FOURTH FIVE-YEAR REVIEW REPORT FOR AVCO LYCOMING SUPERFUND SITE LYCOMING COUNTY, PENNSYLVANIA

Prepared by

U.S. Environmental Protection Agency
Region III
PHILADELPHIA, Pennsylvania

Karen Melvin, Director
Hazardous Site Cleanup Division
EPA Region III

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Date

Table of Contents

LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PFAS	Perflourinated Alkyl Substances
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considered
WMWA	Williamsport Municipal Water Authority

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR 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 AVCO Lycoming Superfund Site (the Site). The triggering action for this statutory review is the completion of the September 26, 2012 FYR. 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 two operable units (OU-1 and OU-2) that will be addressed in this FYR. However, both OU-1 and OU-2 address the containment, recovery, and treatment of contaminated groundwater at the Site and no distinction between OUs will be made in this FYR.

The FYR was led by David Greaves, Remedial Project Manager, EPA Region 3. Participants included Mark Leipert (EPA Site Hydrologist), Jennifer Hubbard (EPA Site Toxicologist), Amanda Miles (EPA Site Community Involvement Coordinator(CIC)), Bruce Pluta, EPA Biological Technical Assistance Group (BTAG), Kathy Patnode, US Fish and Wildlife Service (USFWS) Cheryl Sinclair (Pennsylvania Department of Environmental Protection (PADEP) Environmental Group Manager, North Central Regional Office), and Laura Daniel (PADEP, Geologic Specialist). The review began on 12/15/2016.

Site Background

The Site consists of the AVCO facility (the facility) located at 652 Oliver Street in Williamsport, Lycoming County, Pennsylvania and the groundwater contaminant plume to the south of the facility (See Figure 1). The facility is approximately 28 acres and is situated next to a residential neighborhood with some light industry. Portions of the facility property were first used for manufacturing purposes in the early 1900's. Historic manufacturing operations consisted of a bicycle and sewing machine facility, a sandpaper plant, a tool and die shop and a silk plant. During the 1920's, the facility was purchased by AVCO Corporation. Since then, facility operations have centered primarily in the manufacture and repair of aircraft engines and the facility is currently operating as an aircraft engine production facility. The facility includes a still for the reclamation of petroleum solvents and, since 1950, a waste treatment facility. The main facility area is surrounded by an eight-foot high chain link fence, and access to the facility is controlled and monitored by a full-time security force.

In February 1985, Textron, Inc. acquired AVCO Corporation, which included the AVCO Lycoming Williamsport Division. The facility is currently doing business as Lycoming Engines, a division of AVCO Corporation, a wholly owned subsidiary of Textron, Inc; however, the AVCO facility will be referred to as "the facility" in this FYR and AVCO Corporation (AVCO) is considered the Potentially Responsible Party (PRP) for the Site.

The Site is located in the western part of Williamsport in a primarily residential neighborhood with some light industry present. All residents within three miles of the Site are supplied water through the Williamsport Municipal Water Authority (WMWA). The drinking water is primarily taken from surface water. However, in times of drought, a backup WMWA well field is utilized, and water is extracted from the aquifers. The WMWA well field is about 3,000 feet south (downgradient) of the Site. Extracted groundwater is treated by the WMWA and pumped to a surface reservoir for storage prior to distribution.

The Site is bordered to the north and northwest by two cemeteries. South and southwest of the Site are two public parks, Memorial Park and Elm Park. The southern boundary of the park area is marked by the railroad track which runs east-west across Lycoming Creek. Lycoming Creek flows south and is located about 2,000 feet southwest of the Site. The creek drains into the Susquehanna River which is about 5,000 feet south of the Site. Both the creek and the river are used for recreational purposes.

Surface water drainage, including that from the facility, is controlled by two storm sewers which drain either into the Lycoming Creek or into the Susquehanna River. Flood control levees extend along both banks of the Lycoming Creek, essentially to the Susquehanna River.

The Site is located over two aquifers; an overburden aquifer, which is referred to as the shallow aquifer, and the bedrock aquifer, which is referred to as the deep aquifer.

FIVE-YEAR REVIEW SUMMARY FORM

Site Name: AVCO Lycoming Superfund Site		
EPA ID: PAD003053709		
Region: 3	**State:** PA	**City/County:** Williamsport/Lycoming

NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

Lead agency: EPA
Author name (Federal or State Project Manager): David Greaves
Author affiliation: EPA Region 3
Review period: 12/15/2016 – 9/26/2017
Date of site inspection: 4/12/2017
Type of review: Statutory
Review number: 4
Triggering action date: 9/26/2012
Due date ***(five years after triggering action date)***: 9/26/2017

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Historic operation of the facility resulted in impacts to groundwater by volatile organic compounds (VOCs) and metals. Initial groundwater investigation and remediation was completed by AVCO prior to the listing of the Site on the EPA's National Priorities List (NPL) in accordance with a Consent Order and Agreement (COA) executed November 25, 1985, between AVCO and the Pennsylvania Department of Environmental Resources (PADER) (now PADEP). The COA directed AVCO to develop and implement a Remedial Action Plan to clean up contaminated groundwater at and near the facility. In accordance with the COA, AVCO evaluated on and off-facility shallow groundwater contamination, installed and sampled groundwater monitoring wells, and installed three on-facility and two off-facility recovery wells and associated treatment systems. AVCO still operates the off-facility recovery wells and treatment systems originally installed under the COA with PADEP.

The Site was placed on the NPL on February 21, 1990. Between 1989 and 1991, a Remedial Investigation/Feasibility Study (RI/FS) was conducted by AVCO under an Administrative Order on Consent (AOC) with EPA and in consultation with PADEP. The RI identified that both the shallow and deep aquifers were contaminated with trichloroethelyene (TCE), dichloroethene (DCE), and vinyl chloride. A portion of the shallow aquifer was also contaminated with total chromium and hexavalent chromium. The investigation also concluded that the surface water quality of Lycoming Creek was not impacted by the Site.

The contaminants of concern (COCs) for the Site include DCE, TCE, vinyl chloride, cadmium, manganese, and chromium in groundwater. Groundwater is the media of concern at the Site because it may pose a threat to human health through the ingestion pathway. The Human Health Risk Assessment (HHRA) for the Site determined that the actual or threatened future risk from this Site, if not addressed by a remedial action, presented a potential threat to public health, welfare or the environment.

Response Actions

EPA documented the Selected Remedy for the Site in the following decision documents:

- June, 28, 1991 OU-1 ROD;
- April 9, 1992 OU-1 Explanation of Significant Differences (ESD);
- December 30, 1996 OU-2 ROD;
- April 6, 2000 OU-2 ROD Amendment;
- March 13, 2012 OU-2 ESD.

The 1991 ROD identified the overburden aquifer beneath the facility property as OU-l, however, the Selected Remedy in the 1991 ROD was not implemented. The 1996 ROD selected a new remedy for the overburden aquifer beneath the facility property and identified the overburden aquifer as OU-2. Both RODs address the contamination in the overburden aquifer beneath the facility property. No distinction between OUs will be made in this FYR.

The final Selected Remedy for the Site consists of the following components:

- Groundwater extraction and treatment in the overburden aquifer at the facility;
- Source area treatment via air sparging/soil vapor extraction (SVE), groundwater extraction, or in-situ chemical oxidation;
- Groundwater extraction and treatment in the overburden aquifer beyond the facility property and in the deep bedrock aquifer throughout the Site;

- Institutional controls to limit the facility property to industrial use and prevent the installation of new groundwater wells within the groundwater contamination plume.

The Selected Remedy established the following cleanup levels for groundwater COCs:

Table 1: Contaminants of Concern and Cleanup Levels

COC's	Cleanup Level (ug/L)	Source	Media
1,2 Dichloroethene	70	MCL	groundwater
Cadmium	3	Risk based	groundwater
Chromium IV	32	Risk based	groundwater
Trichloroethene	5	MCL	groundwater
Vinyl Chloride	2	MCL	groundwater
Manganese	50	State cleanup level	groundwater

The 1996 ROD required treatment of metals via in-situ precipitation in a limited portion of the Site. The performance standards for the in-situ metals precipitation were achieved in 2003 and treatment for chromium and cadmium are no longer performed at the Site. The 2000 ROD Amendment included source area treatment via SVE, in addition to groundwater extraction and treatment or in-situ chemical oxidation. SVE pilot testing indicated that SVE would not be effective due to Site geology, therefore, SVE was not implemented.

Status of Implementation

EPA issued a unilateral administrative order (UAO) to AVCO in May 1992 to implement the Selected Remedy in the 1991 ROD and 1992 ESD. EPA subsequently amended the UAO in 1997 and 2000 to encompass changes to the Selected Remedy in the 1996 ROD and 2000 ROD Amendment. Currently, AVCO operates five groundwater extraction and treatment systems to address contaminated groundwater in the shallow overburden aquifer and deep bedrock aquifer. The treatment systems are discussed in detail in the following section. Construction Completion of the Selected Remedy was documented in a September 27, 2002 Prelminary Close-Out Report (PCOR). Additional information on implementation of the Selected Remedy is available in the 2004, 2008, and 2012 FYRs.

Systems Operations/Operation & Maintenance

The operation and maintenance (O&M) of the groundwater extraction and treatment systems is performed by AVCO in accordance the UAO. Progress Reports on the O&M are submitted quarterly to EPA. Annually, AVCO submits an in-depth assessment of the remedial activities performed the prior year. Approximately thirty-three groundwater monitoring wells are sampled at various times throughout the year.

Operational Status of Remedial Systems

A summary of the status of the groundwater extraction and treatment systems is provided below:

- Memorial Avenue Recovery System- This system consists of 15 extraction wells located on the downgradient edge of the facility property to control off-property migration of the contaminated groundwater. The extraction wells are piped to the Memorial Avenue treatment building, which uses a horizontal tray air stripper to remove VOC's in the groundwater. The treated groundwater is discharged to Lycoming Creek and the vapor phase from the air stripper is released after treatment through Granulated Activated Carbon (GAC). Three wells are currently off-line (RW-15, RW-2, and RW-8). The wells are temporarily offline due to maintenance issues that are being addressed. The offline wells are not expected to impact the effectiveness of the Memorial Avenue Recovery System.

- Central Area Recovery System – This system consists of six extraction wells and was installed primarily to recover light non-aqueous phase liquid (LNAPL). Historically, extracted groundwater was pumped to the Central Area treatment building into an oil/water separator and then sent to the Memorial Avenue treatment building for treatment. However, all wells in this system have been shut down since 2015 due to the low accumulation of LNAPL in the wells. The system currently operates via passive recovery using absorbent "socks".
- East Parking Lot Recovery System – This system consists of four extraction wells and was installed to extract groundwater from an area of higher contaminant concentrations. The groundwater is extracted and treated at the Memorial Avenue treatment building. This system is in working condition.
- Elm Park Recovery System – This system was installed in accordance with the 1987 AOC between AVCO and PADEP. It consists of a single extraction well and an air stripper to treat contaminated groundwater. This system is in working condition.
- Third Street Recovery System – This system was also installed in accordance with the 1987 AOC between AVCO and PADEP to prevent contaminated groundwater from migrating toward the WMWA well field. This system consists of a single extraction well. This system is in working condition.

IC Summary Table

Table 2: 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)
AVCO Lycoming Facility	Yes	Yes	**Industrial-Use Parcels:** Deed Book 1028, Page 314-Parcel 1; Deed Book 1029, Page 314-Parcel 2; Deed Book 317, Page 571-Parcel 3; Deed Book 496, Page 289; Deed Book 1172, Page 232-Parcel 3; Deed Book 318, Page 411; Deed Book 352, Page 393-Parcel 1; Deed Book 522, Page 420, Parcel-A; Deed Book 523, Page 911; Deed Book 524, Page 436; Deed Book 523, Page 952; Deed Book 524, Page 994; and Deed Book524, Page 989; Deed Book 318, Page 488; Deed Book 352, Page 393, Rt. Of Way Appurtenant to Parcel 3; Deed Book 522, Page 420, Parcel B; and, Deed Book 4620, Page 40.	Limit future facility property to industrial use.	Environmental Covenant – Recorded August 22, 2017

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)
Groundwater	Yes	Yes	All Parcels comprising AVCO Lycoming Facility and all remaining parcels overlying the VOC plume.	Restrict groundwater use within the plume of VOC contaminated groundwater and restrict the installation of new groundwatwer wells.	Environmental Covenant – Recorded August 22, 2017 City of Williamsport ordinance requiring use of public water within the Flood Zone – groundwater contaminant plume is entirely within the Flood Zone

See map IC Map in Appendix D.

