

**THIRD FIVE-YEAR REVIEW REPORT FOR
FEDERAL CREOSOTE SUPERFUND SITE
SOMERSET COUNTY, NEW JERSEY**



Prepared by

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CEA	Classification Exemption Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ERT	Environmental Response Team
ESD	Explanation of Significant Differences
FYR	Five-Year Review
ICs	Institutional Controls
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
PAHs	Polycyclic Aromatic Hydrocarbons
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be Considereds
TI	Technical Impracticability

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 five-year review 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 five-year 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 Federal Creosote Superfund Site. The triggering action for this statutory review is the completion date of the previous FYR on June 7, 2012. 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), and three OUs will be addressed in this FYR. OU1 addressed the permanent relocations of residents and the excavation and off-site treatment and disposal of materials from the buried lagoons and canals on residential properties. OU2 included permanent relocations of residents and the excavation and off-site disposal, with treatment as necessary, of residual creosote soil contamination on residential properties. OU3 consisted of the excavation of soils containing source material and residual creosote soil contamination from the commercial section of the Site, known as the Rustic Mall as well as site-wide, long-term groundwater monitoring and institutional controls.

The Federal Creosote Superfund Site Five-Year Review was led by Brittany Hotzler, EPA Remedial Project Manager. Participants included Rich Puvogel, EPA Section Chief, Rachel Griffiths, EPA Hydrogeologist, Abbey States, EPA Human Health Risk Assessor, Lora Smith-Staines, EPA Human Health Risk Assessor, and Pat Seppi, EPA Community Involvement Coordinator. The review began on 4/22/2016.

Site Background

The Federal Creosote Superfund Site is located in the Borough of Manville, Somerset County, New Jersey. Historically, the Site was the location of a wood treatment facility that treated railroad ties with coal tar creosote, resulting in the production of creosote-contaminated sludge, process residuals, preservative drippings, and spent process liquid. Creosoting materials and contaminated soils associated with the wood treating facility were not removed prior to construction of a residential community, the Claremont Development, and Rustic Mall. Within the residential portion of the site, as little as 2 to 5 feet below ground surface, and extending in some places 25 to 35 feet below ground surface, were the former locations of two unlined creosote waste sludge lagoons. Two unlined canals used to transport the creosote waste sludge were also located within the residential portion of the site, approximately 14 feet below ground surface.

The Site is comprised of a 35-acre residential community, the Claremont Development, consisting of 129 single-family houses, home to approximately 350 residents. According to the Borough of Manville

it is anticipated that the future land use for this development will remain residential. A 15-acre commercial mall, Rustic Mall, makes up the other portion of the site. The Borough of Manville and the owners of the Rustic Mall are contemplating revitalization of the mall, which includes a combination of commercial and residential use of the Mall property.

The Site is situated on a topographic high that is nearly equidistant from the Raritan and Millstone Rivers and approximately a mile west (upstream) of their confluence. The Raritan River is located approximately 2,000 feet north and east of the Site and the Millstone River is located approximately 1,200 feet to the southeast. The Site is bordered to the west by commercial properties that line the east side of Main Street. To the north, on the opposite side of the Norfolk Southern railroad tracks, is the former Johns-Manville company property. The Johns-Manville property has been redeveloped for a variety of commercial and retail uses, including automobile storage, warehousing, and large retail stores. To the south, on the opposite side of the CSX Transportation tracks, is a primarily residential area known as Lost Valley. There are no open streams or drainage ways (other than storm sewers) within the residential and commercial development. Drainage from the commercial mall and residential development is discharged to the Millstone River by a storm sewer system. No wetlands are associated with the Site. Groundwater and surface water in the area are both current and potential future sources of drinking water. The groundwater beneath the Site is classified by the New Jersey Department of Environmental Protection (NJDEP) as Class IIA, potable water, and surface water intakes for the American Water Company facility are within a mile of the Site near the confluence of the Millstone and Raritan Rivers.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Federal Creosote		
EPA ID: NJ0001900281		
Region: 2	State: NJ	City/County: Manville/Somerset
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: EPA <i>[If "Other Federal Agency", enter Agency name]:</i>		
Author name (Federal or State Project Manager): Brittany Hotzler		
Author affiliation: EPA		
Review period: 4/22/2016 - 1/18/2017		
Date of site inspection: 10/17/2016		
Type of review: Statutory		

Review number: 3
Triggering action date: 5/3/2012
Due date (five years after triggering action date): 5/3/2017

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In April 1996, the New Jersey Department of Environmental Protection (NJDEP) responded to an incident involving the discharge of an unknown liquid from a sump located at one of the Claremont Development residences on Valerie Drive. A thick, tarry substance was observed flowing from the sump to the street. In January 1997, the Borough of Manville responded to a complaint that a sinkhole had developed around a sewer pipe in the Claremont Development on East Champlain Road. Excavation of the soil around the pipe identified a black, tar-like material in the soil. Subsequent investigations of these areas revealed elevated levels of contaminants consistent with creosote. In October 1997, EPA's Environmental Response Team (ERT) initiated a site investigation limited to properties believed to contain creosote contamination based on analysis of historic aerial photographs as well as input from residents. The results of this investigation indicated that the contamination was extensive, uncontrolled, and had impacted sediment, soil, and groundwater in the area.

The Site was placed on the National Priorities List on January 19, 1999. EPA performed a Remedial Investigation and Feasibility Study (RI/FS) to determine the nature and extent of contamination at the Site, including a Human Health Risk Assessment. This risk analysis concluded that an unacceptable risk to human health and the environment was present due to polycyclic aromatic hydrocarbons (PAHs) exposure in the soil of the residential properties and the commercial area, and groundwater if used as a potable water supply, and that a remedial action to address these risks was warranted.

An ecological risk assessment was conducted as part of the OU3 remedial investigation and found no site-related contamination in downgradient wetlands or sediments in the Raritan and Millstone Rivers. The Site is located in a residential and commercial area, and therefore the potential for significant ecological impacts is very low.

Response Actions

From February through April 1998, EPA collected over 1,350 surface soil samples on 133 properties in and adjacent to the Claremont Development, in order to determine if an immediate health risk existed. EPA identified some properties with surface soil in yards containing elevated levels of creosote that posed a long-term health risk. As a result, EPA applied topsoil, mulch, seed, and sod to 11 of the properties that contained elevated levels of creosote in surface soil, to limit the potential for exposure.

EPA addressed the Site in three separate operable units (OUs).

OU1 - addressed the permanent relocations of residents and the excavation and off-site treatment and disposal of materials from the buried lagoons and canals on residential properties. The OU1 ROD was issued September 28, 1999. The following remedial action objectives were established for OU1 of the Federal Creosote site:

- clean up the canal and lagoon source areas to levels that will allow for unrestricted land use;
- remove as much source material as possible in order to minimize a potential source of groundwater contamination.

