FINAL
2012 CONTAINMENT EVALUATION

OPERABLE UNIT No. 2 (GROUNDWATER)
FORMER NEBRASKA ORDNANCE PLANT
MEAD, NEBRASKA

Prepared for

United States Army Corps of Engineers
Kansas City District

September 2013

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I hereby certify that the enclosed *2012 Containment Evaluation*, shown and marked in this submittal, is in compliance with the contract specifications and is submitted for government approval for the former Nebraska Ordnance Plant near Mead, Nebraska.

Approved by:

9/23/13

ECC Project Manager **Date**

Accepted by:

USACE Contracting Officer **Date**

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LIST OF ACRONYMS AND ABBREVIATIONS

AMA	Atlas Missile Area
AOP	advanced oxidation process
AWS	Alternate Water Supply
BMcD	Burns & McDonnell
CE	Containment Evaluation
CENWK	Corps of Engineers, Northwestern Division, Kansas City District
CEWP	Containment Evaluation Work Plan
COC	contaminant of concern
EW	extraction well
FEW	focused extraction well
ft	feet
GTP	groundwater treatment plant
GWM10	2010 Groundwater Model
GWM12	2012 Groundwater Model
LL	Load Line
LPNNRD	Lower Platte North Natural Resources District
LWS	Lincoln Water System
MGD	millions of gallons per day
M.U.D.	Metropolitan Utilities District
µg/L	micrograms per liter
MW	monitoring well
NOP	Nebraska Ordnance Plant
OU	Operable Unit
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
ROD	Record of Decision
SP	stress period
TCE	trichloroethene
WSW	water supply well

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1.0 INTRODUCTION

This document provides the 2012 evaluation of the hydraulic containment component of the Remedial Action for Operable Unit (OU) No. 2 at the former Nebraska Ordnance Plant (NOP) (herein referred to as Site) near Mead, Nebraska as shown on Figure 1-1. The analysis presented herein is based on the *Containment Evaluation Work Plan* (CEWP), *Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (URS, 2009a). The primary tool used for evaluation of containment at the Site is the compliance groundwater monitoring well network, augmented by the predictive capacity of groundwater model contaminant transport simulations. This document is divided into the following sections:

- Section 1.0 presents a brief description of Site background; a history of the remedy; a summary of the Site groundwater fate and transport model development; the extent of groundwater contamination and the objectives and scope of the evaluation.
- Section 2.0 presents a discussion of the extent of contamination; a summary of the 2012 groundwater data from the compliance and the perimeter groundwater monitoring wells; and water supply wells.
- Section 3.0 presents the Site data review; the extent of contamination; groundwater elevation data; aquifer parameters; an evaluation of contaminant capture using transport simulations; a discussion of the uncertainty of model transport simulations; contaminant concentration trends; and recommended modifications to extraction well and focused extraction well pumping rates.
- Section 4.0 presents the conclusions of the Containment Evaluation (CE).
- Section 5.0 presents the references cited in this document.

1.1 Background

The following sections describe the Site history, description of remedial actions, contaminants of concern (COC), the extent of groundwater contamination, and the current remedy.

1.1.1 Site History

The Site is located south and east of Mead, Nebraska, and west of Omaha, Nebraska, in Saunders County and is approximately 17,250 acres in size. Figure 1-1 depicts the location of the Site. The Nebraska Defense Corporation operated the Site for the Army from 1942 until 1945. During World War II, bombs, shells, and rockets were assembled at the Site in four locations known as Load Line (LL)1, LL2, LL3 and LL4. Ordnance production was terminated in 1945 and the facility was placed on inactive status. Between 1945 and 1949, the buildings on the Site were decontaminated and used primarily for storage and disposal of bulk explosives and munitions.

In addition to ordnance production, ammonium nitrate was produced for use as fertilizer. In 1950, the plant was temporarily reactivated and produced an assortment of weapons for use in the Korean Conflict. The Site was placed on standby status in 1956. In 1959, the Site was determined to be surplus and was transferred to the General Services Administration for disposition.

From 1959 to 1960, the Atlas Missile Area (AMA) was built north of LL4. Trichloroethene (TCE) was used during construction to degrease and clean pipelines used to carry liquid oxygen fuel for missiles.

The northern end of LL1 was formerly used as the Air Force Ballistic Missile Division Tech Area. TCE was allegedly disposed in ditches, possibly between 1959 and 1964.

Since the 1960s, private individuals, government agencies, and corporations (including the University of Nebraska, the Nebraska Army National Guard, the United States Air Force, the United States Army Reserve, and the United States Department of Commerce) have conducted operations at the Site. Contaminants were released into the environment as a part of past operations at the Site.

1.1.2 Physical Setting

The hydrogeology of the Site consists of three alluvial aquifers in the areas of groundwater contamination (Todd Valley aquifer, Platte Valley aquifer, and Wahoo Valley aquifer) and one minor aquifer outside of the area of groundwater contamination (till Uplands aquifer). In the areas of groundwater contamination, the three alluvial aquifers are underlain by the Omadi Formation.

The shallow zone is the top half of the saturated thickness of the alluvial aquifer, and the intermediate zone is the bottom half of the saturated thickness of the alluvial aquifer. Deep wells are screened in the Omadi Sandstone which underlies the alluvium.

The groundwater flow direction in the Todd Valley is generally to the south and southeast, with an average hydraulic gradient of 12 feet (ft) per mile. The groundwater flow direction in the Platte River alluvial aquifer is approximately south, with an average hydraulic gradient between 2 ft per mile to 4 ft per mile.

More detailed information on the physical setting at the Site is available in the *Remedial Investigation Report Operable Unit 2 (OU2) (Groundwater) for Former Nebraska Ordnance Plant, Mead, Nebraska* (Woodward-Clyde, 1993) and the *2012 Groundwater Model Update* (GWM12), *Operable Unit 2 (OU2) (Groundwater) for Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC and Burns & McDonnell [BMcD], 2013).

1.1.3 Description of Remedial Action

The remedial action objectives outlined in the OU2 *Record of Decision* (ROD), *Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant Site, Mead, Nebraska* (Woodward-Clyde, 1996a) address the contaminated groundwater and explosives-contaminated soil that could act as a source of explosives contamination to groundwater. The remedial action objectives also consider the long-term goals of protecting human health and the environment and meeting federal and state Applicable or Relevant and Appropriate Requirements.

The remedial action objectives as defined in the ROD are:

- Minimize the potential for ingestion of contaminated groundwater, or reduce concentrations to acceptable health-based levels;
- Minimize the potential for dermal exposure to contaminated groundwater, or reduce concentrations to acceptable health-based levels; and
- Minimize the potential for inhalation of chemicals released during the use of contaminated groundwater, or reduce concentrations to acceptable health-based levels.