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 3: Protectiveness Determinations/Statements from the 2012 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Will be Protective	The remedy selected for the AVCO Lycoming Site is being implemented in accordance with the decision documents and is functioning as designed. Direct contact with soil and groundwater is not expected to pose unacceptable risks under current conditions, because Facility is currently being used for manufacturing operations, and residents are provided public water by the Williamsport Municipal Water Authority. Groundwater cleanup is progressing with the operation of the groundwater treatment systems, but the groundwater has not met the performance standards. The remedy is not considered protective in the short term because two residences have current risk from vapor intrusion. The Site will be considered protective in the short term when the vapor mitigation systems are installed in two homes and supplemental vapor intrusion sampling indicates that the systems are operational.

		To ensure future protectiveness, additional issues need to be addressed. An assessment of the background levels of manganese to determine if the manganese standard in the decision document is still appropriate should be conducted. The Responsible Party should, once again, try to gain access to sample Residence 4 in Area 4 for vapor intrusion. Sampling of the groundwater, to evaluate VOCs levels, needs to continue. The sampling results will be used to assess the need for additional vapor intrusion sampling. In addition, the institutional control limiting the future use of the Facility property to industrial use only should be implemented. The PRP should submit a full-scan analysis of all VOCs, SVOCs, pesticides and metals in groundwater to ensure that no other chemical constituents, yet to be identified, warrant inclusion as a COC based on current standards.

Table 4: Status of Recommendations from the 2012 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	Establish background levels for manganese	Sample background wells to establish manganese level.	Ongoing	EPA is currently evaluating the manganese data submitted in December of 2016. EPA has requested that AVCO Lycoming conduct two rounds of sampling of facility wells to compare sampling conducted on the upgradient wells to evaluate manganese background concentrations.	Ongoing
1	Vapor intrusion mitigation in Area 4 with follow-up Sampling.	Install VI mitigation systems in Area 4 and resample to ensure effectiveness	Complete	VI mitigation systems installed in Area 4	September 2013
1	Sample Area 4 Residence 4	Perform additional VI sampling in Area 4	Complete	Additional sampling conducted in Area 4	September 2013

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	Increases in groundwater VOC levels may necessitate additional vapor intrusion sampling throughout the site	Evaluate groundwater VOC levels to assess the need for additional vapor intrusion sampling.	Ongoing	AVCO Lycoming currently continues to sample groundwater to assess VOC levels. Sampling results continue to be evaluated to assess the need for additional vapor intrusion sampling. EPA has also evaluated additional data and construction information to estimate the potential for VI in buildings constructed since the ROD. No additional vapor intrusion sampling was required based on these evaluations.	Ongoing
1	Implement institutional controls on Facility property	Place Environmental Covenant on Facility property, or other appropriate mechanism as necessary.	Completed	An Environmental Convenant was recorded between AVCO and EPA.	August 22, 2017
1	No recent data for all VOCs, SVOCs, pesticide, and metals in groundwater.	Submit full-scan analysis of all VOC's, SVOC's, pesticides and metals in groundwater	Completed	AVCO submitted the full-scan analysis in December of 2016. The data was evaluated by the EPA technical team and no new COCs were identified.	December 7, 2016

An Addendum to the 2012 FYR was issued on September of 2014 by EPA. This Addendum updated the protectiveness determination to "Short-term protective."

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On April 12, 2017 the EPA CIC, Amanda Miles, conducted a review of the community involvement issues regarding the Site. During the review, the CIC and RPM spoke with AVCO and PADEP representatives to inform them of the FYR and discuss their knowledge and perception of EPA's activities at the Site. PADEP had no concerns or recommendations regarding the community involvement at the Site. The AVCO spokesperson mentioned that community interest remained low.

On August 4, 2017 a public notice was published in the Sun Gazette announcing the commencement of the FYR process for the Site, providing contact information for EPA CIC, Amanda Miles, and inviting community participation. The FYR Report will be made available to the public at the link immediately below once it has been finalized.

www.epa.gov/superfund/avcolycoming

Data Review

Data reviewed for this FYR consisted of vapor intrusion sampling data, air emission data from the groundwater extraction and treatment systems, and groundwater monitoring data.

Vapor Intrusion:

Vapor intrusion evaluations have been performed multiple times at the Site and were discussed in the 2007 and 2012 FYRs, as well as a 2014 FYR Addendum. The following presents a comprehensive summary of vapor intrusion activities completed at the Site to date.

Vapor intrusion sampling results recorded in the 2007 FYR were based on Indoor Air Sampling conducted in April 2007 at two residences located within the plume. Sampling data from Area 1 showed that there were significant amounts of TCE and tetrachloroethylene (PCE) in the outdoor air in concentrations exceeding their respective Regional Screening Levels (RSLs). Since TCE and PCE are not naturally occurring compounds, there may have been an upwind source of TCE and PCE when samples were taken. The EPA databases for air sources identified one source of TCE that may have been upwind. Because the VOC concentrations found in the indoor air at Area 1 were approximately the same as the outdoor air, the sampling results were considered to be inconclusive. Sampling results from Area 2 (which had a dirt floor) showed that there may be a possibility of vapor intrusion at this residence. It was recommended that AVCO develop and implement a plan for assessing vapor intrusion into residences.

As discussed in the 2012 FYR, AVCO submitted a Vapor Intrusion Evaluation Work Plan for EPA's review in October 2009. Sampling of the residences occurred in November 2010 and the results were provided to EPA in an Evaluation Report in February 2011.

The 2010 investigation divided the Site into five different areas, as shown on Figure 2 in Appendix D. One residence was selected for sampling within Area 1, Area 2, and Area 5 and two residences were selected for sampling within Area 3 and Area 4. One residence in Area 5 refused access for sampling and an alternate location was chosen.

In Area 1, TCE was identified in the sub-slab above screening values, which indicated a potential future risk due to vapor intrusion. Indoor air concentrations are subject to fluctuation, and the indoor values were below screening levels during this sampling event, but the accumulation of TCE was at notable concentrations in the sub-slab.

Low levels of TCE were found below screening levels in the sub-slab, but were not detected in the indoor air of the residence sampled in Area 2. Therefore, the data did not indicate that vapor intrusion was occurring in Area 2.

In Area 3, low levels of TCE were found below screening levels in the sub-slab and indoor air. The DCE in indoor air, found in one of the residences in Area 3, was likely due to ambient air, and consequently the data did not indicate that vapor intrusion was currently occurring in Area 3.

The results in Area 4 identified one residence that had low levels of TCE below screening levels in sub-slab and ambient air. Cis-1,2-DCE was identified in the indoor air in this residence, but was likely due to ambient air. PCE in the sub-slab of this house was also of note. At the time of sampling, PCE and TCE indoor air concentrations were at acceptable concentrations. However, indoor air concentrations are subject to fluctuation, and the accumulation of these chemicals in the sub-slab warranted further investigation.

In Area 5, low levels of TCE were found below screening levels in the sub-slab, indoor and ambient air of the residence sampled. Therefore, the data did not indicate that vapor intrusion was occurring in Area 5.

In a letter to AVCO dated April 5, 2011, EPA concluded that there was no current risk from vapor intrusion, but Areas 1 and 4 had future potential for significant risk from vapor intrusion. Another comprehensive round of vapor intrusion sampling was recommended for Areas 1 and 4.

Additional sampling was conducted in Areas 1 and 4 in November of 2011. An Evaluation Report was submitted to EPA in January of 2012 for review. The results indicated that the residences sampled in Area 1 had no current risk from vapor intrusion, but still indicated a potential future risk. EPA recommended continued monitoring of the groundwater contamination levels to identify increases in contamination that may require additional vapor intrusion sampling.

In Area 4, the results from two of the residences sampled indicated that vapor intrusion mitigation systems should be installed. Confirmation sampling after the systems were operational was also required. EPA included these recommendations in the 2012 FYR.

In response to these recommendations, AVCO installed vapor intrusion mitigation systems on the two residences in Area 4 at which unacceptable vapor intrusion risks were identified. Confirmatory samples were collected which demonstrated that Site-related VOCs were reduced in the indoor air, and validation of the data was provided. EPA approved the Indoor Air Mitigation Report for these two residences on September 19, 2013.

One remaining residence in Area 4, located adjacent to the two residences at which vapor intrusion mitigation systems were installed, refused access for sampling. Therefore, as a proactive measure, AVCO obtained access and installed a mitigation system without sample collection. The system was installed in accordance with the plan for the installation of the other two mitigation systems in Area 4. This system is monitored to ensure that it is properly functioning. EPA approved the Summary of Activities Report for the installation of this system in August 2013.

During the October 5, 2016 FYR kick-off meeting, it was discovered that a Habitat for Humanity Home as well as an apartment complex (Memorial Homes Apartments) were constructed within the groundwater contamination plume of the Site. In order to determine whether these homes were at risk for vapor intrusion, groundwater data from 2016 was reviewed along with construction documentation (such as blue prints and plans), environmental covenants, Environmental Systems and Operational Plans, and the PADEP Land Recycling and Environmental Remediation Standards Act (Act 2) reports for these locations that was provided by PADEP and the City of Lycoming.

The Memorial Homes Apartments and the Habitat Humanity Home are located approximately 350 ft from the residence that was sampled for vapor intrusion in Area 2 in 2010 (see map in Appendix D, 2011 VI Locations Map). Vapor intrusion was determined not to be a concern in Area 2. VOC concentrations have decreased in this portion of the groundwater contamination plume since the vapor intrusion sampling was performed in Area 2.

Based on a review of these documents, current groundwater data, and the location of the Memorial Homes Apartments and the Habitat Humanity House in relation to Area 2, vapor intrusion is not a concern at these locations at this time. Groundwater monitoring will continue and additional evaluation for vapor intrusion will be performed if increasing VOC concentrations are observed.

Groundwater Treatment System Air Emissions:
Two of the groundwater extraction and treatment systems at the Site have uncontrolled air emissions; the Elm Park Recovery System and the Third Street Recovery System. Air emissions from the Memorial Avenue System, which also treats groundwater from the East Parking Lot Recovery System, are treated with vapor phase carbon prior to discharge. The Central Area System has been shut down since 2015.

The Elm Park Recovery System is located in Elm Park, approximately 1,200 feet southwest of the facility, and is surrounded by public recreational space. The nearest resident is approximately 300 feet away.

The Third Street Recovery System is located approximately 1,700 feet southeast of the Elm Park Recovery System, within an industrial/commercial area. This area is bordered to the west by Lycoming Creek and to the south by a railroad line.

For this FYR period, EPA assessed the air emissions from both the Elm Park and Third Street Recovery Systems. The contaminant emissions from each system consisted primarily of TCE and trans-1,2-DCE. EPA used a screening air emission model to estimate the ambient air concentrations of TCE and trans-1,2-DCE due to the systems.

Both five-year average emission rates and the maximum emission rates of TCE and trans-1,2-DCE were evaluated. Since the systems are over 1,700 feet apart, the ambient air VOC concentrations will not overlap to any significant extent. Therefore, emissions from the Elm Park Recovery System and Third Street Recovery system were evaluated separately.

There are no inhalation risk factors for trans-1,2-DCE, therefore, the protectiveness of the trans-1,2-DCE emissions could not be evaluated. The TCE emission concentrations were within the acceptable carcinogenic and non-carcinogenic risk ranges. Therefore, the emissions from the Elm Park Recovery System and Third Street Recovery system are considered protective of human health. Results of the air screening emissions model are presented in Appendix G.

2012 – 2016 Groundwater Monitoring Assessment:

The primary remaining COCs in groundwater at the Site are TCE and cis-1,2-DCE and generally define the extent of the groundwater contaminant plume. TCE and cis-1,2-DCE trends for each groundwater recovery system are discussed below.

Memorial Avenue Recovery System

The Memorial Avenue Recovery system consists of 15 extraction wells located on the downgradient edge of the facility property to control off-property migration of the contaminated groundwater. Data for following Memorial Avenue Recovery System wells was reviewed: monitoring wells MW-7, MW- 8, MW-8D, SW-1, and MW-23 and extraction wells EW 1 through EW 14. These wells are monitored on an annual basis for VOCs. Found below is a trend analysis for each well based on the primary COCs in each well:

MW-8 and MW-8D:

- MW-8 and MW-8D are a shallow and deep monitoring well cluster located near the center of the Memorial Avenue extraction wells, directly downgradient from the facility. Cis-1,2-DCE concentrations in MW-8 ranged from 800 µg/L to 2500 µg/L and concentrations in MW-8D ranged from 250 µg/L to 870 µg/L during the FYR period. No discernable trend was observed in either well. TCE concentrations in MW-8 and MW-8D have generally decreased during the FYR period. However, the maximum TCE concentrations observed in both MW-8 (1600 µg/L) and MW-8D (1300 µg/L) exceed the MCL of 5 µg/L by several orders of magnitude.

