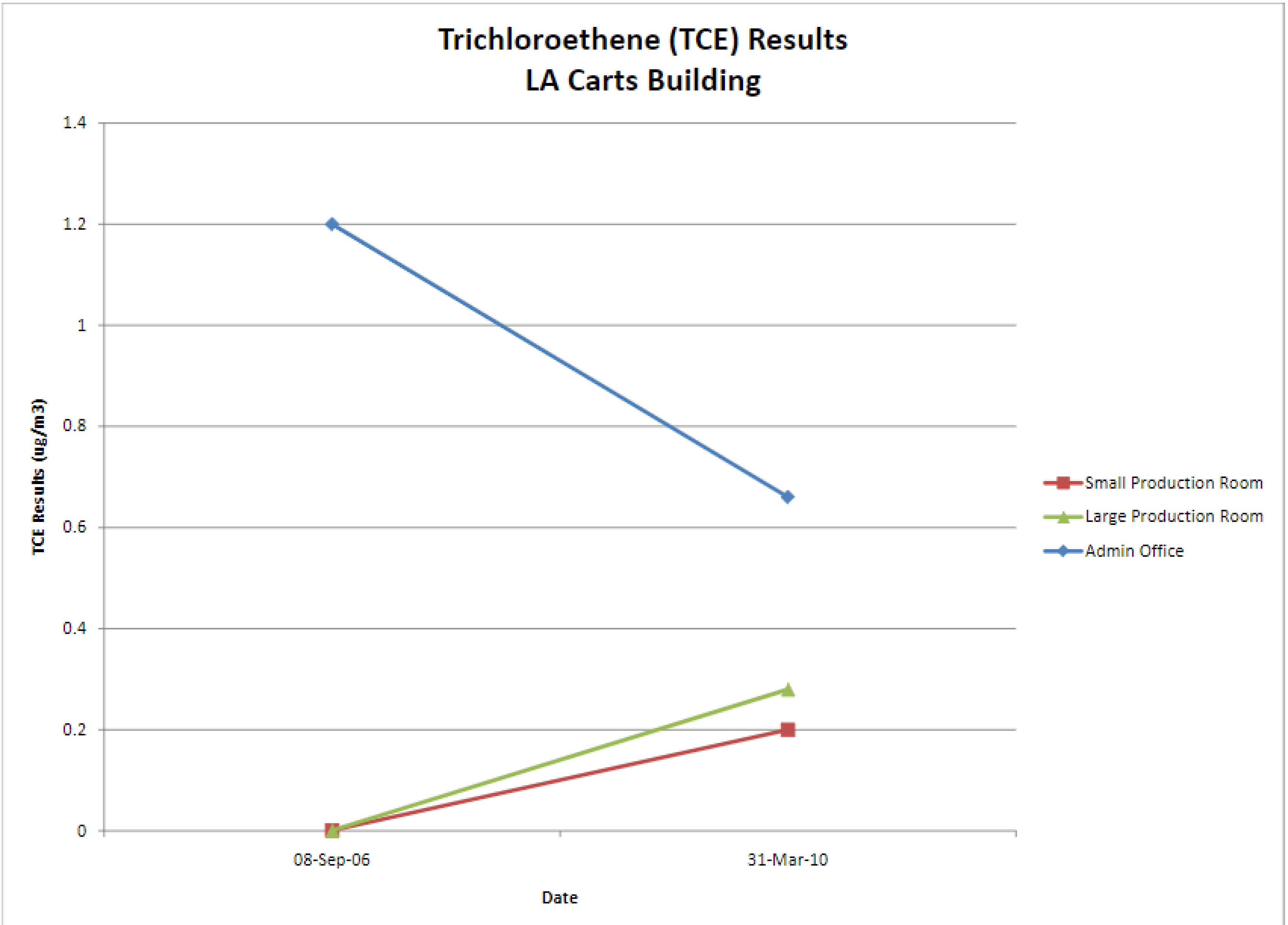


(1) Pursuant to EPA email agreement on the AOC closure process (January 13, 2022).

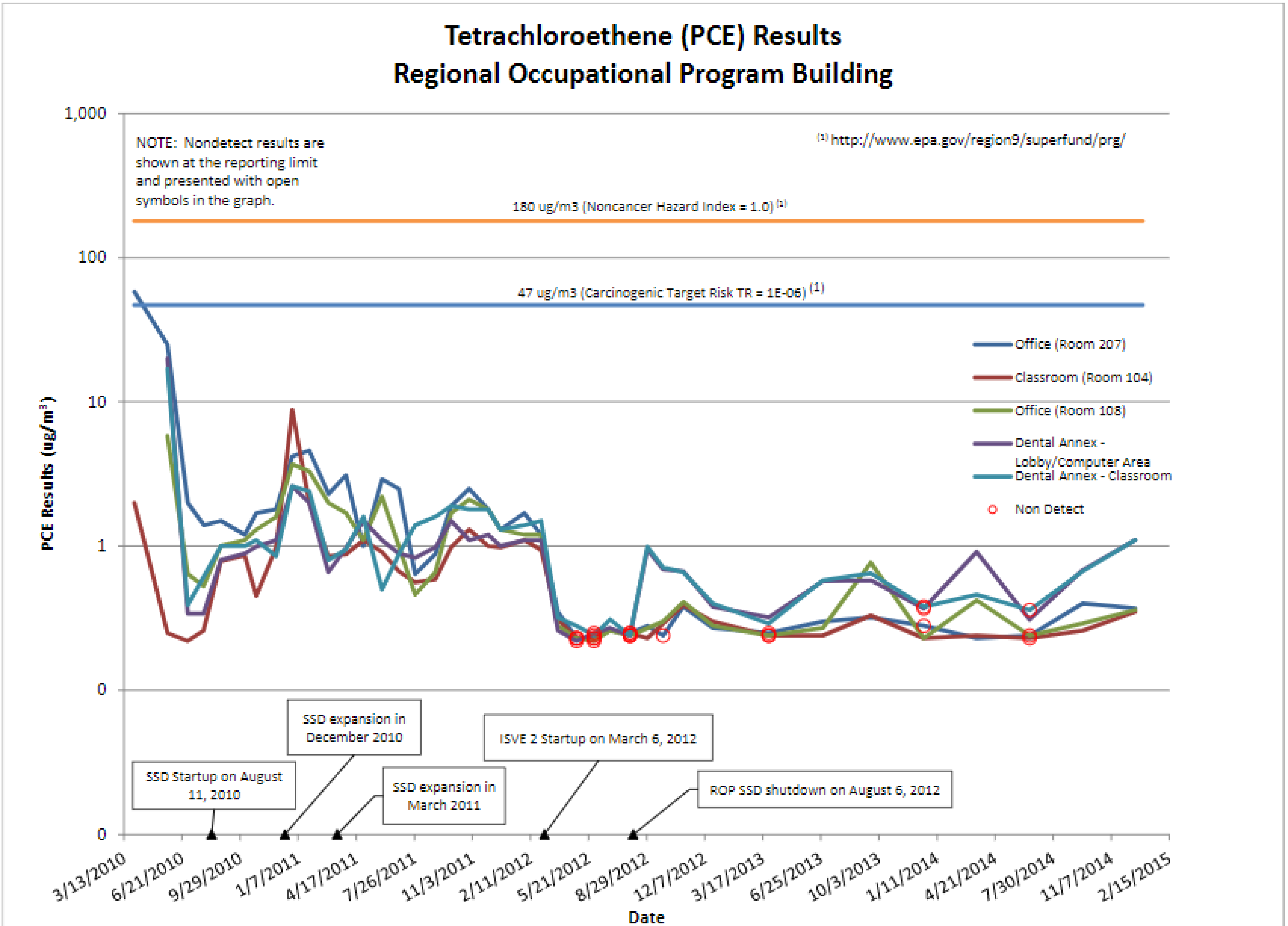
(2) http://www.epa.gov/region9/superfund/prg/

NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.