The major components of the selected remedy include:

- Hydraulically contain contaminated groundwater exceeding the Final Target Groundwater Cleanup Goals.
- Focused extraction of groundwater in areas with relatively high concentrations of TCE and explosives.
- Treat all extracted groundwater using granular activated carbon adsorption, an advanced oxidation process (AOP), and air stripping. Granular activated carbon adsorption and AOP may be applied individually or in combination, while air stripping must be applied in combination with one of the other technologies to effectively treat explosives.
- Dispose of the treated groundwater by beneficially reusing it or through surface water discharge.
- Provide a potable water supply to local groundwater users whose water supply contains hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) exceeding the health advisory of 2 micrograms/liter (µg/L) and/or TCE exceeding the Maximum Contaminant Level of 5 µg/L.
- Monitor groundwater elevations and water quality.
- Excavate and treat explosives-contaminated soils that could act as a source of explosives contamination of groundwater and that do not meet the OU1 excavation criteria.

The remediation of explosives-contaminated soils that could act as a source of explosives contamination to groundwater as defined by the ROD, was completed during the OU1 remedial action in the fall of 1997.

1.1.4 Contaminants of Concern

The COCs and associated Final Target Groundwater Cleanup Goals defined in the ROD are summarized in Table 1-1.

1.1.5 Extent of Groundwater Contamination

The ROD identified the following four groundwater contaminant plumes:

- TCE plume with the suspected source at the AMA;
- TCE plume with the suspected source at the Air Force Ballistic Missile Division Tech Area;
- Explosives plume with the suspected source at LL1; and
- Explosives plumes with suspected sources at LL2, LL3, LL4, and the North Burning Grounds area.

Following ROD approval, TCE plumes have also been identified with the suspected sources at LL2, LL3, and former landfill area (approximately one mile east of LL4). TCE concentrations exceeded the Final Target Groundwater Cleanup Goal of 5 µg/L in the AMA, LL1, LL2, LL3, and former landfill area contaminant plumes. TCE is the most commonly detected volatile organic compound at the Site, and is used as an indicator for other volatile organic compounds at the Site. At locations where the other volatile COCs (e.g., methylene chloride and 1,2-dichloropropane) are detected, TCE is also detected above the Final Target Groundwater Cleanup Goal. Conversely, where TCE is not detected, the other volatile COCs are typically absent.

RDX is the most commonly detected explosive compound in groundwater at the Site, and is detected at concentrations exceeding the Final Target Groundwater Cleanup Goal of 2 µg/L. RDX is used as an indicator for explosive compounds in groundwater at the Site. Where other explosive compounds are detected, RDX also is typically detected above the cleanup goal, and, conversely, when RDX is not detected, other explosive compounds are typically absent.

TCE, RDX, 1,3,5-trinitrobenzene, 2,4-dinitrotoluene, and 2,4,6-trinitrotoluene were the only COCs detected above the Final Target Groundwater Cleanup Goals in monitoring wells at the Site in 2012.

The goal of the hydraulic containment system is to contain groundwater contamination that exceeds the Site Final Target Groundwater Cleanup Goals. The current extent of contamination, developed from an analysis of direct-push, monitoring well, focused extraction and extraction well sampling performed through 2012, is depicted in Figure 1-2. The plume interpretations are the same as those presented in the GWM12.

Plume interpretations were based on multiple investigations. The largest and most recent were:

- *Data Summary Report, Groundwater Investigations, Spring 2007 and Fall 2007, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (URS, 2008);
- *Focused Extraction Well 14 and Extraction Well 16 Construction Completion Report, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC, 2009);

- *2008 Groundwater Investigation Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (URS, 2009b);
- *Pre-Pilot Study Investigation Report, Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC and BMcD, 2011b);
- *Aquifer Characterization Report Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC and BMcD, 2011c);
- *Groundwater Monitoring Program Optimization Investigation Report, Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC, 2012); and
- *Monitoring Well Network Optimization Data Summary Report, Phase II, Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC, 2013a).

1.1.6 Remedy Description

This document evaluates the performance of the hydraulic containment system element of the selected remedy. The remedy was designed and constructed to contain Site groundwater with contaminant concentrations above the Final Target Groundwater Cleanup Goals. Containment is accomplished through the operation of groundwater extraction wells.

For the 2012 CE period (January 2012 through December 2012), the remedy included the following components:

- Eight extraction wells were in operation (extraction well [EW]-1R, EW-3, EW-4, EW-6, EW-7, EW-9, EW-12, and EW-16) to contain contaminated groundwater as presented in Figure 1-2. Groundwater from EW-1R, EW-3, EW-4, EW-6, EW-7, EW-9, and EW-16 is treated at the Main Groundwater Treatment Plant (GTP).
    - EW-1R contains the contaminated groundwater associated with the AMA/LL4 plume. EW-1 was taken offline, abandoned, and replaced by EW-1R in February 2012.
    - EW-4 contains the contaminated groundwater associated with the LL3 RDX plume. EW-4 will also contain the LL3 TCE plume upon arrival at the extraction wells.
    - EW-7 and EW-9 contain the contaminated groundwater associated with the LL2 RDX plume. EW-7 and EW-9 will also contain the LL2 TCE plume upon arrival at the extraction wells.
    - EW-12 contains the contaminated groundwater associated with the LL1 TCE plume. EW-12 will also contain the LL1 RDX plume upon arrival at the extraction well.

- Three focused extraction wells (FEW)-11, FEW-14, and FEW-15 were in operation as presented in Figure 1-2.
    - FEW-11, located in the LL1 TCE and RDX plumes, began operating in March 2008 as a focused extraction well to remediate groundwater containing high concentrations of TCE and RDX. Contaminated groundwater from FEW-11 has primary treatment at the AOP GTP. The effluent from the AOP GTP is then treated at the Main GTP for RDX prior to discharge.
    - FEW-14 began operating in June 2009 as a focused extraction well to remediate groundwater containing high concentrations of RDX in the LL3 RDX plume. Contaminated groundwater from FEW-14 is treated at the Main GTP.
    - FEW-15 began operating in May 2010 as a focused extraction well to remediate groundwater containing high concentrations of TCE in the AMA plume. Contaminated groundwater from FEW-15 is treated at the LL4 GTP.
- EW-2 and EW-5, located at the LL3 RDX plume, were turned off in March 2009 based upon recommendations in the *Restoration Time-Frame Modeling Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. (URS, 2009c).
- EW-10, located at the LL2 RDX plume was shut down on February 23, 2010 in accordance with the January 20, 2010 letter to the U.S. Environmental Protection Agency because it no longer benefited the containment of that plume (Corps of Engineers, Northwestern Division, Kansas City District [CENWK], 2010).
- EW-12 contains the TCE plume associated with LL1. EW-13 is inactive. EW-17 was installed in May 2013 and will be used in conjunction with EW-12 for containment of the LL1 plume. Groundwater from EW-12 and EW-17 is treated at the LL1 GTP.
- EW-8, located at the west edge of the LL1 TCE plume, was turned off in September 2007 because it was no longer contributing to plume containment (URS, 2005).
- The discontinuation of EW-3, EW-6 and EW-16, located at the LL2 and LL3 RDX plumes, on January 1, 2013 in accordance with the November 2, 2012 letter to the U.S. Environmental Protection Agency was intended to optimize the current system while maintaining the groundwater containment in accordance with the OU2 ROD (CENWK, 2012).