SW-1:

- SW-1 is a shallow well located to the east of the facility. Cis-1,2-DCE concentrations in this well ranged from 140 µg/L to 70 µg/L during the FYR period and no discernable trend was observed. Concentrations in this well are close to the MCL of 70 µg/L for this contaminant. TCE concentrations in SW-1 generally

decreased during the FYR period and were below the MCL of 5 µg/L in the August 2016 sampling event. However, the TCE concentration in SW-1 was above the MCL in the October 2016 sampling event.

MW-7 and MW-23:

- MW-7 and MW-23 are a shallow and deep monitoring well cluster located on the western edge of the Memorial Avenue extraction wells, directly downgradient from the facility. Data during the FYR period shows that cis-1,2-DCE concentrations were consistently below the MCL of 70 µg/L in both wells. TCE concentrations in MW-7 and MW-23 were also generally close to or below the MCL during the FYR period. The TCE concentration in MW-7 increased sharply in June 2016 but returned to historic levels during the October 2016 sampling event

Memorial Avenue Recovery Wells

- EW- 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14 are recovery wells located at the downgradient edge of the facility. The following are the ranges for cis-1,2 -DCE contamination in these wells during the FYR period: EW-5 (290 µg/L - 520 µg/L, EW-6 (320 µg/L), EW-7 (190 µg/L - 340 µg/L), EW-8 (190 µg/L - 1100 µg/L), EW-9 (1200 µg/L - 1400 µg/L), EW-10 (400 µg/L), EW-11 (98 µg/L - 11 µg/L), EW-12 (610 µg/L - 1400 µg/L), EW-13 (78 µg/L - 950 µg/L), and EW-14 (320 µg/L - 490 µg/L). The concentrations of cis-1,2-DCE in these wells varied greatly and there is no discernable trend.

- EW- 1, 2, 3, 5, 6, 7, 8, 9, 11, 12, 13, 14 are recovery wells located at the downgradient edge of the facility. The following are the ranges for TCE contamination in these wells during the FYR period: EW-1 (75 µg/L - 130 µg/L), EW-2 (46 µg/L), EW-3 (94 µg/L - 220 µg/L), EW-5 (120 µg/L - 700 µg/L), EW-6 (600 µg/L), EW-7 (400 µg/L - 620 µg/L, EW-8 (260 µg/L - 1100 µg/L), EW-9 (940 µg/L - 1400 µg/L), EW-10 (400 µg/L), EW-11 (130 µg/L - 1300 µg/L), EW-12 (990 µg/L - 2500 µg/L), EW-13 (170 µg/L - 1100 µg/L), EW-14 (600 µg/L - 650 µg/L) The concentration of TCE in wells EW-1, EW-3, EW-9, EW-12, and EW-13 appear to be on a downward trend although they have not met the MCL.

Central Area Recovery System

The Central Avenue System consists of six extraction wells and was installed primarily to recover light non-aqueous phase liquid (LNAPL). This system has been shut down since 2015 due to the low accumulation of LNAPL in the wells. Found below is a trend analysis for each monitoring well in this area of the Site based on the primary COCs in each well:

MW 18:

- MW-18 is a shallow well located northwest of the facility. Cis-1,2-DCE concentrations ranged from 110 µg/L to 600 µg/L during the FYR period. This shows a pattern of increasing concentrations for the contaminant above the 70 µg/L MCL. The TCE concentrations found in this well ranged from estimated concentrations of 0.9 µg/L to 0.58 µg/L and non-detected thereafter. The trend for TCE concentrations in this well remained below the MCL through FYR period.

MW-5:

- MW-5 is a shallow well located in the center area of the Site. Cis-1,2-DCE concentrations ranged from 13,000 µg/L µg/L to 3100 µg/L. The concentrations of this particular contaminant in this well varied during the FYR period but remain well above the MCL of 70 µg/L. TCE found in MW-5 ranged from 650 µg/L to 45 µg/L during the FYR period and showed an overall decrease in TCE concentrations, however, the MCL of 5 µg/L has not been met.

East Parking Lot Recovery System

The East Parking Lot Recovery System consists of four extraction wells and was installed to extract groundwater from an area of higher contaminant concentrations. This system is monitored on a quarterly basis. Found below is a trend analysis for each monitoring well in this area of the Site based on the primary COCs in each well:

MW-9:

- MW-9 is a shallow well located in the eastern portion of the Site. Concentrations of cis-1,2-DCE ranged from 4.7 µg/L to 160 µg/L. During the FYR period, the concentrations for this contaminant were below the MCL of 70 µg/L between January and Octoboer and between March and October of 2014. However, concentrations started trending upward above the MCL starting in March of 2015 through June 2016. The concentrations of TCE in MW-9 ranged from 51 µg/L to 7,600 µg/L during the FYR period. The TCE concentrations in this well were highly variable with no discernable trend.

MW-22:

- MW-22 is a deep well located in the eastern portion of the Site. The concentrations of cis-1,2-DCE ranged from 21 µg/L to 69 µg/L during the FYR period. While the concentrations for this contaminant varied during the FYR period, they were below the MCL of 70 µg/L. The concentrations of TCE ranged from 33 µg/L to 150 µg/L during the FYR period. The concentrations were variable and are above the MCL of 5 µg/L.

MW-35:

- MW-35 is a shallow well located in the eastern portion of the Site and appears to be side-gradient of the source area. The maximum cis-1,2-DCE concentration in this well was 0.26 µg/L to 1.8 µg/L, below the MCL of 70 µg/L. The TCE concentrations in this well ranged from 3.4 µg/L to 9 µg/L during the FYR period. The concentrations of TCE seem to be relatively consistent either being below or slightly above the MCL of 5 µg/L.

MW-20:

- MW-20 is a shallow well located in the eastern portion of the Site. Cis 1,2-DCE concentrations ranged from 700 µg/L to 1,400 µg/L and TCE concentrations ranged from 500 µg/L to 1,300 µg/L during the FYR period. The concentrations for cis-1,2-DCE in this monitoring well were generally consistent throughout the FYR period and exceed the MCL of 70 µg/L. The concentrations of TCE in this monitoring well appear to be on downward trend; however, the MCL of 5 µg/L has not been met.

Elm Park Recovery System

The Elm Park Recovery System was installed in accordance with the 1987 AOC between AVCO and PADEP. It consists of air stripper treatment of contaminated groundwater from a single extraction well. This system is monitored on a quarterly basis. Found below is a trend analysis for each monitoring well in this area of the Site based on the treated contaminant of concern.

MW-14B:

- MW-14B is a deep well located in southern portion of the Site directly east of Lycoming Creek. The TCE concentrations for this well ranged from 29 µg/L to 210 µg/L during the FYR period. The concentrations of TCE in this well varied during the FYR period with no discernable trend. The MCL of 5 µg/L has not been met.

MW-16:

- MW-16 is a shallow well located in the southern portion of the Site directly east of Lycoming Creek. The TCE concentrations for this well ranged from 94 µg/L from to 190 µg/L during the FYR period. The concentrations of TCE in this well are fairly stable; however, the MCL of 5 µg/L has not been met.

MW-52:

- MW-52 is a shallow well located in the southern portion of the Site directly east of Lycoming Creek. The concentrations in this well ranged from 53 µg/L to 200 µg/L during the FYR period. The concentrations of TCE in this well during the FYR period varied with no discernable trend. The MCL of 5 µg/L has not been met.

MW-72:

- MW-72 is shallow well located in the souther portion of the Site directly east of Lycoming Creek. The concentrations of TCE ranged from 68 µg/L to 290 µg/L during this FYR period. The concentrations of TCE in this well were consistent during the FYR period. The MCL of 5 µg/L has not been met.

Third Street Recovery System

The Third Street Recovery System system was installed in accordance with the 1987 AOC between AVCO and PADEP to prevent contaminated groundwater from migrating toward the WMWA well field. This system is monitored on a quarterly basis. Found below is a trend analysis for each monitoring well in this area of the Site based on the treated contaminant of concern.

MW-25:

- MW-25 is a shallow well located in the southern portion of the Site and is directly east of Lycoming Creek. The concentrations of cis-1,2-DCE ranged from 0.49 µg/L to 31 µg/L during the FYR period. The trend of the concentration levels of this contaminant in this well shows that the plume is fairly stable and that concentrations are below the MCL of 70 µg/L. The TCE concentrations in this well ranged from 120 µg/L to 1.7 µg/L. Concentrations for TCE in this well were at or below the MCL of 5 µg/L in September 2014, June 2015, and February 2016. Towards the end of 2016 the concentrations were trending upward and above the MCL for this contaminant.

Groundwater Data Summary

Based on data from the FYR period of 2012 – 2016 it appears that Memorial Avenue and East Parking Lot Recovery Systems are operating as designed and have reduced contaminant concentrations in the western portion of the facility to below MCLs. Monitoring wells in the central and eastern portions of the Memorial Avenue Recovery System and in the vicinity of the East Parking Lot Recovery System contain contaminant concentrations exceeding MCLs; however concentrations have been reduced over time. The Memorial Avenue and East parking Lot Recovery Systems appear to be successfully preventing migration of contaminated groundwater from the facility. The Elm Park and Third Street Recovery Systems have also been effective in reducing contaminant concentrations with respect to historic highs. Additionally, based on the data, it appears the contamination plume is stable and is not migrating further downgradient from the Site. However, the contaminant concentrations throughout the contamination plume were not significantly reduced during the current FYR period and the groundwater extraction and treatment systems may require optimization or modification to achieve groundwater cleanup goals.

Furthermore, the groundwater to surface water pathway was not evaluated in the RI or in previous FYRs. Elevated contaminant concentrations in the vicinity of the Elm Park and Third Street Recovery Systems indicate that contaminated groundwater may be discharging to surface water in this portion of the Site. An evaluation of the groundwater to surface water pathway in the vicinity of the Elm Park and Third Street Recovery Systems is necessary to confirm that the systems are effective in preventing the discharge of contaminated groundwater to surface water at concentrations that may result in an unacceptable risk.

Site Inspection

The inspection of the Site was conducted on 4/12/2017. In attendance were David Greaves (EPA, RPM), William Geiger (EPA, RPM), Mark Leipert (EPA, Hydrogeologist), Amanda Miles (EPA, CIC), Greg Simpson (Textron, Inc.), Drew Zimmerman (Williamsport Municipal Waste Water Authority), Dayne Crowley (Amec Foster Wheeler), Cheryl Sinclair (PADEP), Laura Daniel (PADEP), Melanie Moore (AVCO Lycoming), and Scott Witmer (AVCO Lycoming). The purpose of the inspection was to assess the protectiveness of the remedy.

The Site Inpection consisted of an overview and history of the facility, a tour of the AVCO factory operations, a review and update of the issues and recommendations from the previous FYR, and a thorough tour of all groundwater treatment systems. The treatment systems that were observed were the Memorial Avenue System, Elm Park System, East Parking Lot, Third Street System, and Central Area Recovery Systems. The treatment systems were in working order. No issues were identified during the Site Inspection.

V. TECHNICAL ASSESSMENT

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

The Selected Remedy is functioning as intended by the decision documents. The groundwater treatment systems are collecting and treating contaminated groundwater to meet discharge limits. However, an evaluation is necessary to determine if contaminated groundwater is discharging to surface water and to determine if optimization of the Elm Park and Third Street Recovery Systems is necessary to meet groundwater cleanup goals throughout the contamination plume. The Environmental Covenant for the Site to implement the institutional controls was recorded at the Lycoming County Recorder of Deeds on August 22, 2017.

The use of the facility has remained the same from when the decision documents were written. The 2012 ESD clarified the institutional control requirement for the facility to allow only industrial use unless additional sampling and risk assessment activities are performed to evaluate other use scenarios. At the request of AVCO , EPA evaluated whether commercial use would also meet the industrial use requirements of the 2012 ESD. EPA clarified that a commercial business could be contemplated for the Site, if it could operate within the restrictions identified in the Environmental Covenant (paragraph 4) and meet the exposure frequency of workers similar to an industrial use. EPA generally considers industrial use exposure frequency of workers to be 250 days/year, 8 hours/day for 25 years.

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 groundwater cleanup levels were initially established in the 1996 ROD. The 2000 ROD Amendment set the cleanup levels at the same levels as the 1996 ROD. These cleanup levels are equal to or below current federal MCLs and are considered protective of human health

The 2012 ESD modified the cleanup levels to include cumulative risk. After the individual groundwater cleanup levels have been attained, EPA will evaluate data from the monitoring program to develop a trend analysis and

risk assessment. The risk assessment will be based on the cumulative human health risk across all applicable exposure routes for all COCs remaining in groundwater. The groundwater remediation will continue until EPA's risk-based cleanup standards (1E-4 for cancer risk and a Hazard Index less than or equal to 1) are achieved. This risk-based approach will ensure the long-term protectiveness of the Selected Remedy.