The major components of the OU1 Selected remedy include:

- permanent relocation of residents from certain properties within the canal and lagoon source areas, and temporary relocation where necessary to implement the remedy;
- excavation of source material from the canal and lagoon source areas, backfilling with clean fill, and property restoration as necessary; and
- transportation of the source material for off-site thermal treatment and disposal.

OU2 - included permanent relocations of residents and the excavation and off-site disposal, with treatment as necessary, of residual creosote soil contamination on residential properties.

The OU2 ROD was issued in September 29, 2000. The following remedial action objectives were established for OU2 of the Federal Creosote site:

- prevent human exposure, via direct contact, with contaminated soils, considering the current and future residential site use;
- prevent future impacts to underlying groundwater quality by contaminated soils;
- prevent exposure and minimize disturbance to the Claremont Development residents, and the surrounding community of Manville, during implementation of the remedial action.

The major components of the OU2 Selected Remedy include:

- excavation of soils containing PAHs in excess of site-specific remediation goals from approximately 82 properties, backfilling with clean fill, and property restoration as necessary; and
- transportation of the contaminated soil off site for disposal, with treatment as necessary.

OU3 - consisted of the excavation of soils containing source material and residual creosote soil contamination from the commercial section of the Site, known as the Rustic Mall as well as site-wide, long-term groundwater monitoring and institutional controls. The OU3 ROD was issued September 30, 2002. The following remedial action objectives were established for OU3 of the Federal Creosote site:

- prevent human exposure via direct contact, inhalation, and ingestion of contaminated soils, considering the future potential residential site use;
- prevent future impacts to underlying groundwater quality by contaminated soils that can act as a continuing source of groundwater contamination; and
- prevent exposure and minimize disturbance to the Rustic Mall occupants and consumers, and the surrounding community of Manville, during implementation of the remedial action.

The OU3 ROD also addressed site groundwater. The following remedial action objectives were established for site groundwater for the Federal Creosote site:

- prevent ingestion and direct contact with groundwater that has contaminant concentrations greater than the Applicable or Relevant and Appropriate Requirements (ARARs);
- minimize the potential for additional off-site migration of groundwater with contaminant concentrations that exceed the ARARs; and
- minimize the potential for transfer of groundwater contamination to the other media (e.g., surface water) at concentrations in excess of ARARs.

The major components of the OU3 Soil Remedy include:

- Excavation of soils containing polycyclic aromatic hydrocarbons (PAHs) in excess of site-specific remediation goals on the Rustic Mall, backfilling with clean fill, and property restoration as necessary; and,
- Transportation of the contaminated soil off-site for disposal, with treatment as necessary.

As described in more detail in the Decision Summary of the OU2 ROD, the Selected Remedy may leave residual levels of PAHs (but not source material as defined by the September 1999 Record of Decision) at depths greater than approximately 14 feet below the ground surface in the Rustic Mall. The backfilled clean fill would act as a barrier or "engineering control" to prevent contact with any residual contamination. In addition, a deed notice would be required to prevent direct contact with any remaining residual soil contamination.

The major components of the OU3 Groundwater Remedy include:

- Implementation of a long-term groundwater sampling and analysis program to monitor the concentrations of creosote components in the groundwater at the Site, in order to assess the migration and attenuation of the creosote in groundwater over time; and
- Institutional controls to restrict the installation of wells and the use of groundwater in the vicinity of the contaminated groundwater.

The evaluation of remedial alternatives for remediation of the dense non-aqueous phase liquid (DNAPL) creosote contamination, including contamination found in the fractured bedrock aquifer, concluded that no practicable alternatives could be implemented. As a result, EPA invoked an ARAR waiver for the groundwater at this site due to technical impracticability (TI). The area for the TI waiver covers approximately 119 acres. The area includes three distinct subareas: the north off-site subarea, the on-site subarea, and the south off-site subarea (see Figure 1). The TI waiver includes both the overburden aquifer and the bedrock aquifer within the area. The contaminants for which the ARAR waiver apply include: acenaphthene, benzene, naphthalene, 2,4-dimethylphenol, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, fluorine, chrysene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene.

Cleanup Goals

Table 1: Federal Creosote Soil Remediation Goals

Contaminant of Concern	Remediation Goal (ppm)
Benzo(a)pyrene	0.66
Benzo(a)anthracene	0.90
Chrysene	90.0
Benzo(b)fluoranthene	0.90
Benzo(k)fluoranthene	9.0
Indeno(1,2,3-cd)pyrene	0.90
Dibenz(a,h)anthracene	0.66

Table 2: Federal Creosote Groundwater Remediation Goals

Contaminant of Concern	Remediation Goal (ppb)
Benzo(a)pyrene	5
Benzo(a)anthracene	5
Chrysene	5
Benzo(b)fluoranthene	5
Benzo(k)fluoranthene	5
Indeno(1,2,3-cd)pyrene	5
Dibenz(a,h)anthracene	5
Benzene	1
Naphthalene	300

Status of Implementation

EPA has completed remediation of a total of 93 residential properties. The remediation of these properties required permanent and temporary relocation of residents, excavation to depths ranging from 1 to 35 feet below ground surface, and has resulted in the removal of over 260,000 tons of soil from the residential development.

OU1

The OU1 ROD estimated that 32 properties contained source material and that residents of 19 of these residential properties needed to be permanently relocated in order to excavate and dispose of the source material. The OU1 remedial action included removal of source material from 29 residential properties, required the permanent relocation of 21 OU1 property owners, and the demolition of 18 homes. The residual soil contamination that remained at depth (typically at least 14 feet below ground surface) was found to exceed OU2 soil cleanup numbers. These areas were covered with clean backfill, and institutional controls (discussed below) were placed on these properties to prevent access to contaminated residual soils.

The cleanup of OU1 was divided into three phases. Phase 1 focused on the cleanup of the southern lagoon; Phase 2 focused on the cleanup of the northern lagoon and canal; Phase 3 focused cleanup efforts on the southern canal.

The OU1 Phase 1 remedial action involved the permanent relocation of the residents from eight properties, demolition of eight single-family homes, and excavation and removal of 55,000 tons of soil to off-site treatment and disposal facilities. Remediation of Phase 1 was completed in June 2002. Ownership of these eight properties was transferred to NJDEP in July 2003. NJDEP sold the eight properties to a residential developer and each property has been redeveloped into single family residential housing.

The OU1 Phase 2 remedial action included the permanent relocation of residents from eight properties located over the northern lagoon and canal. The houses on the eight lots were demolished and excavation of creosote-contaminated soil from this northern lagoon and canal started in April 2002. Excavation on this phase reached a depth of 35 feet below the ground surface. Approximately 116,000 tons of soil were excavated and shipped off-site to treatment and disposal facilities. These properties were backfilled with clean soil and were used as a staging area for stockpiling of wastes from other areas of the Site through 2007. The eight residential lots that were remediated during OU1 Phase 2 are currently owned by the Borough of Manville, and await redevelopment.

