EPA Region 5 Records Ctr.
347417

Five-Year Review Report

Third Five-Year Review Report

for

U.S. Aviex Superfund Site

Niles

Cass County, Michigan

November 2009

PREPARED BY:

U.S. Environmental Protection Agency
Region 5
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Approved by: Date:

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Five-Year Review Report

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List of Acronyms

AOC	Administrative Order by Consent
ARAR	Applicable, Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
CLP	Contract Laboratory Program (EPA-approved contract laboratories)
COC	Chemicals of Concern
DCA	Dichloroethane
DCE	Dichloroethylene or Dichloroethene
DCFM	Dichlorofluoromethane
DEE	Diethyl ether
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
EW	Extraction Well
FCOR	Final Closeout Report - documents completion of Remedial Action
FR	Federal Register
FS	Feasibility Study
gpm	Gallons per Minute
IC	Institutional Control
MCL	Maximum Contaminant Level
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MGD	Million Gallons per Day
MW	Monitoring Well
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
PCE	Perchloroethylene or Tetrachloroethylene
ppb	Parts per billion or ug/L (water) and ug/kg (soil/sediment)
ppm	Parts per million, or mg/L (water) or mg/kg (soil/sediment)
PRPs	Potentially Responsible Parties
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAO	Remedial Action Objective

RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RP	Responding Party
RPM	Remedial Project Manager (U.S. EPA)
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SMCL	Secondary Maximum Contaminant Level
SOW	Statement of Work
TAL	Target Analyte List
TBC	To Be Considered
TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TCFM	Trichlorofluoromethane
VOC	Volatile Organic Chemical
WHPP	Well Head Protection Plan
WHPA	Well Head Protection Area

Executive Summary

The U.S. Aviex Site consists of about six acres located at 1056 Huntly Road, approximately two miles northeast of Niles, Michigan. The now-defunct facility produced non-lubricating automotive fluids from the 1960s to1978. The St. Joseph River is about 3.5 miles west of the Site. The primary land use in the area is rural and residential with a small subdivision immediately adjacent to the Site. Minor agricultural activities occur in the general vicinity of the Site. The residential area is comprised of numerous single-family homes with some homes located within100 feet north and east of the property perimeter.

A Record of Decision (ROD) issued in 1988 prescribed a remedy of soil flushing and groundwater extraction and treatment ("pump-and-treat"). Based upon the sampling results of the pre-design studies conducted after the ROD, EPA determined that the risk from the remaining source soils did not warrant the soil flushing system. A 1993 Explanation of Significant Differences (ESD) modified the ROD to remove the soil-flushing component. The groundwater pump-and-treat system operated from 1993 to 2004. After it became inefficient, a ROD Amendment was signed in 2004 to change the remedy from containment to monitored natural attenuation.

The EPA is conducting this third site-wide Five-Year Review of the Remedial Action (RA) for the U.S. Aviex Site, as mandated by Section 121(c) of CERCLA. This statute provides that EPA will conduct reviews no less often than five years at sites where an RA, upon completion, will leave hazardous substances, pollutants or contaminants onsite above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The trigger for this Third Five-Year Review was the completion date (December 3, 2004) of the Second Five-Year Review. The remedy at the U.S. Aviex Site currently protects human health and the environment in the short term. This Five-Year Review found that the remedy implemented at the Site is functioning as intended by the ROD, ESD and ROD Amendment and is protective in the short term. The operation of the ozone/air sparge system has significantly reduced dissolved phase source area concentrations in the area north of the warehouse. Concentrations above ROD and MDEQ criteria persist at other locations both onsite and offsite. The levels of contaminants in the groundwater plume have declined significantly over the last five years as per the monitoring data and trend analysis. The more recent excavation of principal threat soils north of the onsite warehouse prevents further contaminants from entering the groundwater system. As such, the plume system does not appear to pose a threat to the city of Niles water supply; the sentinel wells have not shown any contamination to date and the Niles Well Head Protection Plan (WHPP) has served to protect its groundwater supply source area. The connection of residents to the Niles municipal water supply within the plume area or downgradient of the plume has removed additional potential for human exposure.

The Niles municipal supply is not, nor is it expected to be affected by the Site-related groundwater contamination. Long-term protectiveness at the Site will require the evaluation and implementation of institutional controls (ICs) to ensure that the remedy continues to function as intended. To assure proper maintenance, monitoring, and enforcement of effective ICs, long-term stewardship procedures will be reviewed and a plan developed. More data will need to be reviewed in the forthcoming years in order to determine the effectiveness of monitored natural attenuation (MNA) as the current stand-alone groundwater remedy since the termination of the ozone/air sparge system.

Evaluation of the remedy will continue during future Five-Year Reviews until contamination and/or its associated risks are no longer present in the Site groundwater.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: **U.S. Aviex Site**		
EPA ID *(from WasteLAN)*: **MID980794556**		
Region: 5	**State: MI**	**City/County: Niles/ Cass County**
SITE STATUS		
NPL status: ☒ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete		
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 9/ 21/ 1993	
Has site been put into reuse? ☐ YES ☒ NO		
REVIEW STATUS		
Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____		
Author name: Sheila Alana Sullivan		
Author title: Remedial Project Manager	**Author affiliation: U.S. EPA, Region 5**	
Review period:** 1/ 8/ 2009 to 9/ 30/ 2009		
Date(s) of site inspection: 8/ 19/ 2009		
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☐ 1 (first) ☐ 2 (second) ☒ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐Actual RA Start at OU#____ ☐ Construction Completion ☒ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date *(from WasteLAN)*: 12/ 03/ 2004		
Due date *(five years after triggering action date)*: 12/ 03/ 2009		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form cont'd.

Issues:

1. The institutional controls (ICs) have not been fully evaluated. A review of the ICs is needed to ensure that the remedy is functioning as intended with regard to the ICs, and to ensure effective procedures, including measures to maintain and monitor ICs, are in place to assure long-term protectiveness of the Site.

Recommendations and Follow-up Actions:

1. IC evaluation activities are underway. An IC Plan will be developed to incorporate the results of the evaluation activities and plan for additional IC activities as needed, including planning for long-term stewardship and a review of the need for an ESD for ICs.

Protectiveness Statement:

The remedy at the U.S. Aviex Site currently protects human health and the environment in the short term. There is no human exposure to contaminated groundwater or soil. The operation of the ozone/air sparge system and the excavation of vadose zone soils in the north area of the Site have removed a majority of the contaminant source materials. In addition, the affected residences with private wells situated within the plume and/or downgradient of the plume have been connected to the Niles municipal water supply and their wells have been properly abandoned. The Niles municipal supply is not, nor is it expected to be affected by the Site-related groundwater contamination. A monitoring network is in place that effectively monitors the down-gradient extent of the impacted groundwater. Long-term protectiveness requires compliance with effective ICs. Evaluation of the necessity and types of ICs required is underway. To assure proper maintenance, monitoring, and enforcement of effective ICs, long-term stewardship procedures will be reviewed and a plan developed. A review of the need for an ESD for ICs will also be conducted. These steps are necessary to ensure that the remedy continues to function as intended and to ensure long-term protectiveness.

Other Comments:

None

Environmental Indicators:

Date of last Regional review of Human Exposure Indicator (from WasteLAN): **6/ 17/ 2009**
Human Exposure Survey Status (from WasteLAN): **Current Human Exposure Under Control**
Date of last Regional review of Groundwater Migration Indicator (from WasteLAN): **6/ 17/ 2009**
Goundwater Migration Survey Status (from WasteLAN): **Contaminated Groundwater Migration Under Control**
Ready for Reuse Determination Status (from WasteLAN): **Not Ready for Re-use**

Five-Year Review Report

I. Introduction

The purpose of Five-Year Reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of such reviews are documented in the site-specific Five-Year Review reports. In addition, Five-Year Review reports identify issues or deficiencies, if any, found during the review process for the site, and provide recommendations to address or correct them.

The United States Environmental Protection Agency (EPA) is preparing this site-wide Five-Year Review pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *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 EPA interpreted this requirement further in the National Contingency Plan (NCP); 40 CFR §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 5, in conjunction with the Michigan Department of Environmental Quality (MDEQ), has conducted a site-wide Five-Year Review of the remedial action (RA) implemented at the U.S. Aviex Site (the "Site") in Niles, Michigan. This review was conducted for this Site from January 8, 2009 through September 30, 2009 by the EPA Remedial Project Manager (RPM), with assistance from the MDEQ Site Manager. The MDEQ is the lead agency for the Site. The MDEQ contractor, Weston Solutions of Michigan, Inc., 600 East Lakeshore Drive, Houghton, Michigan, also contributed information to the report. This report documents the results of the review. As part of this review, the RPM and MDEQ reviewed all available quarterly groundwater monitoring data collected under the operation and maintenance (O&M) for the Site over the past five years in order to evaluate the current Site status.

This is the third site-wide Five-Year Review for the U.S. Aviex Site. The second Five-Year Review was completed on December 3, 2004--the triggering date for this third Five-Year Review. This Five-Year Review was specifically activated by the presence of hazardous substances, pollutants and contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE). The RA is expected to require more than five years to complete; however, upon its completion, the hazardous substances, pollutants and contaminants will be remediated to allow for UU/UE. At that time, a Five-Year Review will no longer be required.

II. Site Chronology

TABLE 1 - CHRONOLOGY OF SITE EVENTS

Event	Date
The U.S. Aviex plant manufactures nonlubricating automotive fluids	early 1960s to 1978
Underground pipeline containing diethyl ether (DEE) ruptures during excavation at the plant. Within a year, DEE is found in residential wells.	July 1972
MDNR and MDPH sample onsite and residential wells.	early 1970s to 1986
DEE is detected in nearby residential wells on Lilac Street. Low levels are identified on Blanchard Street and Almaugus Drive. U.S. Aviex provides bottled water to 44 affected homes wells through an agreement with MDPH.	1973 onward
A fire breaks out in the plant, rupturing chemical storage tanks. The large quantity of water used to extinguish the fire washes volatile organic chemicals (VOCs) into the soil and groundwater.	November 28, 1978
Underground production tanks are removed; septic tanks receiving sanitary wastes are pumped out but not removed.	November, 1978 and 1980
Chlorinated hydrocarbons are detected in groundwater approximately 400 feet west/southwest. Fourteen monitoring wells are installed, and five older wells are removed.	1980
State of Michigan initiates legal action against U.S. Aviex, resulting in a groundwater investigation.	Early 1982
U.S. Aviex is proposed for addition to the National Priorities List (NPL).	December 30, 1982
U.S. Aviex is added to the final NPL list	September 8, 1983
Onsite groundwater pump-and-treat system is installed and begins operating as a result of the groundwater investigation.	November 1983

Event	Date
State of Michigan allows EPA to take the lead role under the Superfund program.	Late 1984
Administrative Order by Consent (AOC) is signed between EPA and U.S Aviex to conduct an RI/FS for offsite groundwater contamination and source control.	September 30, 1985
U.S. Aviex files for Chapter 11 bankruptcy. EPA continues the RI/FS using funds set aside by U.S. Aviex.	January to October 1986
Construction begins on the public water supply distribution system for about 220 affected residences, funded by the Michigan Act 307 program.	August 1986
Final RI Report completed. EPA issues the Proposed Plan containing the recommended remedial alternative of the U.S. Aviex Site to the public	June 6, 1988.
Public comment period	June 6 to July 18, 1988
EPA issues the Record of Decision (ROD)	September 7, 1988
Remedial Design (RD) completed	September 9, 1991
Remedial Action (RA) begins	June 1992
Groundwater pump-and-treat system becomes operational and functional. EPA contractor, PRC, begins operating the system.	June 14,1993
EPA issues Explanation of Significant Differences (ESD) to modify the 1988 ROD by removing the soil flushing component	September 23, 1993
Preliminary Close Out Report (PCOR) signed marking the completion of the remedial action (RA) construction	September 21, 1993
Governor Engler issues Executive Order 1995-18, separating environmental and natural resource functions into two separate departments; the remediation program is moved to MDEQ.	June 1995
Tetra Tech EM Inc. completes a Phase I groundwater study to assess the extent of contaminated groundwater in the surficial aquifer downgradient of the groundwater collection system. The investigation results in an "Additional Groundwater Assessment Summary Report" (February 27, 1998).	October 15 to November 13, 1997
U.S. Aviex Site enters the long-term remedial action (LTRA) phase of remediation and MDEQ assumes lead role for Site activities.	1998
First Five-year Review report is signed	December 3, 1999
A Phase II groundwater assessment is conducted to define the extent of contamination downgradient of the pump-and-treat system at the Site, including a study to analyze future remedial alternatives to address downgradient	June 2000 to September 2000

Event	Date
groundwater contamination (report dated August 2001).	
MDEQ completes the investigation of the contaminated groundwater	2002
BIOX™ pilot test applications	October 2003 to March 2004
Sparge System operation to reduce contaminant levels at the property	March 2004 to October 2007
EPA issues ROD Amendment changing the treatment method from groundwater pump-and-treat system to monitored natural attenuation (MNA).	September 29, 2004
Second Five-Year Review completed	December 3, 2004
Excavation of onsite principal source materials by MDEQ as an emergency response action	Fall 2007 – Spring 2008
EPA conducts Third Five-Year Review site inspection	August 19, 2009

III. Background

Physical Characteristics

The U.S. Aviex Site consists of about six acres in the SE quarter of the SW quarter of Section 29 Township 7S, Range 16W, Howard Township, Cass County, Michigan. The six-acre Site, located at 1056 Huntly Road, is approximately two miles northeast of Niles, Michigan. The facility, which produced non-lubricating automotive fluids between the early 1960s and 1978, is no longer in operation. One empty warehouse remains onsite. The St. Joseph River is about 3.5 miles west of the Site. The nearest surface water body, the 199-acre Barron Lake is about 0.75 miles northeast of the Site (see Figure 1). Surface and groundwater flow is toward Brandywine Creek to the south and eventually to the St. Joseph River, which empties into Lake Michigan. The primary land use in the area is rural and residential with a small subdivision immediately adjacent to the Site toward the south and west. Minor agricultural and horticultural activities occur in the general vicinity of the Site. The residential area is comprised of numerous single-family homes with some homes located within 100 feet north and east of the property perimeter. All the residences had their own water supply wells before the groundwater contamination was detected. There are no storm or sanitary sewers nearby, nor are there natural watercourses or drains within 2,000 feet of the Site.

Land and Resource Use

The Site is surrounded by private residences (see Figure 2). There is some commercial development along M-60 and Yankee Street. Agricultural areas are located about one-half mile southeast of the Site. A regional airport, a sewage treatment lagoon, and other light industries are located about one mile west of the Site. Howard Township is a zoned community, consistent with the above description of land use (see Figure 3). Limited agricultural activities occur in the area immediately surrounding the Site. Cass County produces more hogs than any other county in Michigan. Other important agricultural products include soybeans, corn and sheep. However, much of the farmland in the immediate vicinity of the U.S. Aviex Site is unused.

The city of Niles is about 5.9 square miles and while principally located in Berrien County, also extends into Cass County. According to 2000 census data, the population of Niles is 12,204. Over the past five decades, the city's population has been declining. The 2000 population of Cass County, which includes Howard Township, was about 51,104. The 2000 population of Howard Township was 6,309 (US Bureau of the Census 2000).

The city of Niles owns and operates a small general aviation airport for private and charter use. The Jerry Tyler Memorial Airport has two runways and serves Niles and Berrien County (see Figure 1). The airport and surrounding properties are zoned for industrial uses. The adjoining uses in Cass County and Howard Township are rural and undeveloped. The Federal Aviation Administration reviews and approves applications for development within a certain proximity to the airport.

The future industrial uses cluster in two sections of Niles: west and south of the St. Joseph River at the city's southern boundary. The largest area is located at the northeastern edge of Niles, including the Jerry Tyler Memorial Airport. This area actually extends eastward into Cass County.

About 225 homes in Niles and Howard Townships near the Site are now connected to the Niles municipal water supply. The closest municipal wells are located between two to three miles west at the corner of Terminal Road and Lake Street. The municipal wells are screened from approximately 120 to 160 feet deep.

The Niles Municipal Water supply source is from the deepest aquifer of the St. Joseph River Glacial Outwash Aquifer System. The system consists of eight wells, an iron filtration plant, a booster pumping station and five elevated storage tanks. The city water supply capacity is 7.6 million gallons-per-day (GPD), but currently, only pumps an average of two-million GPD, with the peak usage going up to almost four-million GPD in the summer. Certain wells have back-up generation to pump water during power outages.

A significant portion of the city of Niles water distribution system was installed more than 50 years ago. After completion of a water reliability study in 2003, the city improved its water system infrastructure by adding an iron filtration plant, establishing an intermediate water pressure district on the east side of town, and adding water storage in the Bertrand Township Industrial Park.

In 2003, the State of Michigan completed a Source Water Assessment. Groundwater susceptibility is determined by the number and type of contamination sources within the Wellhead Protection Area (WHPA), with additional consideration to well construction and the chemical monitoring history of individual production wells. Information from the WHPA delineation for the eight production wells indicated the aquifer from which the city obtains groundwater is characterized as "leaky-confined". The city's eight production wells possess a "moderately high" susceptibility based on geologic sensitivity analysis and the potential contamination sources within the WHPA. The city implemented a Wellhead Protection Program in response to this information.

Geology

The Site and the affected aquifer occupy part of an extensive northeast-southwest trending belt of ice-contact glacial sand and gravel deposits containing thin lenses and discontinuous interlayers of clay. The two major types of depositional groups in the area are glacial outwash and ice-contact outwash. The glacial outwash is drift or sediments deposited by melt water streams out beyond active glacier(s). Ice-contact outwash is outwash deposited in contact with a melting glacier. Both types of deposits are typically fine sand through course gravel with occasional large cobbles and are very poorly sorted. Beneath the former plant site, assorted clays and lenses compose varying but lesser amounts of the subsoils. A sandy clay layer underlies the sediments of the upper aquifer, which is between seven and 22 feet thick. The sediments beneath the sandy clay are predominately fine to medium sands. The sandy clay layer depth increases to the

southwest of the Site. These clayey soils have a fairly high water capacity and moderately slow permeability.

Groundwater

The water table aquifer is encountered at 15 to 45 feet deep throughout the area investigated to the west of the Site. The aquifer has a saturated thickness of between 70 and 90 feet near the Site, increasing to 170 feet deep near the airport property. The groundwater flow velocity is approximately one-half foot per day. The direction of groundwater flow is west-southwest changing to north/northwest apparently by the influence of the Niles municipal wells. The deep aquifer beneath the sandy clay layer is artesian and has a flow pattern similar to the upper aquifer in the area of the former U.S. Aviex Site.

Groundwater at this location in the surficial aquifer used as a potable supply moves in a southwesterly direction at the rate of 100 to 300 feet per year. The aquifer formation consists of sands and gravels with clay lenses. The chemical contaminants in the groundwater move primarily in the direction of groundwater flow. The water supply system for the city of Niles taps a deeper portion of the aquifer that is beneath two clay layers and is considered to be slightly confined. However, because there is migration of the contaminant plume through the topmost clay layer, these confining clay layers may not be sufficiently thick or continuous to prevent downward migration. Therefore, the water supply wells for the city of Niles could potentially become contaminated from long-term westward and downward migration of the contaminant plume.

History of Contamination

The U.S. Aviex plant manufactured non-lubricating automotive fluids between the early 1960s and 1978, as well as repackaged bulk products. Bulk chemicals were stored either in aboveground tanks, belowground tanks, steel drums, or fiberpak drums. All tanks were connected to the batch and filling rooms by underground or overhead pipelines. Materials stored above ground included No. 1 heating oil, kerosene, methanol, propane, isobutene and refrigerants (freons). An aboveground pressurized starting-fluid batch tank containing ether and propane was located in the underground tank area situated immediately east of the truck dock. Other above-ground tanks included two batch tanks contained oleic acid and an animal-fat acid. Below-ground storage included three ether tanks.

During the 1960s and/or 1970s, unquantified amounts of chlorinated hydrocarbons were released into the vadose zone of the soils in the area south of the process rooms. The soils were found to contain significant levels of benzene, 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethene (1,1-DCE), diethyl ether (DEE), dichlorofloromethane (DCFM) 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), trichlorofluoromethane(TCFM), trans-1,2-dichloroethane (trans-1,2-DCE) and perchloroethene (PCE). Nearby residential wells were later found to be contaminated with one or more of the above-mentioned chemicals.

In July 1972, an underground pipeline containing DEE broke during excavation on the plant site. The break occurred in the southeast area of the plant. Within three to four months, DEE was detected in the part-per-million (ppm) range in nearby residential wells on Lilac Street. By August 1973, ether at the level of 11 ppm had been identified on Lilac Street. Over the next several years, low levels of DEE contamination were identified in downgradient residential wells located southwest of the plant as far as one-half mile away on Blanchard Street and Almaugus Drive.

