FOURTH FIVE-YEAR REVIEW REPORT FOR CHEM-SOLV, INC. SUPERFUND SITE KENT COUNTY, DELAWARE

JULY 2018

Prepared by

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DNREC	Delaware Department of Natural Resources and Environmental Control
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
GWMZ	Groundwater Management Zone
IC	Institutional Control
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
µg/l	Micrograms per Liter
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Tetrachloroethylene
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
ROD	Record of Decision
RPM	Remedial Project Manager
TCE	Trichloroethylene
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy 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 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 fourth FYR for the Chem-Solv, Inc. Superfund Site (the Site). The triggering action for this policy review is the completion date of the previous FYR. The FYR has been prepared because 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 one operable unit (OU), which addresses groundwater contamination.

EPA remedial project manager (RPM) Stepan Nevshehirlian led the FYR. Participants included EPA community involvement coordinators Gina Soscia and Lavar Thomas, EPA hydrogeologist Mindi Snoparsky, EPA biologist Kimberly Plank, EPA toxicologist Dawn Ioven, Delaware Department of Natural Resources and Environmental Control (DNREC) project manager Robert Asreen, and Amanda Goyne and Hagai Nassau from Skeo (EPA's FYR support contractor). The potentially responsible parties (PRPs) were notified of the initiation of the FYR. The review began on November 13, 2017. Documents used to prepare this FYR are summarized in Appendix A. Appendix B includes the site chronology.

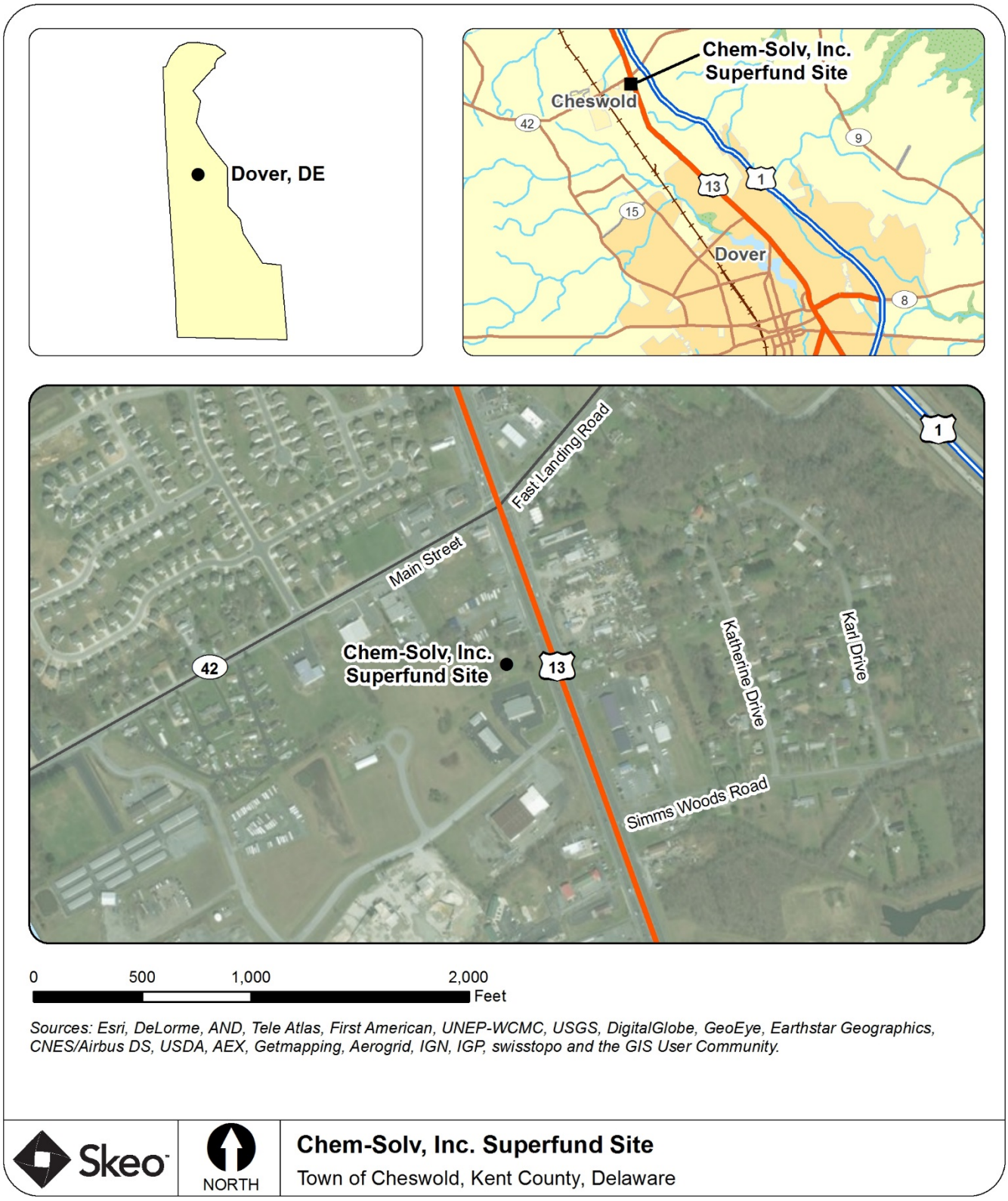
Site Background

The Site consists of a 1.5-acre former solvent recovery facility, as well as areas to the north and east where groundwater has become contaminated due to releases of hazardous substances from the facility. The Site is in a suburban area near Cheswold, Delaware (see Figure 1). From 1981 until 1984, Chem-Solv, Inc. conducted solvent recovery activities at the 1.5-acre property. An explosion and fire at the facility in 1984 resulted in a solvent spill that contaminated soil and groundwater.

Several structures are located on the former facility property, including a residential building with two occupied rental units on the northwest portion of the property. Other structures on the property include a small barn, a shed, and the former Chem-Solv, Inc. office building, which is abandoned and in poor condition. Adjacent land uses are primarily commercial with some residential areas nearby.

The uppermost aquifer at the Site is the Columbia aquifer; the depth to groundwater is about 8 feet. The Cheswold aquifer is beneath the Columbia aquifer. The top of the Cheswold aquifer is about 100 feet below ground surface. The Cheswold aquifer has not been affected by site contamination. Groundwater in the shallow and intermediate zones of the Columbia aquifer flows generally to the northeast. The Alston Branch of the Leipsic River, which is located 0.4 miles north of the Site, is the probable discharge point for groundwater from the Site. Homes and businesses in the area use private groundwater wells. Some of these wells draw from the shallow Columbia aquifer and some of these wells draw from the deeper Cheswold aquifer.

Figure 1: Site Location Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Chem-Solv, Inc.		
EPA ID: DED980714141		
Region: 3	**State:** DE	**City/County:** Cheswold / Kent

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

REVIEW STATUS
Lead agency: EPA
Author name: Stepan Nevshehirlian, with additional support provided by Skeo
Author affiliation: EPA Region 3
Review period: 11/13/2017 - 7/30/2018
Date of site inspection: 3/6/2018
Type of review: Policy
Review number: 4
Triggering action date: 7/30/2013
Due date *(five years after triggering action date)*: 7/30/2018

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Following the fire at the facility, DNREC investigated the Site in 1984 and found volatile organic compound (VOC) contamination in soils. In response, DNREC conducted a soil cleanup (described below under Response Actions). Investigations also found VOC contamination in the shallow Columbia aquifer (primarily trichloroethylene (TCE)), in addition to localized elevated levels of manganese. EPA proposed the Site for listing on the National Priorities List (NPL) in January 1987 and finalized the listing in August 1990.

EPA's human health risk assessment found that long-term exposure to contaminated groundwater at the Site would result in unacceptable human health risks. Cancer risk was attributed mainly to the presence of benzene and TCE. Non-cancer risk was due to the presence of manganese. EPA believes the dissolved manganese in groundwater is caused by the contaminants mobilizing naturally occurring manganese. Based on the 1991 remedial investigation, EPA concluded that exposure to on-site soils would not present an unacceptable risk to human health or the environment.[1] Table 1 lists the Site's contaminants of concern (COCs). The PRPs' 1991 environmental risk assessment for the Site found no unacceptable risks to the environment.

In 1988, underground storage tanks were removed from the former truck stop immediately north of the Chem-Solv property. Benzene, toluene, ethylbenzene and xylenes were found in soil and groundwater at the former truck stop. Groundwater at the former truck stop also contained manganese.