At the time of the RI, the groundwater to surface water pathway was not evaluated. Elevated TCE concentrations have been identified in monitoring wells near Lycoming Creek. However, the Elm Park and Third Street Recovery Systems are operating in this portion of the Site and are expected to limit migration of contaminants to surface water. Additional evaluation of the Elm Park and Third Street Recovery Systems is necessary to confirm that the systems are effective in preventing the discharge of contaminated groundwater to surface water at concentrations that may result in an unacceptable risk.

Manganese does not have a federal MCL. The 1996 ROD selected 50 ug/L as the groundwater cleanup goal for Manganese, which was a state cleanup level derived from the federal secondary MCL. The secondary MCL is not health-based, and may be difficult to achieve, because it appears to be below background concentrations at this Site. In 2008, EPA found that the manganese also did not appear to correlate with elevated VOC concentrations, indicating that the manganese may not be Site-related. In 2006, PADEP adopted the EPA Lifetime Health Advisory Level (HAL) for manganese of 300 ug/L as the state cleanup level. However, even this concentration is expected to be below naturally occurring background in the vicinity of the Site. EPA is currently reevaluating manganese with respect to background concentrations and will determine if the manganese groundwater cleanup goal needs to be modified. However, the current manganese groundwater cleanup level is considered protective of human health.

All residents within three miles of the Site are on municipal water. The City of Williamsport requires connection to the public water system within the floodplain, which encompasses the the groundwater contamination plume from the Site. The WMWA maintains a backup water supply well field approximately 3,000 feet south of the Site. The WMWA relies primarily on surface water, however this wellfield is used under drought conditions. Periodic monitoring and/or review of the water authority sampling are conducted to confirm that the contaminant plume does not adversely affect these wells. The Elm Park and Third Street Recovery Systems prevent migration of contaminated groundwater toward the WMWA wellfield.

As a result of the 2012 FYR, it was recommended that AVCO submit a full-scan analysis of all VOCs, SVOCs, pesticides and metals to ensure that no other chemical constituents warrant inclusion as COCs. The full-scan analysis was performed in August of 2016. Groundwater samples were collected from upgradient wells MW-2, MW-3R, and MW-19, and from downgradient wells SW-1 and MW-25. Thallium and bis-2-ethylhexyl phthalate (BEHP) were detected at concentrations exceeding MCLs in the monitoring wells downgradient from the Site. BEHP also exceeded the MCL in one well upgradient from the Site. Thallium was only detected in one of the two downgradient wells. Generally, the upgradient wells had higher concentrations of potential COCs and EPA did not identify new COCs as a result of this sampling.

EPA also evaluated the potential presence of emerging contaminants 1,4-dioxane and Per- and Polyfluoroalkyl Substances (PFASs) at the Site. 1,4-Dioxane sampling was performed at the Site in July of 2007 and 1,4-dioxane was not detected at concentrations that would present an unacceptable risk to human health. PFASs may be present at sites where chromium plating took place or where such plating wastes were disposed. Therefore, based on current and historic plating activities at the Site, groundwater sampling for PFAS is planned for 2017. The WMWA also sampled their system for PFAS in accordance with Unregulated Contaminant Monitoring Rule (UCMR) requirements. Data collected by WMWA in 2014 and 2015 were non-detect for PFAS.

Vapor intrusion has been evaluated extensively at the Site. In 2014, EPA issued an Addendum to the 2012 Five-Year Review to document that vapor mitigation systems were installed on two homes where vapor intrusion conditions indicated a potential future unacceptable risk. AVCO also installed a system as a preventive measure

on another nearby home where access had not been granted for sampling. Therefore, conditions at these homes are now expected to be protective for both current and future exposures.

Additionally, EPA has reviewed information about newly constructed residences in the vicinity of the Site and has concluded that, based on current groundwater data, the location of the Memorial Homes Apartments and the Habitat Humanity House in relation to a residence where vapor intrusion has been mitigated (See Appendix D, 2011 VI Locations Map), and construction details of the new residences, vapor intrusion is not a concern at these locations at this time.

Air emissions from the groundwater treatment systems were evaluated during previous FYRs and found to be acceptable. As part of this FYR, air emissions were reviewed through 2016. No unacceptable risk to human health was identified from the groundwater treatment system emissions.

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

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

VI. ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	**Issue Category: Monitoring**			
	Issue: PFASs may be present in Site groundwater due to past chrome plating operations at the facility.			
	Recommendation: Perform groundwater sampling to determine the presence of PFASs at the Site and determine if modifications to the groundwater treatment systems are necessary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	3/31/2018

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	Issue Category: Monitoring			
	Issue: The groundwater to surface water pathway in the vicinity of the Elm Park and Third Street Recovery Systems was not evaluated during the RI or in previous FYRs.			
	Recommendation: Evaluate the groundwater to surface water pathway in the in the vicinity of the Elm Park and Third Street Recovery Systems to confirm that the systems are effective in preventing the discharge of contaminated groundwater to surface water at concentrations that may result in an unacceptable risk.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2018

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	Issue Category: Remedy Performance			
	Issue: The groundwater extraction and treatment systems may not be able to meet groundwater cleanup goals throughout the contamination plume.			
	Recommendation: Evaluate the groundwater extraction and treatment systems to determine if optimization or modification of the systems is necessary to achieve groundwater cleanup goals throughout the contamination plume.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2019

OTHER FINDINGS

The following issues were identified that do not affect the protectiveness of the remedy:

Vapor Intrusion Monitoring

Groundwater monitoring will continue and additional evaluation for vapor intrusion will be performed if increasing VOC concentrations are observed in the vicinity of occupied structures.

Manganese Background Evaluation

Manganese concentrations will be evaluated with respect to background concentrations to determine if the managenese groundwater cleanup level needs to be modified. The current manganese groundwater cleanup level is protective of human health.

VII. PROTECTIVENESS STATEMENT

Protectiveness Determination:	*Planned Addendum*
Short-term Protective	*Completion Date:* N/A

Protectiveness Statement:

The Selected Remedy for the Site is being implemented in accordance with the decision documents and is functioning as designed; however, additional evaluation of the groundwater treatment systems is necessary to determine if optimization or modification of the systems are necessary to meet groundwater cleanup goals throughout the contamination plume. Direct contact with soil and groundwater is not expected to pose unacceptable risks under current conditions, because the facility is currently being used for manufacturing operations, and residents are being provided public water by the Williamsport Municipal Water Authority. Institutional controls are in place limiting the use of the facility and preventing groundwater use in the vicinity of the Site. Since the 2012 FYR, vapor intrusion mitigation systems were installed at three residences and supplemental vapor intrusion sampling indicated that the systems are operational and functioning as designed. AVCO continues to monitor groundwater concentrations and assess the need for additional vapor intrusion sampling. Therefore, the selected remedy is considered protective of human health and the environment in the short-term.

For the remedy to be fully protective of human health and the environment, PFAS sampling needs to be conducted, the surface water to groundwater pathway needs to be evaluated, and an evaluation of the groundwater treatment systems needs to be performed.

VIII. NEXT REVIEW

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

APPENDIX A – REFERENCE LIST

Explanation of Significant Differences, AVCO Lycoming Superfund Site
Prepared by EPA Region 3. March 13, 2012

Record of Decision Amendment, AVCO Lycoming Superfund Site
Prepared by EPA Region 3, April 6, 2000

Record of Decision Amendment, AVCO Lycoming Superfund Site
Prepared by EPA Region 3, December 30, 1996

Explanation of Significant Differences AVCO Lycoming Superfund Site
Prepared by EPA Region 3, April, 9 1992

Record of Decision, AVCO Lycoming Superfund Site
Prepared by EPA Region 2, June 28, 1991

Addendum to Five-Year Review Report, AVCO Lycoming Superfund Site, Williamsport, PA.
Prepared by EPA Region 3, September 4, 2014

Third Five-Year Review Report, AVCO Lycoming Superfund Site, Williamsport, PA.
Prepared by EPA Region 3. September 26, 2012.

Addendum to Five-Year Review Report, AVCO Lycoming Superfund Site, Williamsport, PA.
Prepared by EPA Region 3, December 14, 2011

Second Five-Year Review Report, AVCO Lycoming Superfund Site, Wiliiamsport, PA.
Prepared by EPA Region 3, September 24, 2007

First Five- Year Review Report, AVCO Lycoming Superfund Site, Williamsport, PA.
Prepared by EPA Region 3, July 7, 2002

APPENDIX B – SITE CHRONOLOGY

Event	Date
EPA proposed the Site for listing on the National Priorities List (NPL)	February 2, 1987
EPA began the remedial investigation/feasibility study (RI/FS)	June 27, 1988
EPA listed the Site on the NPL	June 10, 1986
EPA issued the OU1 Record of Decision (ROD)	June 28, 1991
Explanation of Significant Differences (ESD) for OU1	April 9, 1992
Second Feasibility Study	June 20, 1996
Remedial Design (RD) Initiated for Metals Precipitation	September 3, 1996
ROD signature for OU2	December 30, 1996
RD initiated for Air Sparging/Soil Vapor Extraction	January 9, 1997
RD Completed and RA initiated Metals Precipitation	May 2, 1997
Air Sparging/Soil Vapor Extraction RD approved	September 24, 1997
Third Feasibility Study initiated	January 30, 1999
ROD Amendment to the 1996 ROD for Groundwater Pump and Treat Facility	April 6, 2000
RD initiated for Groundwater Pump and Treat Facility	May 11, 2000
RD Completed and RA initiated for Groundwater Pump and Treat Facility	October 18, 2000
EPA approves termination of in-situ Metals Precipitation System with 12 quarters of post-termination monitoring	September 6, 2000
Groundwater Pump and Treat System activated	August 15, 2001
Source Area Remediation Technology Evaluation Field and Laboratory Pilot Test Work Plan approved	September 26, 2001
Source Area Remediation Technology Evaluation Field and Laboratory Pilot Test initiated	October 29, 2001
First Five-Year Review Report issued	July 24, 2002
Preliminary Closeout Report issued	September 27, 2002
Second Five-Year Review Report issued	September 24, 2007
Vapor Intrusion Work Plan approved	September 2010
Vapor Intrusion Sampling Conducted	November 2010
Vapor Intrusion Evaluation Report – Final	August 2011
Second Round of Vapor Intrusion Sampling	November 2011
Five-Year Review Addendum	December 2011
ESD for 1991 and 1996 RODs	March 13, 2012
Second Vapor Intrusion Evaluation Report – Draft	January 2012
Five Year Review Addendum dated 9/26/2012	September 4, 2014
Environmental Covenant Signed	August 17, 2017

APPENDIX C – SITE INSPECTION CHECKLIST

AVCO Lycoming Superfund Site Five Year Review Inspection Form	
I. SITE INFORMATION	
Site name: AVCO Lycoming Superfund Site	**Date of inspection: April 12, 2017**
Location and Region: Williamsport, PA. Region 3	**EPA ID: PAD003053709**
Agency, office, or company leading the five-year review: USEPA Region 3, HSCD	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- x Access controls
- X Institutional controls
- x Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other _____
- ☐ Monitored natural attenuation
- x Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   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, etc.) 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 _____
_____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & 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
☐ Other _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

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

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

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

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

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

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 **X** Gates secured ☐ N/A
Remarks _____

B. Other Access Restrictions

1. **Signs and other security measures** **X** 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 _____

_____

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 x N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal 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
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal 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 (armored rock, concrete, etc.)** ☐ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

9.	**Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability Areal 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** ☐ Location shown on site map ☐ No evidence of settlement Areal extent_____ Depth_____ Remarks_____	
2.	**Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation Material type_____ Areal extent_____ Remarks_____	
3.	**Erosion** ☐ Location shown on site map ☐ No evidence of erosion Areal extent_____ Depth_____ Remarks_____	

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal 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 Areal 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. **Leachate Extraction Wells**
☐ 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** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____

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

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable x 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 x N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

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

VIII. VERTICAL BARRIER WALLS ☐ Applicable x N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

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

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

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☐ Good condition☐ All required wells properly operating x Needs Maintenance ☐ N/A
   Remarks: *A number of wells at the Memorial Avenue System were offline. RW-15. RW-12, and RW-8. The issues with these wells consists of pump and wiring issues. The PRP stated they plan to have these wells back online but it is not an urgent matter due to the redundancy in capture. The PRP has completed a review of the hydrologic control provided by each well and prioritized wells for pumping. Due to the redundancy provided by the recovery along Memorial Avenue, recovery at these wells has been determined to be of lower priority while their adjacent wells are operational.*

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   x Good condition ☐ Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   ☐ Readily available x Good condition☐ Requires upgrade ☐ Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable x 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)
   - X Metals removal
   - X Oil/water separation
   - ☐ Bioremediation
   - X Air stripping
   - ☐ Carbon adsorbers
   - X Filters
   - ☐ Additive (*e.g.*, chelation agent, flocculent)
   - ☐ Others
   - X 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

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - ☐ N/A
   - X Good condition
   - ☐ Needs Maintenance

   Remarks

3. **Tanks, Vaults, Storage Vessels**
   - ☐ N/A
   - X Good condition
   - ☐ Proper secondary containment
   - ☐ Needs Maintenance

   Remarks

4. **Discharge Structure and Appurtenances**
   - ☐ N/A
   - X Good condition
   - ☐ Needs Maintenance

   Remarks

5. **Treatment Building(s)**
   - ☐ N/A
   - X Good condition (esp. roof and doorways)
   - ☐ Needs repair
   - ☐ Chemicals and equipment properly stored

   Remarks

6. **Monitoring Wells** (pump and treatment remedy)
   - X Properly secured/locked
   - X Functioning
   - ☐ Routinely sampled
   - ☐ Good condition
   - ☐ All required wells located
   - ☐ Needs Maintenance
   - ☐ N/A

   Remarks

D. Monitoring Data

1. Monitoring Data
   - X Is routinely submitted on time
   - ☐ Is of acceptable quality

2. Monitoring data suggests:
   - X Groundwater plume is effectively contained
   - ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

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

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance **x** N/A
Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are 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 to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy selected for the AVCO Lycoming Site is being implemented in accordance with the decision documents and is functioning as designed. Direct contact with soil and groundwater is not expected to pose unacceptable risks under current conditions, because Facility is currently being used for manufacturing operations, and residents are provided public water by the Williamsport Municipal Water Authority. Groundwater cleanup is progressing with the operation of the groundwater treatment systems, but the groundwater has not met the performance standards

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.