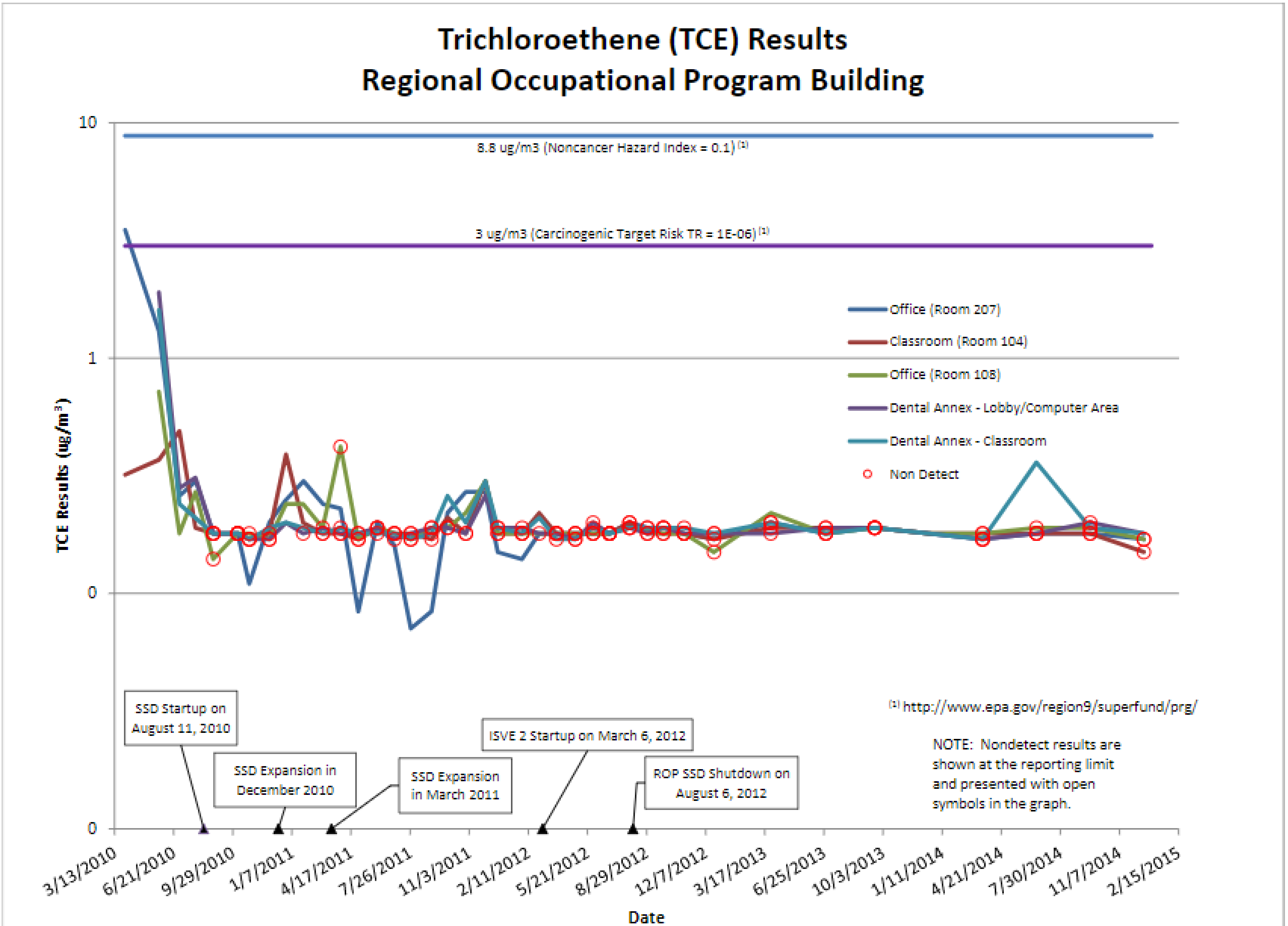

Tetrachloroethene (PCE) Results
LA Carts Building
PCE Results (ug/m3)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
08-Sep-06
31-Mar-10
Date
Small Production Room
Large Production Room
Admin Office



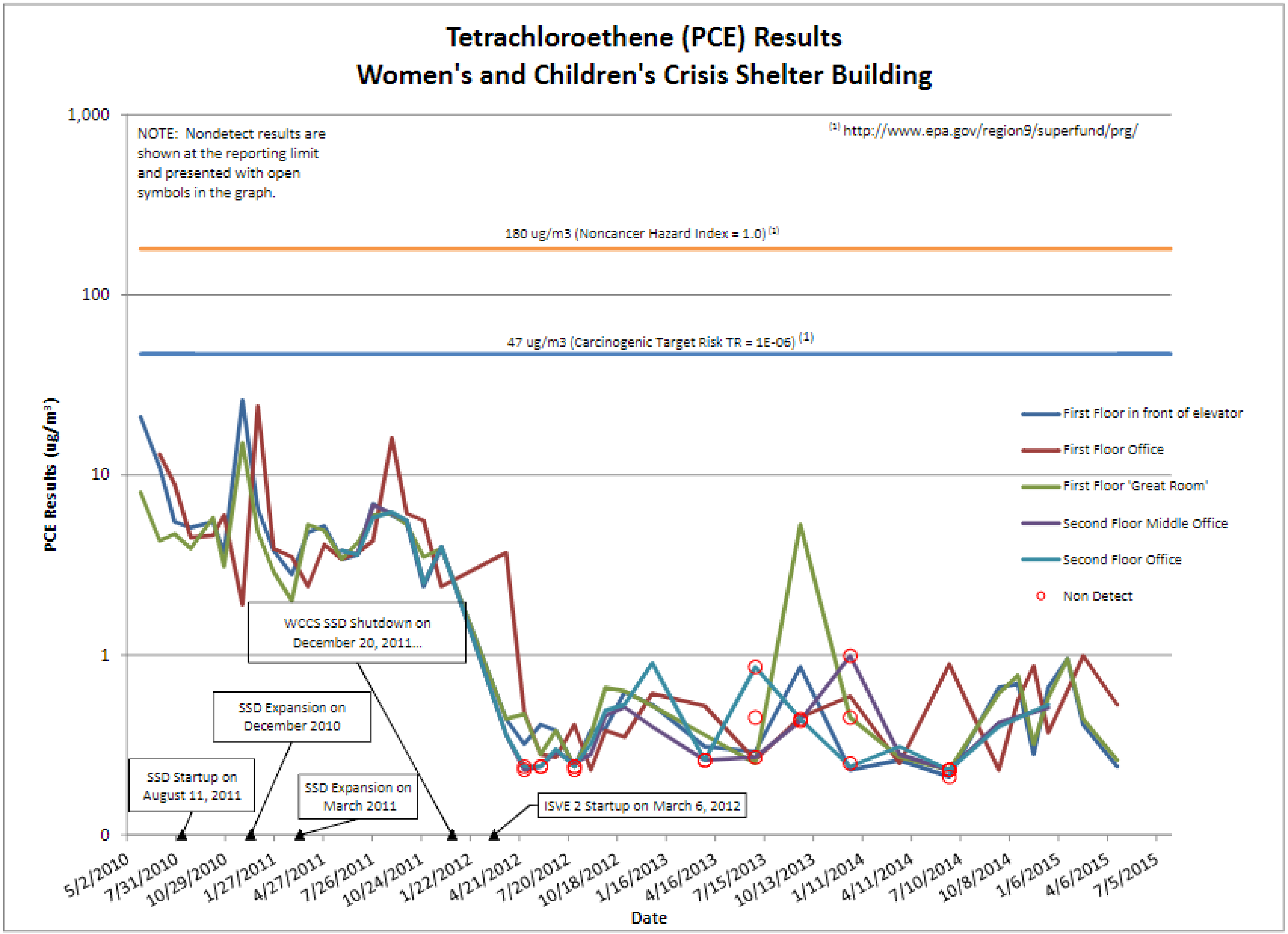
Trichloroethene (TCE) Results
LA Carts Building
1.4
1.2
1
0.8
0.6
0.4
0.2
0
TCE Results (ug/m3)
08-Sep-06
31-Mar-10
Date
Small Production Room
Large Production Room
Admin Office