1.2 Development of Site Groundwater Model

The design of the containment system was accomplished through the development of a series of Site-specific groundwater models. The current model is the culmination of groundwater modeling efforts that started with the report entitled *Removal Action Groundwater Modeling, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (Woodward-Clyde, 1994), subsequently followed by:

- *Conceptual Groundwater Model Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (Woodward-Clyde, 1996b and 1996c);

- *Remedial Design Groundwater Model Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (Woodward-Clyde, 1998);
- *Remedial Design Groundwater Model, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska. Design Analysis Attachment 1 Remedial Design Groundwater Model II* (Woodward-Clyde, 1999);
- *Remedial Design Groundwater Model III Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (URS, 2002);
- *Remedial Design Groundwater Model IV Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (URS, 2004);
- Updates to Remedial Design Groundwater Model IV described in the *LL1 Containment System Remedial Design* (URS, 2005);
- *2006 Groundwater Modeling Report, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (URS, 2007);
- *2008 Groundwater Modeling Update, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (URS, 2009d);
- *2010 Groundwater Model Update* (GWM10), *Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC and BMcD, 2011a); and
- *GWM12* (ECC and BMcD, 2013).

GWM12, the most recent Site modeling effort, details the updates since the GWM10 groundwater model.

1.3 Project Objectives

The goal of the CE is to determine whether the hydraulic containment system is containing the COCs above the Final Target Groundwater Cleanup Goals. The primary CE tool is the compliance groundwater monitoring well network. The secondary CE tool is the system effectiveness review, which includes evaluation of regional groundwater levels and evaluation of capture using the current groundwater transport model.

1.4 Project Scope

Containment was evaluated based on chemical data collected in 2012 from the downgradient compliance groundwater monitoring wells. The general performance, or effectiveness, of the hydraulic containment system was evaluated using the current data and the predicted performance was evaluated using the current version of the groundwater model (GWM12) to perform contaminant transport modeling.

2.0 COMPLIANCE MONITORING REVIEW

The foundation of the COC monitoring portion of the 2012 CE is the data collected from the comprehensive annual Site-Wide Groundwater Monitoring Program. This section discusses the evaluation of groundwater chemical data used during the CE as the primary line of evidence to determine if the hydraulic containment system functioned as designed. Figure 2-1 shows the location of the compliance and perimeter groundwater monitoring wells evaluated for the 2012 CE. Table 2-1 lists the location of the compliance and perimeter groundwater monitoring wells and rationale for sampling. Compliance monitoring wells are located downgradient of the defined groundwater contamination (plumes). These monitoring wells help verify hydraulic containment of the plumes, as required by the ROD. Perimeter monitoring wells monitor contaminant concentrations adjacent to the known extent of the plume boundaries.

If detections of COCs above the Final Target Groundwater Cleanup Goals occurred in one or more perimeter groundwater monitoring well or water supply well, the response actions, as outlined in Section 3.1.1 of the CEWP (URS, 2009a), were performed. If detections of COCs above the Final Target Groundwater Cleanup Goals were to occur in one or more of the compliance groundwater monitoring wells, the response actions, as outlined in Section 3.1.2 of the CEWP, would have been performed. Hydraulic containment was demonstrated using the chemical data from the 2012 calendar year. ROD compliance was demonstrated when COCs were not detected above the Final Target Groundwater Cleanup Goals (shown in Table 1-1) in the compliance groundwater monitoring wells.

Possible response actions for detections at compliance and perimeter groundwater monitoring wells and water supply wells are presented in a tiered approach in Section 3.1 of the CEWP. If detections of COCs above Final Target Groundwater Cleanup Goals in perimeter or compliance groundwater monitoring wells were verified by resampling, possible response actions included, but were not necessarily limited to, direct-push investigations and/or monitoring well installation, testing, and abatement actions to mitigate plume movement (such as modifying pumping rates). Regardless of any findings related to the tiered response action approaches, presented in the CEWP, an alternate water supply would have been provided to any residence whose water supply well contained TCE and/or RDX above Final Target Groundwater Cleanup Goals.

2.1 Compliance Groundwater Monitoring Wells

Figure 2-1 and Table 2-1 identify the compliance groundwater monitoring well clusters evaluated for the 2012 CE. The TCE and RDX data from the groundwater samples collected and analyzed from these wells are summarized in Table 2-2. A detailed presentation of the data is provided in the *2012 Annual Summary Report, Operable Unit No. 2 (Groundwater) former Nebraska Ordnance Plant, Mead, Nebraska* (ECC, 2013b). TCE and RDX concentration trend charts of compliance groundwater monitoring well clusters are presented in Appendix A of this report.

2.1.1 COCs Detected Above Final Target Groundwater Cleanup Goals

TCE and RDX were not detected above the Final Target Groundwater Cleanup Goals in the compliance groundwater monitoring wells during 2012 as presented in Table 2-2. Table 3-3 of

the *2012 Annual Summary Report* (ECC, 2013b), presents all of the COCs and indicates no COCs were detected above the Final Target Groundwater Cleanup Goals.

2.1.2 Response Actions

No COCs were detected above the Final Target Groundwater Cleanup Goals in the compliance groundwater monitoring wells sampled and analyzed in 2012; therefore, no response actions were warranted.

2.2 Perimeter Groundwater Monitoring Wells

Figure 2-1 and Table 2-1 identify the perimeter groundwater monitoring well clusters evaluated for the 2012 CE. The TCE and RDX data from the groundwater samples collected and analyzed from these wells is summarized in Table 2-3. A detailed presentation of the data is provided in the *2012 Annual Summary Report* (ECC, 2013b). TCE and RDX concentration trend charts of perimeter groundwater monitoring well clusters are presented in Appendix B of this report.