The OU1 Phase 3 remedial action included the excavation and off-site disposal of 30,000 tons of contaminated soil from 13 residential properties and roadways located on the buried southern creosote canal. Phase 3 included the permanent relocation of residents from five properties built over a portion of the buried southern creosote canal, and the demolition of two properties. After cleanup, EPA sold two properties that required demolition to a developer. These two properties were redeveloped into single family residences. The remaining three residential properties were also sold by EPA and returned to residential use.

OU2

The cleanup of OU2 consisted of two phases. The OU2 Phase 1 remedial action consisted of soil removal at 14 residential properties that surrounded the southern lagoon area (addressed, as discussed above, in OU1 Phase 1). The OU2 Phase 1 remedial action involved no permanent relocations and no demolitions. The remedial action of this phase started in February 2002, and by June 2002, 8,900 tons of contaminated soil had been excavated, treated, and disposed of off-site, the 14 properties had been completely restored, and temporarily relocated residents returned to their homes.

The OU2 Phase 2 remediation began in June 2003. Cleanup activities occurred on 50 residential properties and portions of roadways in need of remediation. The OU2 Phase 2 remedial action involved two permanent relocations and no building demolitions. The remediation of a daycare center was included in this phase. In August 2001, the daycare center playground was remediated, and in 2006 the daycare center parking lot was remediated. The remedial action of OU2 Phase 2 resulted in the excavation and off-site disposal (with treatment as necessary) of 51,000 tons of soil.

OU3

The OU3 remediation addressed soil contamination in the commercial mall. Remediation of OU3 began in August 2005 and was completed in February 2008. The remedial action of OU3 resulted in the excavation and off-site disposal (with treatment as necessary) of 178,000 tons of soil.

Due to an increased volume of soils from those considered for remediation under the OU1, OU2, and OU3 RODs, the resulting costs to address soils were considered a significant change in scope to the remedies. As such, the change in cost was documented in the 2006 Explanation of Significant Differences (ESD).

Groundwater Monitoring

Long-term monitoring of Site groundwater started in November 2005, as required by the OU3 ROD. Groundwater monitoring was conducted on an annual basis up until 2015, and is now conducted biennially. Ten rounds of groundwater monitoring have been completed since long-term monitoring of groundwater was initiated.

IC Summary Table

Institutional Controls for Soils

The human health risk assessment considered that subsurface soil contamination could pose a direct contact risk to residents over time, through typical residential activities such as gardening or through the removal and surface deposition of subsurface soils during future residential construction activities. At greater depths (deeper than approximately 10 feet), soils are expected to be inaccessible to residential property owners. Deeper excavations (below 10 feet) on OU1 properties were needed to remove source areas, but the OU2 ROD expected that soils with lower concentrations of PAHs (identified as “OU2 soils”) could be left in place if the soils were deeper than approximately 10 feet. This was true for OU1 properties (after the source areas were remediated) as well as at a number of OU2 properties.

The OU2 RI/FS identified a number of properties where the extent of creosote contamination was found at the top of the clay layer, which ranged between approximately 8 to 14 feet below the ground surface. The OU2 ROD anticipated remediation depths beyond 10 feet, to as deep as 14 feet (to the top of the clay) to remediate these lots, if excavating to the top of the clay would address all site contamination on the lot. However, the OU2 ROD also identified properties in the Claremont Development where residual soil contamination was found at depths greater than 14 feet below the ground surface. The OU2 ROD concluded that soils at those depths were inaccessible and did not pose an unacceptable health risk through direct contact; however, NJDEP would not concur with an action that left soils in exceedance of the remediation goals at depth, without an additional step of a deed notice for affected properties. While EPA concluded that institutional controls (the deed notices) were not necessary for protectiveness, to facilitate the placement of the deed notices, the OU2 remedy called for the permanent relocation (and

purchase) of residential properties if the homeowners did not voluntarily agree to place deed notices on their property. Two OU2 property owners did not agree to place deed notices on their properties. EPA purchased the two OU2 properties, placed deed notices on the properties, and then sold both properties.

During the implementation of the remedy in the residential development, all source material encountered in the Claremont Development was removed and residual contamination above the cleanup goals was left beneath 21 properties. These 21 properties required deed notices, and all deed notices have been filed with the appropriate local offices.

Of the 21 properties that required deed notices, six properties received deed notices because of conditions that are consistent with the expectations of the OU2 ROD, that is, residual contamination remains below approximately 14 feet on those properties. The remaining 15 properties that required deed notices have contamination shallower than 14 feet. While the ROD did not expect that institutional controls, in the form of deed notices, would be necessary for protectiveness, EPA did in fact rely on these deed notices as part of the remedy, and an Explanation of Significant Differences was issued on August 8, 2008 to explain this variance.

In addition to residential properties, the Borough of Manville applied deed notices to portions of Borough roads that contained residual levels of creosote above remediation goals pursuant to the 2008 ESD.

A deed notice for residual contamination remaining 14 feet below the Rustic Mall property has been implemented by the property owner.

Institutional Controls for Groundwater

The OU3 ROD required an institutional control for the area of groundwater contamination. A Classification Exception Area (CEA) was established to provide notice that the constituent standards for a Class IIA aquifer classification are not or will not be met in the area of the Federal Creosote Site and that designated aquifer uses are suspended in the affected area for the term of the CEA. Additional monitoring wells were installed to delineate the CEA, and the CEA was established in January 2010.

Table 3: 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)
Soils	Yes	Yes	Claremont Development (21 Properties)	Prevent direct contact with soil containing residual contamination	Deed Notices August 2008
Soils	Yes	Yes	Rustic Mall Property	Prevent direct contact with soil below 14 feet containing residual contamination	Deed Notices December 2011
Soils	Yes	Yes	Borough of Manville Roads in Claremont Development	Prevent direct contact with soil containing residual contamination	Deed Notices September 2010
Groundwater	Yes	Yes	Area delineated by monitoring well network	Reduce exposure to contaminants by restricting the installation of wells and the use of groundwater in the affected area of the CEA	Classification Exception Area January 2010

Climate Change

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 changes in the region and near the site.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last five-year review as well as the recommendations from the last five-year review and the current status of those recommendations.

Table 4: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The implemented actions at OU1 are protective of human health and the environment. All exposure pathways that could result in unacceptable risks are being controlled.
2	Protective	The implemented actions at OU2 are protective of human health and the environment. All exposure pathways that could result in unacceptable risks are being controlled.
3	Protective	The implemented actions at OU3 currently protect human health and the environment because a CEA has been implemented to prevent ingestion of contaminated groundwater and soils have been remediated preventing direct exposure to contaminated material.
Sitewide	Protective	The implemented actions at the site currently protect human health and the environment because soil excavation activities and institutional controls prevent direct exposure to contaminated soils. In addition, a CEA is in place to prevent exposure to contaminated groundwater.

