THIRD FIVE-YEAR REVIEW REPORT FOR COSDEN CHEMICAL COATINGS SUPERFUND SITE BURLINGTON COUNTY, NEW JERSEY

Prepared by

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
EPA	United States Environmental Protection Agency
ERT	Environmental Response Team (EPA)
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
FYR	Five-Year Review
GETS	Groundwater extraction and treatment system
GWQS	Groundwater Quality Standards
ICs	Institutional Controls
ISCO	In-Situ Chemical Oxidation
MCL	Maximum Contaminant Level
mg/kg	Milligrams per kilogram
MIHPT	Membrane Interface Probe / Hydraulic Profiling Tool
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	Nanograms per liter (parts per trillion)
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
O&M	Operation and Maintenance
PCB	Polychlorinated biphenyl
PRP	Potentially Responsible Party
PFAS	Per- and polyfluoroalkyl substances
PFBS	Perfluorobutanesulfonic acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
RDCSCC	Residential Direct Contact Soil Cleanup Criteria
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
SVE	Soil vapor extraction
TBC	To be considered
TCE	Trichloroethene
USACE	United States Army Corps of Engineers
VOC	Volatile Organic Compounds
µg/L	Micrograms per liter (parts per million)
XRF	X-ray fluorescence

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 third FYR for the Cosden Chemical Coatings Superfund Site (Site). The triggering action for this policy review is the completion date of the previous FYR, August 15, 2017. The FYR has been prepared due to the fact that the remedial action will not leave hazardous substances, pollutants or contaminants on-site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete.

The Site consists of one operable unit (OU) which is reviewed in this FYR. OU1 addresses three distinct phases or components, namely: decontamination and demolition of the building on the Site with disposal of the building debris at an appropriate off-site facility, excavation with off-site treatment and disposal of soil contaminated with inorganic compounds and polychlorinated biphenyl (PCBs), and extraction of contaminated groundwater with on-site treatment and recharge to the underlying aquifer.

The Site's FYR was led by EPA's Remedial Project Manager, Stephanie M. Wilson. Additional participants included Jeff Josephson (New Jersey Projects / State Coordination Section Chief), Michael Scorca and Liana Agrios (Hydrogeologists), and Nicholas Mazziotta and Stephanie Kim (Risk Assessors). The review began on 8/1/2018.

Site Background

The Cosden property is located in the southeastern corner of the City of Beverly in Burlington County, New Jersey (Figure 1) at the intersection of Manor Road and Cherry Street within a residential area of Beverly. It is bounded on the north and east by residential streets, on the south by Conrail tracks and farmland, and on the west by undeveloped land. The nearest residence is approximately 300 feet to the north of the Site. The Beverly Elementary School is located 0.2 miles to the northeast. The neighboring area is suburban with some light industry. The Delaware River is approximately 4,000 feet to the north, and Rancocas Creek is approximately 1.5 miles to the southwest of the Site. The population within a one-mile radius of the Site is approximately 800 people. The local water utility provides drinking water, and the Delaware River is the source of the potable water supply.

Cosden Chemical Coatings Corporation was a paint formulation and manufacturing facility which produced coatings for industrial applications. In the manufacturing process, pigments were mixed with resins and solvents in both ball and sand mills. The material was then placed into a mixing tank where other ingredients were added to produce the final coating products. Mixing tanks were then washed out with solvents, and the rinsate was transferred to drums. Organic solvents used in the manufacturing

process were recycled until 1974. After 1974, drums containing spent solvents were stored on-site; some of these drums leaked onto the ground causing soil and groundwater contamination. Fresh solvents were stored in underground tanks, which may have leaked.

The Site was placed on the National Priorities List (NPL) in July 1987. The plant owner ceased operations in May 1989 and subsequently did not finance or undertake the remedial investigation or feasibility study (RI/FS) or remediation of the Site.

Site Geology and Hydrology

The Site is located in the Atlantic Coastal Plain physiographic province of southern New Jersey. Unconsolidated sediments in the shallow subsurface soil at the Site are alluvial deposits consisting mainly of sand and gravel with minor amounts of silt and clay. The Potomac-Raritan-Magothy (PRM) aquifer is the primary aquifer in the area of the Site and a significant source of municipal water for the region. This regional aquifer system is composed of three sandy aquifers (designated Lower, Middle, and Upper) which are separated by intervening confining units composed of silt and clay. The Upper PRM aquifer is not present at the Site. The contaminated aquifer at the Site is the Middle PRM aquifer.

North of the Cosden property, regional groundwater flows northward towards the Delaware River. The Delaware River is the major surface water feature located approximately 4,000 feet north of the property. The projected 100-year flood of the Delaware River is expected to extend no closer than 3,000 feet north of the property. The closest distance that the 500-year flood is expected to occur is approximately 1,900 feet to the north.

Current water-level data collected during non-pumping conditions indicate a groundwater divide at the northern limit of the Site. Groundwater at the Cosden property has a west / northwest flow direction (Figure 2), possibly influenced by the nearby Bogg's Ditch and its unnamed tributary, while groundwater off -property flows north / northwest towards the Delaware River. The low hydraulic gradient measured at the Site, permeabilities measured during Membrane Interface Probe / Hydraulic Profiling Tool (MIHPT) probes, dye injections, and movement of oxidant as part of an ongoing In-Situ Chemical Oxidation (ISCO) pilot study all indicate that groundwater moves slowly through the Site.

Static groundwater levels collected during the past five years as part of the ISCO pilot study indicates the water table is located approximately 17 feet below the ground surface (bgs) on the Site property. An EPA well survey conducted in May 1991 found no private wells used for drinking water in the vicinity of the Site. No additional private wells used for drinking water are known to be present near the site. Two public supply wells owned and operated by New Jersey American Water Company (Wells No. 15 and 16) are located approximately 3,200 feet north of the Site but are no longer in use. New Jersey American Water closed the two supply wells more than twenty years ago and replaced them with a larger surface water treatment plant along the Delaware River.

THIRD FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Cosden Chemical Coatings		
EPA ID: NJD000565531		
Region: 2	**State:** NJ	**City/County:** City of Beverly / Burlington County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA *[If "Other Federal Agency", enter Agency name]*:		
Author name (Federal or State Project Manager): Stephanie M. Wilson		
Author affiliation: Remedial Project Manager, EPA Region 2		
Review period: 8/15/2017 – 12/30/2021		
Date of site inspection: 11/12/2021		
Type of review: Policy		
Review number: 3		
Triggering action date: 8/15/2017		
Due date *(five years after triggering action date)*: 8/15/2022		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

As a result of the risk assessment, conducted as a part of the remedial investigation, ingestion of contaminated groundwater in a future use scenario indicated that an elevated risk to human health existed since the hazard indices were estimated to be 16 for children and 11 for adults, exceeding EPA's noncancer hazard threshold (Hazard Index of 1). Residential adult ingestion of groundwater as drinking water yielded a cancer risk of $3x10^{-4}$, exceeding EPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$, as well. In addition, the concentrations of the following contaminants were found in groundwater above promulgated federal and/or state Maximum Contaminant Levels (MCLs): toluene, ethylbenzene, xylene, trichloroethene, chromium, and lead. Both lead and PCBs were present in Site soils at unacceptable concentrations.

The environmental evaluation provides a qualitative assessment of the actual or potential impacts associated with the Site on plants and animals (other than people or domesticated species). The primary objectives of this assessment are to identify the ecosystems, habitats, and populations likely to be found

at the Site and to characterize the contaminants, exposure routes, and potential impacts on the identified environmental components. There were no endangered species, sensitive ecosystems, or sensitive habitats identified on the Site. The environmental assessment concluded that adverse impacts to on-site plants and animals from site related contamination are not likely.

Response Actions

A grass fire that occurred at the Site on April 22, 1980 prompted the Burlington County Department of Public Safety to report the Site conditions to the New Jersey Department of Environmental Protection (NJDEP). Subsequent visits by the NJDEP revealed the presence of surface spills and several hundred unsecured drums. Various court actions and negotiations undertaken by NJDEP against Cosden Chemical Coatings Corporation resulted in a judicial consent order on February 5, 1985 that ordered Cosden Chemical Coatings Corporation to clean up the facility. Cosden Chemical Coatings Corporation initiated the cleanup in February 1985, but abandoned cleanup efforts after 88 of 695 drums were removed. In January 1986, NJDEP then undertook an emergency removal of the drummed material and cleanup of surface spills around the drum storage areas.

In June 1989, EPA initiated emergency cleanup activities at the Site by constructing a fence around areas of soil contamination and began removing the remaining drums, paint cans, pigment bags, mixing tanks, and underground storage tank contents. On May 28, 1990, as the removal action was nearly completed, a fire occurred inside the process building which consumed a majority of the building. On May 31, 1990, the building was condemned by the Beverly City building inspector.

Based on the RI/FS that was conducted by EPA at the site from April 1988 until September 1992, a Record of Decision (ROD) was issued by EPA on September 30, 1992.

Remedial Action Objectives

The remedial action objectives (RAOs) in the 1992 ROD are:

- Prevent exposure to contaminant sources that present a significant human health risk; and,
- Restore contaminated groundwater to drinking water standards.

Remedy Components selected in the ROD

The major components of the selected remedy include:

- Decontamination and demolition of the building on the Site with disposal of the building debris at an appropriate off-site facility;
- In-situ stabilization of soil contaminated with inorganic compounds and PCBs; and,
- Extraction of contaminated groundwater with on-site treatment and recharge to the underlying aquifer.

Remedy components that have been modified in an ESD

The proposed contaminated soil remedy was reviewed during the design stage. A pre-design investigation related to this component uncovered conditions which led EPA to issue an Explanation of Significant Differences (ESD) in September 1998. This resulted in the 1992 ROD being modified as follows:

- In-situ treatment of contaminated soils was modified to excavation with off-site treatment (if

necessary) and disposal;

- Construction of a soil vapor extraction (SVE) system to address the remaining contaminants present in soil above the water table (the vadose zone); and,
- The lead cleanup goal for soils was modified from 500 milligrams per kilogram (mg/kg) to 400 mg/kg.

Cleanup Levels

The selected remedial actions included the following cleanup goals for soil and groundwater:

Table 1: Groundwater Contaminants of Concern and Remediation Goals

Contaminant of Concern	Remediation Goal (micrograms per liter) (µg/L)
Toluene	1,000
Ethylbenzene	700
Xylenes, Total	44*
Trichloroethene	1
Chromium, Total	100
Lead (at tap)	15 (TT)

TT - Treatment Technique

* The 2004 Groundwater Quality Standards Rule Recodification and Readoption (NJAC 7:9C), provided a revised standard of 1,000 µg/L. This was adopted by the state based on updated toxicological information recommended by the New Jersey Drinking Water Quality Institute (NJDWQI).

Table 2: Soil Contaminants of Concern and Remediation Goals

Contaminant of Concern	Remediation Goal (mg/kg)
PCBs	1
Lead	400

Status of Implementation

Building Demolition

The first component of the selected remedy implemented was decontamination, demolition, and disposal of the process building and equipment. This work was conducted between July 1995 and January 1996 and included demolition of the former 15,000 square-foot (ft^2) process building. All structures were decontaminated and demolished. All demolition debris including asbestos was disposed of off-site.

Soils

The contaminated soils remediation was conducted by the EPA Region 2 Removal Action Branch with technical support provided by EPA's Environmental Response Team (ERT). ERT performed an extensive screening effort at the Site employing x-ray fluorescence (XRF) technology to identify the grid nodes and

the concentrations and depths of inorganic contamination (principally lead and chromium). The data was used to define the areal extent and depth of the excavation. The soil remediation was accomplished in phases between June 1999 and March 2002

The soil cleanup was conducted to meet the NJDEP Residential Direct Contact Soil Cleanup Criteria (RDCSCC) for lead, 400 mg/kg. For PCBs, the soil cleanup objective was the federal residential cleanup criterion of 1 mg/kg in accordance with *Guidance on Remedial Actions for Superfund Sites with PCB Contamination,* OSWER Directive #9355.4-01. However, post-excavation sampling indicated that the soil removal ultimately met NJDEP's more stringent RDCSCC level of 0.49 mg/kg for PCBs. The excavated areas and maximum excavated depths are: the Eastern Wooded Area (two feet below grade), the Former Pad Area [after it had been removed under the soil remedy (two feet below grade)], the Deep Volatile Organic Compounds (VOC) Pit (16 feet below grade), the Former Stockpile Area (one foot below grade), the Hexavalent Chromium Pit (four feet below grade), the inorganic contamination grids (four feet below grade), the PCB grids (six feet below grade), the Buried Drum and Geophysical Survey Area (various test pit depths), and the Final VOC Excavation Area (11 feet below grade), (Figure 3). All contaminated soils, underground storage tanks, and residual liquids were sent off-site for disposal and/or treatment, as necessary. A remedial action report, dated September 2003, was prepared to document the soil portion of the cleanup undertaken which included the excavation and disposal of 13,000 tons of contaminated soil, solid waste, and debris, four underground storage tanks, and 2,600 gallons of liquid waste.