2.2.1 COCs Detected Above Final Target Groundwater Cleanup Goals

TCE was detected above the Final Target Groundwater Cleanup Goal in one perimeter monitoring well (MW)-116A (intermediate zone well), at 7.3 µg/L during the Third Quarter 2012. During the First, Second and Fourth Quarters, TCE concentrations in MW-116A were below the Final Target Groundwater Cleanup Goals at 1.4 µg/L, 4.1 µg/L, and not detected, respectively. RDX was also detected at an estimated concentration of 2.0 J (estimated) µg/L during the Third Quarter 2012. Table 3-2 of the *2012 Annual Summary Report* (ECC, 2013b) presents all of the COCs and indicates no other COCs were detected above the Final Target Groundwater Cleanup Goals.

2.2.2 Response Actions

As stated in the CEWP, if a detection above a Final Target Groundwater Cleanup Goal occurs in a perimeter monitoring well, then the monitoring well will be resampled immediately upon receipt of (validated) data. The sample results from MW-116A indicated that TCE was below the Final Target Groundwater Cleanup Goal during the November (Fourth Quarter) sampling event.

Based on previous TCE detections in MW-116A during the First, Second, and Third Quarters of 2011, above the Final Target Groundwater Cleanup Goals, the *EW-1 Pump Test Summary and Model Simulation Technical Memorandum for Operable Unit No. 2 (Groundwater) at the former Nebraska Ordnance Plant* (ECC, 2011a) was submitted to the Nebraska Department of Environmental Quality and United States Environmental Protection Agency presenting the likely cause of the TCE detections in MW-116. According to the memorandum, irrigation operations may be affecting the TCE plume associated with the LL4/AMA contaminant plume. It is suspected that the 2012 detections at MW-116 were also due to the pumping of groundwater for irrigation. The Fourth Quarter detection (below the Final Target Groundwater Cleanup Goal) indicated no further response actions were needed.

2.3 Water Supply Wells

The 75 water supply wells sampled in 2012 are listed in Table 2-4 and shown on Figure 1-2. A more detailed presentation of the Water Supply Well and Alternate Water Supply (AWS) programs is provided in the *2012 Annual Summary Report* (ECC, 2013b). The AWS program addresses the water supply wells for local groundwater users whose water supply at any point contained RDX and/or TCE above the Final Target Groundwater Cleanup Goals.

2.3.1 COCs Detected Above Final Target Groundwater Cleanup Goals

TCE and RDX concentration trend charts of water supply wells that have had detections are presented in Appendix C of this report. TCE and RDX detections above Final Target Groundwater Cleanup Goals in water supply wells sampled in 2012 are presented in Table 2-5. The water supply wells presented in Table 2-5 are included in the AWS. The remaining residential water supply wells sampled in 2012 had no detections of COCs above the Final Target Groundwater Cleanup Goals.

TCE was detected in water supply well (WSW)-51A during all four quarterly sampling events and has been increasing in concentration since 2009. TCE was detected above the Final Target Groundwater Cleanup Goal at 5.2 µg/L during the Fourth Quarter 2012 sampling event. A confirmation sample was collected during the Fourth Quarter 2012 with a result of 5.3 µg/L for TCE. According to the *Water Supply Well Operations and Maintenance Manual, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* (ECC, 2011b), WSW-51A was added to the AWS program and bottled water is being provided to the residents at their request.

2.3.2 Response Actions

As discussed above, WSW-51A was added to the AWS program and bottled water is being provided to the resident at their request. WSW 50-B, WSW-52A, WSW-52C, WSW-53, and WSW-54 were already included in the AWS program based on detections in previous years and remained in the AWS program in 2012. The AWS program addresses the water supply wells for local groundwater users whose water supply contains RDX and/or TCE exceeding the Final Target Groundwater Cleanup Goals.

3.0 CONTAINMENT SYSTEM EFFECTIVENESS REVIEW

This section describes the secondary line of evidence used to evaluate the effectiveness of the hydraulic containment system. Six steps are used in the secondary line of evidence, as presented in the following sections:

- Step 1: Site Data Review. Site data are evaluated to determine if any modifications to the Site conceptual model are required.
- Step 2: Review of the Extent of Contamination above the Final Target Groundwater Cleanup Goal. The horizontal and vertical extent of contamination above the Final Target Groundwater Cleanup Goals are evaluated using the most recent characterization data.
- Step 3: Interpretation of Water Levels. The regional water-level measurements are used to evaluate the groundwater flow direction to determine if the containment system is effective. The water-level data are also used to assess the presence and magnitude of vertical and horizontal flow gradients that would affect the ability of the extraction well system to capture contaminated groundwater in both vertical and horizontal directions.
- Step 4: Evaluation of Capture Using Contaminant Transport Simulations. Predictive modeling using the most recent Site data is performed to estimate plume capture using contaminant transport simulations compared to Final Groundwater Target Cleanup Goals.
- Step 5: Concentration Trend Evaluation. Concentration trends in compliance groundwater monitoring wells, perimeter groundwater monitoring wells, and water supply wells are examined.
- Step 6: Evaluate the Model Capture and Compare to Groundwater Above the Final Target Groundwater Cleanup Goals. Predictive modeling is performed to estimate plume capture using contaminant transport simulations compared to Final Groundwater Target Cleanup Goals and evaluate the need for modifications to the extraction system pumping rates.

3.1 Step 1: Site Data Review

The latest groundwater model update (GWM12) was performed in 2012, during which the Site conceptual model was reviewed and new information on hydraulic conductivity, recharge, pumping data, and chemical data were incorporated into the model. The additional data and refinements are discussed in detail in GWM12 (ECC and BMcD, 2013).

For the 2012 CE, 2012 groundwater levels and analytical data were examined and the 2012 pumping rates from the following sources were input into the groundwater model:

- Site extraction wells;
- Metropolitan Utilities District (M.U.D.) well field;
- Lincoln Water System (LWS) field in near the city of Ashland, Nebraska;
- Village of Mead water supply wells;

- University of Nebraska-Lincoln Agricultural and Research Development Center irrigation and water supply wells; and
- City of Ashland municipal water supply wells.

No changes to the model have been made since the GWM12.