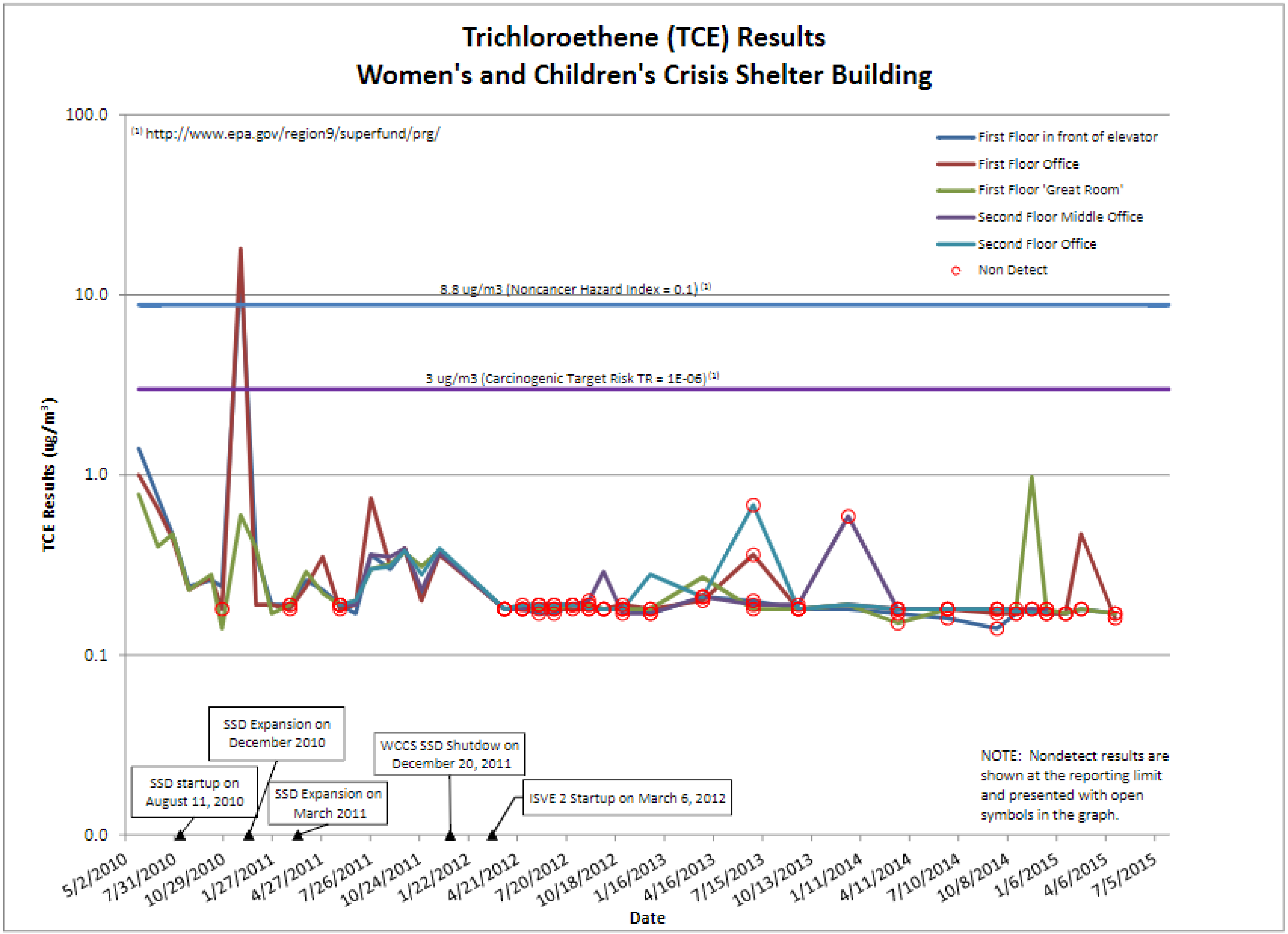


Tetrachloroethene (PCE) Results
Regional Occupational Program Building
NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.
(1) http://www.epa.gov/region9/superfund/prg/
180 ug/m3 (Noncancer Hazard Index = 1.0) (1)
47 ug/m3 (Carcinogenic Target Risk TR = 1E-06) (1)
1,000
100
10
1
0
0
PCE Results (ug/m³)
Office (Room 207)
Classroom (Room 104)
Office (Room 108)
Dental Annex - Lobby/Computer Area
Dental Annex - Classroom
Non Detect
SSD expansion in December 2010
ISVE 2 Startup on March 6, 2012
SSD Startup on August 11, 2010
SSD expansion in March 2011
ROP SSD shutdown on August 6, 2012
3/13/2010
6/21/2010
9/29/2010
1/7/2011
4/17/2011
7/26/2011
11/3/2011
2/11/2012
5/21/2012
8/29/2012
12/7/2012
3/17/2013
6/25/2013
10/3/2013
1/11/2014
4/21/2014
7/30/2014
11/7/2014
2/15/2015
Date



Trichloroethene (TCE) Results
Regional Occupational Program Building
8.8 ug/m3 (Noncancer Hazard Index = 0.1) (1)
3 ug/m3 (Carcinogenic Target Risk TR = 1E-06) (1)
Office (Room 207)
Classroom (Room 104)
Office (Room 108)
Dental Annex - Lobby/Computer Area
Dental Annex - Classroom
Non Detect
TCE Results (ug/m³)
10
1
0
0
SSD Startup on August 11, 2010
SSD Expansion in December 2010
SSD Expansion in March 2011
ISVE 2 Startup on March 6, 2012
ROP SSD Shutdown on August 6, 2012
(1) http://www.epa.gov/region9/superfund/prg/
NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.
3/13/2010
6/21/2010
9/29/2010
1/7/2011
4/17/2011
7/26/2011
11/3/2011
2/11/2012
5/21/2012
8/29/2012
12/7/2012
3/17/2013
6/25/2013
10/3/2013
1/11/2014
4/21/2014
7/30/2014
11/7/2014
2/15/2015
Date


Tetrachloroethene (PCE) Results
Women's and Children's Crisis Shelter Building
NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.
(1) http://www.epa.gov/region9/superfund/prg/
180 ug/m3 (Noncancer Hazard Index = 1.0) (1)
47 ug/m3 (Carcinogenic Target Risk TR = 1E-06) (1)
PCE Results (ug/m³)
1,000
100
10
1
0
First Floor in front of elevator
First Floor Office
First Floor 'Great Room'
Second Floor Middle Office
Second Floor Office
Non Detect
WCCS SSD Shutdown on December 20, 2011...
SSD Expansion on December 2010
SSD Startup on August 11, 2011
SSD Expansion on March 2011
ISVE 2 Startup on March 6, 2012
5/2/2010
7/31/2010
10/29/2010
1/27/2011
4/27/2011
7/26/2011
10/24/2011
1/22/2012
4/21/2012
7/20/2012
10/18/2012
1/16/2013
4/16/2013
7/15/2013
10/13/2013
1/11/2014
4/11/2014
7/10/2014
10/8/2014
1/6/2015
4/6/2015
7/5/2015
Date


Trichloroethene (TCE) Results
Women's and Children's Crisis Shelter Building
(1) http://www.epa.gov/region9/superfund/prg/
First Floor in front of elevator
First Floor Office
First Floor 'Great Room'
Second Floor Middle Office
Second Floor Office
Non Detect
8.8 ug/m3 (Noncancer Hazard Index = 0.1) (1)
3 ug/m3 (Carcinogenic Target Risk TR = 1E-06) (1)
TCE Results (ug/m³)
100.0
10.0
1.0
0.1
0.0
SSD Expansion on December 2010
SSD startup on August 11, 2010
SSD Expansion on March 2011
WCCS SSD Shutdow on December 20, 2011
ISVE 2 Startup on March 6, 2012
NOTE: Nondetect results are shown at the reporting limit and presented with open symbols in the graph.
5/2/2010
7/31/2010
10/29/2010
1/27/2011
4/27/2011
7/26/2011
10/24/2011
1/22/2012
4/21/2012
7/20/2012
10/18/2012
1/16/2013
4/16/2013
7/15/2013
10/13/2013
1/11/2014
4/11/2014
7/10/2014
10/8/2014
1/6/2015
4/6/2015
7/5/2015
Date

Appendix D: Applicable or Relevant and Appropriate Requirements Assessment

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

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

Chemical-specific ARARs identified in the 2011 Record of Decision for treated groundwater were evaluated (Table D-1). Generally, no changes in chemical-specific ARARs were observed. Bis(2-ethylhexyl)phthalate is listed below with a cleanup level based on the state drinking water standard. However, this compound is no longer included in the drinking water standards for California.

Cleanup levels for indoor air are toxicity-based, not ARAR-based, and are evaluated in the Toxicity Analysis (Appendix E).

Table D-1. Summary of Treated Groundwater Chemical-Specific ARAR Changes

Chemical	2011 ROD Cleanup Levels (µg/L, unless specified)	Basis for Cleanup Level	Current Regulations (µg/L, unless specified)		ARARs More or Less Stringent than Cleanup Levels?
			State	Federal	
1,1-DCA	5	Federal MCL	5	None	No changes/ Less stringent
1,2-DCA	0.5	Federal MCL	0.5	5	No changes/ Less stringent
1,1-DCE	6	Federal MCL	6	7	No changes/ Less stringent
cis-1,2-DCE	6	Federal MCL	6	70	No changes/ Less stringent
1,1,2-TCA	5	Federal MCL	5	8	No changes/ Less stringent
Trichloroethylene	5	Federal MCL	5	5	No changes
Tetrachloroethylene	5	Federal MCL	5	5	No changes
Bis(2-Ethylhexyl)phthalate	4	State MCL	None	6	More stringent
Carbon Tetrachloride	0.5	State MCL	0.5	5	No changes/ Less stringent

Chemical	2011 ROD Cleanup Levels (µg/L, unless specified)	Basis for Cleanup Level	Current Regulations (µg/L, unless specified)		ARARs More or Less Stringent than Cleanup Levels?
			State	Federal	
1,4-Dioxane	1	CDPH Notification Level	1	None	No changes/ Less stringent
Aluminum	50	Federal MCL	1000*	50	No changes
Manganese	50	Federal MCL	50	50	No changes
Total Chromium	50	State MCL	50	100	No changes
Hexavalent Chromium	10	State MCL	10	None	No changes
Nitrate (as Nitrogen) (mg/L)	10	Federal MCL	10	10	No changes
Sulfate (mg/L)	250	State MCL	250	250	No changes
TDS (mg/L)	500	Federal MCL	500	500	No changes

* Aluminum is listed in both the primary and secondary contaminant levels for California. The primary contaminant level is presented here. The secondary contaminant level is 200 ug/L.

Federal and State laws and regulations other than the chemical-specific ARARs discussed in Table D-1 that have been promulgated or changed since the 2005 Action Memorandum, 2008 Source Area ROD, and 2011 Downgradient Groundwater ROD are described in Table D-2. There have been no revisions to laws or regulations that affect the protectiveness of the remedy.