Groundwater

EPA entered into an Interagency Agreement with the United States Army Corps of Engineers (USACE) Baltimore District to provide the remedial design. The largest element of the remedial design was the groundwater extraction and treatment system (GETS) which was constructed beginning in July 2006. In addition to the GETS, an SVE system was installed, including three banks of SVE wells and collection lines that allowed contaminated vapors to be extracted from the vadose zone. A fence was installed around the treatment facilities to provide security and prevent trespassing. The remedy achieved construction completion status in July 2007.

Data indicated that the GETS efficiently removed contaminants from the groundwater prior to on-site reinjection. The primary contaminants of concern in groundwater, as noted in the 1992 ROD and again in the September 2006 New Jersey Pollutant Discharge Elimination System Permit Equivalent for Cosden, are ethylbenzene, toluene, xylene and trichloroethene (TCE). The GETS reduced levels of any contaminants present to meet the New Jersey Groundwater Quality Standards (GWQS) Class IIa standards before the groundwater was reinjected back into the aquifer.

A pilot study began in November 2017 to test the effectiveness of ISCO in reducing VOC concentrations in groundwater, referred to as the ISCO pilot study. The pilot study was conducted to address remaining contamination that was identified using Membrane Interface Probe / Hydraulic Profiling Tool (MIHPT). EPA and USACE identified that ISCO could more quickly address this remaining contamination than the GETS. Since the pilot study began, EPA installed 15 monitoring wells to focus monitoring activities where VOC concentrations are highest. Four rounds of injections of persulfate with a sodium hydroxide activator were performed between 2017 and 2021. Groundwater monitoring was conducted before and after each injection event.

Institutional Control (IC) Summary

Neither the ROD or the ESD required institutional controls at Cosden.

Systems Operations/Operation & Maintenance

The operation and maintenance (O&M) requirements and activities were specified in the October 11, 2007 *Cosden Chemical Site, Operation and Maintenance Plan for the Groundwater Extraction and Treatment System and Soil Vapor Extraction System*. Historically, the NJDEP permit equivalent required semi-annual groundwater quality monitoring of monitoring wells MW-l, MW-3, MW-4, MW-9S, PZ-llS and EW-l, and bi-monthly treatment system operation samples. During the operation of the GETS starting in 2009, groundwater was sampled twice a year at seven monitoring wells on the Cosden property that were installed as part of the Remedial Investigation and seven monitoring wells located off property as part of routine O&M (see Figures 4 and 5 for monitoring well locations).

The SVE system was shut down in June 2010 after groundwater levels increased when the nearby public supply wells were eliminated, thus submerging the SVE wells underwater.

The ISCO pilot study began in November 2017 with the first injections completed March 2018. The GETS was temporarily shut-down on May 14th, 2018 due to the potential for ISCO treatment materials to enter the plant during the pilot study. As the pilot study is ongoing, there are currently no operations required for the treatment plant and maintenance requirements include routine inspections to ensure that Site conditions are unchanged. If needed, the plant can be restarted. As mentioned in the "Status of Implementation" section above, 15 groundwater monitoring wells were installed during the pilot test. Currently, groundwater sampling consists of several rounds of sampling of these newer pilot study phase monitoring wells and some of the older monitoring wells constructed as part of Remedial Investigation. In total, approximately 26 monitoring wells are currently monitored.

Potential Site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site.

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 4: Protectiveness Determinations/Statements from the 2017 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The OU1 remedy is protective of human health and the environment.
Sitewide	Protective	The Site remedy is protective of human health and the environment.

Although no issues and recommendations were identified that impacted protectiveness, the previous FYR stated that the in-situ chemical oxidation study should continue to be implemented to assess its effectiveness in addressing remaining groundwater contamination. This ISCO pilot study is ongoing,

resulting in four rounds of injections and monitoring to date and additional injections and monitoring are anticipated for the future.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On Friday, August 6, 2021, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies a Superfund sites in New York, New Jersey, Puerto Rico and the Virgin Islands, including the Cosden Chemical Coatings Superfund site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, efforts will be made to reach out to local public officials to inform them of the results. The EPA Community Involvement Coordinator (CIC) for the Site, Natalie Loney, arranged for a notice to be posted on the City of Beverly website (http://thecityofbeverly.com/ and http://thecityofbeverly.com/municipal-clerk) as well as the EPA website, https://www.epa.gov/superfund/cosden-chemical. This notice indicated that a FYR would be conducted at the Site. Once the FYR is completed, the results will be made available at the following repository: Beverly Municipal Building and the Burlington County Library located at 446 Broad Street, Beverly, NJ 08010 and 5 Pioneer Blvd, Westampton, NJ 08060, respectively. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/cosden-chemical.

Data Review

The groundwater extraction and treatment system (GETS) was designed to extract 95 gallons per minute of water from the two on-site extraction wells (RW-1 and RW-2) with reinjection of treated water back into the aquifer. The system started operating in 2007 and was turned off in May 2018 to prevent persulfate that is used for the ISCO pilot study from entering the system. Before its shutdown, the GETS is estimated to have treated 282,311,828 gallons of water since 2007 and removed approximately 13,000 pounds of total VOCs. The GETS is currently being maintained in a temporary shutdown state during the ongoing ISCO pilot study.

Current water-level data collected during static (non-pumping) conditions indicates a groundwater divide at the northern limit of the Cosden property. Groundwater at the Cosden property has a west/ northwest flow direction, while groundwater off property flows north/northwest towards the Delaware River (Figure 2). The primary VOCs of concern in groundwater are ethylbenzene, toluene, total xylenes, and TCE, with total xylenes typically detected at the highest concentrations. The primary metals of concern in groundwater are chromium and lead. Two extraction wells, 42 Cosden property monitoring wells, and seven off-property monitoring wells are available for sampling. Sampling was previously conducted quarterly and is now conducted several times a year as part of the ISCO pilot study. The analytical data are evaluated and compared to EPA's ROD standards and NDEP's Groundwater Quality Standards (GWQS) (Table 7). Mann-Kendall statistical analyses were calculated to determine if trends in groundwater concentrations, are increasing, decreasing, or remaining the same. In addition, EPA sampled groundwater for several emerging contaminants that were not identified in the ROD during this five-year review period. The NJDEP GWQS for those emerging contaminants are discussed in Appendix C, Table 8.

Cosden Property Monitoring Wells

Property monitoring wells are located within the Cosden property boundaries and consist of a series of monitoring wells that were installed before 2017, referred to as the "Remedial Investigation (RI) phase monitoring wells," and a series of monitoring wells (MW-100 through MW-115) that were installed after 2017 as part of the ISCO pilot study, referred to as "pilot test phase monitoring wells" (Figure 4).

The site data collected to date indicates that the majority of contaminated groundwater that is currently present is located on the Cosden property within a 0.21 acre area and at a depth of 20 to 25 feet bgs. Pilot study monitoring wells were placed specifically to target the location and vertical depth where residual contamination remains.

Overall, fifteen RI phase monitoring wells and 16 pilot test phase monitoring wells were evaluated in this FYR. There was no data for the pilot test phase monitoring wells in the last FYR since these monitoring wells were installed within the past five years.

VOCs

Ethylbenzene –

- None of the RI phase monitoring wells had concentrations above the 700 µg/L ROD standard / NJDEP GWQS, indicating similar results to the previous FYR which reported concentrations below 700 µg/L.
- Within the past five years, the pilot study monitoring wells reported concentrations of ethylbenzene from non-detect to 25,200 µg/L, reported at MW-110 in November 2018 (Plots 1 and 2). Pilot study phase monitoring wells MW-103 and MW-106 demonstrated statistically significant decreasing trends for ethylbenzene due to ISCO injections.

Toluene –

- None of the RI phase monitoring wells reported concentrations above the NJDEP GWQS (600 µg/L), similar to the previous FYR.
- Pilot test phase monitoring wells reported concentrations between non-detect and 3,220 µg/L, reported at MW-110 in November 2018, which is above the NJDEP GWQS of 600 µg/L and the ROD standard of 1,000 µg/L. MW-103 was the only other pilot study monitoring well that reported toluene concentrations above the NJDEP GWQS (600 µg/L) at 700 µg/L (Plot 3).
- MW-103 reported concentrations below both standards since 2019 and MW-110 has reported concentrations below the ROD standard since 2020 due to the ISCO injections.

Total Xylenes –

- During the most recent sampling event in 2021, all the RI phase monitoring wells indicated that total xylene concentrations are currently below NJDEP GWQS (Plot 4).
- Thus, the most recent results indicate improvement in concentrations in the RI phase monitoring wells when compared with the previous FYR which reported some concentrations of total xylenes above standards.
- The RI phase monitoring wells reported total xylenes as the only VOC currently being measured above NJDEP GWQS (1,000 µg/L) and ROD standards (44 µg/L) in the past five years. Concentrations ranged from non-detect to 2,200 µg/L, reported at RW-2 in August 2017. Only four out of the 15 RI phase monitoring wells reported concentrations above 1,000 µg/L.

- The pilot test phase monitoring wells reported total xylene concentrations between 0.95 µg/L, reported at MW-101 in May 2018, and 114,000 µg/L, reported at MW-110 in November 2018 (Figure 6 and 7).
- All of the pilot test phase monitoring wells with high concentrations have reported a decrease in concentrations due to the ISCO treatments that have been applied to the Site.
- MW-110 reported a post-ISCO treatment xylene value of 31,570 µg/L in 2021 (Figure 7) and this is a reduction from 114,000 µg/L detected in 2018.
- Currently, pilot test phase monitoring wells MW-103 and MW-106 report statistically significant decreasing trends.

Trichloroethene-

- The RI phase monitoring wells did not report any detections of trichloroethene above standards, similar to the previous FYR.
- The pilot test phase monitoring wells reported concentrations of trichloroethene between non-detect and 151 µg/L, reported at MW-110 in November 2018, which is above NJDEP GWQS and ROD standard of 1 µg/L. However, MW-110 has reported decreasing concentrations since 2018 due to the ISCO treatments, with the most recent concentration of 0.82 J (estimated) µg/L in May 2021.

In addition, four monitoring wells, MW-10I, PZ-10S, MW-108, and MW-114, are located on the Cosden property near the property boundary, in the downgradient direction of groundwater flow (Figure 4). EPA uses these monitoring wells to monitor if groundwater contamination is leaving the property. These monitoring wells were installed due to changes in the direction of groundwater flow when groundwater pumping ceased at the two downgradient public supply wells. The monitoring wells have reported single detections of VOCs above ROD and NJDEP GWQS standards in the past five years, specifically single detections of ethylbenzene, total xylenes, and trichloroethene. Recent sampling in April 2021 indicates that concentrations of ethylbenzene and trichloroethene may no longer be above the standards, though EPA will continue to sample these monitoring wells to confirm this.

Metals

The Cosden Bench-Scale In-Situ Oxidation Test Summary in the 2017 Work Plan for the ISCO Pilot Study predicted that the persulfate treatment could release certain metals from site soils, including chromium and lead, and that chromium will likely oxidize to hexavalent chromium due to the strongly oxidizing conditions created by the injection of pilot study. However, elevated concentrations for all metals are expected decline as groundwater re-equilibrates to the natural geochemical conditions typical of the area, due to the reduction in the oxidizing conditions created by the pilot study and, thus, result in a reduction in the solubility of the metals.

Chromium-

- Eleven of the Cosden property monitoring wells, including both RI phase and pilot phase monitoring wells, reported total chromium concentrations above NJDEP GWQS (70 µg/L) and ROD standards (100 µg/L). These monitoring wells were all located in areas where active ISCO injections are occurring. The rest of the monitoring wells sampled are located further from areas targeted for ISCO injections and reported concentrations of non-detect or below standards.
- The RI phase monitoring wells reported total chromium concentrations ranging from non-detect to 1,100 µg/L, reported in RW-1 in June 2020 (Plot 5). In the previous FYR, there was only a single detection of total chromium above standards at MW-9S at 110 µg/L.

- The pilot test phase monitoring wells reported total chromium concentrations ranging from non-detect to 1,800 µg/L, reported in MW-104 in November 2019.
- Six monitoring wells were sampled in 2020 and 2021 to determine if dissolved chromium was present. RI phase monitoring well RW-1 reported 26 µg/L dissolved chromium in June 2020. Pilot test phase monitoring wells reported concentrations ranging from 4.32 µg/L, reported at MW-113 in April 2021, to 327 µg/L, reported at MW-103 in April 2021 (Table 9), which is above the 100 µg/L screening value (see Appendix C for a discussion of screening values and standards).
- The RI phase monitoring wells reported hexavalent chromium concentrations ranging from non-detect to 58 µg/L, reported at VE-12 in June 2020. During the previous FYR groundwater was not analyzed for hexavalent chromium. The pilot test phase monitoring wells reported hexavalent concentrations ranging from non-detect to 36 µg/L, reported at MW-103 in June 2020. Additional data is required to determine statistically significant trends.