3.2 Step 2: Review of the Extent of Contamination above the Final Target Groundwater Cleanup Goals

The current extent of contamination above Final Target Groundwater Cleanup Goals, developed from an interpretation of direct-push, monitoring well, and extraction well data collected through 2012, is depicted on Figure 1-2. Detailed discussion of the current extent of contamination is included in GWM12 (ECC and BMcD, 2013). Monitoring well data from 2012 were reviewed and the extent of contamination is within the plumes presented on Figure 1-2, with the exception of TCE in MW-116 during the Third Quarter. However, TCE in MW-116, was below the detection limit and, consequently, the Final Target Groundwater Cleanup Goal in the Fourth Quarter. Based on this review, the extent of contamination above the Final Target Groundwater Cleanup Goals did not change in 2012.

3.3 Step 3: Interpretation of Water Levels

Semi-annual regional water levels were measured in March 2012 and August 2012. The water-level data are used to assess the flow direction and the presence and magnitude of vertical and horizontal flow gradients that would affect the ability of the extraction well system to capture contaminated groundwater in both vertical and horizontal directions.

Table 3-1 summarizes the regional water-level measurements. The water levels used in creating the potentiometric surfaces are from the deepest well in the unconsolidated aquifer in each cluster, which is typically the "A" well. The interpretations of the potentiometric surfaces utilized a kriging algorithm and the program Surfer® developed by Golden Software and were based on water levels from the following sources:

- CENWK monitoring wells, observation wells, and piezometers;
- Lower Platte North Natural Resources District (LPNNRD) piezometers and irrigation wells (LPNNRD, 2012);
- M.U.D. piezometers (LPNNRD, 2012); and
- LWS piezometers (LPNNRD, 2012).

Figures 3-1 and 3-2 present the following potentiometric surfaces:

- March 29, 2012; and
- August 26, 2012.

On average, Site-Wide monitoring well groundwater elevations measured during March 2012 were similar to the March 2011 groundwater elevations. However, the spatial trend showed an increase in groundwater elevations in the Todd Valley aquifer and a decrease in groundwater

elevations in the Platte River Valley aquifer. A comparison of the August 2011 and August 2012 groundwater elevation measurements showed an average Site-Wide decrease of 1.59 ft in 2012.

The interpretations suggest that the groundwater level elevations in March and August 2012 within the Site groundwater plumes are similar. The data indicates no fundamental change has occurred in the potentiometric surface and flow direction in the area of the Site plumes from the prior year, suggesting groundwater levels did not affect capture of contaminated groundwater.

Water level data is also used to evaluate the presence and magnitude of vertical gradients. Vertical gradients are presented in Table 3-2. During the August 2012 measurement event, the MW-107 well cluster, located approximately 0.8 miles southeast of the LPNNRD Reservoir, indicated the most significant downward gradient (0.09) between the shallow zone and the intermediate zone. The largest upward gradient (-0.19) between the shallow zone and the intermediate zone was indicated at the MW-44 well cluster during the August 2012 measurement event. During the March 2012 measurement event, the MW-108 well cluster, located approximately 1 mile southeast of the LPNNRD Reservoir, indicated the most significant downward gradient (0.07) between the intermediate zone and the deep zone. The largest upward gradient (-0.04) between the intermediate zone and the deep zone was indicated during the March 2012 measurement event at the MW-135 well cluster, located near FEW-15. MW-135D is screened at a depth below the screen zone of the FEW-15 extraction well and vertical gradients indicate flow into the well from below, indicating capture. The water level data, used to assess the presence and magnitude of vertical gradients, indicates the extraction well system captures the contaminated groundwater in a vertical direction as well as the horizontal direction.

3.4 Step 4: Evaluation of Capture Using Contaminant Transport Simulations

Measured, estimated, and predicted pumping rates from the containment system, public water supplies, and irrigation wells, were incorporated in the GWM12 model and used to predict capture of the plumes using the contaminant transport modeling software MT3DMS® (Zheng and Wang, 1998). The model flow and transport assumptions and the measured, estimated, and predicted pumping rates are presented in Appendix D of this report.

3.4.1 Groundwater Flow Model for Containment Evaluation

The groundwater flow and transport model used for predicting future TCE and RDX distributions is the GWM12 model. The boundary conditions for the predictive model are the same as presented in the GWM12 Update. The predictive model hydrologic and groundwater extraction conditions beginning in January 2012, are specified in Appendix D, Table D-1, and as follows:

- Two stress periods were used for each year; a non-irrigation season of 273 days and an irrigation season of 92 days; 63 stress periods total.
- Evapotranspiration rates (Appendix D, Table D-2) and groundwater recharge (Appendix D, Table D-3) are assumed to be the estimated long-term average.
- The simulated heads from the end of October 2012 from the calibration model described in GWM12 were used as the initial heads.

- Site pumping rates for Stress Period (SP) 1 (October 2012 – December 2012) are based on the average measured pumping rates from 2012, as presented in Table 3-3. Pumping rates beginning with SP 2 (January 2013 – May 2013) are assumed to be the proposed optimized pumping rates (ECC and BMcD, 2013). Site pumping rates are presented in Appendix D, Table D-4.
- M.U.D. pumping rates for SP 1 (October 2012 – December 2012) are based on the average measured pumping rates from 2012 (M.U.D, 2013). Pumping rates beginning with SP 2 (January 2013 – May 2013) are assumed to be pumping at the maximum permitted annual average rate of 52 million gallons per day (MGD) based on 69 MGD in summer and 46 MGD the rest of the year (Appendix D, Table D-5).
- LWS pumping rates for SP 1 (October 2012 – December 2012) are based on the average measured pumping rates from 2012 (LWS, 2013). Pumping rates beginning with SP 2 (January 2013 – May 2013) are provided in Appendix D, Table D-6 and are estimated to increase approximately 2 percent per year following growth in demand projected by LWS (Black & Veatch, 2003).
- Municipal pumping rates for the villages of Ithaca and Memphis are estimated with per capita usage and population statistics. The Mead and Ashland municipal pumping rates for SP 1 (October 2012 – December 2012) are based on the average measured pumping rates from 2012 (City of Ashland, 2013 and Village of Mead, 2013). Pumping rates for the non-irrigation stress periods beginning with SP 2 (January - May 2013) are the average of September through May rates measured from 2005 – 2012 (Appendix D, Table D-7). Pumping rates for the summer (irrigation) stress periods beginning with SP 3 (June 2013 – August 2013) are the average of summer rates measured from 2005 – 2012.
- The irrigation pumping rates are assumed to be the long-term average for all irrigation stress periods (Appendix D, Table D-8). The estimation of long-term irrigation pumping rate averages were described in Section 2 of the GWM12 Update.
- River stages for the Platte River, Elkhorn River, and Wahoo Creek are the same as the predictive models described in the GWM12 Update.

