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

ORIGINAL

Prepared by

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Region III
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Date

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List of Abbreviations

AO	Administrative Order
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIC	Community Involvement Coordinator
COA	Consent Order and Agreement
COC	Contaminant of Concern
DCE	1,2-Dichloroethylene
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Difference
FS	Feasibility Study
FFS	Focused Feasibility Study
GAC	Granular Activated Carbon
HI	Hazard Index
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
MRL	Maximum Risk Level
NCP	National Contingency Plan (the "National Oil and Hazardous Substances Pollution Contingency Plan")
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PADEP	Pennsylvania Department of Environmental Protection
PADER	Pennsylvania Department of Environmental Resources
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SVE	Soil Vapor Extraction
TCE	Trichloroethylene
SVE	Soil Vapor Extraction
VOC	Volatile Organic Compounds
WMWA	Williamsport Municipal Water Authority

Executive Summary

The EPA Region 3 has conducted a five-year review of the remedial acfions implemented at the Avco Lycoming Superfund Site, Williamsport, Lycoming County, Pennsylvania (see Figure 1). This review was conducted from June 2011 to September 2012. The purpose of the five-year review is to determine whether the remedy at the Site is protective of human health and the environment.

The Site includes the Avco Lycoming facility located at 652 Oliver Street in Williamsport, Pennsylvania. (See Figure 1) The facility is approximately 28 acres and is situated next to a residential neighborhood with some light industry nearby. Avco Lycoming is still operating as an aircraft engine production facility.

The media of concern at the Site is groundwater, which is primarily contaminated with volatile organic compounds (VOCs). The VOCs in the groundwater can release vapors which can collect in structures to create a potential risk, thus vapors are an additional media of concern due to the contaminated groundwater. The Williamsport Municipal Water Authority (WMWA) has a well field about 3,000 feet south of the facility, in the direction of groundwater flow.

Groundwater recovery systems both on the facility and off the facility are currently in operation. The recovery systems off the facility are operated under an agreement with the Responsible Party and the Pennsylvania Department of Environmental Protection.

The Five-Year Review process has identified several issues which need to be addressed to ensure protectiveness of human health and the environment. Recommendafions with milestones are provided to address these issues.

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 the 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 rhet 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 the 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.

Government Performance and Results (GPRA) Measure Review

As part of this Five-Year Review, the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

Environmental Indicators
Human Health: Human Exposure Insufficient Data (HEID)
Groundwater Migration: Contaminated Groundwater Migration Under Control (GMUC)

Sitewide Ready for Anticipated Use (SWRAU)
This Site has not achieved Sitewide Ready for Anticipated Use.

Five-Year Review Summary Form

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

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

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name:**
Author name (Federal or State Project Manager): Jill Lowe
Author affiliation: EPA
Review period: 6/14/2011 – 09/2012
Date of site inspection: 2/23/12
Type of review: Statutory
Review number: 3
Triggering action date: 9/24/2007
Due date *(five years after triggering action date)*: 9/24/2012

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:

OU(s): Sitewide	Issue Category: Monitoring			
	Issue: Establish background level for manganese			
	Recommendation: Sample background/upgradient wells for manganese			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	October 30, 2013

OU(s): Sitewide	Issue Category: Changed Site Conditions			
	Issue: Install VI mitigation systems in Area 4 and re-sample to ensure effectiveness			
	Recommendation: Install VI mitigation systems			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	April 30, 2013

OU(s): Sitewide	Issue Category: Monitoring			
	Issue: Perform additional VI sampling at Residence 4 in Area 4			
	Recommendation: Sample for VI			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	February 28, 2013

Five-Year Review Summary Form (continued)

OU(s): Sitewide	Issue Category: Monitoring			
	Issue: Increases in groundwater VOC levels may necessitate additional vapor intrusion sampling throughout the Site			
	Recommendation: Evaluate groundwater VOC levels to assess need for additional vapor intrusion sampling			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	Ongoing

OU(s): Sitewide	Issue Category: Institutional Controls			
	Issue: Implement institutional control on Facility property			
	Recommendation: Place Environmental Covenant on Facility property, or other appropriate mechanism as necessary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	October 30, 2013

OU(s): Sitewide	Issue Category: Monitoring			
	Issue: No recent data for all VOCs, SVOCs, pesticides and metals in groundwater.			
	Recommendation: Submit full-scan analysis of all VOCs, SVOCs, pesticides and metals in grpundwater.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	October 30, 2013

Five-Year Review Summary Form (continued)

Sitewide Protectiveness Statement (if applicable)
Protectiveness Determination: Will be Protective
Protectiveness Statement: 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 the 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 the 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.

Five-Year Review Report

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a Site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this five-year review report pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 Code of Federal Regulations §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The EPA Region 3 has conducted a five-year review of the remedial actions implemented at the Avco Lycoming Superfund Site, Williamsport, Lycoming County, Pennsylvania. This review was conducted from June 2011 through September 2012. The purpose of the five-year review is to determine whether the remedy at the Site is protective of human health and the environment. The methods, findings, and conclusions of the review are documented in this report.

This is the third five-year review for the Avco Lycoming Site. The triggering action for this review is the date of the second five-year review, as shown in EPA's WasteLAN database: September 24, 2007. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The previous Five-Year Reviews were completed as a policy review. Subsequently, EPA assessed institutional controls for the Site and issued an Explanation of Significant Differences (ESD) on March 13, 2012 which required a use restriction for the

Facility property and for groundwater use throughout the plume of groundwater contamination. These use restrictions require the five-year review be completed as a statutory review.

II. Site Chronology

The table below summarizes important events and relevant dates in the chronology of the Avco Lycoming Site.

Table 1: Chronology of Site Events

Event	Date
Proposed to National Priorities List (NPL)	February 2, 1987
Remedial Investigation/ Feasibility Saidy (RI/FS)	June 27, 1988
NPL Listing	February 21, 1990
Record of Decision (ROD) signature for OU1*	June 28, 1991
Explanation of Significant Differences (ESD) for OU1	April 9, 1992
Second FS	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 FS 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 and1996 RODs	March 13, 2012
Second Vapor Intrusion Evaluation Report – Draft	January 2012

*The 1991 ROD selected a remedy for the overburden aquifer beneath the Facility property identified as OU1. The remedial design was suspended for the 1991 ROD and the remedy was not implemented. The 1996 ROD selected a new remedy for the overburden aquifer beneath the Facility property identified as OU2. Both RODs address the contamination in the overburden aquifer beneath the Facility property.

III. Background

Physical Characteristics

The Site includes the Avco Lycoming facility located at 652 Oliver Street in Williamsport, Lycoming County, Pennsylvania. (See Figures 1 and 2) The facility is approximately 28 acres and is situated next to a residential neighborhood with some light industry nearby. Avco Lycoming is still operating as an aircraft engine production facility. The plant includes a still for the reclamation of petroleum solvents and, since 1950, a waste treatment facility. The main plant area is surrounded by an eight-foot high chain link fence, and access to the plant is controlled and monitored by a full-time security force.

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).

Located north and northwest of the Site are two cemeteries. South and southwest of the facility 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 facility. The creek drains into the Susquehanna River which is about 5,000 feet south of the facility. Both the creek and the river are used for recreational purposes. The WMWA well field is about 3,000 feet south of the facility.

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 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.

Land and Resource Use

Portions of the Avco Lycoming property were first used for manufacturing purposes in the early 1900s. 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 plant property was purchased by Avco Corporation. At the time, as well as today, plant operations center primarily in the manufacture and repair of aircraft engines.

In February 1985, Textron, Inc. acquired Avco, 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 facility will be referred to as the Avco Lycoming facility in this report.

The WMWA provides drinking water to all the residences within the Site plume. The drinking water is primarily taken from surface water, but in times of drought the well field, which extracts water from the aquifers, is utilized. Extracted groundwater is treated by the WMWA and pumped to a surface reservoir for storage prior to distribution.

History of Contamination

The Avco Lycoming facility is an industrial facility that uses oils, solvents and chemicals for various processes. In the past, some of these processes resulted in occasional spills of these materials. Contamination in groundwater at the Site consists mostly of volatile organic compounds (VOCs), specifically trichloroethylene (TCE), vinyl chloride, and 1,2-dichloroethylene (DCE). The shallow aquifer beneath the western section of the property was contaminated with total chromium and hexavalent chromium. (See Figure 2 for a Site Plan)

Initial Response

Groundwater investigation and remediation completed by Avco Lycoming prior to the listing of the Site on the EPA's National Priorities List (NPL) were governed by the Consent Order and Agreement (COA) executed November 25, 1985, between Avco Lycoming and the Pennsylvania Department of Environmental Resources (PADER) (now the Pennsylvania Department of Environmental Protection (PADEP)). The COA directed Avco Lycoming to develop and implement a Remedial Action Plan to cleanup contaminated groundwater at and near the Facility. Avco successfully complied with PADEP's directive by evaluating the on and off-Facility shallow groundwater contamination, installing and regularly sampling groundwater monitoring wells, and installing three on-Facility and two off-Facility recovery wells and associated treatment systems. Avco Lyoming still operates the off-Facility recovery wells and treatment system 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/FS was conducted to identify the types, quantities and locations of contaminants and to develop ways of addressing the contamination problems.

Basis for Taking Action

The RI identified that both the shallow and deep aquifers were contaminated with TCE, 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 contaminants of concern at the Site.

The contaminants of concern 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 Risk Assessment for the Site determined that the actual or threatened future risk from this Site, if not addressed by a remedial action, presents a potential threat to public health, welfare or the environment. The Risk Assessment evaluated soil risk on a limited exposure basis.

IV. Remedial Actions

Remedy Selection

Based on the results of the RI/FS, on June 28, 1991, EPA issued a ROD (1991 ROD) for Operable Unit One (OU-1) to contain, recover and treat contaminated groundwater beneath the

Facility. The 1991 ROD called for the contaminated groundwater beneath the Facility to be extracted, treated and discharged to nearby Lycoming Creek. The chromium-contaminated groundwater would be recovered through a series of extraction wells, treated and discharged. The VOC-contaminated groundwater would be recovered through a series of extraction wells, treated on-site using air-strippers and discharged. The ROD also called for institutional controls in the form of limiting future property use to those activities compatible with Site conditions (i.e. industrial use).

The 1991 ROD addressed only the contaminated groundwater in the shallow aquifer beneath the Facility. The groundwater plume outside the boundaries of the Facility was to be addressed as a separate operable unit, after additional studies of that area. In the interim, this plume was to be remediated through the existing off-Facility recovery and treatment systems required by the COA that Avco had entered into with PADEP, dated November 1985.

The Remedial Action Objective (RAO) for the 1991 ROD was to recover groundwater from under and on the Facility and treat the contamination to restore the groundwater quality to beneficial use as a drinking water aquifer.

On April 9, 1992, EPA issued an Explanation of Significant Differences (ESD), which modified the 1991 ROD in several ways. The ESD changed the time frame for remediation, identified when recovery well pumping would be discontinued, and redefined the area of attainment.

On December 30, 1996, the EPA issued a new ROD (1996 ROD) for groundwater contamination in the shallow aquifer beneath the Facility. The 1996 ROD modified the groundwater remedy for the shallow aquifer identified in the 1991 ROD. The remedy selected in 1996 consisted of two types of treatment for the shallow aquifer beneath the Facility: 1) air sparging and Soil Vapor Extraction (SVE) for treatment of the VOCs; and 2) in-situ metals precipitation for treatment of chromium. The 1996 ROD did not address contamination present in the aquifer beyond the Facility and in the deep aquifer. The 1996 ROD stated that contaminated groundwater in those areas would be addressed in a future ROD.

The RAO for the 1996 ROD was similar to the RAO for the 1991 ROD. It was to restore the contaminated aquifer to levels that are protective of human health, thus allowing beneficial use of the aquifer. The chart below identifies the cleanup levels specified in the 1996 ROD.

Chemical	Concentration limits (ug/l)
1,2 – Dichloroethene	70
Cadmium	3
Chromium VI	32
Trichloroethene	5
Vinyl Chloride	2
Manganese	50

In April 2000, EPA issued a ROD Amendment to the 1996 ROD. The ROD Amendment identified three areas of concern:

- Shallow aquifer beneath the Facility – groundwater contamination beneath the Avco Lycoming Facility in the shallow aquifer, which is also known as the overburden aquifer.
- Source Areas – areas of high contamination, called "hot spots", in the shallow aqmifer beneath the Avco Lycoming Facility. The "hot spots" are specifically found in both the east parking lot area and the central plant area.
- Shallow aquifer beyond the Facility/Deep aquifer throughout the Site – groundwater contamination beyond the property boundaries of the Avco Lycoming Facility in the shallow aquifer and groundwater contamination in the deep aquifer throughout the Site. The deep aquifer is also known as the bedrock aquifer.

The remedy outhned in the ROD Amendment included different actions for the three areas of concern. The actions included a groundwater recovery system to effectively capture groundwater contaminated with VOCs in the shallow aquifer beneath the Facility. Source reduction for the "hot spots" using either one, or a combination, of the following technologies: a) air sparging/SVE; b) groundwater extraction; c) and, in-situ oxidation. The shallow aquifer beyond the Facility and the deep aquifer throughout the Site were to be remediated using the existing downgradient extraction systems, which are operating under the COA between Avco and PADEP.

An ESD was issued in March 2012 to amend the 1996 ROD and the 2000 ROD Amendment. The ESD was to add a risk-based remediation standard which would be evaluated after Maximum Contaminant Levels (MCLs) are attained, and to clarify institutional controls for the facility property and to establish institutional controls for groundwater use within the plume of groundwater contamination. EPA held a comment period for the proposed ESD from October 27, 2011 through November 25, 2011. PADEP concurred with the ESD.

Remedy Implementation

In April 1992, Avco submitted an application to PADEP for a National Pollutant Discharge Elimination System (NPDES) permit to discharge treated water to the Lycoming Creek as part of the design effort to implement the 1991 ROD. In May 1992, EPA issued Avco an Administrative Order (AO) which required Avco to implement the 1991 ROD as modified by the 1992 ESD.

Activities for the remedial design of the groundwater extraction and treatment system began in December 1992. The design of the groundwater recovery and treatment system was at the treatability study phase and could not proceed until the NPDES permit was issued.

After the NPDES permit was issued, EPA notified Avco that it should continue implementing the design work plan and begin performing the treatability study. It was at this time that Avco made a formal request to EPA to perform a pilot study at the Site for an in-situ remedy that could be used in place of the groundwater extraction and treatment remedy called

for in the 1991 ROD. The new technologies were thought to have a favorable remediation time frame and would eliminate the discharge required in the 1991 ROD. EPA and PADEP evaluated Avco's proposal and granted approval for a six month pilot study to be implemented at the Site. The design work plan for the groundwater recovery and treatment system was suspended pending the results of the pilot study.

In August 1995, Avco submitted the work plan for the pilot study. Because of the different contaminants in the plume, the pilot study work plan included field design tests to be performed at separate locations within the Facility. The first field design test was implemented in October 1995 and consisted of air sparging and SVE at three separate locations in the eastern and central areas of the Facility. The second field design test was implemented in November 1995 and consisted of a metals-precipitation test in the western portion of the Facility. The results of the air sparging/SVE and in-situ metals precipitation pilot tests were reported to the EPA in April and June 1996, respectively. The results indicated that each test was successful. As a result, EPA requested that Avco conduct a Focused Feasibility Study (FFS) comparing these technologies to the conventional groundwater extraction and treatment remedy selected in the 1991 ROD.

On December 30, 1996, the EPA issued a new ROD (1996 ROD) for groundwater contamination in the shallow aquifer beneath the Facility. On August 25, 1997, EPA amended the 1992 AO issued to Avco to document the issuance of the 1996 ROD and to change the definition of "ROD" in the 1992 AO to encompass the 1996 ROD, so that the work to be performed under the AO would reflect the change in remedy selection.

The in-situ metals precipitation work called for in the 1996 ROD has been concluded. The metal precipitation system reduced the level of chromium contamination in the shallow aquifer beneath the Facility with the exception of two wells located on the Facility. EPA and PADEP concluded that the continued operation of the in-situ metals precipitation remedy would no longer effectively reduce the level of chromium in the shallow aquifer beneath the Facility. The wells continue to be monitored as part of the Site Operations and Maintenance Plan and will be monitored until the chromium and cadmium levels are below action levels for 12 consecutive quarters. Currently, the chromium levels fluctuate moderately above and below the cleanup levels established in the 1996 ROD.

During the installation of the air sparging and SVE wells in May 1998, Avco's design consultant determined that the designed remedy would not be effective due to subsurface geologic conditions, which were different from the conditions encountered during a pilot study conducted prior to the 1996 ROD. As a result, at the direction of the EPA, all available geologic and hydrogeologic data for the Site was compiled by Avco and thoroughly evaluated by Avco and EPA. It was determined that the plume had not varied in size much through the years and that geology causes the contaminated groundwater to move from north to south, concentrated under the center of the Facility.

The 1996 ROD was amended by the 2000 ROD Amendment to select a groundwater recovery system as the remedy for contaminated groundwater. EPA amended the AO issued to Avco so that the work to be performed under the AO would reflect the 2000 ROD Amendment

change in remedy selection.

The groundwater recovery system was activated on August 15, 2001 to treat the groundwater contamination beneath the Avco Lycoming Facility in the shallow aquifer. A Remediation Technology Evaluation was conducted for the "hot spots." In addition to groundwater recovery and treatment, the Central Area includes a mineral oil recovery system as a result of the Evaluation and Pilot Test. The oil recovery system continues to operate on a reduced scale due to the minimal amount of oil that remains in the area. The East Parking Lot Area also had groundwater extraction wells installed to target the "hot spots" as a result of the Remediation Technology Evaluation.

