SIXTH FIVE-YEAR REVIEW REPORT FOR CHEMSOL, INC., OPERABLE UNIT - 2 SUPERFUND SITE MIDDLESEX COUNTY, NEW JERSEY

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
FYR	Five-Year Review
ICs	Institutional Controls
MCUA	Middlesex County Utilities Authority
µg/L	Microgram per Liter
mg/kg	Milligram per Kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCBs	Polychlorinated biphenyls
PFAS	Per and Poly-Fluorinated Alkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SVOCs	Semi-Volatile Organic Compounds
VOCs	Volatile Organic Compounds
TBC	To be considered
TVOC	Total VOCs
UU/UE	Unlimited Use and Unrestricted Exposure

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR 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 FYR review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the sixth FYR for the Chemsol Inc., Superfund Site (site). The triggering action for this statutory review is the previous five-year review, signed August 17, 2020. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The site consists of three operable units (OUs). OU1 initially addressed interim groundwater actions. This action has been subsumed by OU2. OU2 addressed soils and groundwater contamination. Soils work is complete and the groundwater remedy is ongoing. OU3 addressed downgradient groundwater contamination, and a remedy has not been selected. OU2 will be the subject of this FYR.

The site FYR was led by David Montoya, the EPA Remedial Project Manager. Participants included Michael Scorca, John Mason, and William Yeung (EPA Hydrogeologists), Dr. Lora Smith-Staines and Tara Bhat (EPA Human Health Risk Assessors), Julie McPherson (EPA Ecological Risk Assessor), and Donette Samuel. The Chemsol PRP (Potentially Responsible Party) Group was notified of the initiation of the five-year review. The review began on 10/21/2024.

Site Background

The site is located near a populated area at the end of Fleming Street in Piscataway Township in Middlesex County, New Jersey. The site is about a half-mile north of Interstate 287 (see Figure 1) and is bounded on its southern side by the Conrail railroad right-of-way. The site encompasses approximately 40 acres and is divided into two areas: an undeveloped, wooded area known as Lot 1A, and a cleared area known as Lot 1B. There are two small, intermittent streams known as Stream 1A and Stream 1B that drain northward across the site into a marshy wetland area that is located near the northeastern property boundary.

Chemsol, Inc., operated as a solvent recovery and waste reprocessing facility beginning in the 1950s and ending in 1964. Recovery and reprocessing activities included operations such as mixing, blending, and distillation. During its period of operation, the site experienced numerous accidents, fires, and explosions from the storage, use, and processing of flammable materials. Due to these incidents, the Township of Piscataway ordered the facility to close. The site has remained unused since 1964. In 1978, it was rezoned from industrial to residential, however the site remains undeveloped.

Land in the vicinity of the site is used for a mixture of commercial, industrial, and residential purposes. Single-family residences are located immediately to the west and northwest of the site, and an apartment complex with more than 1,100 units is located north of the site. The 40-acre site is currently fenced.

Geology/Hydrogeology

The site is underlain by the bedrock of the Passaic Formation (referred to in earlier site documents as the Brunswick Formation). This bedrock is overlain by a thin layer of overburden soil comprised of heavily

weathered bedrock, clays and silts (weathered products of the bedrock), and fill. This unconsolidated layer is typically no more than three to ten feet thick at the site.

At the site, the Passaic Formation has been conceptually subdivided into six units based on the site stratigraphy and the observed aquifer response to the various pump tests that have been performed (see Figure 2). The stratigraphy beneath the site includes:

- Overburden Water-Bearing Zone
- Upper Bedrock (Aquitard)
- Upper Permeable Aquifer
- Upper Gray Shale
- Principal Aquifer
- Lower Gray Shale
- Lower Bedrock Aquifer

Groundwater in the overburden at the site occurs in a perched zone approximately two to six feet below the surface and directly interconnected with surface water. Within the bedrock, groundwater is observed at approximately 10 to 26 feet below the ground surface. Because of its fine-grained composition, the primary effective porosity of the Passaic Formation is low.

Groundwater movement within the aquifer is controlled by fracture flow. During pumping, there is a preferential drawdown along the strike of the formation (northeast-southwest). Estimated well yields range from 10 gallons per minute (gpm) to 190 gpm. Groundwater within the overburden generally flows toward the northeast. In the bedrock, the flow is generally towards the north and northeast. Due to low potentiometric gradients, groundwater flow within the bedrock can be easily influenced by off-site pumping.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Chemsol Inc., Superfund Site		
EPA ID: NJD980528889		
Region: 2	**State:** NJ	**City/County:** Piscataway/Middlesex

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: EPA
Author name (Federal or State Project Manager): David Montoya
Author affiliation: EPA
Review period: 9/30/2020 - 5/21/2025
Date of site inspection: 4/15/2025
Type of review: Statutory
Review number: 6
Triggering action date: 8/17/2020
Due date *(five years after triggering action date)*: 8/17/2025

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In evaluating the potential risk to human health and the environment associated with the site, EPA focused on the groundwater contaminants that were likely to pose the most significant risk to human health and the environment. EPA identified several potential pathways by which the public could potentially be exposed to contaminant releases, including exposure to contaminated groundwater at the site.

The following hazardous substances were identified in the groundwater.

Acetone
Benzene
2-Butanone
Chlorobenzene
Chloroethane
1,1-Dichloroethane
1,2-Dichloroethane
1,2-Dichloroethene
Ethylbenzene
Toluene
2-Hexanone
Methylene chloride
Xylenes
2-Methylphenol
4-Methyl-2-pentanone
Phenol
Carbon Disulfide
Styrene
Trichloroethene
Chloroform
Vinyl chloride
1,1,2,2-Tetrachlorothane
Aluminum
Barium

At the time of the initial Remedial Investigation (RI) and Focused Feasibility Study (FFS), EPA concluded that there was no exposure through the groundwater medium to nearby residents since there were no private wells located within the contaminated plume. However, under future land use or plume migration scenarios, the area impacted by the site could be redeveloped residentially and the groundwater potentially used as a source of drinking water. The potential routes of exposure to residents for that scenario were ingestion of contaminants in groundwater and inhalation of groundwater vapors via showering.

In support of the OU2 remedy for soils and groundwater, another human health and ecological risk assessment was conducted. For the human health risk assessment, the following pathways were evaluated: 1) soil ingestion; 2) dermal contact with soil and sediment; 3) ingestion of contaminated groundwater and surface water; 4) dermal contact with surface water; and 5) inhalation of volatile organic compounds (VOCs) and particulates during showering. Because EPA assumed a future residential/recreational land use of the site, the list of possible human receptors identified in the exposure assessment included trespassers, residents (adults and children), site workers (employees), and construction workers. In summary, the human health risk assessment concluded that exposure to surface soil and groundwater, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health or welfare. In contrast, exposure to subsurface soils, sediments, and surface water was determined not to pose a significant threat to human health.

An ecological risk assessment was conducted and determined that the potential for adverse ecological effects exists for Lot 1A and Lot 1B. However, the potential risk is from only a few contaminants that slightly exceed their respective reference toxicity values. It was determined that remedial action to address the potential risk assessed for Lot 1A, which is considered a locally valued habitat (forested wetland), would likely result in significant habitat disturbance or destruction. Therefore, EPA determined that active remediation is not warranted in Lot 1A to address terrestrial risk. An assessment of aquatic risk of Stream 1B concluded that remediation was not warranted; however, the ecological risk assessment recommended that this stream be monitored to assess the effect of any remedial action in Lot 1B on contaminant levels.

A remedial investigation and feasibility study RI/FS for OU3 (off-site groundwater) is being implemented. The investigation will determine the extent to which contaminated groundwater has migrated from the OU2 northern property boundary and will evaluate additional remedial measures that may be needed for the site. OU3 is the last phase planned for the site.

Response Actions

In September 1983, the site was placed on the National Priorities List (NPL). Between 1983 and 1990, the NJDEP directed Tang Realty, the owner of the property, to perform a series of site investigations related to soil and groundwater contamination. Approximately 40 monitoring wells were installed on or near the site, and these wells revealed that the groundwater was contaminated with VOCs and that the soil was contaminated with polychlorinated biphenyls (PCBs), other organic compounds, and metals. In the summer of 1988, Tang Realty removed approximately 3,700 cubic yards of contaminated soils, and between 1990 and 1991, the company removed site wastes and unidentified substances that were discovered during the initial soil removal.

In the fall of 1990, the EPA and the NJDEP agreed that EPA should perform the remainder of the investigatory work using federal funds. The initial focused feasibility study and RI/FS found that groundwater at the site was contaminated with VOCs, semi-volatile organics (SVOCs), pesticides, and inorganic compounds and that soil at the site was contaminated with PCBs along with other contaminants.

OU1 Remedy Selection

EPA conducted a focused feasibility study that evaluated the need for an interim remedy to prevent off-site migration of contaminated groundwater. EPA issued a ROD on September 20, 1991, that selected an interim remedy for the site. The remedy selected in the ROD included:

- Installation of a groundwater collection trench along the northeast portion of Lot 1-B to a depth of approximately 10 to 15 feet and groundwater extraction wells (three were estimated) to a depth of approximately 130 feet to capture on-site groundwater.
- Treatment of the contaminated groundwater by processes including air stripping, biological treatment and activated carbon adsorption, with discharge to the intermittent stream that flows along the eastern boundary of the site.
- Treatment and off-site disposal of sludge generated by the treatment process.
- A monitoring program for on-site and off-site groundwater and on-site surface water until such time that the final remedy was in place.

In July 1994, EPA issued an Explanation of Significant Differences (ESD) modifying the interim remedy to allow for discharge of treated groundwater to the Middlesex County Utilities Authority (MCUA) collection system.

OU2 Remedy Selection

In September 1998, EPA signed the OU2 ROD which subsumed OU1 and selected final remedies for the soil, on-site groundwater, surface water and sediments.

The following remedial action objectives (RAOs) were established for the Chemsol site:

- Restore the soil at the Site to levels which would allow for residential/recreational use (without restrictions).
- Augment the existing groundwater system to contain that portion of contaminated groundwater that is unlikely to be technically practicable to fully restore the remaining affected groundwater to state and federal drinking water standards.
- Remove and treat as much contamination as possible from the fractured bedrock.
- Prevent human exposure to contaminated groundwater.
- Prevent human exposure to surface soils contaminated with PCB concentrations above 1 milligram per kilograms (mg/kg) and lead concentrations above 400 mg/kg.
- Eliminate, to the greatest extent practicable, continuing sources of contamination to the groundwater.

The ROD called for the following actions:

<u>Soil</u>

- Excavation for off-site disposal of approximately 18,500 cubic yards of contaminated soil with PCBs above 1 mg/kg or lead above 400 mg/kg. The excavated areas were to be backfilled with clean fill from an off-site location, covered with topsoil, then seeded with grass.
- Disposal of the excavated soils at an appropriate off-site disposal facility.

<u>Surface Water and Sediments</u>

- Monitoring of sediments and surface water to determine if remediation of Lot 1B results in lower PCB levels in the on-site stream over time.

Groundwater

- Installation and pumping of additional extraction groundwater wells to fully contain contaminated groundwater on site.
- Continued treatment of extracted groundwater through the existing groundwater treatment facility. The ROD indicated that the treated groundwater could continue to be discharged to the MCUA or undergo treatment that would allow it to be discharged on site.
- Perform an additional groundwater investigation to determine if contaminated groundwater is leaving the property boundaries.

Subsequently, EPA issued an ESD on April 30, 2020, to reflect changes to the soil and sediment activities called for by the OU2 ROD. The ESD documented that the soil remediation did not achieve the initial goal of providing unrestricted use of the site due to weathered bedrock encountered at the ground surface in certain areas which restricted the depth of excavation. This necessitated a deed notice for the site property, designating a Restricted Area where concentrations of soil contaminants exceed the NJDEP Residential Direct Contact Soil Remediation Standards. As result of the sediment excavation and post excavation sampling confirming that remediation standards had been met, EPA determined that long-term monitoring of the surface water and sediment would be unnecessary.

Status of Implementation

OU1 Remedy Implementation

In March 1992, EPA issued a Unilateral Administrative Order to a group of PRPs directing them to perform the interim remedy. The remedial design studies concluded that pumping at an existing well, C-1, would achieve the remedial goals of the interim remedy. In November 1993, the PRPs requested a modification to the interim remedy to enable the discharge to be sent to the MCUA wastewater collection system, so that the PRPs would not have to operate a biological treatment system on site. This change was documented in the 1994 ESD modifying the interim remedy to allow for discharge of treated groundwater to the MCUA collection system.

Construction of the groundwater treatment plant was completed in June 1994 and the plant began operations in September 1994. Monitoring results indicated that the interim remedy was effective in controlling the off-site migration of the most highly contaminated groundwater at the site. After several years of effluent discharge to the MCUA collection system, the required permit was obtained for discharge to Stream 1A.

This OU was later incorporated into the OU2 action for groundwater.

OU2 Remedy Implementation

In January 2000, EPA entered into a consent decree with a group of PRPs to implement the OU2 remedial action. The Unilateral Administrative Order directing the PRPs to implement OU1 was superseded by the OU2 consent decree.

Groundwater

As part of the OU2 ROD, the extraction and treatment system was expanded to include six extraction wells and has been operational since January 25, 2011.

Soil and Sediments

Field work began in August 2001. As required by the ROD, soils within the excavation limits delineated during the remedial design were excavated, typically to a depth of two feet and in some cases as deep as six feet and transported off-site for disposal. Most of the soil excavations took place on Lot 1B.

The ROD concluded that an excavation to two foot depth would, in most cases, address the soil contamination, and that after remediation the site would be available for unrestricted use; however, during the remedial design, EPA concluded that PCB and lead contamination in excess of the cleanup goals was likely to remain in some areas beyond a two-foot excavation depth. Compounding this issue, design studies found that, in some areas, the weathered bedrock, with just a thin veneer of soil, was at the ground surface, constraining an excavation that might otherwise achieve the unrestricted use remedial action objective. EPA and the PRPs proceeded with the ROD remedy and through post-excavation sampling, identified areas with contamination in excess of the remediation goals. These areas were capped with clean soil. This change was documented in the 2020 ESD for OU2.

While the ROD anticipated only monitoring of the stream and sediment areas on Lot 1A, remedial design studies supported a more aggressive approach of remediating these areas to the soil remediation goals and then reconstructing the wetland areas. Stream sediments from Stream 1B and the Northern Ditch were excavated to two feet below ground surface or until the red brown native soil, indicating the bottom of the sediments, was reached. The excavated material was also transported off site for disposal.

Approximately 53,000 tons of soil, stream sediments and other material were removed from the site and disposed at non-hazardous waste landfills, consistent with the waste profile of the excavated material.

Two underground storage tanks (USTs) were unearthed during the excavations. They were emptied, washed, and their contents disposed of in accordance with NJDEP UST regulations. In addition, an abandoned tanker truck and its contents, and approximately 401 drums containing investigation-derived waste were characterized and disposed of off-site as non-hazardous material.

After conducting post-excavation sampling, the excavations were backfilled with clean fill and topsoil, reseeded and planted as appropriate for wetland and non-wetland areas. As anticipated in the remedial design, some post-excavation sample results showed that the ROD remediation goals for PCBs and lead were not met at depth in certain locations.

The remedial construction for the soil remedy was completed July 2002. A deed notice for the site property, designating a Restricted Area where concentrations of soil contaminants exceed the NJDEP Residential Direct Contact Soil Remediation Standards was also required as documented in the ESD and was implemented in 2017.

The OU2 ROD anticipated only monitoring of the stream and sediment areas. However, during remedy implementation, sediments from Stream 1B and the Northern Ditch were excavated to an extent which indicated a complete removal of sediments. Post excavation samples confirmed that remediation standards had been met, and EPA determined that long-term monitoring is not needed for surface water and sediments.

IC Summary Table

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil	Yes	Yes	A single, 10.4-acre area that spans into Lot 1A and Lot 1B	Prevent contact with soils above residential cleanup standards.	Deed Notice May 2017
Surface water, sediment, plant and animal habitats, and wetlands.	Yes	Yes	Four areas within Lot 1B totaling 0.658 acres (28,684 sq ft)	Designated Restricted Areas and assuring maintenance and protection of wetlands.	Conservation/ Restriction Easement, May 2017
Groundwater	Yes	Yes	Sitewide	Restrict installation of new extraction wells.	Classification Exception Area established October 2010, revised January 2020

On May 4, 2017, the property owner signed a deed notice that was applied to areas on the property where residual soil contamination remains in subsurface soil. The deed notice was recorded on May 15, 2017. A Conservation Restriction/Easement addressing surface water and sediments and the protections of wetlands was also implemented on May 4, 2017. Restrictions associated with the deed notice were applied to prevent direct contact with soils that contain levels of contaminants that exceed residential cleanup goals established for the site. These restrictions apply at depth and do not change the current non-residential land use of the property. By implementation of the deed notice, residential use of the Restricted Area of the property is prohibited. The property owner is required to adhere to the restrictions applied by institutional controls established in the deed notice. A Classification Exception Area (CEA) was established in October 2010, which encompasses the area of the Chemsol Site. The CEA extends beyond the location of the former pumping wells to restrict the installation of future wells which may alter the natural groundwater flow direction. The downgradient limit of the CEA corresponds with the approximate location of historical pumping wells. An off-site investigation was conducted in 2017, and the current CEA boundary was revised based on the new information on January 2, 2020.

Systems Operations/Operation & Maintenance

Soil and Wetlands: All of the contamination within the surface soils was excavated and disposed of off-site and, in many instances, this excavation reached the top of the shallow bedrock. Residual levels in subsurface soils were covered with clean fill. Land-use controls have been put in place to maintain the protectiveness of this action. The site is also fenced to control access.