The U.S. Aviex Company installed four 20-foot deep and two 40-foot deep monitoring wells on the Site beginning in 1972. These wells are located near the south property line and in the former process building area, and include TW-1 and TW-2 (20-ft and 40-ft wells at both locations) and TW-4 (20-ft). Well TW-3 was a 20-foot deep well located at the west warehouse.

On November 28, 1978, a fire broke out near the process buildings located at the southeast end of the plant. Many thousands of gallons of water were needed to extinguish the fire over a two-day period. Barrels and indoor tanks of stored chemicals were ruptured during the fire and their contents were either consumed by the fire or washed from the Site into unpaved areas and the groundwater. Four large trucks loaded with aerosol cans of dry gas were destroyed in the fire.

Following the 1978 fire and the discovery of chlorinated hydrocarbon contamination of groundwater as far west as 1050 Bame Street, the U.S. Aviex Company installed 14 additional monitoring wells in 1980 which included four 20-foot, six 40-foot, three 60-foot, and two 150-foot deep wells. The deepest wells were placed below a clay layer believed to separate the upper contaminated aquifer from unaffected groundwater below. Wells F-40, G-20, H-20, 1-20, TW-3 were removed during the removal of the buried tanks. Throughout the 1970s to mid-1980s, the Michigan Department of Natural Resources (MDNR), and the Michigan Department of Public Health (MDPH), including the Cass County Environmental Health Department, sampled onsite and neighborhood wells and kept files of the analytical results.

Initial Response

Previous responses by U.S. Aviex include pumping the contaminated groundwater using small-diameter onsite monitoring wells during the 1970s and early 1980s. The total quantity pumped was estimated to be 100,000 gallons. The produced water passed through activated carbon filters before being returned to the ground by infiltration. The onsite groundwater pump-and-treat system resulted in partial cleanup of contaminants from beneath the Site. Except for TCA, the actual amount of chemicals removed from the groundwater is not known. The amount of TCA removed approached the equivalent of three 55-gallon drums of the pure material over three years of pumping.

Commencing in 1972, U.S. Aviex had been providing bottled water to homes with contaminated wells under an agreement with the MDPH. About 32 homes were provided with water and 12 homes with wells in a lower, uncontaminated aquifer were also provided with water by agreement with the MDPH. Early in 1982, the State of Michigan initiated legal action against U.S. Aviex, resulting in a groundwater investigation and the installation of a more effective

onsite groundwater pump-and-treat program. The onsite program began operating in November 1983, and provided two extraction wells pumping up to 200 gallons-per-minute (gpm) from the contaminated upper aquifer, treatment by air stripping, and surface discharge of the treated water into a drain which is part of the St. Joseph River system. Containment of contaminated groundwater, however, was not complete in the western and northern boundaries of the property allowing continuous contaminant migration downgradient from the Site.

Late in 1984, the State of Michigan decided to allow EPA to take the lead role for this Site under its Superfund Program. As a result, EPA and U.S. Aviex reached a negotiated agreement providing for a remedial investigation and feasibility study (RI/FS) to investigate offsite groundwater contamination and onsite source control late in 1985. The RI report, prepared by EDI Engineering and Science (EDI) on behalf of U.S. Aviex in 1985, was finalized by EPA contractor, Jacobs Engineering, in 1988.

Early in 1985, the State of Michigan offered to provide a public water supply and distribution system to homeowners in the area under Michigan Act 307. This act provides funding for emergency remedial measures related to state-ranked hazardous sites. In August 1986, Howard Township let contracts to install a public water distribution system in the affected neighborhoods. The system was designed to distribute water from the Niles water supply system to about 220 homes in the area.

In 1986, U.S. Aviex filed Chapter 11 bankruptcy with the Bankruptcy Court for the Eastern District of Michigan. Funds had been previously set aside by U.S. Aviex to pay for the RI/FS so that the bankruptcy action did not stop the ongoing RI/FS at the Site.

Basis for Taking Action

Significant levels of TCE, PCE and TCA were present in the vadose zone beneath the paved entrance driveway opposite the process buildings. Light contamination was present in the shallow soils of the truck dock. The contamination was being contained by the extraction well systems. Significantly contaminated groundwater was present beneath the entrance driveway due to the leaching of chemicals in the vadose zone. In addition, DEE in a thin, semi-isolated groundwater zone in the north area of the Site near Well 82-3 was not being efficiently drawn into the extraction wells. Both of these contaminated zones were contained by the extraction well system, but the contamination would migrate offsite if the pumping system was discontinued.

Concentrations of the DCA isomers and xylene above one part-per-million (ppm) and other chemicals at lower levels were detected in the groundwater near the west boundary of the Site. These chemicals were partially drawn into the west extraction well, but the system was not effectively cleaning up the groundwater in this area due to the contamination in the downgradient direction beyond the capture zone.

In August 1981, U.S. Aviex consultants submitted a report indicating that chemicals discharged to the ground during the fire had appeared in downstream wells offsite and confirmed that the contamination was moving vertically and horizontally in the aquifer. The consultants measured over 200 ppm TCA and acetone in some onsite wells, DEE concentrations as high as 52 ppm, isopropyl alcohol at 40 ppm, and toluene and xylene at 8.8 ppm and 9.6 ppm, respectively. Lower concentrations of these chemicals were measured in offsite wells. The MDNR sampling and analysis confirmed these findings. Trichloroethane, acetone, DEE, toluene, xylene, and isopropyl alcohol are hazardous substances as defined in Section 101 (14) of CERCLA, 42 U.S.C.S 9601 (14). Human exposure to hazardous materials such as TCA was occurring through ingestion of drinking water from groundwater supplies. Several of the affected wells were replaced. The remaining affected water supply users were provided bottled water. Currently no one is exposed to contaminated drinking water from the Site.

The closest municipal wells to the U.S. Aviex Site are about two miles west of the Site; these wells are located at Terminal Road and Lake Street (Airport Well), at Sycamore Street and 16th Street (Parker Well) and at Fort Street and 9th Street. These wells produce more than one-million GPD from the unconsolidated sediments. In the immediate Site vicinity, groundwater flows in a southwesterly direction. At approximately one-half mile downgradient, the direction becomes westerly and eventually northwesterly at the last monitoring well location, putting the Niles municipal wells directly downgradient from the migrating contaminant plume.

IV. Remedial Actions

Remedial Investigation/Feasibility Study (RI/FS) Results

The RI/FS was conducted as part of the Consent Order agreed to and signed by U.S. Aviex and U.S. EPA. The report is a work product of EDI, the contractor retained by U.S. Aviex to complete a RI/FS under CERCLA as amended by SARA.

The RI results indicated that chemicals originating in the ground at the U.S. Aviex Site flowed offsite in a southwesterly direction along with the groundwater in the upper aquifer. This RI study defined the offsite plume, which was bounded on the north by a line from the Site west-northwest to near the intersection of Janellen and Carberry Roads, on the southeast by an irregular line extending from the Site in a south-southwesterly direction, and on the west by Carberry Road. The plume contaminants included chlorinated hydrocarbons, DEE, and other VOCs. Significant quantities of chlorinated hydrocarbons were also present onsite. These were found in the soils beneath the entrance driveway near the southeast process buildings. There were also traces of some compounds in the truck dock near the west warehouse.

Chemicals present in the neighborhood upper aquifer continued to flow southwest and west down the hydraulic gradient into farther reaches of the neighborhood. The estimated speed of groundwater movement down the centerline of the plume in the study area was about one-half foot per day. Chlorinated hydrocarbons and DEE in the soils and groundwater beneath the Site

would move from the Site in the groundwater in significant concentrations if the extraction wells were shut down.

The study showed that all contaminants were confined to onsite subsurface soils and to onsite and offsite groundwater. Contaminated groundwater would not enter any surface water body during the 30-year time span considered in this report. Hence, at the time, there was no immediate or short-term risk of environmental exposure to chemicals in surface water coming from the U.S. Aviex Site. Long-term exposure (i.e., 70 years) to surface water was not considered by the RI/FS and was not an exposure pathway of concern in the Endangerment Assessment (EA).

The water quality of the municipal wells located approximately three miles west of the Site was unlikely to be affected by the groundwater contamination in the neighborhood at that time. However, assumptions about the potential pumping influence of these wells and the modeling indicated that the plume or a part of it could be eventually drawn into the city wells. The Airport and Parker Street Wells are located approximately one mile northwest and west, respectively, of the intersection of Carberry Road and Yankee Street (Business Route 60). The Airport Well was pumped at a rate of 650 gpm and the Parker Well at 750 gpm, producing a combined average of 1.26 MGD. The actual pumping effect of the city wells on the plume had not been tested.

All potential human health risk estimates were based on EPA proposed and final drinking water maximum contaminant levels (MCLs), EPA drinking water quality criteria values, or MDNR Human Lifecycle Safe Concentration (HLSC) values. The EA considered both carcinogens and toxic noncarcinogenic compounds. Though all routes were evaluated, the only significant exposure route identified was the ingestion of contaminated groundwater. Potential exposure from ingestion of drinking water containing significant levels of chlorinated hydrocarbons was based on total carcinogenic risk and/or risk from toxicological threshold values. The carcinogens considered in the risk assessment included benzene, 1,1-DCE, 1,2-DCA, PCE, and TCE. The toxic, noncarcinogenic compounds considered in this study included 1,1,1-TCA, 1,1-DCA, DEE, trans-l,2-DCE, TCFM and DCFM.

Modeled exposure point concentrations in groundwater from the RI were not used in the EA because the RI considered only a 30-year period instead of the necessary 70-year period required for chronic risk calculations. Further, the modeled area did not include the water supply wells for the city of Niles, yet there was sufficient evidence to indicate that those wells may eventually be endangered. Contaminant concentrations within the plume were expected to decrease with time as the plume migrated downgradient and spread laterally. Exposure point concentrations were estimated at several locations within the plume in order to describe this temporal and spatial variation. Two simple models were used to estimate contaminant concentrations: 1) continuous release model that assumes extraction well pumps are off ("pump off"); and, 2) instantaneous release model assumes the pumps are on ("pump on"). For both models, contaminant concentrations were calculated for 70 years at Almaugus Street (one-third mile downgradient of the Site), at Carberry Road (one mile downgradient of the Site), and at the Niles municipal wells (two miles downgradient of the Site).

The continuous release model predicted concentrations ten-fold greater than those calculated from the instantaneous release model. In the worst-case scenario (continuous release model) 1,2-DCA, 1,1-DCE, TCE and 1,1,1-TCA were at unacceptable levels up to one-third mile from the Site. At one mile from the Site, 1,2-DCA, TCE and 1,1,1-TCA were at unacceptable levels. At the municipal wells two miles from the Site, no contaminants of concern (COCs) were at unacceptable levels by the end of the projected 70-year period.

The risk was potential and would only occur if the extraction wells that withdraw contaminated water from the Site were not pumped at then current rates and municipal water was not supplied to all consumers. The noncarcinogenic chronic Hazard Index (HI) of 1.0 is the toxic threshold value by which EPA determines whether any adverse noncarcinogenic health effects would be expected to occur due to exposure. The HI exceeded 1.0 only for the "pump off" scenario at Almaugus Street. Two indicator chemicals, 1,1-DCE and 1,1,1-TCA, contributed most heavily to this risk. The chronic HI was not projected to exceed 1.0 over a 70-year period at the more distant locations. The subchronic (less than 70 years) HI did not exceed 1.0 at any location. These conclusions would be the same for resident children, even though they have a daily intake about four times that of adults.

For carcinogens, there are no acceptable daily intakes. Incremental cancer risk exceeding the $1x10^{-6}$ (or one-in-one-million) excess lifetime cancer risk indicates potential endangerment. EPA considers the $1x10^{-4}$ (one-in-ten-thousand) to $1x10^{-6}$ cancer risk range to be the upper limit of acceptable risk. Carcinogenic risks from groundwater ingestion exceeded $1x10^{-6}$ at both Almaugus Street and Carberry Road, assuming either continuous or instantaneous release. In the worst-case (continuous release) scenario, 1,2-DCA, 1,1-DCE, PCE, TCE and benzene all exceeded $1x10^{-6}$ at Almaugus Street. At Carberry Road, all contaminants except for benzene and 1,1-DCE exceeded this level. There was no appreciable cancer risk ($1x10^{-8}$) at the Niles municipal wells.

As mentioned, Howard Township installed a water supply distribution system to a large portion of the study area that was funded by MDNR Act 307. Howard Township now prevents the installation of any drinking water wells in areas serviced by the distribution system. This system eliminated the human health concerns in the neighborhood as long as all residents in the potentially affected area hooked up to the distribution system and all new homes constructed in the potentially affected area tied into this water supply system. The data suggested that the service area of the new water supply system in the neighborhood (250 or more residences) was many times larger than the total number of houses actually identified as having affected wells (17 houses) or the estimated 40 residences within the contoured risk area. At present, two residences respectively located on Lilac and Blanchard Streets have refused to be connected to the Niles municipal supply. These residences do not show any contamination.

Based upon the results of the modeling, the potential contaminant plumes that could result from the No Action alternatives ("pump on" or "pump off") were considered unacceptable and were sufficient reasons, along with the existing Site conditions, to require remedial action measures.

It should be noted that, as with the groundwater modeling performed during the RI wherein modeled groundwater exposure point concentrations were not considered accurate for use in the EA, the modeling undertaken for the EA also eventually proved to be inaccurate and biased toward under-predicting the human health risk. More recent investigations have identified contaminant concentrations further downgradient of what the model predicted could occur. However, the in-place sentinel monitoring network can effectively detect potential threats to the Niles public supply water (see Figure 4). If contaminant concentrations are detected in the sentinel wells, there is a ten-year time buffer to mitigate the contamination before the Niles municipal wells would become adversely affected. Further, the corrected risks were not significantly greater than the risk associated with the Site cleanup criteria.

Scope of Remedial Action Objectives (RAOs)

The U.S. Aviex Site posed a public health hazard from exposure to contaminated groundwater. The public health risk results from the possibility of persons in the affected area consuming contaminated groundwater and the long-term potential impact on the city of Niles municipal water supply wells. The overall remedial action objectives (RAOs) are:

1. To provide onsite control of the contaminant source by minimizing leachate production of contaminated groundwater beneath the Site, and to prevent its migration offsite.

2. To provide offsite management of plume migration. Pumping and treating groundwater contaminated above the $1x10^{-6}$ and/or noncarcinogenic threshold (i.e., the HI) of 1.0 to meet Federal or State drinking water quality standards and criteria will reduce the potential for human exposure to contaminants and reduce the impact on groundwater resources by minimizing offsite migration of contaminants.

To evaluate the RA alternatives for the offsite control of groundwater, modeling of the aquifer along with the addition of hypothetical extraction wells was performed. The groundwater cleanup strategy for the U.S. Aviex Site was to install and operate extraction wells in the plume. The wells were to collect and treat onsite and offsite contaminated groundwater within the Site-related $1x10^{-6}$ risk plume[1] and in the primary plume, out to its projected limits. The extracted groundwater was to comply with existing drinking water standards or EPA or MDNR water quality criteria values for human health.

Table 2 lists the clean-up goals for the COCs. The proposed groundwater cleanup alternative was to operate until the water quality within the plume was remediated to a level that was either at or below the individual compound cleanup goals. In the process of achieving groundwater cleanup goals, the extracted groundwater would be treated to comply with the minimum concentrations for the COCs prior to discharge. The discharge concentrations were based on either NPDES permit limits or publicly owned treatment works (POTW) industrial pretreatment standards.

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1 This $1x10^{-6}$ total risk plume is that volume of water that contains contaminants at concentrations that pose an increased lifetime risk of one cancer case in a population of one million people.

The sub chronic and chronic Hazard Indices from inhalation of volatiles emanating from soil were all much less than 1.0. The potential cancer risk due to inhalation of soil volatiles was estimated to be 6.6×10^{-7}. The cancer risk from direct contact with soil was 1.1×10^{-7}. These exposure routes represented a low potential for endangerment.

TABLE 2 – ROD CONTAMINANT CLEANUP GOALS

Contaminant of Concern	Cleanup Concentration (ppb)
Benzene	5
Ethylbenzene	680
Toluene	2,000
Xylene	440
Chloroform	2
1,2-Dichloroethane	5
1,1-Dichloroethylene	7
Trichloroethylene	5
Tetrachloroethylene	0.88
Trans-1,2-Dichloroethylene	700
1,1,1-Trichloroethane	200
Diethyl Ether *	43
Trichlorofluoromethane *	32,000
Dichlorofluoromethane*	3,000

* Concentrations proposed but never adopted due to insufficient data.

The Selected Remedy

Control of the contaminant sources was to be achieved by flushing the contaminants out of the vadose zone soil. Soil flushing and the collection of onsite and offsite groundwater with treatment by air stripping addressed both sources of contamination and the resulting offsite plume. The ROD cleanup levels for groundwater were based on 1×10^{-6} risk levels for carcinogenic contaminants and a Hazardous Index risk of 1.0 for noncarcinogens. Soil cleanup levels were based on leachate testing to meet the appropriate groundwater cleanup goals.

Used flushing fluids would be collected along with the onsite contaminated groundwater through a system of extraction wells. Control and collection of offsite contaminated groundwater would be accomplished by a series of extraction wells installed in the contaminant plume. The collection system was designed to contain the plume and prevent further degradation of the aquifer. The effectiveness of the flushing system was to be evaluated after five years of

operation. This evaluation would be based on an analysis of soil samples for the ten indicator COCs. If there was no reduction in contamination levels, an alternate remedy was to be identified in a new FS and justified in a new ROD.

The potential impacts to the Niles municipal wells were determined in EPA's EA based on a worst-case scenario, i.e., No Action and the continuous release of contaminants at the Site. Under this scenario, analysis indicated that COCs would be at acceptable levels at the municipal wells at the time of arrival of the plume after approximately 70 years. The proposed alternative was expected to treat the sources of potential contamination and to eliminate any potential for impact on the municipal wells.

Remedy Implementation

In September 1991, the State of Michigan entered into a State Superfund Contract with EPA to fund the RA construction. The EPA was the lead agency for design and construction of the remedy. The Preliminary Close-Out Report (PCOR) of September 1993 documented that all construction activities had been completed. The RA construction included:

- Soil-flushing system to remediate the source soil;
- Multi-well extraction system to contain the plume and remove the contaminants;
- Air stripper to remove volatile and halogenated organic compounds in onsite and offsite contaminated groundwater above $1x10^{-6}$ risk, a HI above 1.0, or applicable or relevant and appropriate requirements (ARARs); and
- Discharge of treated groundwater to surface waters under a National Pollutant Discharge Elimination System (NPDES) permit.

Based upon the sampling results of the pre-design studies conducted after the 1988 ROD, EPA determined that the risk from the remaining source soils did not present a significant current or future threat to the groundwater beneath the facility to warrant installing and operating the planned soil flushing system. The 1993 Explanation of Significant Differences (ESD) modified the 1988 ROD to remove the soil-flushing component.

In 1993, MDEQ confirmed that the groundwater contamination extended beyond the capture zone of the groundwater pump-and-treat system. An additional extraction well was installed in 2000 to prevent further downgradient migration of contaminated groundwater until the extent of contaminated groundwater could be fully defined. In 2002, the MDEQ investigation concluded that contaminated groundwater had migrated past the capture zone of the pump-and-treat system including the additional extraction well installed in 2000. Only 1,2 DCA was found downgradient of the Site at concentrations that exceeded its MCL of five ppb.

The refurbished groundwater pump-and-treat system operated continuously from 1993 until July 2003; however, as identified in the 2002 investigation, groundwater contaminated above the MCLs had migrated past the pump-and-treat system. Quarterly groundwater monitoring was performed during this period on select monitoring wells. Although quarterly monitoring results demonstrated a significant decrease in dissolved-phase VOC levels near EW-5 since start-up of this extraction well in 1993, several VOCs persisted at this location above the clean-up criteria established in the ROD. Quarterly monitoring continued to confirm groundwater contamination downgradient of the Site at concentrations exceeding ROD criteria.

The MDEQ conducted several additional groundwater investigations in 2002 and 2003 to better define the extent of the downgradient plume, the effectiveness of the installed pump-and-treat system, and to evaluate the concentrations of impacted groundwater still migrating from the Site. These investigations identified higher concentrations of contaminants, including the presence of light non-aqueous phase liquid (LNAPL), remaining in the source areas on the plant property than had previously been identified.

Based upon the results from the 2002 and 2003 investigations, the MDEQ and the EPA installed a series of additional monitoring wells (RL-l, RL-2, RL-3, and RL-4) downgradient of the contaminated areas to further monitor the groundwater concentrations and to insure the detection of any remaining contaminated groundwater, should it migrate further into the two separate well-head protection areas (see Figure 4).