The Preliminary Closeout Report was issued for the Site on September 27, 2002. The Report documents that the EPA completed construction activities at the Avco Lycoming Superfund Site in accordance with *Closeout Procedures For National Priorities Sites* (OSWER Directive 9320.2-09A-P).

System Operation/Operation and **M**aintenance

The operations and maintenance (O&M) of the various remediation systems constructed in accordance with the Site RODs are the responsibility of Avco, the responsible party. Progress Reports on the O&M are submitted quarterly to the EPA. Yearly, Avco submits an in-depth assessment of the remedial activities. Both the progress reports and the annual report are provided in accordance with the AO that EPA has with the responsible party.

The Site consists of approximately thirty three groundwater monitoring wells which are sampled at various times throughout the year. Table 2 (at end of report) contains the well sampling schedule for the various wells. Results from the sampling events are summarized in the quarterly O&M progress reports and in the yearly O&M Report. The results are discussed in the data review section of this Five-Year Review.

Memorial Avenue System

The Memorial Avenue System (See Figure 2) consists of fifteen extraction wells located on the downgradient edge of the facility property to control the off-facility migration of the contaminated plume. The extraction wells are piped to the treatment facility which uses a horizontal tray stripper to remove the VOCs in the groundwater. The treated groundwater is discharged to Lycoming Creek and the vapor phase from the air stripper is released after treatment through Granular Activated Carbon. The system has undergone routine maintenance through the years. These include pump repair and replacement, as well as, replacement of level sensors and flow meters. The Memorial Avenue Systems has operated on virtually a continuous basis for the last five years.

Central Area System

The Central Area System (See Figure 2) was put into place to address an area identified with light non-aqueous phase liquid (LNAPL) which was believed to be from former underground storage tanks, that stored a type of mineral spirits, located hydraulically upgradient of the area. The system consists of six extraction wells which are pumped to the Central Area

Treatment Building into an oil/water separator. The water is then sent to the Memorial Avenue System for treatment.

In April 2007, the Central Area recovery system was shut down for evaluation of the system in accordance with the Central Area Product Recovery Assessment. The assessment was conducted to optimize the system's operation. The Central Area wells were cleaned to ensure that they were in proper communication with the aquifer to determine whether LNAPL remains in the area. Following two months of system shutdown, well CAEX-3 (refer to Figure 3) was the only system well with an appreciable amount of LNAPL. Avco, in agreement with EPA, reinstalled the recovery pump in CAEX-3 to approximately two feet below the liquid level. Additionally, a well sock was installed in well CAEX-1 to recover the minimal amount of LNAPL detected in the well. During the last five years of operation minimal amounts of oil have been collected.

East Parking Lot Recovery System

The East Parking Lot System (See Figure 2) was put into place to address a "hot spot" of TCE and DCE. The system includes four extraction wells which recover groundwater from the "hot spots" and transports the water to the Memorial Avenue System for treatment. The system has undergone routine maintenance throughout the years. In 2010, several of the wells were down for extended periods of time for maintenance. This area continues to have high concentrations of TCE.

Elm Park Recovery System

The Elm Park Recovery System (See Figure 2) has operated since 1987 in accordance with an agreement between the Responsible Party and PADEP. The system was put into place to control contaminants which had migrated off the Facility. The Elm Park well is installed into the shallow bedrock and an air stripper is located at the well head. The system treats approximately 25 gallons a minute and discharges the treated water to the Lycoming Creek. Routine maintenance is conducted by Avco. In 2011 the system was shut down for approximately two weeks to replace a blower motor.

Third Street Recovery System

The Third Street Recovery System (See Figure 2) was installed and has operated since 1987. The system was intended to act as a barrier to the WMWA well field by collecting contaminated groundwater prior to the well field. The well is pumped in excess of 500 gallons per minute and the groundwater is treated by an air stripper and then discharged into Lycoming Creek. Routine maintenance is provided by Avco in coordination with WMWA.

V. Progress Since the Last Review

The protectiveness statement from the last Five-Year Review (September 2007) was as follows:

A protectiveness determination of the remedy at the Avco Lycoming Superfund Site cannot be made at this time. Vapor intrusion needs to be assessed, since vapor intrusion may affect the current protectiveness. It is estimated that this assessment will take approximately two years to design and complete, at which time a protectiveness determination will be made for the Site.

Direct contact with soil and groundwater is not expected to pose unacceptable risks under current conditions (i.e., exposure is currently being prevented). Groundwater cleanup is progressing with the operation of the groundwater treatment systems, but the groundwater has not met performance standards. EPA will modify the remedy to develop and evaluate risk-based chemical specific remediation goals for groundwater that are protective of human health and the environment, to be considered along with the MCLs.

To ensure future protectiveness, several issues need to be resolved. Verification is required that the entire plume is being captured at the off-facility recovery systems. An assessment of manganese and 1,4-dioxane levels in groundwater is required along with an assessment to determine if the manganese standard in the decision document is still appropriate. The sampling of GM-3, GM-4 and PRW-10 must continue for cadmium and chromium. The emissions from the Third Street and Elm Park Recovery Systems need to be modeled. Lastly, the remedy for the Site should be modified to require institutional controls to prohibit groundwater use within the plume. EPA should then work with the City of Williamsport and the Responsible Party to implement the appropriate institutional controls.

In December 2011, an addendum to the 2007 Five-Year Review was issued based on the results from the Vapor Intrusion Evaluation Report dated February 2011. The protectiveness statement from the addendum was as follows:

The remedy which has been implemented at the Avco Lycoming Superfund Site is protective of human health and the environment in the short term. The vapor intrusion assessment that was conducted in November 2010 concluded that currently vapor intrusion is not an issue at the Site, but there is a potential for future vapor intrusion in several areas. Additional sampling will occur and further evaluation of vapor intrusion will be conducted in the next Five-Year Review.

Direct contact with soil and groundwater is not expected to pose unacceptable risks under current conditions (i.e., exposure is currently being prevented). Groundwater cleanup is progressing with the operation of the groundwater treatment systems, but the groundwater has not met performance standards. EPA intends to modify the remedy to develop and evaluate risk-based chemical specific remediation goals for groundwater that are protective of human health and the environment, to be considered along with the MCLs.

To ensure future protectiveness, several issues need to be resolved. Verification is required that the entire plume is being captured at the off-facility recovery systems. An assessment of manganese and 1,4-dioxane levels in groundwater is required along with an assessment to determine if the manganese standard in the decision document is still appropriate. The sampling of GM-3, GM-4 and PRW-10 must continue for cadmium and chromium. The emissions from the Third Street and Elm Park Recovery Systems need to be modeled. Lastly, the remedy for the Site should be modified to require institutional controls to prohibit groundwater use within the plume. EPA should then work with the City of Williamsport and the Responsible Party to implement the appropriate institutional controls.

The following issues and recommendations were identified in the previous Five-Year

Review (2007).

Issues

Issue	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. Develop and evaluate risk-based chemical specific remediation for groundwater after attainment of MCLs	**N**	**Y**
2. Determine levels of manganese in groundwater and determine if the manganese standard in the decision document is still appropriate	**N**	**Y**
3. Define plume and capture around Elm Park Recovery System and the Third Street Recovery System	**N**	**Y**
4. Vapor Intrusion	**Y**	**Y**
5. Determine if 1,4-dioxane is present in groundwater	**N**	**Y**
6. Metals cleanup levels not attained	**N**	**Y**
7. Determine if emissions from Third Street and Elm Park Recovery Systems pose an unacceptable risk to human health	**N**	**Y**
8. No established institutional controls for groundwater use	**N**	**Y**

Recommendations and Follow-Up Actions

Issue	Recommendations And Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current (Y/N)	Future (Y/N)
1.	**Modify the remedy to develop and evaluate risk-based chemical specific remediation goals for groundwater after attainment of MCLs.**	**EPA**	**EPA**	**9/31/2008**	**N**	**Y**
2.	**Sample for manganese over the next year and determine if the manganese standard in the decision document is still appropriate.**	**PRP**	**EPA**	**3/15/2009**	**N**	**Y**

Issue	Recommendations And Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current (Y/N)	Future (Y/N)
3.	**Provide plume map and capture analysis for Elm Park Recovery System and Third Street Recovery System.**	**PRP**	**EPA**	**3/15/2008**	**N**	**Y**
4.	**Develop and implement plan for assessing vapor intrusion into residences.**	**PRP**	**EPA**	**7/30/2009**	**Y**	**Y**
5.	**Sample 1,4-dioxane over the next year.**	**PRP**	**EPA**	**3/15/2009**	**N**	**Y**
6.	**Continue sampling of GM-3, GM-4 for chromium and cadmium**	**PRP**	**EPA**	**3/15/2008 (continue the yearly sampling)**	**N**	**Y**
7.	**Model emissions from Third Street and Elm Park Recovery Systems.**	**PRP/EPA**	**EPA**	**1/24/2008**	**N**	**Y**
8.	**Modify remedy to establish prohibitions on installing drinking water wells in the plume of contamination, then implement institutional controls.**	**EPA City of Williams-port PRP PADEP**	**EPA**	**7/24/2009**	**N**	**Y**

Actions taken to resolve the issues identified above:

Issue # 1: *Develop and evaluate risk-based chemical specific remediation goals for groundwater after attainment of MCLs.* This issue has been addressed by issuing an ESD on March 13, 2012. The ESD added the requirement for the development of risk-based chemical specific remediation goals, based on the concentration of individual contaminants in the Site monitoring wells. When the MCLs have been attained for all the contaminants of concern, a contaminant specific risk assessment will be developed to assure that the remediation is protective of human health and the environment.

Issue # 2: *Determine the levels of manganese in groundwater and determine if the manganese standard in the decision document is still appropriate.* The Potentially Responsible Party (PRP) sampled for manganese and results indicated levels above the ROD standard of 50 ug/L. A correlation analysis has been performed of the manganese concentrations versus the VOC concentration in the groundwater to aid in determining if manganese is Site-related or background. In an email dated April 28, 2008, the EPA toxicologist stated that there are no

indications that the manganese concentrations are correlated to the VOC concentrations. PADEP noted in their comment letter dated July 20, 2007 that in 2006 PADEP adopted the EPA Lifetime Health Advisory Level for Manganese of 300 ug/L as the Act 2 MCL. The EPA Toxicologist developed a Site Specific risk-based value for manganese at a concentration of 320 ug/L (0.320 mg/L) which would yield a Hazard Index (HI) of 1 for the child, and would also yield an acceptable HI for the adult (0.4), with the central nervous system as the target organ. Naturally occurring manganese may exceed 320 ug/L; in that case, background/upgradient concentrations would usually supersede the risk-based performance goal.

During the manganese sampling conducted in October 2007, only one background well was sampled for manganese (MW-2) and the level was 1780 µg/L of dissolved manganese. Additional upgradient and background wells should be assessed to determine the background level of manganese. During the Site visit for the 2012 Five-Year Review, the PRPs discussed developing a plan to investigate the background levels of manganese. PADEP agreed that the background levels of manganese may be higher than PADEP's new action level. EPA will assess whether to set the performance standard for manganese at the background level based on investigation results.

Issue # 3: *Define the plume and capture around the Elm Park Recovery System and Third Street Recovery System.* The plume and capture of groundwater around the Elm Park Recovery System and the Third Street Recovery System have been determined adequate. EPA's hydrogeologist reviewed the Capture Zone Analysis and the 2010 O&M Report for the Site and determined that the plume has been adequately defined and is being captured by the pump and treat systems.

Issue #4: *Vapor Intrusion.* The PRP submitted a Vapor Intrusion Evaluation Work Plan for EPA's review in February 2010. Sampling of the residences occurred in November 2010 and the results were provided to the EPA in an Evaluation Report in February 2011. In a letter dated April 5, 2011, EPA concluded that there is no current risk from vapor intrusion, but two areas have a future potential for risk from vapor intrusion. Additional sampling was conducted in November 2011. The sampling identified several homes that currently have no risk from vapor intrusion, but have a future potential for risk from vapor intrusion and two homes that have risk from vapor intrusion at levels that would justify installation of a VI mitigation system. EPA recommended continued evaluation of the groundwater plume to assess the need for additional vapor intrusion monitoring in all areas and sampling of Residence 4 in Area 4, if access can be obtained. The PRP is developing a workplan to install vapor mitigation systems in two homes that have current risk from vapor intrusion.

Issue #5: *Determine if 1,4- dioxane is present in groundwater.* The PRP sampled for 1,4-dioxane and forwarded the sampling results in a letter dated July 20, 2007. 1, 4- Dioxane was detected in one of ten samples at a concentration (2.7 ug/L) below the EPA Risk Based Concentration (RBC) at the time. While this concentration would now exceed the updated RBC of 0.67 ug/L, it would still fall within the 1E-6 to 1E-4 cancer risk range, and would not exceed a non-cancer level of concern. The EPA Site Toxicologist reviewed the information and concurred that 1,4-dioxane is not a COC at the Site based on data obtained to date.

Issue 6: *Metals Clean-up Levels not attained.* The PRPs continue to monitor the chromium and

cadmium levels in GM-3 and GM-4 as part of the annual sampling program. Levels of chromium have been fluctuating above and below the action levels. Cadmium levels have remained slightly above the action levels in GM-3 and GM-4.

Issue 7: *Determine if the emissions from the Third Street and Elm Park Recovery Systems pose an unacceptable risk to human health.* The PRP conducted air dispersion modeling of the Third Street and Elm Park Recovery Systems. In a letter dated April 7, 2008, EPA concluded that the chronic Hazard Index (HI) calculated were all two orders of magnitude below the target HI of 1. The cancer risks ranged from 3E-6 (Elm Park) to 7E-6 (Elm Park and Third Street combined), which is within EPAs acceptable risk range of 1E-6 to 1E-4. Acute risks were also examined and were orders of magnitude below Minimal Risk Levels (MRLs).

Issue 8: *There are no established institutional controls for groundwater use.* This issue has been addressed by the March 13, 2012 ESD which calls for institutional controls to prevent exposure to contaminated groundwater.

VI. Five-Year Review Process

Administrative Components

The Avco Lycoming Five-Year Review Team was led by Jill S. Lowe (EPA Remedial Project Manager (RPM)), with EPA technical support staff Bruce Rundell (Hydrogeologist), Jennifer Hubbard (Toxicologist), Patricia Flores-Brown (Air Specialist) and Carrie Deitzel (Community Involvement Coordinator (CIC)). John Angevine, PADEP Project Officer, assisted in the review as the representative of the support agency.

Community Involvement

A notice announcing that EPA was conducting a five-year review for the Site was published in The *Williamsport Sun Gazette*, on March 12, 2012.

Document Review

Documents reviewed in the process of conducting this five-year review included the last five-year review, the two RODs, the Explanation of Significant Differences, the ROD Amendment, documents related to a vapor intrusion study, the past five years' of annual and semi-annual monitoring and operations reports, and the data collected over the past five years.

An assessment of the Applicable or Relevant and Appropriate Requirements (ARARs) was conducted during the document review. The assessment determined that the ARARs have been met or will be met and are still appropriate for the remedies in place with the exception of manganese. A discussion of manganese can be found in the data review section and the Technical Assessment Section.

The major ARARs include:

- MCLs are promulgated under the Safe Drinking Water Act, 40 CFR § 141.61 and are still relevant and appropriate to the groundwater cleanup remedy.

- Non-zero MCLGs are promulgated under the Safe Drinking Water Act, 40 CFR

§§141.50-51 and are still relevant and appropriate.

- EPA determined at the time of the 2000 ROD Amendment that the Pennsylvania Land Recycling and Environmental Standards Act (Act 2), does not impose any requirements that are more stringent than the federal standards. This assessment is still appropriate.

- The discharges from the groundwater treatment systems are meeting the substantive requirements of the Clean Water Act's NPDES regulations, 40 CFR §§ 122.41-122.50, and the Pennsylvania NPDES regulations, 25 Pa Code § 92.31.

- The air emissions from the Memorial Avenue system are treated using Granular Activated Carbon (GAC) treatment before discharge. This emission treatment system meets the requirement to achieve minimum attainable emissions using the best available technology. The treatment system also is in compliance with Federal Clean Air Requirements, 40 CFR §§ 264.1030-1036, 40 CFR §§ 264.1050-1063 and 40 CFR §§ 264.94-96.

- The Regulation for the Underground Injection Control Program, 40 CFR § 144.24 was determined relevant and appropriate for the in-situ metals precipitation system and was complied with during the implementation of that portion of the remedy.

Data Review

The in-situ metals precipitation system was shut down in September 2000. The system required twelve quarters of post termination performance monitoring which was completed in 2003. Based on the results of the post termination monitoring, EPA required annual sampling of three monitoring wells. Two of the wells (GM-3 and GM-4) still contained slightly elevated levels of cadmium and chromium, and one well (PRW-10) was to be used as a sentinel well. The levels of cadmium in GM-3 have continued to be slightly above the action level of 0.003 mg/L. The level of chromium in GM-3 has vacillated from below the action level of 0.032 mg/L to slightly above the action level. The last two samples (2010 and2011) were below the action level for chromium. The cadmium levels in GM-4 have remained slightly above the action level established in the 1996 ROD. The chromium levels in GM-4 have vacillated above and below the action level. Table 3 (at end of report) provides the historical sampling results for these metals in these three wells.

The three on-Facility groundwater recovery systems operated with periodic shut-downs for maintenance during the past five year period. The systems successfully treated groundwater and reduced the total amount of VOCs in the groundwater. Table 4 illustrates the amount of groundwater treated and the estimated amount of VOCs treated during the last five years.