3.4.2 Fate and Transport Model for Containment Evaluation

The initial plume conditions and the fate and transport parameters are the same as those described in GWM12.

<u>Initial Plume Conditions</u>

The initial concentrations were based on investigations through 2012 for the shallow (upper portion of the Todd Valley Aquifer) and intermediate zone (lower portion of the Todd Valley Aquifer). In the GWM12 model, the saturated thickness of the alluvial aquifer is divided approximately equally into the shallow zone (Model Layer 2), which contains the shallow zone monitoring wells, and the intermediate zone (Model Layer 3), which contains the intermediate zone monitoring wells. These initial concentrations, based on plume interpretation, are the same interpretations used in the GWM12 long-term prediction model (Section 7.0, GWM12 Update).

The sources for the data used in the plume interpretations are presented in Tables 3-1 and 3-2 of GWM12.

Fate and Transport Parameters

The fate and transport parameters and assumptions are consistent with GWM12.

As discussed in detail in GWM12, local variations in the soil-water distribution coefficient in the model simulate sorption, possible historic high concentration area residuals, and heterogeneous geologic conditions. In addition, GWM12 conservatively assumed that some high concentration areas still existed on the southwest side of LL1 in 2012. Specified concentration cells in the area of highest concentration at LL1 were used to represent contaminant mass loading decreasing over the next 20 years.

3.4.3 Simulated Extraction Well Pumping Rates

Simulated extraction well pumping rates are presented in Appendix D, Table D-4.

3.4.4 Predicted Fate and Transport of Plume Migration

The predicted fate and transport of the plumes for the model simulation are presented in five-year increments for TCE (Appendix E) and RDX (Appendix F) in the shallow layer (Layer 2) and intermediate layer (Layer 3). The figures provided in Appendices E and F display the areas of TCE and RDX contaminated groundwater above the Final Target Groundwater Cleanup Goals over time. The simulations indicate the plumes will remain hydraulically contained for the next 10 years using the pumping rates presented in Appendix D, Table D-4. These predictions include the operation of EW-17, which was installed in the spring of 2013. The predictive simulations indicate that even with EW-9 operating at its maximum sustainable rate, the LL2 RDX plume is predicted to eventually migrate southeast of EW-9, towards MW-83, at levels over the Final Target Groundwater Cleanup Goals at some future time. In order to mitigate the predicted plume migration between EW-7 and EW-9, optimization efforts are being explored, including evaluating the installation of an additional extraction well.

3.4.5 Uncertainty of Transport Modeling Simulations

As part of the CE process, the available data are assembled and analyzed to evaluate the performance of the hydraulic containment system. The containment analysis is partially based on a well-calibrated groundwater model (GWM12), which allows for a quantitative evaluation of system performance.

While evaluating the hydraulic capture of a one-well pumping system is relatively straightforward, evaluating the combined capture zone created by an eight-well pumping system is complicated. Therefore, evaluation of the containment system capture zones has relied on numerical model predictions. Groundwater modeling is a predictive method used to evaluate the theoretical aquifer response to a series of prescribed future stresses. A degree of uncertainty is inherent in groundwater modeling and is related to temporal and spatial variations of model parameters and matrix heterogeneity used to represent Site conditions.

3.5 Step 5: Concentration Trend Evaluation

Concentration trends were evaluated for compliance groundwater monitoring wells, perimeter groundwater monitoring wells, and water supply wells.

3.5.1 Compliance Groundwater Monitoring Wells Concentration Trends

The TCE and RDX chemical groundwater data trends observed in the compliance groundwater monitoring wells evaluated during the 2012 CE are presented in Appendix A. The samples from all compliance groundwater monitoring wells were below Final Target Groundwater Cleanup Goals for both TCE and RDX. The trends observed in the compliance groundwater monitoring well indicate that containment system is operating effectively.

3.5.2 Perimeter Groundwater Monitoring Wells Concentration Trends

The TCE and RDX chemical groundwater data trends observed in the perimeter groundwater monitoring wells evaluated during the 2012 CE are presented in Appendix B. The samples from all perimeter groundwater monitoring wells were below Final Target Groundwater Cleanup Goals for both TCE and RDX, with the exception of MW-116A (discussed in detail in Section 2.2.). The trends observed in the perimeter groundwater monitoring wells indicate the containment system is operating effectively.

3.5.3 Water Supply Well Concentration Trends

The TCE and RDX chemical groundwater data trends observed in water supply wells with historic detections are presented in Appendix C. The concentration of RDX in WSW-50B has gradually increased over the last four years, as shown in Appendix C. Results from WSW-51A showed an increasing trend for TCE and RDX. These wells are located within the area of containment. The concentration of RDX in WSW-52A-B has been below the Final Target Groundwater Cleanup Goal since 2001. The concentration of TCE in WSW-52C-B has decreased over the last six years. Results from the pre-treatment sample collected from WSW-54-B showed a decreasing trend for TCE and RDX since 2000. None of the other water supply wells indicated a discernible trend. The trends of water supply wells with concentrations exceeding the Final Target Groundwater Cleanup Goals (located within the defined contaminant plumes) provide information on contaminant distribution over time within the plumes, and the trends of water supply wells outside of the defined contaminant plumes indicate the containment system is operating effectively.

3.6 Step 6: Evaluate the Model Capture and Compare to Groundwater Above the Final Target Groundwater Cleanup Goals

The contamination transport simulation figures (Appendices E and F) over time illustrate the extent of the model capture zone over time as compared to the area of contaminated groundwater above Final Target Groundwater Cleanup Goals in the horizontal directions. The simulation results are presented in Appendices E and F of this report. Based on simulation results, the known extent of contamination above the Final Target Groundwater Cleanup Goals is predicted to be contained for the next 10 years. Based on data evaluated for the 2012 CE period, current extraction well pumping rates are satisfactory for containment over the next 10 years; however, optimization efforts are currently being explored in order to minimize LL2 RDX plume migration to the southeast.

4.0 CONCLUSIONS

The Site CE is an annual process updated with new chemical and hydraulic data collected as part of yearly Site activities. In accordance with the CEWP, the compliance groundwater monitoring well network data were used as the primary containment evaluation tool and the predictive capacity of groundwater model transport simulations were used as the secondary containment evaluation tool. The 2012 CE is based on data collected during calendar year 2012. The tools used to complete the CE for 2012 indicate that the containment system is containing TCE and RDX contamination above the Final Target Groundwater Cleanup Goals of 5 µg/L and 2 µg/L, respectively.