2004 ROD Amendment

The remaining source areas could not be effectively treated by the pump-and-treat system. Further, the air stripper tower that was installed by the U.S. Aviex in 1983, and subsequently reused by the 1993 EPA system, had become inefficient to operate. Due to the age of the groundwater pump-and-treat system and the amount of volatile organics remaining at the Site, the MDEQ, with the EPA's concurrence, performed expanded pilot tests in 2003 and 2004 at the Site to address the contamination remaining at the plant property. The pilot studies consisted of ozone sparging of the groundwater and enhanced bioattenuation of the groundwater by injecting a chemical product (BIOX^{TM}) into the perched water table just north of the warehouse to facilitate natural attenuation of the contaminants. The pump-and-treat system was shut down in late 2003.

The EPA issued a ROD Amendment on September 29, 2004, that modified the remedy. The modified remedy included the termination of the groundwater pump-and-treat system, continued operation of the ozone sparging system, and monitored natural attenuation (MNA) for the remaining low-level groundwater contamination off the U.S. Aviex property. Another goal of the ROD Amendment was to update the clean-up standards to reflect current drinking water values. Groundwater contaminants present at levels above health-based risk levels, or exceeding water quality standards, were assigned clean-up standards in the 1988 ROD. At that time, standards for DEE, DCFM and TCFM had not been promulgated under the Safe Drinking Water Act. In 1990, the State of Michigan promulgated Administrative Rules pursuant to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994

PA 451, as amended (Part 201), regulating and establishing criteria for the cleanup of contaminated sites. The ROD Amendment updated the health-based cleanup standards for these and other contaminants to current maximum contaminant levels (MCLs) or residential health-based criteria under MDEQ Part 201 (see Table 3).

The ROD Amendment was signed in September 2004 and involved the following major components:

- Use MNA to remediate the plume and in-situ ozone/air sparge to treat the perched water table source area north of the warehouse;

- Shut down the existing groundwater pump-and-treat system;

- Modify the current groundwater monitoring plan;

- Update the groundwater clean-up criteria to reflect the current Michigan Part 201 Residential Health-Based Drinking Water Criteria; and

- Provide contingency plans that may include the operation of the existing pump-and-treat system with a new air stripper, and/or the installation of a downgradient pump-and-treat system.

The EPA and MDEQ agreed, upon signing the ROD Amendment, that if it later became necessary to address the continued migration of downgradient contaminated groundwater, it may be necessary to address the area as a separate operational unit. To date, MNA appears to be effectively controlling the further migration of contaminated groundwater.

TABLE 3- REVISED CLEANUP CRITERIA

Contaminants Detected	U.S. EPA ROD Clean up Goal (ppb)	MDEQ Part 201 Criteria (ppb)[1]	MDEQ Part 201 Health-Based Criteria (ppb)[3]	ROD Revised Clean-up Criteria (ppb)[4]
Benzene	5	5	5	5
sec-butyl Benzene	NI	80	80	NE
Carbon Disulfide	NI	800	800	NE
Chloroform	2	100	100	100
Chloroethane	NI	430	430	NE
1,2-Dichlorobenzene	NI	600	600	NE
Ethylbenzene	680	74 (2)	700 (3)	700
Isopropyl Benzene	NI	800	800	NE
n-Propyl Benzene	NI	80	80	NE
1,2,4-Trimethylbenzene	NI	63 (2)	1,000 (3)	NE
1,3,5-Trimethylbenzene	NI	72 (2)	1,000 (3)	NE
Diethyl Ether	43	10 (2)	3,700 (3)	3,700
1,1-Dichloroethane	NI	880	880	NE
1,2-Dichloroethane	5	5	5	5
1,1,1-Trichloroethane	200	200	200	200
1,1,2-Trichloroethane	NI	5	5	NE
1,1-Dichloroethylene	7	7	7	7
cis-1,2-Dichloroethene	NI	70	70	70
trans-1,2-Dichloroethylene	700	100	100	100
Hexachloroethane	NI	7.3	7.3	NE
Dichlorodifluoromethane	NI	1,700	1,700	NE
2-Butanone(MEK)	NI	7.3	7.3	NE
2-Propanone (Acetone)	NI	1,700	1,700	NE
Tetrachloroethylene	0.88	5	5	5
Trichloroethylene	5	5	5	5
Trichlorofluoromethane	32,000	2,600	2,600	2,600
Methylene Chloride	NI	5	5	5
4-Methyl-2-Pentanone (MIBK)	NI	1,800	1,800	NE
Napthalene	NI	520	520	520
2-Methylnapthalene	NI	260	260	260
Tetrahydrofuran	NI	95	95	NE
Toluene	2,000	790 (2)	1,000 (3)	1,000
p-Isopropyl Toluene	NI	NL	NL	NI/NL
Vinyl Chloride	NI	2	2	2
Xylene (total)	440	280 (2)	10,000 (3)	10,000

1 - MDEQ Administrative Rules for Part 201 Residential and Commercial Drinking Water Criteria.
2 - Criteria listed are aesthetic drinking water values included in MDEQ Part 201 Criteria.
3 - Criteria listed are residential health-based drinking water values.
4 - As requested by MDEQ on September 23, 2003, revised clean-tip criteria include updated health-based criteria for all constituents identified in the Record of Decision (ROD), and criteria for all constituents not included in the ROD that exceeded health-based drinking water values during February 2002 through July 2003 investigative sampling rounds.

NE = Compound not included in original ROD and does not exceed health-based criteria, based on recent sampling.
NI = Not included in original ROD NL=Not listed in MDEQ Part 201 Criteria.

Institutional Controls

Institutional controls (ICs) are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for any areas that do not allow for unlimited use or unrestricted exposure (UU/UE).

Decision Document:

The 1988 ROD suggested the use of advisories for short-term protectiveness. This was accomplished by informing all property owners affected by the groundwater contamination of the associated risk from continued use of this groundwater. Many homeowners hooked up to the Niles municipal water supply at that time. With regard to long-term protectiveness, the ROD requires that groundwater use be restricted through ICs because the timeline for achieving groundwater clean-up goals was estimated to be at least 20 years. As the State of Michigan owns the U.S. Aviex property, ICs in the form of proprietary controls, particularly, restrictive covenants, for that property should be evaluated. Additionally, since the groundwater plume has migrated beyond the Site boundaries, ICs in the form of governmental controls should also be evaluated. If it is determined that ICs are required to ensure long-term protectiveness of the remedy, then EPA and MDEQ will consider whether a remedy revision or clarification is necessary such as an Explanation of Significant Differences to document the need for ICs. The remedy for the Site may not allow for UU/UE and therefore, ICs would be necessary for long-term protectiveness. Table 4 summarizes ICs for these restricted areas.

Evaluation of Current Conditions, Current ICs and IC Activities Underway

IC evaluation activities are currently being conducted by the MDEQ and EPA. Once the IC evaluation activities have been completed, an IC plan will be developed by MDEQ and EPA to incorporate the results of the evaluation and plan for additional IC activities as needed, including planning for long-term stewardship.

The MDEQ has placed an easement on the property to allow for the continued access and remediation of the Site. The MDEQ plans to place a restrictive covenant on the property to restrict the use of drinking water on the Site property by 2011. Annual fact sheets will be provided to the area residents, and public officials and local health department will keep them apprised of the progress of the remedial action and assist in the public notification of Site conditions. Fencing and warning signs are in place and all access points are locked when personnel are not onsite.

ICs to Regulate Groundwater Use - Well Head Protection Area

In June of 2000, the city of Niles adopted a Well Head Protection Plan (WHPP). The goal of the Well Head Protection Area (WHPA) Management is to provide a mechanism to prevent existing and potential sources of contamination from reaching the public water supply or well field. Intelligent land use decisions regarding development are more effective by using wellhead

protection policies and specific management techniques. A discussion of well head protection management strategies in the plan should assist community leaders to recognize the WHPA and the importance of well head protection. Planning elements are intended to provide guidance in the development of land use and land protection measures supporting wellhead protection.

The city elected to develop a WHPA "overlay zoning district." The use of a zoning "overlay" district in the city's Zoning Ordinance was to protect the public water supply based on known and clearly identifiable physical criteria and is a well-accepted method and a commonly used technique. The purpose of the WHPA overlay zone is to protect water quality, to keep pollutants from entering surface and groundwater, to reduce the danger of contamination, and to protect potable water supplies. The WHPP determined that prohibiting uses was not necessary or feasible. The plan states that well-crafted design and performance standards for new businesses and appropriate Best Management Practices for existing businesses were more appropriate techniques. In turn, design and performance standards have been developed for implementation during the Site plan review process. Figure 4 delineates some of the WHPAs for the municipal water supply wells.

ICs for Former U.S. Aviex Property

The MDEQ has placed an easement on the property to allow for the continued access and remediation of the Site. The MDEQ plans to place a restrictive covenant on the property to restrict the use of drinking water on the Site proper by 2011. Annual fact sheets will be provided to the area residents, and public officials and local health department will keep them apprised of the progress of the remedial action and assist in the public notification of Site conditions. Although not ICs, fencing and warning signs are in place and all access points are locked when personnel are not onsite.

The MDEQ intends to place the necessary use restrictions on the property prior to its release of the property for redevelopment. The property is currently under MDEQ control and owned by the State of Michigan; however, the deed restrictions have not been put in place yet. The State of Michigan has been developing new model language in recent months to ensure that such instruments are enforceable under state law. This model language is in the final stages of development and EPA is evaluating these alternate instruments. Additionally, further review of the property title may be required to ensure no inconsistent encumbrances exist. Last, as mentioned above, maps of the areas subject to restrictions will be prepared. The IC activities will be incorporated into an IC Plan prepared by EPA and MDEQ.

Current Compliance: There are currently no known IC compliance issues at the Site. In addition, based on inspections and interviews, EPA is not aware of Site or media uses that are inconsistent with the stated objectives of the ICs. Although there are no ICs on the former U. S. Aviex property, it is currently under MDEQ control and owned by the State of Michigan, which adds a level of comfort that the land will not be developed in a manner that is inconsistent with the needed restrictions. Also, while not yet reviewed for their effectiveness, there are groundwater restrictions in place for the area to limit the uses of groundwater. The remedy

appears to be functioning as intended. However, compliance with effective ICs is required to ensure long-term protectiveness.

Long-Term Stewardship: Long-term protectiveness at the Site requires compliance with use restrictions to assure the remedy continues to function as intended. To assure proper maintenance, monitoring and enforcement of effective ICs, long-term stewardship procedures will be reviewed and the O&M Plan will be revised as necessary. The plan will call for regular inspection of ICs at the Site and annual certification to EPA that the required ICs are in place and effective. Additionally, development of a communications plan and a possible use of the one-call system should be explored for long-term stewardship. This review of the O&M Plan will be contained in the IC Plan discussed above.

TABLE 4 – INSTITUTIONAL CONTROLS SUMMARY TABLE

Media, Engineered Controls, & Areas that Do Not Support UU/UE Based on Current Conditions.	**IC Objective**	**Title of Institutional Control Instrument Implemented**
U.S. Aviex Property Onsite Groundwater: The Site property does not currently support UU/UE based on the current concentrations detected in the groundwater.	Prohibit the onsite use of groundwater by prohibiting the installation of any wells for consumption of groundwater on the project Site.	Township restrictions prohibit the installation of groundwater drinking wells in areas supplied by municipal water. The Niles WHPA zoning ordinance currently protects the municipal well field and groundwater source areas. Activity and use limitations will be placed on the property to prevent installation and use of drinking water wells. Such limitations will be set forth in a declaration of restrictive covenants to be recorded with the Cass County Clerk/ Register of Deeds by 2011. (planned)
U.S. Aviex Property Offsite Groundwater: The offsite areas with groundwater contamination do not currently support UU/UE.	Prohibit groundwater use until cleanup standards are achieved; prevent the drilling or alteration of new water supply wells in the offsite impacted areas. Also, prevent the interference with monitoring wells in the area and other components of the remedial action where there is groundwater contamination.	Township restriction prohibits the installation of new groundwater drinking water well in areas serviced by municipal water. The Niles WHPA zoning ordinance currently protects the municipal well field and groundwater source areas. The O&M Plan requires periodic monitoring, and notice to local residents of groundwater contamination. (continued and planned)

U.S. Aviex Property **Onsite Soils:** Area of Soil treated to industrial cleanup standards	The soils are subject to further investigation. Prohibit residential use onsite without proper engineering controls in place to prevent possible vapor intrusion issues.	The necessity of requiring vapor mitigation systems on all new structures will be evaluated. Activity and use restrictions may be placed on the property to prevent excavation/ disturbance of onsite soils. Such limitation will be set forth in a declaration of restrictive covenant to be recorded with the Cass County Clerk/ Register of Deeds by 2011. (planned)
U.S. Aviex Site **Remedy Components**	Prevent interference with remedy components	The need for ICs is under review.

Maps which depict the current conditions of the Site and areas which do not allow for UU/UE will be developed as part of the IC Plan.

System Operation and Maintenance

With the signing of the September 2004 ROD Amendment, process activity, including associated operation and maintenance (O&M) activities has been eliminated. Ongoing O&M activities at the Site still include a groundwater monitoring program and Site maintenance and any enhancements to the MNA.

Monitoring Well Systems

Groundwater at the Site is not being used as a source of drinking water and is not likely to be used in the future because of groundwater use restrictions on the Site and the availability of municipal water. Monitoring well systems were completed in 2003, in anticipation of the 2004 ROD Amendment. This well system contains plume centerline wells, sentinel wells (perpendicular to centerline wells), plume boundary wells and background wells (upgradient of the plumes).

System Operations and O&M Costs

The annualized costs at the U.S. Aviex Site over the past five years are presented in Table 5.

TABLE 5 - ANNUAL SYSTEM O&M COSTS

Year						General Activity
2004	**2005**	**2006**	**2007**	**2008**	**2009**	
$55,000	$49,000	$58,440	$15,000	$0	$0	Maintenance and Monitoring of Treatment System (Pilot Study and Expanded Pilot Study)
$62,000	$45,000	$0	$0	$0	$0	Investigation and Sampling (north of the warehouse; southeast system expansion)
$96,000	$46,000	$45,440	$63,821	$11,990	$21,500	Quarterly Groundwater Monitoring and Analytical
$135,000	$57,108	$61,000	$35,000	$8,000	$11,500	Reporting (construction and groundwater technical memoranda; pilot study reports; work plan addenda; sampling plans; ROD Amendment)
$475,000	$0	$0	$30,000	$59,500	$4,500	Construction Management (contracted treatment and construction; trade contractor management and oversight)
$60,222	$15,000	$45,000	$67,000	$12,000	$570	Planning/Design (cost estimates; study/investigation development; project design, well survey; specification development; and preconstruction)
$0	$0	$0	$0	$436,609	$10,685	Construction Trade Contract (contracted directly to the state of Michigan)
Annual Totals						
$883,222	$212,108	$209,880	$210,821	$528,099	$48,755	

As previously mentioned, the O&M work is being performed by the MDEQ under a contract with Weston Solutions of Michigan. Overall, the most expensive year for O&M was 2004, with most of the costs attributable to construction management. This involves managing and overseeing the contracted treatment and construction, and the trade contractor. This work was related to the installation of the ozone/air sparge system in March 2004. The second most costly year was 2008, wherein the highest costs were due to the construction trade contract, which is contracted directly to the State of Michigan. Most of these costs are due to the connecting of additional residences to the municipal water supply and the removal of LNAPL impacted soils. The 2009 costs appear significantly lower because most of the physical work has been completed, and the Site is in a monitoring-only phase.

V. Progress Since the Last Review

The protectiveness statement from the December 2004 Five-Year Review indicated that the remedy was protective of human health and the environment in the short term, and had been implemented according to the ROD, ESD, and ROD Amendment. These decisions specified the onsite treatment of a zone of contaminated perched groundwater and soils and the use of in-situ ozone oxidation to augment the MNA remedy. However, in order for the remedy to be

protective in the long term, the MNA progress must be assessed through monitoring to insure eventual accomplishment of the groundwater remedial action goals.

The only issues affecting the protectiveness of the remedy in 2004 involved the development and implementation of an IC plan to restrict groundwater use and the disturbance of contaminated soils onsite. The recommendations and follow-up actions in 2004 called for the continuation of quarterly monitoring and reporting until the groundwater data supported a reduction in monitoring frequency or the clean-up standards have been achieved. Since the last review, the following activities have occurred at the Site:

In January 2005, Weston conducted a residential well survey in the area surrounding the former U.S. Aviex facility. The survey results, submitted to MDEQ in May 2005, confirmed that several residences located in the approximated groundwater plume pathway were still using private wells for potable water. The MDEQ offered to connect these residents to the municipal water supply so that they could abandon their drinking water wells. Additional information regarding the residential well survey that was performed near the Site is available in the *Residential Well Survey ResultsLetter* (May 23, 2005) prepared by Weston.

During April 2005, Weston conducted an investigation in the area north of the warehouse to further delineate the source of free product in that area. A separate draft technical memorandum entitled *Draft Technical Memorandum for: Area North of the Warehouse Investigation* (October 14, 2005) that included the results and recommendations for further assessment and remediation in the area north of the warehouse was prepared by Weston. Quarterly groundwater monitoring continued at the Site and the surrounding area.

In July 2005, MDEQ personnel flush-mounted and redeveloped all monitoring wells located at the Site. The MDEQ also surveyed the flush-mounted monitoring wells and soil boring locations from the April 2005 investigation in the area north of the warehouse. The MDEQ installed several other new and "replacement" monitor wells throughout the Site in September 2005. These monitor wells were installed to replace monitor wells and piezometers previously abandoned.

In November 2005, Weston conducted an additional soil and groundwater investigation at the Site near monitor well WMW-7a to further delineate source area contamination for the proposed system expansion south and east of monitoring well WMW-7a. A separate draft technical memorandum entitled *Draft Technical Memorandum for: Additional Investigation and System Enhancements* (April 18, 2006) summarizing the results and providing recommendations for system expansion in this area was prepared. The November 2005 investigation indicated source area dissolved phase contaminant concentrations east of the ozone/air sparge treatment system. The ozone/air sparge treatment system was expanded in June 2006 to include this area. The system enhancements included installing five additional sparge wells and one performance monitoring/groundwater monitoring well, trenching for sparge transmission lines, and connecting the five expansion wells to the ozone/air sparge treatment system.

In March 2007, the ozone/air sparge treatment system was shut down but was left onsite pending results of the subsequent groundwater monitoring. A water main extension was installed and provided service connections to six private residences with potable water wells in the groundwater plume pathway (see Figure 5). Their private water wells were also properly abandoned.

The five onsite groundwater monitoring wells (WMW-1, WMW-2, WMW-3, WMW-13, and WMW 14) were abandoned. The five monitoring wells were replaced in August 2008 after the excavation and are part of the current monitoring network. Also abandoned were six groundwater extraction wells EW-1 through EW-6. A source area abatement excavation was performed to remove the northeastern soil. The excavation went 10 feet down to 740 feet above mean sea level (AMSL). The 4,817 tons of contaminated soil were removed and hauled to the Three-Rivers Landfill (see Figure 2).

The only issue carrying over from the previous Five-Year Review involved the recommendation for developing an Institutional Control (IC) Plan to restrict groundwater use and disturbance of contaminated soils on the property. As discussed, the State of Michigan is the current property owner and will implement the required ICs before releasing the property for potential redevelopment.

VI. Five-Year Review Process

Administrative Components

Members of the MDEQ, the city of Niles and township of Howard, Michigan were notified of the initiation of the Third Five-Year Review in July 2009 via a notice that was placed in the local paper. The U.S. Aviex Five-Year Review team was led by the EPA Superfund RPM Sheila Sullivan and included EPA Community Involvement Coordinator (CIC) Cheryl Allen and EPA Site attorney Richard Murawski. MDEQ members included Superfund Project Manager Matthew Williams, and MDEQ contractor, Weston Solutions of Michigan, Inc. Beginning in January 2009, the RPM established the components of the review and MDEQ and EPA responsibilities. The components of the review included:

- Community Notification
- Document Review
- Data Review
- Site Inspection/Community Interviews
- Five-Year Review Report Development and Review

Community Notification and Involvement

Activities to involve the community in this Five-Year Review process were initiated in July 2009 in the form of a notification to the Region 5 Superfund CIC for the U.S. Aviex Site. A notice

announcing the initiation of the Five-Year Review process and soliciting Site information and concerns from the community appeared on July 30, 2009 in the Niles Daily Star. This newspaper is published Monday through Saturday and has a paper circulation of 2,361 (Attachment 2).

Community interest regarding U.S. Aviex environmental issues has been low over the last five years. Past community relations activities for the Site have included public meetings held at the start and completion of the RI/FS process to present the RI results and the Proposed Plan for the Site cleanup. Fact sheets have been distributed to update the community of the cleanup progress. MDEQ and EPA have maintained a document repository in the community throughout the cleanup process at the Niles District Library, 620 East Main Street, Niles, MI. No formal public meetings have been necessary since August 2004, at which time, the public comment period was in progress for the 2004 proposed ROD Amendment. At the close of that public comment period, MDEQ had received no public written or verbal comments. The MDEQ has held two public meetings for the residences in lieu of any fact sheets. The last meeting was held prior to the construction and extension of the water main in 2007. In addition, no community members have expressed interest or concern regarding the Five-Year Review process since the July 2009 notice was published.