TABLE 4 – On-Facility Recovery System

MEMORIAL AVENUE SYSTEM					
YEAR	**GALLONS TREATED PER YEAR**	**TOTAL POUNDS OF VOCs REMOVED**	**%TCE**	**%DCE**	**%VC**
2007	16,026,945	240.1	60.7	38.6	0.8
2008	10,192,499	100.5	60.0	38.0	2.0
2009	16,712,496	63.6	72.2	27.7	0.1
2010	26,517,804	160	73.7	26.2	0.1
2011	18,035,923	118.5	70.9	29.0	0.1
TOTALS	87,485,667	682.7			
CENTRAL AREA					
YEAR	**GALLONS TREATED PER YEAR**	**TOTAL POUNDS OF VOCs REMOVED**	**%TCE**	**%DCE**	**%VC**
2007	1,525,984	19.90	2.4	93.5	4.2
2008	1,634,522	0.8	87.97	8.58	3.45
2009	816,976	6.39	86.2	0.5	13.3
2010	1,545,959	6.7	0.38	92.73	7.07
2011	2,127,719	36.3	1.4	93.2	5.4
TOTALS	7,651,160	70.09			
EAST PARKING LOT AREA					
YEAR	**GALLONS TREATED PER YEAR**	**TOTAL POUNDS OF VOCs REMOVED**	**%TCE**	**%DCE**	**%VC**
2007	4,998,941	43.30	89.0	9.5	1.5
2008	5,459,796	122.37	87.65	8.92	3.43
2009	4,139,537	13.17	94.2	5.8	0
2010	9,610,227	214.0	95.9	4.10	0
2011	7,857,835	561.4	98.5	1.5	0
TOTALS	32,066,336	954.24			

The two off-Facility groundwater recovery systems also operated with periodic shut-downs for maintenance during the past five year period. The systems successfully treated groundwater and reduced the total amount of VOCs in the groundwater. Table 5 illustrates the amount of groundwater treated and the estimated amount of VOCs treated during the last five year period.

TABLE 5 – Off-Facility Recovery Systems

ELM PARK SYSTEM					
YEAR	GALLONS TREATED PER YEAR	TOTAL POUNDS OF VOCs REMOVED	%TCE	%DCE	%VC
2007	10,095,483	22.94	100	0	0
2008	7,122,511	19.1	100	0	0
2009	9,489,903	16.9	88.4	11.6	0
2010	11,743,199	17.0	87.9	12.1	0
2011	16,659,248	24.3	89.7	10.7	0
TOTALS	55,110,344	100.24			
THIRD STREET SYSTEM					
YEAR	GALLONS TREATED PER YEAR	TOTAL POUNDS OF VOCs REMOVED	%TCE	%DCE	%VC
2007	275,683,000	106.31	100	0	0
2008	244,859,538	87	100	0	0
2009	325,762,807	256	78.3	21.7	0
2010	307,644,749	315.1	78.5	21.4	0
2011	298,766,994	373.2	77.0	22.9	0
TOTALS	1,452,717,000	1,137.61			

The historic groundwater monitoring results for the past five years are provided in Attachment 1. The majority of the monitoring wells sampled in November 2011 showed an upward trend. Monitoring wells MW-6, which is upgradient of the Memorial Avenue System, and MW-9, which is in the area of the Central Area System have, the highest concentrations of TCE. Figure 4 illustrates the trend of TCE in well MW-9. The increase in TCE may be attributable to the high water table at the time of sampling which could have resulted in the groundwater moving through a source area in the soil. Table 6 (at end of report) contains data on the depth to groundwater of select monitoring wells from 2007 to 2011.

Figures 5 through 9 show the TCE plume maps for the past five years. The plume maps vary only slightly over the past five years, but comparison of the current plume maps to the plume map from 2001 (Figure 10) indicates that the southern movement of the most highly contaminated area of the plume has been curtailed. This can be attributed to the operation of the Memorial Avenue System which contains this portion of the plume from migrating past the Facility property.

The Elm Park and Third Street Systems are slowly reducing the levels of VOCs in the groundwater. Table 7 contains the TCE sampling results from wells near both systems from 2007 to 2011. See Figure 3 for the well locations.

Table 7 – Off-Facility Monitoring Well Results for TCE (µg/L)

Well	Apr 07	Oct 07	Apr 08	Oct 08	Apr 09	Oct 09	May 10	Oct 10	Apr 11	Nov 11
MW-25	94	92	64	70	14	150	38	18	130	22
MW-41	NS	3.9	NS	7	NS	2.9	1.5	NS	NS	4.2
MW-52	230	210	240	230	170	130	200	270	140	83
WMWA 9								11.7	NS	11.20
MW 72	190	320	450	310	180	290	170	160	200	160
FW-4								3.84	NS	171
MW-16	NS	NS	250	NS	NS	NS	160	NS	180	N S
MW-32	NS	80	NS	58	NS	70	NS	60	NS	54

The discharge limits for the NPDES permits associated with the treatment systems have been met for the past five years. Information regarding the Discharge Monitoring Reports will now be included in the Site's progress reports.

During June 2012, the EPA Air Specialist reassessed the air emissions from both the Elm Park and Third Street air strippers using data from the past five years (2008– 2011). For the Elm Park air stripper, the amount of groundwater influent decreased from an average of 18,000,000 gallons per year (2003-2006) to an average of 11,000,000 gallons per year (2008-2011). Only total VOC groundwater concentrations treated by the air stripper were provided to EPA instead of the individual concentrations of TCE and trans-1,2-DCE for the June 2012 assessment. However, the predominant VOC, by over an order of magnitude, has always been TCE. Therefore, for the air stripper analysis, it was assumed that all of the VOCs extracted from the system were TCE.

The emission rate of the total VOCs emitted by the Elm Park air stripper, calculated during the assessment conducted in 2008, was 1.11E-04 grams/sec. The June 2012 assessment calculated that the emission rate was reduced to 6.09E-05 grams/sec. Therefore, since the amount and concentration of VOCs emitted from the Elm Park air stripper are less than during the previous evaluation, the resultant ambient air impacts are also less.

More detailed data on the Third Street air stripper system was provided to EPA for the past five years. For the 2008 assessment, the average TCE emission rate modeled was 1.53E-03 grams/sec. Since then, the TCE emission rate has varied from 1.31E-03 grams/sec to 1.67E-03 grams/sec. The average TCE emission rate for 2008 - 2011 has been 1.52E-03 grams/sec for the Third Street air striper system. Since the emissions for TCE have been stable, the air quality impacts would still be below screening values.

The average trans-1,2-DCE emission rate modeled for the Third Street air stripper system during the 2008 assessment was 1.07E-04 grams/sec. During 2008 – 2011, the trans-1,2-DCE emission rate has varied from 2.24E-04 grams/sec to 2.66E-04 grams/sec., which is approximately 2.5 times higher from the calculated 2008 emissions. Therefore, the ambient air

concentrations are also about 2.5 times higher. The modeled concentrations of trans-1,2-DCE from the Third Street air stripper (see below) are well below the air screening level for trans-1,2-DCE (6.3 ug/m3 for an HQ of 0.1). Therefore, the change in trans-1,2-DCE concentration does not result in concentrations that would exceed the screening values.

Sum of Modeled Elm Street & Third Street Air Cone.	trans-1,2-DCE (ug/m3)
Sum of 24-hr Maximum Ambient Air Cone.	9.250E-02
Sum of Annual Average Maximum Ambient Air Cone.	1.875E-02

For both air strippers, vinyl chloride influent information was not provided with the 2008 – 2011 groundwater data. However, during the 2008 air stripper assessment, the values used for vinyl chloride were the reporting limits since most of the vinyl chloride data were at non-detect concentrations. The levels of vinyl chloride in the groundwater have remained constant or decreased over the past five years; therefore, the levels entering the air stripper would have remained constant or decreased. It was assumed that vinyl chloride was not detected in the influent samples over the past five years which would result in concentrations that would not exceed the screening values.

In conclusion, during the 2008 assessment, EPA determined that there were no unacceptable air risks to human health from the air stripper emissions. The chronic Hazard Indices calculated were all more than 2 orders of magnitude below the target HI of 1. The cancer risks ranged from 3E-06 (Elm Park) to 7E-06 (Elm Park and Third Street combined), which was within EPA's acceptable risk range of 1E-06 to 1E-04. For acute risks, the 1-hour maximum concentrations were compared to the Agency for Toxic Substance and Disease Registry Acute Inhalation Minimal Risk Levels. The modeled concentrations were all orders of magnitude below the Acute Minimal Risk Levels of 10,740 ug/m^3 for TCE; 794 ug/m^3 for trans-1,2-DCE; and 1,280 ug/m^3 for vinyl chloride.

The data from 2008 – 2011 show a decrease in volume and total VOC concentrations in the influent to the Elm Park air stripper, resulting in decreased ambient air impacts from this air stripper. For the Third Street air stripper, TCE (the predominant contaminant) concentrations in the influent have remained the same while the 1,2-DCE concentrations have increased 2.5 times. The ambient air impacts from the increase of 1,2-DCE are still below screening levels. In summary, the chronic and acute inhalation human health risks associated with the Elm Park and Third Street air strippers remain within EPA's acceptable range.

EPA's evaluation of the potential for vapor intrusion to impact nearby residents began in 2001 when indoor air samples were collected from a residential duplex. Although the indoor air concentrations were not found to be of concern at the time, there were several factors preventing this study from serving as conclusive with respect to vapor intrusion. For example, indoor air concentrations may fluctuate; trichloroethylene (TCE) toxicity factors have increased since early 2001; and other local homes and businesses may be affected. Because of the proximity of occupied buildings to the areas of subsurface contamination, a more comprehensive study of potential vapor intrusion was recommended in the 2007 Five-Year Review.

The PRP submitted a Vapor Intrusion Evaluation Work Plan for EPA's review in October 2009. The Work Plan was reviewed by EPA and on January 19, 2010 a meeting was held with EPA, the PRP and its contractors to discuss the plan. The Vapor Intrusion Evaluation Work Plan was revised based on EPA's comments and resubmitted for review in February 2010. Sampling of the residences occurred in November 2010 and the results were provided to EPA in an Evaluation Report in February 2011.

The Work Plan divided the Site into five different areas (Figure 11). 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 was chosen.

In Area 1, TCE was identified in the sub-slab above screening values which indicates a potential future risk due to vapor intrusion. Indoor air concentrations are subject to fluctuation, the 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 not in the indoor air of the residence sampled in Area 2. Therefore, vapor intrusion was not currently a problem 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 vapor intrusion was not currently a problem in Area 3.

The results in Area 4 identified one residence that had low levels of TCE below screening levels in the sub-slab, indoor and ambient air. Cis-1,2-DCE was identified in the indoor air in this residence, but it is likely due to ambient air. Therefore, vapor intrusion was not currently a problem in this portion of Area 4. The other residence in Area 4 had TCE in the sub-slab above screening values which indicates a potential future risk due to vapor intrusion. 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, vapor intrusion was not currently a problem in Area 5.

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

Additional sampling was conducted in Areas 1 and 4 in November 2011. An Evaluation Report was submitted in January 2012 for EPA review. The results indicate that the residences sampled in Area 1 have no current risk from vapor intrusion, but still indicate a potential future

risk due to vapor intrusion. EPA recommends continued monitoring of the groundwater contamination levels in all areas to identify increases in contamination that may require additional vapor intrusion sampling.

In Area 4, the results from two of the residences sampled indicate that VI mitigation systems should be installed. Confirmation sampling after the systems are operational will be required. The Responsible Party should, once again, try to gain access to sample Residence 4.

Institutional controls were required in the 1991 ROD to limit future property use. The January 1991 Risk Assessment evaluated soil risk based on a limited exposure scenario. This exposure scenario was based on an industrial use of the Facility property with 95% of the soils being paved and the Facility being fenced with 24 hour security. The 2000 ROD Amendment included a requirement to limit risk to human health and the environment by restricting the future use of the property to those activities compatible to Site conditions. EPA clarified the intent of the 2000 ROD Amendment in the March 2012 ESD which limits the future land use of the Facility property to industrial use only. Institutional controls to restrict the Facility property to industrial use only will be implemented by use of one or more tools, such as easements, covenants, or title notices or use restrictions through federal or Commonwealth orders, or agreements with EPA and the Facility owner. If, at a later date, appropriate investigations and plans are submitted and approved by EPA which identify an area, or areas, of the Facility which meet residential risk standards within EPA risk assessment guidelines, such portions of the Facility will no longer require an industrial use restriction. Currently, EPA and the Responsible Party are discussing an Environmental Covenant to be placed on the Facility property to implement this IC.

To ensure future protectiveness, the March 2012 ESD also required institutional controls to restrict groundwater use within the plume of VOC-contaminated groundwater, by placing restrictions on the installation of new groundwater wells to prevent exposure to contaminated groundwater through ingestion, dermal contact or inhalation. Currently, the City of Williamsport has an ordinance that requires use of public water in the Flood Zone. The Avco groundwater contamination plume is entirely within the Flood Zone. In addition, EPA expects to implement an informational program to raise awareness regarding the condition of the groundwater among property owners located within the plume. (No private drinking water wells are currently located within a three-mile radius of the Site.)

Site Inspection

A Site visit was conducted on February 23, 2012. During the Site visit, a thorough tour of all the on-Facility treatment systems was conducted.

- Memorial Avenue Recovery System – The pump and treat system was in working order. The system provides capture and treatment of the groundwater plume. The system controls off-property migration of contaminated groundwater. The extracted water from the Central Area and the East Parking Lot Systems is pumped to the Memorial Avenue System for treatment and discharge. The influent flow from both these systems is metered separately.

- Central Area Recovery System – This system was installed to reduce contamination and recover LNAPL. At this point, only one well is operating because of the low accumulation of LNAPL in the other wells. The other wells are swabbed on a regular basis to eliminate any oil, but there is not enough accumulation to run through the oil/water separator.

- East Parking Lot System – This system was installed to extract groundwater from an area of higher contaminant concentration. The groundwater is extracted and treated at the Memorial Avenue Recovery System. This system seemed to be in good working order. The East Parking Lot Area contains wells with the highest concentrations of VOCs. MW-9 contained 11,000 pg/L of TCE during the 2011 sampling. This concentration is an order of magnitude higher than the other wells. The results of the sampling conducted in 2012 show a marked reduction in the level of TCE in well MW-9 to 72 µg/L in February 2012 and 55 µg/L in April 2012. The PRP's contractor is investigating optimization possibilities for this area to reduce the contamination.

- Elm Park Recovery System – This system was installed as part of an agreement with the Responsible Party and PADEP. This system was reported to be in good working order.

- Third Street Recovery System – This system was installed as part of an agreement with the Responsible Party and the WMWA. This system was reported to be in good working order.

The Site visit also included discussions of the following:

- The NPDES permit reporting for the treatment facility discharge met the discharge requirements for the past five years.

- The PRPs will develop a plan to investigate the background levels of manganese. PADEP agreed that the background levels of manganese may be higher than PADEP's new action level.

- PRP will draft an environmental covenant which limits future use of the Facility property for PADEP and EPA to review.

Interviews

Interviews were conducted with the contractor responsible for the operation and maintenance of the treatment systems, and the WMWA. No information provided through the interviews suggested any problems with the Site or the treatment systems.

VII. Technical Assessment

- ***Question A: Is the remedy functioning as intended by the decision documents?***

The remedy is functioning as intended by the RODs, ROD Amendment and ESDs for the Site. All the groundwater treatment systems are collecting groundwater and successfully treating the groundwater to meet the discharge limits. The Central Area System has been modified to ensure operation at the current level of LNAPL.

The in-situ metals precipitation work called for in the 1996 ROD has been concluded. The metal precipitation system reduced the level of chromium contamination in the shallow aquifer beneath the Facility with the exception of two wells located on the Facility. EPA and PADEP concluded that the continued operation of the in-situ metals precipitation remedy would no longer effectively reduce the level of chromium in the shallow aquifer beneath the Facility. The wells continue to be monitored as part of the Site Operations and Maintenance Plan. Currently, the chromium levels fluctuate. The chromium levels will continue to be assessed in relation to the cleanup level at the time of the Five-Year Reviews and at the conclusion of the VOC remedy.

The use of the Facility has remained the same from when the decision documents were written. The recent ESD clarified the IC requirement for the Facility requiring the use of the Facility be limited to industrial use only unless sampling and risk assessment information is provided to prove otherwise. The ESD also added a requirement to restrict the use of groundwater for drinking water purposes. The IC limiting future use of the Facility property has yet to be implemented.

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

Have standards identified in the ROD been revised, and does this call into question the protectiveness of the remedy? Do newly promulgated standards call into question the protectiveness of the remedy? Have TCBs used in selecting cleanup levels at the Site changed, and could this affect the protectiveness of the remedy?

The groundwater standards currently in effect were set in the 1996 ROD: cadmium 3 pg/L; chromium 32 µg/L; manganese 50 µg/L; 1,2-DCE 70 µg/L; TCE 5 µg/L; and vinyl chloride 2 µg/L. The 2000 ROD Amendment set the VOC cleanup levels at the same standards as the 1996 ROD. These standards are at or below current Federal Maximum Contaminant Levels (MCLs) of cadmium 5 pg/L; chromium 100 µg/L; 1,2-DCE 70 µg/L(cis-) or 100 pg/L(trans-); TCE 5 µg/L; and vinyl chloride 2 µg/L.