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

- Federal Primary Drinking Water Standards (40 CFR 141.61 and 141.62)
- DTCS Hazardous Waste Regulations (22 CCR Part 261)
- California Constitution Article X, Section 2
- State Water Resources Control Board Resolution 68-16
- California Water Code (27 CCR Div 2, Subdiv 1, Chap 3, Subchap2, Article 2)
- Hazardous Waste Security (22 CCR §66264.14)
- California Hazardous Waste Regulations (22 CCR §66260.200, 22 CCR §66261.1, 22 CCR §66261.20-.24, 22 CCR §66262.10-.11, 22 CCR §66262.20, 22 CCR §66262.34, 22 CCR §66264.13, 22 CCR §66264.15, CCR §66264.18, CCR §66264.25, CCR §66264.30-.37, CCR §66264.170-.179, CCR §66264.190-.200, 22 CCR §66264.601-.603, 22 CCR §66265.30, 22 CCR §66265.170, 22 CCR §66265.190, 22 CCR §66268)
- Preparedness and prevention (22 CCR Division 4.5, Chapter 14, Article 3)
- Tank Systems (22 CCR Division 4.5, Chapter 14, Article 10)
- County Sanitation District of Los Angeles County Wastewater Ordinance “Guidelines for the Discharge of Rainwater, Stormwater, Groundwater, and Other Water Discharges”
- South Coast Air Quality Management District (Regulation IV Rules 401 through 404, Rule 1166; Regulation XIV Rules 1401 and 1401.1)
- California Well Standards, Bulletin 74-90
- California Land Use Covenant CCR Section 1471 (CCR §67391.1(a)(1) and (2), (d)
- California Toxics Rule (40 CFR 131.36(d)10(ii)

- California Domestic Water Quality and Monitoring Regulations (Health and Safety Code §4010, 22 CCR§64434)
- Water Quality Control Plan (Basin Plan) for Los Angeles Region (Chapters 2 and 3)
- California Land Disposal Restrictions (22 CCR Division 4.5, Chapter 18, Articles 2,4,5,10)
- State Water Regional Control Board (Resolutions 68-16 and 88-63)
- Publicly Owned Treatment Works Requirements

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

Requirement and Citation	Document	Description	Effect on Protectiveness	Comments	Recent Amendment Date
National Pollutant Discharge Elimination System (NPDES) Clean Water Act §402	2005 Action Memorandum	NPDES requirements are applied to point and non-point discharge sources.	Changes to do not affect protectiveness	Minor changes to improve and clarify regulations in the following major categories: regulatory definitions, permit applications, and public notice.	June 21, 2019
National Pollutant Discharge Elimination System (NPDES) CFR 40 122-125	2005 Action Memorandum	Substantive provisions of a NPDES permit for discharges to a State body of water.	Changes to do not affect protectiveness	Minor changes to improve and clarify regulations in the following major categories: regulatory definitions, permit applications, and public notice. Section 125.3(a)(1)(ii) was deleted	June 21, 2019
Storm Water Discharge Requirements 40 CFR 122.26	2011 ROD	Nonpoint sources must be addressed using best management practices (BMPs) to control contaminants in stormwater runoff from construction activities.	Changes do not affect protectiveness.	Administrative changes	November 2, 2020
California Hazardous Waste Control Law Health and Safety Code Division 20, Chapter 6.5	2005 Action Memorandum, 2008 Operable Unit 1 (Soils) ROD	This relates to hazardous waste classifications during removal actions.	Changes to do not affect protectiveness	Addition of H&S 25110.3 and 25110.4 (definitions) and administrative changes to 25123.3, 25141, 25143.6, 25144.6, and 25150.84.	July 12, 2021

Requirement and Citation	Document	Description	Effect on Protectiveness	Comments	Recent Amendment Date
Hazardous Waste Facility General Inspection Requirements and Personnel Training 22 CCR §66264.15-.16	2005 Action Memorandum	The hazardous waste facility standards require routine facility inspections conducted by trained hazardous waste facility personnel. Inspections are to be conducted at a frequency to detect malfunctions and deterioration, operator errors, and discharges which may be causing or leading to a hazardous waste release and a threat to human health or the environment.	Changes to do not affect protectiveness	22 CCR §66264.16 changes are related to personnel training.	January 1, 2019
California Domestic Water Quality and Monitoring Regulations 22 CCR 64444	2011 ROD, 2016 ESD	Establishes California MCLs	Changes do not affect protectiveness.	Changes to the hexavalent chromium MCL. This change was included in the 2106 ESD.	December 14, 2017
South Coast Air Quality Management District Regulation XIII Rules 1301 through 1313	2011 ROD	Rules 1301 through 1313 establish new source review requirements. Rule 1303 requires that all new sources of air pollution in the air district use best available control technology (BACT) and meet appropriate offset requirements	Changes do not affect protectiveness.	Rule 1302 changed definitions Rule 1304 added limited BACT exemptions related to NOx emissions for new or modified permits Rule 1301 included administrative changes	December 4, 2020 (Rule 1302) January 5, 2022 (Rule 1304)

Appendix E. Toxicity Assessment

EPA selected indoor air cleanup levels for a residential exposure scenario that were developed in the 2007 Human Health Risk Assessment. EPA's Integrated Risk Information System (IRIS) updates toxicity values used by EPA in risk assessment when newer scientific information becomes available and are used to calculate the EPA Regional Screening Levels (RSLs). The most recent update available used for this analysis was the May 2022 update.

Changes have occurred to some RSLs since the 2008 ROD (Table E-1). All changes fall within EPA's acceptable target cancer risk range of 1 x 10^{-4} to 1 x 10^{-6} as discussed in the National Oil and Hazardous Substances Contingency Plan, so the changes do not affect protectiveness. While the current residential indoor air regional screening levels for 1,2-Dichloroethane and trans-1,2-Dichloroethene are less than the cleanup standard, a review of sampling results during the reporting period found that results for these chemicals were non-detect. Sample results from this reporting period for TCE were mostly non-detect; detected concentrations were less than the May 2022 regional screening level.

Table E-1. Summary of Indoor Air Toxicity Changes

Chemical	Indoor Air Cleanup Level (µg/m3)	Basis for Cleanup Level	Current Residential Air RSL (µg/m3) c = cancer n = noncancer	RSLs More or Less Stringent than Cleanup Levels?
1,2-Dichloroethane	0.74	Residential exposure scenario	0.11 (c)	More Stringent
1,1-Dichloroethene	88	Residential exposure scenario	210 (n)	Less Stringent
cis-1,2-Dichloroethene	29	Residential exposure scenario	NA	NA
trans—1,2-Dichloroethene	58	Residential exposure scenario	42 (n)	More Stringent
1,1,1-Trichloroethane	1,800	Residential exposure scenario	5,200 (n)	Less Stringent
Trichloroethylene	0.96	Residential exposure scenario	0.48 (c)	More Stringent
Tetrachloroethylene	0.33	Residential exposure scenario	11 (c)	Less Stringent
Trichlorofluoromethane (Freon 11)	310	Residential exposure scenario	NA	NA

Notes:
c = cancer, n = noncancer, RSL = Regional Screening Level; NA – not available/not applicable

Appendix F: Public Notice

Appendix G: Interview

Five-Year Review Interview Record			
Site:	Omega Chemical Corporation Superfund Site	**EPA ID No:**	CAD042245001

Interview Type: Email Interview
Location of Visit: Not Applicable
Date: June 24, 2022
Time:11:49 AM

Interviewers

Name	**Title**	**Organization**
Marlowe Laubach	Environmental Engineer	USACE Seattle District

Interviewees

Name	**Organization**	**Title**	**Telephone**	**Email**
Edward Modiano	de maximis, inc.	Project Coordinator (OU-1)	619-991-9074	edm@demaximis.com

Summary of Conversation

1) What is your role in the project and your length of time with the project? de maximis, on behalf of the Omega Chemical Site PRP Organized Group (OPOG), has been serving as the Project Coordinator at the Omega site since 2000. Specifically, I was utilized as a technical resource during the remedial investigation/hydrogeologic assessment phase of the project from 2000 to 2005. During this time, OPOG was implementing the initial phases of the 2001 OU1 Consent Decree (CD). Subsequently, I was named the Project Coordinator in 2006 for the Operable Unit 1 (OU1) Groundwater Remedy and Soil Remedial Investigation/Feasibility Study per the 2001 CD and the OU1 On-site Soil (OSS) Remedial Action/Remedy Design (RD/RA) per the 2010 CD. Additionally, I am the Project Coordinator for the November 2009 Administrative Order on Consent (AOC) which included the construction/operation of the interim SVE1 system in early 2010 to address vapor intrusion at certain OU1 buildings. Overall, I have been involved with site assessment and remedial project activities at the Omega Site for approximately 22 years.

2) What is your overall impression of the project? It has been a collaborative effort between USEPA, OPOG, and other stakeholders who have worked together to achieve the project objectives of meeting respective RAOs and maintaining protectiveness of human health and the environment. Throughout the project, OPOG remains in compliance with the 2001 CD, 2009 AOC, and 2010 CD. In fact, OPOG recently submitted the AOC Final Closure Report to EPA on April 1, 2022, wherein it is recommended that the AOC closure be granted by EPA pending the results of a final indoor air quality (IAQ) and soil vapor sampling event that will be conducted in January 2023. As a commemorative point, OPOG maintains a groundwater discharge permit jointly with Sanitation District of Los Angeles County and City of Whittier, and on a year over year basis, has received the "good corporate citizen award" from these agencies.

3) Is the remedy functioning as expected? How well is the remedy performing? The OU1 groundwater and soil remedies are functioning, performing, and achieving respective RAOs. Additional details of the OU1 remedy effectiveness and performance are summarized as part of the answer to Question 10.

The Groundwater Containment Remedy (GCR) is functioning in accordance with OPOG's Engineering Evaluation/Cost Analysis dated July 2005 and EPA's Action Memorandum dated September 2005 for the Non-Time Critical Removal Action. Per EPA's 2005 Action Memorandum, the OU1 groundwater pump and treat system is achieving the primary objective of containing the highest levels of VOC contamination dissolved in groundwater from within OU1, so that they don't migrate and contribute to the OU2 plume. The effectiveness and performance of the groundwater containment remedy is clearly demonstrated in the Quarterly Performance Standard Verification Plan (PSVP) Report submittals to EPA which consist of GCR operational data, water level and water quality time series hydrographs, and a groundwater capture analysis.