Lead –

- Nine of the Cosden property monitoring wells, including both RI phase and pilot test phase monitoring wells, reported total lead concentrations above NJDEP GWQS (5 µg/L), and four additional monitoring wells reported total lead concentrations above ROD standards (15 µg/L). The RI phase monitoring wells reported total lead concentrations ranging from non-detect to 46 µg/L, reported at RW-1 in June 2020 (Plot 9). The pilot test phase monitoring wells reported total lead concentrations ranged from non-detect to 75 µg/L, reported at MW-104 in November 2019 (Plots 10 and 11).
- Seven Cosden property monitoring wells were sampled for dissolved lead in 2020 and 2021 (Table 10). RI phase monitoring well RW-1 reported non-detect concentrations in May 2020. The previous FYR did not report dissolved lead concentrations. The pilot test phase monitoring wells reported concentrations between non-detect and 12 µg/L, reported at MW-111 in April 2021.

As mentioned before, four monitoring wells, MW-10I, PZ-10S, MW-108, and MW-114, are located near the property boundary in the downgradient direction of groundwater flow (Figure 4). EPA uses these monitoring wells to monitor if groundwater contamination is leaving the property. These monitoring wells were installed due to changes in direction of groundwater flow when groundwater pumping ceased at the downgradient public supply wells. For metals, MW-108 was the only monitoring well to report one exceedance of NJDEP GWQS for total chromium (GWQS is 70 µg/L), specifically 94.7 µg/L in April 2021, though this value is below the ROD standard of 100 µg/L.

Off Property Monitoring wells

Eight off property monitoring wells were installed in 2001 as part of an off-site groundwater investigation. They are located outside of the Cosden property boundaries (Figure 5). Though these monitoring wells were historically located downgradient from the site, these monitoring wells are now located hydraulically downgradient and side-gradient from the source area due to the elimination of the effects from the aquifer pumping at the former public supply wells. In preparation for this FYR, the off property monitoring wells were sampled in September 2017, March 2018, and April 2021.

- The previous FYR presented results for OS-7D, which historically had the highest concentrations of contamination and is located nearest to the Site (Figure 5). In the previous FYR, OS-7D reported VOC concentrations as below 1 µg/L.

- The off property monitoring wells have not reported any exceedances of NJDEP GWQS or ROD standards for VOCs or metals in the past five years.

Emerging Contaminants

Per- and polyfluoroalkyl substances (PFAS) –
Six monitoring wells were sampled for PFAS in April 2021. NJDEP has developed GWQS for three specific PFAS chemicals: Perfluorononanoic Acid (PFNA, 13 nanograms per liter (ng/L)), Perfluorooctane Sulfonate (PFOS, 13 ng/L), and Perfluorooctanoic Acid (PFOA, 14 ng/L).

- PFNA concentrations ranged from non-detect at MW-10I to 19 ng/L at MW-8S, which is the most hydraulically upgradient Cosden property monitoring well. (Table 11).
- PFOS concentrations ranged from non-detect at MW-9S to 66.8 ng/L at MW-3 (Table 12).
- PFOA concentrations ranged from 41.8 ng/L at MW-10I to 253 ng/L at MW-8S (Table 13). MW- 8S is the most upgradient monitoring well sampled.
- MW-10I and PZ-10S, the most downgradient Cosden property wells, reported detections of PFAS above NJDEP GWQS (Table 14).

1,4-Dioxane-
- Four Cosden property, monitoring wells, were sampled for 1,4-dioxane in November 2019. All of the monitoring wells sampled reported non-detect values. Downgradient property monitoring well MW-10I did not report detections of 1,4-dioxane, but downgradient monitoring well MW-108 reported 1.3 µg/L J (estimated) in November 2019.
- In 2021, eight Cosden property monitoring wells, including downgradient monitoring well MW-108, were sampled for 1,4-dioxane, with a detection limit below GWQS (0.4 µg/L). MW-108 reported 0.406 µg/L in April 2021. All the other Cosden property monitoring wells reported non-detect values in 2021.

1,2,3-Trichloropropane-
- Four Cosden property monitoring wells, MW-103, MW-104, MW-105, and MW-110, were sampled for 1,2,3-tricholoropropane in March 2021. These monitoring wells were selected because they currently report the highest concentrations of VOCs.
- All monitoring wells were non-detect for 1,2,3-trichloropropane with a detection limit below the 0.03 µg/L NJDEP GWQS.

Results from the ISCO Pilot Study

The ISCO injections consist of sodium persulfate oxidant and sodium hydroxide activator and occur approximately 20-25 feet below ground surface, where currently the highest concentration of VOCs exist. Since 2017, four rounds of ISCO injections were performed to reduce VOC concentrations near suspected source areas at the Site where residual contamination remains.

The results of the pilot study indicate that the area of contaminated groundwater was reduced by approximately 73%. Specifically, the area of the remaining plume at the initiation of the pilot study was estimated to be 33,500 ft² (0.77 acres) prior to injections and the plume is now estimated to have been reduced to 9,000 ft² (0.21 acres). Figure 7 visualizes this reduction in plume size. The average concentration of individual contaminants have also been reduced by more than 70%, as demonstrated in this table:

Table 5. Calculated percent change and concentrations of individual contaminants before and after the ISCO pilot study

Analyte	Percent Decrease	Pre-Injection Average Concentration	Post-Injection Average Concentration
Toluene	78%	336 µg/L	75 µg/L
Ethylbenzene	74%	5,881 µg/L	1,516 µg/L
Total Xylenes	75%	26,789 µg/L	6,728 µg/L

Figure 6 displays the trend graph for total xylenes in each monitoring well. The majority of the monitoring wells display an overall decreasing trend in total xylenes. As presented above, two of the pilot test phase eastern monitoring wells, MW-103 and MW-106, report statistically significant decreases.

Groundwater Summary

Since the temporary shutdown of the GETS in 2018, VOC concentrations are being addressed with an in-situ chemical oxidation pilot study at a target interval thickness of 20 to 25 feet below ground surface (bgs). During this five-year review period, VOC concentrations remain above NJDEP GWQS in many pilot study phase monitoring wells, with total xylenes typically detected at the highest concentrations. However, concentrations have decreased due to the ISCO treatments that have been applied to the Site resulting in reduction of individual contaminations by more than 70% and a reduced plume size. For example, MW-110 reported the highest concentration of total xylenes at 114,000 µg/L in November 2018 and reported post-ISCO treatment concentrations of 31,570 µg/L in April 2021. The monitoring wells located off the Cosden property have not reported any exceedances of VOCs or metals in the past five years, indicating the plume is stable.

PFNA, PFOS, and PFOA were analyzed for in samples from select monitoring wells and were detected at maximum concentrations of 19 ng/L (MW-8S), 66.8 ng/L (MW-3), and 253 ng/L (MW-8S), respectively. None of the monitoring wells reported detections of 1,4-dioxane within the VOC plume, but 1,4-dioxane was detected at low concentrations in downgradient property monitoring well MW-108. None of the monitoring wells reported detections of 1,2,3-trichloropropane in groundwater.

As a result of the pilot study, the area of the plume was reduced from 33,500 ft^2 prior to the ISCO pilot study to 9,000 ft^2 after the ISCO pilot study was completed. The average concentration of toulene, ethylbenzene, and total xylenes have reduced by more than 70%, and a majority of monitoring wells display an overall decreasing trend in total xylenes. The pilot study is ongoing and an additional round of injections is planned.

Site Inspection

The inspection of the Site was conducted on 11/12/2021. In attendance were Stephanie Wilson (EPA Remedial Project Manager), Liana Agrios (EPA Hydrogeologist), and Daniel Sirkis (USACE Hydrogeologist).

Based on the observations from the Site inspection as well as the continual evaluation of the remedy by EPA and USACE, no issues were identified. The fence was intact, there were no signs of trespassing, and no drainage problems were observed.

V. TECHNICAL ASSESSMENT

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

Question A Summary:

Both the groundwater treatment system and the ISCO pilot study have been effective at addressing Site contamination at the Cosden property. The ISCO pilot study has also demonstrated ISCO is able to reduce VOC contamination. Metal concentrations are predicted to decline once ISCO is complete, as described in more detail below. Access controls have also demonstrated to be effective at reducing exposure. Additional PFAS sampling may be warranted. While groundwater concentrations exceed drinking water standards, an institutional control is needed to prevent exposure. The Focused Feasibility Study that is currently being drafted will evaluate institutional controls such as a Classification Exception Area for the Cosden property groundwater which would prevent the installation of drinking water wells until groundwater meets NJDEP GWQS. Additional details are added below.

Remedial Action Performance

Contamination existed both on and off the Cosden property before the long-term remedial action was implemented, which is the GETS. The GETS demonstrated it was effective in ensuring contamination remained on-site, indicated by the large volume of groundwater extracted by the GETS, the shallow hydraulic gradient, and the decline in the contamination concentrations found in the off property monitoring wells. EPA and USACE identified that ISCO could more quickly address this remaining contamination than the GETS. The GETS was turned off the initiation of the ISCO pilot study in May 2018 to prevent persulfate, which would damage the treatment equipment, from entering the system. In addition, the most recent sampling of the Cosden property downgradient monitoring wells indicate that contamination at the perimeter of the Site is below NJDEP GWQS and ROD standards, though EPA will continue to monitor these wells to confirm this result. Currently, the ISCO pilot study has demonstrated it is effective at reducing VOC contaminant concentrations, and EPA has initiated drafting a Focused Feasibility Study (FFS) to evaluate if ISCO should be formalized as a remedial action for the site through a ROD amendment. The FFS will also evaluate institutional controls such as a Classification Exception Area for the Cosden property groundwater which would prevent the installation of drinking water wells until groundwater contaminant concentrations meets NJDEP GWQS.

Though there were some exceedances of standards for metals, the Cosden Bench-Scale In-Situ Oxidation Test Summary in the 2017 Work Plan for the ISCO Pilot Study predicted that the persulfate treatment could release certain metals from site soils, including chromium and lead, and that chromium will likely oxidize to hexavalent chromium due to the oxidizing conditions created by the pilot study. However, elevated concentrations for all metals are expected decline as groundwater re-equilibrates to the natural geochemical conditions typical of the area, due to the reduction in the oxidizing conditions created by the pilot study and, thus, result in a reduction in the solubility of the metals. As indicated in the data review section above, the highest concentrations of metals are located in areas that have received the greatest amount of ISCO injections. Additionally, concentrations of metals detected in groundwater monitoring wells were low prior to the ISCO injections.

One round of sampling for PFAS indicated detections above GWQS in the Cosden property monitoring wells, indicating that additional PFAS sampling is warranted. EPA will conduct the next round of PFAS sampling in April 2022 to determine if PFAS concentrations are Site related.

System Operations/O&M

The groundwater extraction and treatment system has been maintained during the ISCO pilot study. Repairs have been made to the system, specifically the replacement of a sludge thickening tank (TK8) in March 2018. The system is operational, though additional repairs, including replacing mixed-media filter tanks, replacing the Supervisory Control and Data Acquisition System, replacing pumps, and redeveloping and/or installing extraction wells, would be required for it to run optimally. EPA is currently evaluating the continuation of ISCO, with the goal of reducing contaminant concentrations to a level where the extraction and treatment system would no longer be needed, though the system currently remains as a back-up treatment option. Both the groundwater treatment system and the ISCO pilot study indicate they are effective at reducing migration of contaminants, as well as the volume of contaminants in the plume to restore contaminated groundwater to drinking water standards, an RAO that is outlined in the 1992 ROD. The ISCO pilot study has also demonstrated it is able to reduce VOC contamination.

Implementation of Institutional Controls and Other Measures

Institutional controls are not required in the ROD for Cosden. Access controls consist of a fence and warning signs around the entire perimeter of the Site. There have been no reported incidents of trespassing or damage to the Site, indicating the controls are effective. Additionally, the soil was remediated, eliminating this exposure pathway.

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

Question B Summary:

The exposure assumptions, pathways, and receptors that were used to estimate the potential risks and hazards to human health followed the standard risk assessment paradigm in use at the time. Ingestion, dermal contact, and inhalation exposures to groundwater, surface soil, and subsurface soil were evaluated for trespassers, future Site residents, and future Site workers. The exposure assumptions, pathways, and receptors are still valid. Furthermore, the ecological risk assessment indicated that there were no endangered species, sensitive ecosystems, or sensitive habitats identified on the Site. The assessment concluded that adverse impacts to on-site plants and animals from on-site contamination are not likely. The assumptions used in the assessment are still valid. Soils have been remediated, and the groundwater contamination does not impact any surface water bodies. Therefore, no ecological receptors are impacted.