The 2012 FYR did not identify any issue or recommend any action at the Site needed to protect public health and/or the environment that is not addressed by the remedy selected in Site decision documents. In addition, no new activities of not (i.e., redevelopment or changed site use) have occurred since the second FYR was completed.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On November 14, 2016, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 38 Superfund sites in New York and New Jersey, including the Federal Creosote site, and inviting the public to submit comments on the FYR to the EPA. The announcement can be found at the following web address:
https://www.epa.gov/sites/production/files/2016-11/documents/five_year_reviews_fy2017_final.pdf

In addition to this notification, a public notice was provided to the Borough of Manville for posting on the Borough's website on 12/1/2016, stating that there was a FYR and inviting the public to submit any comments to the U.S. EPA. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the repositories. The results of the review and report will be made available at the site information repositories, located at EPA Region 2, 290 Broadway, 18th Floor, New York, New York, 10007, and at the Manville Public Library, 100 South 10th Avenue, Manville, New Jersey, 08835, (908) 722-9722.

Data Review

Residential and commercial properties have been remediated to levels (Table 1) that would allow for unrestricted use, or, in some cases, residually contaminated soil was left at depth, and institutional controls have been used to prevent direct contact with residual soil contamination. Because there is little potential for direct contact with residual soil contamination, this review focuses on groundwater.

Two rounds of groundwater sampling were conducted in 1999, prior to the start of soil remediation. As per the Groundwater Monitoring Plan, a round of groundwater samples was obtained from a monitoring well network of over 30 wells on an annual basis starting in November 2005. Data collected between 2005 and 2013 showed that the source areas did not appear to be migrating and contaminant concentrations were decreasing downgradient of the source areas, therefore the long-term monitoring program was reduced to biennial groundwater sampling. Several monitoring wells were abandoned in 2012 due to expansion of the railroad on the CSX property, thus the current sampling program consists of 27 monitoring wells screened in the overburden aquifer, shallow bedrock, or deep bedrock.

Semi-volatile organic compounds:

Overburden Aquifer

Semi-volatile organic compounds (SVOCs) were the most commonly detected organic compounds in the overburden aquifer. The primary indicator compound for groundwater contamination at the Site is naphthalene. During the most recent round of groundwater sampling in 2015, naphthalene was detected in the overburden aquifer in the immediate vicinity of the former northern and southern lagoons (Lagoons A and B, respectively). The naphthalene results, and results for PAHs in general, indicated that shallow groundwater contamination remains in the vicinity of these two areas. At monitoring wells located within the footprint of the lagoons (MW-6S, MW-7S, MW-2RS), naphthalene concentrations stayed near their pre-remediation levels over their respective monitoring periods due to the presence of DNAPL (see Figure 1). The last available data in the footprint of Lagoon B (MW-6S and MW-7S) is from October 2011 due to expansion of the railroad tracks, and evaluation of these wells is included in the previous five-year review. The stability of this plume in the overburden is currently monitored by downgradient off-site well MW-114S (approximately 200 feet downgradient Lagoon B), Site contaminants have not been detected above Site-specific screening criteria in this well in any sampling round. No contaminants of concern have been detected at MW-114S since 2011. Naphthalene concentrations in MW-2RS at former Lagoon A have fluctuated since 2011, but the overall trend of SVOCs at this location is stable (Figure 2). Monitoring data since 2011 at MW-111S in the vicinity of the former wood treatment plant has been fluctuating, with an overall decreasing concentration trend of naphthalene (Figure 3). No site contaminants were detected at MW-111S in 2013, and in 2015 only dibenzofuran and carbazole exceeded their Site-specific screening criteria.

Bedrock Aquifer

Semi-volatile organic compounds were the most commonly detected organic compounds in the intermediate and deep bedrock wells. In 2011, naphthalene was detected above its criterion in two on-site wells, MW-5I in the vicinity of the Lagoon B, and MW-2RI in the vicinity of the Lagoon A. Naphthalene concentrations at MW-2RI have fluctuated throughout the long-term monitoring program, but have never exceeded pre-remediation concentrations. Associated PAHs (such as dibenzofuran, phenanthrene, and carbazole) at MW-2RI have also remained stable or exhibited slight fluctuations, with no clear trends

(Figure 4). In 2012, MW-5I was abandoned due to railroad expansion on the CSX property. The stability of this plume is being monitored by downgradient, off-site well MW-114I, where naphthalene has not been detected since October 2010 (Figure 5). None of the remaining off-site wells had detections of naphthalene. Other PAHs including 2-methylnaphthalene, dibenzofuran, phenanthrene, and carbazole were consistently detected in association with naphthalene detections. The only detection of naphthalene in the deep bedrock well network was at MW-2RD, where Site contaminants are expected to persist due to the presence of DNAPL (Figure 6). Downgradient, off-site well MW-114D has not had any detections of Site contaminants since October 2009 (Figure 7).

Summary

Overburden and bedrock data collected and analyzed over this FYR period indicate that the source area groundwater concentrations remain stable above drinking water standards and that the contamination plume remains within the footprint of the 119-acre Technical Impracticability (TI) zone.

Site Inspection

The inspection of the Site was conducted on 10/17/2016. In attendance were EPA Remedial Project Manager Brittany Hotzler, EPA Section Chief Rich Puvogel, EPA Hydrogeologist Rachel Griffiths, EPA Risk Assessor Lora Smith-Staines, and EPA Community Involvement Coordinator Pat Seppi. The purpose of the inspection was to assess the protectiveness of the remedy.

V. TECHNICAL ASSESSMENT

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

Yes. Soil contamination at the Site has been addressed by the removal of contaminated soil and off-site treatment and/or disposal. The selected remedy for the groundwater (long-term groundwater monitoring) has been implemented and groundwater monitoring is conducted on a biennial basis. Groundwater data for both the overburden and the bedrock indicate that the groundwater contamination remains localized within the former area of the lagoons and treatment plant and within the area of the TI zone. Institutional controls have been implemented at all properties and a CEA is in place to prevent unacceptable use of the groundwater within the TI zone.

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?

Although other specific parameters may have been changed since the time the risk assessment was completed, the process that was used remains valid and is not expected to affect the remedy. The exposure assumptions, toxicity data, cleanup levels and RAOs identified for all OUs remain valid.

There have been no physical changes to the Site that would adversely affect the protectiveness of the remedy. Residential land use assumptions, exposure assumptions and pathways evaluated in the RI/FS and considered in the decision documents remain valid.

In a previous five-year review, the soil remediation goals for all carcinogenic PAHs were re-evaluated using Age Dependent Adjustment Factors (ADAFs) which were identified in EPA's 2005 Cancer

Guidance and Supplemental Guidance. The risk levels for the remediation goals were found to be within the acceptable risk range of 10^{-6} to 10^{-4} , therefore the remedial goals remain protective.