As part of the OU2 soil remedy, approximately four and a half acres of wetlands were created as a part of the soil and groundwater remedies; this acreage, along with existing acreage, continues to be maintained.

Surface Water and Sediments: The OU2 ROD required monitoring of the surface water and stream sediments to determine if the soil remedy would result in lower PCB concentrations in stream sediments. As described above, as part of the soil remedy, all of the contaminated stream sediments and adjacent soils were excavated and permanently removed from the site and replaced with clean fill. Therefore, monitoring of the surface water and stream sediments is no longer necessary.

Groundwater: As part of the Long-Term Monitoring Plan, sampling for VOCs is performed semi-annually at the site. Long-term monitoring involves the groundwater sampling and analyses from the six operating extraction wells along with 51 monitoring wells. Water level measurements are also taken from selected groundwater monitoring wells throughout the site. The data is compiled in a semi-annual report and is used to determine if the remedy is functioning as designed. The treatment plant undergoes regular maintenance.

Remedy Resilience: Potential Site impacts from severe weather have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of severe weather in the region and near the Site. This is because the Site is located at a higher elevation away from the coastline, has low flood risks, and the topography of the area does not make the groundwater wells vulnerable to landslides (see Appendix D).

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the **last** FYR as well as the recommendations from the **last** FYR and the current status of those recommendations.

Table 2: **Protectiveness Determinations/Statements from the 2020 FYR**

OU #	Protectiveness Determination	Protectiveness Statement
2	Protective	The OU2 remedy is protective of human health and the environment.

No issues and recommendations were included in the previous FYR, although the following suggestion was included as an Other Finding:

Since the property was previously used for recycling and dumping purposes, it is recommended that future groundwater sampling include per and poly-fluorinated alkyl substances (PFAS), as these are emerging and toxic at very low levels.

PFAS were analyzed for in groundwater as per the recommendation and the results are discussed under Data Review.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 7, 2024, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, and Puerto Rico, including the Chemsol Inc. Superfund site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, the EPA Community Involvement Coordinator (CIC) for the site, Steven Petrucelli, posted a public notice on the EPA site webpage https://www.epa.gov/superfund/chemsol and provided the notice to Piscataway Township by email on February 21, 2025, with a request that the notice be posted in municipal offices and on the village/town webpages. This notice indicated that a FYR would be conducted at the Chemsol Inc. Superfund site to ensure that the cleanup at the site continues to be protective of human health and

the environment. Once the FYR is completed, the results will be made available at the following repository/ies: Kennedy Library, 500 Hoes Lane, Piscataway, New Jersey 07202. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/chemsol. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

The expanded OU2 extraction and treatment system includes six extraction wells and has been operational since January 25, 2011. Four wells are located along the northern property boundary: EX- 1UP (Upper Permeable aquifer), EX-2P (Principal aquifer), EX-4P (Principal aquifer), and EX-3L (Lower Bedrock). The previous single extraction well C-1 was replaced by C-1M (Upper Permeable aquifer) and C-1P (Principal aquifer). See Figures 2 and 3 for the location of all on-site and off-site wells. The treatment system is configured to handle the design flow of approximately 55 gallons per minute (gpm) with a maximum flow of 70 gpm. Flow recorders show the average combined pumping rate for the six wells generally ranges from 46 to 60 gpm. After an observed reduction in pumping rates in 2023, wells C-1M, C-1P, and EX-2P were redeveloped in February 2024, and rates increased to the typically observed values.

Summary of System Performance

To more readily show the cumulative impact of contamination at the Chemsol site, VOC concentrations were totaled for each sample and used to evaluate contaminant extent and temporal trends. Total VOC (TVOC) concentrations in monthly samples of the combined influent to the treatment system between April 2019 and May 2024 generally ranged between 500 to 1,100 micrograms per liter (µg/L), with a minimum value of 347 µg/L and a maximum value of 1,879 µg/L.

The effluent from the treatment plant is discharged to Stream 1A and has met discharge permit limits.

Summary of Groundwater Monitoring Well Data

Groundwater samples are collected from 45 monitoring wells and 6 extraction wells. This summary considers data collected during sampling events between August 2019 and May 2024. In March 2021, the monitoring frequency was updated across the network, and samples were collected at specified frequencies ranging from semiannual to every four years. During recent sampling events, the VOCs most frequently detected in the groundwater samples include 1,1-dichloroethene, 1,2-dichloroethane, carbon tetrachloride, cis-1,2-dichloroethene, 1,4-dioxane, benzene, tetrachloroethene, and trichloroethene. Some other commonly detected VOCs include chloroform, chlorobenzene, vinyl chloride, and toluene.

As part of the OU3 off-property groundwater remedial investigation (RI), an additional eight multi-level wells were installed which have screened ports open to the aquifer at selected depths.

Groundwater flow is generally to the north and northeast and is influenced by the predominant fracture and bedding plane orientations and the regional hydraulic gradient. Results of water quality samples from the OU3 multi-level wells demonstrate that TVOC contamination from the Chemsol site is present off the property in the Upper Permeable, Principal, and Lower Bedrock aquifers. Prior to the implementation of the expanded OU2 extraction and treatment remedy in 2011, groundwater contamination migrated off-property with groundwater flow to the north and northeast.

Groundwater levels have been measured quarterly at wells in the monitoring network since 2012. The pumping of the groundwater extraction system, which includes two interior extraction wells and four extraction wells along the northern property boundary, results in lowered groundwater levels and groundwater flow which is generally directed towards the extraction wells. In addition, groundwater level recorders are installed in two wells screened in the Principal aquifer (C-3 and C-5) and two wells in the Lower Bedrock (DMW-4 and MW-101) to monitor

and confirm that the hydraulic gradient along the southern property boundary remains directed inward onto the site property. Water levels measured at the first transect of off-property wells, installed about 400 feet north of the property (OSW-1 to OSW-4), tend to be higher than at wells along the northern property boundary, which indicates that some off-property groundwater is directed back to the extraction wells.

Groundwater levels and water quality in the OU2 (on-property) and OU3 (off-property) networks will continue to be monitored to evaluate system performance. Opportunities to improve the monitoring networks or remediation system will be pursued when necessary.

Upper Bedrock - The Upper Bedrock (Aquitard) unit contains the highest concentrations of TVOCs in wells TW-5 and TW-5A, which are both 45 feet deep and located in the northeast part of the former operations area. These two wells both showed significant increases in TVOC concentrations following startup of the system in 2011 due to shifted flow patterns and remain much higher than they were in 2004. However, concentrations in these wells were variable across the review period, with an overall decreasing trend. Concentrations were generally lower than those observed in the previous review period. The most recent TVOC concentrations recorded were 60,074 µg/L at well TW-5 and 149,883 µg/L at well TW-5A.

Well TW-1 (southwest corner of the property) also showed a large increase in TVOC concentrations after the system startup due to shifted flow patterns, reaching 14,972 µg/L in 2011 but decreasing to 7,471 µg/L in 2024. This concentration is still well above the 2004 level of 127 µg/L. Concentrations were stable across the review period in this well.

Well TW-4 (just north of the operations area) showed a significant improvement after the system startup, with TVOC concentrations dropping from 102,965 µg/L in 2004 to 40 µg/L in 2024. Wells TW-10 and TW-11 (located on the northern property boundary) contained no detectable VOCs in 2024.

Upper Permeable Aquifer - Extraction well C-1M, which was retrofitted from former extraction well C-1, is screened in the Upper Permeable aquifer and is located near the central portion of the site. TVOC concentrations at C-1M were 177,966 µg/L in 2011 and have been variable since this time. Total VOC concentrations at this well, which is monitored semiannually, ranged between 1,852 µg/L and 124,556 µg/L across the review period (Figure 8).

Other affected Upper Permeable wells within the property include C-10, MW-207UP, MW-208UP, MW-203UP, and EX-1UP. Concentrations at well C-10 (north of the operations area) were declining before the treatment system startup and reached as low as 513 µg/L in 2015, however, since 2018 concentrations have stabilized between 700 µg/L and 900 µg/L at this location. Concentrations at well MW-207UP (north of the operations area, about 200 feet northeast of C-10) are generally declining following the system startup, but continue to occasionally spike up significantly (Figure 7). Concentrations at well MW-208UP (about 250 feet north of the northeast corner of the former operations area) have not been significantly changed by the operation of the treatment system and continue to range from about 1,400 to 1,700 µg/L.

Along the northern property boundary, extraction well EX-1UP and nearby monitoring well MW-203UP are most affected. The concentrations at well EX-1UP initially increased following system startup to 1,987 µg/L and have subsequently declined to 676 µg/L in 2024. Well MW-203UP has shown declining concentrations from 9,859 µg/L in 2012 to 3,663 in 2024, lower than the 5,080 µg/L observed at the end of the previous review period (February 2019). The wells in the Upper Permeable aquifer at the other four well clusters along the northern property boundary have generally stable and low concentrations.

Off-property well OSW-2 Port 2 (190 - 200 feet bgs) has shown generally decreasing concentrations since its installation in 2011, suggesting that the extraction system is improving conditions in the Upper Permeable aquifer off-property. Concentrations were relatively stable across the review period, with TVOC concentrations between 30 and 50 µg/L. Concentrations at further downgradient well OSW5 Port 2 (258 - 268 feet bgs) have been more

variable. The TVOC concentration at this location dropped to 420 µg/L and subsequently increased to 805 µg/L. The effects of extraction on water quality at this distance from the property have been less clear.

Principal Aquifer - The Principal Aquifer contains TVOC concentrations greater than 100 µg/L beneath most of the former operations area. Concentrations at well DMW-5 in the northern part of the operations area showed an increase after system startup, and continue to exceed 1,600 µg/L. However, concentrations at this well were generally lower than those observed during the previous review period. The concentrations at nearby well DMW-6, which is about 90 feet deeper than DMW-5, declined across the review period and were most recently observed at 291 µg/L in 2023.

Along the southern property boundary, Principal Aquifer wells TW-7 and TW-8 have consistently reported TVOC concentrations above 10,000 µg/L and have experienced increases during the previous review period. Concentrations at well TW-7 reached 26,639 µg/L in 2015 and were 16,387 µg/L in February 2019. Since this time, concentrations have declined to 10,034 µg/L (05/2024). Historically, concentrations at well TW-8 rose from 12,503 µg/L in 2004 to 200,045 µg/L in 2013, and subsequently declined to 103,055 µg/L in February 2019. During the current review period, total VOCs at TW-8 increased to a maximum of 120,352 µg/L in August 2020, before declining to 49,263 µg/L in May 2024. Wells C-4 and DMW-1, also along the southern boundary, have exhibited declining TVOC trends since system startup, with concentrations in 2023 of 113 µg/L and 661 µg/L, respectively.

Along the northern property boundary, monitoring wells MW-203P and DMW-9, and nearby extraction wells EX-2P and EX-4P, are the most affected wells within the Principal Aquifer. TVOC concentration trends at these four wells are fairly stable to declining (Figures 11, 14-15). Wells MW-204P and MW-206P are located along the eastern part of the northern property boundary, and both have shown generally declining concentration trends, with concentrations at both wells below 100 µg/L in 2023.

Off-property wells OSW-2 and OSW-3 both have three ports screened within the Principal Aquifer (Ports 3-5). Concentrations of TVOCs are generally decreasing overall, indicating the extraction system is improving conditions off property. OSW-2 Port 3 (250 - 260 feet bgs) showed an overall increase in TVOC concentrations across the review period, although concentrations generally remained lower than those observed during the previous review period. The most recent TVOC concentration at this port was 343 µg/L. Further downgradient, well OSW-5 also has three ports screened in the Principal Aquifer. TVOC concentrations have continued to increase in the upper port (OSW-5 Port 3, 314-324 feet bgs). Concentrations were variable, as a part of an overall decreasing trend in the intermediate port (OSW-5 Port 4, 360-370 feet bgs), and increased in the deeper port OSW-5 Port 5 (434-444 feet bgs), although concentrations generally remained lower than those observed during the previous review period in OSW-5 Port 5.

Lower Bedrock Aquifer - In the Lower Bedrock aquifer, well DMW-2, which is located on the southern property boundary, exhibited an increasing trend after system startup, with a peak concentration of 2,754 µg/L in 2015. Since this time, concentrations have decreased while exhibiting significant variability across the current review period. Most recently, the total VOC concentration was 1,089 µg/L in 2024, the highest concentration observed within the Lower Bedrock Aquifer. Well DMW-3, along the southern boundary in the southeast corner of the former operations area, also showed an increase in concentrations from system startup and reached 686 µg/L in August 2019. Concentrations subsequently declined, with 339 µg/L TVOC observed during the most recent sampling event (May 2024). Well DMW-4, which is near DMW-3 and about 75 feet deeper, has had relatively stable concentrations below 100 µg/L since 2011.

Five wells along the northern property boundary are screened in the Lower Bedrock. TVOC concentrations at extraction well EX-3L and nearby monitoring well MW-203L have exhibited increasing trends since the startup of pumping, which indicate that the contamination is being drawn to the extraction well. Most recently, EX-3L reported a TVOC concentration of 519 µg/L (May 2024). Concentrations at well MW-201L (in the northwestern part of the property) had shown a significantly increasing TVOC concentration trend from 2011 through the previous review period. During the current review period, concentrations were variable between approximately

500 µg/L and 700 µg/L, with a reported concentration of 617 µg/L in 2024. Semiannual monitoring will continue at this well, and results will be utilized to evaluate the effectiveness of contaminant capture in the deep bedrock unit. TVOC concentrations at well MW-202L, which is east of EX-3L, have continued to decrease through the review period and have remained below 10 µg/L since 2021. TVOC concentrations at the easternmost well MW-204L have remained very low (<1 µg/L).

The westernmost off-property well OSW-1 Port 5 (520 - 530 feet bgs) continues to show effects of contamination at stable, low levels and most recently recorded 26 µg/L TVOC in May 2021. This well is north of on-property well MW-203L, which has shown increasing concentrations. Well OSW-2 Port 6 (468 - 478 feet bgs) is downgradient of extraction well EX-3L and has generally shown stable to decreasing concentrations of VOCs, suggesting that the extraction system is having a noticeable positive effect in this zone. However, PCE concentrations increased at OSW-2 Port 6 across the review period, with a most recent detection of 14 µg/L in May 2024, and a TVOC concentration of 25 µg/L. Further downgradient well OSW-5 Port 6 (529 - 539 feet bgs) had reported increasing TVOCs through the previous review period but was relatively stable across the current review period with significantly lower concentrations of TCE, which has historically been the most abundant VOC at this location. In May 2024, OSW-5 Port 6 contained 280 µg/L TCE, lower than the 430 µg/L observed at the end of the previous review period.

Emerging Contaminants

In April 2024, EPA finalized MCLs for perfluorooctanoic acid (PFOA) (4.0 nanograms per liter [ng/L]) and perfluorooctanesulfonic acid (PFOS) (4.0 ng/L). New Jersey adopted GWQS of 14 ng/L for PFOA, 13 ng/L for PFOS, 13 ng/L for PFNA, and 0.4 µg/L for 1,4-dioxane between 2018 and 2020. During the current review period, two sampling events for emerging contaminants took place in 2020 and 2023 which included analysis for PFAS and 1,4-dioxane in monitoring wells, extraction wells, and treatment system influent and effluent.

Results from all seven monitoring wells sampled across the two sampling events exceeded the current EPA MCLs for PFOS and PFOA. In 2023, concentrations of one or more of these analytes exceeded MCLs at 5 of the 6 extraction wells sampled, in addition to treatment system influent. PFOS was observed at a maximum concentration of 512 ng/L (MW-206P), PFOA at a maximum of 115 ng/L (TW-5A), PFNA at a maximum of 19 µg/L (extraction well C-1P), and PFHxS at a maximum of 305 ng/L (MW-206P). The influent sample contained elevated concentrations of PFOS (61.5 ng/L), PFOA (18.6 ng/L), and PFHxS (34 ng/L). The effluent sample returned no detectable levels of any PFAS with relevant EPA or NJDEP standards. Additional PFAS sampling is recommended in order to provide a more comprehensive characterization of PFAS on-site, concentration trends, and the potential for offsite influence.

Site Inspection

The inspection of the Site was conducted on 4/15/2025. In attendance were David Montoya (EPA-RPM), John Mason (EPA Hydrogeologist), Tara Bhat (EPA Human Health Risk Assessor), and one of the PRPs' representatives. Activities included a walk-through of the site, inspection of the treatment plant, and inspection of monitoring and extraction wells. The OU3 monitoring wells were also a part of the site inspection.

The treatment plant continues to be well maintained and functions as designed. The fence around the property remains intact, and the open lot was filled with vegetation. It appeared ICs were being complied with as wetlands were still in existence and no residential use of the area with a deed notice was observed.

No interviews were conducted for this review.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

The OU2 groundwater extraction and treatment system, which replaced the interim OU1 system, extracts contaminated groundwater from six wells and has been operational since 2011. The data collected since the system startup in 2011 suggest that the remedy is operating as designed by extracting contaminated groundwater and treating it on site. However, the concentrations in several on-property wells continue to contain high levels of VOCs, and ongoing OU3 RI/FS activities for off-site groundwater show that contamination has migrated off the property. This migration may have occurred prior to the installation of the groundwater treatment plant and persists due to matrix diffusion from fractured bedrock. Although groundwater levels and water quality trends in several off-property well ports indicate that the capture zone extends at least 500 feet off the property in parts of the aquifer system, groundwater quality data suggest other off-site contamination currently exists beyond the capture zone and will be addressed in OU3. Groundwater levels and water quality in the on-property and off-property networks will continue to be monitored to evaluate system performance. Groundwater in the vicinity of the site is not being used for potable purposes as the surrounding area is served by a public water supply. A CEA is in place to preclude such use of contaminated groundwater and appears effective at preventing use.