Table 1: COCs by Media

Groundwater
Acetone
Benzene
1,2-Dichloroethane
Manganese
Tetrachloroethylene (PCE)
Toluene
1,1,1-Trichlorethane
Trichloroethylene (TCE)
Xylenes

Response Actions

In 1985, DNREC excavated and aerated 1,300 cubic yards of contaminated soil to remove the VOCs. This process addressed the soil contamination by reducing contaminant concentrations to levels that permitted the soil to be returned to the excavated area. To address groundwater contamination, DNREC installed a groundwater collection and treatment system in 1985 and operated the system until 1988. The treatment system reduced TCE concentrations in groundwater beneath the Site from the 250 milligrams per liter (mg/l) range to the 1 mg/l range.

EPA selected a remedy in the Record of Decision (ROD) issued in March 1992 that was modified by an Explanation of Significant Differences (ESD) issued in June 1999. The remedial action objectives (RAOs) for the Site are:

- Restore groundwater to its beneficial use as a potential drinking water source by reducing contaminant levels to maximum contaminant levels (MCLs) and non-zero maximum contaminant level goals (MCLGs) established under the federal Safe Drinking Water Act and, where MCLs and MCLGs are not available, to levels determined by EPA to be protective of human health.
- Prevent exposure to the contaminated groundwater until the restoration is complete.

[1] The property was in residential use at the time of the remedial investigation.

The major components of the remedy selected in the ROD, as modified by the ESD, include:

- Collection of contaminated groundwater using recovery wells in the contaminated portion of the Columbia aquifer until cleanup levels are achieved.
- Discharge of extracted groundwater to the local publicly owned treatment works via the Kent County sewer system. If an agreement with the publicly owned treatment works cannot be reached, on-site treatment of extracted groundwater and discharge of treated groundwater to local surface water.
- Continued groundwater monitoring at domestic, recovery and monitoring wells until cleanup levels are achieved (see Table 2).
- Provision of an alternate water supply for users of private water supply wells should any wells become contaminated before the groundwater restoration is complete.
- Establishment and enforcement of a state Groundwater Management Zone (GWMZ) to prevent the installation of water supply wells within the contaminated portion of the Columbia aquifer until cleanup levels are achieved.
- Removal of existing recovery wells and establishment of new recovery wells.

Table 2: Groundwater COC Cleanup Goals

Groundwater COC	Cleanup Goal (µg/l)[a]
Acetone	3,500[b]
Benzene	5
1,2-Dichloroethane	5
Manganese	3,000[c]
PCE	5
Toluene	1,000
1,1,1-Trichloroethane	200
TCE	5[d]
Xylene	10,000

Notes:
µg/l = micrograms per liter
a) The cleanup goal is based on the MCL and non-zero MCLG unless otherwise stated.
b) Drinking Water Equivalent Level calculated using the reference dose following the procedure in EPA/540/G088-003.
c) No Observed Adverse Effect Level calculated based on a 70-kilogram adult consuming 2 liters of water per day.
d) EPA and DNREC identified a risk-based cleanup goal of 3 µg/l in March 2017.

Status of Implementation

In December 1992, EPA issued an Administrative Order to 33 PRPs, requiring them to design, construct, operate and maintain the selected remedy. The PRPs abandoned monitoring and recovery wells not needed for monitoring purposes in November 1993 and April 1999. From 1996 to 1998, the PRPs replaced all drinking water wells in the contaminated portion of the Columbia aquifer with water supply wells in a deeper, confined aquifer that has not been affected by releases from the Site.

The PRPs designed the new groundwater extraction and on-site treatment system and EPA approved the design in May 1997. The PRPs constructed the groundwater extraction and treatment system from July to September 1997, and started operating it in October 1997. The extracted groundwater was treated on site and then discharged to

local surface water, rather than being discharged to the local publicly owned treatment works via the Kent County sewer system. In May 1998, EPA and DNREC jointly determined that the remedial action was operational and functional. The Site achieved construction completion with the signing of the Site's Preliminary Close-Out Report in June 1998.

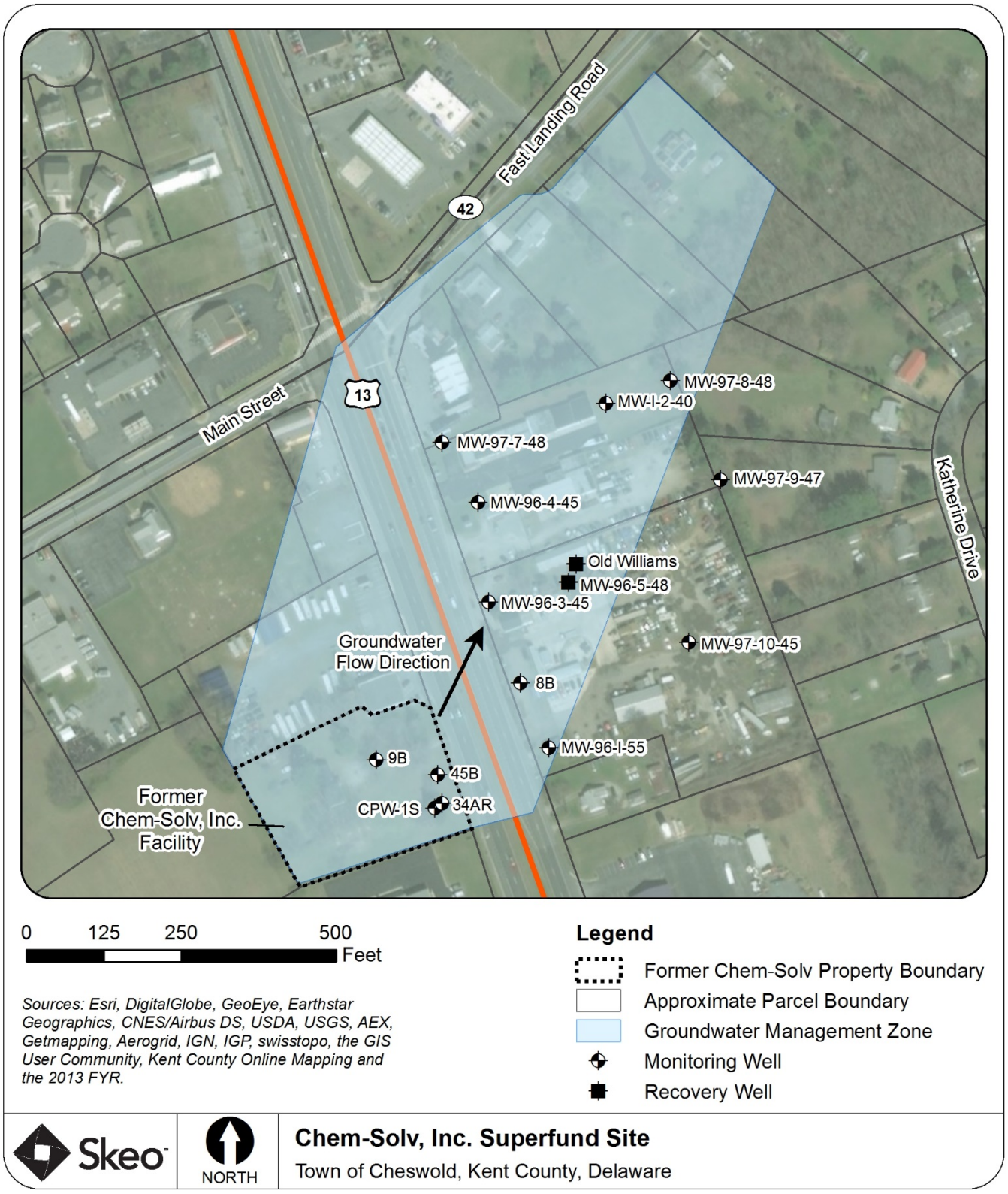
By 1999 groundwater quality at the Site had substantially improved. One monitoring well (well 9B) had TCE concentrations exceeding the cleanup standard and manganese concentrations in groundwater exceeded the cleanup standard only in isolated areas beneath the Site and immediately downgradient from a former truck stop located north of the former Chem-Solv, Inc. facility property. In August 1999, the PRPs proposed terminating the groundwater collection and treatment operations with continued groundwater monitoring to document anticipated declines in TCE concentrations. EPA approved the proposal in October 1999 with the stipulation that the PRPs resume operation of the groundwater collection and treatment system should sampling identify an increasing trend in TCE concentrations.

In March 2003, EPA determined that TCE concentrations had not declined. EPA determined that TCE concentrations were exhibiting a statistically significant increasing trend in two site monitoring wells. As a result, EPA requested that the PRPs resume treatment of groundwater.

In August 2003, EPA approved a modification to collect groundwater from two recovery wells with the highest TCE concentrations. In June 2003, the PRPs proposed modifications to the groundwater collection system to remediate the site groundwater more efficiently. These modifications consisted primarily of collecting groundwater from the location with the highest TCE concentrations and increasing the withdrawal rate by using two recovery wells (see Figure 2). EPA approved the collection system modification in August 2003. Groundwater recovery operations resumed in November 2003.