Document Review

The Five-Year Review included a review of the relevant documents such as the RI/FS, RD/RA, ROD, administrative orders, and groundwater cleanup criteria and risk-based levels to protect human health and the environment. Also reviewed were post-ROD documents such as the 1993 ESD, the September 2004 ROD Amendment, the first and second five-year reviews, and applicable EPA and MDEQ guidance. The comprehensive list of documents is included as Attachment 3.

Data Review

All available data since the previous December 2004 Five-Year Review were evaluated to discern relevant trends and the progress towards achieving cleanup goals for the COCs. The data reviewed includes quarterly groundwater monitoring data through the third quarter of 2007 (September 2007) and some more recent data from the second quarter of 2009 (June 2009).

Current Groundwater Monitoring Program

The third quarter 2007 groundwater monitoring activities were conducted in September 2009 in accordance with Weston's revised Draft 2007 Groundwater Monitoring Plan (GMP) for the Site. The GMP was revised in April 2007 to reflect changes to the groundwater monitoring program as a result of terminating the ozone/air sparge system operation. The revised GMP included the monitoring conducted to assess the progress of MNA and to determine the effects of terminating the ozone/air sparge system. Weston samples only the monitoring wells located on and east of Bame Avenue; north of Lilac Avenue; and, west of Huntly Road. The remaining wells are

sampled by MDEQ. A complete groundwater sampling event was performed in June 2009; however, most of the data has not been compiled at the time of the writing of this report, so discussions of the results are not included unless noted.

The second quarter 2009 groundwater monitoring activities were conducted on June 1-4, 2009, in accordance with Weston's updated Groundwater Monitoring Plan (GMP) for the Site. The GMP was further revised in April 2009 to reflect changes to the monitoring well network based on newly installed and/or abandoned monitoring wells as well as changes to the monitoring well sampling frequencies (see Table 6). The revised sampling program is subject to change based on a quarterly review of groundwater monitoring results. The following changes to the monitoring well network have been incorporated into the updated GMP:

- Abandonment of several monitoring wells and piezometers following the September 2004 ROD Amendment;
- Installation of replacement wells RL-5 through RL-9;
- Installation of WMW-15 during the 2005 investigation north of the former U.S. Aviex warehouse;
- Installation of WMW-16 following the June 2006 ozone/air sparge system expansion;
- Installation of dedicated submersible pumps in the wells located at and near the Tyler Memorial Airport;
- Termination of ozone/air sparge system operations in March 2007; and
- Excavation of source area soils located north of the warehouse in November 2007 and subsequent replacement of monitoring wells WMW-1, WMW-3, and WMW-14.

Locations for all of the monitoring wells included in the monitoring network are depicted on Figure 4.

Groundwater/Monitoring Well Network

Water levels were measured at 45 monitor well locations on September 10, 2007 and at 61 locations on June 1, 2009. The monitoring wells used for depth to water measurements are screened over several different vertical intervals. Although stratigraphic conditions are not well documented at all locations, conditions across the Site are non-homogeneous. Groundwater flow direction has been primarily to the west-southwest over the last five years and is consistent with historical results. In general, groundwater elevations have increased uniformly across the Site. An area of perched groundwater is located in the area north of the warehouse. The water levels for the monitoring wells located in the area north of the warehouse are measured using an

TABLE 6 – MONITORING POINTS AND RECOMMENDED SAMPLING FREQUENCY

Well/Piezometer	Recommended Sampling Frequency	Sampled By	Sampling Pump Type
82-3	Water Level Only	-	-
86-1A	Water Level Only	-	-
86-2	Water Level Only	-	-
86-2A	Quarterly	WESTON	peristaltic
86-2B	Water Level Only	-	-
86-3	Annual	WESTON	bladder
86-3A	Quarterly	WESTON	peristaltic
86-3B	Water Level Only	-	-
86-4	Annual	MDEQ	bladder
86-4A	Annual	MDEQ	bladder
86-7	Annual	MDEQ	Dedicated bladder
86-9	Water Level Only	-	-
86-14	Quarterly	MDEQ	bladder
A-25	Water Level Only	-	-
A-40	Water Level Only	-	-
A-150	Water Level Only	-	-
C-60	Quarterly	WESTON	peristaltic
E-40	Annual	WESTON	peristaltic
E-60	Annual	WESTON	peristaltic
G-40	Annual	WESTON	peristaltic
MP-3	Quarterly	WESTON	peristaltic
MP-4	Water Level Only	-	-
NW	Quarterly	WESTON	peristaltic
RL-1	Quarterly	MDEQ	bladder
RL-2	Quarterly	MDEQ	Dedicated bladder
RL-4	Annual	MDEQ	bladder
RL-5	Annual	WESTON	peristaltic
RL-6	Annual	WESTON	peristaltic
RL-7S	Annual	MDEQ	bladder
RL-7I	Annual	MDEQ	bladder
RL-7D	Quarterly	MDEQ	bladder
RL-8S	Annual	MDEQ	bladder
RL-8I	Annual	MDEQ	bladder
RL-8D	Quarterly	MDEQ	bladder
RL-9S	Annual	MDEQ	bladder
RL-9I	Annual	MDEQ	bladder
RL-9D	Quarterly	MDEQ	bladder
TTOS-7	Quarterly	WESTON	peristaltic
TW-1-40	Water Level Only	-	-
TW-4-20	Quarterly	WESTON	peristaltic
WMW-1	Abandoned		
WMW-1R	Annual	WESTON	peristaltic
WMW-2	Abandoned		
WMW-3	Abandoned		
WMW-3R	Annual	WESTON	peristaltic
WMW-4a	Annual	WESTON	peristaltic
WMW-4b	Water Level Only	-	-
WMW-5	Annual	WESTON	peristaltic
WMW-7a	Quarterly	WESTON	peristaltic
WMW-7b	Quarterly	WESTON	peristaltic
WMW-8a	Annual	WESTON	peristaltic
WMW-8b	Water Level Only	-	-
WMW-9	Annual	MDEQ	Dedicated bladder
WMW-10S	Annual	MDEQ	Dedicated bladder
WMW-10D	Annual	MDEQ	Dedicated bladder
WMW-11S	Annual	MDEQ	Dedicated bladder
WMW-11D	Annual	MDEQ	Dedicated bladder
WMW-12S	Annual	MDEQ	Dedicated bladder
WMW-12D	Annual	MDEQ	Dedicated bladder
WMW-13	Abandoned		
WMW-14	Abandoned		
WMW-14R	Annual	WESTON	peristaltic
WMW-15	Annual	WESTON	peristaltic
WMW-16	Quarterly	WESTON	peristaltic

Notes:
This table was updated after the September 2004 ROD Amendment. A number of monitoring wells were abandoned and the sampling frequency for the remaining locations was altered. In addition, during performance of the 2007 remedial construction activities at the Site five wells located with the footprint of the excavation, shaded in grey above, were abandoned.

oil/water interface probe. Bailers are also used at select wells to check for visual indication of free product. Free product was first found in this area in July 2003 prior to the pilot test. From November 2003 through January 2007, free product observations were as follows:

TABLE 7 - FREE PRODUCT MEASUREMENTS

Sample Dates	Wells with Detections	Amount Detected
Nov. 2003-May 2004	None	
August 2004	WMW-2	0.01 feet
November 2004	WMW-2, WMW-14	0.01 feet
February 2005	WMW-2, WMW-13, WMW-14	0.01 feet
April 2005	WMW-2	0.01 feet
August 2005	WMW-1, WMW-2, WMW-3, WMW-14, WMW-15	free product detected but not measurable amounts
November 2005	WMW-2	free product detected but not measurable amounts
March 2006	WMW-3, WMW-14, WMW-15, WSB-21	free product detected but not measurable amounts
May 2006	None	
July 2006	None	
November 2006	None	
January 2007	WMW-3, WMW-14, WMW-15	free product detected but not measurable amounts
May 2007	None	
September 2007	None	free product detected but not measurable amounts
June 2009	None	None detected at any wells

Free product has not been identified in any of the wells since the MDEQ's removal action in 2007. Though many of the wells that had free product identified in them were destroyed during the removal action, the MDEQ has replaced the wells, and there has been no return of the free product to date.

On June 1-4, 2009, second quarter groundwater monitoring was conducted at 45 monitoring wells. The samples were analyzed for VOCs by EPA Method 8260 through the State of Michigan Laboratory Program.

The following is a summary of the second quarter 2009 VOC sample results having concentrations that exceeded Site-specific ROD criteria and MDEQ Part 201 Aesthetic Criteria:

TABLE 8 – CONTAMINANTS EXCEEDING ROD CRITERIA (June 2009)

Well Number	Contaminant	Concentration (ppb)	Criterion Exceeded
86-3	1,2-DCA	7.6	ROD criterion of 5.0 ppb
86-3A	DEE	20	MDEQ Part 201 Aesth. Crit. 20 ppb
86-14	1,2-DCA	18	ROD Criterion of 5.0 ppb
NW	1,2-DCA	7.8	ROD Criterion of 5.0 ppb
RL-1	1,2-DCA	13	ROD Criterion of 5.0 ppb
	DEE	130	MDEQ Part 201 Aesth. Crit. 10 ppb
RL-4	DEE	26	MDEQ Part 201 Aesth. Crit. 10 ppb
RL-8I	DEE	12	MDEQ Part 201 Aesth. Crit. 10 ppb
RL-8D	1,2-DCA	24	ROD Criterion of 5.0 ppb
	DEE	13	MDEQ Part 201 Aesth. Crit. 10 ppb
WMW-7a	PCE	87	ROD Criterion of 5.0 ppb
	TCE	92	ROD Criterion of 5.0 ppb
	1,1,1-TCA	290	ROD Criterion of 200 ppb
WMW-7b	PCE	11	ROD Criterion of 5.0 ppb
	TCE	87	ROD Criterion of 5.0 ppb
	1,1,1-TCA	560	ROD Criterion of 200 ppb
WMW-14R	1,2-DCA	30	ROD Criterion of 5.0 ppb
WMW-15	DEE	15	MDEQ Part 201 Aesth. Crit. 10 ppb
	1,2-DCA	1,100	ROD Criterion of 5.0 ppb
	Vinyl Chloride	8.0	ROD Criterion of 2.0 ppb
WMW-16	PCE	14	ROD Criterion of 5.0 ppb
	TCE	8.0	ROD Criterion of 5.0 ppb

Figure 6 depicts a regional contaminant concentration map constructed using the most recent 2009 groundwater data. Figure 7 presents a Site contaminant concentration map also developed using the 2009 groundwater data.

In addition to evaluating groundwater sample results, Weston had previously conducted performance monitoring to evaluate ozone/air sparge system operation. Performance monitoring results are available in quarterly monitoring reports for the period of system operation from March 2004 through March 2007. Seven representative monitoring wells (MP-3, TW4-20, WMW-4a, WMW-5, WMW-7a, WMW-7b, and WMW-16) were selected for contaminant trend analysis to evaluate the ozone/air sparge system performance during its operation and after the system was decommissioned. The wells were selected because they were located within the estimated horizontal and vertical radius of influence of the ozone/air sparge system.

As of September 2007, contaminant concentration trends at the seven wells indicated that COC concentrations at five of the wells (TW4-20, WMW-4a, WMW-5, WMW-7a, and WMW-16) have decreased since system start up. Since shutting down the system in March 2007, increases or rebounds were seen at WMW-16 for TCA and TCE, and at WMW-7a for TCA, PCE and

TCE. The TCA rebound in WMW-7a was most notable as it went from 8.7 to 180 ppb. Although some decrease in 1,1,1-TCA concentrations were observed at WMW-7b, no significant change was observed for PCE and TCE at this location (likely due to the vertical depth of the screen and possible clay presence). Decreases of DEE at MP-3 were initially observed but later increased. Results from the third quarter 2007 sampling indicate that current DEE concentrations at MP-3 are below the detection level of five ppb.

The compounds on Figures 8 through Figure 14 are DEE, 1,2-DCA, 1,1,1-TCA, PCE, and TCE. DEE and 1,2-DCA were included because these contaminants were detected above applicable criteria in offsite monitor wells. The other compounds are shown because they are the predominant source area COCs. The change in concentration over time for the seven monitoring wells is illustrated on Figures 8 through Figure 14.

Conclusions

VOC concentrations in groundwater exceed ROD criteria and/or MDEQ Part 201 Aesthetic Criteria at 13 of the 61 monitoring wells sampled during the second quarterly 2009 monitoring data. Expanded pilot study system operation was discontinued in October 2007. The ozone/air sparge system performance monitoring for the expanded pilot study system identified the following results during the targeted treatment interval during the expanded pilot study:

- 1,2-DCA concentrations have decreased below the detection limit at all locations previously exceeding 1,2-DCA applicable criteria.

- 1,1,1-TCA concentrations had decreased below ROD criteria at all six monitoring well locations that previously exceeded the criteria. However, 1,1,1-TCA increased at WMW-7a and WMW-16 during the third quarter 2007 monitoring. Concentrations of 1,1,1-TCA have increased at monitoring wells WMW-7a and WMW-7b, and as of the 2nd Quarter 2009 monitoring event, exceed applicable ROD criteria.

- PCE concentrations had decreased at four of the six monitor well locations that previously exceeded the criteria. The PCE levels have increased at WMW-7a and WMW-16 during the third quarter 2007 monitoring and now exceed criteria at monitoring wells WMW-7a, WMW-7b, and WMW-16, and increased significantly at WMW-7a during the 2009 monitoring event.

- TCE concentrations had decreased below ROD criteria at five of the six monitoring well locations that previously exceeded criteria; however, TCE increased at WMW-7a and WMW-16 during the third quarter 2007 monitoring. TCE concentrations now exceed criteria at monitoring wells WMW-7a, WMW-7b, and WMW-16, showing significant increases in WMW-7a and WMW-7b during the 2009 monitoring event.

- DEE concentrations have decreased and now remain below ROD and aesthetic criteria at all locations previously exceeding applicable criteria.

- Of the locations currently exceeding criteria within the targeted treatment zone (TW4-20, WMW-7a, WMW-7b, and WMW-16), TW4-20, WMW-7a and WMW-16 had shown decreases in VOC concentrations after the ozone/air sparge system operated. However, concentrations at WMW-7a and WMW-16 increased after the shut-down of the ozone/air sparge system.

Overall, the ozone/air sparge system operation has significantly reduced source area concentrations in the target area. Outside of the targeted treatment area, elevated dissolved phase concentrations persist in the area north of the warehouse in the vicinity of WMW-2 and WMW-15. Concentrations above ROD and MDEQ aesthetic criteria persist at other locations on- and offsite, but at significantly lower levels.

Groundwater monitoring should continue in order to evaluate the post-ozone/air sparge system contamination trends in the targeted area. Though some rebound was seen during the third quarter 2007 and the second quarter 2009 sampling events, the limited extent does not warrant restarting the system. Evaluating the effectiveness of MNA also needs to continue in order to track the progress of concentrations and whether they will continue to decrease over time. This will entail continued monitoring at certain wells in the source area and downgradient of the source area.

Dissolved phase groundwater monitoring should be continued to evaluate the effect of the source removal on improving dissolved phase concentrations at the area north of the warehouse.

Site Inspection

The U.S. Aviex Five-Year Review Site inspection was held on August 19, 2009. The review team included EPA Site RPM Sheila Sullivan and Weston Solutions Project Manager Keith Kidder. The purpose of the inspection was to assess the protectiveness of the remedy, including the condition of the Site itself, and the surrounding land and ICs, if applicable. During the inspection, the representatives discussed Site and community issues. The completed inspection checklist is provided as Attachment 4. Attachment 5 provides photo documentation of the inspection.

The weather conditions on August 19 were partly cloudy and warm; the air temperature was about 70 degrees Fahrenheit with a slight wind. The Site inspection began with locating the sentinel wells for the city of Niles water supply. The sentinel wells are at the Jerry Tyler Memorial Airport southwest of the Site: WMW-9, 86-7, WMW-12d, WMW-12s, WMW-10s and WMW-10d. The wells were difficult to locate as the grasses were fairly tall in the airfield away from the runways. The airport sentinel wells were in good condition and still are beyond the leading edge of the downgradient plume. The zone between the residential area and the airport is a combination of wooded and agricultural areas. The team also visited the twelve residences located in the downgradient plume area that, until recently, used private wells for potable water. These residences were discovered during the MDEQ 2005 residential well survey. Six of these residences were along Janellen Drive, Marshlyn Drive and Carberry Road.

Four of the six homes were connected to the city water supply[2], and their private wells were abandoned by the MDEQ. Two residences on Carberry and Marshlyn were allowed to keep their private wells for limited greenhouse and agricultural businesses. Six other residences who rely on private wells for potable water, including three houses on Carberry Road and one house each on Lilac Avenue, Blanchard Drive and Almaugus Drive chose to keep their wells because they are screened well above the depth of the contaminant plume. The inspection team also looked at the locations of the former extraction wells EW-1, EW-3 (at Bame and Lilac) and EW-4 located at Bailey and Lilac Streets. In December 2008, these wells were all plugged and abandoned. There is little visible evidence that they ever existed.

The team returned to the U.S. Aviex Site property, which is fenced; the only gate is located on the eastern perimeter fence, which fronts Huntly Road and is securely locked. A sign is mounted on the front gate and on the front fence indicating the hazardous nature of the Site. There is little evidence of the industrial or remedial activities that previously occurred at this Site. The visible remains include a large cement block warehouse with corrugated steel doors located toward the western property line. The warehouse footprint is approximately 14,875 square-feet and the warehouse is empty.

Two small light blue buildings also remain onsite toward the middle of the property that were used to house the groundwater pumping and treatment apparatus. A large cement platform that formerly supported the air-stripping tower was visible. The flush-mounted air sparge points are still visible (see Attachment 4, photo 18) with a high concentration of them located on the south property line and the adjacent property south of the Site also fronting on Huntly Road. Several flush-mounted monitoring wells are visible throughout the Site, particularly in the northwestern area of the Site where the perched aquifer containing the toluene is located. This area was the location of the excavation in which five monitoring wells (WMW-1, WMW-2, WMW-3, WMW-13, and WMW-14) had to be removed and replaced by WMW-1R, WMW-3R, and WMW-14R. There are no accessible onsite contaminants from past and current activities that would present hazards to trespassers, and no signs of vandalism or tampering were evident.

There is no current planned use for the property in the future. There are no controls prohibiting the use of groundwater beneath the Site; however, no activities aside from O&M occur onsite. The Niles water supply is the primary source of potable water to the area. As indicated in the last Five-Year Review, the agencies have determined that ICs are needed at the Site until cleanup goals are met, and before this property can be released by the MDEQ for redevelopment.

Interviews

The interviews conducted included Matthew Williams, Site Manager, MDEQ and Keith Kidder, Geologist, Weston Solutions. Mr. Kidder has visited the Site several times during O&M operations. He indicated that aside from the period of time during which residents were being

2 The State of Michigan paid for the installation of water mains and the city of Niles provided the service connections to these residences.

connected to the Niles municipal supply, there has been little concern or interest in the U.S. Aviex Site in the community. The content of these interviews is incorporated into this report.

Another interview was conducted over the telephone on September 14, 2009 with Mr. Johnnie Hall, Superintendent of the Niles Municipal Water Supply. Mr. Hall clarified the responsibilities regarding drinking water purveyance, well installation and local ordinances among the overlapping entities of the city of Niles, Howard Township and Cass County. He also indicated that while the city of Niles supplies water within the city limits, since wells were not allowed in those areas outside the city in Howard Township where the contamination had spread, the city extended its water lines into Howard Township. Presently, all new homes in the city must be connected to the municipal supply. All existing homes that connect to the supply must have their wells plugged. The State had offered to hook up any residents of the area at the time of the RA. Anyone now experiencing well contamination must pay for their own connection to the city water if their well becomes contaminated.

Mr. Hall also indicated that there were no issues or concerns regarding the Niles municipal water supply. The city monitors the wells annually for required parameters under the Safe Drinking Water Act, as well as for VOCs and SOCs. No contaminants have been detected. The city has re-drilled some of its wells. The contaminant plume from the U.S. Aviex Site is moving toward the Parker well; however, that well was taken out of the system and the water is run through an aeration, filtration and detention system.

The RPM also visited the Niles District Library to review the U.S. Aviex document repository. The most recent document found in the repository was the 1993 ESD. Some older pre-ROD documents and agency guidance documents were also present. The repository was immediately updated to include in the administrative record the 2004 ROD Amendment, as well as the previous Five-Year Reviews. All current documents are now in the Niles Site repository.