Consistent with the 2008 ROD, the OU1 soil vapor extraction (SVE) system was implemented. Since beginning SVE operations in 2010, contaminant mass has been significantly reduced in the shallow and deep vadose zones and effectively mitigated vapor intrusion as evidenced by IAQ concentrations remaining below EPA Regional Screening Levels (RSLs) for commercial/industrial use since operations commenced as an interim SVE system in 2010 and a full-scale SVE system in 2015. While the 2008 ROD lists soil gas, IAQ, and soil RSLs designated for residential exposure scenarios, the area is not utilized as residential, has been used in a commercial/industrial fashion since the systems were designed and operated, and the most recent General Plan Update from the City of Whittier indicate the areas of OU1/OU3 to be zoned as medical and innovation technology land use. The SVE system has been optimized over time using a combination of methods. This has included installation of additional vapor extraction wells, installation of additional conveyance infrastructure to existing wells to maximize flow and mass removal rates, replacement of the original interim SVE blower system with a larger blower to accommodate more extraction wells, adjustment of well flows on a quarterly basis to maximize mass removal, early proactive implementation of the ROD contingency of dual phase extraction wells and later conversion of additional deep SVE wells to dual phase extraction (DPE) wells, installation of additional vapor monitoring points to better understand OSS remedy performance, use of passive air inlet wells to attempt to improve recovery from specific SVE wells, and extraction well cycling to allocate flow capacity to those wells with the highest mass recovery rates. In accordance with the 2008 ROD, site pavement is inspected regularly during routine O&M and has been repaired when needed to prevent direct contact with subsurface soils. The effectiveness and performance of the OSS remedy has significantly reduced contaminant mass as clearly demonstrated in the Quarterly Performance Evaluation Report (QPER) submittals to EPA which consist of SVE operational data, soil gas and indoor air compliance monitoring, and system mass removal and indoor air concentration times series graphs.

4) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? Significant decreases in concentrations have been observed based on consistent SVE system operations and efforts to optimize mass removal. As mentioned above, the PSVP Reports and QPER's contain all monitoring data and demonstrate that trends relating to mass removal and VOC contaminant levels have significantly decreased over time. The following provides a summary of the monitoring data and trends:

OSS Remedy

- The optimized SVE system has removed a total of 9,709 pounds of mass since 2010.
- The current annual VOC mass recovery rate, as presented in 1Q2022 QPER, represents less than 0.05% of the 9,709 pounds recovered. This low rate of VOC mass recovery achieved by the already-optimized OU1 OSS remedy indicates this system has reached asymptotic conditions.
- The SVE influent concentrations for PCE, TCE, and total VOC's have decreased by three to four orders of magnitude from initial concentrations.
- PCE is currently below the ROD soil gas cleanup level based on residential land use and a conservative risk management benchmark based on the point of departure of 470 micrograms per liter (ug/L) in 14 of the 16 routinely sampled shallow soil gas probes as summarized in the 1Q2022 QPER.
- TCE is below the ROD soil gas cleanup level in all the shallow vapor probes.
- Indoor air PCE/TCE concentrations decreased in OU1 buildings with the start of SVE operations in 2010 and have remained below the current EPA risk screening levels for the commercial/industrial land uses within OU1 since 2011.

GCR Remedy

- Per the EPA approved 2007 PSVP Work Plan, the collection of water level and water quality data are the lines of evidence to demonstrate that the GCR is containing the high levels of VOC's in OU1 from migrating into OU2. The following provides the current findings related to the water level and water quality data:
    - The interpretive hydrogeologic capture analyses prepared by CDM Smith (included in PSVP Reports) clearly indicate that the GCR is achieving containment.
    - PCE concentration decreases in monitoring wells downgradient of the GCR also demonstrate effective containment by the GCR:
        - PCE concentrations at key performance monitor well OW-9 have decreased from 28,000 ug/L to 1,100 ug/L (approximate 97% reduction)
        - PCE concentrations at key performance monitor well OW-10 have decreased from 220 ug/L to 14 ug/L (approximate 94% reduction)
        - PCE concentrations at key performance monitor well OW-11 have decreased from 1,500 ug/L to 19 ug/L (approximate 99% reduction)
- The following provides additional GCR observations regarding the performance monitoring data:
    - PCE concentrations at monitor well OW1A/OW12, located within the OU1 groundwater source area and upgradient of the GCR, have decreased from 170,000 ug/L to 760 ug/L (approximate 97% reduction).
    - The GCR influent concentrations for PCE have decreased from approximately 15,000 ug/L to 120 ug/L (99% reduction) (approximate 99% reduction).
    - The GCR system has removed a total of 993 pounds of mass since 2009.
      The current annual VOC mass recovery rate, as presented in the 1Q2022 PSVP, represents 0.11% of the 993 pounds recovered.

5) Is there a continuous O&M 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. Onsite O&M of the GCR and OSS remedies are conducted on a weekly basis by JHA Environmental, Inc. (JHA). Each system requires one day each for onsite O&M, hence, JHA is at the Omega Site twice a week. During the weekly site visits, JHA mechanically maintains, inspects, replaces equipment, and resets alarms, as necessary, for both the GCR and OSS systems inclusive of extraction wells. Also, JHA collects field parameter data to ensure both systems are operating per design and collects monitoring data to track the effectiveness and performance of both systems. Both systems include instrumentation that continuously monitors system conditions, and automatic controls that will initiate a system shutdown and notify operators in the event of a shutdown. Operators can also monitor the operation of the systems remotely and perform some remote tasks.

JHA's O&M presence sometimes has increased to 3 – 5 days/week if non-routine activities are occurring. Other activities that JHA conducts during the O&M visits include maintaining the site fence for security purposes, maintaining the automatic site security system, visually inspecting paved surfaces, and maintaining a good rapport with all property owners for access. JHA has been conducting O&M activities at the Omega Site since 2010. All routine and non-routine maintenance activities are provided in quarterly reports for respective systems.

6) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? If so, do they affect protectiveness of the remedy? Please describe changes and impacts. There have not been any significant changes to the O&M requirements, maintenance schedules, or sampling routines in the last five years. In 2017, EPA agreed to decrease the frequency of IAQ and vapor monitor probe (VMP) sampling and reduced monitoring locations for the OU1 On-Site Soils remedy since the remedy had been effectively operating for 5+yrs, had significantly reduced mass, and was in a routine O&M mode. These changes did not affect the protectiveness of the remedy.

7) Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details. Outside of the normal wear and tear of equipment associated with both the GCR and OSS remedy there have been no unexpected O&M difficulties or costs at the Omega Site over the last 5 years.

8) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency. Yes. See above responses to Question 3 (regarding more significant system optimizations) and Question 6 (regarding other O&M and monitoring efforts). In addition to these efforts, others have been conducted to improve the efficiency of the operations, including optimization of GCR extraction well pump set points to maximize pump lifespan, extraction well development to improve performance, addition of redundant instruments to improve system reliability and reduce nonroutine effort and system downtime, improvement in remote system monitoring capabilities to make O&M more efficient, connection of the SVE condensate discharge pump to the GCR to facilitate condensate treatment and disposal, improvements to the system control hardware and software to improve data management, installation of sunshades and control panel fans to improve the reliability and prolong the lifespan of system components, increased alarm testing to improve system reliability, and optimization of operational data collection and management practices. These actions have made O&M more efficient and reduced the likelihood of future nonroutine costs. OPOG expended a significant amount of capital costs to design and install the GCR during the period from 2007 to 2009, the interim SVE1 remedy from 2009 through 2010 and full-scale SVE remedy during the period 2013 to 2015. Over the last 5 years, the GCR remedy costs have decreased from $509,574 in 2017 to $453,980 in 2021 and the OSS SVE remedy costs have decreased from $1.5M in 2017 to $293,858 in 2021 (Note: As approved by EPA, the OSS SVE remedy was non-operable from July 2021 to December 2021 due to the implementation of the voluntary OU1 Data Collection Program, hence, the O&M costs for 2021 tend to be on the low side). These costs indicate that both the GCR and OSS remedies are in the O&M, monitoring, and reporting phases of the project and are operating efficiently. As mentioned in the response to the above Question 5, the O&M contractor spends two days a week at the site (one day dedicated to GCR O&M and one day dedicated to SVE O&M). Note: While there is a security system, there is a significant homeless element around the Site, which has been subject to vandalism, hence, there is a benefit to having a physical presence at the Site.

9) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy? No. The City of Whittier updated and adopted a new General Plan in September 2021 assuring land use designation for the Omega OU1 site, as medical and innovation. The City of Whittier has indicated that no residential developments will occur at the Omega OU1 site or adjacent properties south of Whittier Boulevard.

10) Do you have any comments, suggestions, or recommendations regarding the project? From the answers to the above questions and based on the information contained in the quarterly PSVP Reports and QPER's, the GCR and OSS remedies have been and continue to be very effective at reducing/controlling mass/mass flux and mitigating vapor intrusion. The OU1 OSS remedy has been designed, operated, and optimized to maximize COC mass removal and concentration reduction in the unsaturated zone of OU1 while mitigating vapor intrusion into the OU1 buildings. The GCR has been effective in achieving containment of the VOCs in OU1 groundwater from migrating into OU2 groundwater.