The evaluation of groundwater in this five-year review focused on two primary exposure pathways, direct ingestion (as a potable water source) and the possibility of vapor intrusion into residential and commercial buildings in proximity to the plume. The evaluation of the direct contact pathway showed that though exceedances of COCs remain in the localized groundwater plume areas, all nearby residents are receiving public water and a CEA is in place to prevent future groundwater use. Indoor air sampling was conducted inside residences at the site in 1997. EPA collected sub-slab air sampling in the nearby residential properties in late February 2007 to further evaluate the potential indoor air pathway. All sub-slab results were below EPA's levels of concern. No additional subslab samples have been collected since 2007. To ensure this potential pathway is not of concern, groundwater sampling results from this five-year review period were compared to EPA vapor intrusion screening levels. The only screening level exceedances of the COCs in the shallow aquifer occurred at MW-2RS, which is located in the core of the Lagoon A groundwater plume and not in the immediate vicinity of any buildings. Based on the previous sub-slab investigations and the recent groundwater data review, exposure to site contamination via the vapor intrusion pathway remains unlikely.

The Site is located within a residential and commercial area, and all surface soils have been remediated as part of the OU1, OU2, and OU3 remedial action, eliminating any pathways for ecological receptors. During the OU3 remedial investigation, an ecological risk assessment was conducted and found no site-related contamination in downgradient wetlands or sediments in the Raritan and Millstone Rivers.

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

There is no information that calls into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations	
OU(s) without Issues/Recommendations Identified in the Five-Year Review:	
OU1, OU2, OU3	

VII. PROTECTIVNESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> Operable Unit 1	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The implemented actions at OU1 are protective of human health and the environment.	

Protectiveness Statement(s)	
<i>Operable Unit:</i> Operable Unit 2	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The implemented actions at OU2 are protective of human health and the environment.	

Protectiveness Statement(s)	
<i>Operable Unit:</i> Operable Unit 3	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The implemented actions at OU3 are protective of human health and the environment	

Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Protective	
<i>Protectiveness Statement:</i> The implemented actions at the site are protective of human health and the environment.	

VIII. NEXT REVIEW

The next five-year review report for the Federal Creosote Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

Reference List	Date
Operable Unit 1 Record of Decision	1999
Operable Unit 2 Record of Decision	2000
Operable Unit 3 Record of Decision	2002
Remedial Action Report Operable Unit 1 Phase 1	2004
Remedial Action Report Operable Unit 2 Phase 1	2005
Remedial Action Report Operable Unit 1 Phase 3	2006
Remedial Action Report Operable Unit 2 Phase 2	2006
Remedial Action Report Operable Unit 1 Phase 2	2008
Explanation of Significant Differences	2008
Remedial Action Report Operable Unit 3	2008
Federal Creosote Second Five Year Review	2012
Groundwater Monitoring Report	2015

APPENDIX B – CHRONOLOGY OF EVENTS

Chronology of Events	Date
Operations of the creosoting facility	1911-1955
Construction of the Claremont Development consisting of 137 single-family residences begins on 35 acres of the former Federal Creosoting property	1961
Construction of the Rustic Mall begins on 15 acres of the former Federal Creosoting property	1963
Manville Health Department responds to a call regarding a basement sump pump discharge of creosote from a Claremont residence onto Valerie Drive	1997
NJDEP and EPA begin soil investigation in the Claremont Development	1997
Responsibility for the Site transferred from NJDEP to EPA	1998
Engineering Evaluation and Cost Analysis for Lagoons and Canals	1998-1999
Remedial Investigation/Feasibility Study	1998-2002
Site placed on the National Priorities List	1999
Record of Decision OU 1 addressing residential soils containing source areas	1999
Remedial Design	1999-2004
Record of Decision OU 2 addressing residential areas containing residually contaminated soils	2000
Record of Decision OU 3 addressing contaminated soil in the Rustic Mall and Site-wide groundwater contamination	2002
Explanation of Significant Differences	2008
Remedial Action	2000-2008