The OU2 groundwater extraction system and monitoring network will continue to be evaluated to determine if there are opportunities to improve pumping capacity and efficiency to increase capture and treatment of groundwater contaminants.

The OU2 soils remedy included excavation of soils contaminated with lead greater than 400 mg/kg and PCBs greater than 1 mg/kg in the top two feet of soil, covering with topsoil and seeding to allow for unrestricted use of the property. To a great extent, these cleanup levels were met in soils on site. However, for areas where bedrock was present close to the surface, excavation was not feasible and post-excavation sampling identified areas with contamination above cleanup goals. As a result, a clean soil cover was placed over these areas, perimeter fencing was installed to prevent trespassing, and a deed notice has been placed on the property to limit exposure to remaining covered contaminated soils. The clean fill limits exposure and the deed notice limits use of the site where contaminated soils remain. All contaminated stream sediments were excavated, removed from the site and replaced with clean fill as well. The sediments have been remediated to a level that is protective of human health and the environment, and the source of surface water contamination has been removed.

In addition, PFAS were analyzed for in groundwater as per the recommendation in the last FYR. Several concentrations of PFOS and PFOA exceed their respective 2024 EPA MCLs, which are more conservative than the NJ GWQS. EPA believes that the PFAS-impacted groundwater plume is migrating onto the site from an upgradient off-site source, and detections are not site-related due to higher detection of PFAS at two wells (MW-204 and MW-206) located further east from the source zone. However, additional PFAS sampling is needed in order to provide a more comprehensive characterization of PFAS on-site, concentration trends, and the potential for offsite influence.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

The 1996 baseline risk assessment was completed prior to much of the Risk Assessment Guidance for Superfund used currently by EPA. However, the process that was used remains valid. The RAOs selected as part of the remedies remain valid and appropriate.

In the last five years, site-related contaminants remain elevated above current standards (New Jersey State and/or Federal) in groundwater, including: acetone, benzene, carbon tetrachloride, chloroform, 1,1-dichloroethene, 1,2-dichloroethane, tetrachloroethylene, toluene, trichloroethylene, and vinyl chloride. Several other VOCs were detected above state or federal drinking water standards in the last five-year monitoring period but were not

considered site-related in the ROD. As stated above, PFAS compounds were detected in the site vicinity above EPA MCLs and state standards as well. Despite these elevated levels of contaminants, groundwater in the vicinity of the Site is not being used for potable purposes as the surrounding area is served by a public water supply. A CEA is in place to preclude such use of contaminated groundwater.

Although the ecological risk assessment screening and toxicity values used to support the ROD may not necessarily reflect the current values, the remedy effectively interrupts exposure to ecological receptors as contaminated sediments and soil were excavated, removed from the site, and replaced with clean fill.

Changes in Toxicity Characteristics

The site PCB residential soil cleanup level of 1 parts per million (ppm) was based on toxicity reassessment developed by EPA since the original 1990 EPA "Guidance on Remedial Actions for Superfund Sites with PCB Contamination." Based on post-excavation data, residual PCBs are at an arithmetic mean concentration of 4.8 ppm. EPA now performs a dioxin toxic equivalency for PCB sites since it is common that dioxins and dioxin-like PCBs are present along with PCBs. While this approach was not followed at the time of the ROD, exposure to contaminants in soil is inhibited as two feet of clean fill cover were placed over soils containing PCBs exceeding the cleanup goal and a deed notice was placed on the property.

On January 17, 2024, EPA Office of Land and Emergency Management released the "Updated Residential Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities" (2024 Updated Soil Lead Guidance), which updates the residential soil lead screening level (RSL) and removal management level (RML) for the CERCLA and Resource Conservation and Recovery Act programs, and provides additional guidance for setting residential lead preliminary remediation goals (PRGs) and cleanup levels. The 2024 Updated Soil Lead Guidance recommends that regions use the most current version of the Integrated Exposure Uptake Biokinetic (IEUBK) model, with 5 micrograms per deciliter (µg/dL) as the 95th percentile target blood lead level and site-specific environmental data (e.g., lead concentrations in various media and bioavailability) to develop PRGs and cleanup levels for residential land use. If an additional source of lead (e.g., lead water service lines, lead-based paint, non-attainment areas where the lead concentrations exceed NAAQS) is identified, 2024 Updated Soil Lead Guidance recommends 3.5 µg/dL as the 95th percentile target blood lead level. The 2024 Updated Soil Lead Guidance also recommends that the EPA region adjust PRGs and cleanup levels to account for uncertainty, technical limitations (i.e., detection/quantification limits), and site-specific soil lead background.

The residential human health cleanup goal for lead in the 1998 ROD was 400 mg/kg. Nevertheless, since the ROD was signed EPA has updated its residential soil lead policy to be more stringent. EPA's analysis of the post-remediation data shows that the post-excavation arithmetic mean lead concentration for the remediated areas was 93 ppm which is below the current average for unrestricted use of approximately 200 ppm, based on a 5 µg/dL blood lead level, and below approximately 100 ppm based on a 3.5 ug/dL blood lead level. In addition, there are no other identified sources of lead to the hypothetical resident at the site, and the fill cover and deed notice will prevent direct contact with residual lead contamination. Therefore, EPA's analysis of the post-remediation data shows that the remedy, as implemented, is protective and no changes to the remedy are needed; however, lead in soil will continue to be evaluated as statutory FYRs will be completed for this site in perpetuity.

Vapor Intrusion

Soil vapor intrusion (SVI) is evaluated when soils and/or groundwater are known or suspected to contain VOCs. Since VOCs were/are present in site soil and groundwater, a soil vapor intrusion investigation was performed in April 2012. Data indicated that the vapor intrusion pathway is not a concern at the site. Further, a clean lens of water exists in the overburden soils and the upper bedrock aquitard at the northern property boundary, so it is unlikely that the vapor intrusion pathway could become complete in the future at OU2.

QUESTION C: Has any **other** information come to light that could call into question the protectiveness of the remedy?

No other contaminants or pathways have been identified that would call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 2	**Issue Category: Monitoring**			
	Issue: PFAS has been detected but further characterization is necessary to identify the source.			
	Recommendation: Additional PFAS sampling is recommended in order to provide a more comprehensive characterization of PFAS on-site, concentration trends, and the potential for offsite influence.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2027

Other Findings

In addition, the following recommendation was identified during the FYR and may improve performance of the remedy, management of O&M, and support site close out, but does not affect current and/or future protectiveness:

- The residential human health cleanup goal for lead in the 1998 ROD was 400 mg/kg. Nevertheless, since the ROD was signed EPA, has updated its residential soil lead policy to be more stringent. EPA's analysis of the post-remediation data shows that the remedy, as implemented, is protective and no changes to the remedy are needed; however, an evaluation as to whether additional administrative documentation would be needed for supporting site completion is suggested.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: 2	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The OU2 remedy is protective of human health and the environment in the short term because all exposure pathways have been addressed. To be protective in the long term, additional PFAS sampling needs to be completed to provide a more comprehensive characterization of PFAS on site, concentration trends, and the potential for offsite influence.	

VIII. NEXT REVIEW

The next FYR report for the Chemsol, Inc., Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Chemsol OU2 Semi-Annual Reports (2020-2024)
See Table II (Appendix B) for additional.

APPENDIX B – Tables

Table 1: Chronology of Site Events

Event	Date
Chemsol operated as a solvent recovery and waste reprocessing facility with operations including mixing, blending, and distillation.	1950's-1964
Facility was ordered to shut down by Piscataway Township after a series of accidents, explosions, and fires, the last of which accidentally generated enough hydrogen chloride gas to force the evacuation of neighboring residential areas.	1964
Property was rezoned from industrial to residential use and was purchased by Tang Realty Corporations.	1978
Final NPL Listing	1983
NJDEP entered into an Administrative Consent Order with Tang Realty, requiring that Tand Realty perform an investigation to evaluate site contamination and develop a remedial action plan for the site.	1984
Approximately 40 groundwater monitoring wells were installed and revealed the presence of organic contaminants in the groundwater. Sampling and analysis of soils revealed the presence of PCBs and organic contaminants.	1984
Removal actions – Tang Realty removed approximately 3700 cubic yards of PCB-contaminated soil to be disposed of off-site. Several thousand small containers of unknown substances were discovered, stabilized, and stored on-site.	1988
Sampling revealed the presence of organic contaminants in residential drinking wells, and the people serviced by these wells were subsequently given municipal water service.	1990
EPA and NJDEP agreed that EPA should perform site investigations and federally fund the remainder of the work.	1990
EPA issued a ROD documenting its selection of an interim remedy (OU1)	1991
The unknown substances and other site wastes stabilized and stored under the previous removal action were disposed of off-site.	1990-1991
EPA issued a Unilateral Administrative Order to four (4) PRPs for the design and construction of the interim remedy.	1992
Design of the interim remedy was completed.	1993
Construction of the interim remedy (OU1) was completed and the interim remedy became fully operational.	1994
EPA issued and Explanation of Significant Differences for the OU1 interim remedy.	1994
Second phase RI/FS was completed.	1997

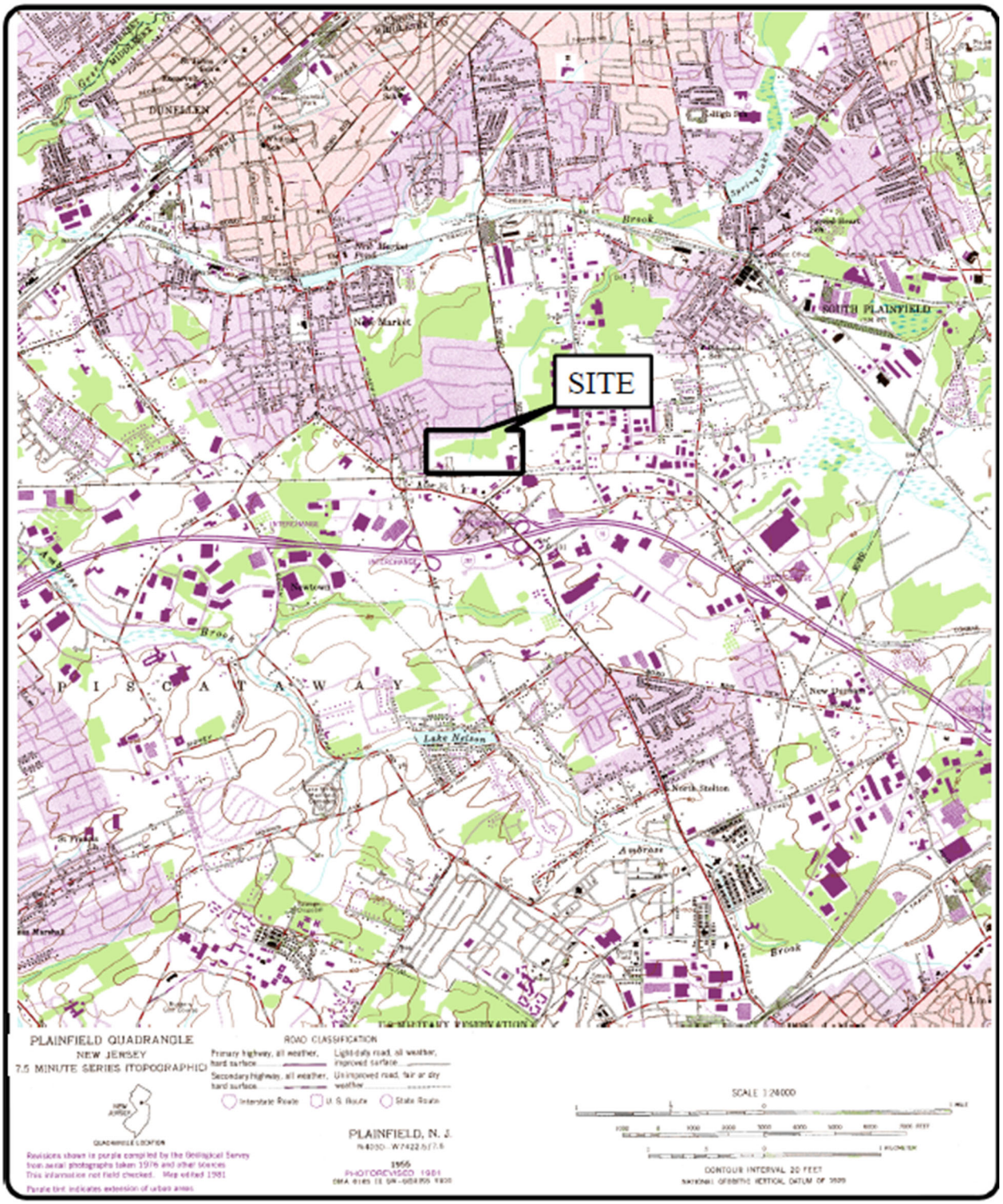
EPA issued a ROD for OU2.	1998
EPA and responsible parties signed a Consent Decree for the implementation of the OU2 remedy.	1999
First five-year review was issued.	2000
EPA entered into an AOC with the responsible parties to perform an investigation to determine if contaminated groundwater was leaving the boundaries of the site, and this investigation was launched.	2001
Responsible parties completed the remedial design for the OU2 soil excavation and began remedial action activities.	2001
Remedial Action construction completed (OU2-soils).	2002
Second five-year review was issued.	2005
Conceptual Site Model and Evaluation of Vapor Intrusion Investigation Report was submitted.	2006
Pre-Design Verification Study was performed.	2007
EPA approved Remedial Action Work Plan	2010
Remedial Action construction activities began.	2010
Third five-year review issued	2010
RA Construction completed (OU2)	2011
Fourth Five-Year Review issued.	2015
Fifth Five-Year Review issued.	2020

Table II: Documents, Data and Information Reviewed in Completing the Five-Year Review

Document Title	Submittal Date
Remedial Investigation Report – Volume 1	10/1996
Second Five-Year Review Report	09/2005
Third Five-Year Review Report	09/2010
Fourth Five-Year Review Report	09/2015
Fifth Five-Year Review Report	08/2020
Record of Decision	09/1998
Monthly Monitoring Reports	2010-2011
Remedial Design Report, Remedial Work Element I	7/2001
Remedial Action Work Plan, Remedial Action Work Element I, Soils	9/2001
Remedial Construction Report – Remedial Work Element I - Soils	10/2002
Chemsol Final Design Report – Operable Unit 2, Remedial Work Element (RWE) II	11/2009
Remedial Action Work Plan, Operable Unit 2 – Remedial Work Element (RWE) II	03/2010
Semi-Annual Operations and Monitoring (O&M) Reports	2011-2019
Chemsol PFAS Sampling Memo	10/2020
Chemsol OU2 Annual Long Term Monitoring Reports	2020-2023
OU2 Annual O&M Report 2023-2024	10/2024

APPENDIX C – Figures and Maps

Figures 1-18 (include map(s) of the site that shows the wells discussed in the report along with data from wells).