The March 2017 groundwater monitoring results showed that all COCs met their cleanup levels for two consecutive quarters, so the PRPs shut down the groundwater recovery and treatment system on April 1, 2017. Sampling continues to be conducted to monitor COC levels in site groundwater. Results are discussed in Section IV.

Figure 2: Detailed Site Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Institutional Control Review

In 1994, DNREC established a Groundwater Management Zone (GWMZ) in the vicinity of the Site to prevent the installation of new water supply wells within the contaminated portion of the Columbia aquifer (see Figure 2 and Table 3). The residential building on the former Chem-Solv, Inc. property is still served by a shallow drinking water well. This well is within the GWMZ, but it has not been affected by the Site's contamination because it is hydraulically upgradient from the groundwater plume. As part of the property owner's redevelopment plan being overseen by DNREC, the 2009 Final Plan of Remedial Action requires the proper abandonment of this well. As of the site inspection in March 2018 for this FYR, the property owner's plans to redevelop the property have not yet been carried out. In the meantime, any prospective purchaser of the former facility property will be made aware of site conditions by the following documents recorded by the Recorder of Deeds for Kent County, Delaware:

- Environmental Agreement recorded on June 30, 2009, in Book RE, Volume 5031, Page 300 (Instrument Number 2009-151123).
- The Site's 1992 Administrative Order recorded on February 10, 1993, in Book 01, Volume R52, Pages 43 through 129 (Instrument Number 3824).

Table 3: Summary of Institutional Controls (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
Groundwater	Yes	Yes	All parcels with site-related groundwater contamination	Prevent the installation of water supply wells within the contaminated portion of the Columbia aquifer until cleanup levels are achieved.	1994 DNREC GWMZ (see Figure 2)

Systems Operations/Operation & Maintenance (O&M)

The PRPs are conducting long-term monitoring and maintenance activities according to the Site's O&M Plan, which EPA approved in June 1998. Following the shutdown of the groundwater recovery and treatment system in April 2017, primary O&M activities now include:

- Quarterly sampling of 11 groundwater monitoring wells (identified in Section IV)
- Semi-annual sampling of 11 potable wells

III. PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determination and statement from the previous FYR, as well as the recommendations from the previous FYR and the current status of those recommendations.

Table 4: Protectiveness Determination/Statement from the 2013 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1, Sitewide	Short-term Protective	The Site's remedy currently protects human health and the environment because there are no known exposures to the contaminated groundwater. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness. The PRPs will sample the previously unsampled residential well. The EPA and the PRPs will assess whether the system is capturing the contamination effectively to achieve cleanup goals in a timely manner and consider improving the remedy to remove the TCE contamination more quickly if needed. The EPA will review the new state MCLs for PCE and TCE and will consider revising the groundwater cleanup goals for PCE and TCE to meet the state ARARs. The EPA will assess manganese concentrations in groundwater and will prepare an ESD to select a new cleanup level if warranted. The PRPs will monitor all wells for manganese and analyze treated groundwater for metals. The PRPs will evaluate existing Site data for dioxin to confirm the implemented soil remedy is protective. Conduct sampling if needed. The PRPs will continue to analyze groundwater and effluent for non-COC organics; the EPA will evaluate the data to determine whether the previously-detected non-COCs are a concern as it relates to the treatment system and associated effluent.

Table 5: Status of Recommendations from the 2013 FYR Report

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	State MCLs for PCE and TCE have been lowered from 5 µg/l to 1 µg/l.	The EPA will review the new state MCLs for PCE and TCE and will consider revising the groundwater cleanup goals for PCE and TCE to meet the state ARARs.	Ongoing	EPA and DNREC issued a letter (dated March 17, 2017) to the PRPs identifying that using a cleanup goal of 3 ug/l for TCE would be protective based on a risk evaluation. Because PCE was non-detect at that time, a risk evaluation was not performed for PCE.	
1	During the 2013 FYR site inspection, an additional residential well was identified within the area of the Site's groundwater plume. This well is not being sampled.	Add the unsampled residential well to the semi-annual potable well sampling.	Completed	The PRPs added this residential well to their semi-annual potable well sampling. All results were below the groundwater cleanup goals.	4/13/2015
1	TCE remains in the groundwater at concentrations above the cleanup level.	Consider whether the groundwater remedy can be improved to achieve the TCE cleanup level more quickly.	Completed	The groundwater treatment system was taken offline in April 2017, following two consecutive groundwater monitoring well sampling events in which the concentrations of all COCs were below their cleanup goals.	4/1/2017

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	The toxicity value for manganese has changed, so the current cleanup level (3,000 µg/l), as selected in the 1992 ROD, is no longer protective in the long term.	Assess manganese concentrations and prepare an ESD to select a new cleanup level if warranted.	Completed	Over the past five years, manganese concentrations in monitoring wells have never exceeded EPA's current regional screening level for tapwater (430 µg/l). Therefore, a revised cleanup level is not needed at this time.	3/29/2018
1	Samples from only two monitoring wells were analyzed for manganese over the past five years.	Monitor all wells for manganese.	Completed	In July 2014, the PRPs analyzed samples from monitoring wells 8B, 96-3, 96-4, 97-8, 96-5 and 9B for manganese. All results were below EPA's current regional screening level for tapwater (430 µg/l). The PRPs continue to analyze on-site monitoring wells 34AR and CPW-1S for manganese on an annual basis.	7/28/2014
1	Treated groundwater is not being analyzed for metals prior to being discharged to surface water.	PRPs will analyze treated groundwater for metals. The EPA will determine whether additional treatment is needed to remove metals from recovered groundwater in order to meet standards for discharge to surface water.	Completed	In July 2014, the PRPs analyzed a sample of treated effluent from the groundwater recovery and treatment system for manganese. Manganese concentrations were within acceptable limits. The groundwater treatment system was taken offline in April 2017. Therefore, discharges to surface water are no longer occurring.	7/30/2014
1	Several non-COCs were detected in groundwater and treated effluent during the previous five years.	Continue to analyze groundwater and effluent for non-COC organics over the next five years. The EPA will evaluate the data to determine whether these detections are a concern.	Completed	Over the past five years, non-COC organics were rarely detected in groundwater and treated effluent, and all detected concentrations were below applicable threshold levels.	3/29/2018

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	On February 17, 2012, EPA released the final non-cancer dioxin reassessment, publishing a noncancer toxicity value, or reference dose (RfD), for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in EPA's Integrated Risk Information System (IRIS). Based on this new RfD, today's levels would be lower than levels that were considered protective at the time the soil remediation was conducted at the Site. Therefore, the protectiveness of the remedy needs to be reevaluated.	Evaluate existing Site data for dioxin to confirm that implemented soil remedy is protective. Conduct sampling if needed.	Considered But Not Implemented	Dioxin was never identified as a constituent of concern at the Site and was not sampled for. If dioxins were to be present as a result of the fire that occurred at the site in 1984, they would have been present in surficial soil. Soil remediation consisted of excavating all soil within the contaminated area down to the water table followed by significant aeration and soil mixing. The remediated soil was then returned to the excavated area. This was completed by DNREC in 1985. As a result of handling of contaminated soil during remediation, it is unlikely that there would be significant dioxin levels in surface soils at the site. Conducting sampling for dioxin in soil is considered unnecessary.	6/26/2018

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by a newspaper posting in the *Dover Post* on February 28, 2018 (see Appendix C). It stated that the FYR was underway and invited the public to submit any comments to EPA. The results of the review and the report will be made available at the Site's information repository, William C. Jason Library, Delaware State College, located at 1200 North DuPont Highway in Dover, Delaware and online at: https://www.epa.gov/superfund/search-superfund-five-year-reviews.

The FYR process included interviews with parties affected by the Site, including nearby residents and a nearby business owner. The interviews were conducted in person during the Site visit on March 6, 2018. The purpose was to document the perceived status of the Site and any perceived problems or successes with the remedy. The interviews are summarized below. Appendix D provides the complete interviews.

Resident No. 1 is aware of the cleanup project, but not up to date on recent information. Overall, the resident does not have any impressions related to the Site, but did note that the drinking water from the new well is not good. The resident noted sediment in the water and stated that the water was fine before the new well was installed. The resident provided an email address and requested to be kept updated on activities related to the Site.

Resident No. 2 was not aware of the former environmental issues at the Site as he is the son-in-law of the property owner. The owner did not have any concerns, comments or suggestions, but did note that his private well is used for everything but drinking, because the water tastes terrible (like sulfur).