Changes in Standards and TBCs

As discussed in the previous FYR, the cleanup goal for PCBs in soil at the time of the ROD was 1 mg/kg. However, post excavation sampling indicated that the soil removal ultimately met NJDEP's Residential Direct Contact Soil Cleanup (RDCSC) level of 0.49 mg/kg for PCBs at that time. Although the most current NJDEP RDCSC value for PCBs is 0.2 mg/kg, the previous standard still equates to residential cancer risk within the EPA target risk range and noncancer hazard below the threshold of 1, which does not call into question the protectiveness of the remedy.

The remediation goals for several groundwater Contaminants of Concern (COCs) also differ between the ROD and their current NJDEP GWQSs, as displayed in the table below. Thus, both standards were used when evaluating the data collected during this FYR period. The cleanup goal for total xylenes increased since the ROD was issued due to updated toxicological information, as reported in the last FYR. The higher cleanup goal for this compound does not impact the remedial decision made for groundwater at the Site. Groundwater is not currently in use; however, there are not currently restrictions in place to prevent the use of groundwater. The Focused Feasibility Study will evaluate institutional controls such as a Classification Exception Area to prevent the installation of drinking water wells until groundwater meets NJDEP GWQS.

Table 6: Contaminant of concern (COC) for the Site, ROD cleanup goal, and current NJDEP GWQS.

COC	ROD Cleanup Goal (µg/L)	Current NJDEP GWQS (µg/L)
Toluene	1,000	600
Total Xylenes	44	1,000
Chromium	100	70
Lead	15	5

PFAS compounds in groundwater were also investigated as part of this FYR. NJDEP added GWQS for PFOA (10 ng/L), PFOS (10 ng/L), and PFNA (13 ng/L) within the past five years. EPA has established health advisories for PFOA and PFOS at 70 ng/L based on the agency's assessment of the latest peer-reviewed science in order to provide a margin of protection, including the most sensitive populations, from a lifetime of exposure to PFOA and PFOS in drinking water. As shown in Section III, PFOA was detected in several monitoring wells above the NJDEP GWQS and the EPA health advisory level, which suggests additional monitoring for PFAS may be needed, including determining the source.

Changes in Toxicity and Other Contaminant Characteristics

The toxicity values used to calculate the risks and hazards were reported in Table 4 of the 1992 ROD. Some of the toxicity values that were used in the 1992 ROD have changed; however, the changes would not impact the remedial decision that was made for the Site. The cleanup goal for lead in soil documented in the 1992 ROD was 500 mg/kg, based on future residential use. The cleanup goal in the 1998 ESD was subsequently modified to 400 mg/kg to reflect EPA Lead Technical Review Workgroup (TRW) recommendations and the NJDEP soil standard for residential use, which were derived using a target blood lead level of 10 micrograms per deciliter (µg/dL). The Agency is currently assessing lead cleanup goals on a site-specific basis using version 2 of the Integrated Exposure Uptake and Biokinetic (IEUBK) model released in May 2021. This version of the IEUBK uses a default blood lead level of 5 µg/dL based on more current scientific literature regarding lead toxicity and epidemiology. Use of updated parameters and toxicity information in the model may result in residential lead cleanup goals less than 400 mg/kg. However, the remedial actions conducted at the Cosden property, including soil excavations ranging from 1 to 16 feet below ground surface, combined with Site perimeter fence installation, are interrupting potential direct contact exposures. The Site is also not currently used for residential purposes and if Site redevelopment occurs, EPA will reevaluate exposure scenarios based on the soil remedial actions taken and residual soil lead concentrations present.

Changes in Risk Assessment Methods

Land use assumptions, exposure assumptions, and pathways considered in the decision documents for this Site followed the Risk Assessment Guidance for Superfund used by the Agency and remain valid. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used also remains valid.

Changes in Exposure Pathways

Since the primary contaminants of concern at the Site are VOCs, vapor intrusion was evaluated in March 2004 via vapor intrusion sampling. There were no VOCs detected above EPA's screening criteria, and it was determined that the vapor intrusion pathway was not complete. The results of this evaluation remain valid since the concentrations of VOCs in groundwater have continued to decline since this time and no VOCs are detected above standards in off-site wells. No additional human health or ecological routes of exposure, Site conditions, or anticipated land uses have been identified during this FYR period that would call into question the protectiveness of the remedy.

Expected Progress Towards Meeting RAOs

The RAOs presented in the 1992 ROD were (1) prevent exposure to contaminant sources that present a significant human health risk, and (2) restore contaminated groundwater to drinking water standards. The access controls, groundwater extraction and treatment system, and ISCO pilot study are effective at preventing exposure to remaining metals and VOCs in soils and groundwater, indicating that the first objective has been achieved. The ISCO pilot study also indicates it is effective at further reducing VOC contamination; therefore, progress towards meeting the second objective is expected to continue. The detection of PFAS in Cosden property monitoring wells indicates that additional monitoring of PFAS is required to determine if subsequent actions are necessary; however, all residents in the Site vicinity are currently connected to a municipal water supply thus interrupting potential exposure.

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 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

OU: 1	**Issue Category: Institutional Controls**
	Issue: Although not required by the current ROD, a CEA is not in place to prevent installation of groundwater wells that could be used for drinking water.
	Recommendation: Once funding is available, establish a CEA.

Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA	EPA	9/30/2023

OU: 1	Issue Category: Remedy Performance			
	Issue: The treatment plant, which was not operating during the ISCO pilot study, will not operate efficiently to address the remaining source areas without maintenance funding.			
	Recommendation: Evaluate other potential remedial alternatives along with operation of the groundwater extraction and treatment system to address remaining sources by developing an FFS and consider ROD Amendment based on the FFS.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/30/2022

OTHER FINDINGS

No other findings were raised during this FYR.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
*Operable Unit:*OU1	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The OU1 remedy is protective of human health and the environment in the short term because all exposure pathways have been addressed. In order to be protective in the long term, a CEA needs to be established and FFS finalized.	

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The Site remedy is protective of human health and the environment in the short term because all exposure pathways have been addressed. In order to be protective in the long term, a CEA needs to be established and FFS finalized.

VIII. NEXT REVIEW

The next FYR report for the Cosden Chemical Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Interim Remedial Investigation Report, Ebasco Services, October 1989

Phase I Remedial Investigation Report, Ebasco Services, 1990

Phase II Remedial Investigation Results Report, Ebasco Services, June 1992

Contaminant Fate & Transport Study / Risk Assessment, Ebasco Services, June 1992

Final Feasibility Report, Ebasco Services, July 1992

Record of Decision, EPA, September 1992

Continuous Groundwater Monitoring Report, USACE Baltimore, September 1997

Site Investigation Remedial Design Report, Roy F. Weston REAC, April 1998

Explanation of Significant Differences, September 1998.

Summary Report Phase III Off-Site Groundwater Investigation, USACE Baltimore, July 2001

Remedial Action Report (Soil), REAC, September 2003

35% Groundwater Remedial Design Report, URS Group Inc., May 2004

100% Groundwater Remedial Design Report, URS Group Inc., Sept. 2005

First Five Year Review Report – Cosden Chemical Coatings Corporation Superfund Site, EPA Region 2, August 2012

Second Five Year Review Report – Cosden Chemical Coatings Corporation Superfund Site, EPA Region 2, July 2017

Cosden Bench-Scale In Situ Oxidation Test Summary, Attachment B of the Work Plan for In-Situ Chemical Oxidation Pilot Study, October 2017

Ground Water Quality Standards, New Jersey Administrative Code, last amended January 16, 2018

Draft Summary Report for In-Situ Chemical Oxidation Pilot Study, USACE, July 2021

Safe Drinking Water Act, Chromium in Drinking Water, EPA retrieved from https://www.epa.gov/sdwa/chromium-drinking-water#standard on September 2, 2021

APPENDIX B – SITE MAPS AND FIGURES

Figure 1. Cosden Chemical Coatings property location

Figure 2. Groundwater Flow Map at Cosden Chemical Coatings Superfund Site, May 2021

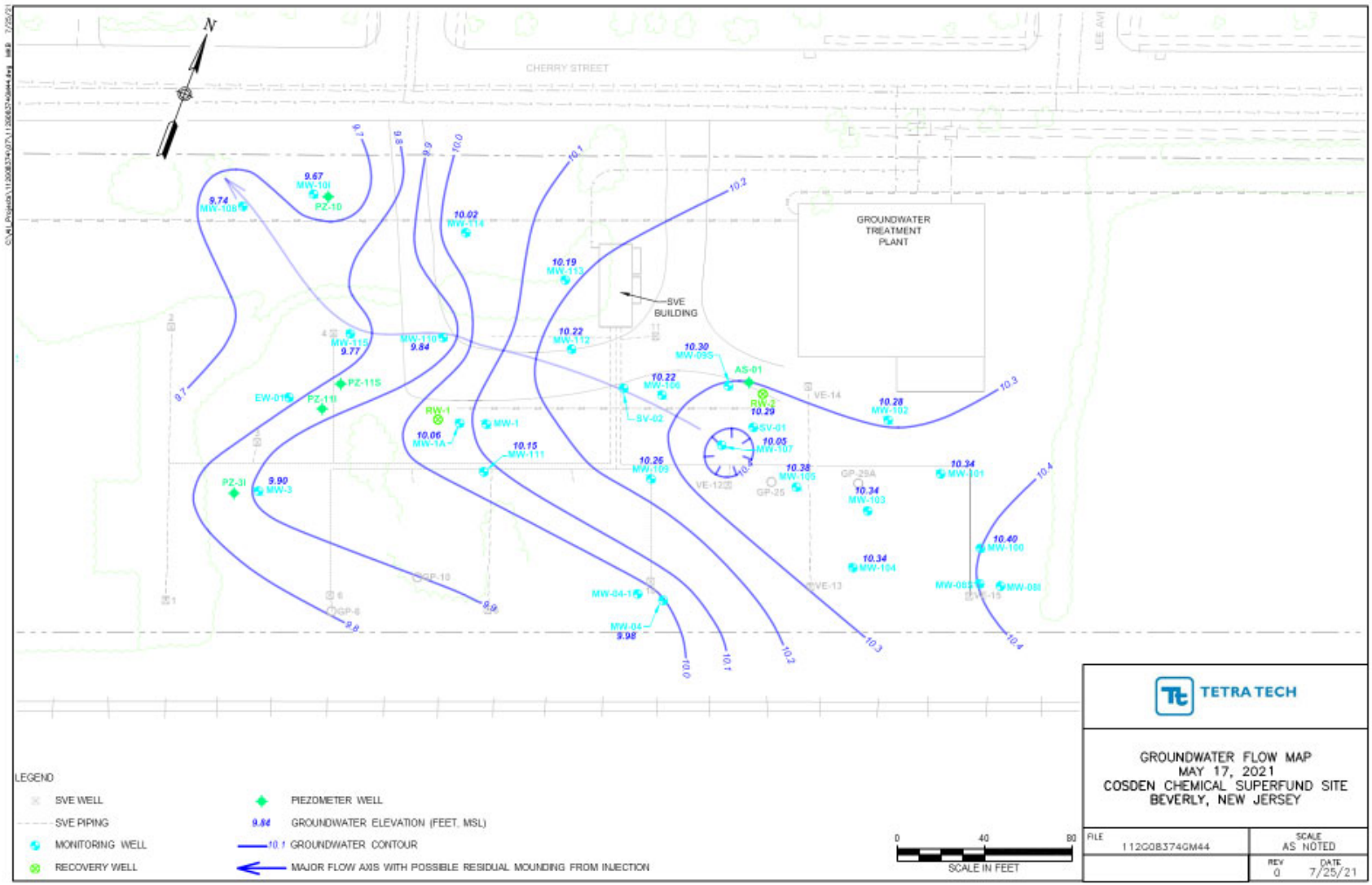


Figure 3. Soil removal locations at the Cosden Chemical Coatings property, 2003 Remedial Action Report