cornerstone environmental

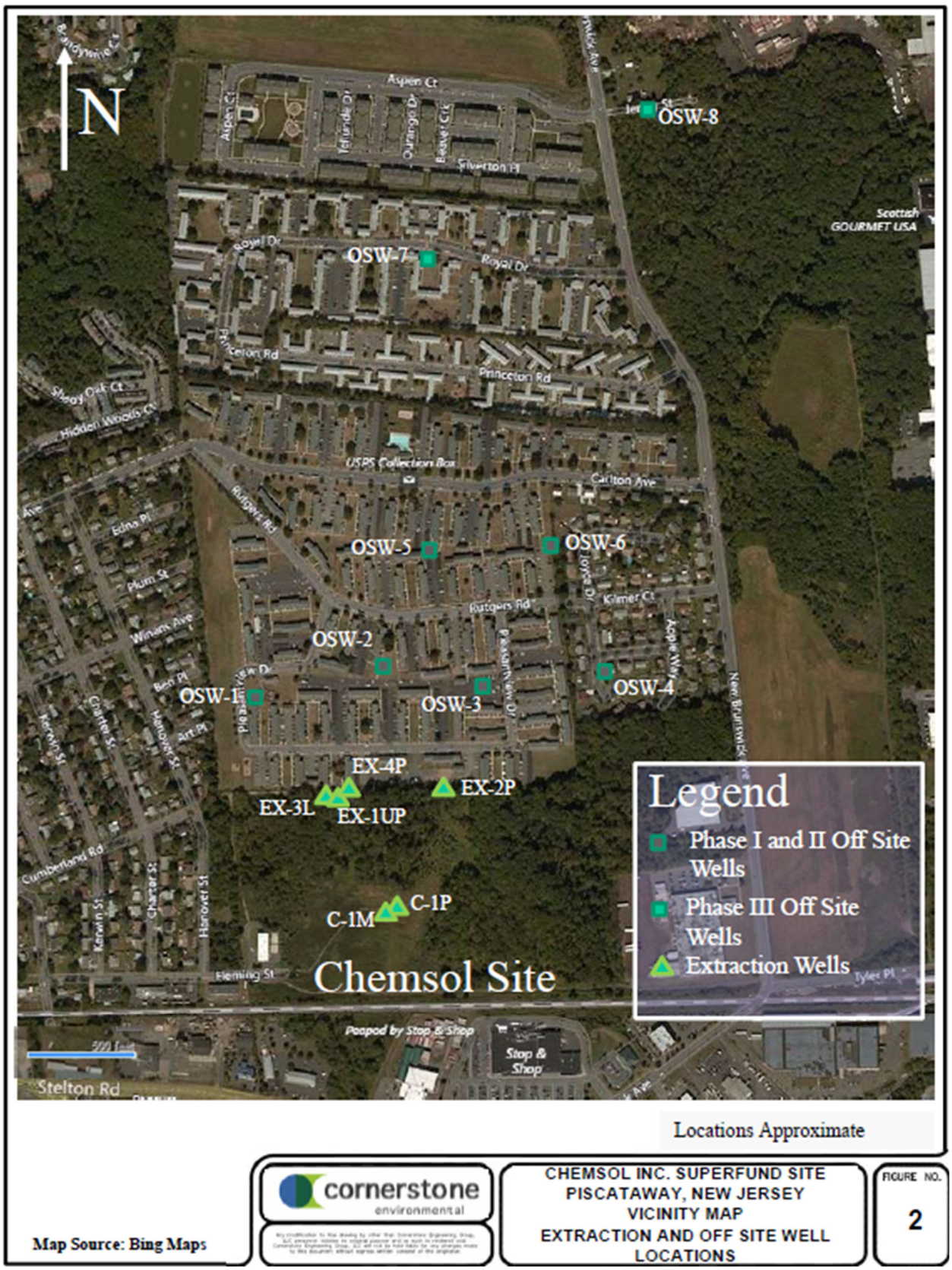
PREPARED BY:
CORNERSTONE ENVIRONMENTAL GROUP, LLC

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

SITE LOCATION MAP

FIGURE NO.
1

PROJECT NO.
190036



Locations Approximate

Map Source: Bing Maps

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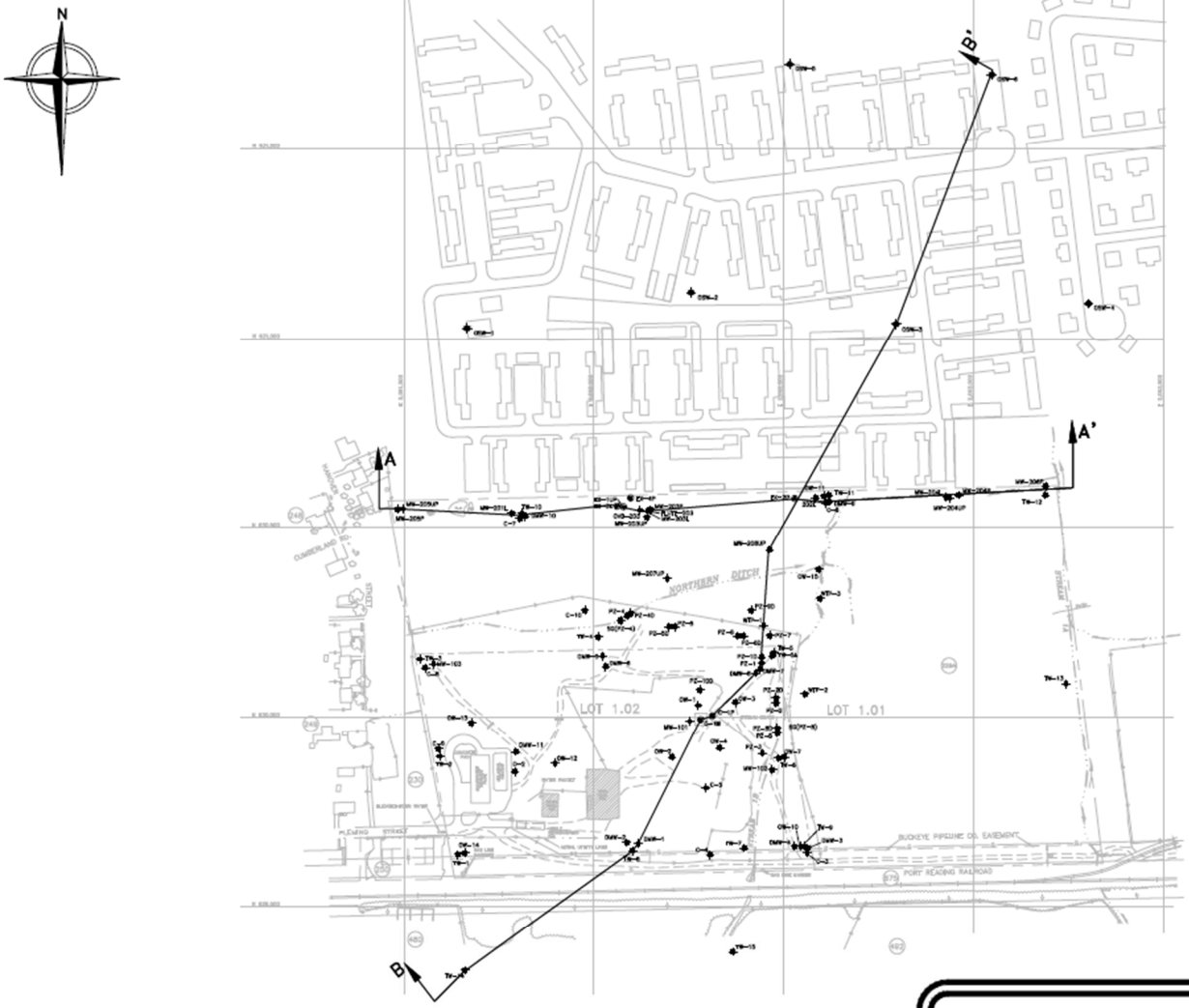
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY
VICINITY MAP
EXTRACTION AND OFF SITE WELL LOCATIONS

FIGURE NO. 2



LEGEND:

EX-4P	EXTRACTION WELL
MW-203	MONITORING WELL

NOTE:

1. SECTION A–A' OREINTED ROUGHLY PERPINDICULAR TO GROUNDWATER FLOW AND PARALLEL TO STRIKE OF BEDDING PLANES.
2. SECTION B–B' ORIENTED ROUGHLY PARALLEL TO GROUNDWATER FLOW AND PARALLEL TO STRIKE OF PREDOMINENT JOINT SET.

BEDDING PLANE STRIKE AND DIP

STRIKE OF JOINTS
JOINTS DIP STEEPLY (TYPICALLY >60°) TO THE NW AND SE

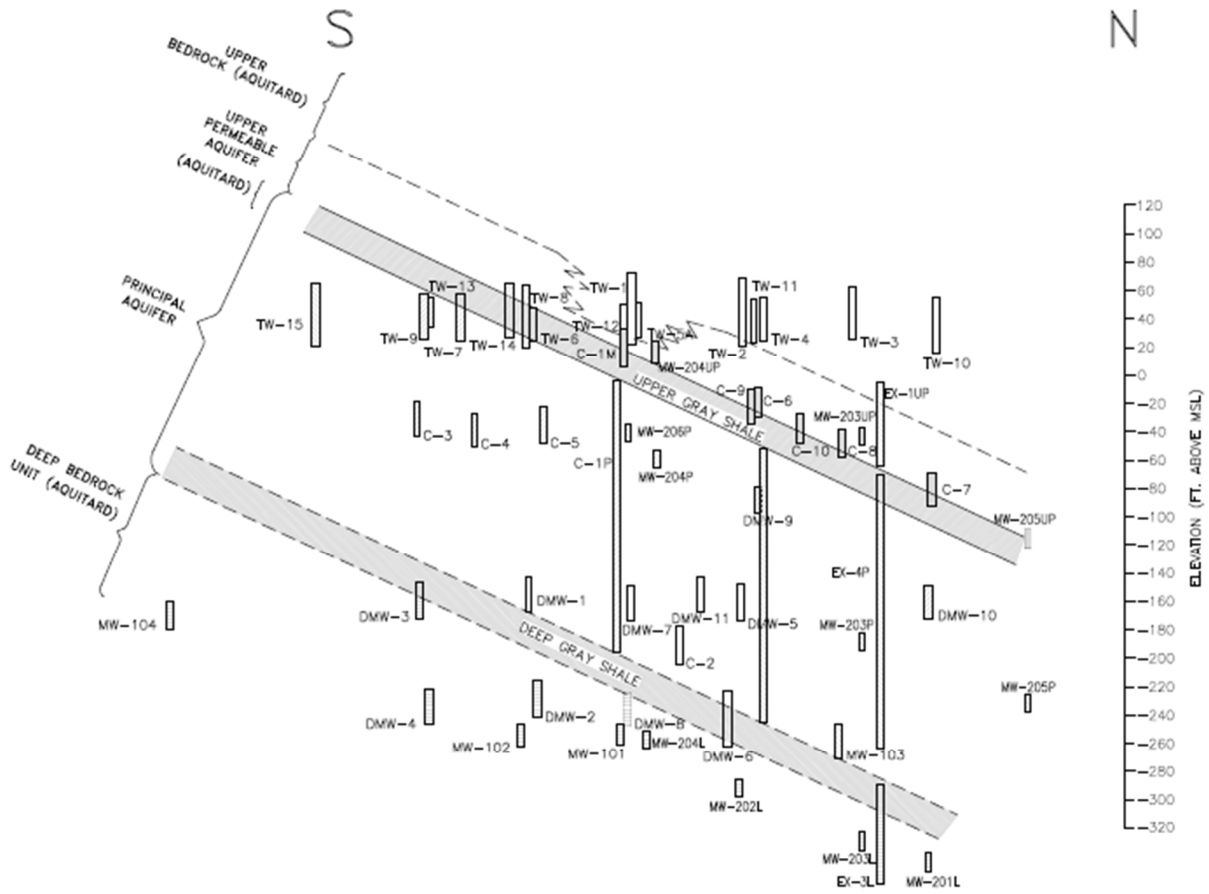
0 300 600
SCALE IN FEET

TETRA TECH

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

SITE MAP WITH CROSS SECTION ORIENTATION

FIGURE NO.
3
PROJECT NO.
4203196



LEGEND:

- WELLS SCREENED IN UPPER BEDROCK AQUITARD (NOT USED FOR PLAN VIEW POTENTIOMETRIC MAPPING)
- WELLS SCREENED IN THE UPPER PERMEABLE AQUIFER
- WELLS SCREENED IN THE PRINCIPAL AQUIFER
- WELLS SCREENED IN THE DEEP BEDROCK UNIT

NOTES:

1. CONCEPTUAL CROSS-SECTION REPRESENTING BEDROCK WELLS PROJECTED TO A CONCEPTUAL ORIENTATION, ALLIGNED PARALLEL TO DIP.
2. ADAPTED FROM RI FIG. 3-3, (CDM,1996)
3. ASSIGNMENT OF WELLS TO VARIOUS HYDRO STRATIGRAPHIC UNITS IS BASED LARGELY ON OBSERVED RESPONSES TO PUMPING.

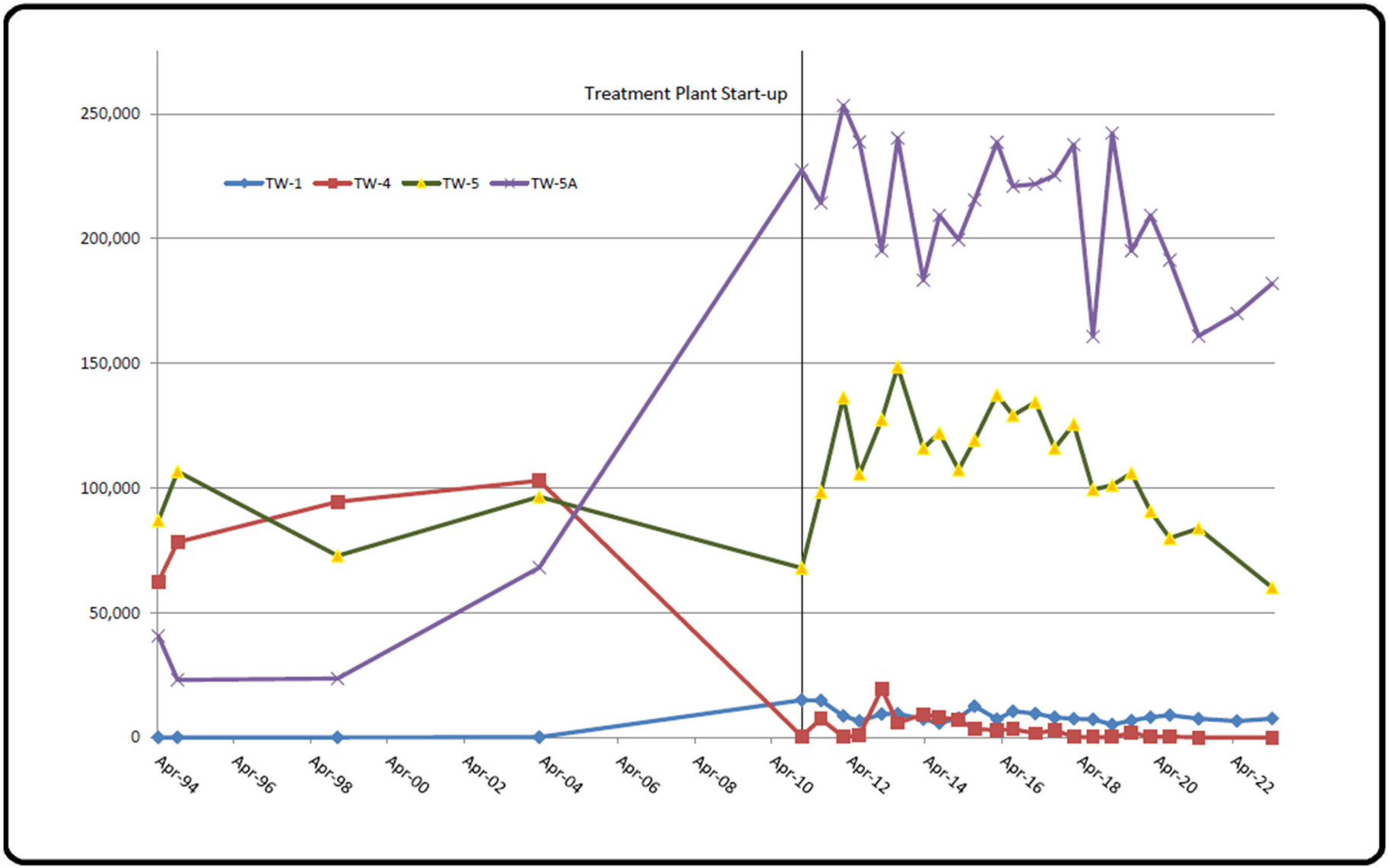
TETRA TECH

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

CONCEPTUAL GEOLOGIC CROSS SECTION

FIGURE NO. **4**

PROJECT NO. 4213516



TETRA TECH

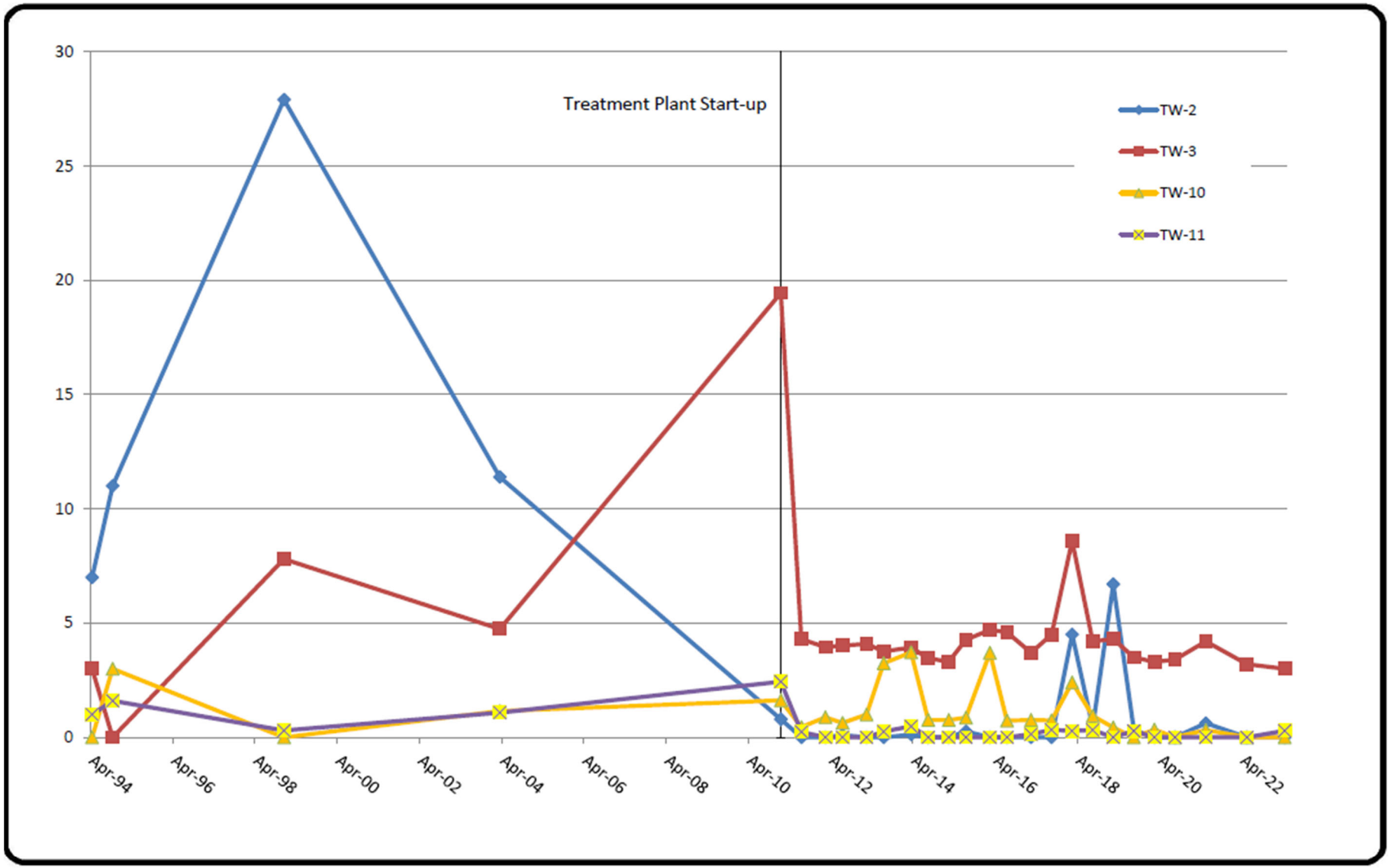
ALL PROFESSIONAL ENGINEERING WORK IS PERFORMED BY DULY LICENSED PROFESSIONAL ENGINEERS UNDER THE APPROPRIATE STATE REGISTERED PROFESSIONAL ENTITY.