O&M procedures appear adequate as the remedial systems did not have any major malfunctions or operational issues. NPDES discharge limits are being met.

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.

No issues and observations such as changes in cost or scope of O&M were or a high frequency of unscheduled repairs were discovered that suggest that the protectiveness of the remedy may be compromised in the future.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

As the levels of contamination are reduced the opportunities for optimization (reduction in monitoring frequency, reduction of monitored parameters) will present themselves.

APPENDIX D – SITE MAPS

Figure 1 :AVCO Lycoming Superfund Site Aerial Map with Remedial System locations

Figure 2: AVCO Lycoming Aerial map with 2011 VI sampling locations

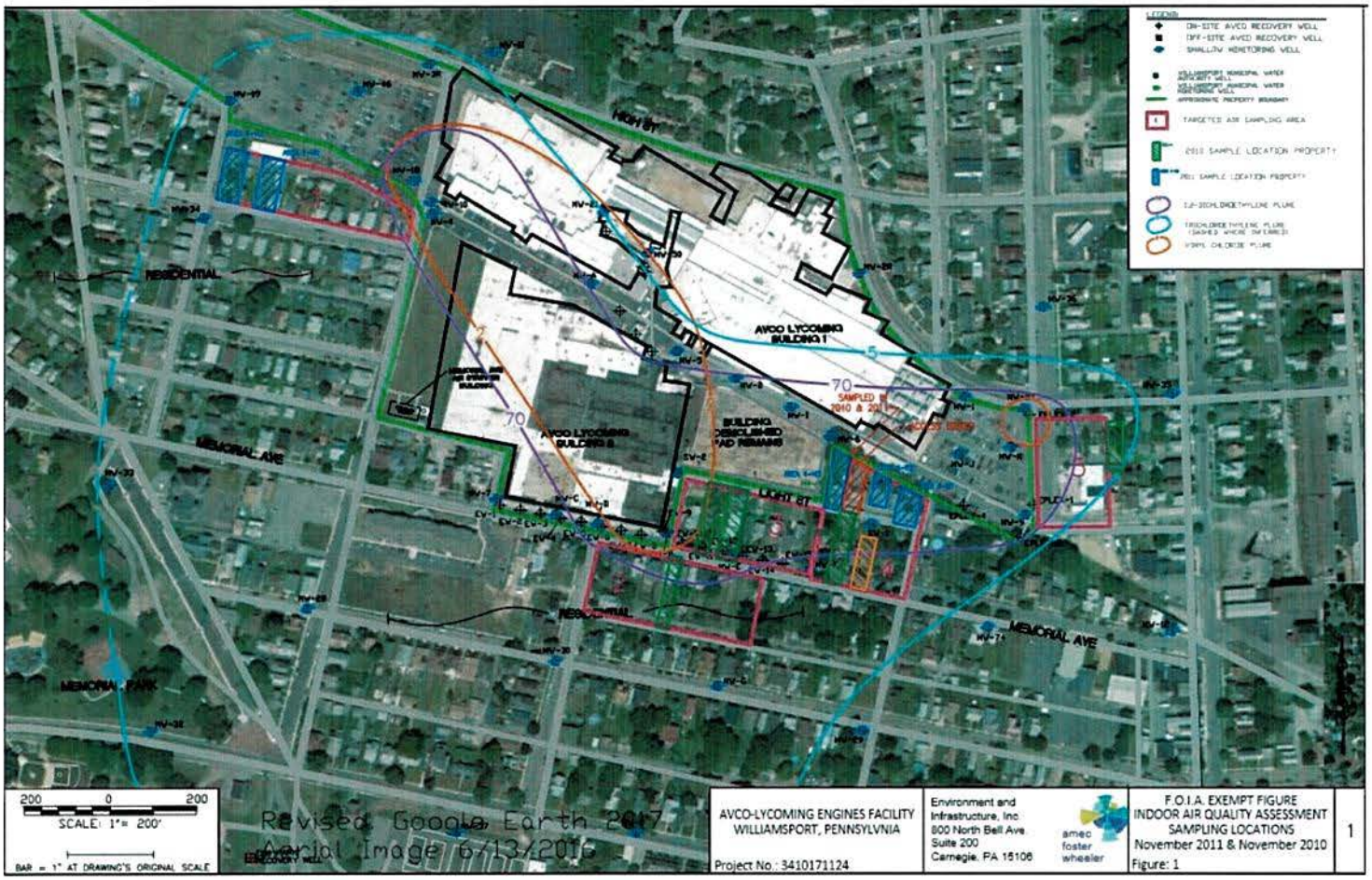


Figure 3: Institutional Controls Map

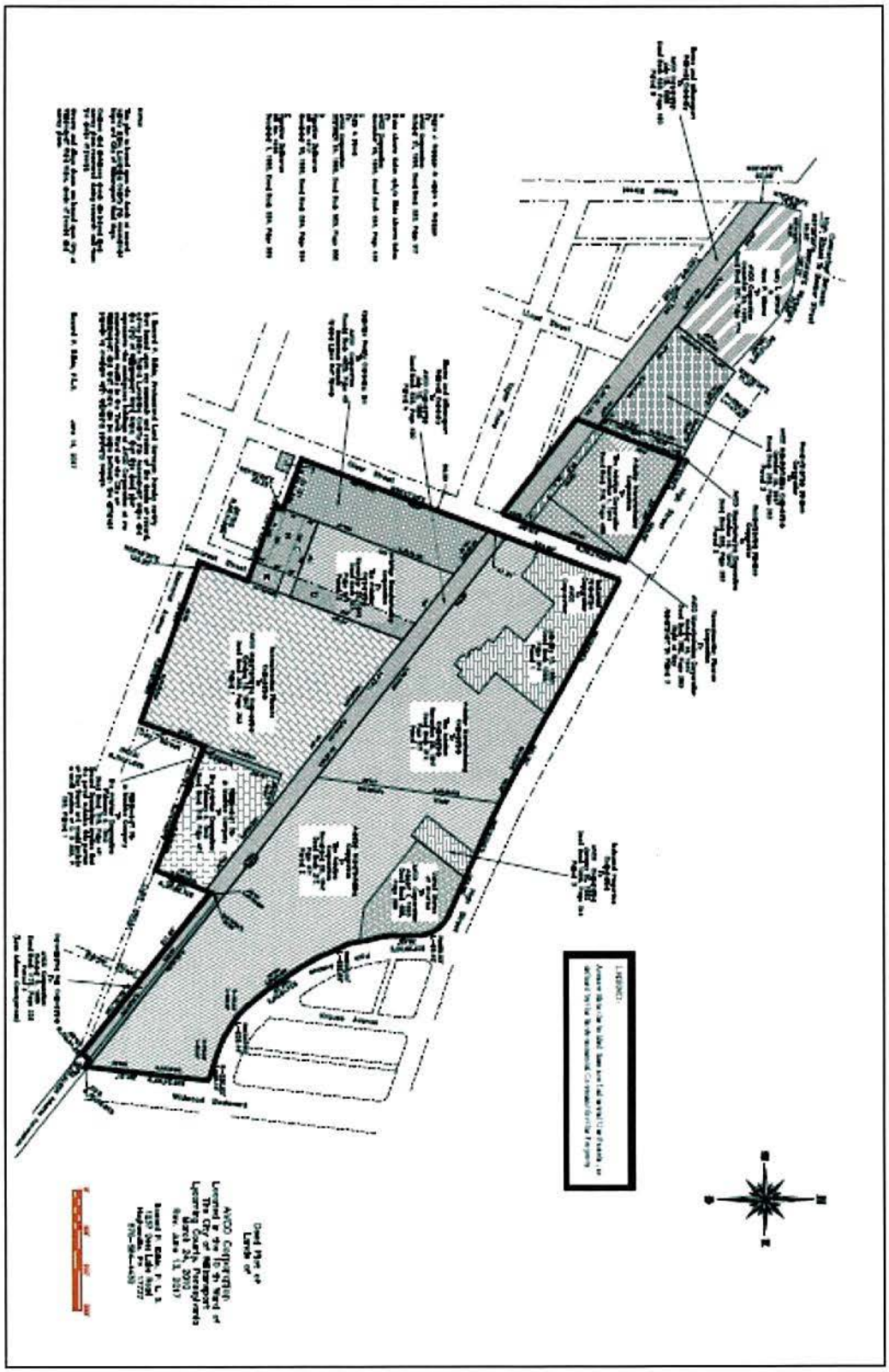
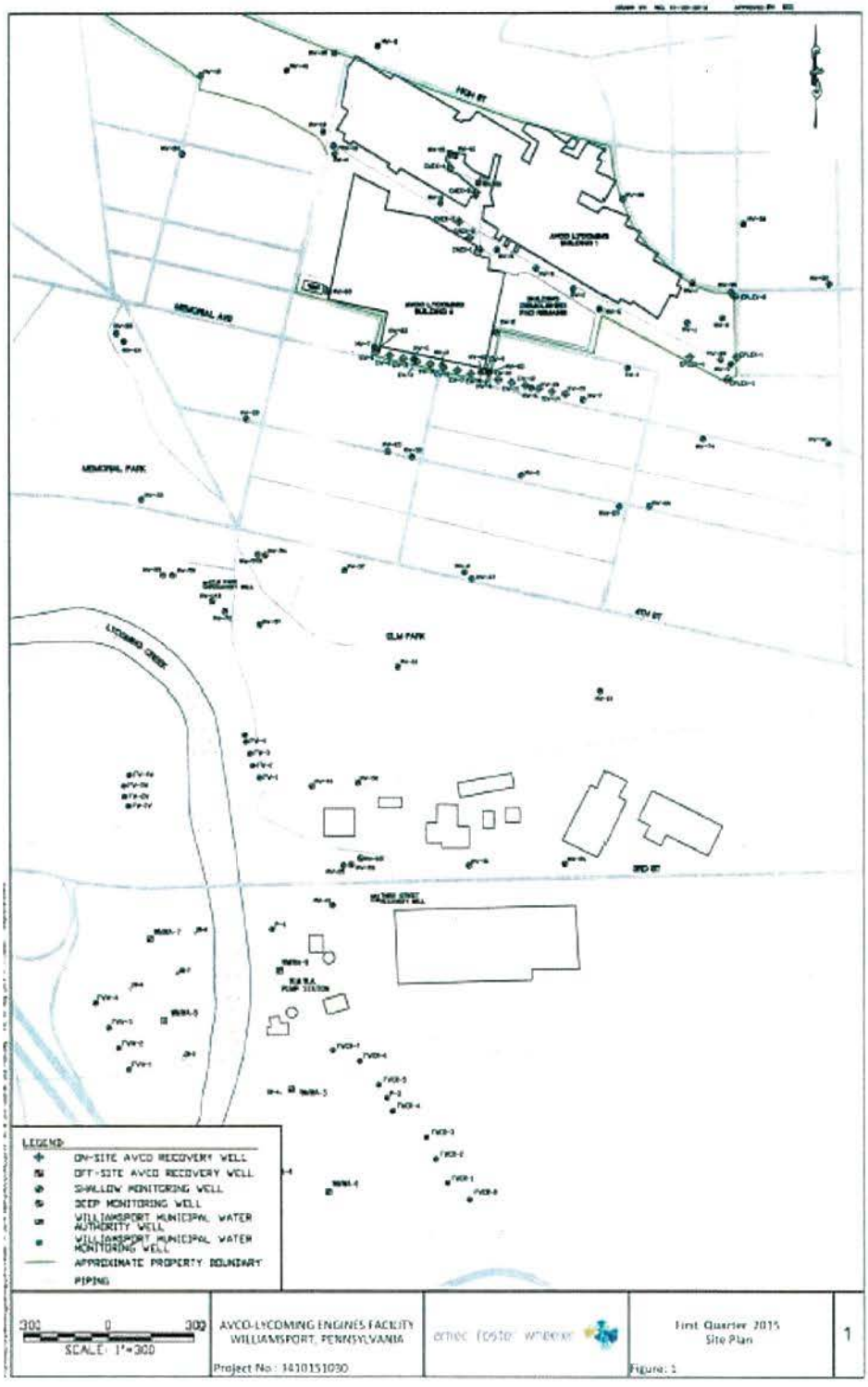


Figure 4: Groundwater Recovery Well Map



APPENDIX E – PUBLIC NOTICE

EPA REVIEWS CLEANUP

Avco Lycoming Superfund Site

The U.S. Environmental Agency is reviewing the cleanup activities conducted at the Avco Lycoming Superfund Site located in Williamsport. 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 2012 determined that the remedy is protective and more investigation is needed to determine protectiveness in the long-term. Findings from the current review being conducted will be available September 2017.