The 2012 ESD modified the cleanup standards to include cumulative risk. Groundwater which meets the MCLs for individual contaminants may not meet risk-based standards cumulatively, when multiple contaminants are present. Since multiple contaminants are present in Site groundwater, the determination of meeting the "protection of human health" RAO should be based on cumulative risk.

EPA modified the groundwater cleanup standards to include a provision to assess the

cumulative risk associated with the remaining groundwater contaminants. After the groundwater cleanup standards have been attained, EPA will evaluate data from the periodic groundwater monitoring program to develop a trend analysis and risk assessment. The risk assessment will be based on an assessment of the cumulative human health risk across all applicable exposure routes for all COCs remaining in groundwater following achievement of the MCLs. The risk assessment will calculate both the cancer risk and the Hazard Index (non-cancer risk). The remediation of groundwater at the Site will continue until EPA's risk-based cleanup standards (1.0E-04 for cancer risk[1] and a Hazard Index less than or equal to 1) are achieved. Manganese does not have a federal MCL. The 1996 ROD indicates that 50 µg/L for manganese was a state MCL, which was derived from a secondary MCL. This secondary MCL is not health based and may be difficult to achieve, because it may be below naturally occurring background concentrations. The PRP sampled for manganese and results indicated levels above the ROD standard of 50 ug/L. A correlation analysis has been performed of the manganese concentrations versus the VOC concentration in the groundwater to aid in determining if manganese is Site-related or background. In an email dated April 28, 2008, the EPA toxicologist stated that there are no indications that the manganese concentrations are correlated to the VOC concentrations. PADEP noted in their comment letter dated July 20, 2007 that in 2006 PADEP adopted the EPA Lifetime Health Advisory Level for Manganese of 300 ug/L as the Act 2 MCL. The EPA Toxicologist developed a Site Specific risk-based value for manganese. A concentration of 320 ug/L for manganese (0.320 mg/L) would yield an HI of 1 for the child, and would also yield an acceptable HI for the adult (0.4), with the central nervous system as the target organ. Naturally occurring manganese may exceed 320 ug/L; in that case, background/upgradient concentrations would usually supersede the risk-based performance goal.

During the manganese sampling conducted in October 2007, only one background well was sampled for manganese (MW-2) and the level was 1,780 µg/L of dissolved manganese. Additional upgradient and background wells should be assessed to determine the background level of manganese. During the Site visit for the 2012 Five-Year Review, the PRPs discussed developing a plan to investigate the background levels of manganese. PADEP agreed that the background levels of manganese may be higher than PADEP's new action level. EPA will then assess whether to set the performance standard for manganese at background level.

In summary, the cleanup standards currently in effect are still protective but the background level of manganese needs to be assessed.

Changes in Exposure Pathways

Has land use or expected land use on or near the Site changed?

Local land use still remains a mixture of residential and industrial. The Avco property consists of 30 separate parcels which collectively encompass over 28 acres of land; much of

[1] The NCP establishes an acceptable risk range for cancer of 10^{-6} to 10^{-4}. *See* 40 C.F.R. 300.430(e)(2)(A)(i)(*2*). EPA set the standard for this Site at 10^{-4} because the presence of vinyl chloride makes achievement of a more stringent cleanup goal impracticable. Although EPA's point of departure for analysis of an appropriate risk-based standard is 10^{-6}, the preamble to the NCP contemplates site- or remedy-specific circumstances in which EPA may establish a standard higher in the acceptable risk range. *See* National Oil and Hazardous Substances Pollution Contingency Plan, 55 Fed. Reg. 8666, 8718 (March 8, 1990).

which is occupied by buildings or parking areas. Avco is currently preparing a multi-year plan to eliminate unnecessary manufacturing space and consolidate its operations, if possible.

Have human health or ecological routes of exposure or receptors been newly identified or changed in a way that could affect the protectiveness of the remedy? Are there newly identified contaminants or contaminant sources? Have physical Site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?

At the time the Site was identified and evaluated for a remedy, the major pathway of concern was potable use of the local groundwater. All residents within three miles of the Site are on municipal water. The City of Williamsport requires connection to the public water system in the area that has groundwater contamination from the Site. The requirement is Article 1379.10(f) of the Williamsport Codified Ordinances.

The WMWA maintains a back-up water supply well field about 3,000 feet south of the facility. Periodic monitoring and/or review of the water authority sampling are conducted on a quarterly basis to confirm that the contaminant plume does not adversely affect these wells. As shown in Table 7, the TCE concentrations in the wells in this area are either decreasing or remaining the same.

Vapor intrusion is a newer route of concern for the Site. Vapor Intrusion sampling was conducted in November of 2010 and 2011. EPA has concluded that some residences in Area 4 require VI mitigation systems to mitigate the risk of vapor intrusion and the groundwater needs to continue to be monitored to assess the VOC concentrations which may be a potential risk for VI. (See the Data Review Section of this report)

Air emissions from the air strippers were evaluated in 2008 and found to be acceptable. EPA Air Specialist evaluated the 2008-2011 emissions and determined that the risk is still below acceptable limits.

The post-treatment monitoring of the in-situ chemical oxidation system needs to continue in wells GM-3, GM-4 and PRW-10. No receptors are currently being exposed to this area of localized contamination. Annual sampling will continue and the results will be forwarded to EPA.

Changes in Toxicity and Other Contaminant Characteristics

Have toxicity factors for contaminants of concern at the Site changed in a way that could affect the protectiveness of the remedy? Have other contaminant characteristics changed in a way that could affect the protectiveness of the remedy?

The risk assessment was performed for the original 1991 ROD and has not been updated. Of the chronic toxicity factors listed in Table 8 of the 1991 ROD, there have been significant changes. Some factors increased and others decreased, making it impossible to generalize about whether risks would be higher or lower if recalculated today. Lead is now not assessed using an RfD, as it was then, but by using predictive models of blood lead.

Therefore, in assessing the protectiveness of the remedy, three questions can be asked:
Are the current groundwater and soil concentrations protective?
Are the current groundwater performance standards protective?
Would any new chemicals that were not previously identified as contaminants of concern (COCs) qualify as COCs by today's standards?

With respect to the first question, the performance standards in groundwater have not been met yet, and treatment is ongoing. Therefore, the actual concentrations are not expected to represent protective conditions yet. For soil, the Site records mention lead and chromium. However, the lead levels reported in the RI would not be of concern today (maximum 185 mg/kg). Rather, the soil chemicals of potential concern would be arsenic, chromium, iron, and Aroclor 1254 (comparing maximum concentrations to spring 2012 industrial RBCs, at an HI of 0.1 and a cancer risk of 1E-6). Furthermore, the fact that VOCs were reported in subsurface soils would indicate a potential concern for migration to groundwater.

Of these soil chemicals, only chromium might continue to pose a direct-contact concern for workers; the cancer risk would be at or slightly above the upper-bound risk (1E-4) if all the detected chromium were hexavalent, and if conservative assumptions about dermal exposure were valid (e.g., that 1% could be absorbed through the skin, and that the slope factor for hexavalent chromium must be adjusted by 2.5% to account for differences between administered and absorbed doses). The 1991 ROD, the 2000 ROD Amendment, and the 2012 ESD state that institutional controls will limit the Facitity use to industrial use. Even for industrial use, if any activities occur that will bring workers into frequent contact with the soils, protective measures should be used to minimize worker risk from chromium in soil.

To answer the second question about protectiveness of groundwater standards, a risk assessment was performed during the previous five-year review. However, since that time, the 2012 ESD has been issued. That ESD states, "After the groundwater cleanup standards have been attained (MCLs), EPA will evaluate data ... The remediation of groundwater at the Site will continue until EPA's risk-based cleanup standards (1.0E-4 for cancer risk and a Hazard Index less than or equal to 1) are achieved." This performance standard, as articulated in the ESD, is protective. Because it is based on total risk, it will remain protective.

In the meantime, until these groundwater performance standards are achieved, groundwater is not being used and is not expected to be used for potable purposes. The WMWA uses the groundwater in times of drought. The extracted groundwater is treated by the WMWA and pumped to a surface water reservoir prior to distribution.

The third question has already been answered with respect to soil, above. With respect to groundwater, the recent monitoring data are limited to the COCs identified in the decision documents. The RI data indicated MCL exceedances not only for those COCs but also for 1,1-DCE, antimony, barium, copper, and lead. Additionally, other VOCs, pesticides, and metals would warrant evaluation in a revised risk assessment (i.e., they exceeded screening-level RBCs), but they might or might not be COCs after completion of the risk assessment. However, a revised risk assessment using these data would not be recommended, since the data are now

more than 20 years old, and the groundwater has undergone treatment in the intervening time. The 2012 ESD included a provision to evaluate data from the periodic groundwater monitoring program to develop a trend analysis and risk assessment, after groundwater cleanup standards have been attained. The risk assessment will be based on an assessment of the cumulative human health risk across all applicable exposure routes for all COCs remaining in groundwater following achievement of the cleanup levels. It is recommended that the PRP submit a full-scan analysis of all VOCs, SVOCs, pesticides and metals to ensure that no other chemical constituents, yet identified, warrant inclusion as a COC based on today's standards.

1,4-Dioxane was a contaminant unanticipated at the time of the ROD that came to EPA's attention later. Subsequent sampling has shown it not to be a COC at this Site, based on data obtained to date.

In summary, direct contact with soil and groundwater is not expected to pose unacceptable risks under current conditions (i.e., exposure is currently being prevented because 95% of the Site soils are covered with pavement and the WMWA provides drinking water). Groundwater has not met performance standards and would not be suitable for potable use at this time. When performance standards have been met, a risk-based assessment of the cumulative risk will be performed. If land use is proposed to be changed, a reassessment of the risk would need to be performed.

Changes in Risk Assessment Methods

Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?

There have been significant changes in EPA's risk assessment guidance since the original risk assessment was performed. These include changes in dermal guidance, inhalation methodologies, exposure factors, and a change in the way early-life exposure is assessed for vinyl chloride. An evaluation of Site risks in light of updated guidance was discussed above.

Expected Progress Towards Meeting RAOs

Is remedy progressing as expected?

In general the remedy is progressing as expected. EPA and the PRP have discussed optimization opportunities. Avco is considering an investigation of in-situ methods to expedite the cleanup of VOCs in the East Parking Lot area.

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

No other information that has not already been discussed has come to light that would call into question the protectiveness of a remedy.

Technical Assessment Summary

In summary, the remedy is functioning as intended by the decision documents. Direct contact with soil and groundwater is not expected to pose unacceptable risks under current conditions (i.e., exposure is currently being prevented because 95% of the Facility soils are covered with pavement, the Facility has 24 hour security and the WMWA provides drinking water). Groundwater has not met performance standards and would not be suitable for potable use at this time. When performance standards have been met, a risk-based assessment of the cumulative risk will be performed. If land use is proposed to be changed, a reassessment of the risk would need to be performed.

An assessment of background levels of manganese needs to be performed. Once background levels are established, a decision should be made as to whether the selected cleanup level for manganese should be changed.

Vapor intrusion mitigation systems need to be installed in two residences in Area 4 to ensure protectiveness of this area. The Responsible Party should, once again, try to gain access to sample Area 4 Residence 4. Groundwater contamination will be monitored in all the areas that have a potential for VI and if the levels of TCE increase additional vapor intrusion investigation may be required.

The IC limiting future use of the Facility property to industrial use should be finalized.

It is recommended that the PRP submit a full-scan analysis of all VOCs, SVOCs, pesticides and metals in groundwater to ensure that no other chemical constituents, yet identified, warrant inclusion as a COC based on current standards.

VIII. Issues

The table below summarizes the current issues at the Avco Lycoming Superfund Site.

Table 8: Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. Establish background level for manganese	N	Y
2. Vapor intrusion mitigation in Area 4 with follow-up sampling	Y	Y
3. Sample Area 4 Residence 4	N	Y
4. Increases in groundwater VOC levels may necessitate additional vapor intrusion sampling throughout the Site	N	Y
5. Implement institutional control on Facility property	N	Y
6. No recent data for all VOCs, SVOCs, pesticides and metals in groundwater.	N	Y

IX. Recommendations and Follow-up Actions

Table 9: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1.	Sample background wells to establish manganese level	PRP	EPA	October 30, 2013	N	Y
2.	Install VI mitigation systems in Area 4 and re-sample to ensure effectiveness	PRP	EPA	April 30, 2013	Y	Y
3.	Perform additional VI sampling in Area 4	PRP	EPA	February 28, 2013	N	Y
4.	Evaluate groundwater VOC levels to assess need for additional vapor intrusion sampling	PRP	EPA	Ongoing	N	Y
5.	Place Environmental Covenant on Facility property, or other appropriate mechanism as necessary.	PRP	EPA	October 30, 2013	N	Y
6.	Submit full-scan analysis of all VOCs, SVOCs, pesticides and metals in groundwater.	PRP	EPA	October 30, 2013	N	Y

X. Protectiveness Statement

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 the 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 the 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.

XI. Next Review

EPA will conduct another five-year review within five years of the completion of this five-year review report. The completion date is the date of the signature on the front of this report.

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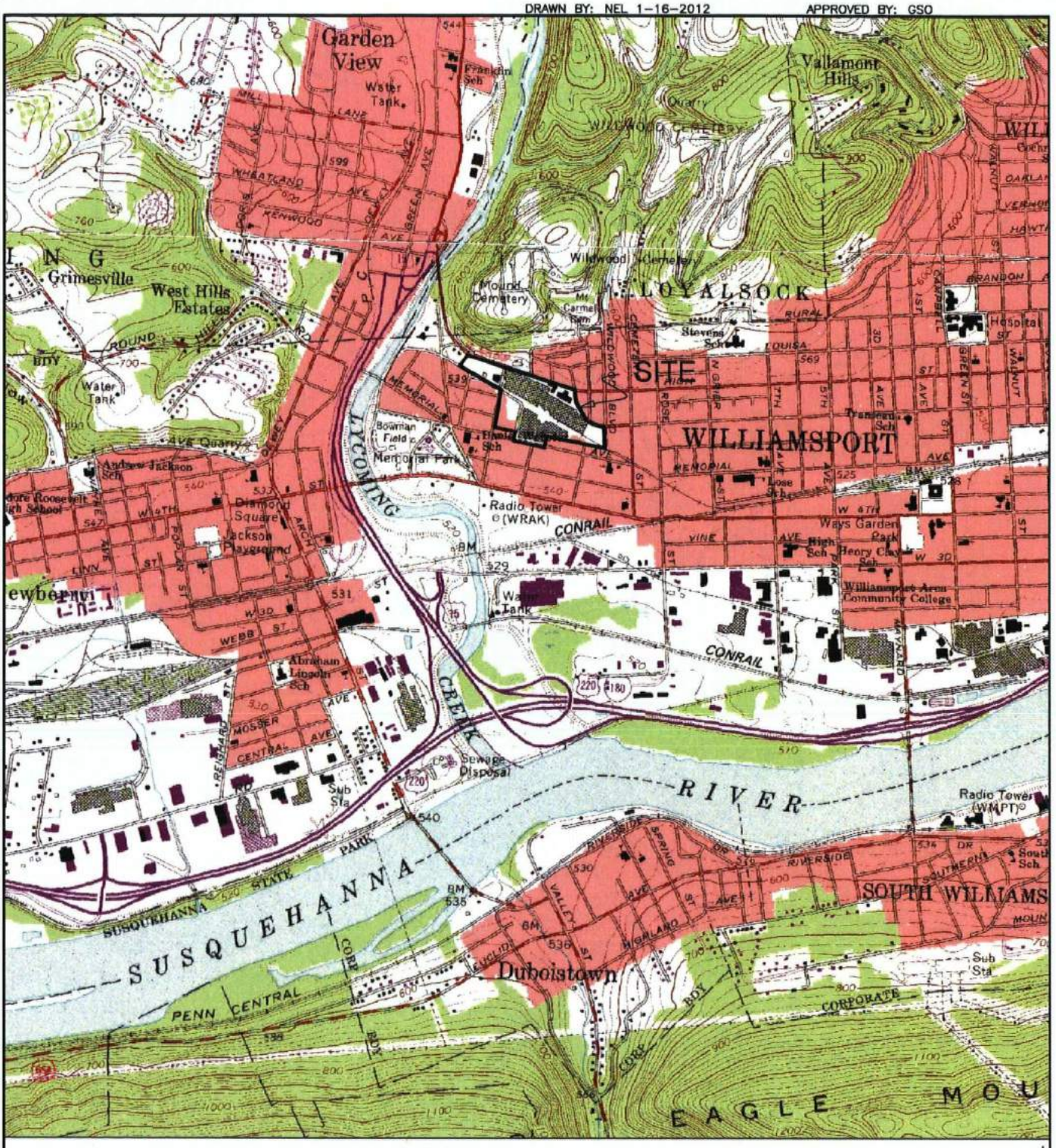