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN UPPER BEDROCK AQUITARD WELLS TW-1, TW-4, TW-5, TW-5A

FIGURE NO.
5

PROJECT NO.
4233347



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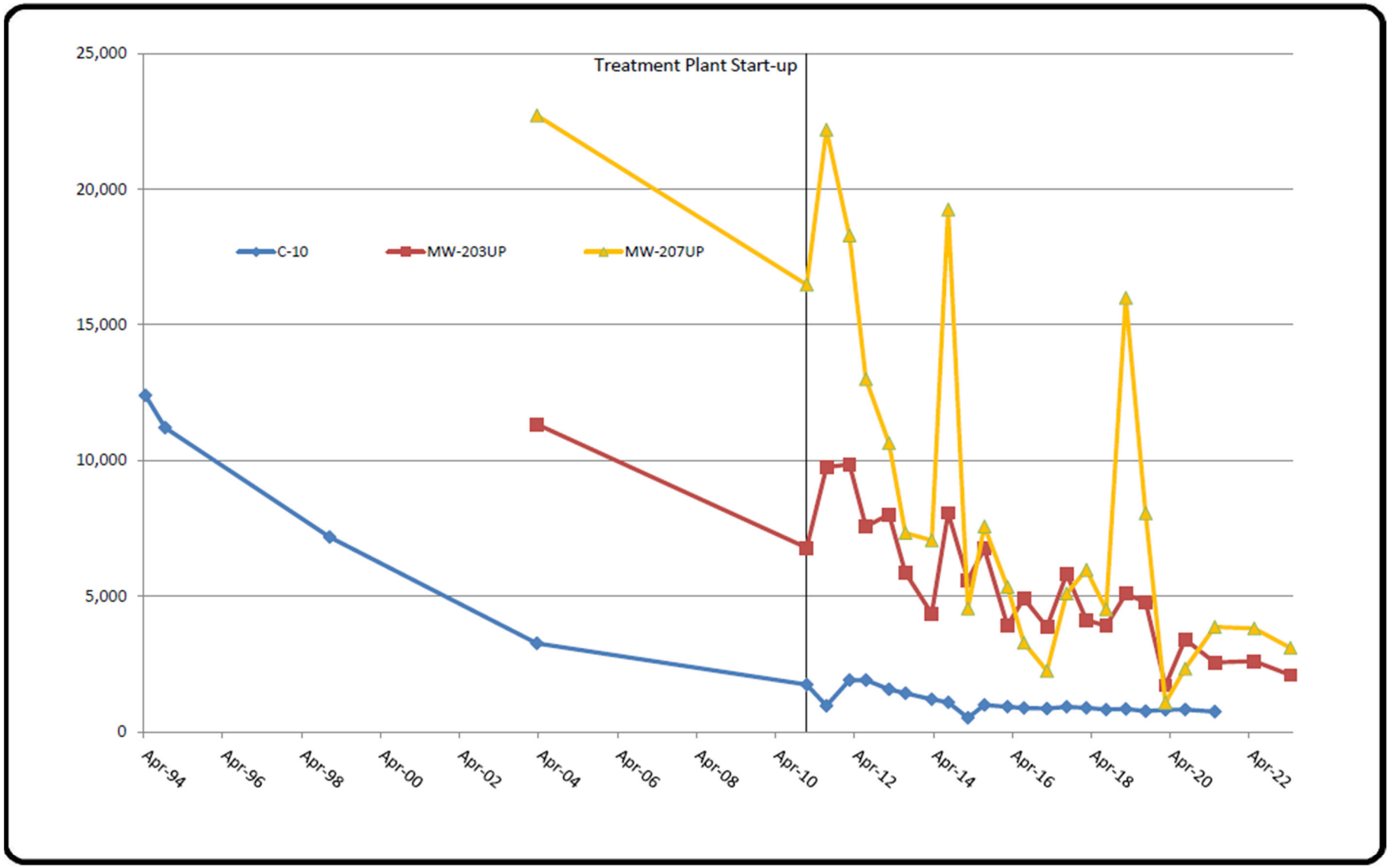
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN UPPER BEDROCK AQUITARD WELLS TW-2, TW-3, TW-10, TW-11

FIGURE NO.
6

PROJECT NO.
4233347



TETRA TECH

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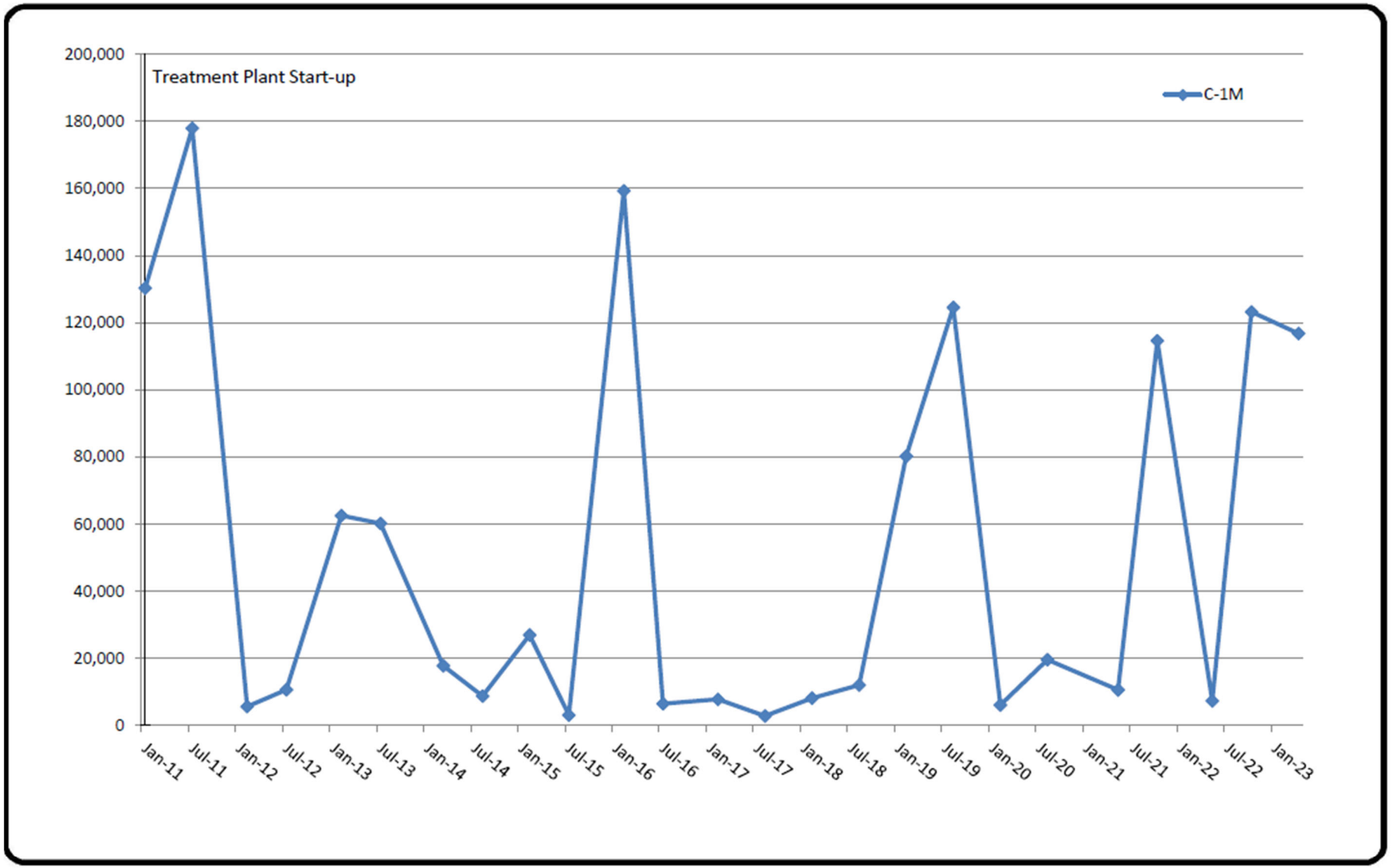
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN UPPER PERMEABLE AQUIFER WELLS C-10, MW-203UP, MW-207UP

FIGURE NO.
7

PROJECT NO.
4233347



TETRA TECH

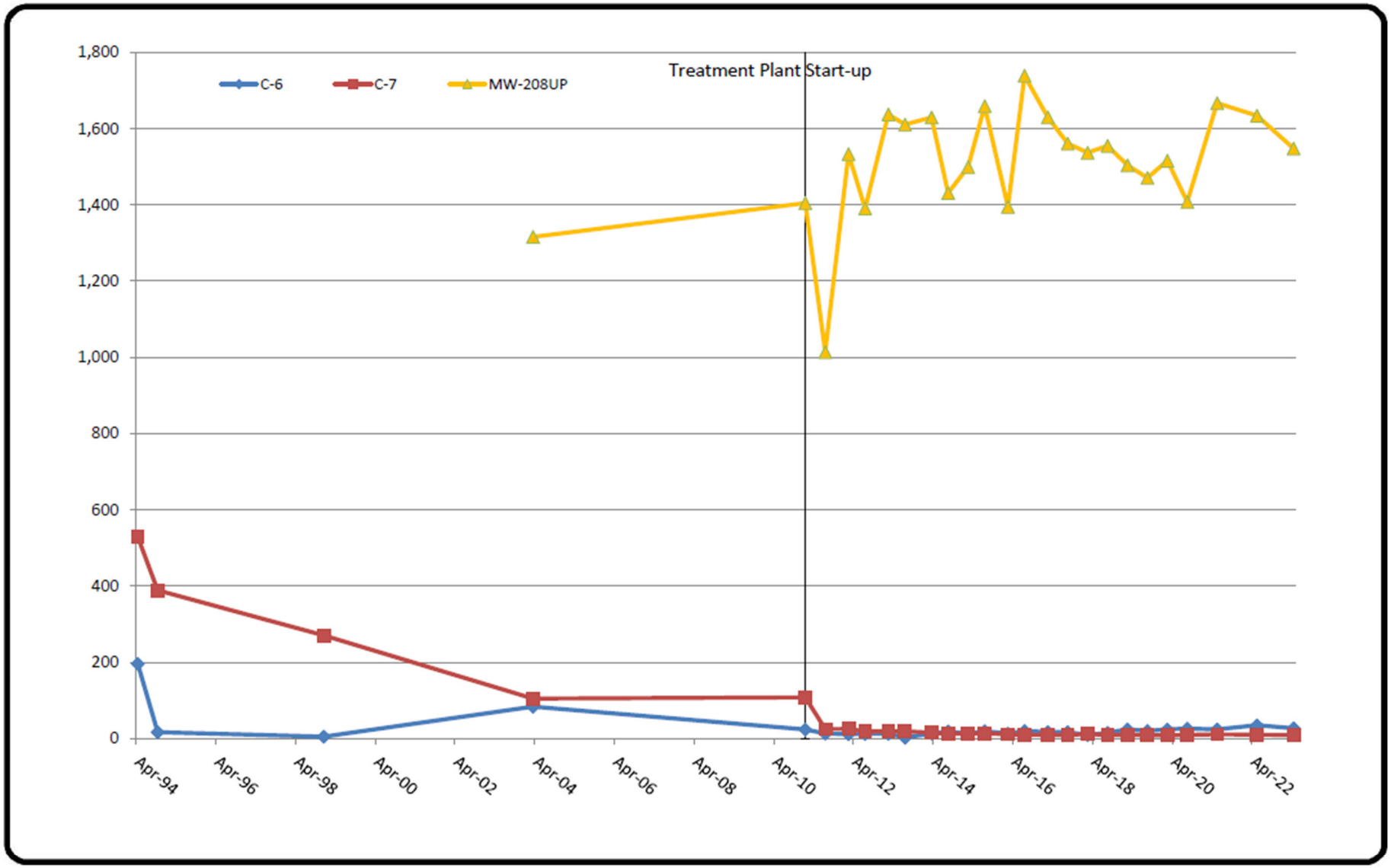
ALL PROFESSIONAL ENGINEERING WORK IS PERFORMED BY DULY LICENSED PROFESSIONAL ENGINEERS UNDER THE APPROPRIATE STATE REGULATORY PROFESSIONAL ENTITY.

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME EXTRACTION WELL C-1M

FIGURE NO.
8

PROJECT NO.
4233347



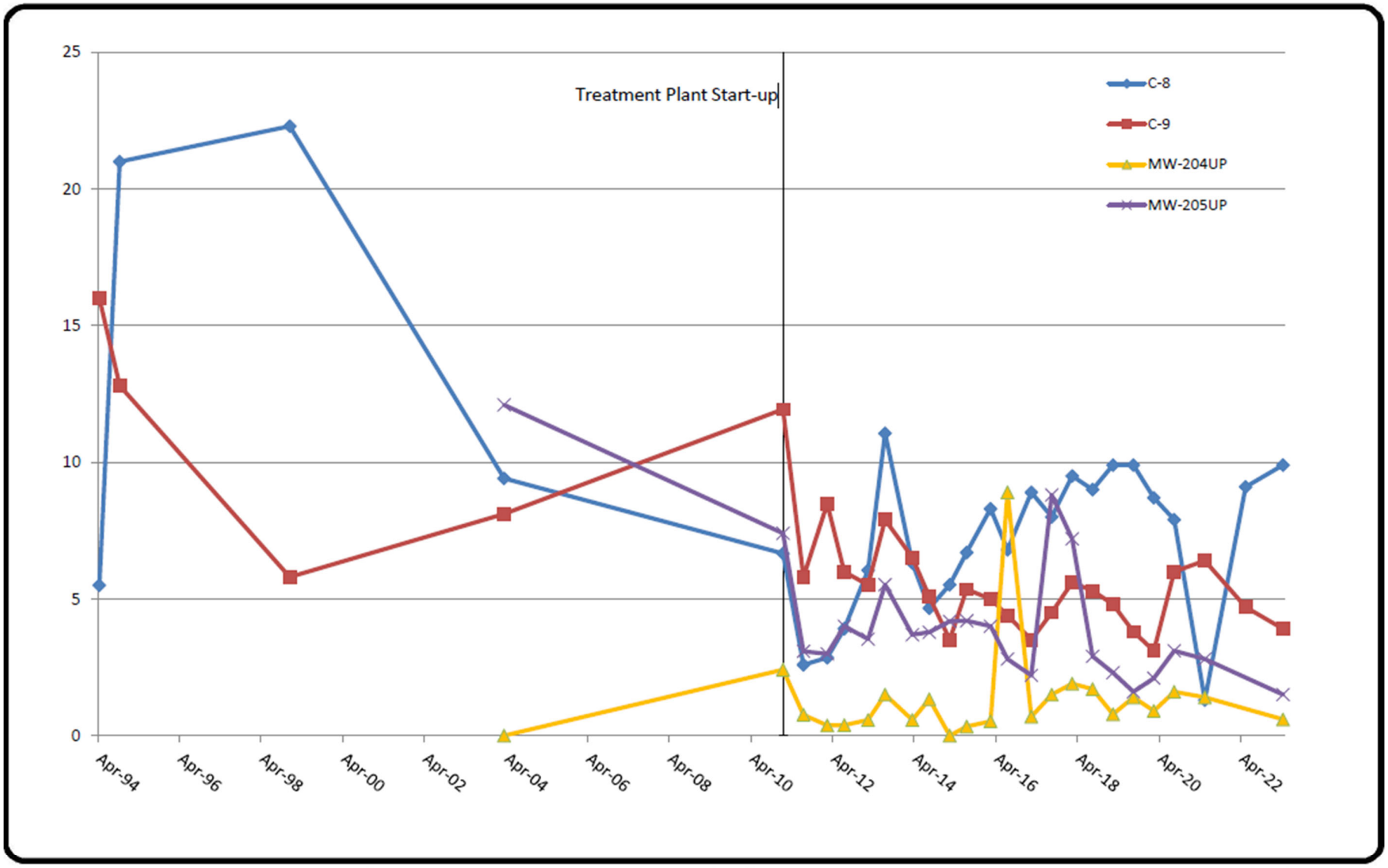
TETRA TECH

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN UPPER PERMEABLE AQUIFER WELLS C-6, C-7, MW-208 UP