Resident No. 3 is aware of the Site and cleanup, but is not pleased with what has transpired. The resident feels as though the Site is a hazard as chemicals are in the ground. EPA staff explained that the soil had been cleaned up, but the resident still feels as though the whole area around the Site should be tested within a half mile radius of the building due to the accidents that have happened there over time. The resident would like to see the whole area dug up and rebuilt. This resident also stated that the well water tastes bad, like sulfur. For future updates, this resident would like to be kept informed through factsheets and available documents.

Business Owner No. 1 is aware of the environmental cleanup and feels as though everyone did a good job. The owner stated that the State put in two wells at the business for use and the water is used daily for drinking purposes. The owner is pleased with the quality of the drinking water. The business owner stated the Site has not had any effect on the community lately.

Doug Beaver of Rare Earth Enviroscience, the PRPs' contractor, stated that his overall impression of the project is good and the remedy is performing more than adequately.

Data Review

During this FYR period, the following data were collected:

- Semi-annual potable well monitoring for VOCs.
- Quarterly groundwater monitoring for VOCs.
- Annual groundwater monitoring for manganese.
- July 2014 sampling of additional monitoring wells and treated effluent for manganese.
- Monthly monitoring of influent and treated effluent from the groundwater treatment system for VOCs, until the system was shut down in April 2017.

Potable Well Sampling

Samples from residential and commercial potable supply wells near the Site are analyzed for VOCs on a semi-annual basis. During the 2013 FYR site inspection, one previously unknown residential well was identified within the area of the Site's groundwater plume. The PRPs added this well to their semi-annual potable well sampling in November 2013.

No COCs were detected in any potable well samples from 2013 to 2017, except for sporadic detections of acetone at concentrations around 5 µg/l (far below the cleanup goal of 3,500 µg/l). Potable well samples are not analyzed for metals, including manganese.[2]

Groundwater Monitoring (VOCs and manganese)

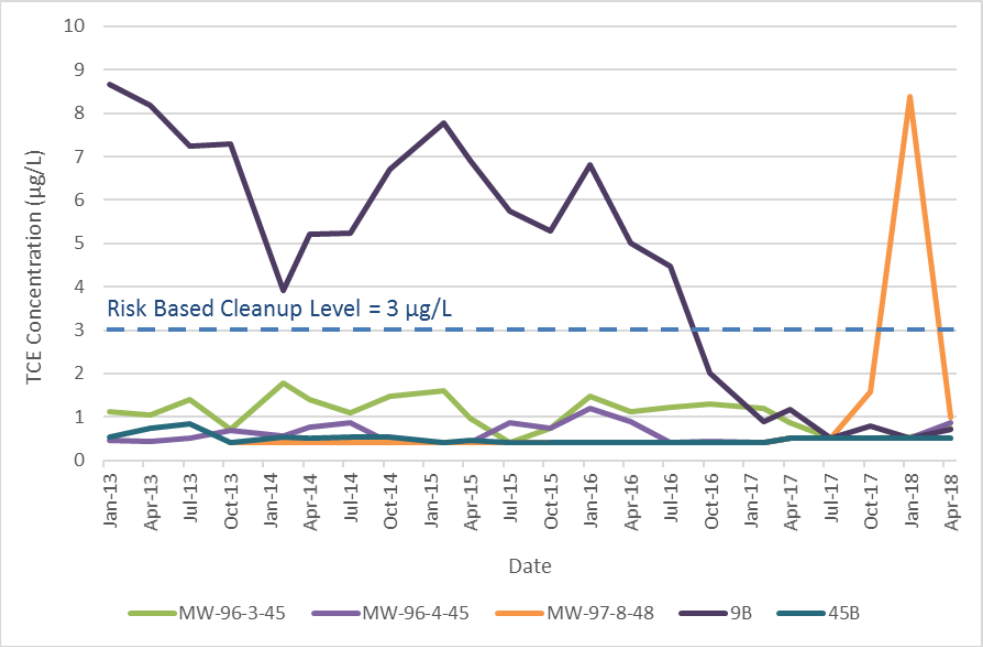
This data review included January 2013 through April 2018 results from quarterly sampling of 11 groundwater monitoring wells (MW-96-1-55, MW-96-3-45, MW-96-4-45, MW-97-7-48, MW-97-8-48, MW-97-9-47, MW-97-10-45, 8B, 9B, 45B and MW-I-2-40). These wells are shown on Figure 2. All monitoring wells are screened in the uppermost aquifer (the Columbia aquifer). The deeper aquifer (the Cheswold aquifer) has not been affected by the Site. Groundwater monitoring has been conducted at the Site since the mid-1980s.

Figure 3 presents the TCE concentrations in monitoring wells from 2013 through 2018. Monitoring wells with no detections of TCE during this period are omitted from the figure. The concentrations of TCE in all monitoring wells were below 3 µg/l (the risk-based cleanup goal identified by EPA and DNREC) from October 2016 through October 2017. In October 2017, TCE was detected (1.6 µg/l) in monitoring well MW-97-8-48, which is the farthest downgradient monitoring well; TCE had not been detected in this well over the previous four years. In January 2018, the TCE concentration in MW-97-8-48 was 8.38 µg/l. The TCE concentration in MW-97-8-48 decreased to 1 µg/l in the most recent April 2018 sampling.

The same monitoring well (MW-97-8-48) also contained PCE in October 2017 (2.6 µg/l), January 2018 (7.57 µg/l) and April 2018 (1.43 µg/l). These were the only PCE detections during this FYR period. The ROD cleanup level for PCE is 5 µg/l. Delaware's current MCL for PCE is 1 µg/l. Similar to TCE, it is recommended that a risk based evaluation be performed to determine an appropriate cleanup goal for PCE.

[2] The 2013-2018 monitoring well data indicates that manganese concentrations in site groundwater are below EPA's current screening level for tapwater (see the Groundwater Monitoring section).

Figure 3: TCE Concentrations in Monitoring Wells, 2013 to 2018



In the October 2017 and January 2018 sampling events, methylene chloride was detected in multiple samples; the highest concentration (2.58 µg/l) was below the MCL (5 µg/l). The January 2018 laboratory report states that the methylene chloride detections during that sampling event were due to laboratory contamination. Prior to the October 2017 sampling event, methylene chloride had been detected only once from 2013 to 2017 (April 2017, well 8B, 0.6 µg/l). During the April 2018 sampling event, acetone was detected in all 10 monitoring wells sampled; concentrations were approximately 5 µg/l to 11 µg/l, which is well below the Site's cleanup goal (3,500 µg/l).

From 2013 to 2018, several other organic contaminants were detected sporadically in monitoring wells, including cis-1,2-dichloroethylene, benzene, chloroform and toluene. All concentrations were below the Site's cleanup goals, federal MCLs, and EPA's current screening levels for tapwater.

In July 2014, the PRPs analyzed samples from monitoring wells 8B, MW-96-3-45, MW-96-4-45, MW-97-8-48, MW-96-5-48 and 9B for manganese. The concentrations ranged from 77 µg/l to 81 µg/l, which is below EPA's current screening level for tapwater of 430 µg/l. The PRPs continue to analyze on-site monitoring wells 34AR and CPW-1S for manganese on an annual basis. During the 2013 through 2018 annual sampling events, manganese concentrations in monitoring wells 34AR and CPW-1S were below EPA's current screening level for tapwater of 430 µg/l.

Treatment System Influent/Effluent Monitoring

Prior to system shutdown in April 2017, the reviewed data showed that influent and effluent samples were in compliance with the surface water discharge standards (see Appendix G, Table G-2) for VOCs. Most results were below laboratory detection limits. In addition, manganese effluent samples collected in July 2014 were within acceptable limits.

Site Inspection

The site inspection for this Fourth FYR took place on 3/6/2018. In attendance were EPA RPM Stepan Nevshehirlian, EPA community involvement coordinator Lavar Thomas, Kimberly Plank with EPA's Biological and Technical Assistance Group, DNREC project manager Robert Asreen, Doug Beaver of Rare Earth Environsciences (PRP contractor), and Amanda Goyne and Hagai Nassau from Skeo (EPA's FYR support contractor). The purpose of the inspection was to assess the protectiveness of the remedy. Appendix E provides the site inspection checklist. Appendix F provides photographs from the site inspection.

Site inspection participants toured the former Chem-Solv, Inc. facility property, the Site's monitoring well network, and the inactive groundwater extraction and treatment system. The former facility property appeared to be unchanged from the 2013 FYR site inspection. An occupied two-unit residential building is on the property. The owner's redevelopment plans for the property have not yet been accomplished. The properties east of Route 13, where the Site's monitoring wells are located, are still occupied by industrial and commercial businesses. The inactive groundwater extraction and treatment system is still in place and operable.