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CONTOUR INTERVAL 20 FEET

WILLIAMSPORT QUADRANGLE

AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Project No.: 3410110820

amec

Environment & Infrastructure - Pittsburgh

800 North Bell Avenue, Carnegie, Pennsylvania 15106

2200 Georgetown Drive, Sewickley, Pennsylvania 15143

SITE LOCATION MAP

Figure: 1

1

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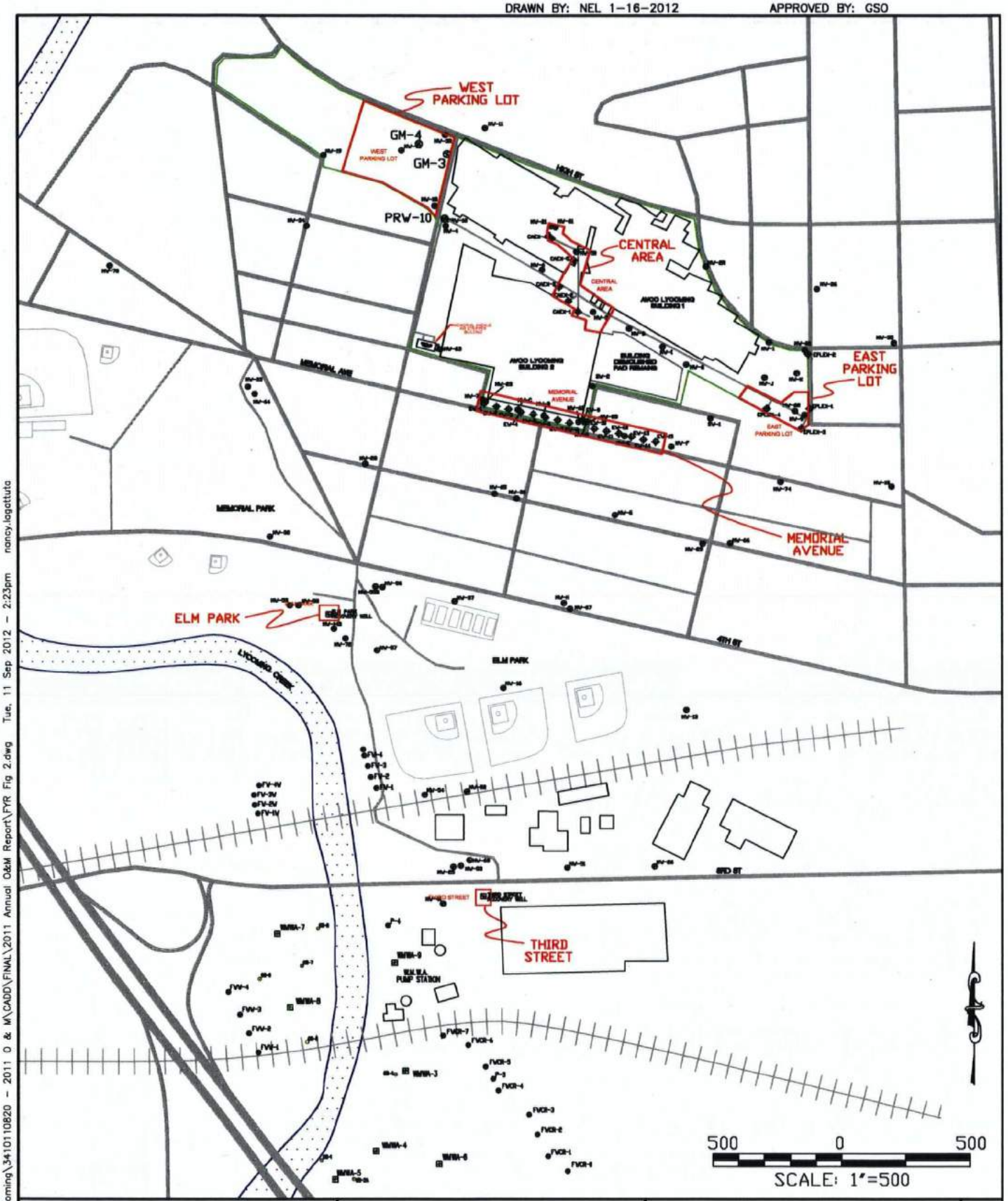

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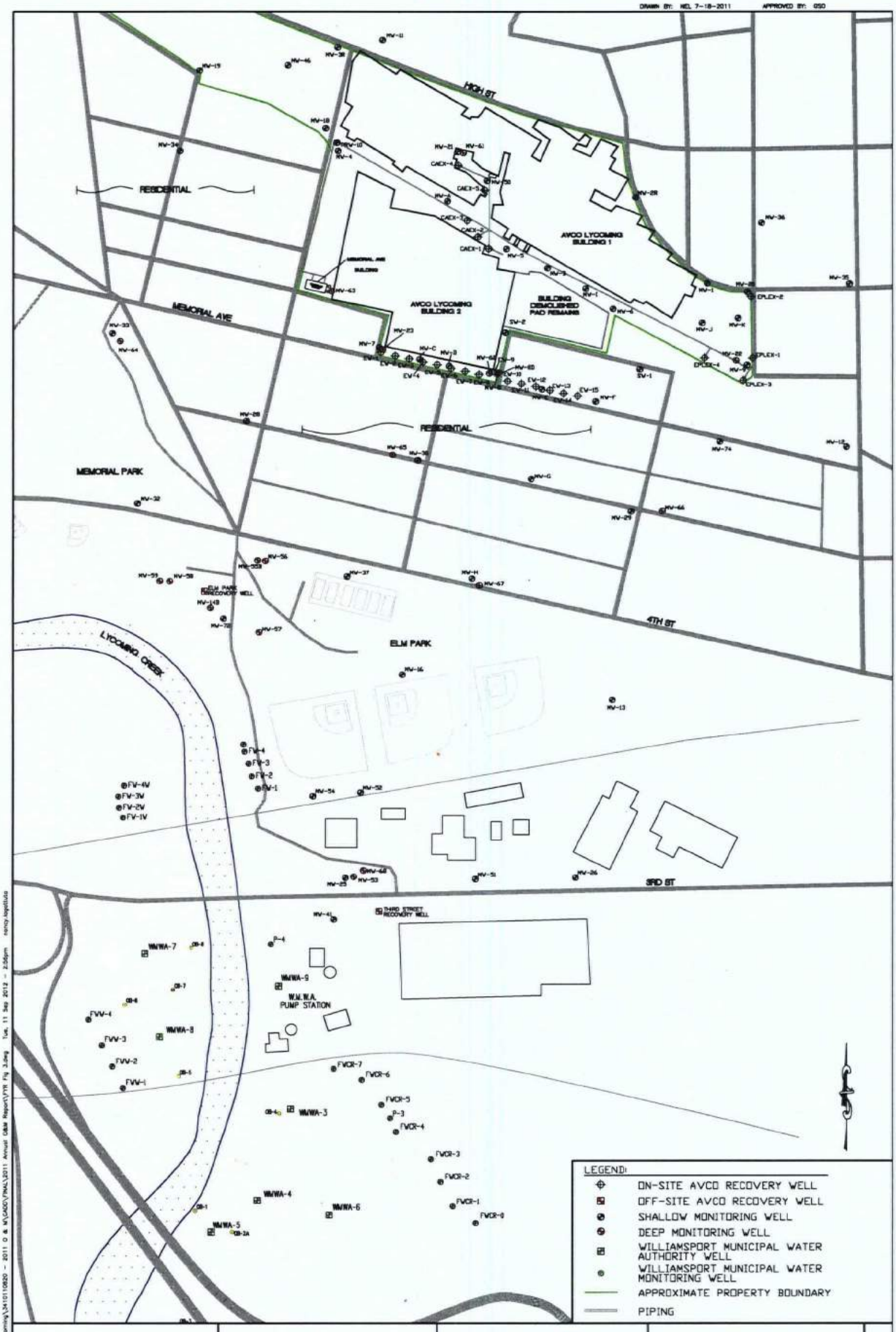
AVCO-LYCOMING ENGINES FACILITY WILLIAMSPORT, PENNSYLVANIA Project No.: 3410110820	amec Environment & Infrastructure - Pittsburgh 800 North Bell Avenue, Carnegie, Pennsylvania 15106 2200 Georgetown Drive, Sewickley, Pennsylvania 15143	SITE PLAN Figure: 2	2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APPROVED BY: GSD
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RESIDENTIAL
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AVCO LYCOMING BUILDING 2
BUILDING DEMOLISHED PAD REMAINS
MEMORIAL AVE
MEMORIAL PARK
RESIDENTIAL
ELM PARK DRIVEWAY WELL
4TH ST
ELM PARK
LYCOMING CREEK
3RD ST
THIRD STREET RECOVERY WELL
W.M.W.A. PUMP STATION
LEGEND:
ON-SITE AVCO RECOVERY WELL
OFF-SITE AVCO RECOVERY WELL
SHALLOW MONITORING WELL
DEEP MONITORING WELL
WILLIAMSPORT MUNICIPAL WATER AUTHORITY WELL
WILLIAMSPORT MUNICIPAL WATER MONITORING WELL
APPROXIMATE PROPERTY BOUNDARY
PIPING
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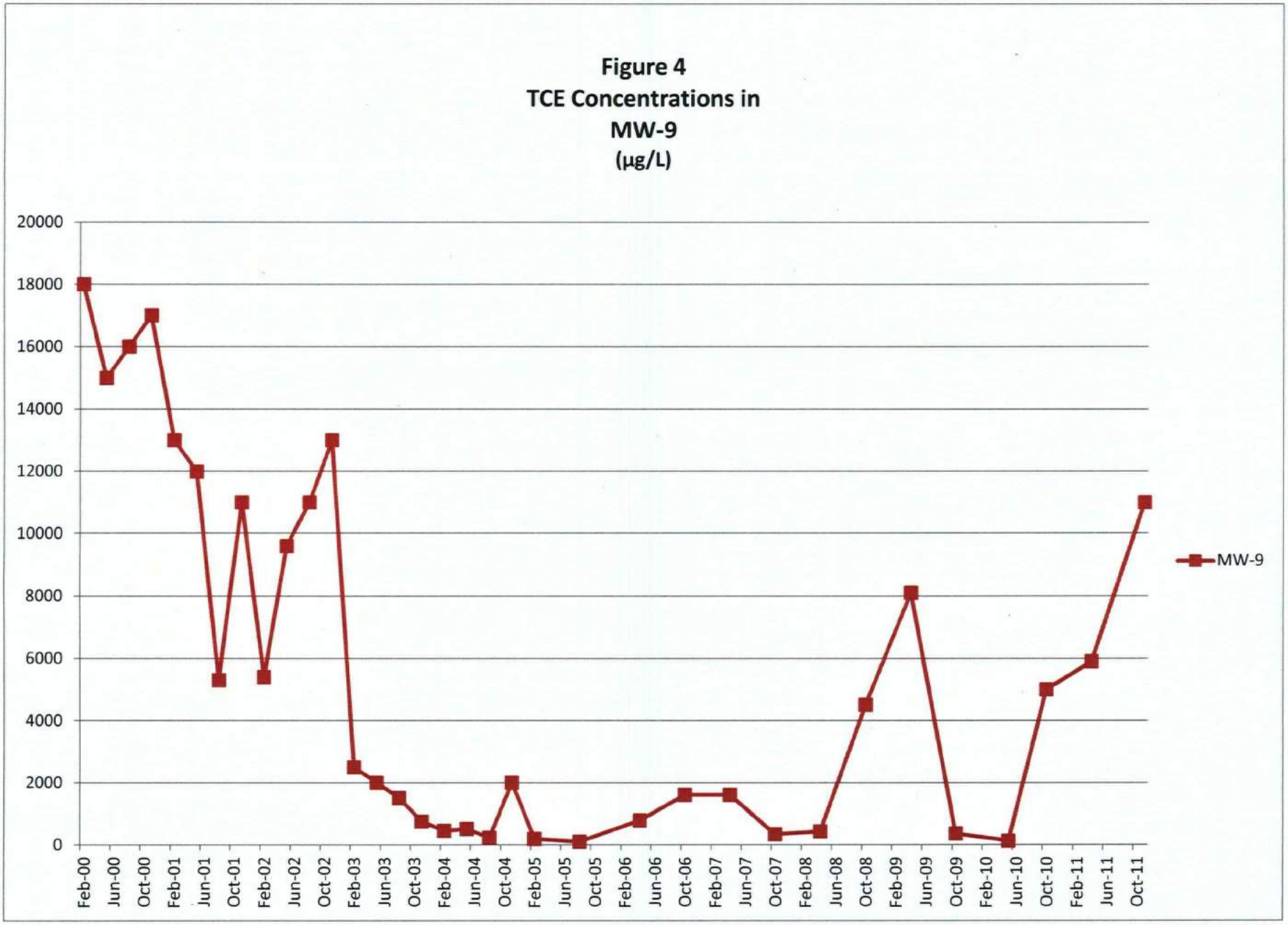
SCALE: 1"=300
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA
Project No.: 3410110820
amec
Environment & Infrastructure - Pittsburgh
500 North Bell Avenue
Carnegie, Pennsylvania 15106
2200 Georgetown Drive
Sewickley, Pennsylvania 15143
WELL LOCATIONS
AVCO-LYCOMING SUPERFUND SITE
Figure: 3
3

Figure 4
TCE Concentrations in
MW-9
(µg/L)



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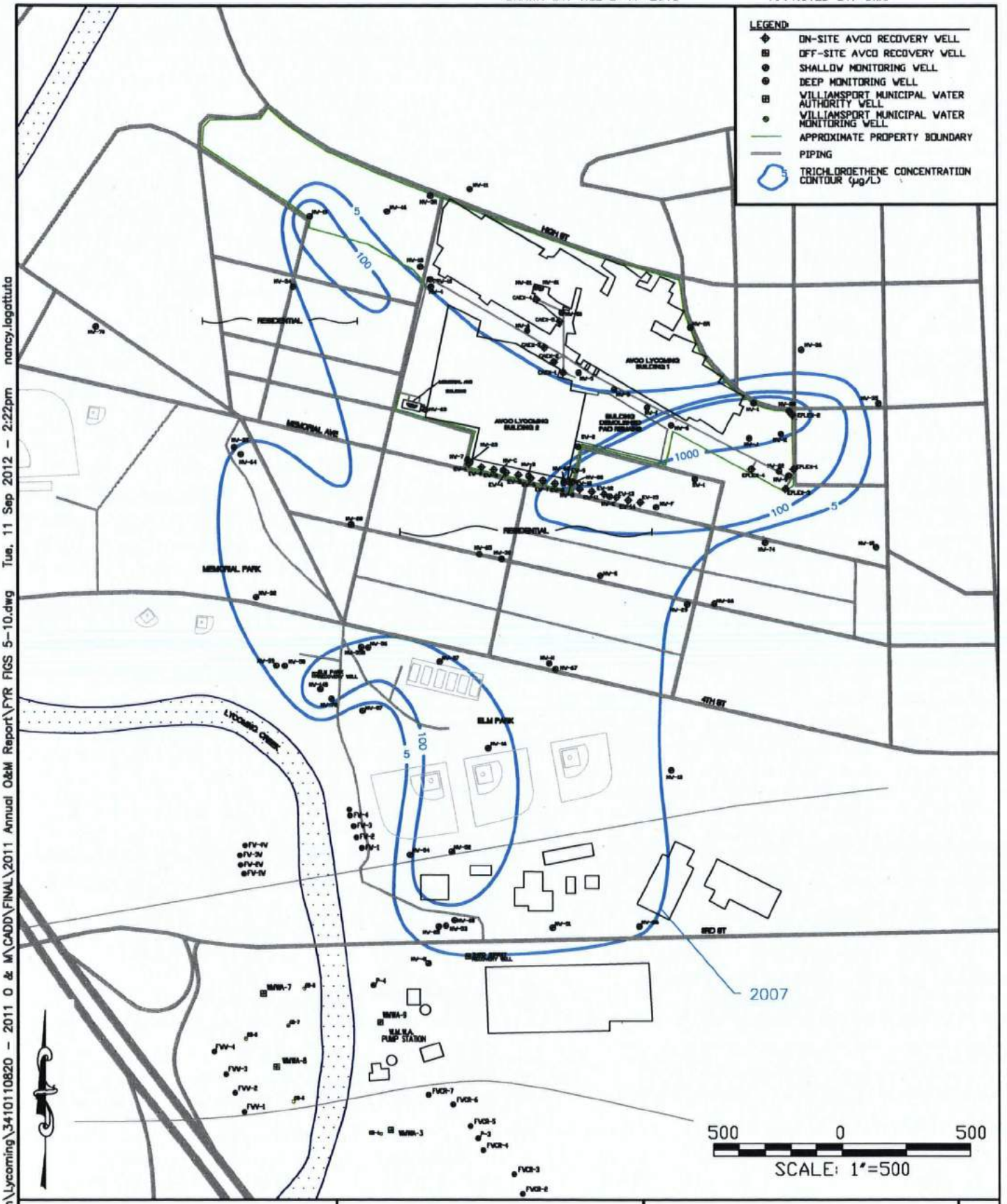

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AVCO-LYCOMING ENGINES FACILITY WILLIAMSPORT, PENNSYLVANIA Project No.: 3410110820	amec Environment & Infrastructure - Pittsburgh 800 North Bell Avenue, Carnegie, Pennsylvania 15106 2200 Georgetown Drive, Sewickley, Pennsylvania 15143	2007 TCE ISOPLETH MAP Figure: 5	5