APPENDIX C – FIGURES

Figure 1

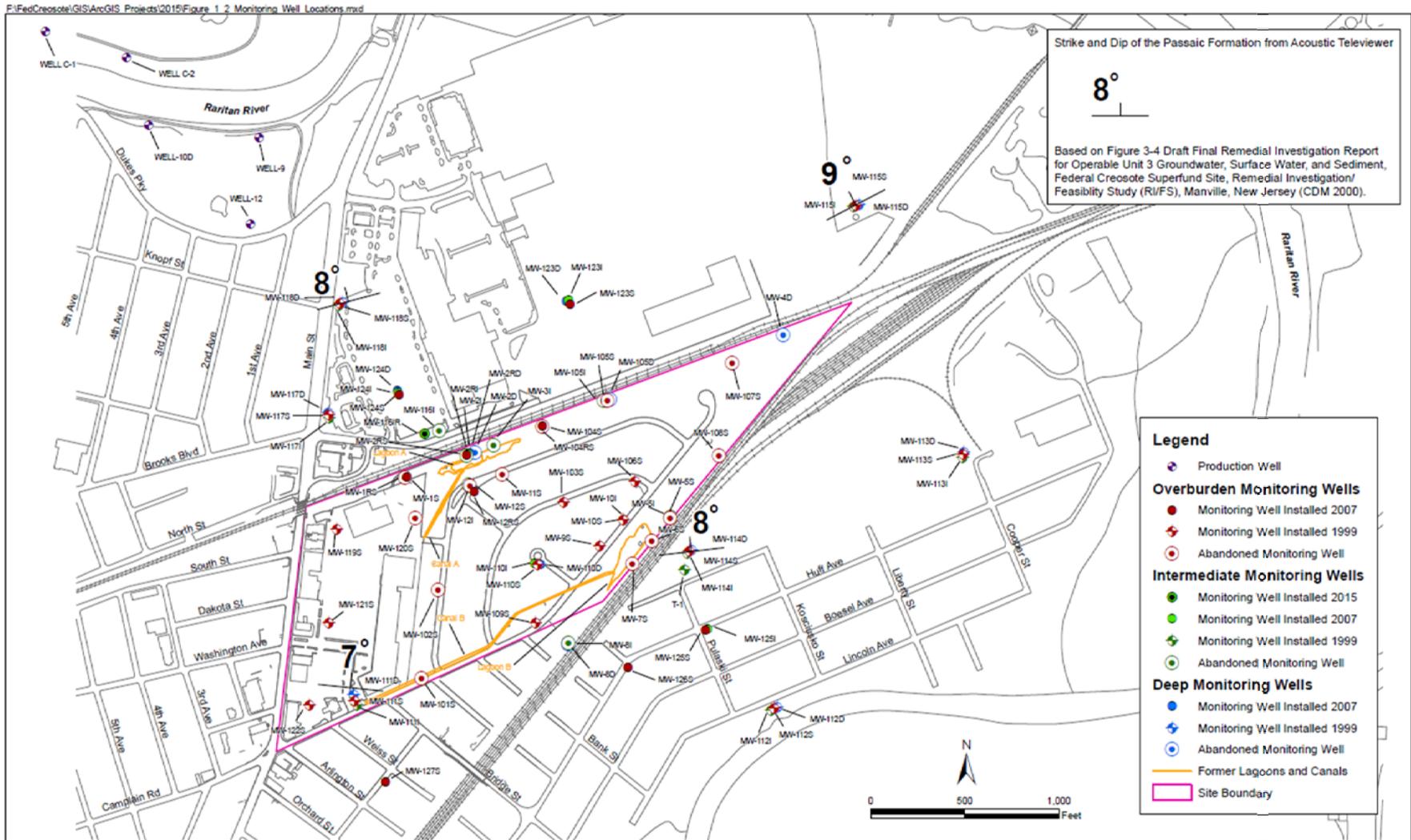


Figure 2

Trend Analysis – MW-2RS

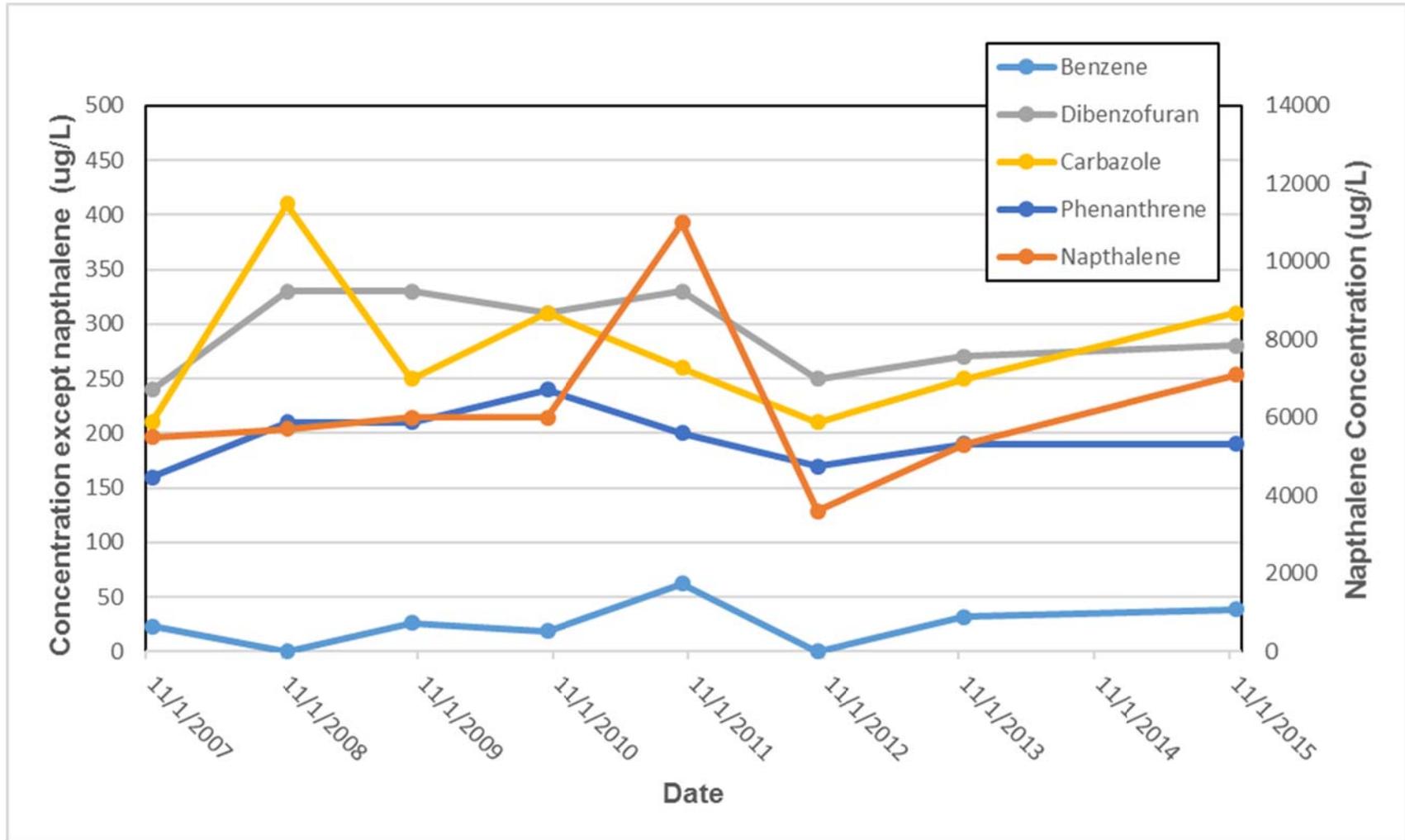


Figure 3