Two of the Site's monitoring wells were accidentally destroyed in 2017 (MW-I-2-40 and MW-97-10-45). Other monitoring wells were not labeled or secured. Some monitoring wells had standing water in the annular space above the level of the well casing.

Skeo staff visited the Site's information repository, William C. Jason Library, Delaware State College, located at 1200 North DuPont Highway in Dover, Delaware. No site documents were available for review at that time. EPA has since updated the repository with site documents.

V. TECHNICAL ASSESSMENT

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

Yes, the remedy is functioning as intended by the ROD and modified by the ESD. A significant reduction in constituent concentrations in groundwater has been achieved since the remedy was implemented. Contaminated private wells were replaced with deeper, uncontaminated wells. The March 2017 groundwater monitoring results showed that all COCs met their cleanup levels for two consecutive quarters, so groundwater extraction and treatment operations were suspended in April 2017. However, after the system was shut down, PCE and TCE were detected in the farthest downgradient monitoring well (MW-97-8-48), where they had not been detected in the last five years. PCE was detected in monitoring well MW-97-8-48 in October 2017 (2.6 µg/l), January 2018 (7.57 µg/l) and April 2018 (1.43 µg/l). PCE was not detected in any other monitoring or potable wells during 2013 through 2018. TCE was detected in monitoring well MW-97-8-48 in October 2017 at 1.6 µg/l, which is below the risk-based cleanup goal of 3 ug/l (identified by EPA and DNREC in 2017). In January 2018, the TCE concentration in MW-97-8-48 was 8.38 µg/l. The PCE concentration in MW-97-8-48 decreased to 1 µg/l in the most recent April 2018 sampling. The PRPs continue to monitor groundwater at potable wells and monitoring wells. EPA will evaluate future groundwater monitoring results to determine whether additional actions are needed.

DNREC has implemented a GWMZ to prevent the installation of water supply wells within the contaminated portion of the Columbia aquifer until cleanup levels are achieved.

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?

The RAOs to restore groundwater and prevent exposure described in the remedy are still valid.

Delaware has lowered its MCLs for PCE and TCE from 5 µg/l to 1 µg/l. EPA and DNREC identified a site-specific risk-based cleanup level of 3 µg/l for TCE in March 2017, after determining that reducing TCE concentrations throughout the groundwater plume to levels at or below 3 µg/l would achieve an overall reduction of risk to human health under a residential exposure scenario that is within EPA's acceptable cancer risk range of 1×10^{-4} to 1×10^{-6} and has a non-cancer endpoint hazard index that is 1 or less. EPA will continue to monitor PCE and TCE concentration trends. When existing clean-up standards stated in the ROD are met, EPA and DNREC will re-evaluate all cleanup standards (including those for TCE and PCE) to verify they are protective of human health and the environment. See Appendix G for more information about this FYR's ARAR review.

The 1992 ROD calculated a cleanup level of 3,500 µg/l for acetone based on its reference dose. The current regional screening level for acetone in residential tapwater is 14,000 µg/l. The ROD's health-based cleanup level for acetone in groundwater is still protective.

EPA's current regional screening level for manganese in residential tapwater is 430 µg/l (based on non-cancer risk). The ROD's health-based cleanup goal for manganese in groundwater is 3,000 µg/l. Manganese concentrations have been below EPA's current screening level during 2013 through 2018 annual groundwater sampling, and during the July 2014 expanded manganese groundwater sampling event.

This FYR conducted a screening-level analysis of the Site's potential for vapor intrusion risk using the highest VOC concentrations detected in shallow groundwater in 2017-2018 (see Appendix H). This screening indicates that the Site does not pose a risk from vapor intrusion, under either residential or commercial scenarios. However, any redevelopment of the former Chem-Solv, Inc. facility property must comply with DNREC's 2009 Final Plan of Remedial Action which prohibits residential redevelopment or be approved by DNREC.[3]

In 2003, the PRPs analyzed groundwater samples for 1,4-dioxane as requested by EPA. None of the samples contained detectable levels of 1,4-dioxane. As a result, no changes to the treatment system were needed to address 1,4-dioxane. The laboratory detection limit for this analysis was 11 µg/l. The current regional screening level for 1,4-dioxane in residential tapwater is 0.46 µg/l (based on cancer risk). Cancer-based regional screening levels are derived based on a risk level of 1×10^{-6}. The 11 µg/l detection limit is less than two orders of magnitude larger than the current cancer-based regional screening level, so a concentration of 11 µg/l corresponds to a risk of less than 1×10^{-4}, which is within EPA's acceptable risk range. Therefore, no additional sampling is needed for 1,4-dioxane.

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 calls into question the protectiveness of the remedy.

[3] DNREC issued a Final Plan of Remedial Action for the Site in January 2009. The Final Plan states that the cumulative soil gas vapor risk to human health due to the contaminants is above DNREC's restricted use standard. Therefore, the Final Plan requires an environmental covenant on the property limiting its use only to non-residential purposes and prohibiting land-disturbing activities without prior written approval from DNREC. This covenant has not been implemented. DNREC's Final Plan also requires proper abandonment of the domestic well on the Chem-Solv, Inc. facility property.

VI. ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the FYR:

OU: 1	**Issue Category:** Monitoring			
	Issue: The ROD identified groundwater cleanup levels of 5 µg/l for TCE and PCE. Delaware's current MCLs for TCE and PCE are 1 µg/l. EPA and DNREC identified a site-specific risk-based cleanup level of 3 µg/l for TCE in March 2017. At that time, PCE concentrations were not of concern and the PCE cleanup level was not evaluated.			
	Recommendation: Continue to monitor site groundwater. When existing clean-up standards stated in the ROD are met, re-evaluate all cleanup standards to verify they are protective of human health and the environment.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	12/31/2019

OU: 1	**Issue Category:** Monitoring			
	Issue: Two of the Site's monitoring wells were accidentally destroyed in 2017.			
	Recommendation: Determine whether the nine remaining groundwater monitoring wells are sufficient to monitor site conditions. If not, identify suitable replacement wells or install additional monitoring wells as needed.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/PRP	EPA	7/30/2019

OTHER FINDINGS

In addition, the following recommendations were identified during the FYR. They may improve management of O&M but do not affect current and/or future protectiveness:

- During the March 2018 FYR site inspection, monitoring wells were not labeled or secured, and some had standing water in the annular space above the level of the well casing. Label and secure all monitoring wells and install gaskets to prevent surface water from entering the annular space.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Site currently protects human health and the environment because there are no known exposures to the contaminated groundwater. A Groundwater Management Zone was established to prevent the installation of new water supply wells within the contaminated portion of the Columbia aquifer, and the groundwater extraction and treatment system was successful in reducing contaminant concentrations to below cleanup goals for two consecutive quarters. Monitoring is ongoing. However, for the remedy to be protective in the long-term, all cleanup standards should be re-evaluated to verify they are protective of human health and the environment, and the monitoring network should be evaluated to ensure it's sufficient.

VIII. NEXT REVIEW

The next FYR Report for the Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

BCM. Remedial Investigation Report. May 1991.

BCM. Groundwater Feasibility Study. November 1991.

EPA. Record of Decision. March 31, 1992. https://semspub.epa.gov/work/03/151957.pdf.

Rare Earth Environsciences, Inc. Operations and Maintenance Manual for Interim Remedial Action Ground Water Treatment System. December 1997.

EPA. Explanation of Significant Differences. June 18, 1999. https://semspub.epa.gov/work/03/151346.pdf.

EPA. Second Five-Year Review Report for Chem-Solv, Inc. Site. September 26, 2008. https://semspub.epa.gov/work/03/2093850.pdf.

EPA. Third Five-Year Review Report for Chem-Solv, Inc. Site. July 30, 2013. https://semspub.epa.gov/work/03/2178023.pdf.

Ten Bears Environmental. Supplemental Brownfields Investigation Report. Revised December 2008.

DNREC. Final Plan of Remedial Action. January 29, 2009.

Rare Earth Environsciences, Inc. Monthly reports submitted to EPA. April, May and November 2013; February, July, August, September, November and December 2014; January, April, May, June, July, November and December 2015; February, March, April and June 2016; and February, April, May and June 2017.

Rare Earth Environsciences, Inc. Annual Remedial Action Report: 2014. April 2015.

Rare Earth Environsciences, Inc. Treatability Study Work Plan. June 2015.

Rare Earth Environsciences, Inc. Annual Remedial Action Summary: 2015. May 2016.

Rare Earth Environsciences, Inc. Annual Remedial Action Summary: 2016. April 2017.

Accredited Analytical Resources, LLC. Analytical Reports prepared for Rare Earth Environsciences Inc. 2013 through 2018 Quarterly Groundwater Sampling Laboratory Reports.