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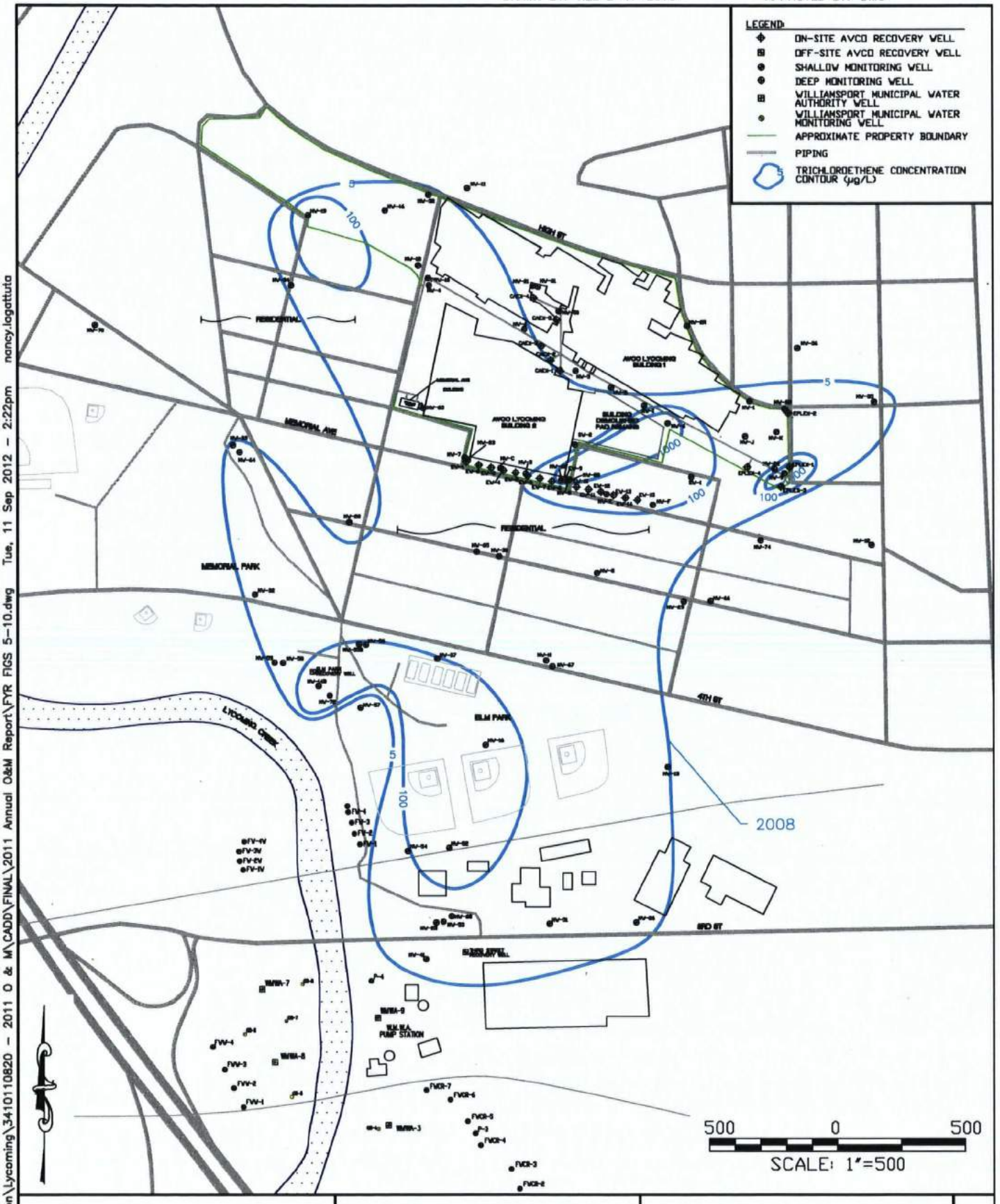

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AVCO-LYCOMING ENGINES FACILITY WILLIAMSPORT, PENNSYLVANIA Project No.: 3410110820	amec Environment & Infrastructure - Pittsburgh 800 North Bell Avenue, Carnegie, Pennsylvania 15106 2200 Georgetown Drive, Sewickley, Pennsylvania 15143	2008 TCE ISOPLETH MAP Figure: 6	6

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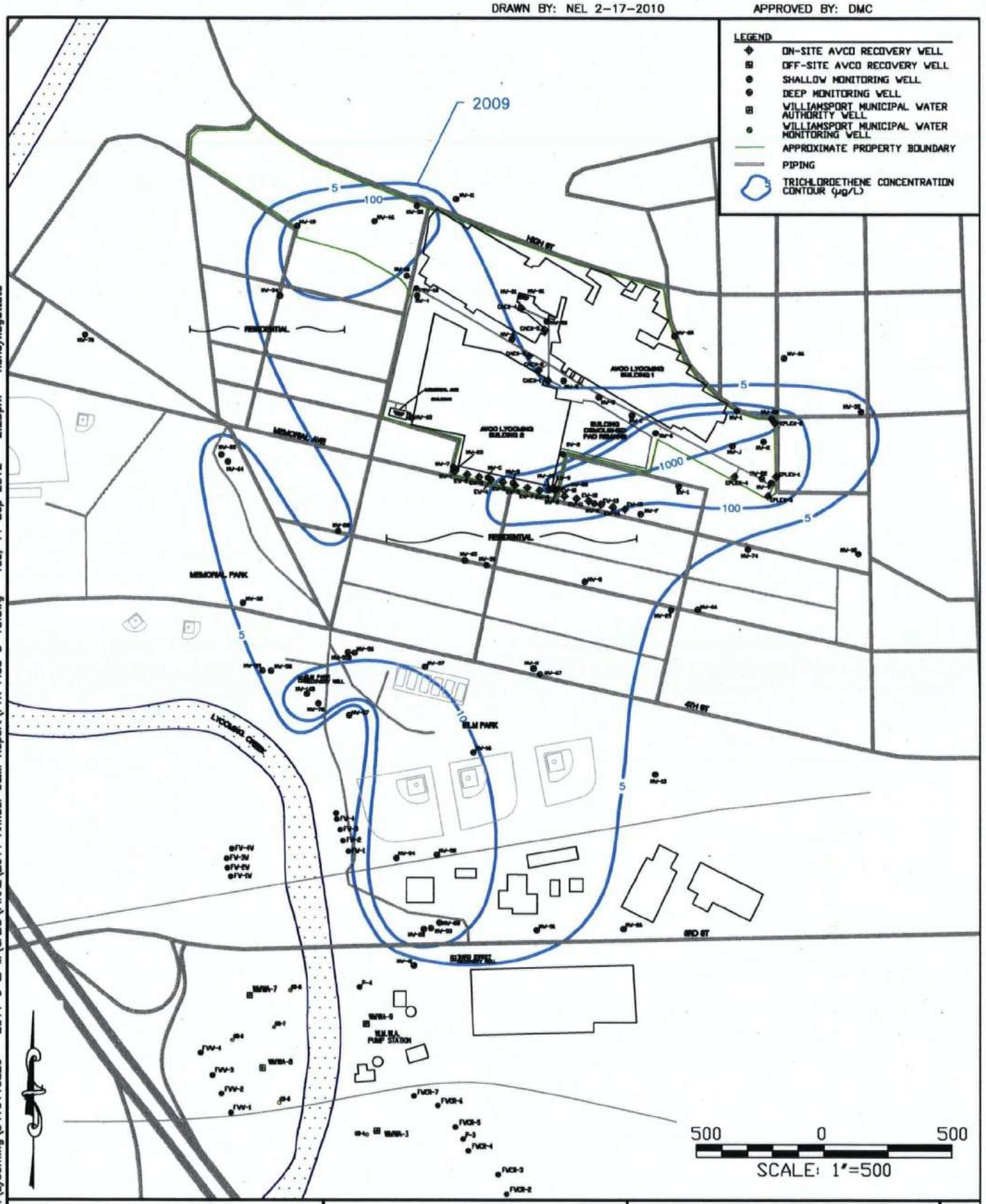

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2009 TCE ISOPLETH MAP

Figure: 7

7

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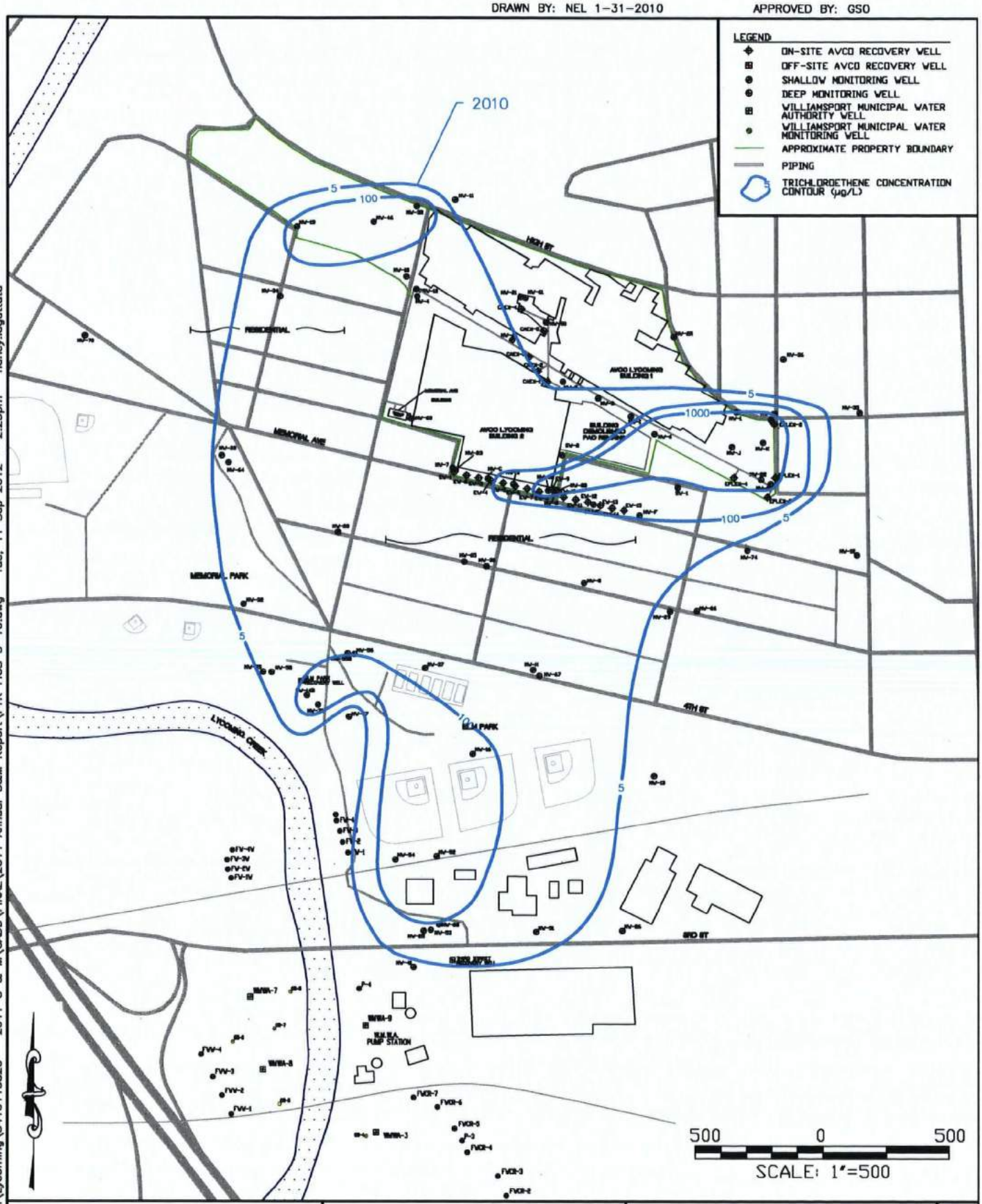

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2010 TCE ISOPLETH MAP

Figure: 8

8

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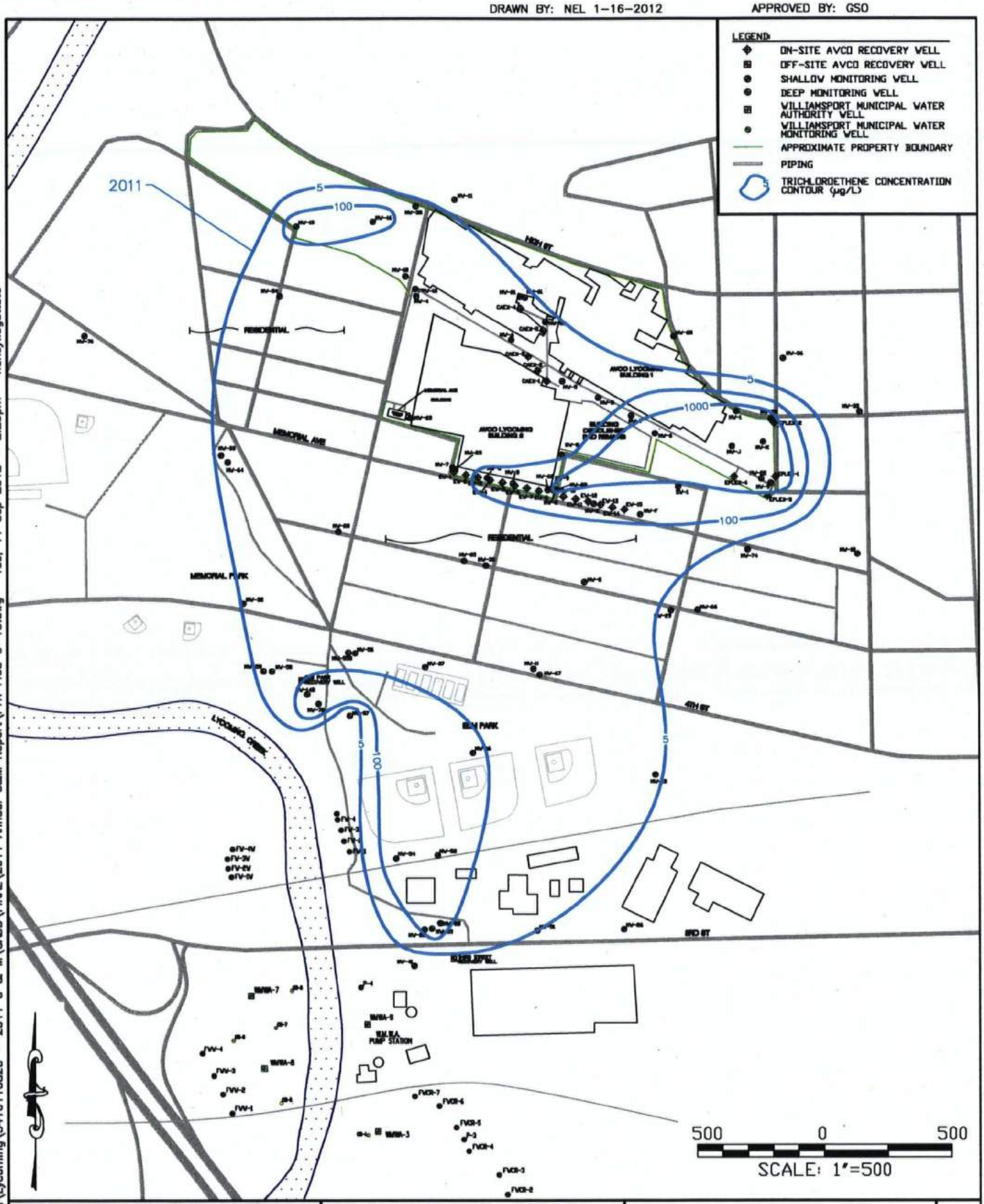

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AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

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2011 TCE ISOPLETH MAP

Figure: 9

9

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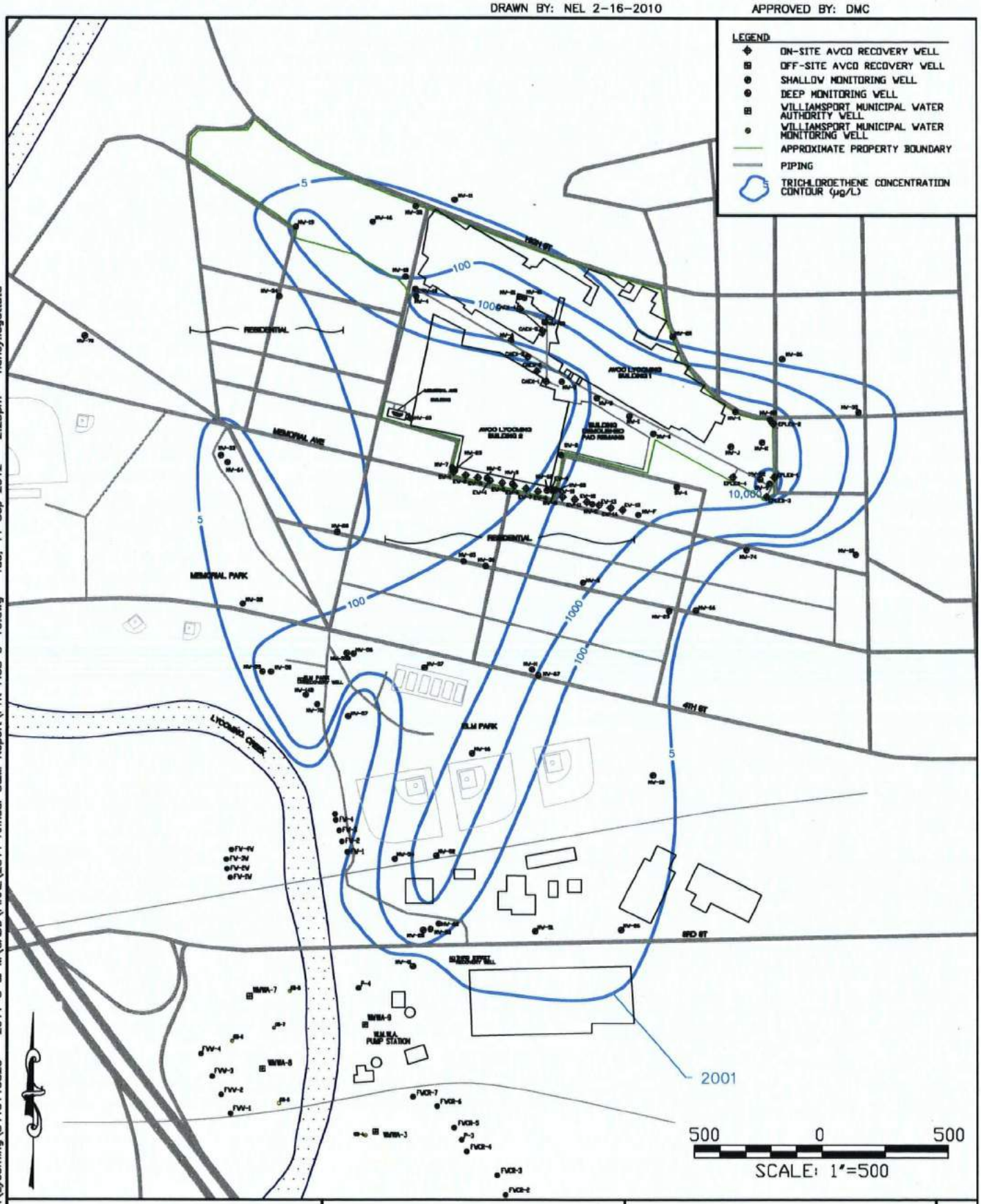