In March 2021, OPOG proposed to EPA to perform a voluntary OU1 Data Collection Program (DCP) to further evaluate soil and groundwater conditions in support of the ongoing remedial efforts in OU1. More specifically, the objectives of the OU1 DCP were to collect soil matrix and soil gas concentration data to evaluate the OU1 OSS remedy (i.e., SVE and DPE remediation progress) and determine the current distribution of residual VOC mass/concentrations in former high concentrations portions of the unsaturated and saturated zones. The OU1 DCP field program was initiated in July 2021 and completed in February 2022. All data collected from the OU1 DCP were provided to EPA in February and March 2022 and formally on May 9, 2022. The following summarizes the results from the OU1 DCP:

- Recent soil matrix data indicate that the ROD cleanup level has been achieved for direct contact with soil.
- Recent soil gas samples data collected during the OU1 DCP field program indicate that PCE was the only compound exceeding the ROD soil gas cleanup level for residential land use and a conservative risk management benchmark based on the point of departure. The concentration reduction in soil gas data observed during the OU1 DCP supports an alternate risk management approach that is consistent with the NCP combined with anticipated future commercial land use.
- The indoor air samples collected during the 6-month rebound period remained over 9 times below the commercial/industrial RSLs.
- The recently collected soil matrix and soil gas samples indicate there has been substantial COC concentration reduction, on the order of 99% or greater, in the OU1 subsurface.
- Soil and soil gas samples collected from the shallow and deep soil indicate that there are no high residual concentration/mass areas remaining in the shallow or deep soil. The COC concentration reduction in the shallow and deep soil and the relatively low to no rebound observed in soil gas concentrations during the SVE1 downtime indicates that the OU1 OSS remedy has been effective in treating the soil.
- Soil samples collected from the formerly saturated deep soil (between ~70 and 85 feet bgs) along with MIP profiles indicate that there are no high residual concentration/mass areas remaining in this interval. The COC concentration reduction in this interval indicates that the OU1 OSS remedy has been effective in treating this zone. As a note, the previously saturated deep zone has been dewatered over the last 10+ years due to on-going drought conditions and by operation of the upgradient DPE wells that were installed approximately 20 feet bgs deeper than the extraction wells installed along Putnam Street.
- The PCE groundwater concentrations at the water table prior to initiating the GRC removal action were as high as approximately 170,000 µg/L. As the water table declined and soil and groundwater remediation progressed, the

concentration of PCE in groundwater at monitoring wells throughout OU1 also declined. Recent PCE concentrations have declined to a maximum of approximately 1,500 µg/L.

Overall, the optimized OU1 OSS remedy has resulted in reductions in high soil matrix and soil gas concentrations as observed during the OU1 data collection program. The OU1 OSS remedy, SVE system mass recovery, has reached near asymptotic conditions with very low rates of mass recovery that continue to diminish with time. These observations are consistent with depleted subsurface mass and diffusion-limited mass partitioning and recovery, though significant rebound is not observed. The GCR has been effective in containing the high concentrations of VOCs in OU1 groundwater from migrating into OU2 groundwater, and at the same time reducing the higher VOC concentrations within OU1. Comparison of maximum pre-removal versus maximum recent groundwater concentrations indicates that there has been an approximate 99 percent reduction in groundwater concentrations in OU1.

OPOG attributes the successful implementation of the OU1 program and substantial progress made to date to the combined efforts of the EPA and OPOG project teams. OPOG plans to continue to work with the EPA project team following completion of the 5-year remedy review by incorporating practical, proven, and sustainable controls that facilitate and foster the future commercial/industrial land uses in OU1.

Additional Site-Specific Questions

4) Who are other parties that you would recommend being interviewed for this Five-Year Review and what is their contact information? Over the years, OPOG has predominantly worked with EPA on the Omega OU1 soil and groundwater remedies. At the request of EPA, Don Indermill of DTSC has been copied on Omega OU1 documents, however, it is our understanding that he is no longer working on the Omega OU1 project. The RWQCB has not been involved with Omega OU1 project activities. On the local agency level, OPOG has been working with the City of Whittier since 2005 as related to OU1 cleanup levels, remedial system installation and associated conveyance piping, easements for extraction/monitor well installations, land use determinations, and property developments around the Omega OU1 site. However, there has been a significant amount of turnover within the City of Whitter staff. The current contact at the City of Whittier is Ben Pongetti, Interim Director of Community Development, 562-567-9320, bpongetti@cityofwhittier.org.

5) We are interested in interviewing contacts from the area hospitals that have done air sampling and are planning construction to expand their facilities, respectively, and other contacts that you may suggest. Over the years, OPOG has been working with PIH representatives as related to easement agreements, remedial system installation and associated conveyance piping, extraction well/monitor well installations, soil vapor/indoor sampling activities, and potential property developments. Like the City of Whittier, there has been a significant amount of PIH staff turnover. With this understanding, the current contact is David Sperry, Director, Facilities Support, PIH Health Whittier Hospital-PHWH 12401 Washington Blvd., Whittier, CA. 90602, P: 562.698.0811 Ext. 12769, E: David.Sperry@PIHHealth.org.

Appendix H: Site Inspection Report and Photos

Omega Chemical Superfund Site

Whittier, California

a. Date of Visit: 29 June 2022
b. Location: Whittier, CA
c. Purpose: A site visit was conducted to visually inspect and document the conditions of the remedy, the site, and the surrounding area for inclusion into the Five-Year Review Report.
d. Inspector: Kevin Yu; U.S. Army Corps of Engineers, Project Engineer; 626-401-4087
e. Participants:

Name	Company	Email	
Kevin Yu	U.S. Army Corps of Engineers, Los Angeles District	Kevin.yu@usace.army.mil	626-401-4087
Khalid Azhar	JHA Environmental, Inc.	kazhar@jacobandhefner.com	
Chris Ross	Engineering Analytics	CRoss@enganalytics.com	
Edward Modiano	De Maximis	edm@demaximis.com	
Jillian Ly	LARWQCB	jillian.ly@waterboards.ca.gov	213-576-6664
Tina Liu	Geosyntec	TLiu@Geosyntec.com	
Jason Hermening	EPA	hermening.jason@epa.gov	415-462-6469
Cesar Rangel	City of Whittier		

A site visit to the Omega Chemical (Omega) Superfund Site was conducted on 29 June 2022. The inspection included visual observation of overall site conditions and inspection of various components of the remedy. The participants received an overview of the site and the remedial history. The inspection evaluated the groundwater treatment system, soil vapor extraction system, groundwater and soil vapor extraction wells.

On 29 June 2022, Mr. Kevin Yu arrived at the Omega Chemical Superfund Site at 0900 hours. The weather was sunny, calm and approximately 75 degrees Fahrenheit. The participants gathered for a safety briefing followed by a brief history of the site given by Mr. Edward Modiano. This will be the first Five-Year Review (FYR) for this site. Vandalism and theft of copper wire have been an ongoing issue at the site. The former Skateland property, now owned by Omega, is surrounded by a steel fence with a privacy screen; a row of trees along the outside of the fence provides additional cover for the property. The property entrance is a sliding gate which is secured with a padlock. The perimeter fence is in good condition. The property is monitored by a motion-capture security system and the operator, Mr. Khalid Azhar, is on site once a week.

The group toured the groundwater pump and treat system located on the former Skateland property (12520 Whittier Blvd). The system is located within a secure building that appears to be in good condition. The double steel gate to the building is secured by a padlock, and a chain link fence extends from the building's concrete block wall to the roof. The system has a total of five (5) extraction wells, four (4) vapor extraction (VE) wells, and five (5) dual phase extraction (DPE) wells. Out of these wells, one (1) extraction, one (1) VE, and five (5) DPE wells are active. Mr. Azhar reported that they have not had any scaling, pneumatic, or other non-routine issues with the pump and treat (P&T) system which has had an uptime of greater than 95%. Mr. Azhar is able to monitor the system remotely using a phone application. Occasionally, the system will shut down if the operating temperature exceeds 130 degrees Fahrenheit or if the system is flooded by rainwater. In the event of system shut down, Mr. Azhar is able to restart the system remotely after the issues are addressed. There is a backup operator if Mr. Azhar is not available. The O&M manual and Health and Safety plans were all in place. No major issues with the air stripper were noted, and the system appeared to be in good condition and functioning normally.

Next, the group inspected the soil vapor extraction (SVE) system located on the adjacent property (12512 Whittier Blvd). The release area is located on the former Omega Administration property. The entrance to the property is a steel gate secured by a padlock. The SVE system, which was in operation, is surrounded by a slatted chain link fence. The system has 10 SVE wells which were part of the original system and 5 dual phase extraction (DPE) wells. The fence and concrete pad were in good condition. The SVE system does not operate with dilution air or cycling. There are two vapor granular activated carbon (VGAC) vessels. The GAC for each tank is replaced once every two years on an alternating basis. Mr. Azhar explained that they have installed a permanent condensate line for the air/water separator to convey moisture directly to the GWTP to be managed. Representative vapor extraction well, VE-15S was inspected. The well was found to be secured and in good shape.

The concrete on the former Omega Administration property has some cracking but was otherwise in good condition.

Following the tour of the SVE system, the group walked the perimeter of the site along Whittier Blvd, Washington Blvd, Putnam St, and Pacific Pl. The lot on the corner of Whittier and Washington is empty. There are plans to build a three-story medical building with a Starbucks on the first floor on this lot and the former LA Carts lot. The LA Carts building had burned down several years ago, leaving the lot now vacant. The only segment of the OU-1 Groundwater Containment Remedy conveyance piping that is above ground is located on the former LA Carts lot and will be buried below ground in the future.

The Tomacico building located on the corner of Washington Blvd and Putnam St consists of Suites A, B, and C. Suites A is occupied by the building owner, Mr. Chen, who has an Oncology practice, and Suite B is occupied by an urgent care facility, BeWell Immediate Care. Suite C is vacant. A De Maximis representative stated that they routinely reach out to the property owner to schedule indoor air sampling but typically do not receive a response.