Accredited Analytical Resources, LLC. Analytical Reports prepared for Rare Earth Environsciences Inc. 2013 through 2018 Annual Manganese Groundwater Sampling Laboratory Reports.

APPENDIX B – SITE CHRONOLOGY

Table B-1: Site Chronology

Event	Date
Chem-Solv, Inc. conducted solvent recovery activities at the Site	1981–1984
An explosion and fire at the facility caused release of hazardous substances; DNREC issued Cessation of Operation Order	September 1984
DNREC conducted on-site treatment of soil contaminated with VOCs	September – November 1985
DNREC conducted groundwater recovery and treatment operations	December 1985 – November 1998
DNREC issued Administrative Order on Consent	September 27, 1988
EPA listed the Site on the NPL	August 30, 1990
PRPs submitted revised Remedial Investigation Report and Groundwater Feasibility Study	November 1991
EPA issued the Site's remedial investigation/feasibility study	January 1992
EPA signed ROD documenting selected cleanup plan	March 31, 1992
EPA issued Administrative Order governing PRPs' implementation of response activities	December 29, 1992
PRPs began remedial design	February 22, 1993
DNREC established the Groundwater Management Zone (GWMZ) in the vicinity of the Site	March 1, 1994
PRPs suspended the remedial design pending evaluation of the extent of TCE in the basal portion of the Columbia aquifer	February 8, 1995
PRPs resumed the remedial design (EPA notified PRPs of the need for additional response actions)	October 18, 1995
PRPs replaced a contaminated private water supply well with a well in the deeper, uncontaminated aquifer	October 1996
EPA approved the remedial design (EPA approved PRPs' plans to carry out interim remedial measures) PRPs began the remedial action	May 28, 1997
PRPs started construction of the groundwater recovery and treatment system	July 31, 1997
PRPs completed construction of the groundwater recovery and treatment system	September 17, 1997
U.S. Army Corps of Engineers conducted final inspection on behalf of EPA	September 18, 1997
PRPs began continuous operation of Site's groundwater recovery and treatment system	October 10, 1997
PRPs replaced a contaminated private water supply well with a well in the deeper, uncontaminated aquifer; PRPs replaced remaining (uncontaminated) downgradient private water supply wells within GWMZ with wells in the deeper, uncontaminated aquifer	January 1998
EPA approved Site's O&M Plan	June 8, 1998
PRPs completed the remedial action (EPA determined that PRPs' interim remedial measures were sufficient to meet remedial action objectives specified in ROD)	June 10, 1998
EPA issued the Site's Preliminary Close-Out Report, indicating that the Site achieved the construction completion milestone	June 30, 1998
EPA issued an Explanation of Significant Differences (ESD) eliminating the requirement for certain institutional controls	June 18, 1999
EPA approved PRPs' proposal to terminate groundwater collection and treatment at the Site on the condition that PRPs resume these activities in the event of increasing trends in groundwater contaminant concentrations	October 12, 1999
EPA directed PRPs to resume groundwater recovery and treatment operations	March 4, 2003
PRPs resumed groundwater recovery and treatment operations	November 5, 2003

Event	Date
EPA signed the Site's first FYR Report	September 26, 2003
EPA signed the Site's second FYR Report	September 26, 2008
Owners of the former Chem-Solv property submitted revised Supplemental Brownfields Investigation Report to DNREC	December 2008
DNREC issued Final Plan of Remedial Action for the redevelopment of the former Chem-Solv property	January 29, 2009
EPA signed the Site's third FYR Report	July 30, 2013
PRPs submitted the Treatability Study Work Plan for in-situ biological oxidation	June 30, 2015
PRPs determined that the proposed in-situ biological oxidation was no longer needed given the continued decline of TCE concentrations in monitoring well 9B	December 2016
EPA and DNREC revised the TCE groundwater cleanup level from the ROD value of 5 µg/l to a site-specific level of 3 µg/l	March 17, 2017
PRPs shut down the groundwater recovery and treatment system after groundwater monitoring results showed that the cleanup goals for all COCs had been met for two consecutive quarters	April 1, 2017
PRPs submitted a Post Remedial Action Ground Water Monitoring Plan	September 2017

APPENDIX C – PRESS NOTICE

EPA REVIEWS CLEANUP
CHEM-SOLV, INC. SITE

The U.S. Environmental Agency is reviewing the cleanup that was conducted at the Chem-Solv, Inc. Superfund Site located in Cheswold. EPA inspects sites regularly to ensure that cleanups conducted remain protective of public health and the environment. EPA's previous review of the site in 2013 determined that the remedy was working as designed and was protective. Findings from the current review that is being conducted will be available August 2018.

For questions or to provide site-related information for the review:
Contact: Gina Soscia, *Community Involvement Coordinator*
Phone: 215-814-5538
Email: soscia.gina@epa.gov

To access site information including the Review Report once finalized: https://www.epa.gov/superfund/chemsolv

Protecting human health and the environment

APPENDIX D – INTERVIEW FORMS

Chem-Solv, Inc. Superfund Site Five-Year Review Interview Form

Site Name: Chem-Solv, Inc. **EPA ID No.:** DED980714141

Interviewer Name: Lavar Thomas **Affiliation:** EPA
Subject Name: Resident #1 **Affiliation:** Resident
Time: 9 a.m. **Date:** 3/6/2018

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes, but wasn't aware they were doing anything over there now.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   Don't have one, but the drinking water from the new well is not good. The water was good before the new well was installed.

3. What have been the effects of this Site on the surrounding community, if any?

   It was a mess at the time – they tried to blame it on the fire department, but they had to put out the fire.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   Not that I know of.

5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

   No. [Provided email address.]

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   Yes. The water from the private well is used for everything.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   No because I don't know about it. My husband took care of this, but he passed away. The water from the new well has a lot of sediment in it – white stuff that clogs everything.

Chem-Solv, Inc. Superfund Site — Five-Year Review Interview Form

Site Name: Chem-Solv, Inc. **EPA ID No.:** DED980714141

Interviewer Name: Lavar Thomas **Affiliation:** EPA
Subject Name: Resident #2 **Affiliation:** Resident
Time: 9:15 a.m. **Date:** 3/6/2018

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   No. [Doug Beaver provided an explanation of the site history.]

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   No impression.

3. What have been the effects of this Site on the surrounding community, if any?

   None.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No.

5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

   Information provided would have gone to his mother in law.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   Yes. We use the private well water for everything but drinking, because it tastes terrible (like sulfur).

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   No.

Chem-Solv, Inc. Superfund Site — Five-Year Review Interview Form

Site Name: Chem-Solv, Inc. **EPA ID No.:** DED980714141

Interviewer Name: Lavar Thomas **Affiliation:** EPA
Subject Name: Resident #3 **Affiliation:** Resident
Time: 9:30 a.m. **Date:** 3/6/2018

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes. Since the well was replaced the water tastes like sulfur.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   I don't like it – I think they should dig the whole area up and rebuild. It is a hazard and there are chemicals in the ground. [Mr. Thomas explained they have cleaned up the soil.] They need to do more. There is never going to be grass over there, it won't grow. A train carrying foam blew up over there too. The whole area around the Site should be tested within a half-mile radius of the building because of all the accidents that happened there over time.

3. What have been the effects of this Site on the surrounding community, if any?

   [No response.]

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   I have seen kids spray painting over there.

5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

   No. Mail is preferred, or environmental forums for the public.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   Yes. We use the private well for everything – the water tastes bad, like sulfur.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   Clean up the whole area so it's not toxic – make sure.

Chem-Solv, Inc. Superfund Site — Five-Year Review Interview Form

Site Name: Chem-Solv, Inc. **EPA ID No.:** DED980714141

Interviewer Name: Lavar Thomas **Affiliation:** EPA
Subject Name: Business owner **Affiliation:** Business operator
Time: 8:45 a.m. **Date:** 3/6/2018
Interview Location: North DuPont Highway

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Residents

1. Are you aware of the former environmental issues at the Site and the cleanup activities that have taken place to date?

   Yes, I think everybody did a good job – we have the best water and we drink it every day. The state put in two wells for us and Harris Towing.

2. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

   They didn't leave a mess.

3. What have been the effects of this Site on the surrounding community, if any?

   After the first two to three years, there hasn't been much effect. If you're not going to use the treatment system, it would be good take it out to free up the space in that bay.

4. Have there been any problems with unusual or unexpected activities at the Site, such as emergency response, vandalism or trespassing?

   No, we have guard dogs.

5. Has EPA kept involved parties and surrounding neighbors informed of activities at the Site? How can EPA best provide site-related information in the future?

   Yes, people have been kept aware – the state told everybody. Continue doing it the way it has been done.