4.1 Compliance Review

The primary CE tool at the Site is the compliance groundwater monitoring well network chemical data. Groundwater chemical data collected in 2012 from compliance groundwater monitoring wells indicates that the remedy is operating properly and successfully. No COC was detected in the compliance groundwater monitoring wells above the Final Target Groundwater Cleanup Goals, as discussed in Section 2.1. Further primary evidence to determine if the hydraulic containment system is functioning as designed is the evaluation of groundwater chemical data from the perimeter groundwater monitoring wells. The 2012 groundwater chemical data from the perimeter groundwater monitoring wells indicated that TCE was detected above the Final Target Groundwater Cleanup Goal in the Third Quarter in MW-116; however, the subsequent Fourth Quarter chemical data in this well were below the detection limit. Groundwater chemical data collected in 2012 from perimeter groundwater monitoring wells indicates that the remedy is operating properly and successfully.

One water supply well, WSW-51A, was added to the AWS program, due to COCs detected and confirmed above the Final Target Groundwater Cleanup Goals during the 2012 sampling events.

4.2 System Effectiveness Review

The second line of evidence for the CE is the system effectiveness review. The contamination transport simulation indicates that the known extent of contamination in both the horizontal and vertical directions is predicted to be contained for the next 10 years. The system effectiveness review consisted of six steps:

- Step 1: Evaluate the Site data to determine if any modifications to the Site conceptual model are necessary. As discussed in Section 3.1, the Site conceptual model was refined in GWM12 based on additional data collected since the previous model update (GWM10). These updates to the Site conceptual model were incorporated into the contaminant transport simulations used in this 2012 CE.
- Step 2: Review the extent of contamination above the Final Target Groundwater Cleanup Goals. The current extent of contamination above the Final Target Groundwater Cleanup Goals was updated using recent direct-push and monitoring well chemical data. The current extent of contamination indicated that plume containment has been maintained.

- Step 3: Annual review of the water level data. The horizontal gradients and vertical gradients at the Site in 2012 are similar to the 2011 values and did not adversely impact containment.
- Step 4: Evaluate capture using contaminant transport simulations. The predictive simulations indicate that even with the pump at EW-9 operating at its maximum sustainable rate, the LL2 RDX plume is predicted to eventually migrate southeast of EW-9, towards MW-83, at levels over the Final Target Groundwater Cleanup Goals at some future time. In order to mitigate the predicted plume migration between EW-7 and EW-9, optimization efforts are being explored including evaluating the installation of an additional extraction well.
- Step 5: Evaluate concentration trends in compliance groundwater monitoring wells, perimeter groundwater monitoring wells, and water supply wells. These results are presented in Appendices A through C. No trends were observed that contradict the Site conceptual model or the contaminant transport model. The trends observed in the compliance and perimeter groundwater monitoring wells indicate the containment system is operating effectively. The trends of water supply wells with concentrations exceeding the Final Target Groundwater Cleanup Goals (located within the defined contaminant plumes) provide information on contaminant distribution over time within the plumes, and the trends of water supply wells outside of the defined contaminant plumes indicate the containment system is operating effectively.
- Step 6: Compare the interpretation of theoretical capture based on predictive transport modeling to measured groundwater concentrations above the Final Target Groundwater Cleanup Goals. Based on simulation results, the known extent of contamination above the Final Target Groundwater Cleanup Goals is predicted to be contained for the next 10 years. Based on data evaluated for the 2012 CE period, current extraction well pumping rates are satisfactory for containment over the next 10 years; however, optimization efforts are currently being explored in order to minimize LL2 RDX plume migration to the southeast.

5.0 REFERENCES

Black & Veatch, 2003. "Lincoln Water System Facilities Master Plan" Executive Summary. http://www.lincoln.ne.gov/city/pworks/water/mplan/pdf/execsumm.pdf. Prepared for Lincoln Water System. Accessed September 2006.

CENWK, 2010. Letter to U.S. Environmental Protection Agency, Region VII and Nebraska Department of Environmental Quality regarding EW-10. January 20.

CENWK, 2012. Letter to U.S. Environmental Protection Agency, Region VII and Nebraska Department of Environmental Quality regarding EW-3, 6, and 16. November 2.

City of Ashland. 2013. *Ashland Well Production Since 2004*. Excel© spreadsheet transmitted via email from Bill Torpy, City of Ashland, to Bradley Brink, USACE. February 4.

ECC, 2009. *Focused Extraction Well 14 and Extraction Well 16 Construction Completion Report, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska* Appendix A-1. November.

ECC, 2011a. *EW-1 Pump Test Summary and Model Simulation Technical Memorandum for Operable Unit No. 2 (Groundwater) at the former Nebraska Ordnance Plant.* August.

ECC, 2011b. *Water Supply Well Operations and Maintenance Manual, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska.* July.

ECC, 2012. *Groundwater Monitoring Program Optimization Investigation Report, Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. June

ECC, 2013a. *Monitoring Well Network Optimization Data Summary Report, Phase II, Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. May.

ECC, 2013b. *2012 Annual Summary Report, Operable Unit No. 2 (Groundwater) former Nebraska Ordnance Plant, Mead, Nebraska.* May.

ECC and BMcD, 2011a. *2010 Groundwater Model Update, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. August.

ECC and BMcD, 2011b. *Pre-Pilot Study Investigation Report, Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. January.

ECC and BMcD 2011c. *Aquifer Characterization Report Operable Unit 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska.* March.

ECC and BMcD, 2013. *2012 Groundwater Model Update, Operable Unit No. 2 (Groundwater) for Former Nebraska Ordnance Plant, Mead, Nebraska*. July.

Lower Platte North Natural Resources District (LPNNRD). 2012. Ground Water Energy Levels - Wann Basin Area (October 30, 2003 through October 30, 2012). Wahoo, NE. Excel Spreadsheet. December 6. Email from Larry Angle to David Dander, ECC.

Lincoln Water System (LWS). 2013. *Monthly Totals for Well Field Pumpage (MG*). Excel© spreadsheet transmitted via email from Julie M. Vales, LWS, to Bradley Brink, USACE. February 4.

M.U.D., 2013. 2012 Platte West Well Field Flows. Excel© spreadsheet transmitted via e-mail from Kevin Tobin, M.U.D.to Brad Brink, CENWK. February 4, 2013.

University of Nebraska Agricultural Research and Development Center (ARDC), Univ. of Nebraska – Lincoln. 2013. ARDC Well Summary (Excel© spreadsheet of irrigation pumping rates), 2012, provided by Mark Schroeder, ARDC, to Brad Brink, CENWK. February 25.

URS, 2002. *Remedial Design Groundwater Model III Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Draft. Prepared for U.S. Army Corps of Engineers; Kansas City District. February.