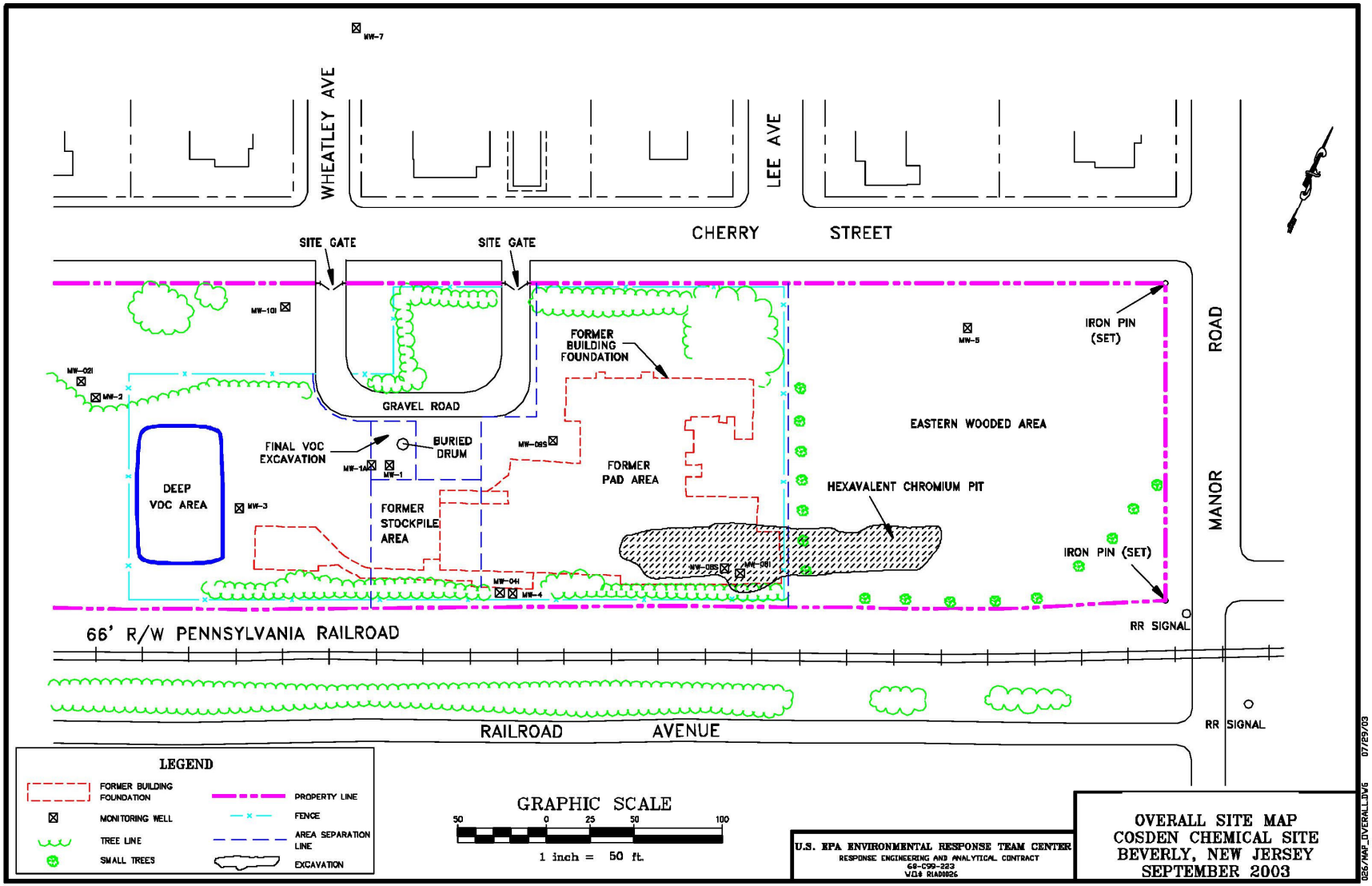


Figure 4. Cosden Property Monitoring Well Locations

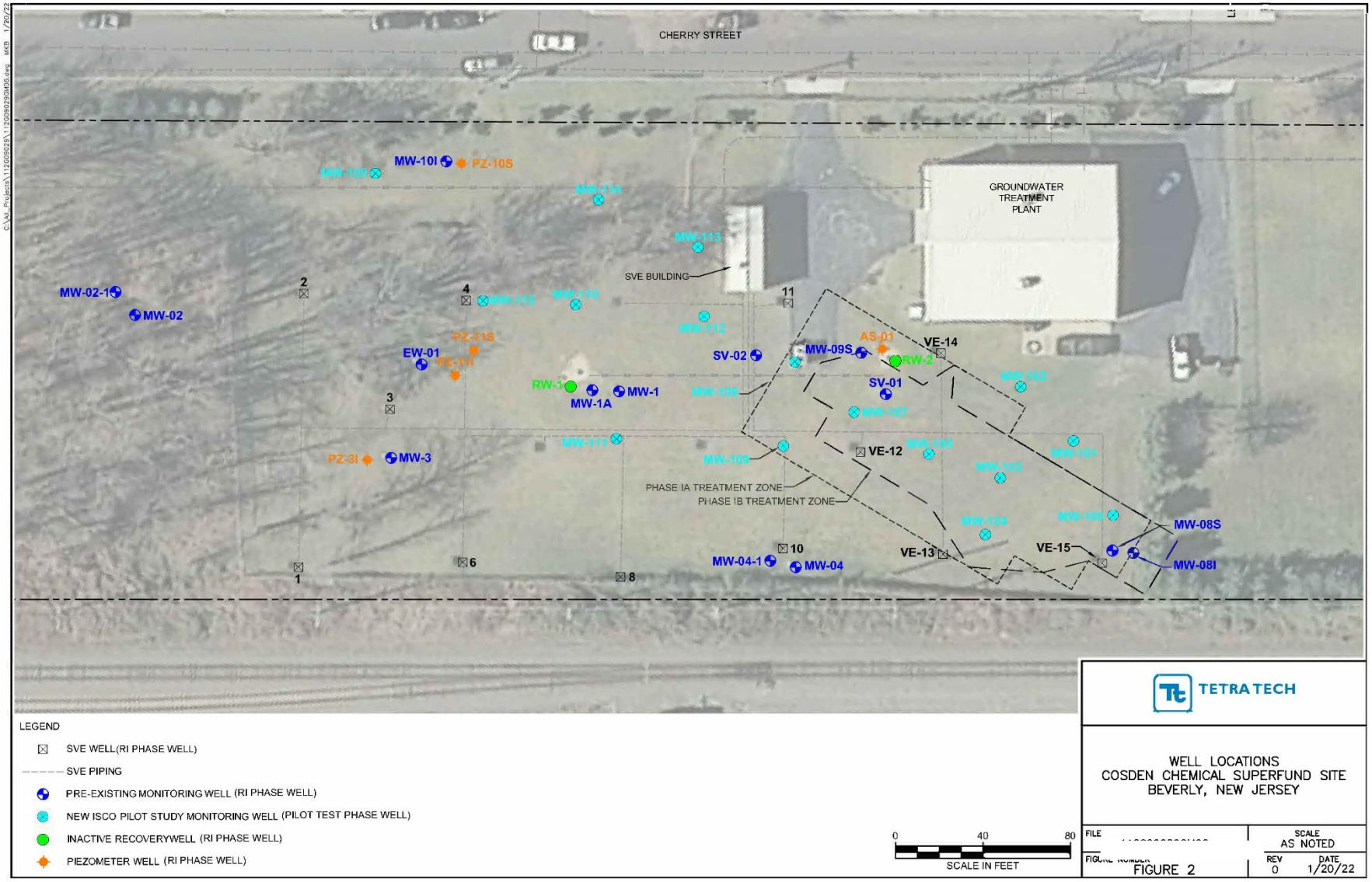


Figure 5. Off Property Monitoring Well Locations

Figure 6. Total xylene trends (µg/L) in groundwater over course of ISCO pilot study

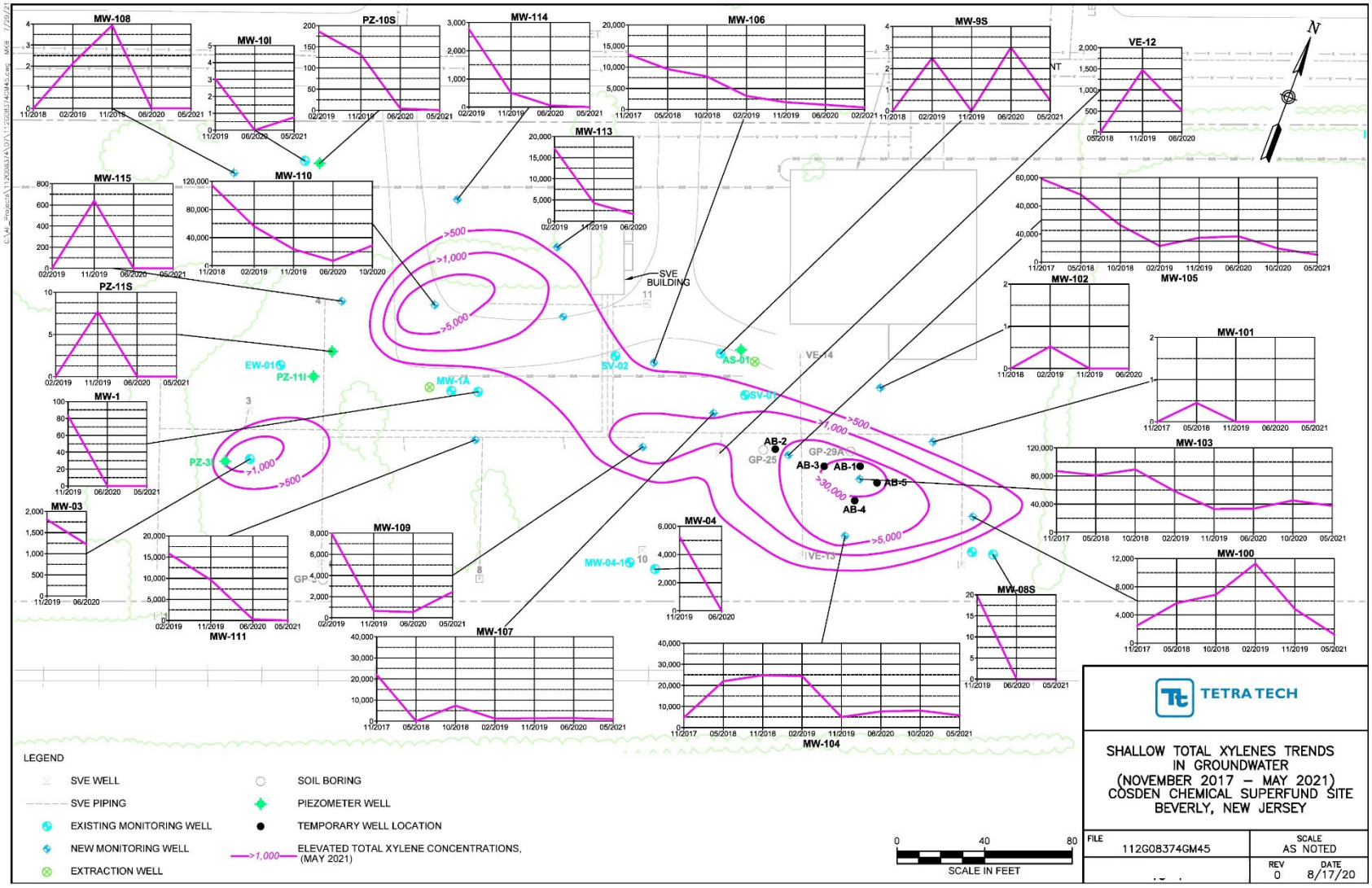
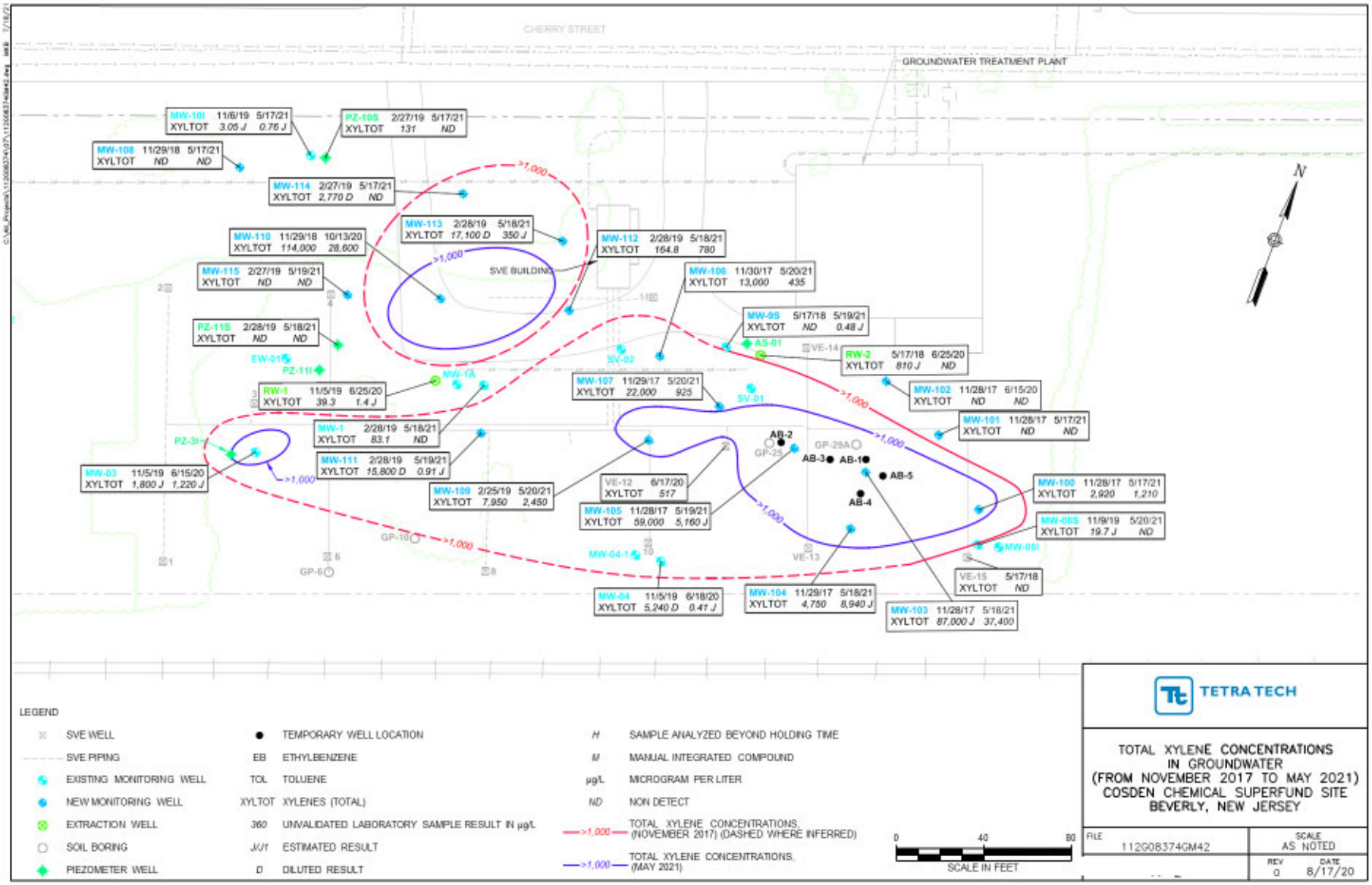


Figure 7. Total xylene concentrations in groundwater before and after ISCO pilot study



APPENDIX C– STANDARDS AND SCREENING VALUES

The following table list the standards that were listed in the ROD as well as the current New Jersey Department of Environmental Protection (NJDEP) Groundwater Quality Standards (GWQS). Both are referred to throughout the data review section.