6. Do you own a private well in addition to or instead of accessing city/municipal water supplies? If so, for what purpose(s) is your private well used?

   Yes, we use it for everything.

7. Do you have any comments, suggestions or recommendations regarding any aspects of the project?

   No.

Chem-Solv, Inc. Superfund Site Five-Year Review Interview Form

Site Name: Chem-Solv, Inc. **EPA ID No.:** DED980714141

Interviewer Name: Lavar Thomas **Affiliation:** EPA
Subject Name: Doug Beaver **Affiliation:** Rare Earth Envirosciences, Inc.
Subject Contact Information: dgbeaver@rareearthesciences.com
Time: 10:15 a.m. **Date:** 3/6/2018
Interview Location: 5321 North DuPont Highway

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: O&M Contractor

1. What is your overall impression of the project? (general sentiment)

   So far, so good. On the compliance schedule until recently, when we detected PCE and TCE for the first time in a well on the far side of the recovery system.

2. Is the remedy functioning as expected? How well is the remedy performing?

   More than adequate except for the point source over by the building – we went back and forth with EPA about what to do about it. PRPs are not going to do what EPA requested because it was too expensive. For manganese, two wells are sampled now – EPA wanted them to sample all wells, but PRP said no and that they would keep sampling the two wells. The concentrations then came down below the standards for five quarters, then they had the PCE and TCE hits in the furthest well.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

   There was benzene, but it was agreed that it was not from the Site. Wonder if it is the same situation with the recent PCE and TCE hits.

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

   Not continuous – it was more regular when the system was operating.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

   No changes since they decided to continue sampling with compliance, and the PCE and TCE hits – the system has been off for a year now.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please give details.

   No, it's pretty maintenance free. We replaced the pumps at one point and had to replace the head unit.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

   No, well 9B stayed high for a long time. Don't think we could have done much to optimize. The cleanup level was changed at one point and we were not told right away.

8. Do you have any comments, suggestions or recommendations regarding the project?

   No.

APPENDIX E – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Chem-Solv, Inc.	**Date of Inspection:** 03/06/2018
Location and Region: Dover, DE; Region 3	**EPA ID:** DED980714141
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** partly sunny, 40°F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Groundwater Monitoring
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** Doug Beaver (Name) _____ (Title) 03/06/2018 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone: _____
   Problems, suggestions ☐ Report attached: see Appendix D

2. **O&M Staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: _____
   Problems/suggestions ☐ Report attached: _____

3. **Local Regulatory Authorities and Response Agencies** (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____
   Contact _____Name _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached:_____

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached:_____

   Agency _____
   Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone No.)
   Problems/suggestions ☐ Report attached: _____

   Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone No.
Problems/suggestions ☐ Report attached:_____

4. **Other Interviews** (optional) ☒ Report attached: nearby residents and business owner

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

2.	**Site-Specific Health and Safety Plan**	☐ Readily available	☐ Up to date	☒ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

3.	**O&M and OSHA Training Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☒ Water (effluent)	☒ Readily available	☐ Up to date	☐ N/A

Remarks: _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☒ N/A

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): _____

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ _____ _____

Name Title Date Phone no.

Reporting is up to date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: _____

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: Planned redevelopment at site property has not progressed.

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads Damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☐ Settlement not evident

Arial extent: _____ Depth: _____

Remarks: _____

2.	**Cracks**	☐ Location shown on site map	☐ Cracking not evident
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable ☐ N/A	
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement
   Arial extent: _____ Depth: _____
   Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
   Material type:_____ Arial extent: _____
   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
   Arial extent: _____ Depth: _____
   Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
   Arial extent: _____ Depth: _____
   Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions
   ☐ Location shown on site map Arial extent: _____
   Size: _____
   Remarks: _____

6. **Excessive Vegetative Growth** Type: _____
   ☐ No evidence of excessive growth
   ☐ Vegetation in channels does not obstruct flow
   ☐ Location shown on site map Arial extent: _____
   Remarks: _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
   Remarks: _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
   Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

4. **Extraction Wells Leachate**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A

☐ Siltation not evident

Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____

☐ Erosion not evident

Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☐ Functioning ☐ N/A

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☒ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: The pump-and-treat system was shut down in April 2017.

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: No spare parts on site.

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps and Electrical**

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☒ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: Pump-and-treat system was shut down in April 2017.

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☐ Good condition

☒ All required wells located ☒ Needs maintenance ☐ N/A

Remarks: Monitoring wells should be secured and labeled.

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☒ N/A

Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The remedy was designed to restore groundwater to drinking water quality and prevent exposure to contaminated groundwater until restoration is complete. In general, the remedy is functioning as intended by the ROD and ESD. Contaminated private wells were replaced with deeper, uncontaminated wells. The groundwater extraction and treatment system operated until April 2017, when it was shut down after all COCs met their cleanup levels for two consecutive quarters. However, after the system was shut down, PCE was detected above its MCL in one monitoring well. EPA will evaluate future groundwater monitoring results to determine whether additional actions are needed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Two of the Site's monitoring wells were accidentally destroyed in 2017.

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. After the groundwater treatment system was shut down, PCE was recently detected above its MCL in one monitoring well.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Determine whether additional monitoring wells are needed.

Site inspection participants:
Stepan Nevshehirlian, EPA RPM
Lavar Thomas, EPA community involvement coordinator
Kimberly Plank, EPA Biological and Technical Assistance Group
Bob Asreen, DNREC
Doug Beaver, Rare Earth Environsciences
Amanda Goyne, Skeo
Hagai Nassau, Skeo

APPENDIX F – SITE INSPECTION PHOTOS

Residential building on former facility property

Abandoned Chem-Solv office building

Area of 1985 DNREC soil cleanup on former facility property

Unsecured monitoring well with standing water

Destroyed monitoring well MW-97-10-45

Monitoring well on former facility property

Groundwater extraction components (shut down in April 2017)

Air stripper (shut down in April 2017)

APPENDIX G – DETAILED REVIEW OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. In performing the FYR for compliance with applicable or relevant and appropriate requirements (ARARs), only those ARARs that address the protectiveness of the remedy are reviewed.

Groundwater ARARs
According to the Site's 1992 ROD, the primary groundwater ARARs are:

- Federal MCLs.
- Non-zero federal MCLGs.
- Delaware's regulations governing public drinking water.

The ROD stated that the remedial action must meet Delaware's public drinking water standards if those levels are more stringent than the federal MCLs and non-zero MCLGs. This FYR compared the MCLs and MCLGs from the 1992 ROD with the current ARARs (Table G-1). None of the federal MCLs and MCLGs have changed since the 1992 ROD. However, Delaware has lowered the state MCLs for PCE and TCE from 5 µg/l to 1 µg/l.

EPA and DNREC identified a site-specific risk-based cleanup level of 3 µg/l for TCE in March 2017, after determining that reducing TCE concentrations throughout the groundwater plume to levels at or below 3 µg/l would achieve an overall reduction of risk to human health under a residential exposure scenario that is within EPA's acceptable cancer risk range of 1×10-4 to 1×10-6 and has a non-cancer endpoint hazard index that is 1 or less. EPA will continue to monitor PCE and TCE concentration trends. When existing clean-up standards stated in the ROD are met, EPA and DNREC will re-evaluate all cleanup standards (including those for TCE and PCE) to verify they are protective of human health and the environment.

EPA developed health-based cleanup levels for contaminants with no associated MCLs or MCLGs (acetone and manganese). The health-based cleanup levels are discussed in Section V of this FYR Report.

Table G-1: Groundwater ARAR Review

COC	1992 ROD ARAR (µg/l)		Current ARAR (µg/l)			ARAR Change
	Federal MCL	Federal MCLG	Federal MCL[a]	Federal MCLG[a]	State MCL[b]	
Acetone	no MCL	no MCLG	no MCL	no MCLG	no MCL	No change
Benzene	5	0	5	0	5	No change
1,2-Dichloroethane	5	0	5	0	5	No change
Manganese	no MCL	no MCLG	no MCL	no MCLG	no PMCL[c]	No change
PCE	5	0	5	0	1[d]	More stringent
Toluene	1,000	1,000	1,000	1,000	1,000	No change
1,1,1-Trichloroethane	200	200	200	200	200	No change
TCE	5	0	5	0	1[d]	More stringent
Xylene	10,000	10,000	10,000	10,000	10,000	No change

Notes:

a) Current MCLs and MCLGs are available at: https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations (accessed 2/12/2018).

b) Current Delaware Regulations Governing Drinking Water are available at: http://regulations.delaware.gov/AdminCode/title16/Department%20of%20Health%20and%20Social%20Services/Division%20of%20Public%20Health/Health%20Systems%20Protection%20%28HSP%29/4462.pdf (accessed 2/12/2018). The 1992 ROD does not list the state drinking water standard values.

c) Delaware has no primary MCL for manganese. The federal and state secondary MCL is 50 µg/l.

d) State MCLs for PCE and TCE were lowered to 1 µg/l effective January 1, 2013 (http://regulations.delaware.gov/AdminCode/title16/Department%20of%20Health%20and%20Social%20Services/Division%20of%20Public%20Health/Health%20Systems%20Protection%20%28HSP%29/4462.pdf) (accessed 2/12/2018).