FIGURE NO.
9

PROJECT NO.
4233347



TETRA TECH

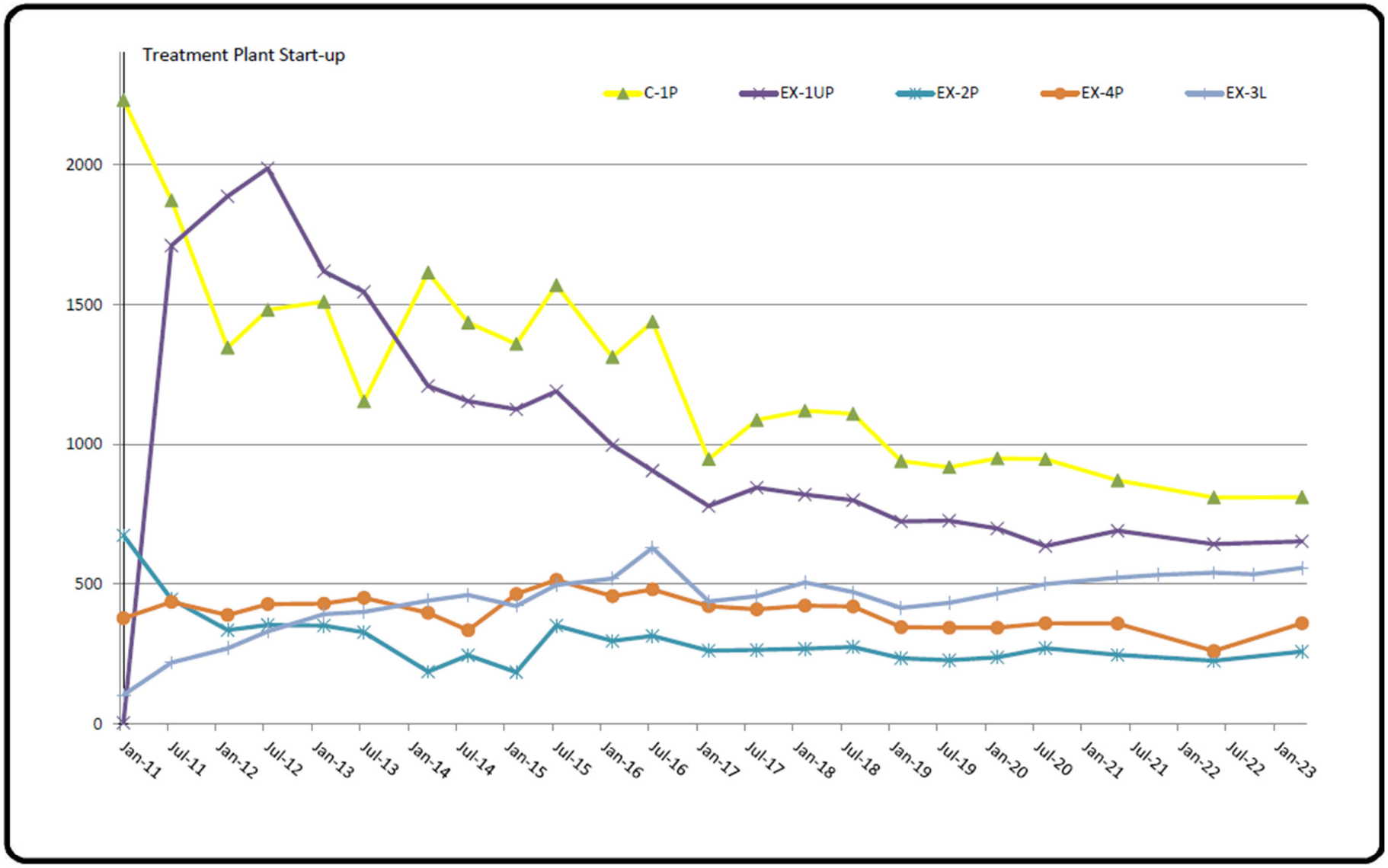
ALL PROFESSIONAL ENGINEERING WORK IS PERFORMED BY DULY LICENSED PROFESSIONAL ENGINEERS UNDER THE APPROPRIATE STATE REGULATED PROFESSIONAL ENTITY.

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN UPPER PERMEABLE AQUIFER WELLS C-8, C-9, MW-204UP, MW-205UP

FIGURE NO.
10

PROJECT NO.
4233347



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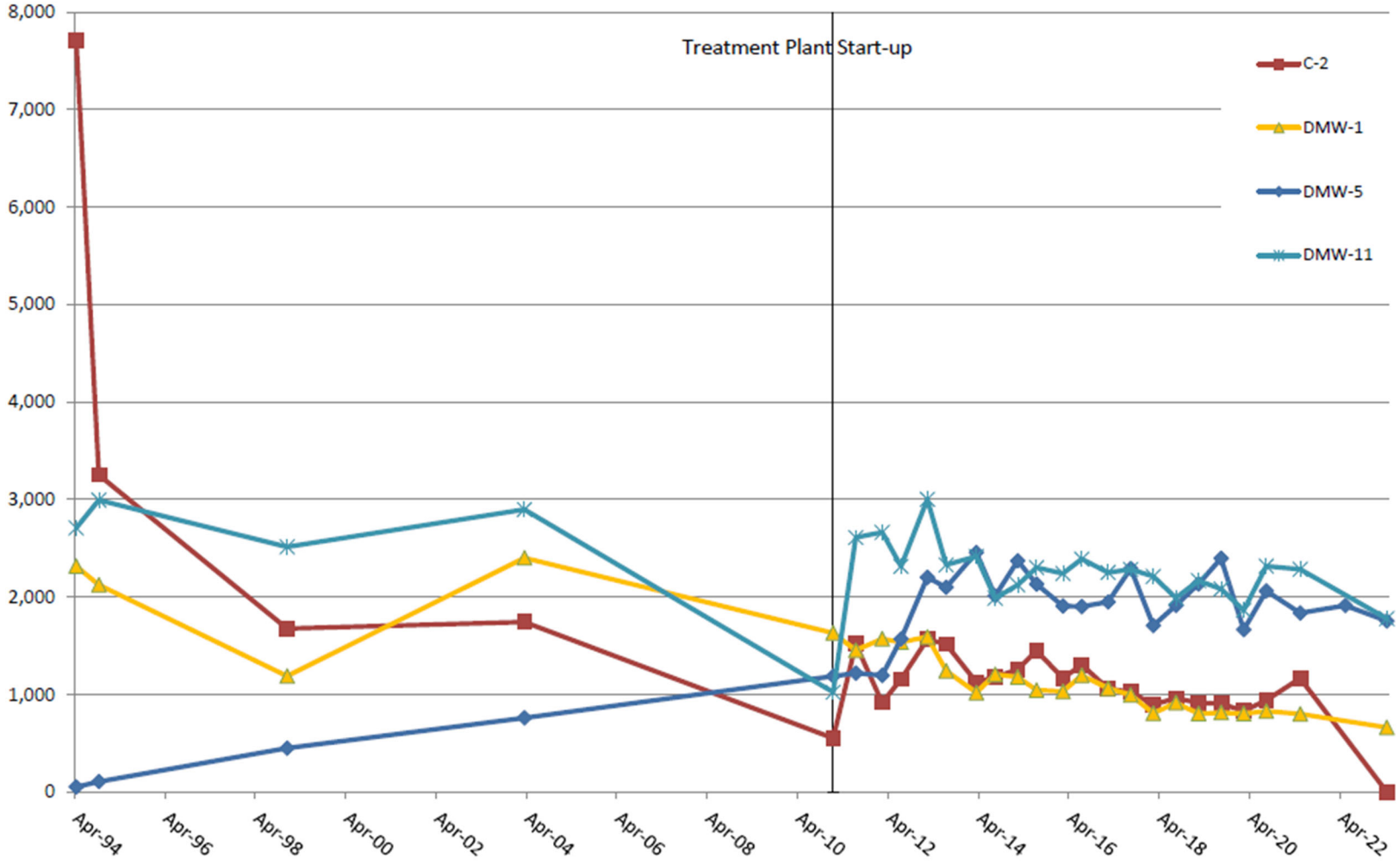
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME EXTRACTION WELLS C-1P, EX-3L, EX-1UP, EX-2P, EX-4P

FIGURE NO.
11

PROJECT NO.
4233347



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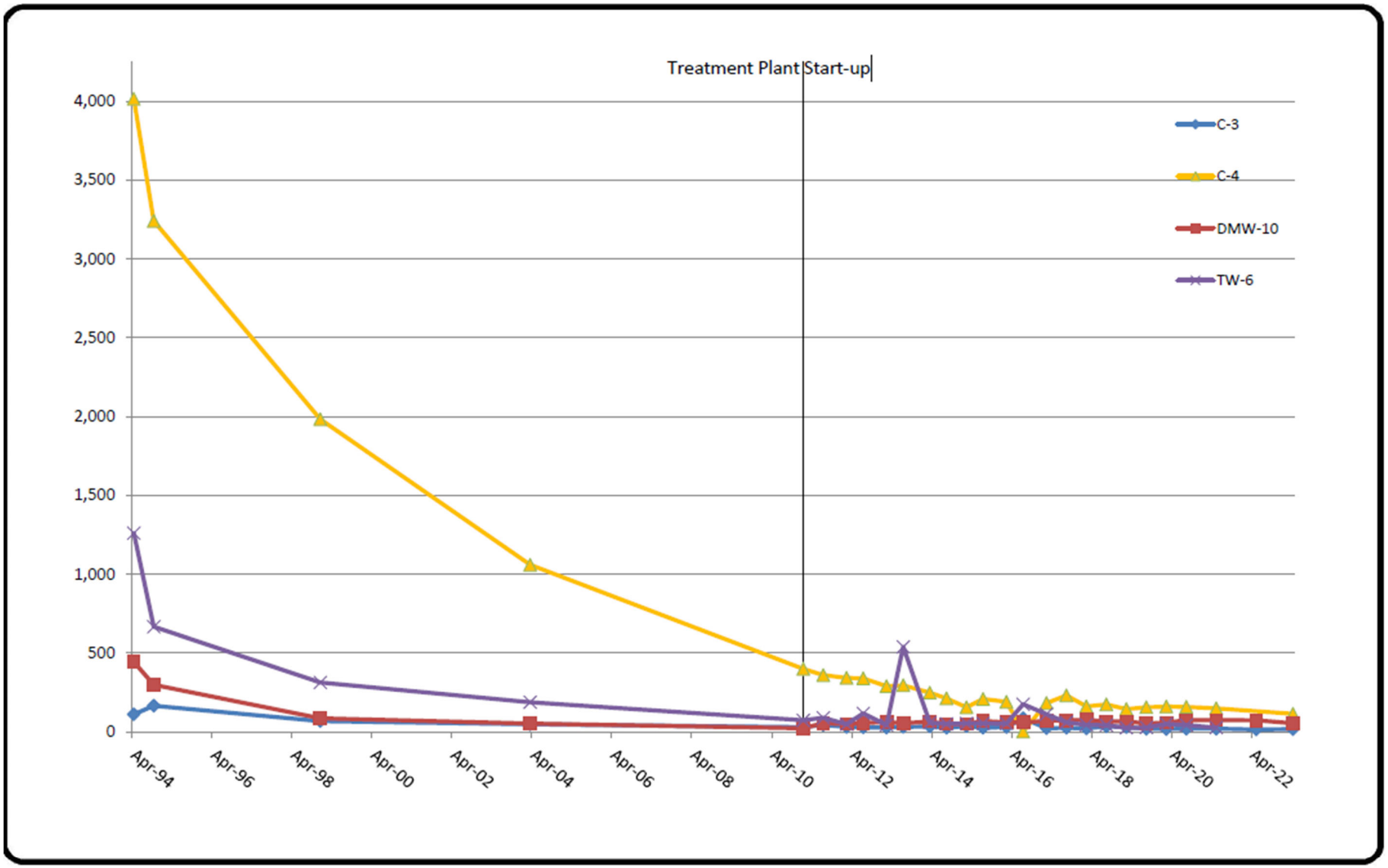
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN PRINCIPLE AQUIFER WELLS C-2, DMW-1, DMW-5, DMW-11

FIGURE NO.
12

PROJECT NO.
4233347



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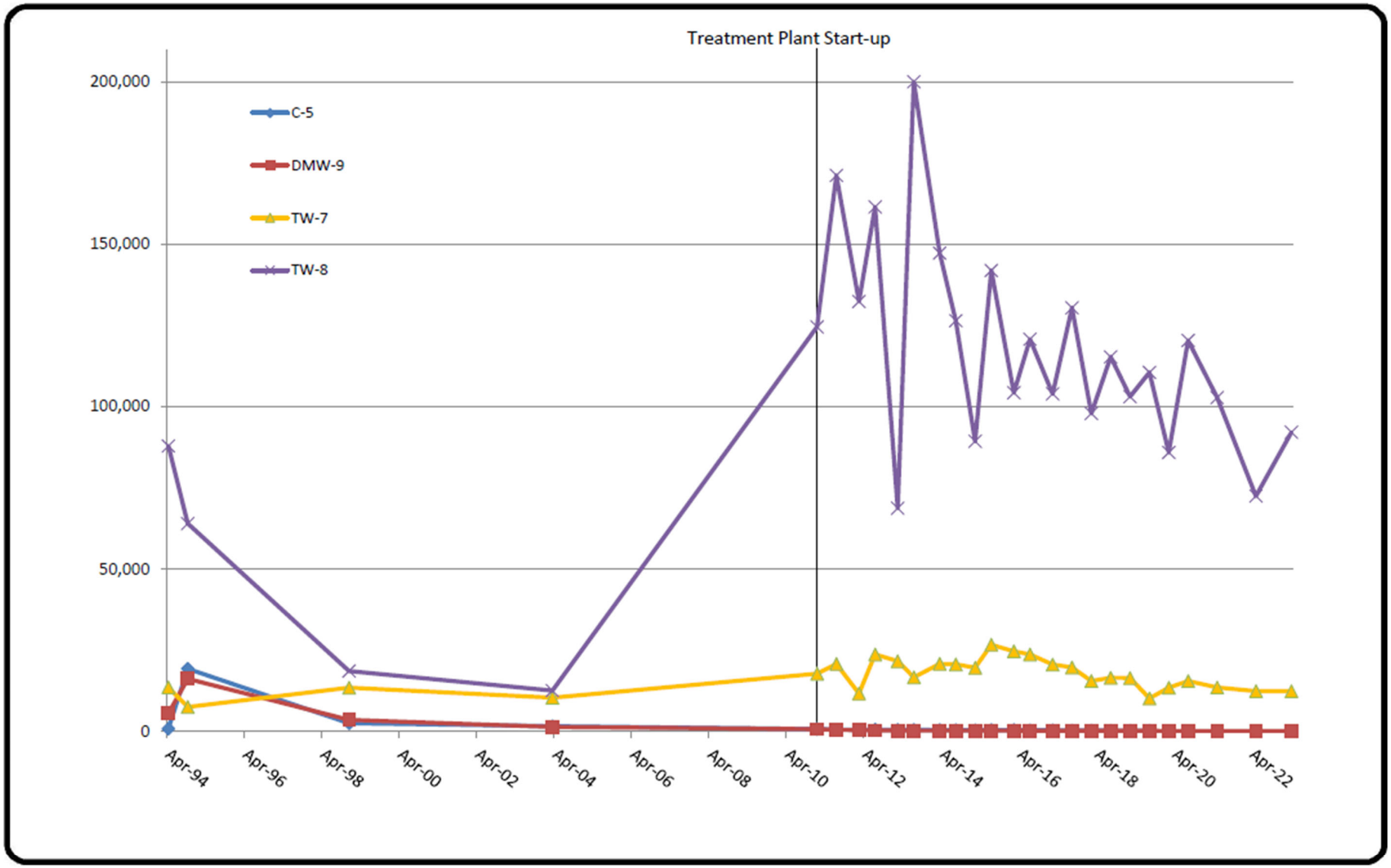
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN PRINCIPLE AQUIFER WELLS C-3, C-4, DMW-10, TW-6

FIGURE NO.
13

PROJECT NO.
4233347



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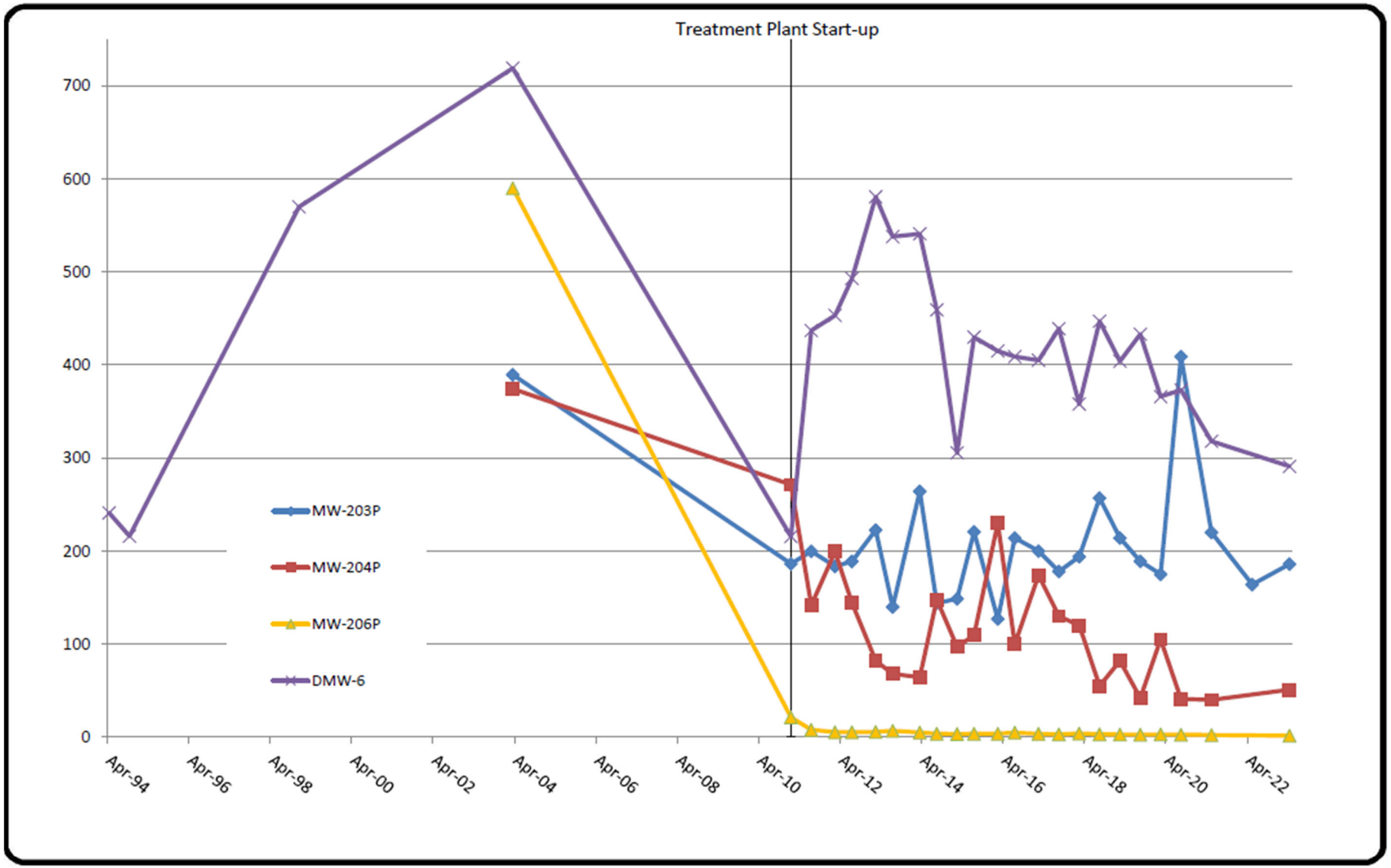
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN PRINCIPLE AQUIFER WELLS C-5, DMW-9, TW-7, TW-8