VII. Technical Assessment

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

Yes. The remedial action continues to operate and function as designed. Overall, the ozone/air sparge system operation significantly reduced dissolved phase source area concentrations in the area north of the warehouse near WMW-2 and WMW-15. Outside of the targeted treatment area, elevated dissolved phase concentrations persist. Concentrations above ROD and MDEQ aesthetic criteria persist at other locations on- and offsite, but at significantly lower levels. The data show that the levels of contaminants in the groundwater plume have declined significantly since the 2004 Five-Year Review. This is particularly evident from the trend analysis performed for the seven wells in the targeted analysis area where the ozone/air sparge system operated. Further, the additional activities at the Site since the last Five-Year Review, such as excavation of the identified source soils north of the warehouse, will prevent any future loading of contaminants to the groundwater plume system and will add to the present and future effectiveness of the containment system. As such, the remaining groundwater contaminant

plume does not appear to pose a threat to the city of Niles water supply. More data will need to be reviewed in the forthcoming five years in order to determine the effectiveness of MNA as the current stand-alone groundwater remedy since the ozone/air sparge system was decommissioned in 2007.

Groundwater monitoring should continue in order to evaluate the post-ozone/air sparge system contamination trends in the targeted area. Though some rebound was seen during the third quarter 2007, the limited extent does not warrant restarting the system. The agencies need to continue to evaluate the effectiveness of MNA in order to track the concentration trends and the likelihood that they will decrease again. Most costs involve activities associated with O&M and groundwater monitoring. Access controls in the form of a locked perimeter fence and warning signs are in place. In addition, no known exposures to site-related contaminants are occurring. Some governmental ICs are in place to protect the Niles water supply. Additional ICs will be needed to ensure the long-term protectiveness of the remedy. Also, long-term protectiveness requires compliance with effective ICs.

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

Yes. The exposure assumptions, toxicity data and RAOs used at the time of the remedy selection are still valid and have been addressed by the cleanup. At the time of the 1988 ROD, MCLs for DEE, DCFM and TCFM had not yet been promulgated under the Safe Drinking Water Act. The State of Michigan proposed surface water discharge standards for DEE at 43 ppb, DCFM at 3,000 ppb and TCFM at 32,000 ppb under the NPDES permit process. After the ROD was signed in 1988, the proposed rule criteria were never promulgated by the State of Michigan. In 2002, the State of Michigan promulgated the Administrative Rules pursuant to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 201), which establishes the criteria for the cleanup of contaminated sites. The 2004 ROD Amendment updated the health based cleanup standards for these and other contaminants to current maximum contaminant levels (MCLs) or residential health-based criteria under MDEQ Part 201 (Table 1).

The land use or expected land use on or near the Site has not changed. The area is currently zoned as a low-density residential district. Institutional controls will need to be implemented to ensure that the property and groundwater use are appropriately restricted until groundwater cleanup goals are met.

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

No. There is no new information to suggest that the selected remedial measures in place are not protective. There have been no changes in the physical condition of the Site and no new exposure pathways or receptors have been identified that would call into question the protectiveness of the remedy.

Technical Assessment Summary

This Five-Year Review found that the remedy implemented at the Site is functioning as intended by the ROD, ESD and ROD Amendment. The operation of the ozone/air sparge system has significantly reduced dissolved phase source area concentrations in the area north of the warehouse. Concentrations above ROD and MDEQ criteria persist at other locations both onsite and offsite. The levels of contaminants in the groundwater plume have declined significantly over the last five years as reflected in the monitoring data and trend analysis. The more recent excavation of principal threat soils north of the onsite warehouse prevents further contaminants from entering the groundwater system. As such, the plume system does not appear to pose a threat to the city of Niles water supply; the sentinel wells have not shown any contamination to date, and the Niles WHPP has served to protect its groundwater supply source area. The connection of all residents within the plume area or downgradient of the plume, except for the two residences refusing connection to the Niles municipal supply, has removed the potential for human exposure to contaminated groundwater. More data will need to be reviewed in the forthcoming years in order to determine the effectiveness of MNA as the current stand-alone groundwater remedy since the termination of the ozone/air sparge system.

The exposure assumptions, toxicity data and RAOs used at the time of the remedy selection are still valid and have been addressed by the cleanup. The 2004 ROD Amendment updated the health-based cleanup standards for the contaminants to the current MCLs or residential health-based criteria under MDEQ Part 201. There is no new information to suggest that the selected remedial measures in place are not currently protective of human health and the environment. The MDEQ, as owner of the property, will need to evaluate the ICs and work with EPA to ensure that effective ICs are in place and that procedures are in place to maintain and monitor ICs to assure the long-term protectiveness of the Site until the remedial action goals are achieved.

VIII. Issues

TABLE 9 - ISSUES

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. The ICs have not been fully evaluated. A review of the ICs is needed to ensure that the remedy is functioning as intended with regard to the ICs, and to ensure that effective procedures, including measures to maintain and monitor and enforce ICs, are implemented to assure long-term protectiveness of the Site.	No	Yes

IX. Recommendations and Follow-up Actions

TABLE 10 – RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
1. The ICs have not been fully evaluated. A review of the ICs is needed to ensure that the remedy is functioning as intended with regard to the ICs, and to ensure effective procedures, including measures to maintain, monitor, and enforce ICs, are implemented to assure long-term protectiveness of the Site.	IC evaluation activities are underway. An IC Plan will be developed to incorporate the results of the evaluation activities and plan for additional IC activities as needed, including planning for long-term stewardship and a review of the need for an ESD for ICs.	EPA/ MDEQ	EPA	12/31/2010	No	Yes

X. Protectiveness Statement

The remedy at the U.S. Aviex Site currently protects human health and the environment in the short term. The implementation of ICs will insure that the remedy remains protective in the long term. There is no current human exposure to contaminated groundwater or soil. The operation of the ozone/air sparge system and the excavation of vadose zone soils in the north area of the Site have removed contaminant source materials. In addition, residences with private wells situated within the plume and/or downgradient of the plume have been connected to the Niles municipal water supply, and their wells have been properly abandoned. The Niles municipal supply is not, nor is it expected to be affected by the Site-related groundwater contamination. Long-term protectiveness requires compliance with effective ICs. Evaluation of the necessity and types of ICs required is underway. To assure proper maintenance, monitoring, and enforcement of effective ICs, long-term stewardship procedures will be reviewed and a plan developed. A review of the need for an ESD for ICs will also be conducted. These steps are necessary to ensure that the remedy continues to function as intended and to ensure long-term protectiveness.

XI. Next Review

The next five-year review for the Site will be completed by November 2014, and within five years from the signature date of this review.

Tables

Table 1 – Chronology of Site Events
Table 2 – Contaminant Cleanup Goals from the ROD
Table 3 – Revised Criteria as per the ROD Amendment
Table 4 – Institutional Controls Summary
Table 5 – Annual System Operations/O&M Costs
Table 6 – Groundwater Monitoring Points and Sampling Frequency
Table 7 – Free Product Measurements
Table 8 – Contaminants Exceeding ROD Criteria – June 2009
Table 9 – Issues
Table 10 – Recommendations and Follow-Up Actions

Figures

Figure 1 – Site Location Map
Figure 2 – Site Setting and Features Map
Figure 3 – Howard Township Zoning Map
Figure 4 – Monitoring Well Network
Figure 5 – Water Main Extension Map
Figure 6 – Regional Contaminant Concentration Map
Figure 7 – Site Contaminant Concentration Map
Figures 8 -14: Contaminant Concentration Trends for Select Monitoring Wells

Attachments

Attachment 1 – Site Maps and Figures
Attachment 2 – Public Notice of Five-year Review
Attachment 3 – List of Documents Reviewed
Attachment 4 – Five-Year Review Inspection Sheet
Attachment 5 – Photos Documenting Site Conditions

Attachments

Attachment 1 – Site Maps and Figures

Attachment 2 – Public Notice of Five-Year Review

Attachment 3 – List of Documents Reviewed

Attachment 4 – Five-Year Review Inspection Sheet

Attachment 5 – Photos Documenting Site Conditions

0 1,500 Feet

Figure 1

File: HMI/Aviex/Qtrly Rpts/SiteLocation.mxd	Date: 8/9/06	Drawn By: EPM	Checked By: MMB	Approved By: JSB

WESTON SOLUTIONS

600 East Lakeshore Dr.
Suite 200
Houghton, Michigan
49931

Former U.S. Aviex Facility Location Map
U.S. Aviex Site
Niles, Michigan

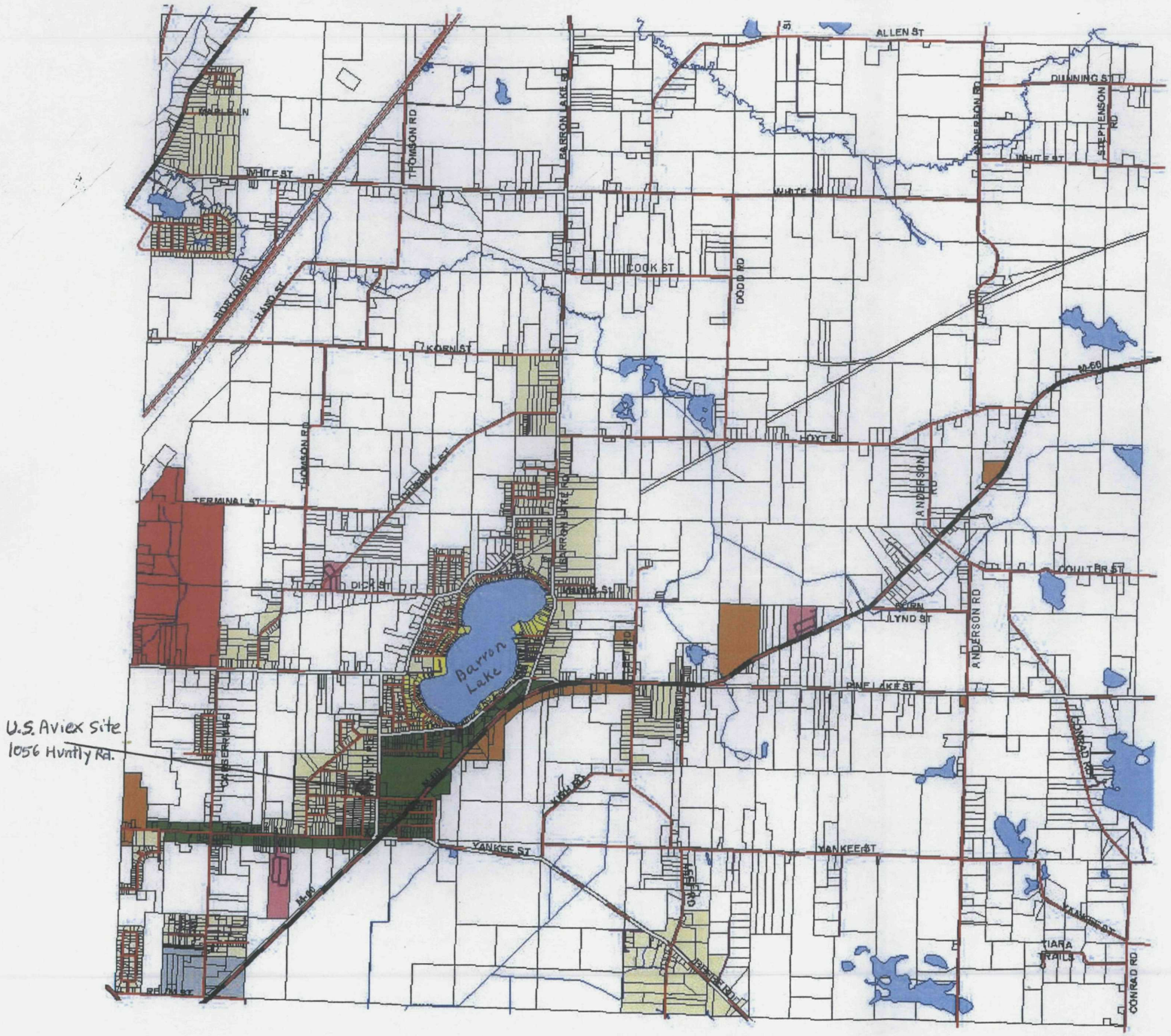
U.S. Aviex Site
1056 Huntly Road
Niles, Michigan

Site Features Map

Figure 2

HOWARD TOWNSHIP

ZONING MAP



Zoning Legend

- Agricultural Residential District
- General Commercial District
- Lake Residential District
- Light Industrial District
- Low Density Residential District
- Manufactured Housing Park District
- Manufacturing District
- Mixed Use District

Information contained herein is provided for reference purposes only and should be confirmed with the appropriate local agency. Cass County assumes no responsibility for errors and/or omissions.

Scale: 1 inch equals 3,300 feet

Road/Rail Legend

- U.S. Highways
- State Highways
- County Primary Roads
- County Local Roads
- City/Village Major Roads
- City/Village Local Roads
- Not Defined
- Railroads

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Cass County

Figure 3

LEGEND

- EW-3 Extraction Well Location
- 86-7 – Monitor Well Location (Installed 1974-1992)
- WMW-9 – MDEQ/WESTON Monitor Well Location (Installed May – August 2003)
- RL-1 – MDEQ Monitor Well Location (Installed Spring 2002)
- Approximate Extent City of Niles Municipal Well Head Protection Area
- DETAIL A – FORMER U.S. AVIEX FACILITY

150' 600'
0' 300' 900'

Figure 4

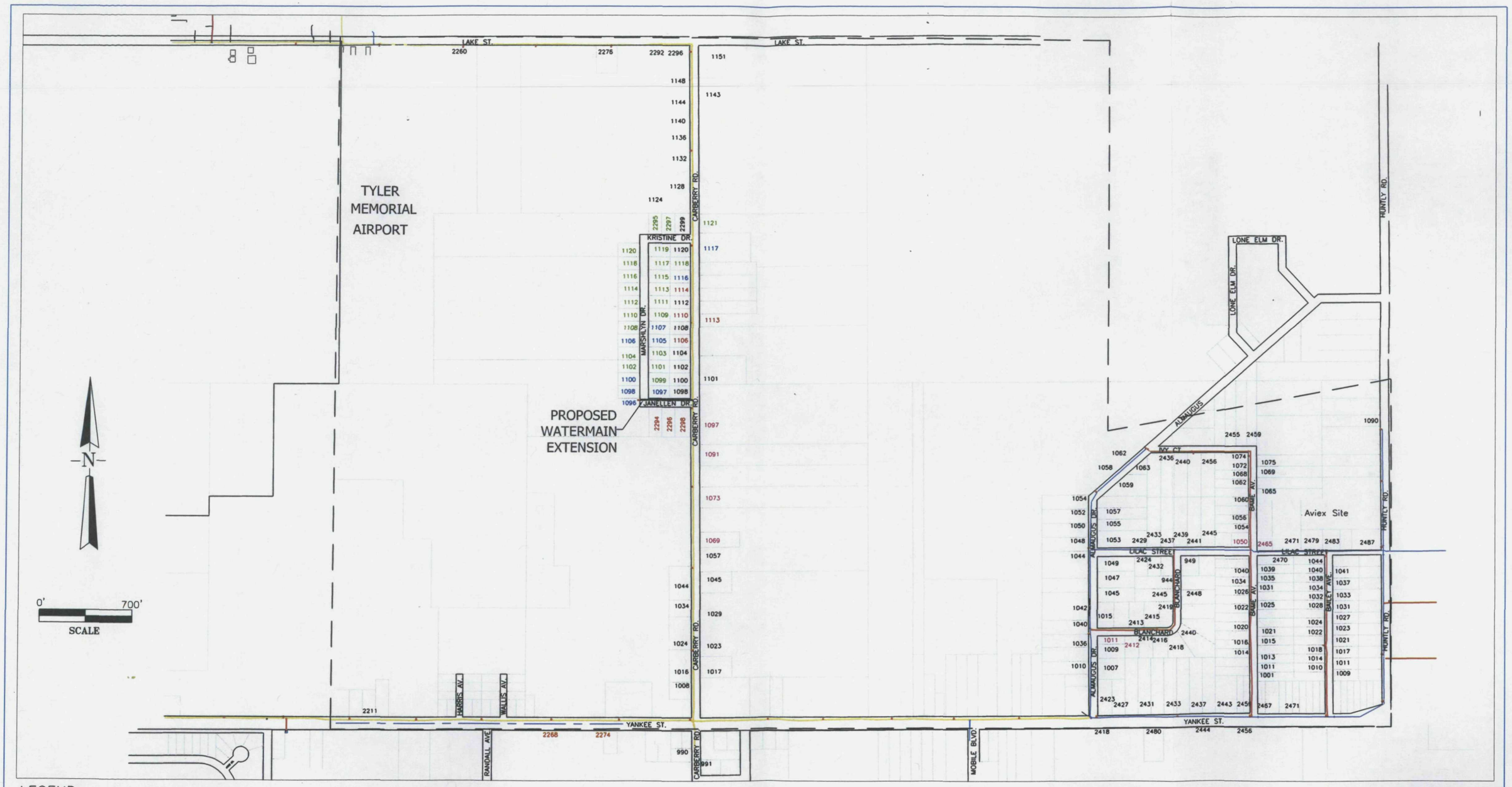
File:HMI\Projects\AVIEX\QTRLY GW Sampling Plan\MW-REGIONAL.DWG | Modified After Tetra-Tech, EMI & Kebs, Inc. | Drawn By: JJV | Check

WESTON SOLUTIONS

600 EAST LAKESHORE DRIVE
SUITE 200
HOUGHTON, MICHIGAN
49931

MONITOR WELL NETWORK

FORMER U.S. AVIEX SITE
NILES, MICHIGAN



LEGEND

- PROPOSED WATERMAIN EXTENSION
- EXISTING WATERMAIN, VALVE, & TEE
- 1008 STREET ADDRESS FOR 1008 CARBERRY ROAD, CURRENTLY ON MUNICIPAL WATER.
- 1050 STREET ADDRESS ON "AVIEX" LIST AND ARE CURRENTLY SAMPLED BY THE VAN BUREN/CASS COUNTY HEALTH DEPARTMENT.
- 1096 STREET ADDRESS ON "SECTIONS 19 AND 30" LIST AND ARE CURRENTLY SAMPLED BY THE VAN BUREN/CASS COUNTY HEALTH DEPARTMENT.
- 1121 STREET ADDRESS INCLUDED ON THE "AVIEX" LIST IN FEBRUARY 2003, BUT ARE NO LONGER SAMPLED BY THE VAN BUREN/CASS COUNTY HEALTH DEPARTMENT.
- 1073 RESIDENT OFFERED CONNECTION BY MDEQ TO MUNICIPAL WATER SUPPLY.

NOTES:
DRAWING INCLUDES ADDRESSES THAT WERE CROSS REFERENCED WITH THE HOWARD TOWNSHIP MUNICIPAL WATER LIST SUPPLIED BY THE CITY OF NILES.

THERE ARE SOME ADDRESSES INCLUDED ON THE LIST THAT ARE NOT ON THE FIGURE.

LOCATION OF RESIDENCES FOR 2268 AND 2274 YANKEE STREET WERE APPROXIMATED.