To access the review, or to provide site-related information:
Contact: Cathleen Kennedy, *Community Involvement Coordinator*
Phone: 215-814-2746
Email: kennedy.cathleen@epa.gov

To access detailed site information, including Review Report:
https://www.epa.gov/superfund/avcolycoming

Protecting human health and the environment

APPENDIX F – AIR EMISSIONS RESULTS

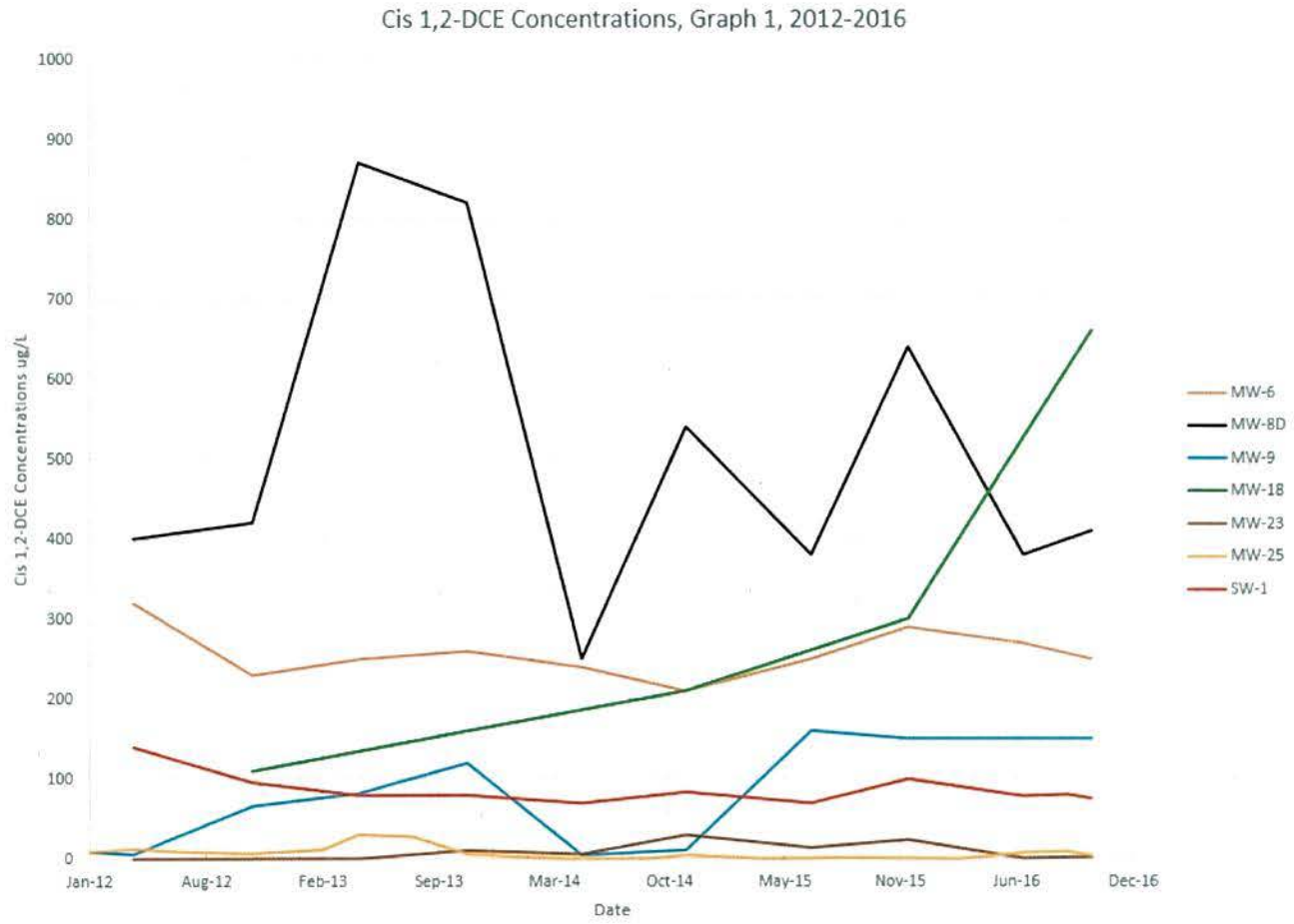
Elm Park Recovery System						
Year	Total Annual Flow (Gallons)	Annual Mean VOC Conc. (µg/l)	TCE Annual Mass Removed (Pounds)	TCE Emission Rate (g/s)	DCE Annual Mass Removed (Pounds)	DCE Emission Rate (g/s)
2012	12,522,668	144.20	13.32	1.92E-04	1.71	2.46E-05
2013	11,784,605	165.43	14.38	2.07E-04	1.85	2.67E-05
2014	12,753,709	122.70	11.58	1.66E-04	1.45	2.09E-05
2015	13,234,529	160.50	15.45	2.22E-04	2.23	3.21E-05
2016	19,344,805	194.00	28.20	4.06E-04	3.05	4.38E-05
Average				2.39E-04		2.96E-05

Third Street Recovery System						
Year	Total Annual Flow (Gallons)	Annual Mean VOC Conc. (µg/l)	TCE Annual Mass Removed (Pounds)	TCE Emission Rate (g/s)	DCE Annual Mass Removed (Pounds)	DCE Emission Rate (g/s)
2012	296,098,526	41.70	88.86	1.28E-03	13.87	1.99E-04
2013	326,721,078	35.30	84.47	1.22E-03	11.55	1.66E-04
2014	238,030,360	31.53	55.06	7.92E-04	7.45	1.07E-04
2015	206,454,794	32.71	49.59	7.13E-04	6.64	9.55E-05
2016	205,050,328	37.25	55.71	8.01E-04	7.90	1.14E-04
Average				9.60E-04		1.36E-04

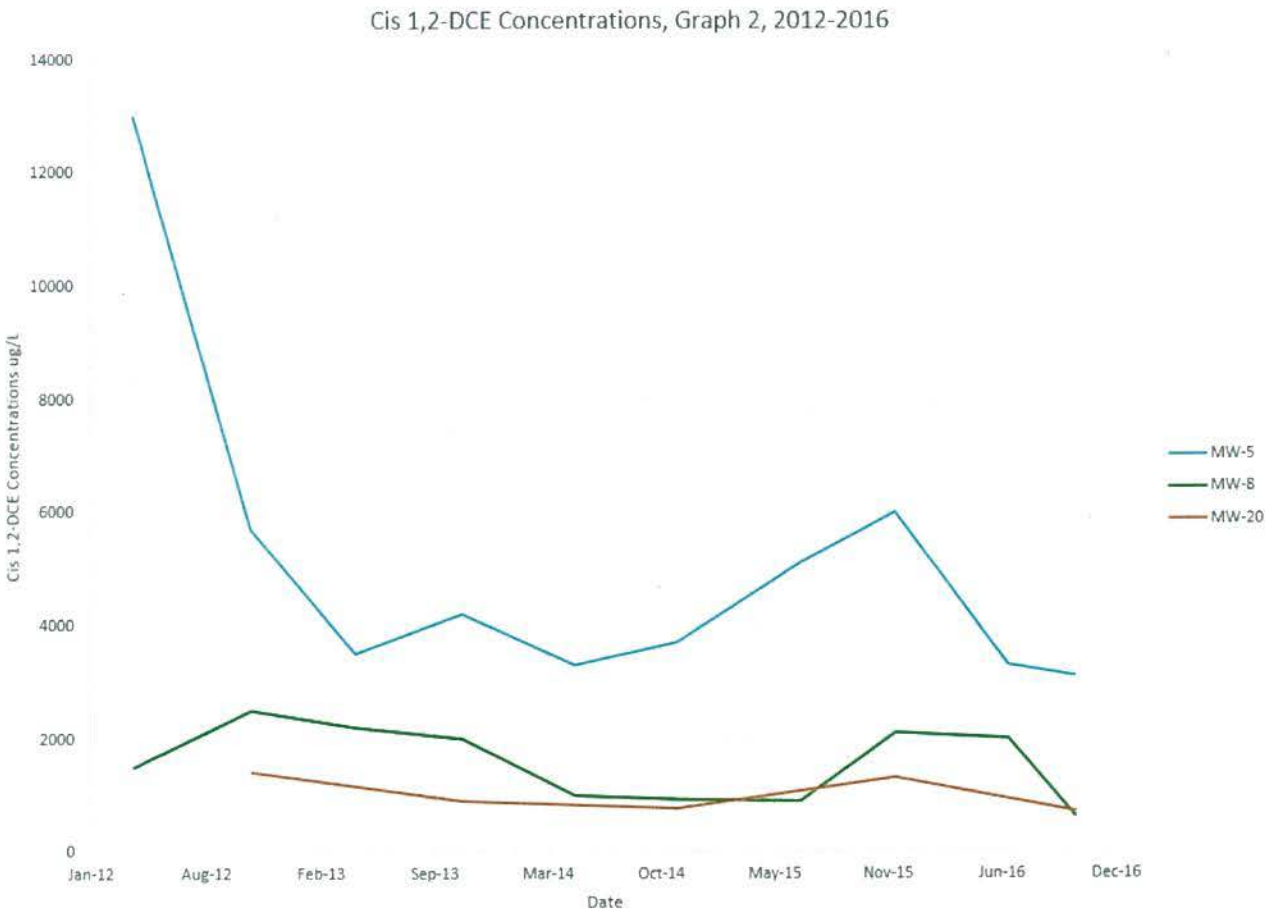
Elm Park Air Stripper Air Modeling Results	TCE	DCE
Average emission rate (g/s)	2.39E-04	2.96E-05
1-hr Maximum Ambient Air Conc. (ug/m3)	0.413	5.12E-02
24-hr Maximum Ambient Air Conc. (ug/m3)	0.1652	0.0205
Annual Average Maximum Ambient Air Conc. (ug/m3)	0.033	0.00411
Maximum emission rate (g/s)	4.06E-04	4.38E-05
1-hr Maximum Ambient Air Conc. (ug/m3)	0.7016	7.57E-02
24-hr Maximum Ambient Air Conc. (ug/m3)	0.2806	0.0303
Annual Average Maximum Ambient Air Conc. (ug/m3)	0.0561	0.0061

Third Street Air Stripper Air Modeling Results	TCE	DCE
Average emission rate (g/s)	9.60E-04	1.36E-04
1-hr Maximum Ambient Air Conc. (ug/m3)	0.3274	0.0464
24-hr Maximum Ambient Air Conc. (ug/m3)	0.131	0.0186
Annual Average Maximum Ambient Air Conc. (ug/m3)	0.0262	0.0037
Maximum emission rate (g/s)	1.28E-03	1.99E-04
1-hr Maximum Ambient Air Conc. (ug/m3)	0.04365	0.0679
24-hr Maximum Ambient Air Conc. (ug/m3)	0.1746	0.0271
Annual Average Maximum Ambient Air Conc. (ug/m3)	0.0349	0.0054