Table 7: Groundwater Contaminants of Concern, Remediation Goals, and NJDEP GWQS		
Contaminant of Concern	**ROD Remediation Goal (µg/L)**	**NJDEP GWQS (µg/L)**
Ethylbenzene	700	700
Toluene	1,000	600
Xylenes, Total	44	1,000
Trichloroethene	1	1
Chromium, Total	100	70
Lead (at tap)	15	5

In addition, several emerging contaminants that were not identified in the ROD were screened for in preparation for this FYR. The NJDEP GWQS for those emerging contaminants are in the table below.

Table 8: Emerging Groundwater Contaminants, NJDEP GWQS, and Units		
Emerging Contaminant	**NJDEP GWQS**	**Units**
1,2,3-trichloropropane	0.03	µg/L
1,4-dioxane	0.4	µg/L
Perfluorononanoic Acid (PFNA)	13	nanograms / liter (ng/L)
Perfluorooctane Sulfonate (PFOS)	13	ng/L
Perfluorooctanoic Acid (PFOA)	14	ng/L

A NJDEP GWQS for hexavalent or dissolved chromium has not been established nor did the ROD establish a specific clean-up goal for hexavalent chromium in groundwater. Thus, EPA's Safe Drinking Water Act chromium standard of 100 µg/L, which "includes all forms of chromium" (See References, Safe Drinking Water Act, EPA, 2021) was used as a screening value for hexavalent and dissolved chromium.

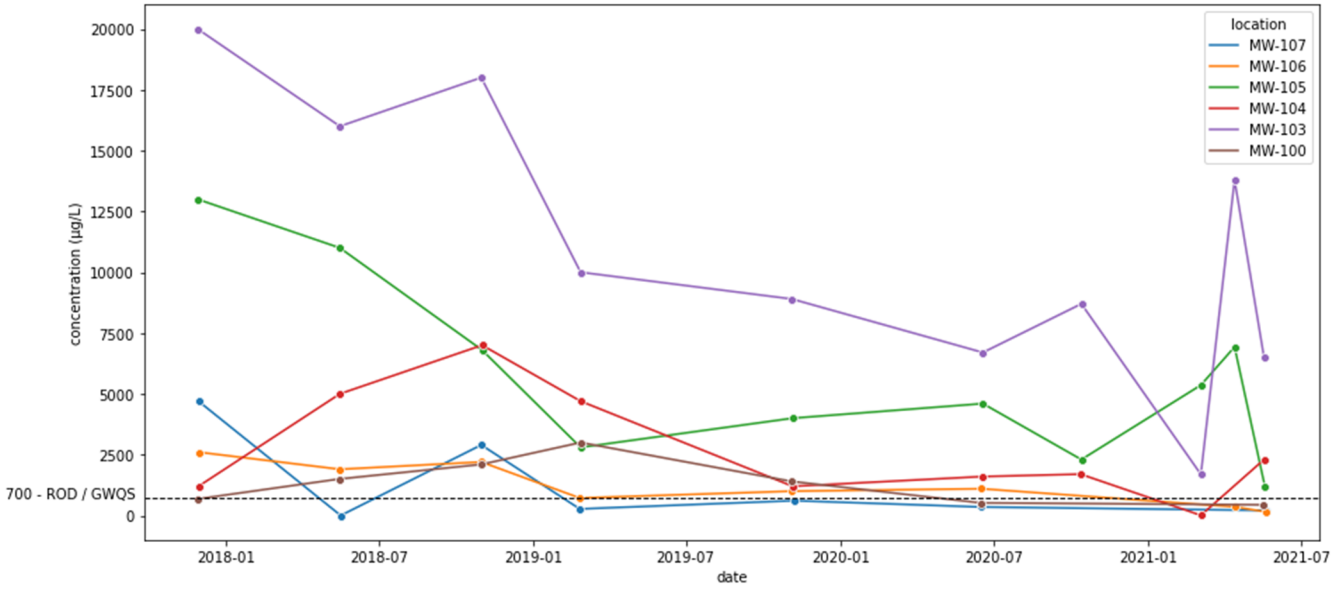
APPENDIX D – DATA PLOTS AND TABLES

Cosden Property Monitoring wells

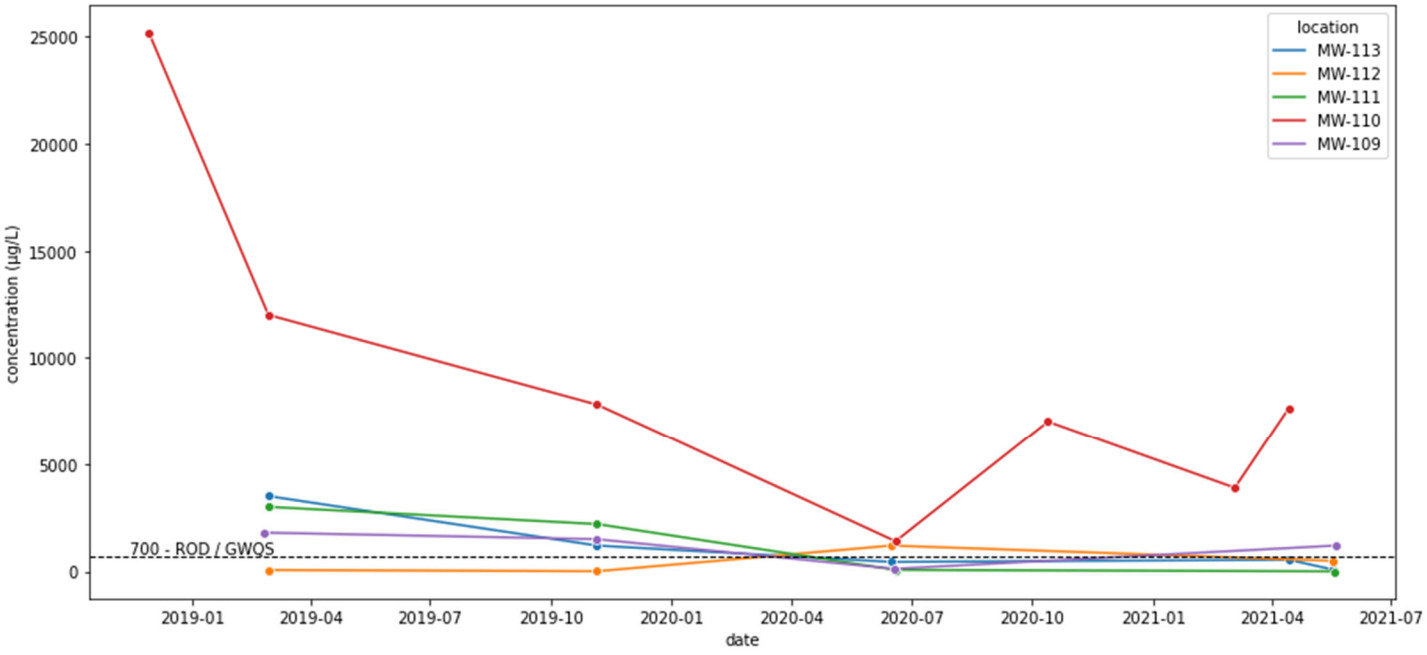
VOCs

Ethylbenzene

Plot 1. Cosden property pilot test phase eastern monitoring wells ethylbenzene concentrations

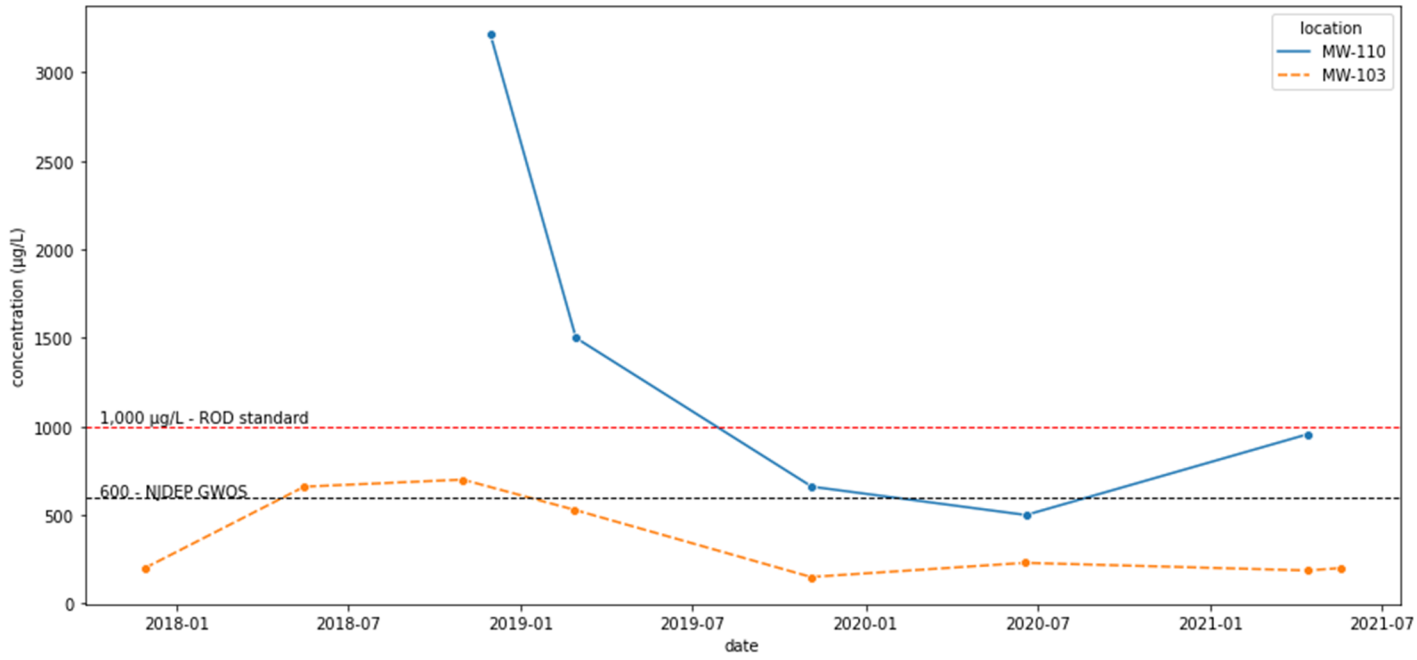


Plot 2. Cosden property pilot test phase western monitoring wells ethylbenzene concentrations