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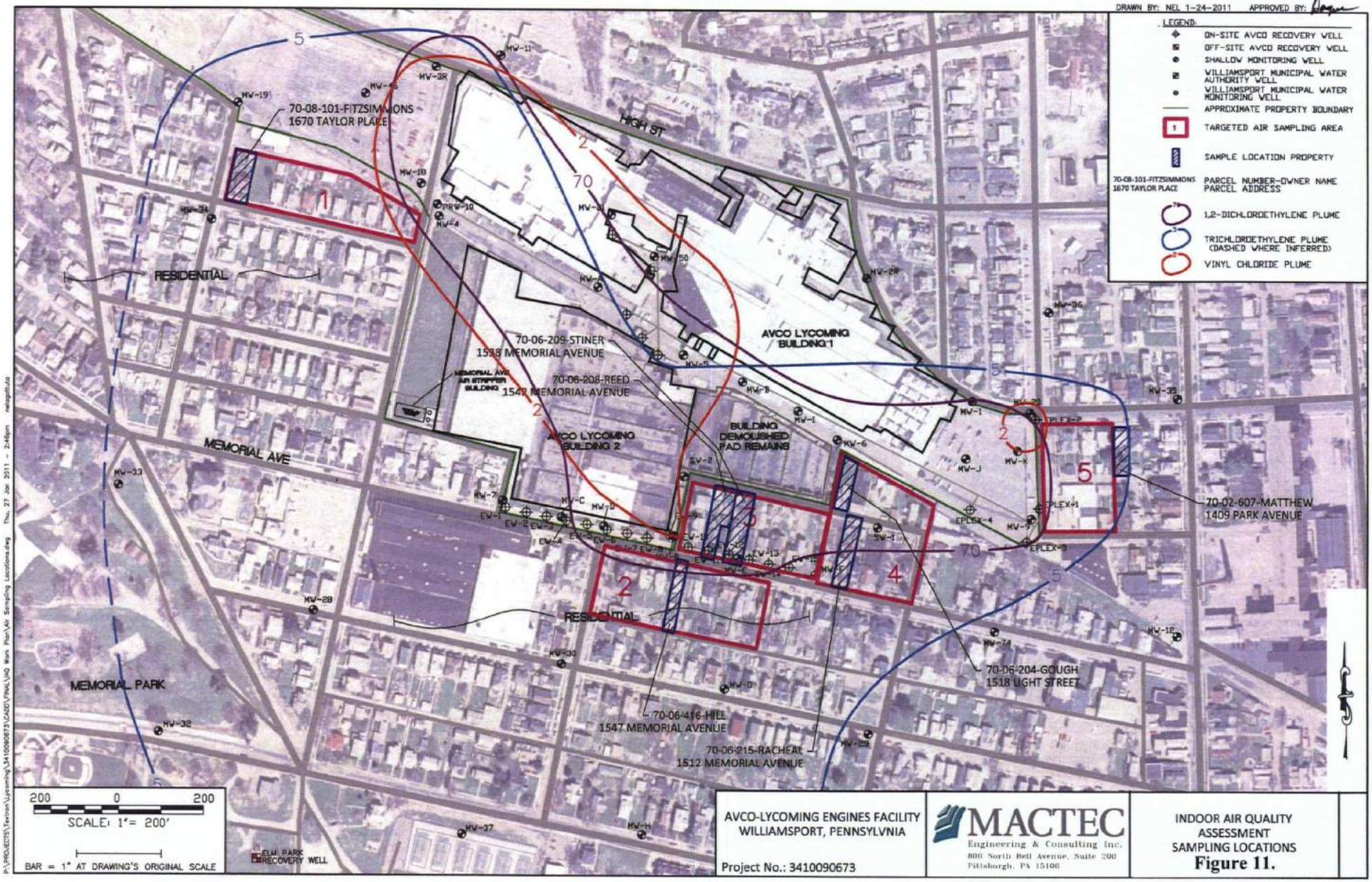
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OFF-SITE AVCO RECOVERY WELL
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WILLIAMSPORT MUNICIPAL WATER AUTHORITY WELL
WILLIAMSPORT MUNICIPAL WATER MONITORING WELL
APPROXIMATE PROPERTY BOUNDARY
TARGETED AIR SAMPLING AREA
SAMPLE LOCATION PROPERTY
70-08-101-FITZSIMMONS 1670 TAYLOR PLACE
PARCEL NUMBER-OWNER NAME PARCEL ADDRESS
1,2-DICHLORDETHYLENE PLUME
TRICHLORDETHYLENE PLUME (DASHED WHERE INFERRED)
VINYL CHLORIDE PLUME
70-08-101-FITZSIMMONS 1670 TAYLOR PLACE
HIGH ST
RESIDENTIAL
MEMORIAL AVE
MEMORIAL PARK
AVCO LYCOMING BUILDING 1
AVCO LYCOMING BUILDING 2
BUILDING DEMOLISHED PAD REMAINS
MEMORIAL AVE AIR STRIPPER BUILDING
70-06-209-STINER 1538 MEMORIAL AVENUE
70-06-208-REED 1542 MEMORIAL AVENUE
70-02-607-MATTHEW 1409 PARK AVENUE
70-06-204-GOUGH 1518 LIGHT STREET
70-06-416-HILL 1547 MEMORIAL AVENUE
70-06-215-RACHEAL 1512 MEMORIAL AVENUE
ELM PARK RECOVERY WELL
200 0 200
SCALE: 1"= 200'
BAR = 1" AT DRAWING'S ORIGINAL SCALE
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVNIA
Project No.: 3410090673
MACTEC
Engineering & Consulting Inc.
800 North Bell Avenue, Suite 200
Pittsburgh, PA 15106
INDOOR AIR QUALITY ASSESSMENT SAMPLING LOCATIONS
Figure 11.

Table 2

2011 Well Sampling Schedule

Well	Rationale	Quarterly Sampling	1Q2011	2Q2011	3Q2011	4Q2011
Shallow Monitoring Wells						
MW-02	Upgradient on Facility – Never detected VOCs	Annual				Not able to be sampled
MW-03R	Upgradient of West Lot – decrease VOC since 1Q2002	Semi-Annual		X		X
MW-05	Source Area well near RW-1	Semi-Annual		X		X
MW-06	Highest Concentrations on Facility, increasing levels, upgradient of sentinel wells	Semi-Annual		X		X
MW-07	Downgradient Property Line, West end of Memorial Avenue System	Semi-Annual		X		X
MW-08	Well Located between Facility and Memorial Avenue	Semi-Annual		X		X
MW-09	Next to Bedrock Well, Downgradient Property Line, High Concentrations	Semi-Annual		X		X
MW-13	Located in Elm Park, Replacement Well for MW-26	Semi-Annual		X		X
MW-16	Located in Elm Park, Will Help Assess Plume South of Memorial Avenue	Annual		X		
MW-18	Downgradient of West Parking Lot	Annual				X
MW-19	Downgradient of West Parking Lot	Annual				X
MW-20	Upgradient Property Line, Upgradient of MW-9	Annual				X
MW-25	Close to Third Street Recovery Well, MW-41 is downgradient	Quarterly	X	X	X	X
MW-29	Downgradient of Memorial Avenue, Monitor System Effectiveness	Semi-Annual		X		X
MW-30	Downgradient of Memorial Avenue, Monitor System Effectiveness	Semi-Annual		X		X
MW-32	TCE Concentrations Increase	Annual				X
MW-35	Off-Facility, Lateral to Groundwater Flow	Semi-Annual		X		X
MW-41	Between Third Street and PW-9, Most Downgradient Monitoring Well	Annual				X
MW-52	Upgradient of Third Street Well and MW-25	Semi-Annual		X		X
MW-72	Close to Elm Park Recovery Well	Semi-Annual		X		X
MW-74	Monitors East Limit of Plume, Beyond Influence of Memorial Avenue Recovery System	Semi-Annual		X		X
SW-1	Well Located between Facility and Memorial Avenue	Semi-Annual		X		X
SW-2	Well Located between Facility and Memorial Avenue	Semi-Annual		X		X
Bedrock Monitoring Wells						
MW-08D	On-Facility Near East End of Memorial Avenue System	Semi-Annual		X		X
MW-14B	Near Elm Park Recovery Well	Semi-Annual		X		X
MW-22	East End Parking Lot	Annual				X
MW-23	On-Facility Near West End of Memorial Avenue	Semi-Annual		X		X
MW-53	At Third Street	Quarterly	X	X	X	X
MW-57	Near Elm Park Recovery Well	Annual				X
Other Wells						
EW-1 thru EW-15	Memorial Avenue Wells Sampled to Assess Recovery System	Special		X		
GM-3	Assess West Parking Lot Metals Precipitation	Annual		X		
GM-4	Assess West Parking Lot Metals Precipitation	Annual		X		
PRW-10	Assess West Parking Lot Metals Precipitation	Annual		X		

Table 3
Summary of Historical
Cadmium and Chromium
In-Situ Well Sampling Results

GM-3																				
Analyte	**1Q00**	**2Q00**	**3Q00**	**4Q00**	**1Q01**	**2Q01**	**3Q01**	**4Q01**	**1Q02**	**3Q02**	**2Q03**	**4Q03**	**3Q04**	**2Q05**	**2Q06**	**2Q07**	**2Q08**	**2Q09**	**2Q10**	**2Q11**
Cadmium	0.069	0.08	0.19	0.13	0.3	0.039	0.083	0.28	0.068	0.15	0.14	0.23	0.40	0.23	0.23	0.244	0.279	0.292	<0.005	0.0097
Dissolved Cadmium																	0.281	0.291	<0.005	0.0036B
Chromium VI	<0.003	<0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.32	<0.01	0.02	0.93	<0.010	0.58	0.42	0.49	0.38	0.0056B	0.0035B
GM-4																				
Cadmium	0.039	0.042	0.036	0.039	0.029	0.037	0.024	0.035	0.0528	0.03	0.034	0.032	0.02	<0.010	0.0250	0.023	0.0243	0.0272	<0.005	0.0379
Dissolved Cadmium																	0.0252	0.0277	<0.005	0.0390
Chromium VI	0.412	<0.3	0.46	0.56	0.38	0.54	0.37	0.42	0.29	0.33	0.46	0.42	<0.01	<0.010	0.32	0.30	0.32	0.27	0.0043B	0.27
PRW-10																				
Cadmium	<0.0036	<0.0036	0.0002	0.0002	0.0004	0.0003	0.0001	0.0002	0.0004	0.0001	0.0011	0.0015	0.0015	0.0010	<0.005	0.0032	<0.005	0.00036	0.00091B	0.001B
Dissolved Cadmium																	<0.005	<0.005	0.00075B	<0.0050
Chromium VI	<0.003	0.494	0.8	1.2	<0.01	0.28	1	0.16	<0.01	0.09	0.37	1.2	0.03	<0.010	<0.010	<0.010	<0.01	<0.01	1.7	0.0061B

Notes:

1- All concentrations are in mg/L
2- ROD Documented Performance Criteria: Cadmium – 0.003 mg/L and Chromium VI - 0.032 mg/L
3- "B" indicates estimated result

Table 6					
Avco Lycoming Depth to Groundwater of Selected Wells					
Well ID	Depth to water (feet)				
	Oct-07	Oct-08	Oct-09	Oct-10	Oct-11
MW-1	19.2	18.84	17.55	17.45	16.59
MW-2	9.08	8.67	7.57	7.37	
MW-3R	10.34	10.21	9.87	9.79	9.75
MW-4	12.47	12.31			
MW-5	15.96	15.72	13.95	13.71	15.86
MW-6	20.02	20.22	19.09	19.07	20.11
MW-7	18.52	18.79	18.46	18.05	20.51
MW-8	23.7	24.88	23.84	23.97	23.84
MW-8D	25.18	25.54	24.45		23.04
MW-9	31.98	31.91	30.77	29.05	25.27
MW-11	22.74	22.76	21.74	22.15	23.58
MW-12	26.45				
MW-13	12.15	12.35	11.08	10.7	9.97
MW-14B	15.85	15.71	14.87		
MW-16	14.96	15.92	13.79	12.99	13.34
MW-18	15.04	14.88	13.87	13.59	15.86
MW-19	16.77	16.68	15.82	15.47	17.9
MW-20	22.75	24.88	21.39	21.41	18.98
MW-21	13.85	13.75	12.16		18.51
MW-22	28.66	28.24	27.42		
MW-23	20.82	21.02	20.64	21.11	22.57
MW-25	25.8	27.69	24.27	22.92	19.35
MW-26	19.58	20.4	18.12		
MW-28	19.85	14.26	14.11		14.22
MW-29	27.16	25.83	20.89	24.89	17.65
MW-30	20.52	20.6	19.54	19.44	18.44
MW-32	13.12	12.34	10.15	10.26	9.51
MW-33	26.95	26.08	24.57	23.55	22.69
MW-35	27.7	27.56	25.41	26.06	20.59
MW-36	17.76	14.56	12.03	11.02	
MW-37	17.18	17.12	15.99	14.4	15.23
MW-41	17.09	17.35	15.44	14.68	13.7
MW-46	11.37				
MW-50	12.41	12.28	10.42		
MW-51	19.9	21.07			
MW-52	13.4	13.44	12.15	11.34	11.57
MW-53	23.9	25.58	22.95	21.82	18.89
MW-72	12.78	12.42	11.55	10.94	12.47
MW-74	24.68	24.7	22.99	22.78	21.48
SW-1	16.74	16.85	15.44		13.01
SW-2	16.78	12.13	12.84		11.8
PRW-10				10.12	12.36

ATTACHMENT 1
HISTORIC GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits	Feb-07	Apr-07	Aug-07	Oct-07	Feb-08	Apr-08	Jul-08	Aug-08	Sep-08	Oct-08	Mar-09	Apr-09	Jul-09	Oct-09	Jan-10	May-10	Aug-10	Oct-10	Feb-11	Apr-11	Aug-11	Nov-11
MW-2	Cis 1,2-DCE	70				0.19						6.0				0.51		1						
	Trans 1,2-DCE	100				1						1				1		1						
	TCE	5				0.23						5.3				2.9		1						
	Vinyl Chloride	2				1						1				1		1						
MW-3R	Cis 1,2-DCE	70		1.4				7.8				320		4.0		220		3.4		130		1		8.8
	Trans 1,2-DCE	100		1				1				11		1		5.5		1		4.5		1		2
	TCE	5		1.2				2.2				170		1.1		320		26		110		0.56		34
	Vinyl Chloride	2		1				0.80				25		0.29		22		1		9.6		1		1
MW-4	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-5	Cis 1,2-DCE	70		57		4100		59				2.9		520		1100		760		210		720		3100
	Trans 1,2-DCE	100		5		200		4				1		40		2.3		25		10		25		6.3
	TCE	5		4.7		200		1.3				2.1		40		3.6		25		2.0		5.5		52
	Vinyl Chloride	2		12		170		49				1		90		160		57		16		52		170
MW-6	Cis 1,2-DCE	70		440		440		420				350		290		300		300		250		350		410
	Trans 1,2-DCE	100		83		100		100				50		50		100		100		50		100		13
	TCE	5		2800		1600		1800				1300		1300		1100		1800		1200		2200		2900
	Vinyl Chloride	2		19		15		100				50		50		100		100		50		100		11
MW-7	Cis 1,2-DCE	70		0.27		1		0.26				1		0.31		0.33		1.9		0.38		0.34		2
	Trans 1,2-DCE	100		1		1		1				1		1		1		1		1		1		2
	TCE	5		12		11		18				8.4		11		14		27		13		9.8		15
	Vinyl Chloride	2		1		1		1				1		1		1		1		1		1		1
MW-8	Cis 1,2-DCE	70		1900		1900		1900				1500		740		860		2300		880		3000		1400
	Trans 1,2-DCE	100		71		100		100				100		100		50		120		50		120		4.2
	TCE	5		2400		2500		1500				1800		1100		800		2700		1200		2200		1300
	Vinyl Chloride	2		44		28		38				100		100		13		48.0		50		67		14
MW-8D	Cis 1,2-DCE	70				490		410				360		270		370		320		440		340		430
	Trans 1,2-DCE	100				20		50				25		25		25		20		25		25		1.9
	TCE	5				690		610				510		400		490		440		540		430		620
	Vinyl Chloride	2				20		50				25		25		25		20		25		25		1