BASE MAP REFERENCE: CITY OF NILES MUNICIPAL DEPARTMENT

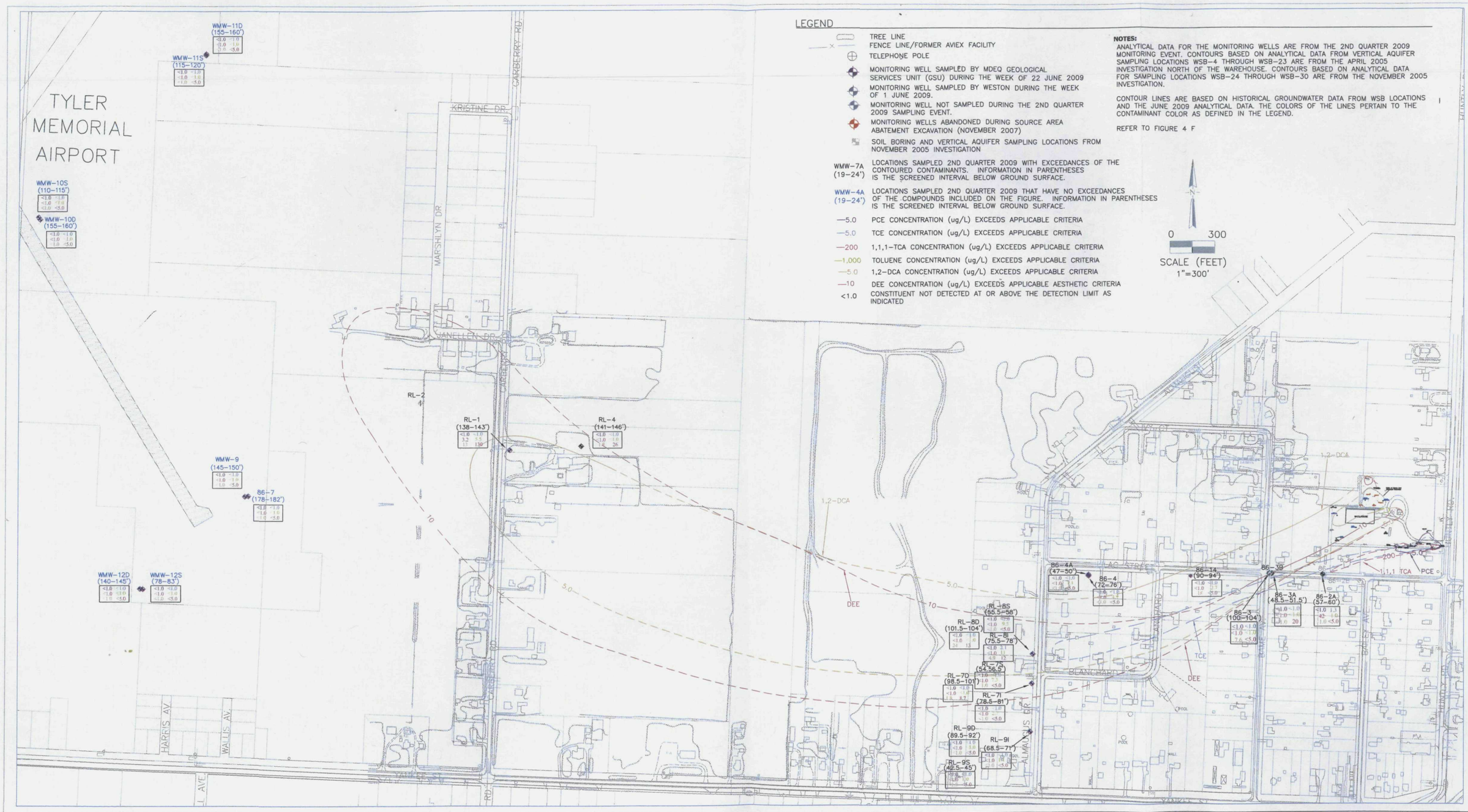
FIGURE 5

Path: HMI\Aviex\New LOE Assignment\City of Niles Correspondence\Proposed watermain loop.dwg	Source: City of Niles	Drawn By: ASD	Checked By: DPL	Approved By: JSB

WESTON SOLUTIONS

600 EAST LAKESHORE DRIVE
SUITE 200
HOUGHTON, MICHIGAN
49931

PROPOSED WATERMAIN EXTENSION
FORMER U.S. AVIEX SITE
NILES, MICHIGAN



LEGEND

- TREE LINE
- FENCE LINE/FORMER AVIEX FACILITY
- TELEPHONE POLE
- MONITORING WELL SAMPLED BY MDEQ GEOLOGICAL SERVICES UNIT (GSU) DURING THE WEEK OF 22 JUNE 2009
- MONITORING WELL SAMPLED BY WESTON DURING THE WEEK OF 1 JUNE 2009.
- MONITORING WELL NOT SAMPLED DURING THE 2ND QUARTER 2009 SAMPLING EVENT.
- MONITORING WELLS ABANDONED DURING SOURCE AREA ABATEMENT EXCAVATION (NOVEMBER 2007)
- SOIL BORING AND VERTICAL AQUIFER SAMPLING LOCATIONS FROM NOVEMBER 2005 INVESTIGATION
- WMW-7A (19-24') — LOCATIONS SAMPLED 2ND QUARTER 2009 WITH EXCEEDANCES OF THE CONTOURED CONTAMINANTS. INFORMATION IN PARENTHESES IS THE SCREENED INTERVAL BELOW GROUND SURFACE.
- WMW-4A (19-24') — LOCATIONS SAMPLED 2ND QUARTER 2009 THAT HAVE NO EXCEEDANCES OF THE COMPOUNDS INCLUDED ON THE FIGURE. INFORMATION IN PARENTHESES IS THE SCREENED INTERVAL BELOW GROUND SURFACE.
- —5.0 — PCE CONCENTRATION (ug/L) EXCEEDS APPLICABLE CRITERIA
- —5.0 — TCE CONCENTRATION (ug/L) EXCEEDS APPLICABLE CRITERIA
- —200 — 1,1,1-TCA CONCENTRATION (ug/L) EXCEEDS APPLICABLE CRITERIA
- —1,000 — TOLUENE CONCENTRATION (ug/L) EXCEEDS APPLICABLE CRITERIA
- —5.0 — 1,2-DCA CONCENTRATION (ug/L) EXCEEDS APPLICABLE CRITERIA
- —10 — DEE CONCENTRATION (ug/L) EXCEEDS APPLICABLE AESTHETIC CRITERIA
- <1.0 — CONSTITUENT NOT DETECTED AT OR ABOVE THE DETECTION LIMIT AS INDICATED

NOTES:

ANALYTICAL DATA FOR THE MONITORING WELLS ARE FROM THE 2ND QUARTER 2009 MONITORING EVENT. CONTOURS BASED ON ANALYTICAL DATA FROM VERTICAL AQUIFER SAMPLING LOCATIONS WSB-4 THROUGH WSB-23 ARE FROM THE APRIL 2005 INVESTIGATION NORTH OF THE WAREHOUSE. CONTOURS BASED ON ANALYTICAL DATA FOR SAMPLING LOCATIONS WSB-24 THROUGH WSB-30 ARE FROM THE NOVEMBER 2005 INVESTIGATION.

CONTOUR LINES ARE BASED ON HISTORICAL GROUNDWATER DATA FROM WSB LOCATIONS AND THE JUNE 2009 ANALYTICAL DATA. THE COLORS OF THE LINES PERTAIN TO THE CONTAMINANT COLOR AS DEFINED IN THE LEGEND.

REFER TO FIGURE 4 F

N

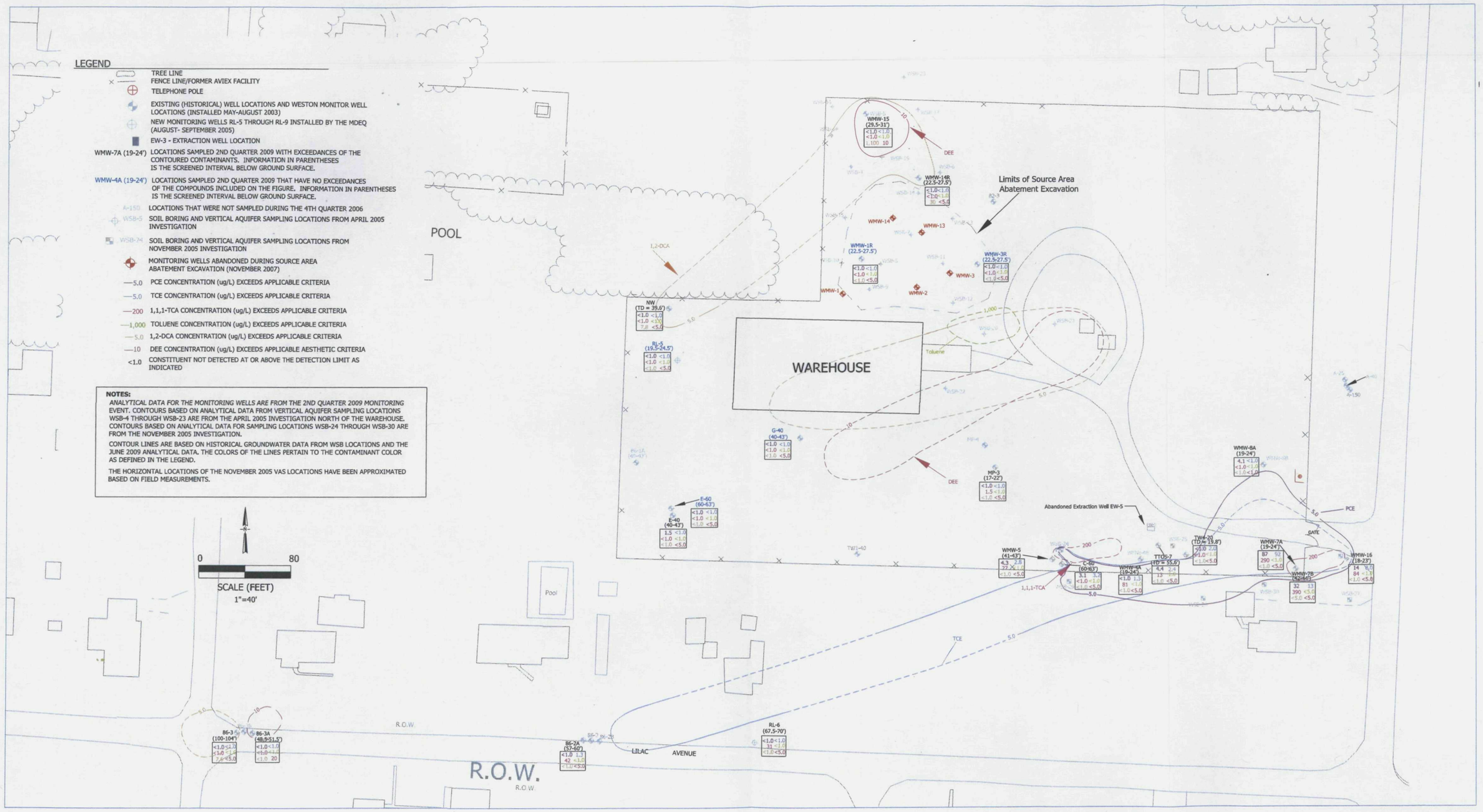
0 300

SCALE (FEET)
1"=300'

Michigan Department of Environmental Quality (MDEQ)	PROJ. ENG. M.M.B.			DRAFT	REGIONAL CONTAMINANT CONCENTRATION MAP June 2009 Former U.S. Aviex Site Niles, Michigan
LANSING MICHIGAN	PROJ. MGR. J.S.B.				DRAWN D.P.L. / DATE 8/09
WESTON SOLUTIONS	APPROVED				SCALE 1" =300' / W.O. NO. 20083.712.001.001
HOUGHTON MICHIGAN	APPROVED				
	APPROVED	ISSUED FOR	DATE		

NO. DATE APPR. REVISION NO. DATE APPR. REVISION

Figure 6



NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION
			E:\Aviex\QTRLY Reports\4thQTR2006 Report\Figures\Figure3 VOC SiteConcentration Map				

Michigan Department of Environmental Quality (MDEQ)

LANSING MICHIGAN

WESTON SOLUTIONS

HOUGHTON MICHIGAN

CHECKED		DATE	CLIENT APPROVALS	DATE
PROJ. ENG.	M.M.B.			
PROJ. MGR.	J.S.B.			
APPROVED				
APPROVED				
APPROVED			ISSUED FOR	DATE

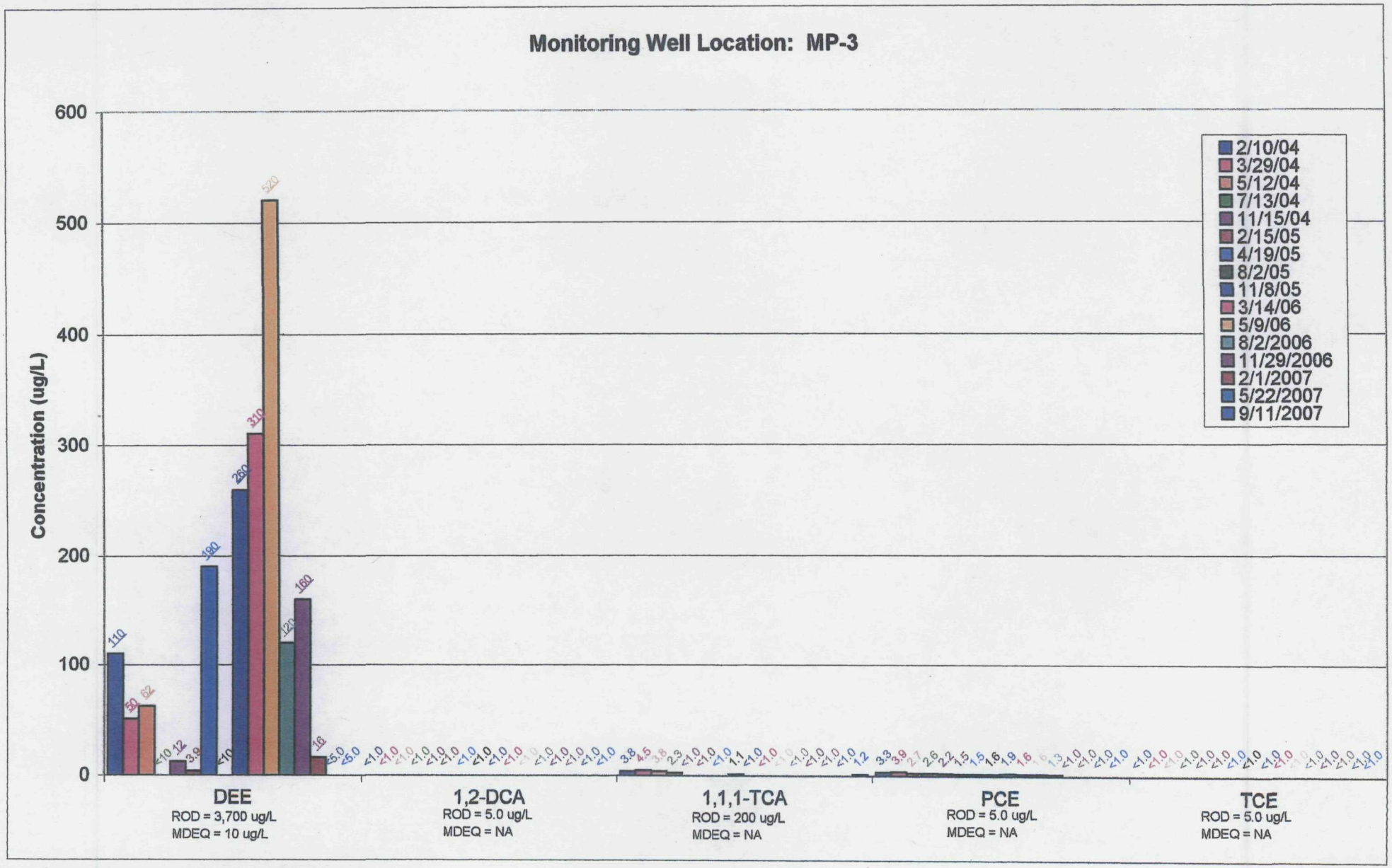
DRAFT

SITE CONTAMINANT CONCENTRATION MAP
June 2009
Former U.S. Aviex Site
Niles, Michigan

DRAWN	DATE
D.P.L./A.S.D./J.M.N	8/09
SCALE	W.O. NO.
1" =35'	20083.712.001.0010

Figure 7

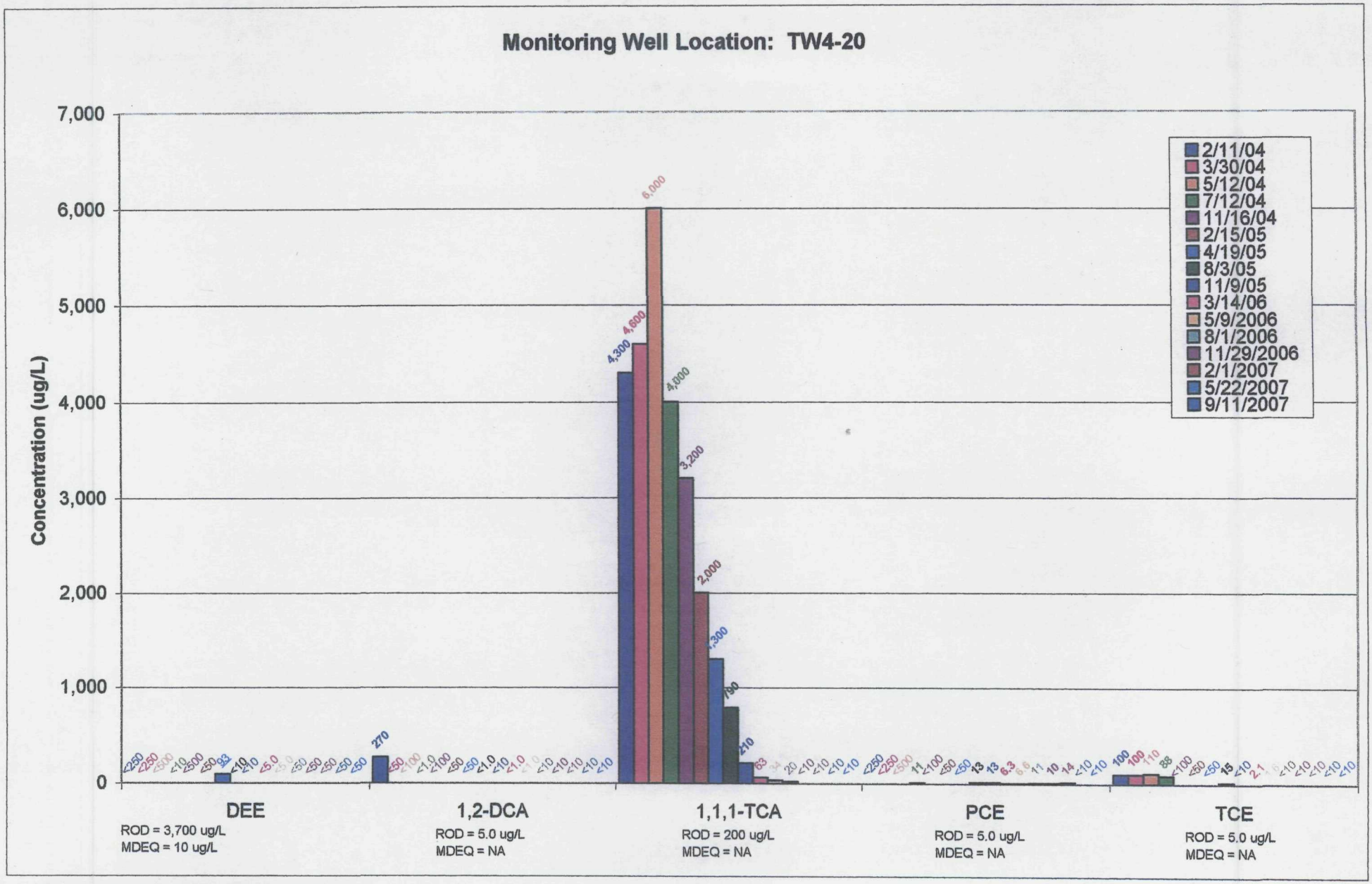
FIGURE 8
CONTAMINANT OF CONCERN CONCENTRATION TRENDS
Former U.S. Aviex Site
Niles, MI



Underlined Text = Exceeds MDEQ Aesthetic Criteria
Bold Text = Exceeds ROD Criteria
Criteria are listed beneath corresponding compound.
NA = Not applicable

K:\Aviex\QTRLY Reports\3rdQTR2007 Report\Figures\Figures 4-9 COC Trends Over Time.xls

FIGURE 9
CONTAMINANT OF CONCERN CONCENTRATION TRENDS
Former U.S. Aviex Site
Niles, MI



Underlined = Exceeds MDEQ Aesthetic Criteria
Bold Text = Exceeds ROD Criteria
Criteria are listed beneath corresponding compound
NA = Not applicable