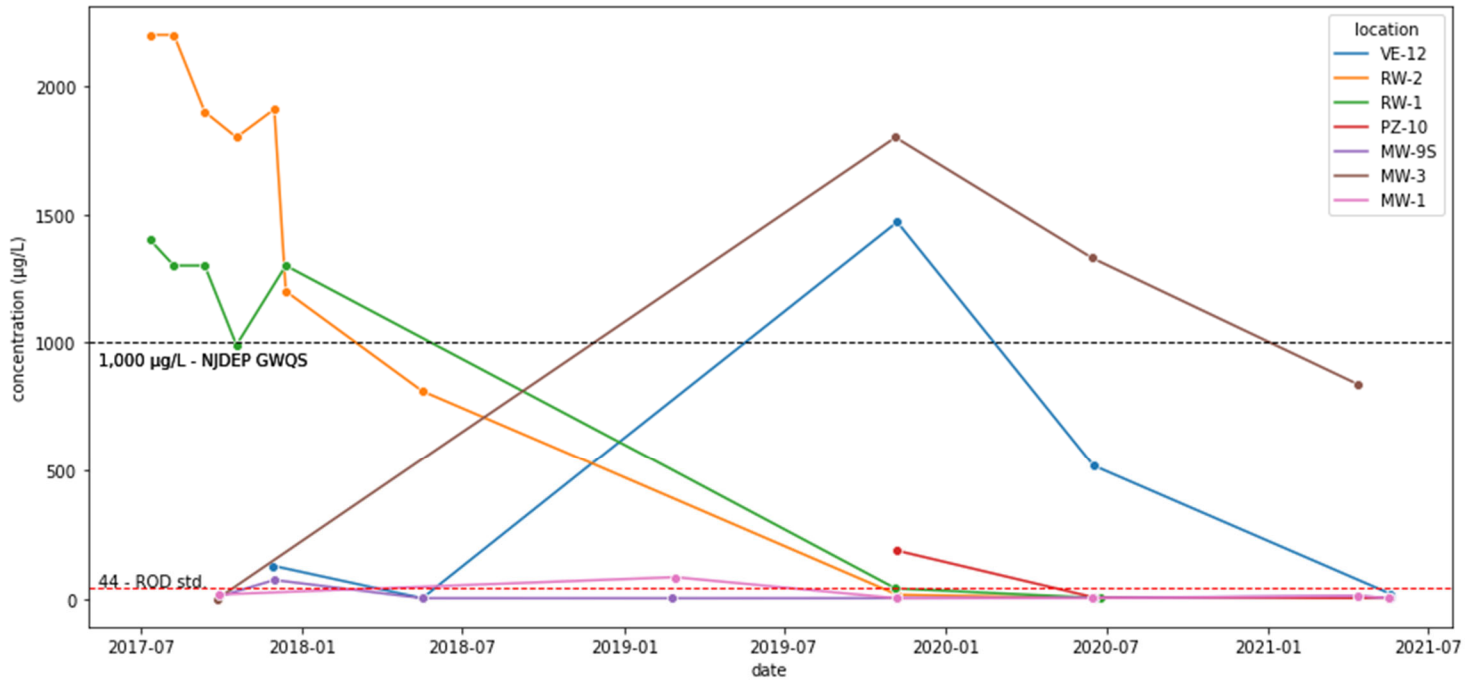
Toluene

Plot 3. Cosden property pilot test phase monitoring wells with toluene concentrations



Total Xylenes

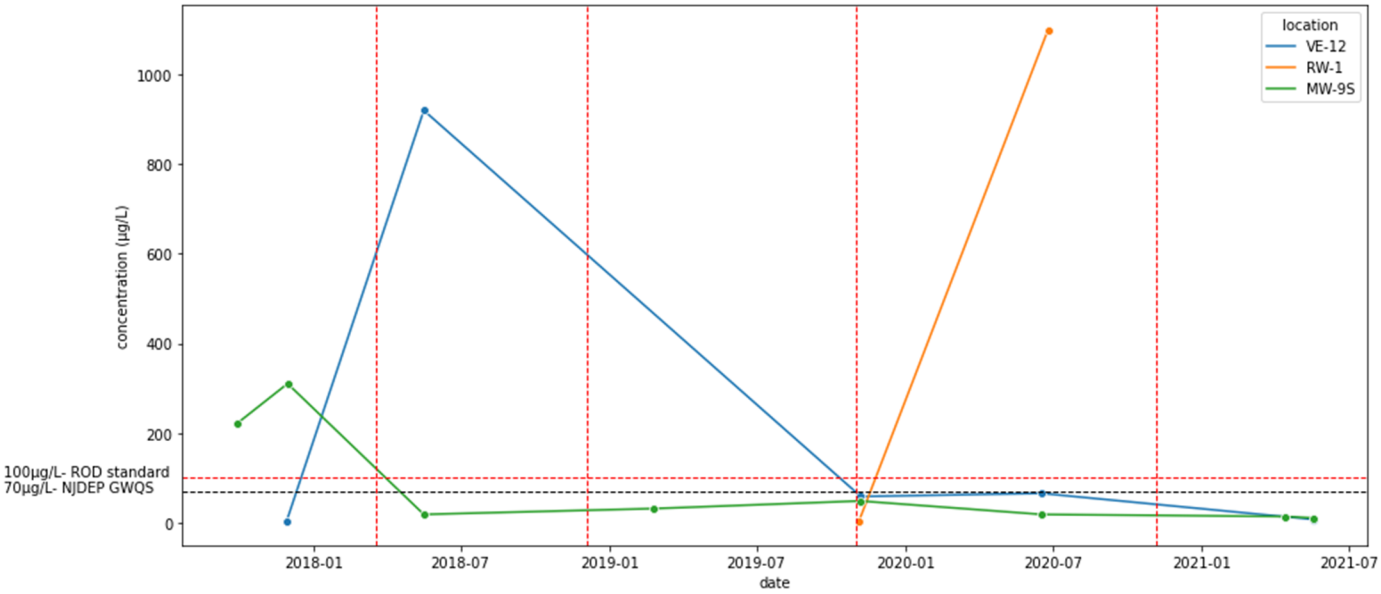
Plot 4. Cosden property RI phase monitoring wells total xylenes groundwater concentrations



Metals

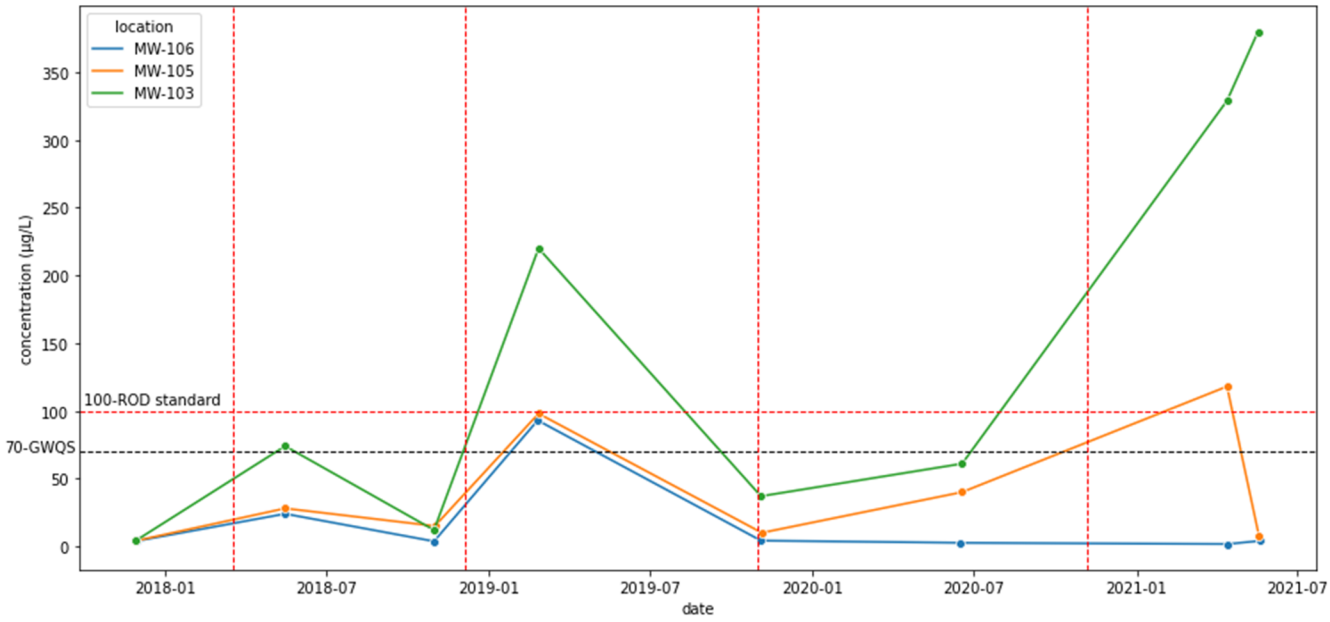
Chromium

Plot 5. Cosden property RI phase monitoring wells total chromium groundwater concentrations



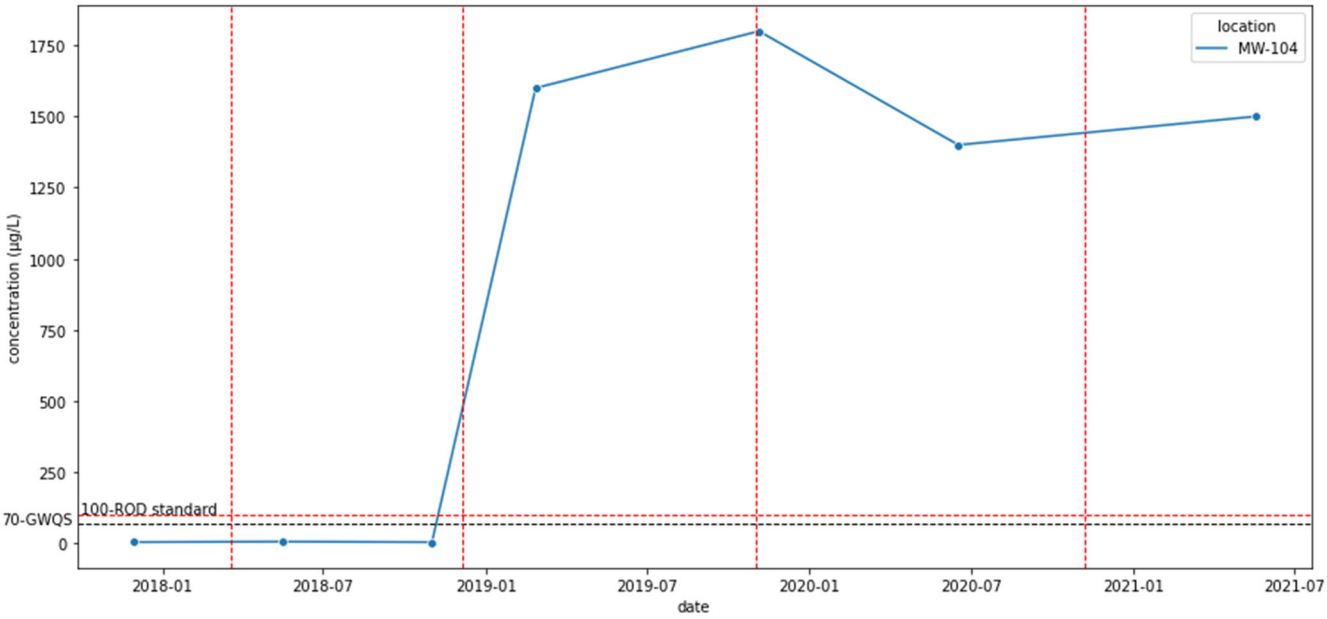
*Red vertical lines are injection events

Plot 6. Cosden property pilot test phase eastern monitoring wells lower total chromium groundwater concentrations



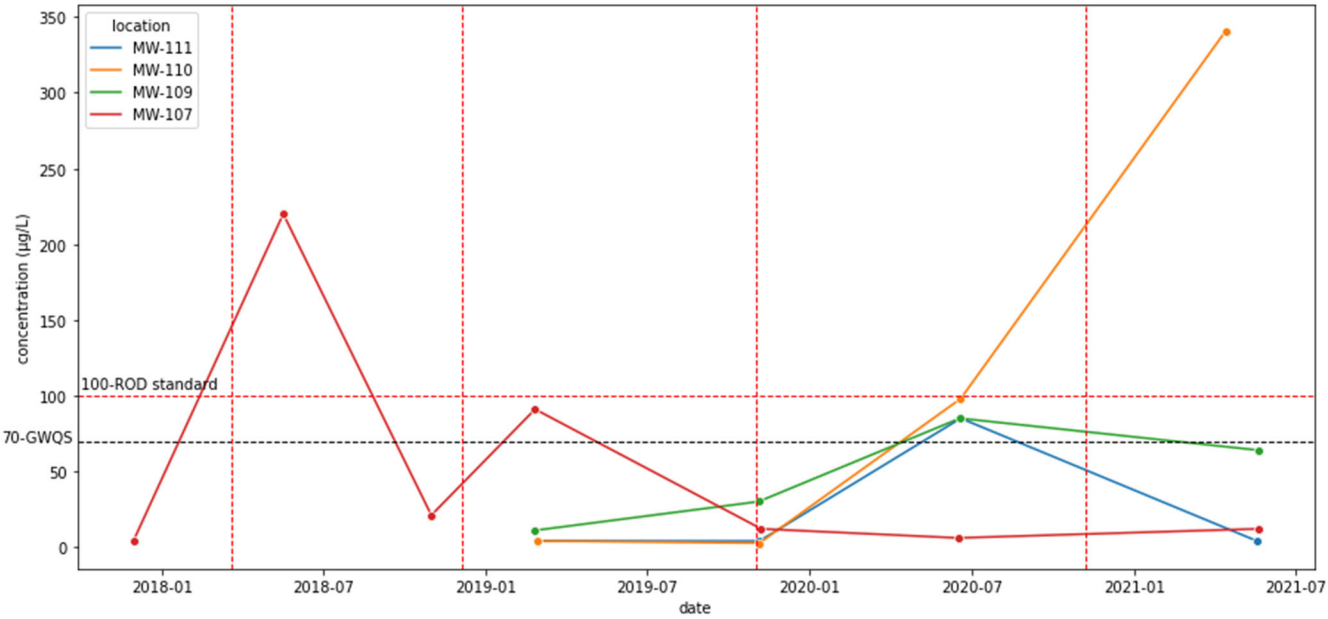
*Red vertical lines are injection events