Surface Water ARARs

The 1992 ROD selected ARARs for both of the discharge options (discharge to the publicly owned treatment works or discharge to surface water). The Site's groundwater extraction and treatment system was shut down in April 2017 after all COCs met their cleanup levels. Before the system was shut down, it was discharging to surface water, rather than to the publicly owned treatment works, so the following surface water ARARs were in effect:

- Federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) requirements.
- Delaware surface water quality standards.
- Memorandum of Agreement between the Delaware River Basin Commission and EPA Region 3 (§III.5 and V.8).

The Site's surface water discharge is required to meet the substantive requirements of NPDES, although CERCLA sites are not required to have NPDES permits.

This FYR compared the surface water quality standards from the 1992 feasibility study with current Delaware surface water quality standards for the Site's groundwater COCs (Table G-2). Values from the feasibility study were used because the ROD does not include numerical values for the surface water ARARs. Four of the COCs now have more stringent surface water standards. Three of the COCs now have less stringent standards and two of the COCs have no change.

Table G-2: Surface Water ARAR Review

COC	1992 Feasibility Study ARAR (µg/l)[a]	Current Delaware Surface Water Quality Criteria for Leipsic River Basin (µg/l)[b]		ARAR Change
		Systemic Toxicants	Human Carcinogens	
Acetone	N/A	N/A	N/A	No change
Benzene	40	3,100	14	More stringent
1,2-Dichloroethane	243	N/A	37	More stringent
Manganese	100	N/A	N/A	Less stringent
PCE	8.85	780	62	Less stringent
Toluene	424,000	30,000	N/A	More stringent
1,1,1-Trichloroethane	1,003,000	1,400,000	N/A	Less stringent
TCE	80.7	190	8.2	More stringent
Xylene	N/A	N/A	N/A	No change

Notes:
N/A indicates that there is no standard for this COC.
a) Human health standard for fish consumption, from Table 2-4 of the 1992 Feasibility Study Report. The fish consumption values are presented here because the Leipsic River basin is currently not designated as a Public Water Supply Source.
b) Current Delaware Surface Water Quality Standards are available at: http://regulations.delaware.gov/AdminCode/title7/7000/7400/7401.shtml (accessed 2/12/2018). These values are for "Fish Ingestion Only" because the Leipsic River basin is not designated as a Public Water Supply Source.

According to the ROD, the Memorandum of Agreement between the Delaware River Basin Commission and EPA Region 3 is applicable if the remedial action involves the discharge of greater than 50,000 gallons per day, averaged over any month, or a withdrawal of groundwater of 100,000 gallons per day or more, averaged over any month. Data from the past five years indicate that the average discharge rate in some months is greater than 50,000 gallons per day, so the Memorandum of Agreement is applicable.

Air ARARs
The Site's groundwater extraction and treatment system was shut down in April 2017, after all COCs met their cleanup levels. Before the system was shut down, the following ARARs from the ROD applied to the Site's air stripper:

- National Ambient Air Quality Standards.
- National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61) (according to the ROD, this regulation is relevant to benzene emissions from the air stripper).
- Delaware's regulations governing the control of air pollution.
- Delaware Ambient Air Quality Standards.

Table G-3 presents the current air emission standards that must be met by the Site's air stripper.

Table G-3: Air ARAR Review

COC	National Ambient Air Quality Standards[a]	National Emission Standards for Hazardous Air Pollutants (ppm)[b]	Delaware Ambient Air Quality Standards (ppm)[e]
Acetone	N/A	Not applicable[c]	(f)
Benzene	N/A	10[d]	(f)
1,2-Dichloroethane	N/A	Not applicable[c]	(f)
Manganese	N/A	Not applicable[c]	N/A
PCE	N/A	Not applicable[c]	(f)
Toluene	N/A	Not applicable[c]	(f)
1,1,1-Trichlororethane	N/A	Not applicable[c]	(f)
TCE	N/A	Not applicable[c]	(f)
Xylene	N/A	Not applicable[c]	(f)

Notes:
N/A indicates that there is no standard for this COC.
ppm = parts per million
a) Current National Ambient Air Quality Standards are available at: https://www.epa.gov/criteria-air-pollutants/naaqs-table (accessed 2/12/2018).
b) Current National Emission Standards for Hazardous Air Pollutants are available at https://www.epa.gov/stationary-sources-air-pollution/national-emission-standards-hazardous-air-pollutants-neshap-9.
c) According to the ROD, the National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61) are relevant to benzene emissions from the air stripper.
d) Ten ppm by weight. See 40 CFR §61.348(a)(1)(i) at https://www.gpo.gov/fdsys/pkg/CFR-2015-title40-vol9/pdf/CFR-2015-title40-vol9-part61-subpartFF.pdf (accessed 2/12/2018).
e) Current Delaware Ambient Air Quality Standards are available at: http://regulations.delaware.gov/AdminCode/title7/1000/1100/1103.pdf (accessed 2/12/2018).
f) Section 7.2 of the Delaware Ambient Air Quality Standards states that "The average concentration of hydrocarbons, exclusive of methane, taken over a three hour period from 6 to 9 a.m., local time, shall not exceed 160 micrograms per cubic meter (0.24 ppm) more than once per year."

The ROD states that Delaware's regulations governing the control of air pollution are applicable, and that if emissions from the air stripper exceed 2.5 pounds per day then the substantive requirements of these regulations must be met. This threshold has become more stringent since the ROD was issued in 1992. Delaware's air quality regulations now require a permit for equipment that emits more than 0.2 pounds per day.[4] Based on DNREC's review of EPA's air emission screening model and its own review of the projected emissions, DNREC determined that the potential maximum emissions from the treatment system would be below the threshold that would trigger the substantive requirements of an air permit. Given that the mass of contaminants removed by the air stripper when it was operating was about 100 to 200 grams per year, the Site is not expected to exceed the 0.2 pounds-per-day threshold.

[4] http://www.dnrec.delaware.gov/Air/Pages/DAQPermittingFAQs2.aspx.

APPENDIX H – VAPOR INTRUSION SCREENING

This FYR conducted a screening-level analysis of the Site's potential for vapor intrusion risk using the highest VOC concentrations detected in shallow groundwater in 2017 and 2018. Site contaminants have been detected only in the uppermost aquifer (the Columbia aquifer); the deeper aquifer (the Cheswold aquifer) has not been affected. The screening-level analysis assumed a residential exposure scenario because homes are present near the affected monitoring wells. As shown in Table H-1, the vapor intrusion screening found that the estimated total cancer risk fell within EPA's range of acceptable risk (1×10^{-4} to 1×10^{-6}). The total estimated non-cancer hazard was slightly above EPA's noncancer threshold value of 1 due to a one-time spike of TCE in MW-97-8-48. The TCE concentration in that well has subsequently decreased substantially (1.0 µg/l in April 2018); therefore, this FYR concludes that the Site does not pose a risk from vapor intrusion, under either residential or commercial scenarios. However, if VOC concentrations in groundwater or site conditions change, then the potential for vapor intrusion should be reassessed.

Table H-1: Vapor Intrusion Screening

Groundwater COC	Maximum Concentration in Groundwater in 2017-2018			Residential Scenario	
	Concentration (µg/l)	Monitoring Well	Date	Cancer Risk	Noncancer Hazard
Acetone	10.8	MW-96-1-55	April 2018	NA	4.8×10^{-7}
Benzene	0.63	MW-97-7-48	July 2017	4.0×10^{-7}	4.6×10^{-3}
Methylene chloride	2.58	MW-96-4-45	Oct. 2017	3.4×10^{-9}	5.5×10^{-4}
PCE	7.57	MW-97-8-48	Jan. 2018	5.1×10^{-7}	1.3×10^{-1}
TCE	8.38	MW-97-8-48	Jan. 2018	7.1×10^{-6}	1.6
Sum				8.0×10^{-6}	1.8

Notes:
Screening conducted using EPA's Vapor Intrusion Screening Level Calculator, available at https://epa-visl.ornl.gov/cgi-bin/visl_search, accessed 5/25/2018.
NA = inhalation unit risk value is not available for acetone, so cancer risk cannot be calculated.