ATTACHMENT 1
HISTORIC GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits	Feb-07	Apr-07	Aug-07	Oct-07	Feb-08	Apr-08	Jul-08	Aug-08	Sep-08	Oct-08	Mar-09	Apr-09	Jul-09	Oct-09	Jan-10	May-10	Aug-10	Oct-10	Feb-11	Apr-11	Aug-11	Nov-11
MW-9	Cis 1,2-DCE	70		68		110		58				150		150		22		9.6		210		140		120
	Trans 1,2-DCE	100		50		1.6		8.1				200		400		20		5		250		250		0.95
	TCE	5		1600		340		430				4500		8100		360		130		5000		5900		11000
	Vinyl Chloride	2		50		15		50				200		400		20		5		250		250		1
MW-12	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-13	Cis 1,2-DCE	70																				0.93		0.98
	Trans 1,2-DCE	100																				2.4		2.4
	TCE	5																				2.9		5.4
	Vinyl Chloride	2																				1		1
MW-14B	Cis 1,2-DCE	70		33		14		44				8.5		35		6.4		31		12		9.6		27
	Trans 1,2-DCE	100		5.7		10		10				4		10		5		12		5		5		2
	TCE	5		180		110		260				69		220		67		200		81		77		190
	Vinyl Chloride	2		5.7		10		10				4		10		5		12		5		5		1
MW-16	Cis 1,2-DCE	70						55										43				49		
	Trans 1,2-DCE	100						20										12				10		
	TCE	5						250										160				180		
	Vinyl Chloride	2						20										12				10		
MW-18	Cis 1,2-DCE	70				39						110		150						180				240
	Trans 1,2-DCE	100				1.2						2.2		2.5						2.5				3.6
	TCE	5				1.2						5		5						10				0.93
	Vinyl Chloride	2				20						19		19						16				25
MW-19	Cis 1,2-DCE	70				9.1						8.7		8.3						11				11
	Trans 1,2-DCE	100				12						12		12						10				2
	TCE	5				200						160		180						160				260
	Vinyl Chloride	2				12						12		12						10				1
MW-20	Cis 1,2-DCE	70				1500						34		1700						2000				1600
	Trans 1,2-DCE	100				50						1		100						100				23
	TCE	5				1700						38		1800						2000				1900
	Vinyl Chloride	2				32						0.91		46						48				50

ATTACHMENT 1
HISTORIC GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits	Feb-07	Apr-07	Aug-07	Oct-07	Feb-08	Apr-08	Jul-08	Aug-08	Sep-08	Oct-08	Mar-09	Apr-09	Jul-09	Oct-09	Jan-10	May-10	Aug-10	Oct-10	Feb-11	Apr-11	Aug-11	Nov-11
MW-22	Cis 1,2-DCE	70				32		31						28				42				49		
	Trans 1,2-DCE	100				1		2						2				2				2		
	TCE	5				20		25						51				2				45		
	Vinyl Chloride	2				0.51		2						2				2				2		
MW-23	Cis 1,2-DCE	70		0.43		1.8		0.53				0.31		1		0.42		1		0.45		0.59		2
	Trans 1,2-DCE	100		1		1		1				1		1		1		1		1		1		2
	TCE	5		13		15		14				11		6.3		12		1		12		9.5		17
	Vinyl Chloride	2		1		1		1				1		1		1		1		1		1		1
MW-25	Cis 1,2-DCE	70	34	29	1	25	14	17	77	96	23	19	15	1.9	24	41	39	11	52	3.0	46	41	50	5.1
	Trans 1,2-DCE	100	5	2.5	1	5	2	3	10	15	5	4	2	1	5	10	12	1	12	1	10	7.5	10	2
	TCE	5	110	94	1	92	64	64	280	420	70	70	62	14	69	150	150	38	180	18	150	130	160	22
	Vinyl Chloride	2	5	2.5	1	5	2	3	10	15	5	4	2	1	5	10	12	1	12	1	10	7.5	10	1
MW-26	Cis 1,2-DCE	70		1		1		1				1		1		1								
	Trans 1,2-DCE	100		1		1		1				1		1		1								
	TCE	5		6.2		5.4		8.3				7.0		4.7		4.4								
	Vinyl Chloride	2		1		1		1				1		1		1								
MW-28	Cis 1,2-DCE	70						1																
	Trans 1,2-DCE	100						1																
	TCE	5						1																
	Vinyl Chloride	2						1																
MW-29	Cis 1,2-DCE	70		1		0.37		0.14				1		1		1		1		1		1		2
	Trans 1,2-DCE	100		1		1		1				1		1		1		1		1		1		2
	TCE	5		1.5		8.4		3.0				3.8		2.6		3.4		2.1		2.4		0.95		2.9
	Vinyl Chloride	2		1		1		1				1		1		1		1		1		1		1
MW-30	Cis 1,2-DCE	70		3.9		3.8		2.8				7.4		2.1		4.6		4.6		3.3		1.7		3.4
	Trans 1,2-DCE	100		1.4		2		2				2		1		2		1		1		1		2
	TCE	5		34		38		43				48		32		47		43		31		21		38
	Vinyl Chloride	2		1.4		2		2				2		1		2		1		1		1		1
MW-32	Cis 1,2-DCE	70				9.7						7.5				8.8				8.2				5.3
	Trans 1,2-DCE	100				5						5				5				2.5				2
	TCE	5				80						58				70				60				54
	Vinyl Chloride	2				5						5				5				2.5				1

ATTACHMENT 1
HISTORIC GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits	Feb-07	Apr-07	Aug-07	Oct-07	Feb-08	Apr-08	Jul-08	Aug-08	Sep-08	Oct-08	Mar-09	Apr-09	Jul-09	Oct-09	Jan-10	May-10	Aug-10	Oct-10	Feb-11	Apr-11	Aug-11	Nov-11
MW-33	Cis 1,2-DCE	70						0.097																
	Trans 1,2-DCE	100						1																
	TCE	5						5.7																
	Vinyl Chloride	2						1																
MW-34	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-35	Cis 1,2-DCE	70		1		0.22		1				1		1		1		1		1		1		0.81
	Trans 1,2-DCE	100		1		1		1				1		1		1		1		1		1		2
	TCE	5		1		6.9		1.9				6.6		5.6		5.2		3.4		2.6		0.56		2.7
	Vinyl Chloride	2		1		1		1				1		1		1		1		1		1		1
MW-36	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-41	Cis 1,2-DCE	70				1						0.72				1		1						2
	Trans 1,2-DCE	100				1						1				1		1						2
	TCE	5				3.9						7.2				2.9		1.5						4.2
	Vinyl Chloride	2				1						1				1		1						1
MW-46	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-50	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-52	Cis 1,2-DCE	70		54		54		40				57		34		16		35		82		30		84
	Trans 1,2-DCE	100		5.7		10		12				12		12		10		10		12		7.5		2
	TCE	5		230		210		240				230		170		130		200		270		140		83
	Vinyl Chloride	2		5.7		10		12				12		12		10		10		12		7.5		1

ATTACHMENT 1
HISTORIC GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits	Feb-07	Apr-07	Aug-07	Oct-07	Feb-08	Apr-08	Jul-08	Aug-08	Sep-08	Oct-08	Mar-09	Apr-09	Jul-09	Oct-09	Jan-10	May-10	Aug-10	Oct-10	Feb-11	Apr-11	Aug-11	Nov-11
MW-53	Cis 1,2-DCE	70	1	1	20	1	1	0.11	0.14	0.22	1	1	1	1	1	1	1	1	1	1	0.48	1	1	2
	Trans 1,2-DCE	100	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	1	1	2
	TCE	5	1	1	68	0.80	1	1	1	1	1.3	1	1	1	1	1	1	1	1	1	0.17	1	1	1
	Vinyl Chloride	2	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1.0	1	1	1
MW-55B	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-56	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-57	Cis 1,2-DCE	70				0.15						1				1		1						2
	Trans 1,2-DCE	100				1						1				1		1						2
	TCE	5				1						1				1		1						1
	Vinyl Chloride	2				0.24						1				0.25		1						1
MW-58	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-70	Cis 1,2-DCE	70																						
	Trans 1,2-DCE	100																						
	TCE	5																						
	Vinyl Chloride	2																						
MW-72	Cis 1,2-DCE	70		22		38		57				38		24		32		20		18		23		15
	Trans 1,2-DCE	100		5.7		10		20				20		10		20		10		12		10		2
	TCE	5		190		320		450				310		180		290		170		160		200		160
	Vinyl Chloride	2		5.7		10		20				20		10		20		10		12		10		1
MW-74	Cis 1,2-DCE	70		1		1		1				1		1		1		1		1		1		2
	Trans 1,2-DCE	100		1		1		1				1		1		1		1		1		1		2
	TCE	5		1		1		1				1		1		1		1		1		1		1
	Vinyl Chloride	2		1		1		1				1		1		1		1		1		1		1

ATTACHMENT 1
HISTORIC GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits	Feb-07	Apr-07	Aug-07	Oct-07	Feb-08	Apr-08	Jul-08	Aug-08	Sep-08	Oct-08	Mar-09	Apr-09	Jul-09	Oct-09	Jan-10	May-10	Aug-10	Oct-10	Feb-11	Apr-11	Aug-11	Nov-11
SW-1	Cis 1,2-DCE	70		180		150		180				110		120		79		120		140		100		100
	Trans 1,2-DCE	100		13		2.4		25				25		25		10		2.4		25		20		0.78
	TCE	5		500		430		490				340		360		240		370		430		300		350
	Vinyl Chloride	2		13		20		25				25		25		10		1.1		25		20		1
SW-2	Cis 1,2-DCE	70		1		0.28		0.33				1		1		0.31		1		1		1		2
	Trans 1,2-DCE	100		1		1		1				1		1		1		1		1		1		2
	TCE	5		1.6		4.8		4.5				1.2		1.8		3.2		1.9		2.6		0.41		0.74
	Vinyl Chloride	2		1		1		1				1		1		1		1		1		1		1
MW-H	Cis 1,2-DCE	70						1																
	Trans 1,2-DCE	100						1																
	TCE	5						1																
	Vinyl Chloride	2						1																
MW-G	Cis 1,2-DCE	70						1																
	Trans 1,2-DCE	100						1																
	TCE	5						1.2																
	Vinyl Chloride	2						1																
Checked by:			AEB	AEB	AEB	DMC	AEB	CEH	GSO	GSO	GSO	CEH	NEL	GSO	ESW	GSO	NEF	CEH	DMC	SCC	SCC	SCC	GSO	GSO
Checked/Formatted by:			PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY	PJY

NOTES:

RESULTS IN RED INDICATE THE ANALYTICAL RESULT WAS NON-DETECT

ALL RESULTS ARE IN MICROGRAMS PER LITER (UG/L)

FOR GRAPHING PURPOSES, ALL DATA QUALIFIERS HAVE BEEN REMOVED.

ATTACHMENT 1
SUMMARY OF HISTORICAL GROUNDWATER SAMPLING ANALYTICAL RESULTS
WEST PARKING LOT
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PA

LOCATION	ANALYTE	1ST 00	2ND 00	3RD 00	4TH 00	1ST 01	2ND 01	3RD 01	4TH 01	1ST 02	3RD 02	2ND 03	4TH 03	3RD 04	2ND 05	2ND 06	2ND 07	2ND 08	2ND 09	2ND 10	2ND 11
GM-3	Cadmium	0.069	0.08	0.19	0.13	0.3	0.039	0.083	0.28	0.068	0.15	0.14	0.23	0.40	0.23	0.23	0.244	0.279	0.292	<0.005	0.0097
	dis Cadmium																0.247	0.281	0.291	<0.005	0.0036 B
	Chromium VI	<0.003	<0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.32	<0.01	0.02	0.93	<0.010	0.58	0.42	0.49	0.38	0.0056 B	0.0035 B
GM-4	Cadmium	0.039	0.042	0.036	0.039	0.029	0.037	0.024	0.035	0.0528	0.03	0.034	0.032	0.02	<0.010	0.026	0.0228	0.0243	0.0272	<0.005	0.0379
	dis Cadmium																0.0224	0.0252	0.0277	<0.005	0.0390
	Chromium VI	0.412	<0.3	0.46	0.56	0.38	0.54	0.37	0.42	0.29	0.33	0.46	0.42	<0.01	<0.010	0.32	0.30	0.32	0.27	0.0043 B	0.27
PRW-10	Cadmium	<0.0036	<0.0036	0.0002	0.0002	0.0004	0.0003	0.0001	0.0002	0.0004	0.0001	0.0011	0.0015	0.0015	0.0010	<0.005	0.0032 B	<0.005	0.00036	0.00091 B	0.0010 B
	dis Cadmium																0.48 B	<0.005	<0.005	0.00075 B	<0.005
	Chromium VI	<0.003	0.494	0.8	1.2	<0.01	0.28	1	0.16	<0.01	0.09	0.37	1.2	0.03	<0.010	<0.010	<0.01	<0.01	<0.01	1.7	0.0061 B

NOTES:

All concentrations are in miligrams per liter (mg/L) or parts per million

ROD Documented Performance Criteria are 0.003 mg/L for Cadmium and 0.032 mg/L for Hexavalent Chromium

"B" indicates estimated result.

ATTACHMENT 1
MEMORIAL AVENUE REMEDIATION SYSTEM
HISTORICAL GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits[1]	Aug-07	Oct-08	Jul-09	May-10	Apr-11
EW-1	Cis 1,2-DCE	70	7.5	0.68 J	8.4	1.4	6.3
	Trans 1,2-DCE	100	<5	<1	<1	<1	<4
	TCE	5	84	14	50	23	73
	Vinyl Chloride	2	<5	<1	<1	<1	<4
EW-2	Cis 1,2-DCE	70	670	2.1	0.47 J	0.45 J	0.91 J
	Trans 1,2-DCE	100	<50	<1	<1	<1	<1
	TCE	5	1100	21	9.5	8.5	12
	Vinyl Chloride	2	<50	<1	<1	<1	<1
EW-3	Cis 1,2-DCE	70	18	20		2.2	15
	Trans 1,2-DCE	100	<8	<8		<1	<8
	TCE	5	130	80		34	120
	Vinyl Chloride	2	<8	<8		<1	<8
EW-4	Cis 1,2-DCE	70	11				
	Trans 1,2-DCE	100	<1				
	TCE	5	30				
	Vinyl Chloride	2	0.77 J				
EW-5	Cis 1,2-DCE	70	35	58	82	170	68
	Trans 1,2-DCE	100	<5	<5	<20	<20	<12
	TCE	5	110	130	230	260	200
	Vinyl Chloride	2	<5	<5	<20	<20	<12
EW-6	Cis 1,2-DCE	70	490	360	84	280	540
	Trans 1,2-DCE	100	<50	<50	0.44 J	<50	<50
	TCE	5	740	710	230	590	910
	Vinyl Chloride	2	<50	<50	0.44 J	<50	<50
EW-7	Cis 1,2-DCE	70	140	100	71	140	
	Trans 1,2-DCE	100	<25	<25	<5	<25	
	TCE	5	350	260	140	400	
	Vinyl Chloride	2	<25	<25	<5	<25	
EW-8	Cis 1,2-DCE	70	440	2.1	80	630	73
	Trans 1,2-DCE	100	<50	<1	<10	<50	<10
	TCE	5	720	21	140	1000	190
	Vinyl Chloride	2	<50	<1	<10	<50	<10
EW-9	Cis 1,2-DCE	70	2400	1600	780	1700	1600
	Trans 1,2-DCE	100	<100	<100	<50	<100	<100
	TCE	5	2500	1600	690	1900	1400
	Vinyl Chloride	2	90 J	70 J	16 J	33 J	49 J
EW-10	Cis 1,2-DCE	70	93	70	94	36	14
	Trans 1,2-DCE	100	<10	<10	<15	<5	<1
	TCE	5	210	120	180	89	40
	Vinyl Chloride	2	<10	<10	<15	<5	<1
EW-11	Cis 1,2-DCE	70	560	19	130	510	560
	Trans 1,2-DCE	100	21 J	<3	<10	<50	<50
	TCE	5	1100	66	240	910	770
	Vinyl Chloride	2	<50	<3	<10	<50	<50

ATTACHMENT 1
MEMORIAL AVENUE REMEDIATION SYSTEM
HISTORICAL GROUNDWATER SAMPLING RESULTS
AVCO-LYCOMING ENGINES FACILITY
WILLIAMSPORT, PENNSYLVANIA

Location	Compound	MSC Limits[1]	Aug-07	Oct-08	Jul-09	May-10	Apr-11
EW-12	Cis 1,2-DCE	70	990		320	110	460
	Trans 1,2-DCE	100	<100		<25	<12	<50
	TCE	5	2000		670	230	860
	Vinyl Chloride	2	<100		<25	<12	<50
EW-13	Cis 1,2-DCE	70	87	75	53	12	350
	Trans 1,2-DCE	100	<10	<10	<4	<2	<25
	TCE	5	190	260	100	40	580
	Vinyl Chloride	2	<10	<10	<4	<2	<25
EW-14	Cis 1,2-DCE	70	410	280	220	100	200
	Trans 1,2-DCE	100	<50	<50	<25	<12	<25
	TCE	5	950	840	590	290	440
	Vinyl Chloride	2	<50	<50	<25	<12	<25
EW-15	Cis 1,2-DCE	70	730	420	2.9	32	
	Trans 1,2-DCE	100	<100	<50	<1	<5	
	TCE	5	1500	1100	28	120	
	Vinyl Chloride	2	<100	<50	<1	<5	
Checked/Formatted by:			PJY	PJY	PJY	PJY	PJY

NOTES:

All results in micrograms per liter (ug/l) or parts per billion

1 - From 25 PA Code 250 Appendix A Table 1

J - Indicates estimated result. Result is less than reporting limit.

Shading indicates exceedance of MSC

Blank - Indicates no sample collected.