FIGURE NO.
14

PROJECT NO.
4233347



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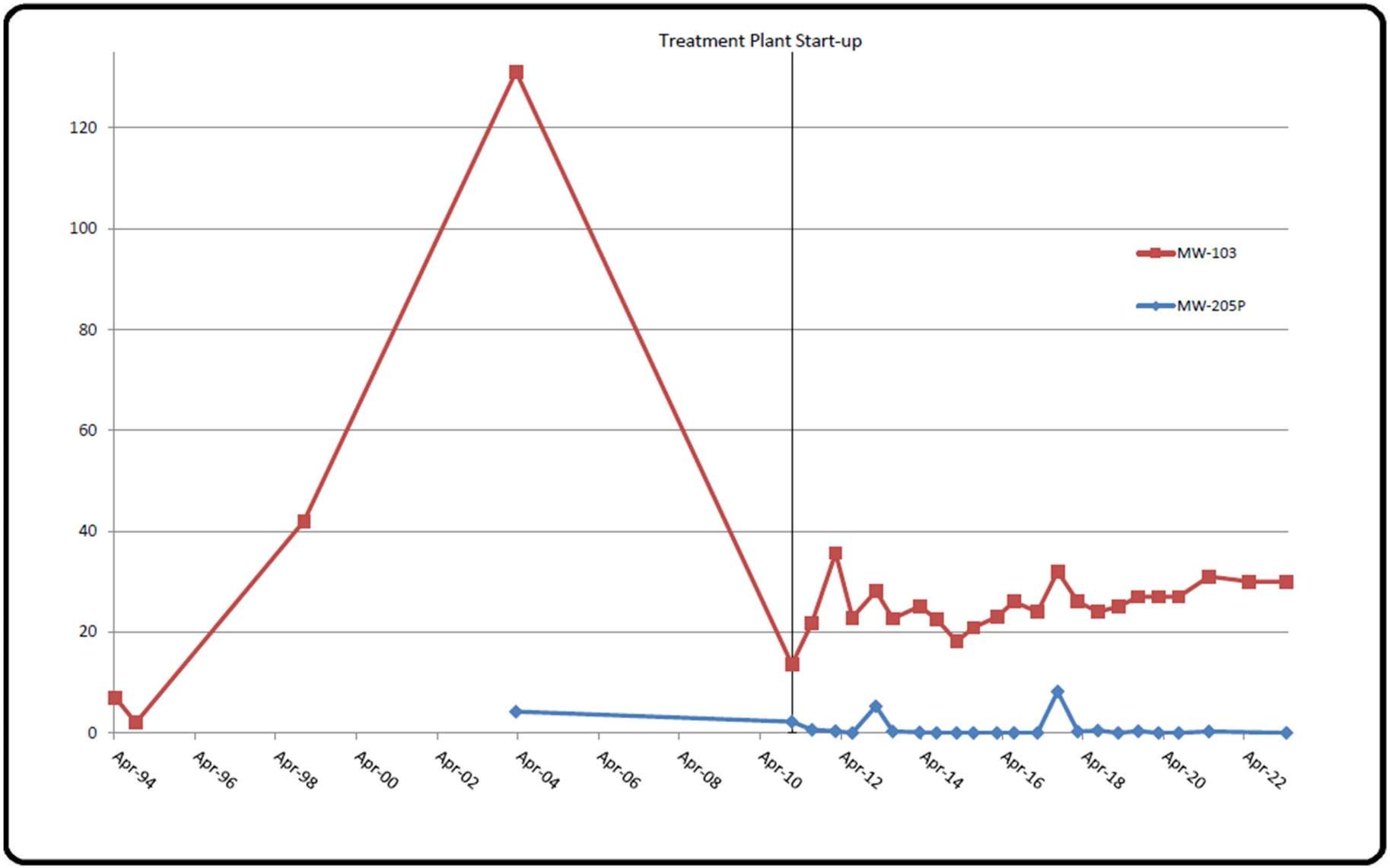
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN PRINCIPLE AQUIFER WELLS MW-203P, MW-204P, MW-206P, DMW-6

FIGURE NO.
15

PROJECT NO.
4233347



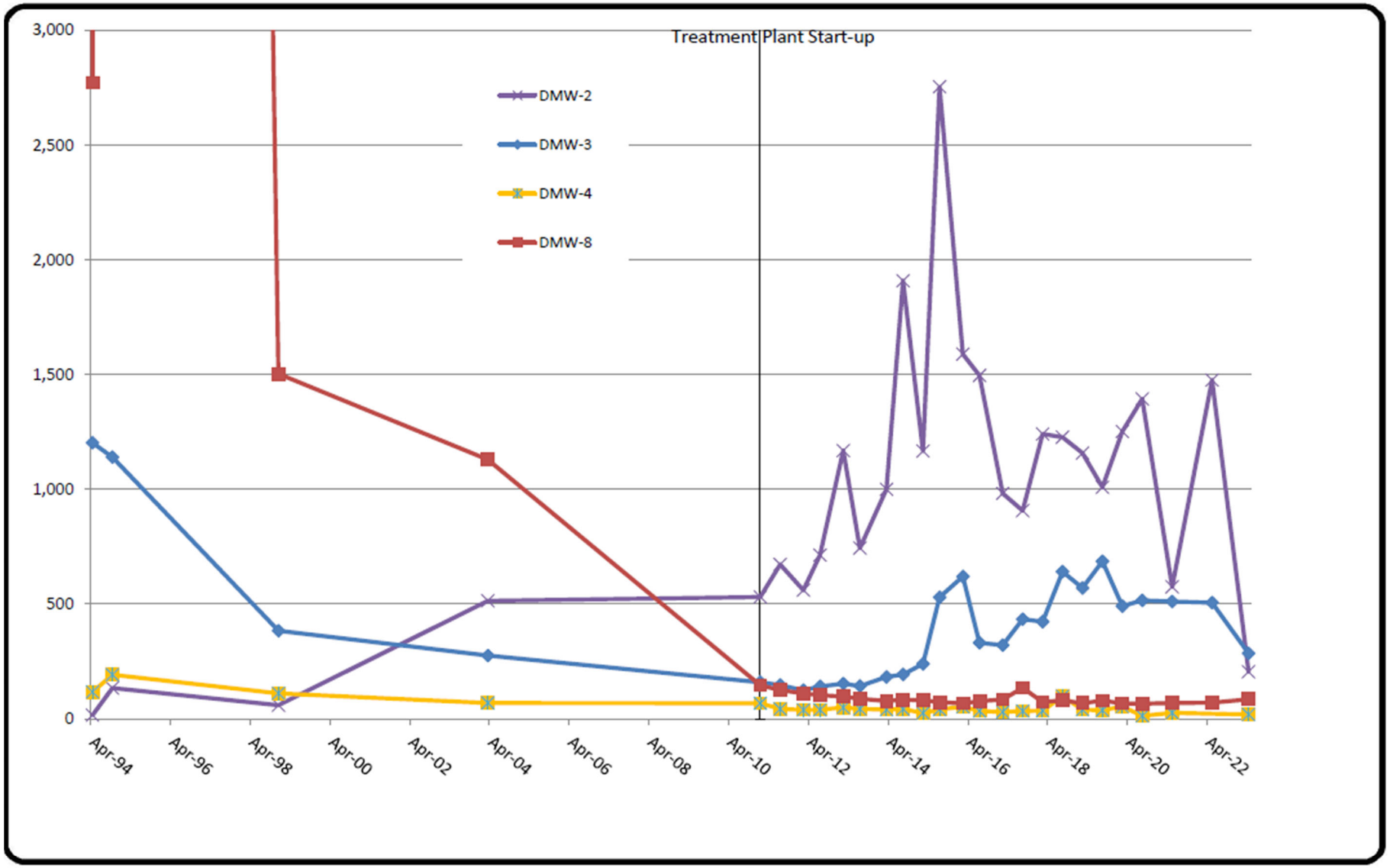
TETRA TECH

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN PRINCIPLE AQUIFER WELLS MW-103, MW-205P

FIGURE NO.
16

PROJECT NO.
4233347



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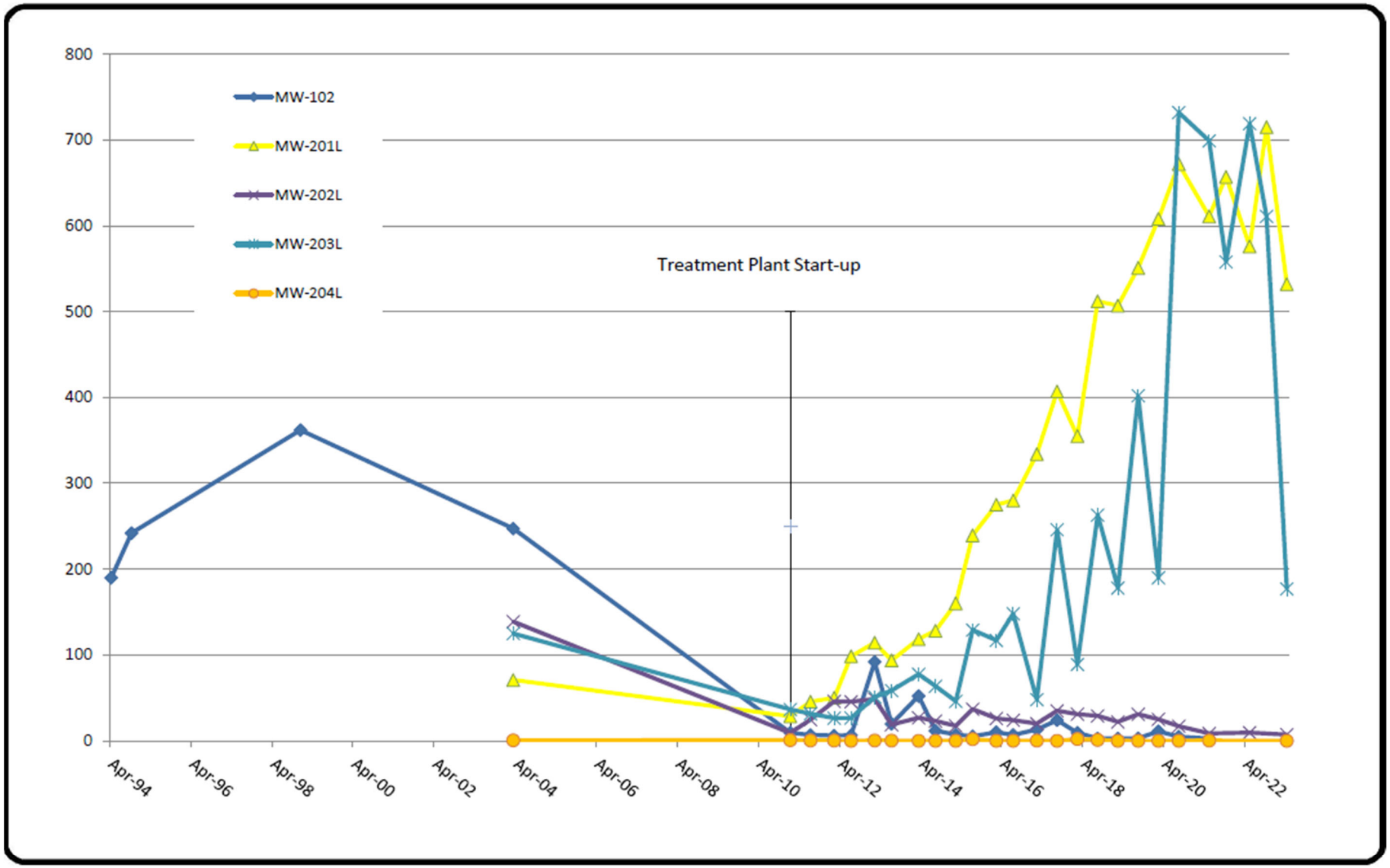
CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY

TVO CONCENTRATION (ug/L) WITH TIME IN DEEP BEDROCK ZONE WELLS DMW-2, DMW-3, DMW-4, DMW-8

FIGURE NO.
17

PROJECT NO.
4233347



TETRA TECH

CHEMSOL INC. SUPERFUND SITE
PISCATAWAY, NEW JERSEY
TVO CONCENTRATION (ug/L) WITH TIME IN DEEP BEDROCK ZONE WELLS MW-102, MW-201L, MW-202L, MW-203L, MW-204L

FIGURE NO.
18

PROJECT NO.
4233347

APPENDIX D – Remedy Resilience Assessment

Three tools were utilized to assess the Chemsol, Inc., Site. Screenshots from each of the tools assessed are included here.

The first tool utilized was the *CMRA Assessment Tool*. The tool examined five severe weather hazards for the county the Site falls within. According to this tool, the National Risk Index Rating for extreme heat, flooding, and coastal flooding for Middlesex County is "Relatively High," however, the site is located inland and is at an elevation where the flooding would be unlikely. There is a projected increase of days per year with maximum temperatures >100°F, as shown in Figure D-1. Drought and wildfire have a National Risk Index Rating of "Relatively Low." Figures D-2 and D-3 show an increase in average annual total precipitation and an increase in days per year with precipitation. Figures 2 and 3 show slight increases in average annual total precipitation and an increase in days per year with precipitation. Figure D-4 shows a slight increase in annual days with precipitation over one inch. As shown in Figure D-5, the percent of the county impacted by global sea level rise is 0.0% through 2044.

The second tool utilized is called *NOAA Sea Level Rise Viewer*, Figure D-6. The site itself is also located at a higher elevation away from the coastline. The primary severe weather concerns in Middlesex County include increasing temperatures and changes in seasonal patterns.

The final tool utilized is called the *USGS U.S. Landslide Inventory & Susceptibility Map*. As shown by Figure D-7, the site is likely not susceptible to landslide activity in the future.

Increases in temperature over time are not expected to impact the site. Thus, the performance of the remedy is currently not at risk due to the expected effects of severe weather in the region and near the site.