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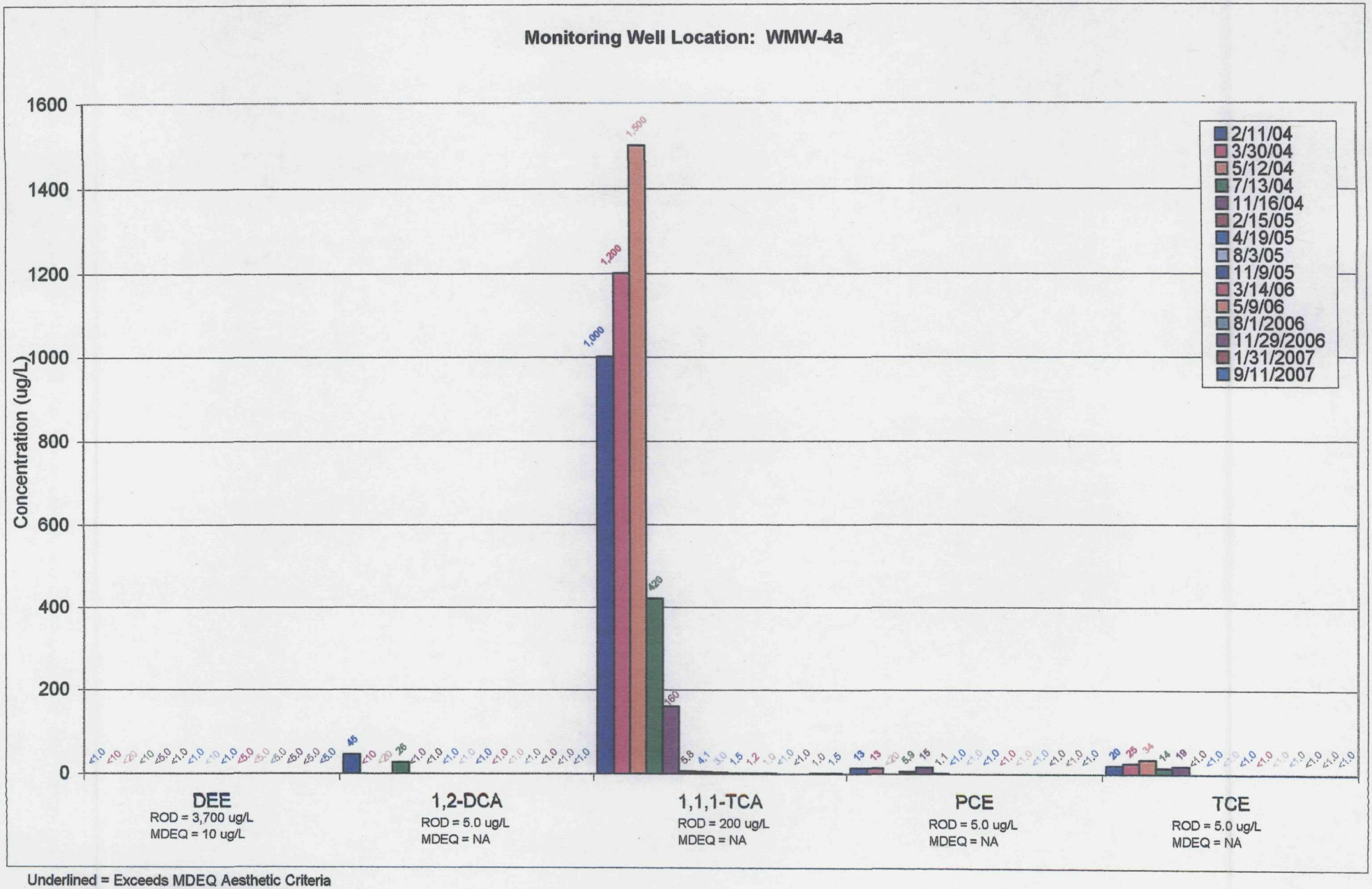
FIGURE 10
CONTAMINANT OF CONCERN CONCENTRATION TRENDS
Former U.S. Aviex Site
Niles, MI



Underlined = Exceeds MDEQ Aesthetic Criteria
Bold Text = Exceeds ROD Criteria
Criteria are listed beneath corresponding compound
NA = Not applicable

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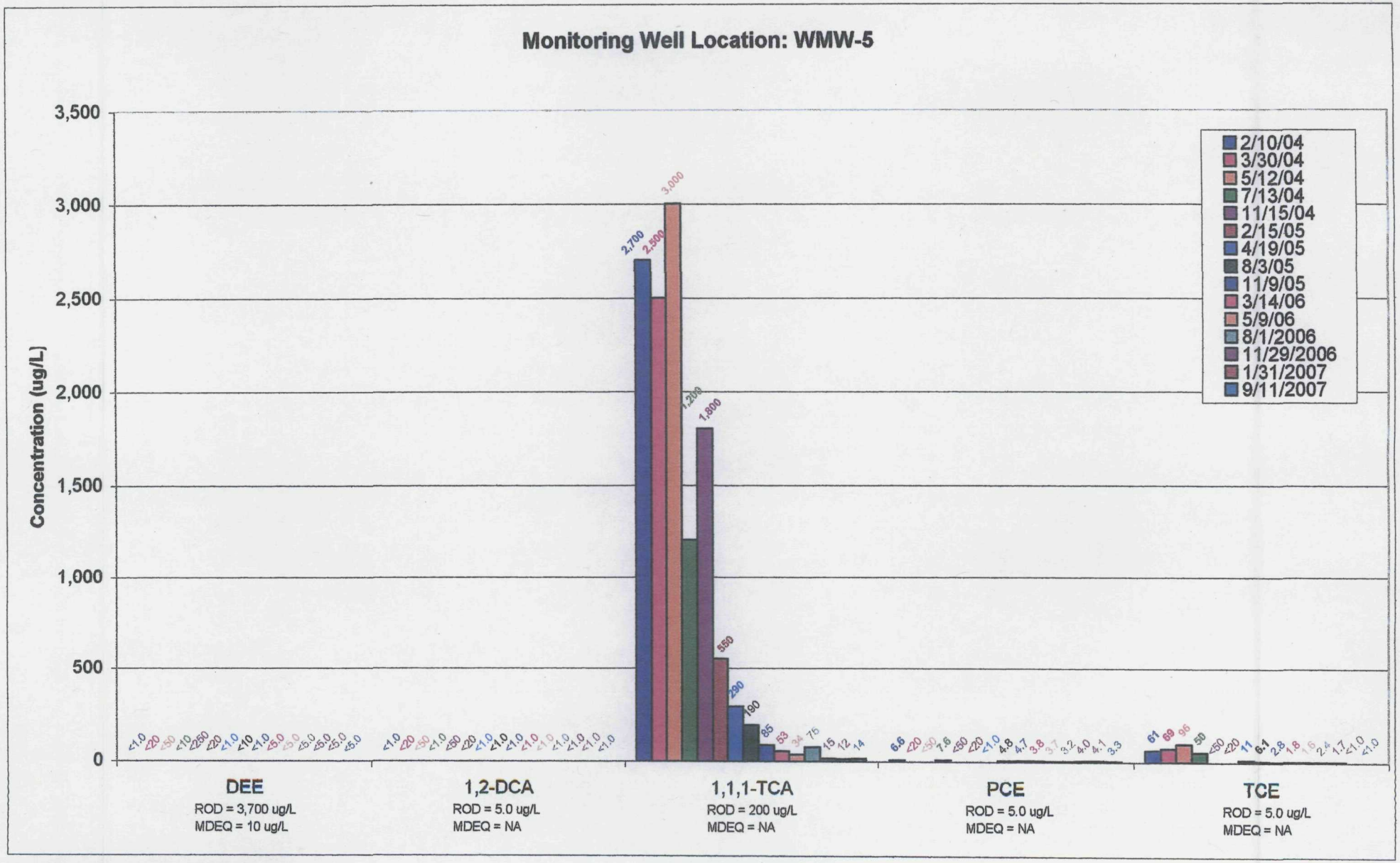
FIGURE 11
CONTAMINANT OF CONCERN CONCENTRATION TRENDS
Former U.S. Aviex Site
Niles, MI



Underlined = Exceeds MDEQ Aesthetic Criteria
Bold Text = Exceeds ROD Criteria
Criteria are listed beneath corresponding compound
NA = Not applicable

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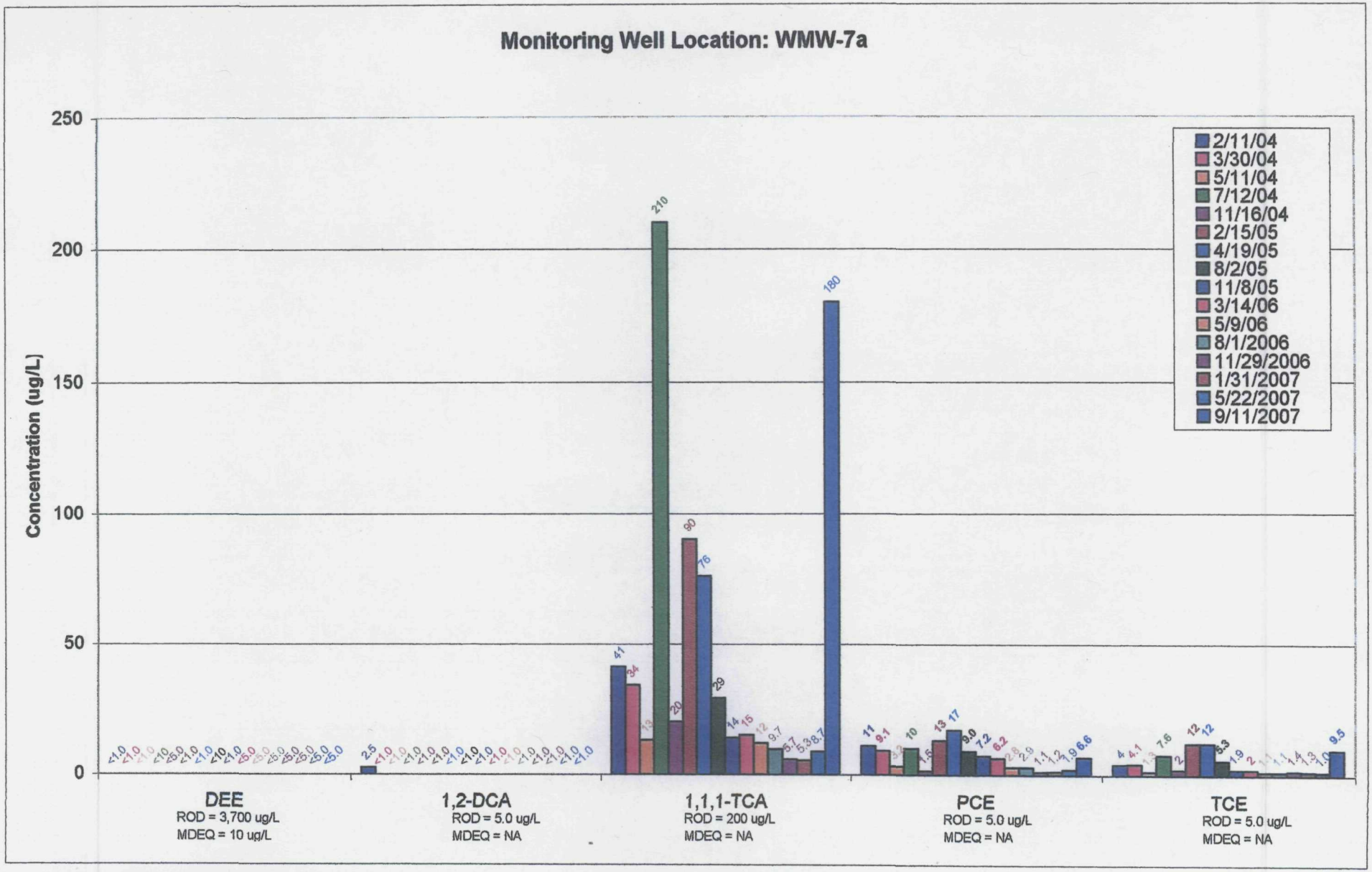
FIGURE 12
CONTAMINANT OF CONCERN CONCENTRATION TRENDS
Former U.S. Aviex Site
Niles, MI



Underlined = Exceeds MDEQ Aesthetic Criteria
Bold Text = Exceeds ROD Criteria
Criteria are listed beneath corresponding compound
NA = Not applicable

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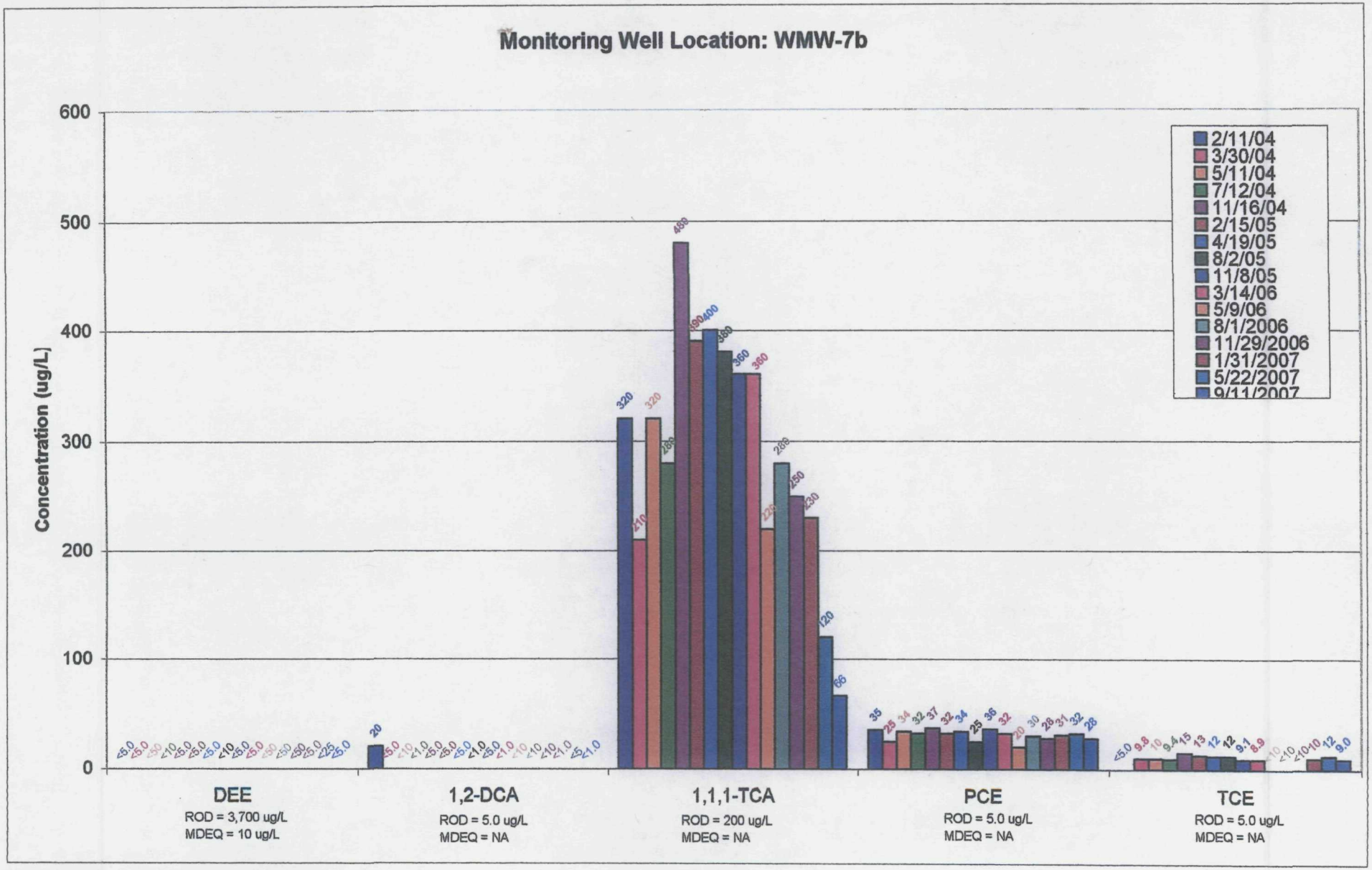
FIGURE 13
CONTAMINANT OF CONCERN CONCENTRATION TRENDS
Former U.S. Aviex Site
Niles, MI



Underlined = Exceeds MDEQ Aesthetic Criteria
Bold Text = Exceeds ROD Criteria
Criteria are listed beneath corresponding compound
NA = Not applicable

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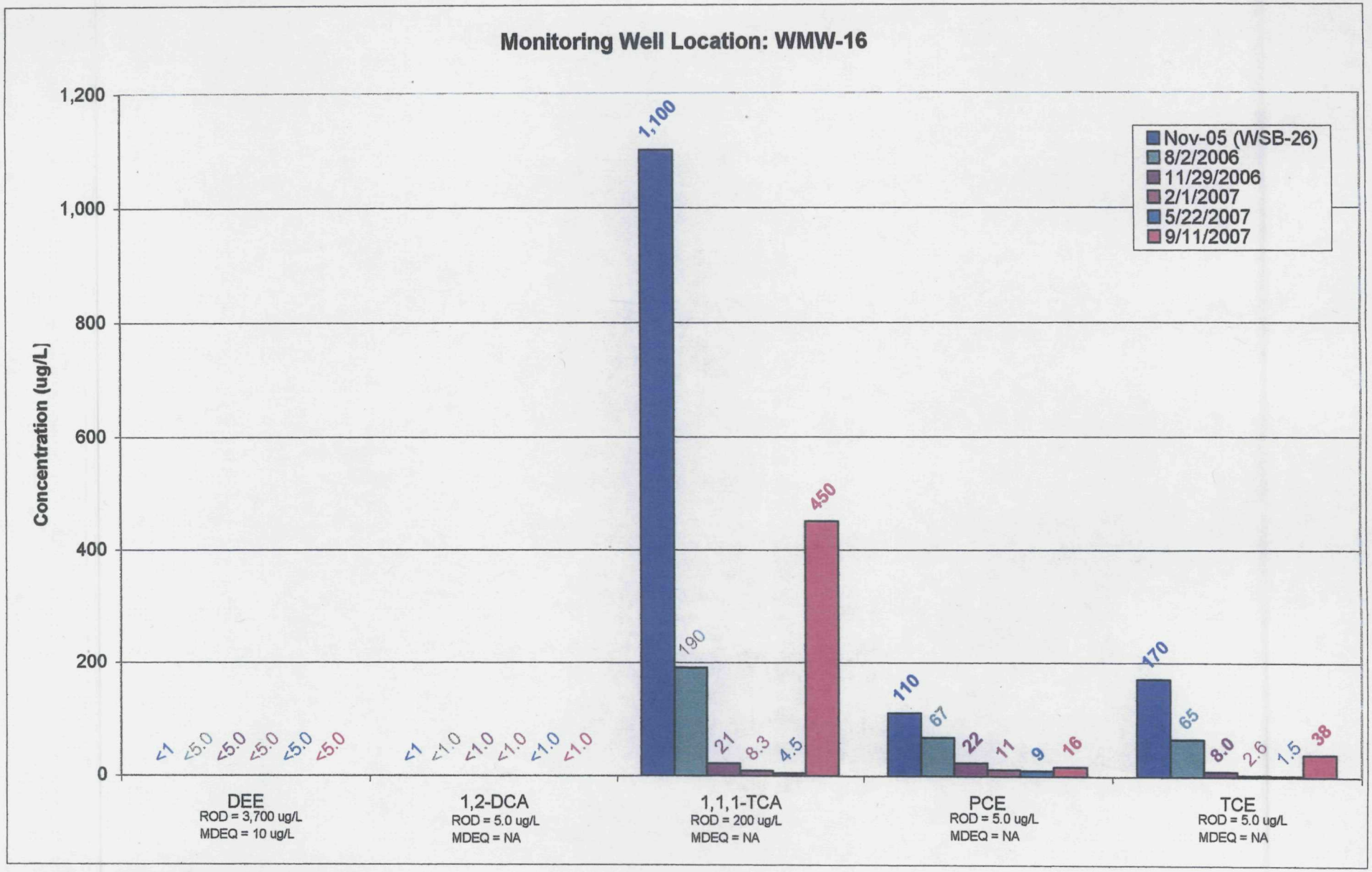
FIGURE 1 4
CONTAMINANT OF CONCERN CONCENTRATION TRENDS
Former U.S. Aviex Site
Niles, MI



Underlined = Exceeds MDEQ Aesthetic Criteria
Bold Text = Exceeds ROD Criteria
Criteria are listed beneath corresponding compound
NA = Not applicable

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Attachment 2

EPA Begins Review of U.S. Aviex Superfund Site

Niles, Michigan

U. S. Environmental Protection Agency is conducting a five-year review of the U.S. Aviex Superfund site at 1056 Huntley Road, Niles. The Superfund law requires regular checkups of sites that have been cleaned up – with waste managed on-site – to make sure the cleanup continues to protect people and the environment. This is the third five-year review of this site.

EPA's cleanup initially consisted of pumping contaminated ground water out of the ground, treating it to remove contaminants and discharging the treated ground water to surface water. The treatment system was later upgraded to remove more concentrated contaminants in the shallow aquifer. This treatment has been effective and is no longer operating. EPA is monitoring the ground water while any remaining contaminants are cleansed naturally from the aquifer.

More information is available at the Niles District Library, 620 E. Main S., and at www.epa.gov/region5superfund/npl/michigan/MID980794556.htm. This review should be completed the end of December.

The five-year review is an opportunity for you to tell EPA about site conditions and any concerns you have. Contact:

Sheila Sullivan
Remedial Project Manager
312-886-5251
sullivan.sheila@epa.gov

Cheryl Allen
Community Involvement Coordinator
312-353-6196
allen.cheryl@epa.gov

You may also call Region 5 toll-free at 800-621-8431, 9:30 a.m. to 5:30 p.m. weekdays

Attachment 3

List of Documents Reviewed for the Third Five-Year Review Report
U.S. Aviex Site, Niles, Cass County, Michigan

EDI Engineering & Science. "*U.S. Aviex Remedial Investigation Report Volume 1*" Prepared for: U.S. Aviex Company, Niles, Michigan, November 1986.

EDI Engineering & Science. "*Volume 1-Final Remedial Investigation Report for the Huntly Road Site, Niles, Michigan.*" Prepared for U.S. EPA Region 5, July 1988.

Jacobs Engineering Group Inc. Project Number: 05-B339-00. "*Final Endangerment Assessment for the U.S. Aviex Company, Niles, Michigan.*" Prepared for EPA Region 5, by ICAIR, May 1988.

Michigan Department of Environmental Quality (MDEQ) Environmental Response Division. "*Information Bulletin: U.S. Aviex Superfund Site Long-Term Remedial Action, Niles, Michigan*", March 2001.