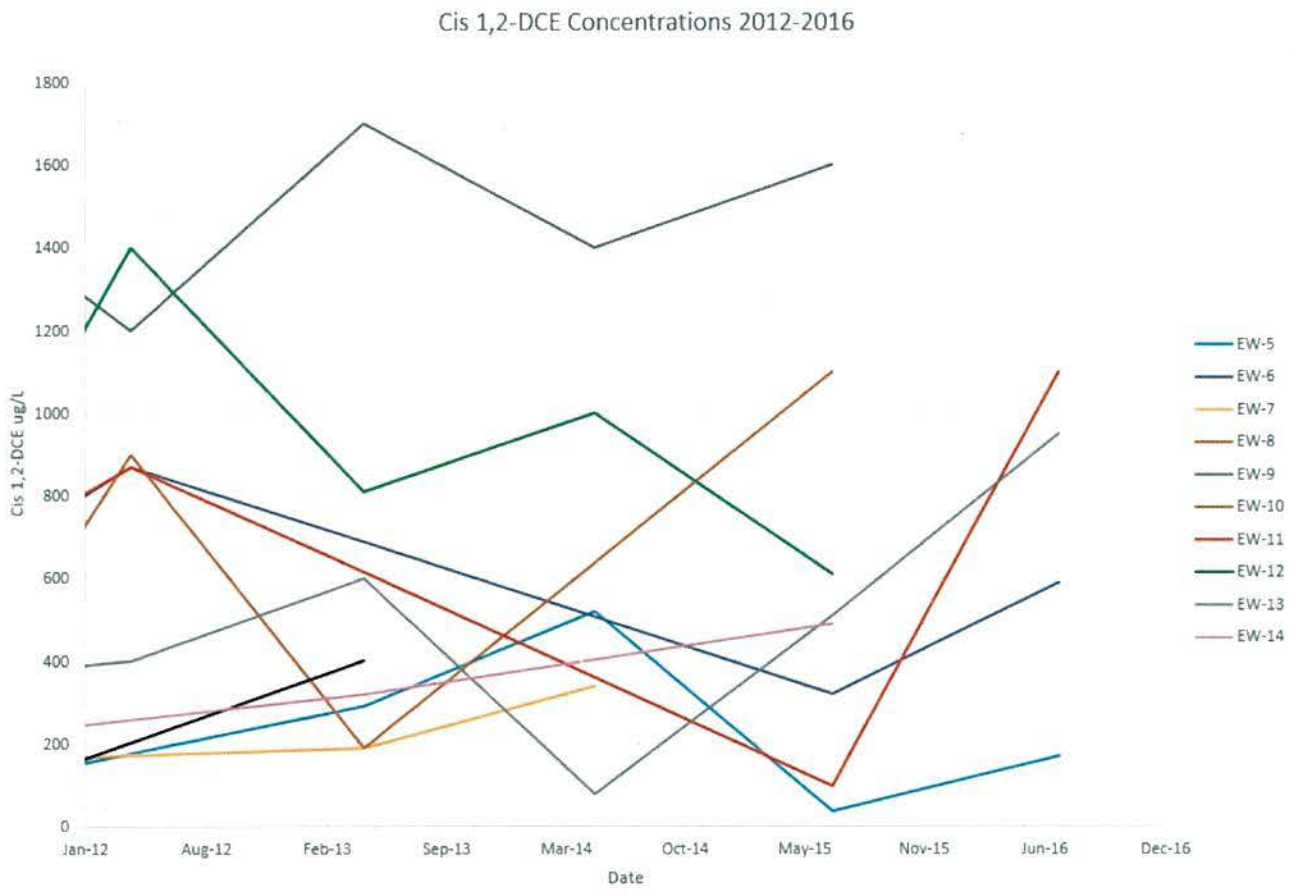
APPENDIX G – GROUNDWATER DATA TRENDS



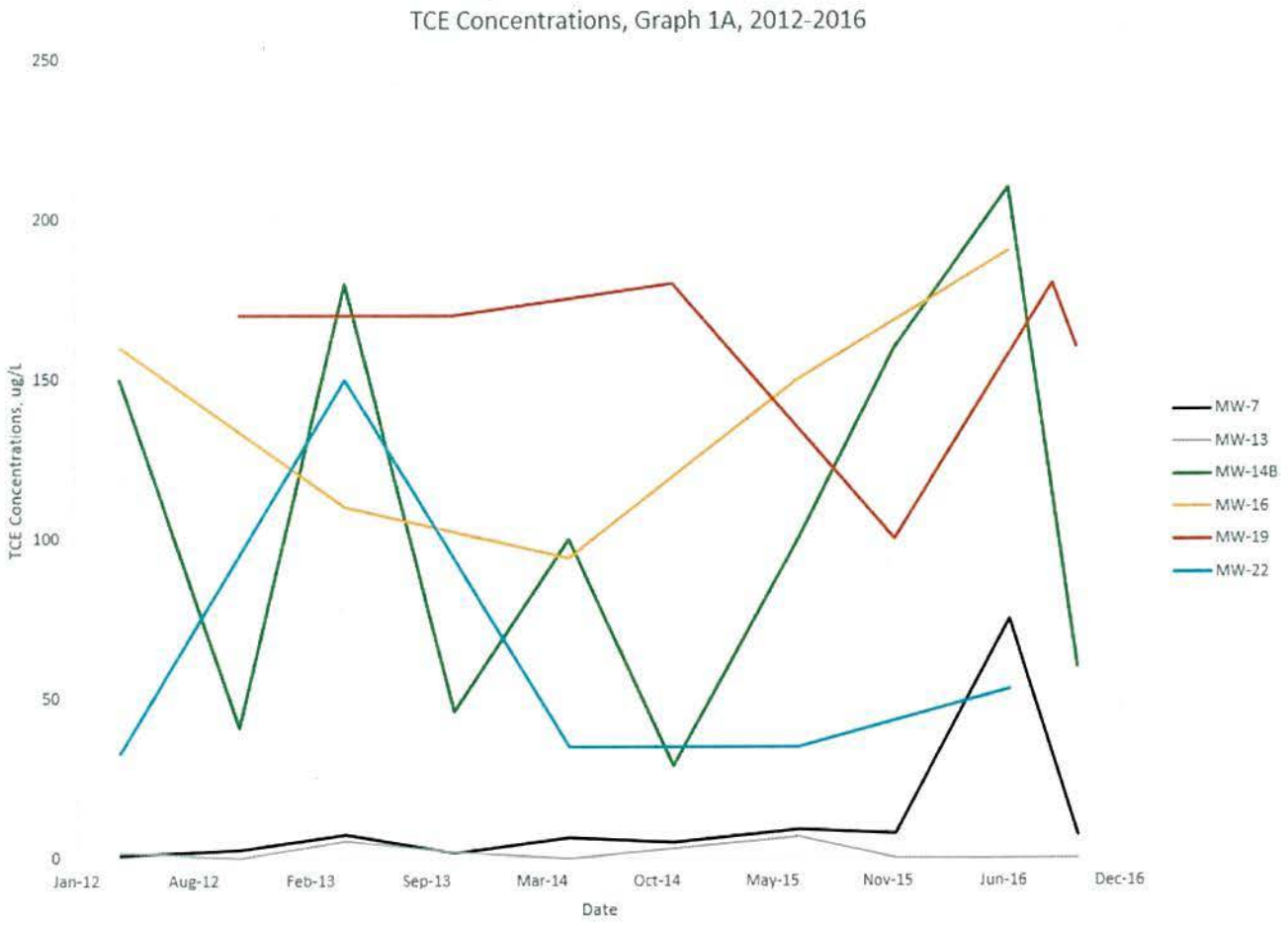
Comments: Graph 1, shows the concentration of Cis 1,2-DCE from January 2012 through December 2016. MW-23 and MW-25 show that the plume is fairly stable and that concentrations are below the MCL of 70 ppb. During the same time frame the data for SW-1 show a stable plume at or slightly above the MCL. MW-8D, MW-6 and MW-18 show a fluctuating plume with concentrations exceeding the MCL throughout the 2012 to 2016 period.



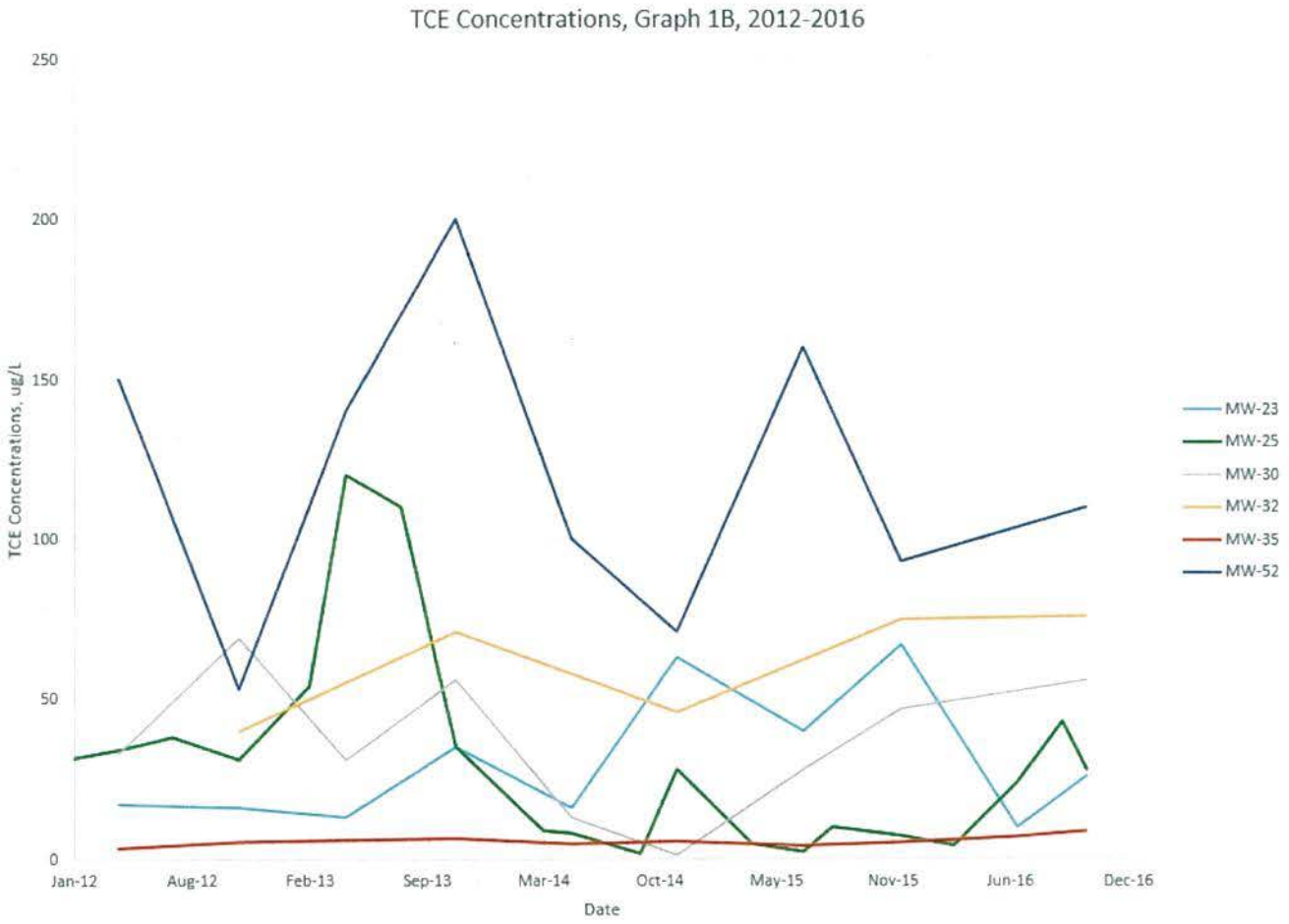
Comments: Graph 2, shows that although MW-20 appears to be stable but above the MCL of 70 ppb. All of the wells (MW-5, MW-8, MW-20) are elevated in concentration but indicate that the process has stalled or is in stagnation. There has been little to no progress with this series of wells over the last four years.