Figure D-1

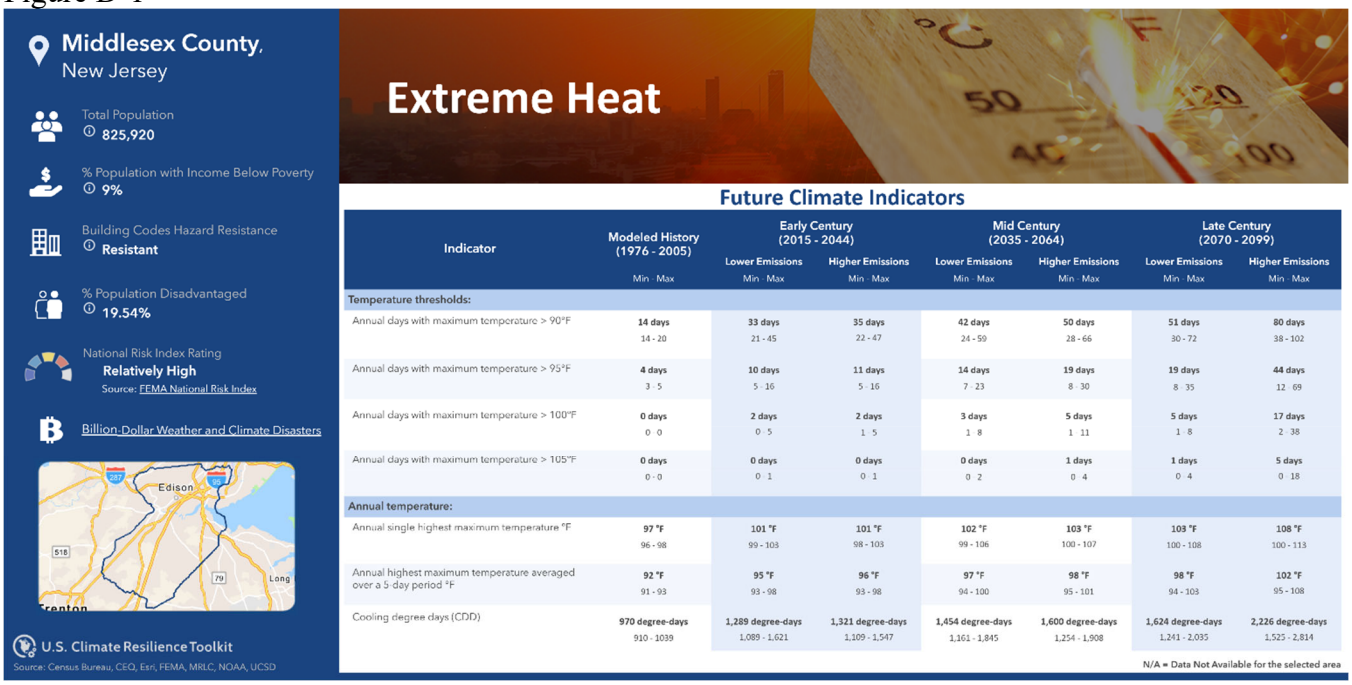
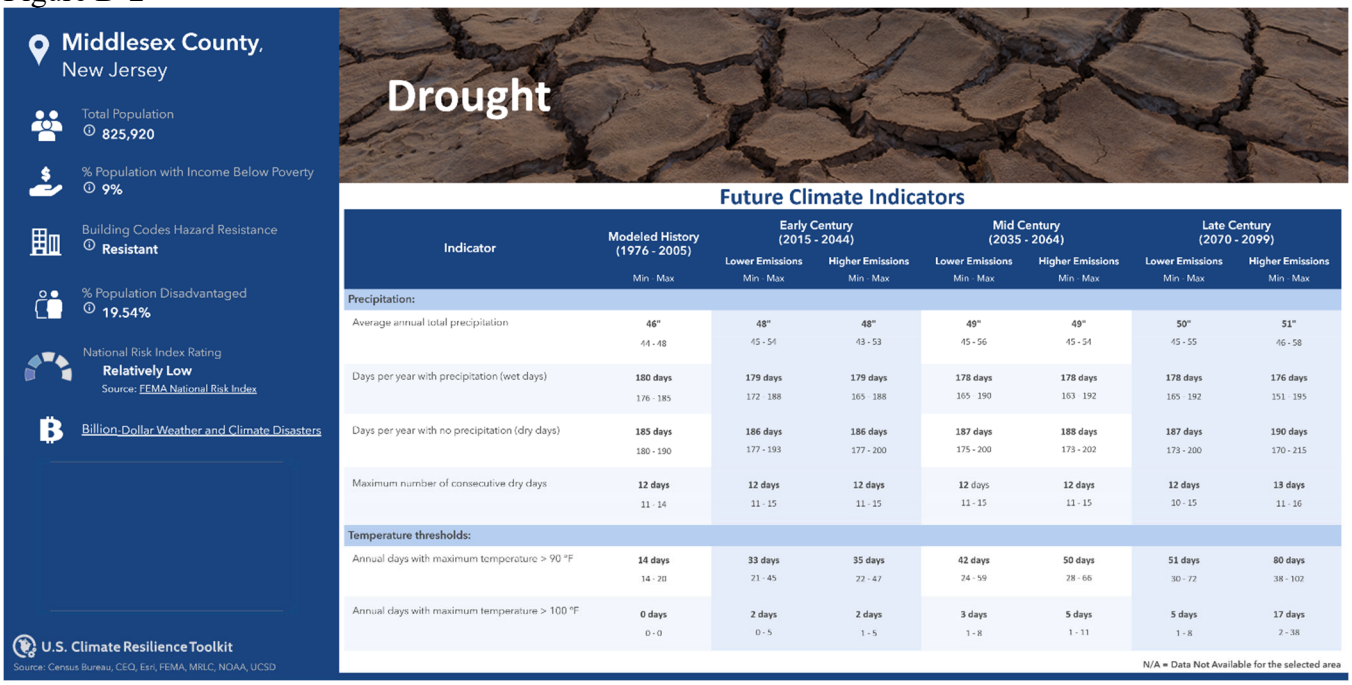


Figure D-2



Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Average annual total precipitation	46" 44 - 48	48" 45 - 54	48" 43 - 53	49" 45 - 56	49" 45 - 54	50" 45 - 55	51" 46 - 58
Days per year with precipitation (wet days)	180 days 176 - 185	179 days 172 - 188	179 days 165 - 188	178 days 165 - 190	178 days 163 - 192	178 days 165 - 192	176 days 151 - 195
Days per year with no precipitation (dry days)	185 days 180 - 190	186 days 177 - 193	186 days 177 - 200	187 days 175 - 200	188 days 173 - 202	187 days 173 - 200	190 days 170 - 215
Maximum number of consecutive dry days	12 days 11 - 14	12 days 11 - 15	12 days 11 - 15	12 days 11 - 15	12 days 11 - 15	12 days 10 - 15	13 days 11 - 16
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	14 days 14 - 20	33 days 21 - 45	35 days 22 - 47	42 days 24 - 59	50 days 28 - 66	51 days 30 - 72	80 days 38 - 102
Annual days with maximum temperature > 100 °F	0 days 0 - 0	2 days 0 - 5	2 days 1 - 5	3 days 1 - 8	5 days 1 - 11	5 days 1 - 8	17 days 2 - 38

N/A = Data Not Available for the selected area

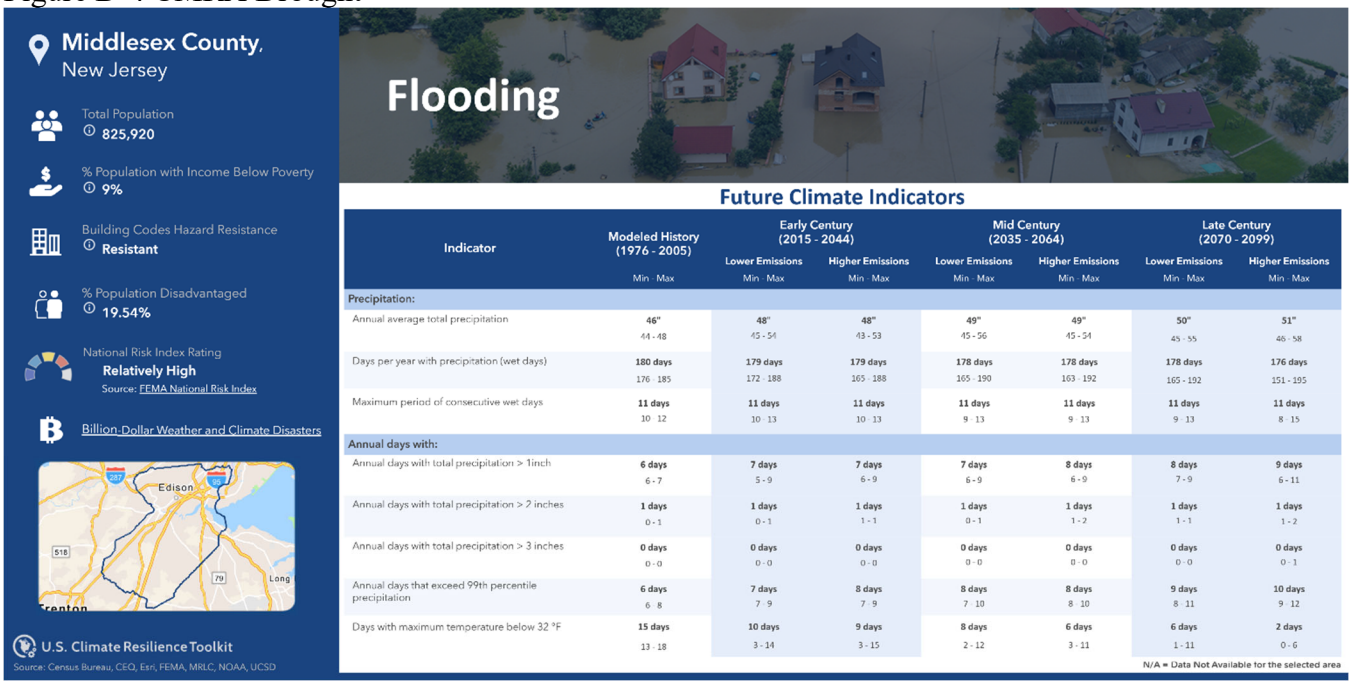
Figure D-3

Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Days per year with no precipitation (dry days)	185 days 180 - 190	186 days 177 - 193	186 days 177 - 200	187 days 175 - 200	188 days 173 - 202	187 days 173 - 200	190 days 170 - 215
Maximum number of consecutive dry days	12 days 11 - 14	12 days 11 - 15	12 days 11 - 15	12 days 11 - 15	12 days 11 - 15	12 days 10 - 15	13 days 11 - 16
Days per year with precipitation (wet days)	180 days 176 - 185	179 days 172 - 188	179 days 165 - 188	178 days 165 - 190	178 days 163 - 192	178 days 165 - 192	176 days 151 - 195
Temperature thresholds:							
Annual days with maximum temperature > 90°F	14 days 14 - 20	33 days 21 - 45	35 days 22 - 47	42 days 24 - 59	50 days 28 - 66	51 days 30 - 72	80 days 38 - 102
Annual days with maximum temperature > 100°F	0 days 0 - 0	2 days 0 - 5	2 days 1 - 5	3 days 1 - 8	5 days 1 - 11	5 days 1 - 8	17 days 2 - 38

N/A = Data Not Available for the selected area

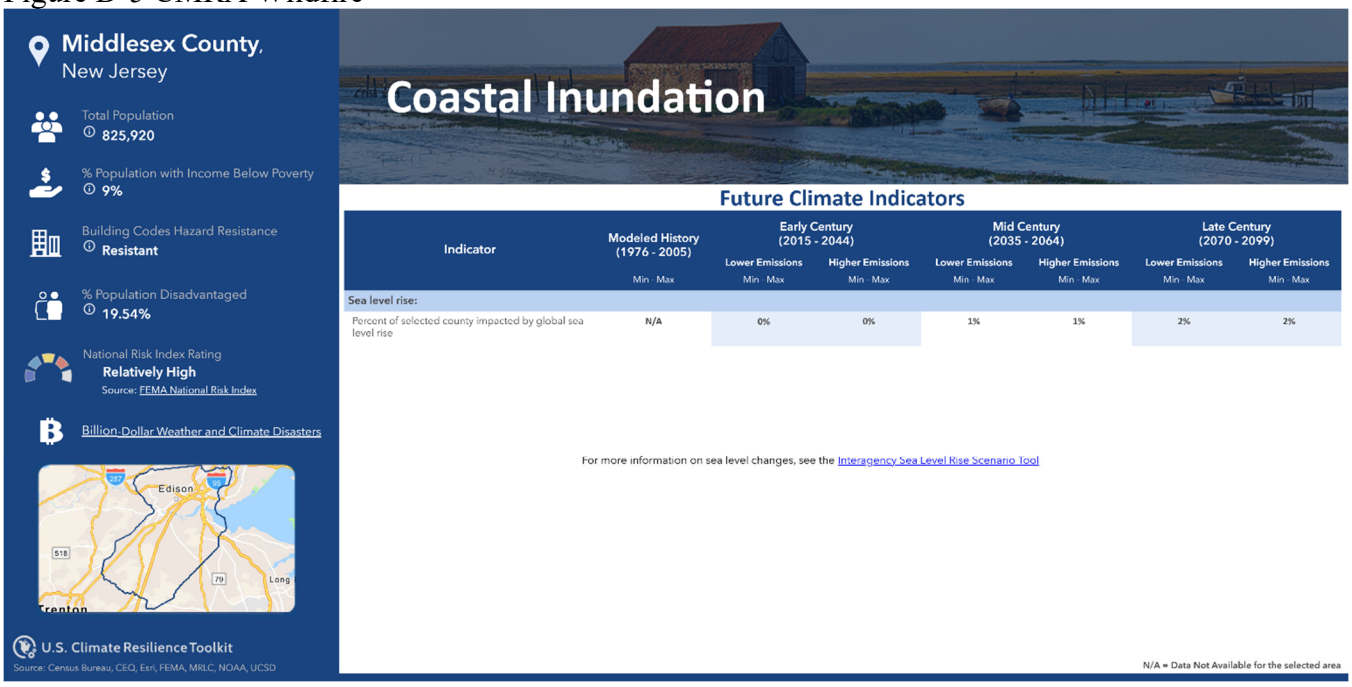
Figure D-4 CMRA Drought



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Annual average total precipitation	46" (44 - 48)	48" (45 - 54)	48" (43 - 53)	49" (45 - 56)	49" (45 - 54)	50" (45 - 55)	51" (46 - 58)
Days per year with precipitation (wet days)	180 days (176 - 185)	179 days (172 - 188)	179 days (165 - 188)	178 days (165 - 190)	178 days (163 - 192)	178 days (165 - 192)	176 days (151 - 195)
Maximum period of consecutive wet days	11 days (10 - 12)	11 days (10 - 13)	11 days (10 - 13)	11 days (9 - 13)	11 days (9 - 13)	11 days (9 - 13)	11 days (8 - 15)
Annual days with:							
Annual days with total precipitation > 1inch	6 days (6 - 7)	7 days (5 - 9)	7 days (6 - 9)	7 days (6 - 9)	8 days (6 - 9)	8 days (7 - 9)	9 days (6 - 11)
Annual days with total precipitation > 2 inches	1 days (0 - 1)	1 days (0 - 1)	1 days (1 - 1)	1 days (0 - 1)	1 days (1 - 2)	1 days (1 - 1)	1 days (1 - 2)
Annual days with total precipitation > 3 inches	0 days (0 - 0)	0 days (0 - 0)	0 days (0 - 0)	0 days (0 - 0)	0 days (0 - 0)	0 days (0 - 0)	0 days (0 - 1)
Annual days that exceed 99th percentile precipitation	6 days (6 - 8)	7 days (7 - 9)	8 days (7 - 9)	8 days (7 - 10)	8 days (8 - 10)	9 days (8 - 11)	10 days (9 - 12)
Days with maximum temperature below 32 °F	15 days (13 - 18)	10 days (3 - 14)	9 days (3 - 15)	8 days (2 - 12)	6 days (3 - 11)	6 days (1 - 11)	2 days (0 - 6)

N/A = Data Not Available for the selected area

Figure D-5 CMRA Wildfire



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Sea level rise:							
Percent of selected county impacted by global sea level rise	N/A	0%	0%	1%	1%	2%	2%

For more information on sea level changes, see the Interagency Sea Level Rise Scenario Tool

N/A = Data Not Available for the selected area

Figure D-6 NOAA Sea Level Rise

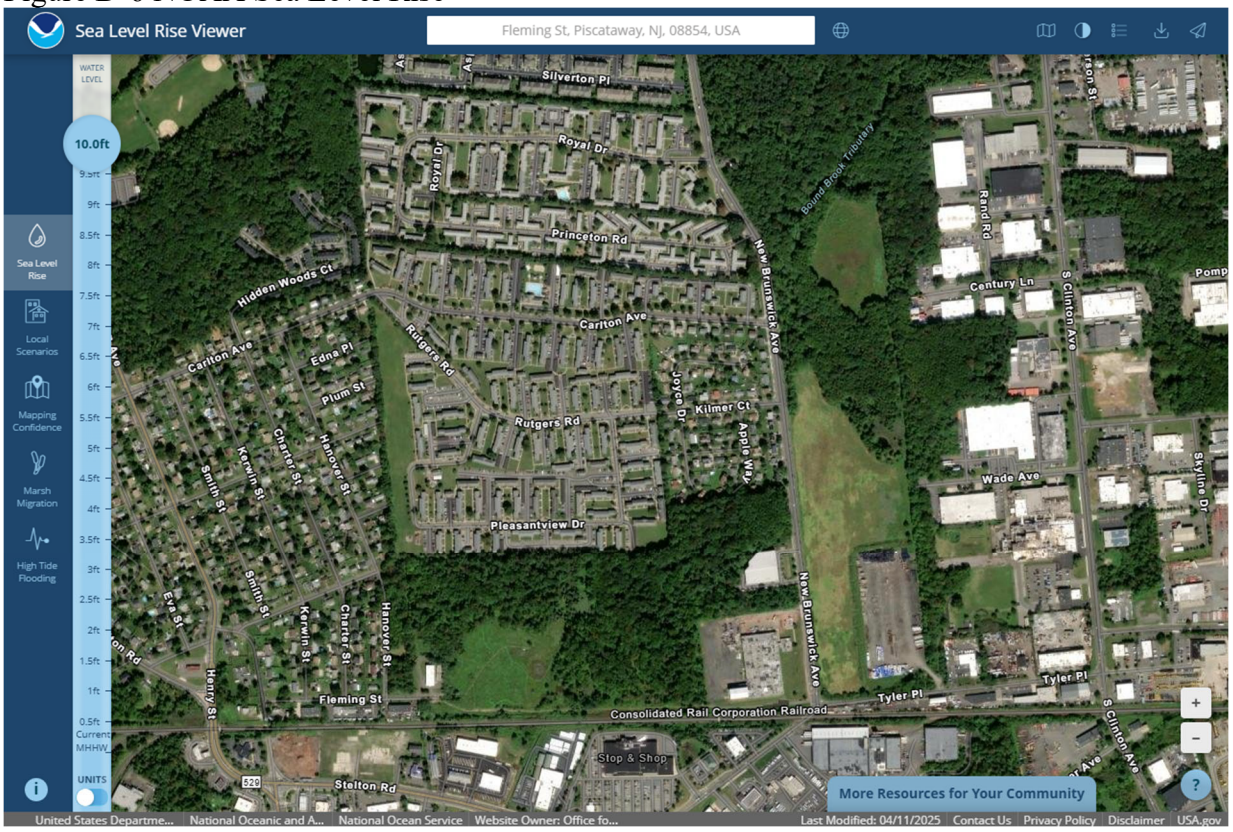


Figure D-7 CMRA Flooding