Trend Analysis – MW-111S

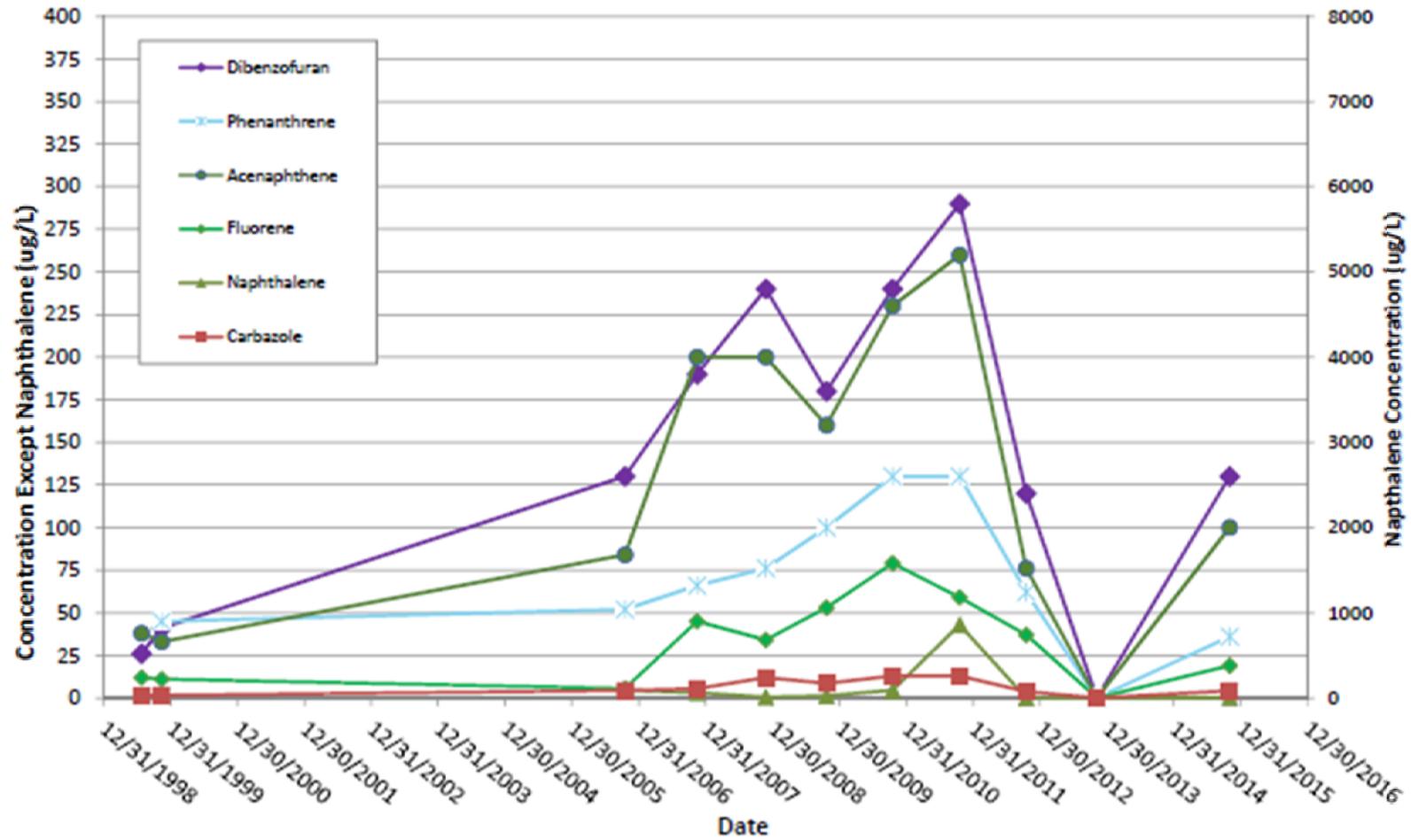


Figure 4

Trend Analysis – MW-2I/2R

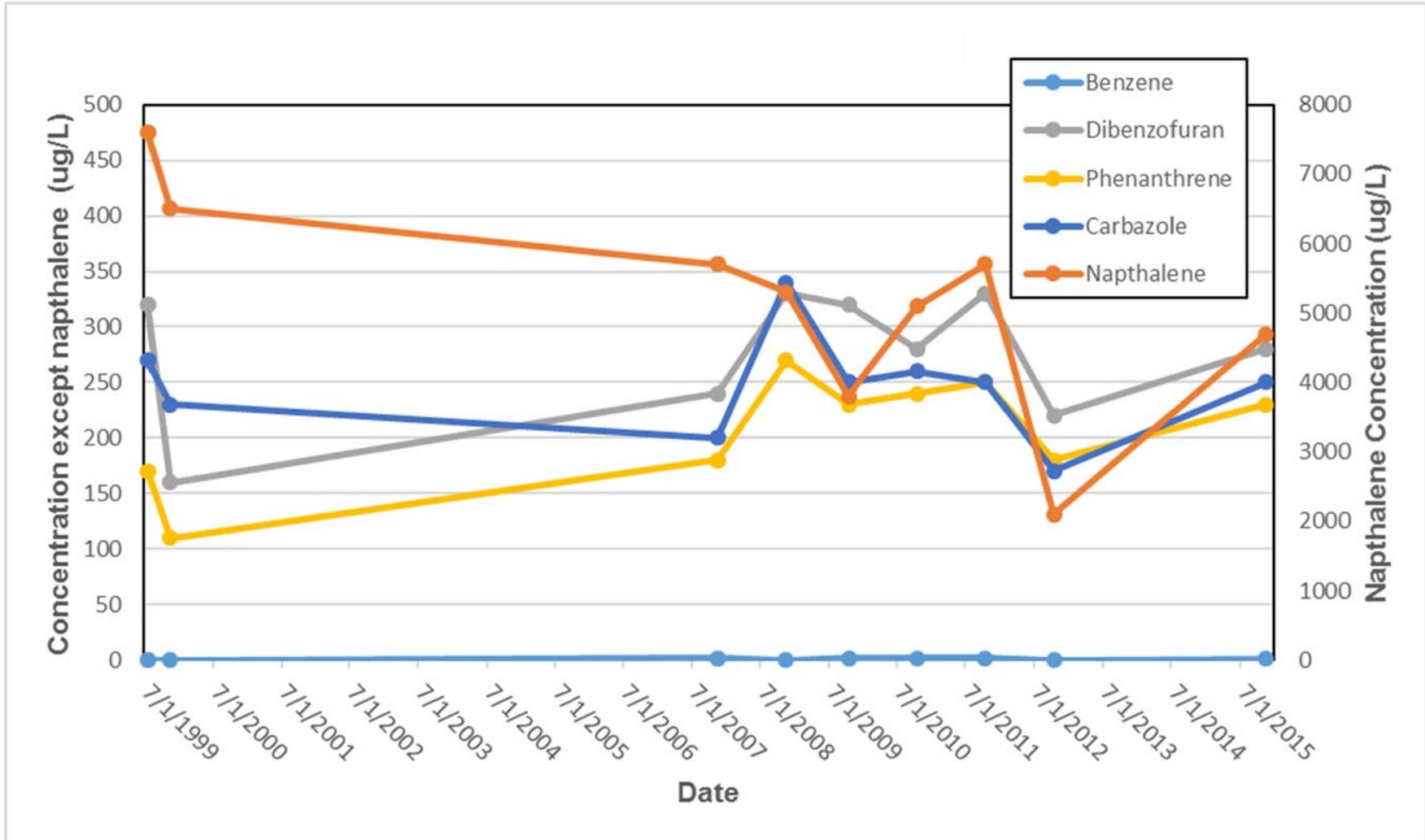


Figure 5

Trend Analysis – MW-114I