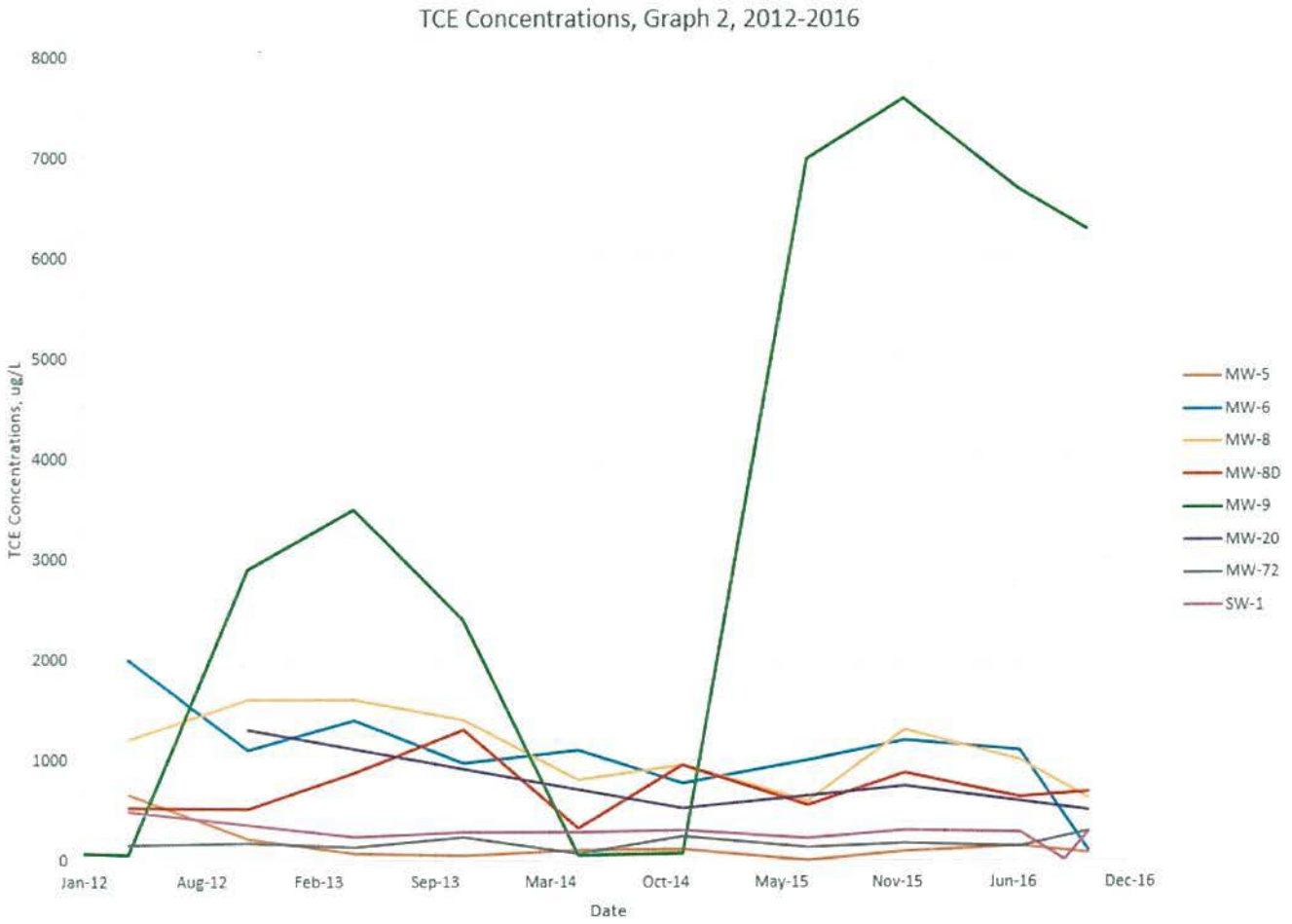
Comments: Graph 3, shows that there is no real stability over this time frame. Concentrations of Cis 1,2 DCE are all extremely inconsistent. Several wells were not ever sampled again for an unknown reason since May 2013, April 2014, July 2015.



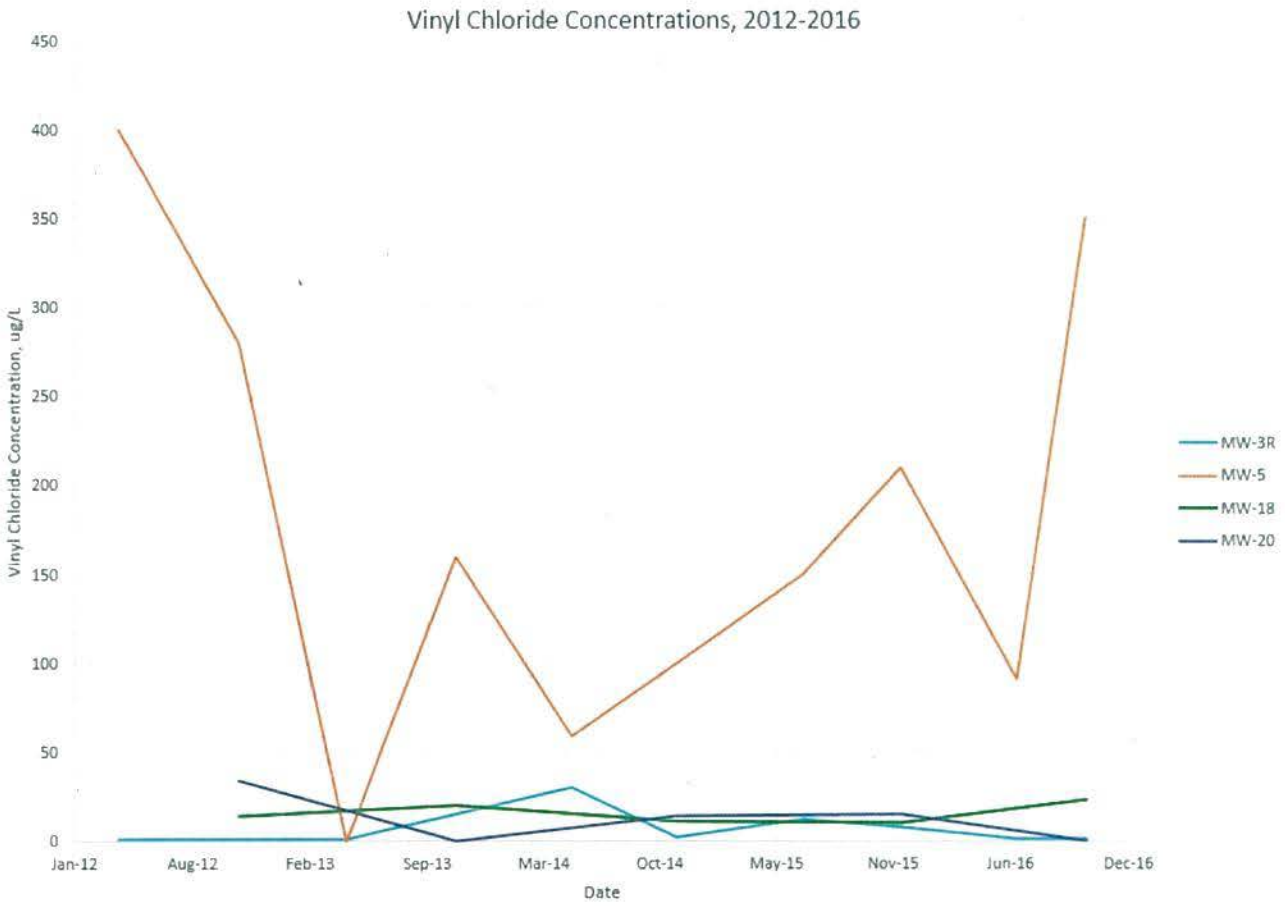
Comments: Graph 4, shows that only one well, MW-13, is on the outer fringes downgradient of the TCE plume with concentrations less than the MCL for TCE. The other wells MW-7, MW-14-B, MW-16, MW-19 and MW22 have concentrations that are highly variable and are above the MCL of 5 ppb.



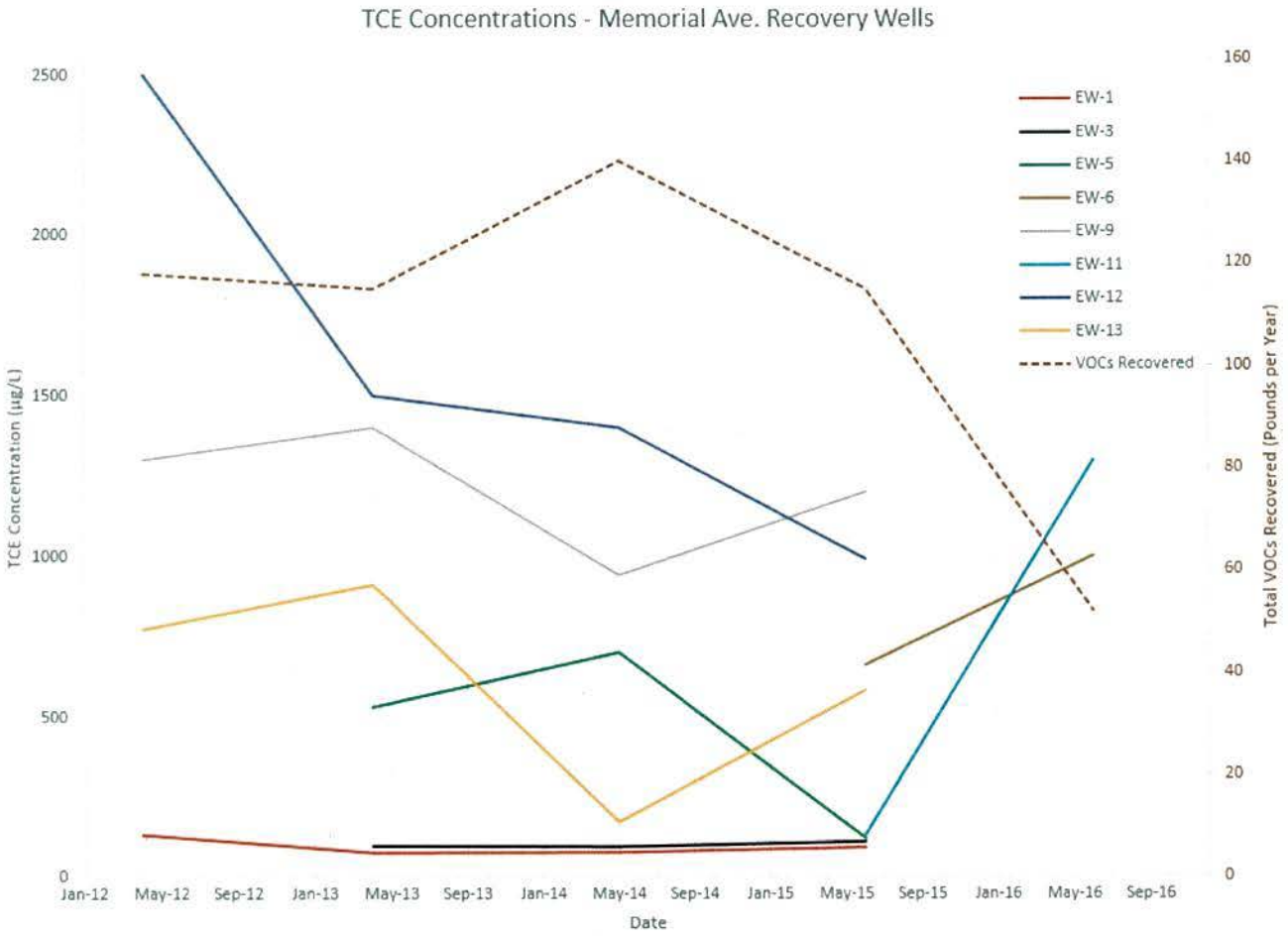
Comments: Graph 5, shows that only one well, MW-35, which appears to be side gradient of the source area and has concentrations of TCE at or below the MCL of 5 ppb. MW-30, appears to be in a transition zone between sections of the TCE plume that have concentrations around 100 ppb. MW-30 therefore fluctuates at concentrations near 50 ppb but has decreased to near MCLs and then increased to 50 ppb again. This graph shows that the TCE concentration in this area of the plume are highly variable.



Comments: Graph 6, shows that well MW-9 is highly variable with values from close to the MCL for TCE of 5 ppb. Some event happened after November 2014 that caused the concentration of TCE in MW-9 to peak at 7,500 ppb November 2015. The other wells MW-5, MW-6, MW-8, MW-8D, MW-20, MW-72 and SW-1 show an overall decrease in TCE concentrations but they still exceed the MCL of 5 ppb. This graph should be redrawn with a different scale and not to include MW-9. Some of these monitoring wells might be getting close to the MCL but it cannot be determined by this graph.



Comments: Graph 7, shows that MW-5 has increased vinyl chloride concentrations which is indicating dichlorination of the TCE in the source area of the plume. The vinyl chloride concentrations for wells MW-3R, MW-18 and MW-20 vary from less than 25 ppb to close to non-detect in October 2016. These wells are also located side gradient to the initial source area. MW-3R and MW-18 are located on the northwestern flank and MW-20 is on the southeastern flank of the TCE plume.



Comments: Graph 8, shows the TCE concentrations compared to the total VOCs recovered in pounds per year. The peak recovery of VOCs occurred in May 2014, since then the recovery has been steadily decreasing. EW-1 seems to have stalled out at the 10 ppb level from March 2013 to May 2016. This also coincides with the low concentrations found in the adjacent well, MW-23.