Plot 7. Cosden property pilot test phase eastern monitoring well MW-104 total chromium groundwater concentrations



*Red vertical lines are injection events

Plot 8. Cosden property pilot test phase western monitoring wells total chromium groundwater concentrations

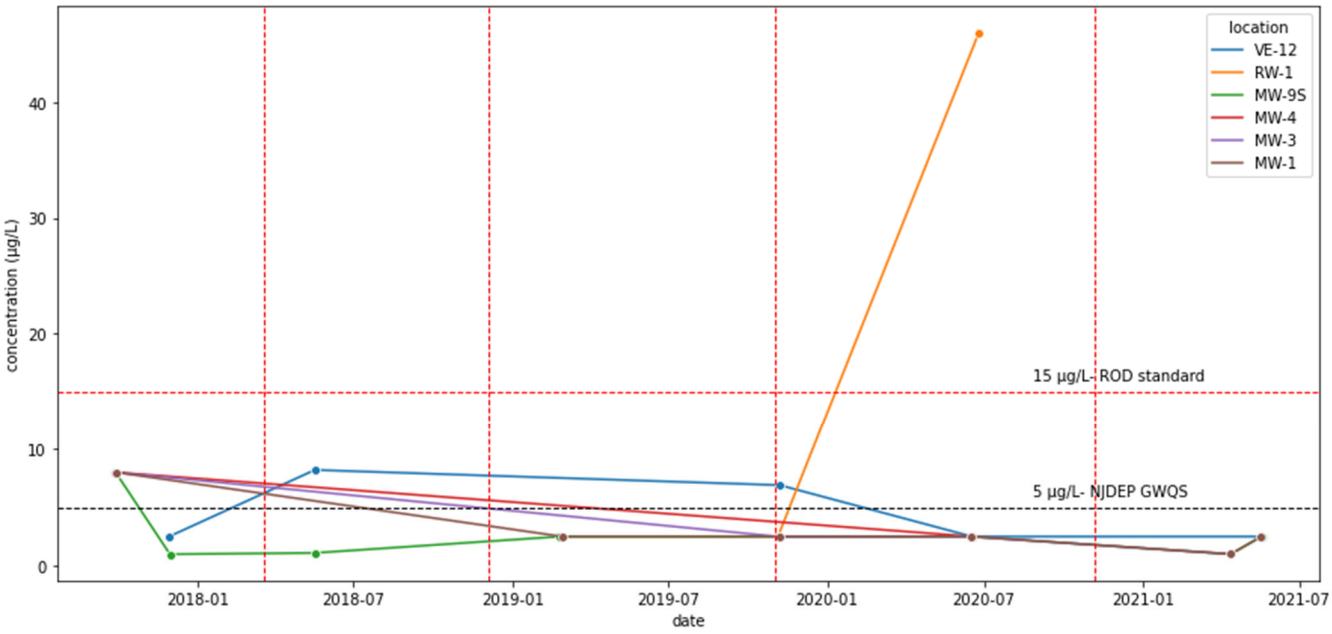


*Red vertical lines are injection events

Table 9. Cosden property monitoring wells (RI phase and pilot test phase) dissolved chromium groundwater concentrations				
location	**date**	**Chemical name**	**Concentration**	**units**
MW-109	2020-06-18	Chromium (dissolved)	30.00	µg/L
MW-111	2020-06-19	Chromium (dissolved)	50.00	µg/L
RW-1	2020-06-25	Chromium (dissolved)	26.00	µg/L
MW-103	2021-04-13	Chromium (dissolved)	327.00	µg/L
MW-113	2021-04-14	Chromium (dissolved)	4.32	µg/L
MW-110	2021-04-14	Chromium (dissolved)	292.00	µg/L

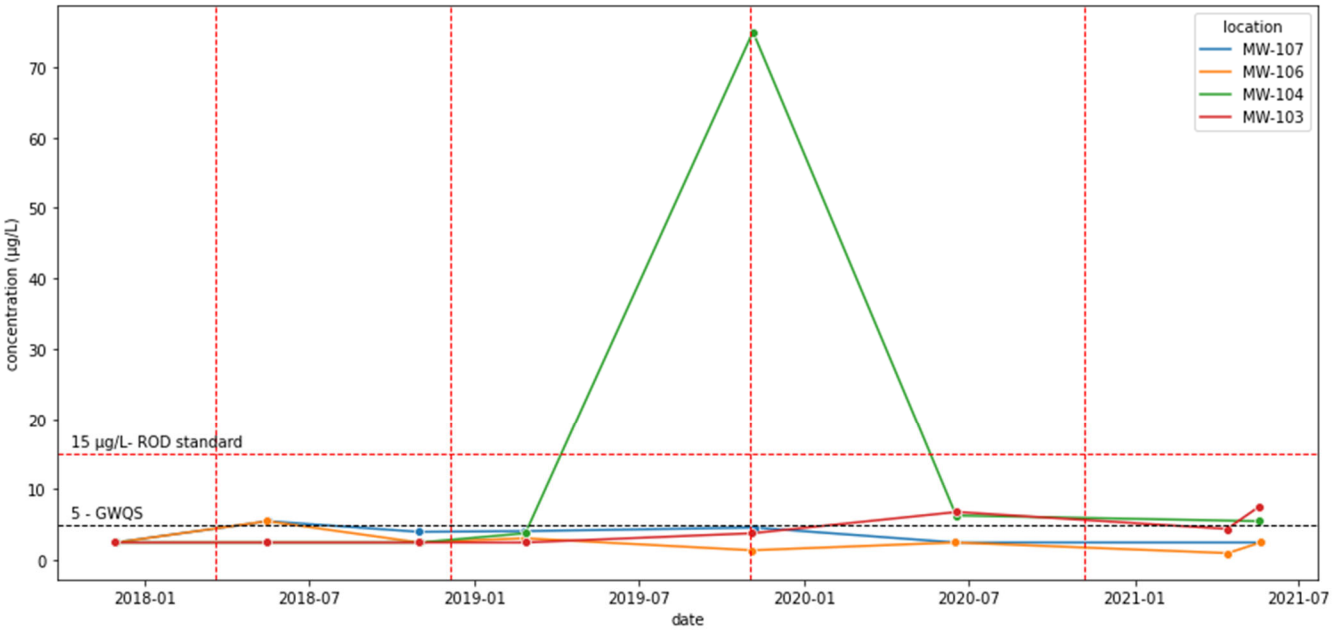
Lead

Plot 9. Cosden property RI phase monitoring wells total lead groundwater concentrations



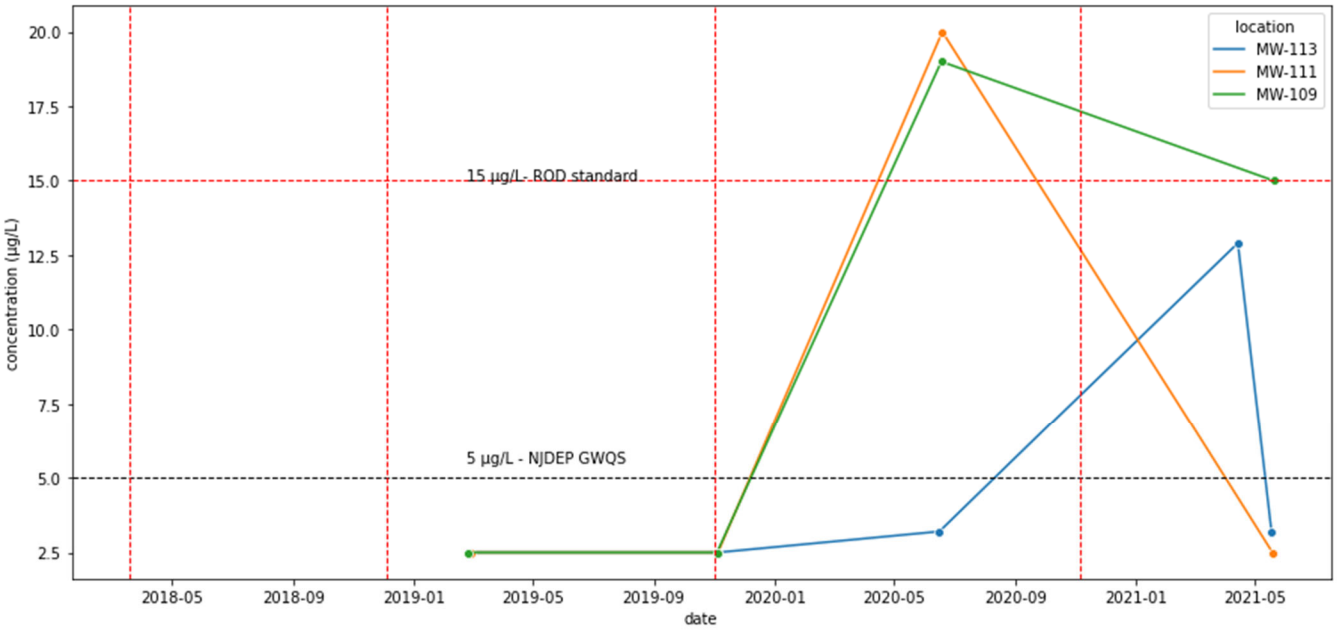
*Red vertical lines are injection events

Plot 10. Cosden property pilot test phase eastern monitoring wells total lead concentrations in groundwater



*Red vertical lines are injection events

Plot 11. Cosden property pilot test phase western monitoring wells total lead concentrations in groundwater



*Red vertical lines are injection events

Table 10. Cosden property monitoring wells (RI phase and pilot test phase) dissolved lead groundwater concentrations				
location	**date**	**Chemical name**	**Concentration**	**units**
MW-109	2020-06-18	Lead (dissolved)	2.60	µg/L
MW-111	2020-06-19	Lead (dissolved)	12.00	µg/L
RW-1	2020-06-25	Lead (dissolved)	Non-detect	µg/L
MW-103	2021-04-13	Lead (dissolved)	3.02	µg/L
MW-113	2021-04-14	Lead (dissolved)	Non-detect	µg/L
MW-110	2021-04-14	Lead (dissolved)	Non-detect	µg/L

Emerging Contaminants

Cosden property, monitoring wells

Table 11. Cosden property monitoring wells PFNA groundwater concentrations				
location	**date**	**Chemical name**	**Concentration**	**units**
MW-1	2021-04-13	PFNA	5.77	ng/L
MW-3	2021-04-13	PFNA	8.85	ng/L
MW-8S	2021-04-13	PFNA	19.00	ng/L
MW-9S	2021-04-13	PFNA	9.13	ng/L

Table 12. Cosden property monitoring wells PFOS groundwater concentrations				
location	**date**	**Chemical name**	**Concentration**	**units**
MW-1	2021-04-13	PFOS	18.60	ng/L
MW-3	2021-04-13	PFOS	66.80	ng/L
MW-8S	2021-04-13	PFOS	21.30	ng/L
MW-9S	2021-04-13	PFOS	Non-detect	ng/L

Table 13. Cosden property monitoring wells PFOA groundwater concentrations				
location	**date**	**Chemical name**	**Concentration**	**units**
MW-1	2021-04-13	PFOA	151.00	ng/L
MW-3	2021-04-13	PFOA	105.00	ng/L
MW-8S	2021-04-13	PFOA	253.00	ng/L
MW-9S	2021-04-13	PFOA	109.00	ng/L

Cosden Property downgradient monitoring wells

Table 14. Sentinel monitoring wells PFAS concentrations in groundwater, MW-10I and PZ-10S				
location	**date**	**Chemical name**	**Concentration**	**units**
MW-10I	2021-04-13	PFNA	non-detect	ng/L
PZ-10S	2021-04-13	PFNA	non-detect	ng/L
MW-10I	2021-04-13	PFOS	8.31	ng/L
PZ-10S	2021-04-13	PFOS	4.89	ng/L
MW-10I	2021-04-13	PFOA	41.80	ng/L
PZ-10S	2021-04-13	PFOA	81.00	ng/L