Michigan Department of Environmental Quality (MDEQ). "*Five-Year Review Report, U.S. Aviex Superfund Site, Cass County, Michigan*", December 3, 1999.

Tetra Tech EM Inc. "*Additional Groundwater Assessment Summary Report, U.S. Aviex Site, Niles, Michigan.*" Prepared for U.S.EPA Office of Waste Programs Enforcement Washington, DC 20460, February 27, 1998.

Tetra Tech EM Inc. "*Phase II Groundwater Assessment and Comparative Remediation Study, U.S. Aviex Superfund Site, Niles, Michigan.*" Prepared for Michigan Department of Environmental Quality, Environmental Response Division, August 7, 2001.

Tetra Tech EM Inc. "*Technical Memorandum: Groundwater Monitoring Well, Extraction Well, Influent, Effluent, and Piezometer Sampling Results, U.S. Aviex Site, Niles, Michigan*", July 2002.

United States Environmental Protection Agency (U.S.EPA) Region 5 Chicago, Illinois. "*Record of Decision for the U.S. Aviex Site*", Sept 7, 1988.

United States Environmental Protection Agency (U.S. EPA) Region 5 Chicago, Illinois. "*Explanation of Significant Differences, U.S. Aviex Site, Niles, Howard Township, Cass County, Michigan*", September 23, 1993.

United States Environmental Protection Agency (U.S. EPA) Region 5 Chicago, Illinois. "*Groundwater Monitoring and Sampling Analytical Results, U. S. Aviex Site*", June 1996.

Attachment 3

United States Environmental Protection Agency (U.S. EPA). "*Institutional Controls: A Site Managers Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanup*", Office of Solid Waste and Emergency Response, OSWER Directive 9355.0-74FS-P (EPA 540-F-00-005), September 2000.

United States Environmental Protection Agency (U.S. EPA). "*Comprehensive Five-Year Review Guidance, Office of Solid Waste and Emergency Response.*" Dir.9355.7-03B-P, June 2001.

United States Environmental Protection Agency (U.S. EPA). "*Operation and Maintenance in the Superfund Program.*" Office of Solid Waste and Emergency Response, OSWER 9200.1-37FS (EPA 540-F-01-004), 2001.

United States Environmental Protection Agency (U.S. EPA) Region 5, Chicago, Illinois. "*Record of Decision Amendment to the Remedial Action, U.S. Aviex Superfund Site, Cass County, Michigan*", September 2004.

United States Environmental Protection Agency (U.S. EPA) Region 5, Chicago, Illinois. "*Second Five-Year Review Report, U.S. Aviex, Cass County, Niles, Michigan*", December 3, 2004.

Weston Solutions of Michigan, Inc. "*Ground Water Monitoring Plan, Former U.S. Aviex Site, Niles, Michigan*", December 2003.

Weston Solutions of Michigan, Inc. "*Vertical Aquifer Sampling of Former U.S. Aviex Site, Niles, Michigan*", May 2004.

Weston Solutions of Michigan, Inc. "*Well Head Protection Analysis of Former U.S. Aviex Site, Niles, Michigan*", May 2004.

Administrative Order on Consent in the Matter of United States Aviex Company, 1800 Terminal Road, Niles, Michigan 49120. Proceeding Under Section 106(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. S9606(a)) U.S. EPA Docket No. V-W-85-C-016. September 30, 1985.

Weston Solutions of Michigan, Inc. "*Source Area Remediation Pilot Study Report, U. S. Aviex Site, Niles, Cass County, Michigan (Michigan Site ID Number 14000017).*" Prepared for: MDEQ Remediation and Redevelopment Division, Superfund Section, Lansing District Office.

Weston Solutions of Michigan, Inc. "*Draft Technical Memorandum for: 3rd Quarter 2007 Groundwater Monitoring, U.S. Aviex Site, Niles, Michigan.*" Prepared for MDEQ Remediation and Redevelopment Division – Superfund Section, Lansing District Office, December 2007.

Attachment 3

Weston Solutions of Michigan, Inc. "*Draft Technical Memorandum for: 2nd Quarter 2009 Groundwater Monitoring - June 2009, U.S. Aviex Site, (Site ID # 14000017), Niles, Michigan.*" Prepared for MDEQ Remediation and Redevelopment Division – Superfund Section, Lansing District Office, September 2009.

Site Inspection Checklist

I. SITE INFORMATION	
Site name: U.S. Aviex Site	**Date of inspection:** 8/19/09
Location and Region: Niles, Michigan, Cass County	**EPA ID:** MID980794556
Agency, office, or company leading the five-year review: U.S. EPA	**Weather/temperature:** Warm, 70° F, Sunny

Remedy Includes: (Check all that apply)

- G Landfill cover/containment
- X Access controls
- G Institutional controls
- X Groundwater pump and treatment
- G Surface water collection and treatment
- X Other ozone / air sparging
- X Monitored natural attenuation (current)
- X Groundwater containment
- G Vertical barrier walls

Attachments: G Inspection team roster attached G Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Matt Williams, MDEQ (Name) Project Manager (Title) 8/2009 (Date)
   Interviewed G at site G at office X by phone Phone no. 517-373-4821
   Problems, suggestions; G Report attached

2. **O&M staff** Keith Kidder, Weston Solutions (Name) (Title) 8/19/09 (Date)
   Interviewed X at site G at office G by phone Phone no. 517-381-5943
   Problems, suggestions; G Report attached

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Niles Municipal Water Supply
Contact Johnnie Hall (Name) Superintendent (Title) 9/14/09 (Date) 269-684-3901 X 302 (Phone no.)
Problems; suggestions; G Report attached _____

Agency Van Buren/Cass County Hlth Dept
Contact Mr. Singler (Name) Sanitarian (Title) _____ (Date) 269-445-5280 (Phone no.)
Problems; suggestions; G Report attached _____

Agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)
Problems; suggestions; G Report attached _____

Agency _____
Contact _____ (Name) _____ (Title) _____ (Date) _____ (Phone no.)
Problems; suggestions; G Report attached _____

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

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	**O&M Documents**			
	☒ O&M manual	☒ Readily available	G Up to date	G N/A
	☒ As-built drawings	☒ Readily available	G Up to date	G N/A
	☒ Maintenance logs	☒ Readily available	☒ Up to date	G N/A
	Remarks			
2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☒ Up to date	G N/A
	G Contingency plan/emergency response plan	G Readily available	G Up to date	G N/A
	Remarks			
3.	**O&M and OSHA Training Records**	☒ Readily available	☒ Up to date	G N/A
	Remarks			
4.	**Permits and Service Agreements**			
	☒ Air discharge permit	G Readily available	G Up to date	☒ N/A
	☒ Effluent discharge	G Readily available	G Up to date	☒ N/A
	G Waste disposal, POTW	G Readily available	G Up to date	☒ N/A
	G Other permits	G Readily available	G Up to date	G N/A
	Remarks			
5.	**Gas Generation Records**	G Readily available	G Up to date	☒ N/A
	Remarks			
6.	**Settlement Monument Records**	G Readily available	G Up to date	☒ N/A
	Remarks			
7.	**Groundwater Monitoring Records**	☒ Readily available	☒ Up to date	G N/A
	Remarks			
8.	**Leachate Extraction Records**	G Readily available	G Up to date	☒ N/A
	Remarks			
9.	**Discharge Compliance Records**			
	G Air	G Readily available	G Up to date	☒ N/A
	G Water (effluent)	G Readily available	G Up to date	☒ N/A
	Remarks			
10.	**Daily Access/Security Logs**	☒ Readily available	G Up to date	G N/A
	Remarks			

IV. O&M COSTS

1. **O&M Organization**

G State in-house
G PRP in-house
G Federal Facility in-house
G Other_____

X Contractor for State
G Contractor for PRP
G Contractor for Federal Facility

2. **O&M Cost Records** See 5-yr. Report

X Readily available X Up to date
X Funding mechanism/agreement in place
Original O&M cost estimate_____ G Breakdown attached

Total annual cost by year for review period if available

From (Date)	To (Date)	Total cost	
			G Breakdown attached
			G Breakdown attached
			G Breakdown attached
			G Breakdown attached
			G Breakdown attached

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

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS X Applicable G N/A

A. Fencing

1. **Fencing damaged** G Location shown on site map X Gates secured G N/A

Remarks Fencing was in excellent condition

B. Other Access Restrictions

1. **Signs and other security measures** X Location shown on site map G N/A

Remarks Signs are posted on fence

C. Institutional Controls (ICs) ICs are in place to protect remediation activities only

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — G Yes G No ☒ N/A
Site conditions imply ICs not being fully enforced — G Yes G No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency MDEQ
Contact Matt Williams (Name) Project Manager (Title) _____ (Date) 517-373-4821 (Phone no.)

Reporting is up-to-date — G Yes G No G N/A
Reports are verified by the lead agency — G Yes G No G N/A

Specific requirements in deed or decision documents have been met — G Yes ☒ No G N/A
Violations have been reported — G Yes ☒ No G N/A
Other problems or suggestions: G Report attached

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

Remarks ICs are being more fully evaluated to ensure long-term health protection

D. General

1. **Vandalism/trespassing** G Location shown on site map ☒ No vandalism evident

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks No land changes evident. Site is abandoned post-manufacturing facility with most buildings removed. 1 warehouse and 2 tot. buildings remain

3. **Land use changes off site** G N/A

Remarks The area is residential / agricultural around the site proper.

VI. GENERAL SITE CONDITIONS

A. Roads G Applicable G N/A

1. **Roads damaged** G Location shown on site map ☒ Roads adequate G N/A

Remarks _____

B. Other Site Conditions

Remarks _____

VII. LANDFILL COVERS G Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) G Location shown on site map G Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** G Location shown on site map G Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** G Location shown on site map G Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** G Location shown on site map G Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** G Grass G Cover properly established G No signs of stress
   G Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** G N/A
   Remarks _____

7. **Bulges** G Location shown on site map G Bulges not evident
   Areal extent _____ Height _____
   Remarks _____

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

9.	**Slope Instability** G Slides G Location shown on site map G No evidence of slope instability Areal extent_____ Remarks_____
B. Benches	G Applicable G N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)
1.	**Flows Bypass Bench** G Location shown on site map G N/A or okay Remarks_____
2.	**Bench Breached** G Location shown on site map G N/A or okay Remarks_____
3.	**Bench Overtopped** G Location shown on site map G N/A or okay Remarks_____
C. Letdown Channels	G Applicable G N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)
1.	**Settlement** G Location shown on site map G No evidence of settlement Areal extent_____ Depth_____ Remarks_____
2.	**Material Degradation** G Location shown on site map G No evidence of degradation Material type_____ Areal extent_____ Remarks_____
3.	**Erosion** G Location shown on site map G No evidence of erosion Areal extent_____ Depth_____ Remarks_____

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

5. **Obstructions** Type_____ G No obstructions
G Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
G No evidence of excessive growth
G Vegetation in channels does not obstruct flow
G Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations G Applicable G N/A

1. **Gas Vents** G Active G Passive
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance
G N/A
Remarks_____

2. **Gas Monitoring Probes**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

4. **Leachate Extraction Wells**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

5. **Settlement Monuments** G Located G Routinely surveyed G N/A
Remarks_____

E. Gas Collection and Treatment	G Applicable G N/A	
1.	**Gas Treatment Facilities** G Flaring G Thermal destruction G Collection for reuse G Good condition G Needs Maintenance Remarks_____	
2.	**Gas Collection Wells, Manifolds and Piping** G Good condition G Needs Maintenance Remarks_____	
3.	**Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) G Good condition G Needs Maintenance G N/A Remarks_____	
F. Cover Drainage Layer	G Applicable G N/A	
1.	**Outlet Pipes Inspected** G Functioning G N/A Remarks_____	
2.	**Outlet Rock Inspected** G Functioning G N/A Remarks_____	
G. Detention/Sedimentation Ponds	G Applicable G N/A	
1.	**Siltation** Areal extent_____ Depth_____ G N/A G Siltation not evident Remarks_____	
2.	**Erosion** Areal extent_____ Depth_____ G Erosion not evident Remarks_____	
3.	**Outlet Works** G Functioning G N/A Remarks_____	
4.	**Dam** G Functioning G N/A Remarks_____	

H. Retaining Walls G Applicable G N/A

1. **Deformations** G Location shown on site map G Deformation not evident
Horizontal displacement_____ Vertical displacement_____
Rotational displacement_____
Remarks_____

2. **Degradation** G Location shown on site map G Degradation not evident
Remarks_____

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

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

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

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

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

VIII. VERTICAL BARRIER WALLS G Applicable G N/A

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

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

C. Treatment System G Applicable G N/A

1. **Treatment Train** (Check components that apply)
   G Metals removal G Oil/water separation G Bioremediation
   G Air stripping G Carbon adsorbers
   G Filters_____
   G Additive (*e.g.*, chelation agent, flocculent)_____
   G Others_____
   G Good condition G Needs Maintenance
   G Sampling ports properly marked and functional
   G Sampling/maintenance log displayed and up to date
   G Equipment properly identified
   G Quantity of groundwater treated annually_____
   G Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   G N/A G Good condition G Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   G N/A G Good condition G Proper secondary containment G Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   G N/A G Good condition G Needs Maintenance
   Remarks_____

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

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

D. Monitoring Data

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

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

D. Monitored Natural Attenuation

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

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

Remarks

X. OTHER REMEDIES

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

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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

The remedy as per the 2004 ROD Amendment is to use in-situ ozone/airsparge to remediate the plume in the perched water table area; shut down pump-and-treat; use MNA to remediate the plume in lieu of pump-and-treat. The remedy appears to be functioning well in that VOC levels have decreased overall in groundwater. The ozone/airsparge was effective; and soil removal was later conducted to remove vadose zone contaminated soil that acted as a continuing source of groundwater contamination. Water main extension was also installed to provide service to six residents with potable water wells that were in the plume pathway. The Niles wells remain safe and Sentinel wells are regularly tested.

B. Adequacy of O&M

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

The O+M procedures are continually updated as required, and monitoring is being conducted adequately. The site is continually being assessed and appropriate actions are undertaken to modify the O+M plan as needed. The remedy is protective in the short term, but IC activities need to continue and expand to ensure the long-term protectiveness of the site. These include use restrictions on the property as needed, and restrictive covenant before the property is released for redevelopment.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There do not appear to be any evident indicators to suggest that the protectiveness of the remedy will be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None immediately apparent.

Attachment 5 – Photos Documenting Site Inspection of the U.S. Aviex Site, August 19, 2009

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 1 – View of two sentinel wells (WMW-9 and 86-7) located off the toe of the north-northwest runway at the Jerry Tyler Memorial Airport. The wells are difficult to see in the tall grass.

Photo 2 – Facing eastward. A close up of sentinel well WMW-9. The well is in good condition and locked.

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 3 – Looking eastward, a close-up view of sentinel well 86-7. The well is in good condition and locked.

Photo 4 – Facing northwest, a view of the backside of the Jerry Tyler Memorial Airport from the airfield

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 5 – Facing south-southwest toward fence line, a view of sentinel monitoring wells WMW-12d (right side) and WMW-12s (left side)

Photo 6 – Facing , a close-up view of WMW-12d. The well casings are rusty but in good condition and locked.

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 7 – A close-up view of sentinel monitoring well WMW-12s

Photo 8 – A view of the flush-mounted sentinel monitoring well 10-s located just east of the midpoint of the north/northwest runway.

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 9 – A close-up view of flush-mounted sentinel monitoring well WMW-10d, located next to 10-s

Photo 10 – A close-up view of sentinel monitoring wells WMW-11s and WMW-11d located

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

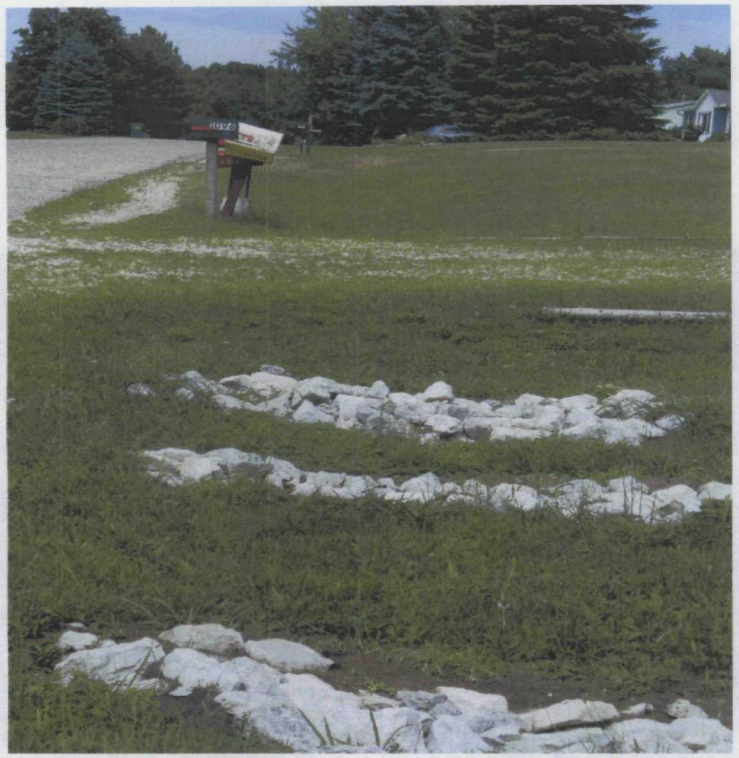

Photo 11 – Rip-rap placed over area where water distribution lines were installed in 2007 to connect the residents along Janellen Drive.

Photo 12 – Facing northwest from Huntly Road, a view of the front gate of the U.S. Aviex Site. The perimeter fence is six-foot tall cyclone topped with barbed wire. An abandoned air sparge point is visible in the middle of the immediate foreground.

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 13 – Warning sign on the front gate of the U.S. Aviex Site

Photo 14 – A general view of the U.S. Aviex Site looking northwest. The gray warehouse (left) and blue treatment buildings (right) are visible in the background. Multiple abandoned sparge points are located in the area from where the photo is taken, just inside the southeast corner of the fence.

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 15 –Facing northeast from near the warehouse. The midground brown longitudinal patch in front of the gravel drive indicates where the mobile air sparge trailer was parked onsite. A total of 12 sparge banks, each bank containing 5 sparge points, were operated at the Site.

Photo 16 – Facing westward, a close-up view of the abandoned empty warehouse located in the back central area of the Site property.

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 17 – Facing northwest from the treatment buildings, a view of the Site area containing the perched contaminated vadose zone soil that was excavated and backfilled with clean fill. A pebbly topsoil is visible. Six monitoring wells are located in this area.

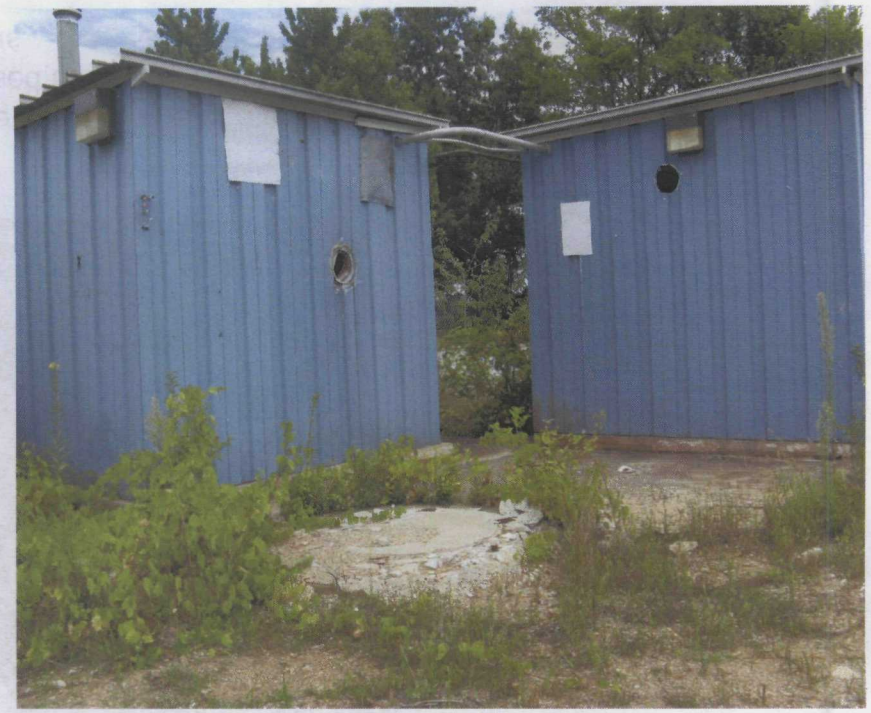

Photo 18 – Facing northeast, a view of the treatment buildings which housed the extraction well pumps and treatment system apparatus. The broken concrete platform in the center foreground supported an air stripping tower.

U.S. Aviex 2009 Five-Year Review Site Inspection (8/19/2009)

Photo 19 – Picture showing the scale of one of the two treatment buildings which housed the extraction well pumps and treatment apparatus.