The Bishop Building is currently occupied by Bishop Company which operates an open warehouse and sells landscaping supplies and equipment. The building has a general office space on the ground floor and a shop and open warehouse elevated a half floor above the ground. An employee in the store told Mr. Hermening and Mr. Yu that the building has seven employees and receives regular customer traffic.

The Terra Pave Building is currently unoccupied. The building was previously an administration building which has since been relocated to a new location. Mr. Modiano stated that the owner of this lot receives payment from Omega Chemical each time the lot is accessed, including for sampling events. The owner did not allow conveyance piping for the GWTP to transect his property which is why the conveyance circumvents the lot via Putnam St and Washington Blvd.

Next, the group visited the OU-3 SVE system located down an alley which extends to the southwest of Putnam St. The system is not in operation and does not have a Decision Document. Mr. Modiano stated that they are trying to close the Area of Concern. The former Merchant Metals building is being redeveloped into a wellness center and beer tasting business by the new owners, PIH. Representative DPE well, DPE-10D was inspected. The well was found to be secured and in good condition.

After the walking tour, the group broke for lunch at 1130 hours. After lunch, the party regrouped at the site of the future OU-2 groundwater extraction and treatment system location located at 10065 Santa Fe Springs Rd, Santa Fe Springs. The lot does not have any active oil wells on the property. The treatment system will have 4 extraction wells at 7 depths. EW-1, -2, and -3 will be dual-nested, shallow and deep, while EW-4 will only be deep. The extraction wells have already been installed and conveyance piping will be installed. The group toured the system in a van and confirmed the location of each of the extraction wells. Mr. Yu departed OU-2 at 1430 hours.

All components of the remedial action for the Omega Chemical Superfund Site appear to be in good condition and are currently operating as intended.

Figure 11. Overview of Groundwater Treatment Plant (GWTP) Compound facing NW.

Figure 12. HDPE lines in.

Figure 13. Pressure gages for influent.

Figure 14. Influent flow meter.

Figure 15. Air Stripper trays.

Figure 16. Air Stripper blower.

Figure 17. GWTP VGAC vessels.

Figure 18. GWTP control panel.

Figure 19. Interior of the GWTP control system cabinet.

Figure 20. Contractor office trailer on the former Skateland parking lot facing NW.

Figure 21. Overview of the former Skateland Property facing N.

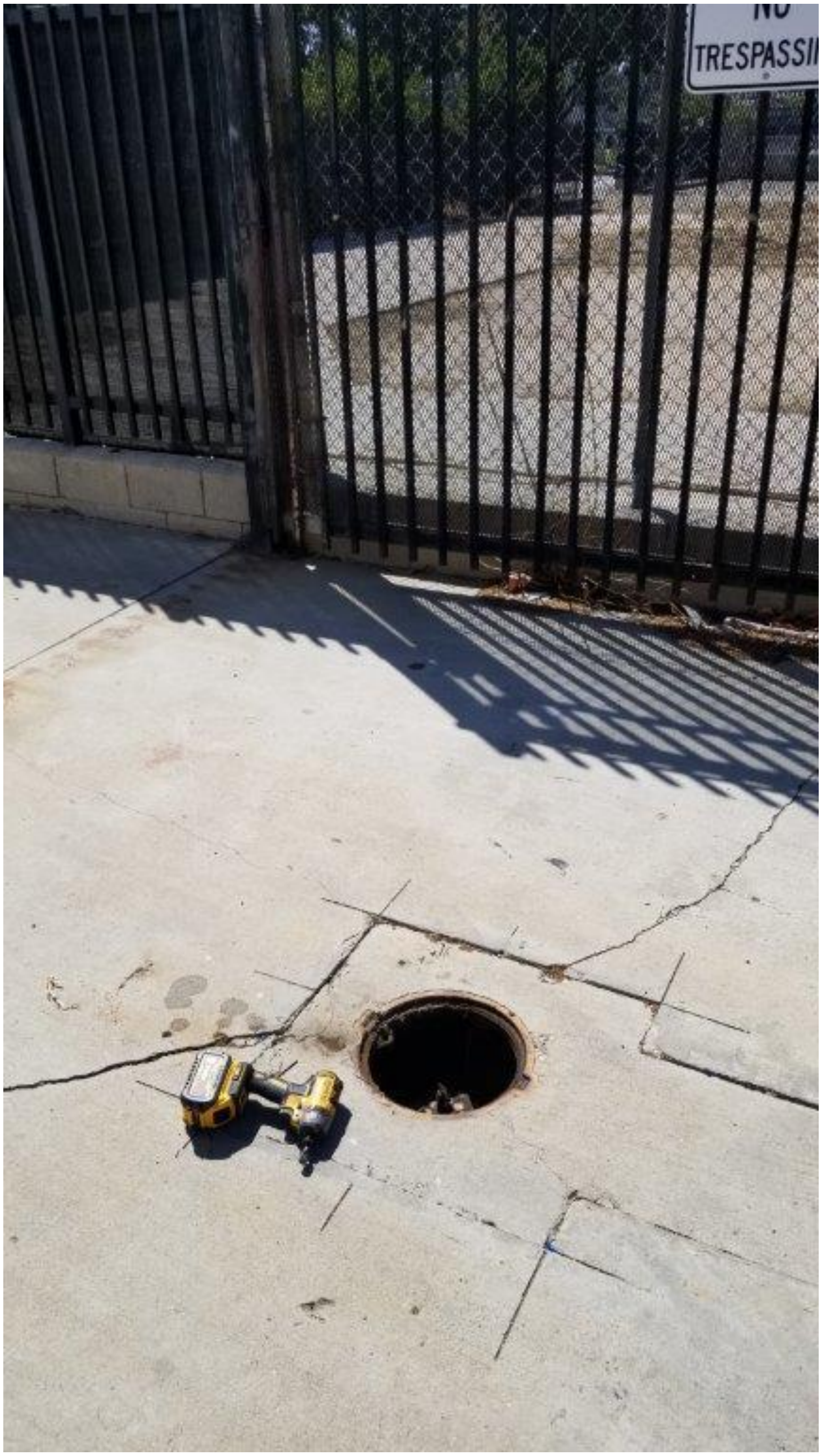


Figure 22. Vapor extraction well VE-15S located immediately within the former Omega Administration property gate facing SW.

Figure 23. Close-up of VE-15S.

Figure 24. Overview of the OU-1 SVE Treatment Plant facing N.

Figure 25. Overview of SVE system facing N.

Figure 26. SVE sampling ports facing N.

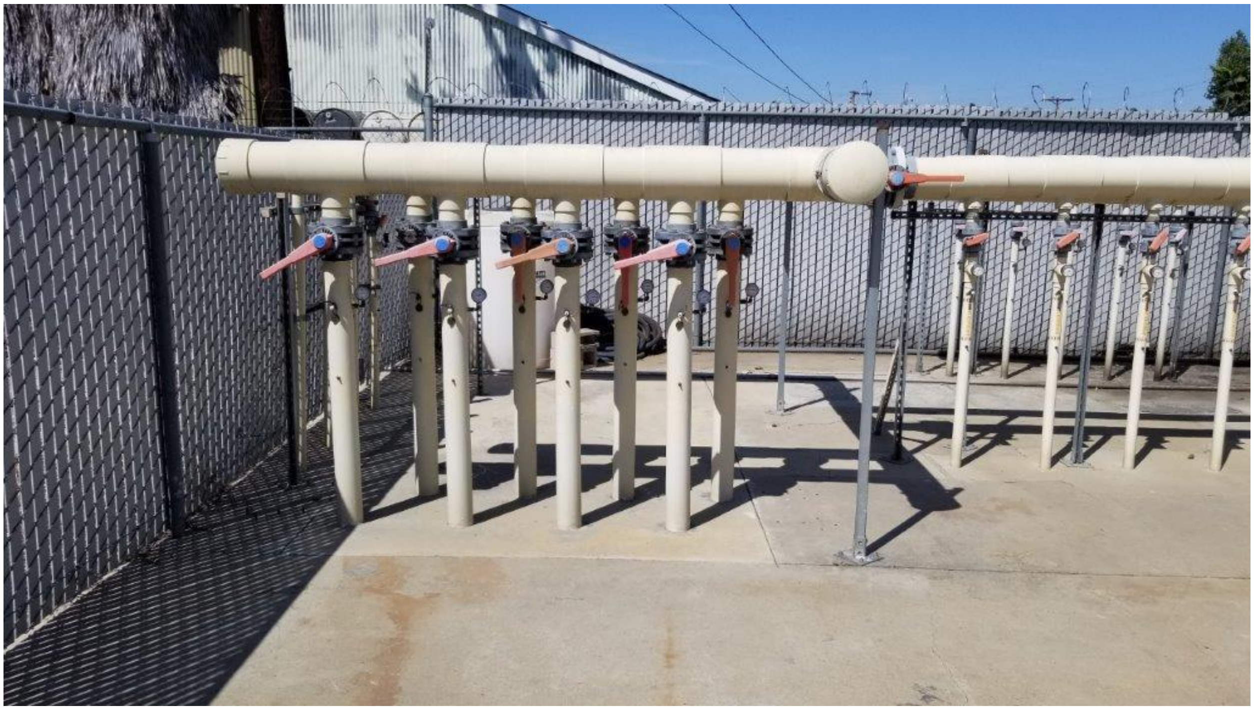


Figure 27. SVE sampling ports facing NW.