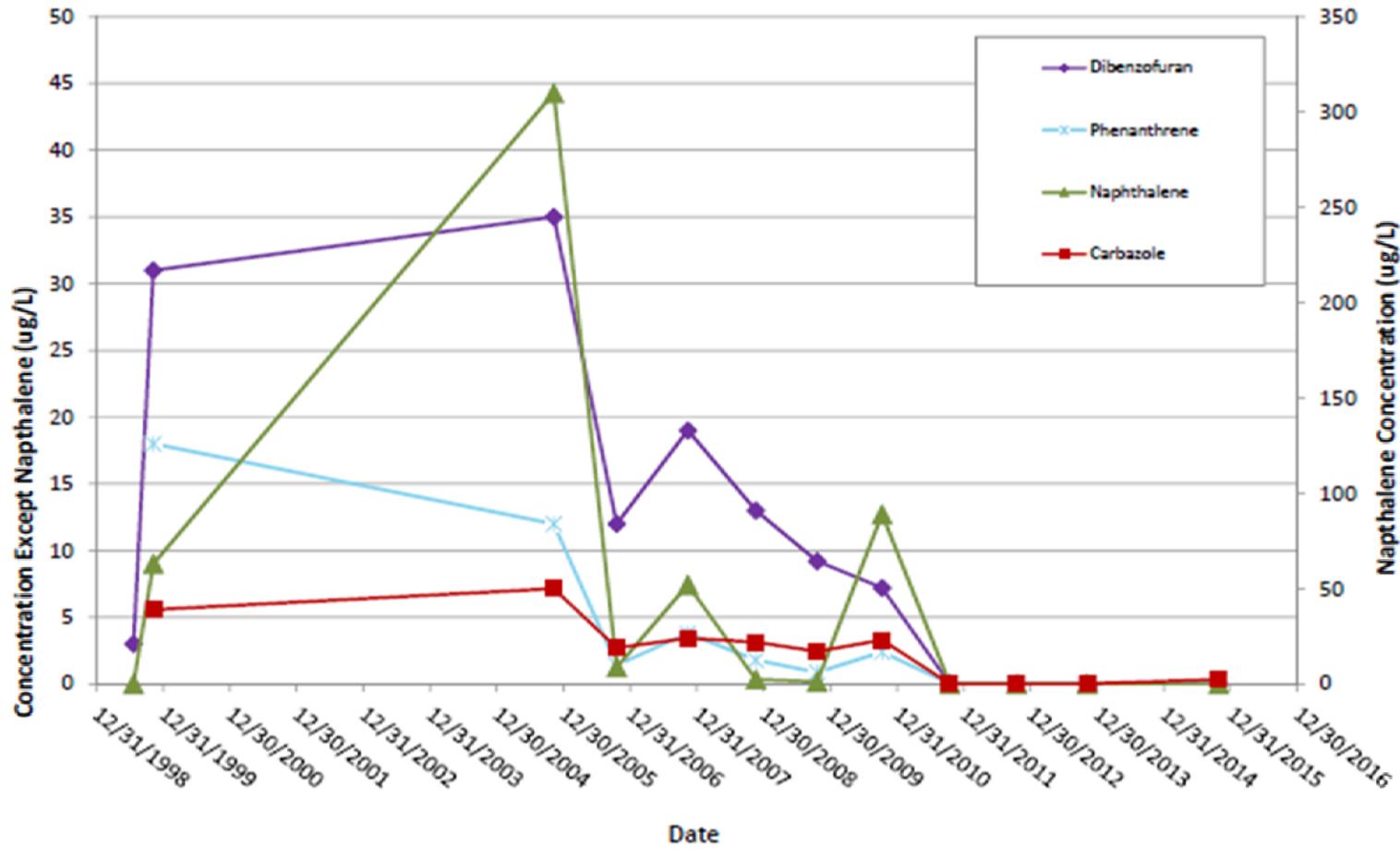


Figure 6

Trend Analysis – MW-2RD

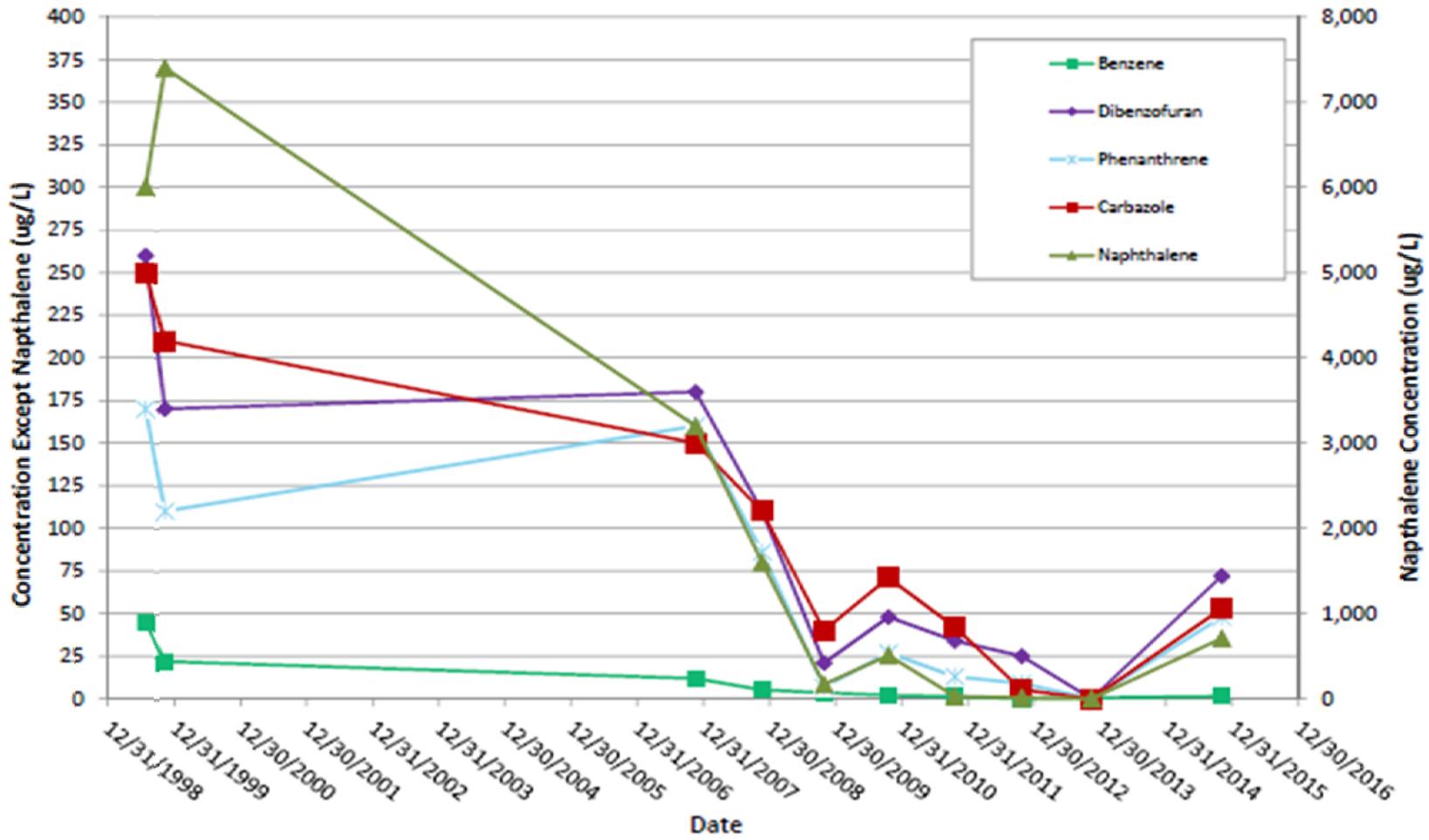


Figure 7

Trend Analysis – MW-114D