Figure 28. SVE sampling ports VE-14D and DPE-4.

Figure 29. SVE system VGAC vessels facing NE.

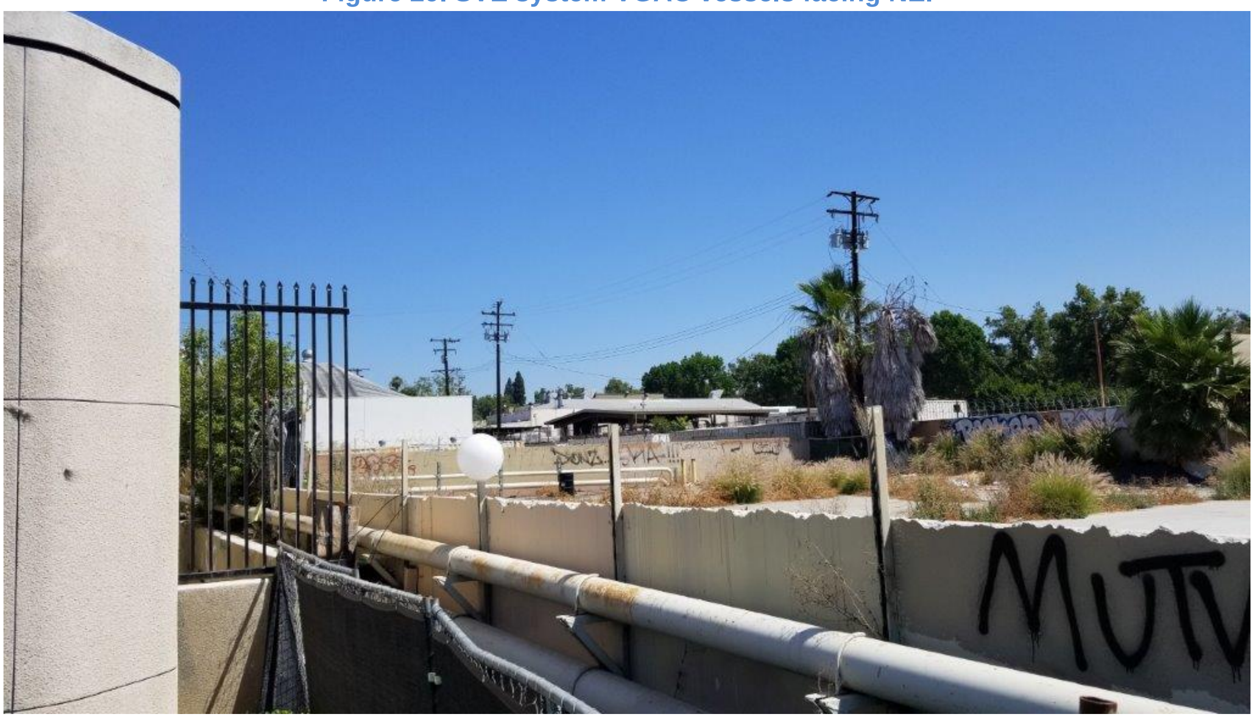


Figure 30. GWTP above-ground conveyance on former LA Carts property to be relocated underground facing E.

Figure 31. Bishop Company property facing SE.

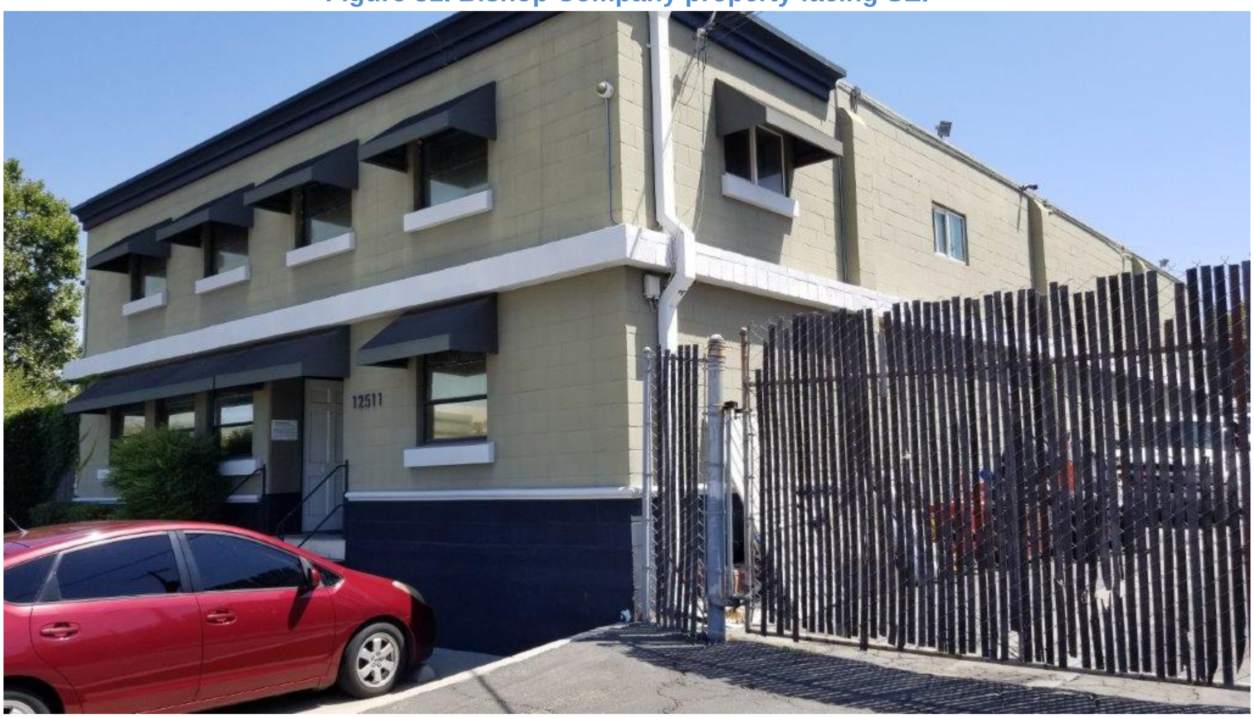


Figure 32. Terra Pave property facing SE.

Figure 33. Dual Phase Extraction Well Vault DPE 10D facing N.

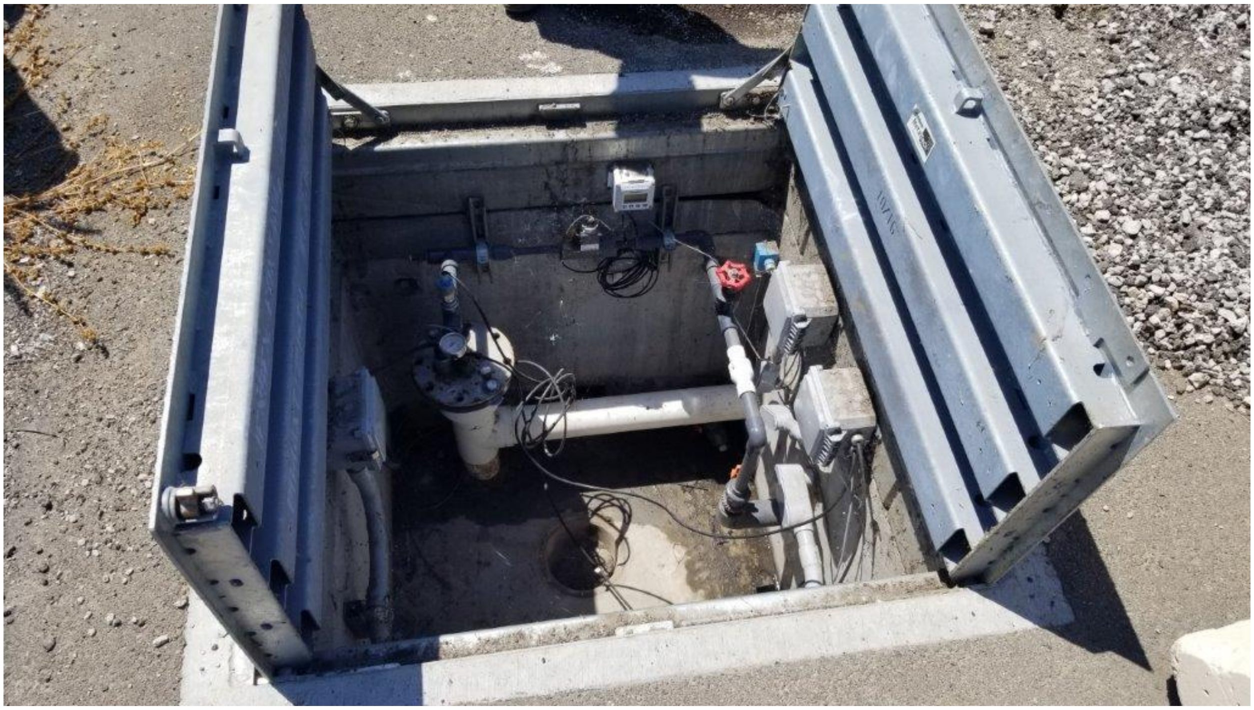


Figure 34. Dual Phase Extraction Well Vault DPE 10D.

Figure 35. Dual Phase Extraction Well Vault DPE 10D.

Figure 36. Overview of 10065 Santa Fe Springs Rd property where the Downgradient Groundwater Extraction and Treatment System will be located facing SE.

Figure 37. Extraction Well EW-4 located on Hawkins St. facing SW.