URS, 2004. *Remedial Design Groundwater Model IV Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Draft. Prepared for the U.S. Army Corps of Engineers, Kansas City District. February.

URS, 2005. *Load Line 1 Containment System Remedial Design, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska. Draft Final*. Prepared for the U.S. Army Corps of Engineers, Kansas City District. July.

URS, 2007. *2006 Groundwater Modeling Report, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Draft Final. Prepared for the U.S. Army Corps of Engineers, Kansas City District. May.

URS, 2008. *Data Summary Report, Groundwater Investigations, Spring 2007 and Fall 2007, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Prepared for the Department of the Army, U.S. Army Engineer District, Kansas City District, Corps of Engineers, Kansas City, Missouri. June.

URS, 2009a. *2008 Containment Evaluation Work Plan, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Draft Final. Prepared for the Department of the Army, U.S. Army Engineer District, Kansas City District, Corps of Engineers, Kansas City, Missouri. April.

URS, 2009b. *2008 Groundwater Investigation Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Draft. Prepared for the Department of the Army, U.S. Army Engineer District, Kansas City District, Corps of Engineers, Kansas City, Missouri. July.

URS, 2009c. *Restoration Time-Frame Modeling Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Prepared for U.S. Army Corps of Engineers, Kansas City District. March.

URS, 2009d. *2008 Groundwater Modeling Update, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Draft. Prepared for the Department of the Army, U.S. Army Engineer District, Kansas City District, Corps of Engineers, Kansas City, Missouri. September.

Village of Mead. 2013. Mead Water Use. Email message transmitted from Nick Raver, Village of Mead, to Bradley Brink, USACE. February 6.

Woodward-Clyde, 1993. *Remedial Investigation Report Operable Unit 2 (Groundwater) for Former Nebraska Ordnance Plant, Mead, Nebraska*. May

Woodward-Clyde, 1994. *Removal Action Groundwater Modeling, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska*. Prepared for the U.S. Army Corps of Engineers, Kansas City District. May.

Woodward-Clyde, 1996a. *Record of Decision, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant Site, Mead, Nebraska. Final*. Prepared for the U.S. Army Corps of Engineers, Kansas City District. October.

Woodward-Clyde, 1996b. *Conceptual Groundwater Model Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska. Draft*. Prepared for the U.S. Army Corps of Engineers, Tulsa District. May.

Woodward-Clyde, 1998. *Remedial Design Groundwater Model Technical Memorandum, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska. Prepared for the U.S. Army Corps of Engineers, Kansas City District*. Draft Final. January.

Woodward-Clyde, 1999. *Remedial Design Groundwater Model, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant, Mead, Nebraska. Design Analysis Attachment 1 Remedial Design Groundwater Model II*. Prepared for the U.S. Army Corps of Engineers, Kansas City District. March.

Zheng, C. and P. P. Wang. 1998. MT3DMS A Modular Three Dimensional Multispecies Transport Model for Simulation of Advection, Dispersion and Chemical Reactions of Contaminants in Groundwater Systems. Prepared for the United States Army Corps of Engineers.

Tables

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Table 1-1
Final Target Groundwater Cleanup Goals
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Final Target Groundwater Cleanup Goals	
Contaminant of Concern	**Concentration (µg/L)**
Methylene Chloride	5
1,2-Dichloropropane	5
TCE	5
1,3,5-Trinitrobenzene (TNB)	0.778
2,4,6-Trinitrotoluene (TNT)	2
2,4-Dinitrotoluene (2,4-DNT)	1.24
RDX	2

Source : *Record of Decision, Operable Unit No. 2 (Groundwater), Former Nebraska Ordnance Plant Site, Mead, Nebraska, Final*, (Woodward Clyde, 1996a)
µg/L = micrograms per liter
TCE = trichloroethene
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
Bold = Indicator compounds used to define groundwater contamination at the site

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Table 2-1
Monitoring Well Clusters Evaluated
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Well Cluster	Location of Well(s)	Rationale for Sampling/Location
Compliance Monitoring Wells		
MW-20	Outside LL2 RDX Plume, Cross-gradient of EW-10	Provide Cross-gradient Data: Long-term Containment Confirmation
MW-61	Outside LL1 TCE Plume, Cross-gradient of EW-12	Provide Cross-gradient Data: Long-term Containment Confirmation
MW-82	Outside LL2 RDX Plume, Downgradient of EW-10	Provide Downgradient Data: Long-term Containment Confirmation
MW-86	Outside LL3 RDX Plume, Downgradient of EW-2	Provide Downgradient Data: Long-term Containment Confirmation
MW-88	Outside LL4/AMA TCE Plume, Downgradient of EW-1R	Provide Downgradient Data: Long-term Containment Confirmation
MW-96	Outside LL2 RDX Plume, Downgradient of EW-9 and EW-10	Provide Downgradient Data: Long-term Containment Confirmation
MW-97	Outside LL2 RDX Plume, Downgradient of EW-7 and EW-9	Provide Downgradient Data: Long-term Containment Confirmation
MW-98	Outside LL3 RDX Plume, Downgradient of EW-4 and EW-5	Provide Downgradient Data: Long-term Containment Confirmation
MW-100	Outside LL3 RDX Plume, Downgradient of EW-3 and EW-4	Provide Downgradient Data: Long-term Containment Confirmation
MW-101	Outside LL1 TCE Plume, Downgradient of EW-12	Provide Downgradient Data: Long-term Containment Confirmation
MW-158	Outside LL4/AMA TCE Plume, Downgradient of EW-1R (replaced MW-62)	Monitor Immediately Downgradient of EW-1R: Long-term Containment Confirmation
Perimeter Monitoring Wells		
MW-35	Outside LL3 RDX Plume, Downgradient of EW-3	Provide Downgradient Data: Long-term Containment Confirmation
MW-38	Outside LL4/AMA TCE Plume, Cross-gradient of EW-1R	Provide Cross-Gradient Data: Long-term Containment Confirmation
MW-41	Outside AMA TCE Plume, Eastern Boundary Monitoring	Monitor Eastern Boundary: Long-term Containment Evaluation
MW-46	Outside LL4/AMA TCE Plume, Cross-gradient of EW-1R	Provide Cross-Gradient Data: Long-term Containment Confirmation
MW-80	Outside LL1 TCE Plume, Downgradient of EW-12	Provide Downgradient Data: Long-term Containment Confirmation
MW-81	Outside LL1 TCE Plume, Downgradient of EW-12	Provide Downgradient Data: Long-term Containment Confirmation
MW-83	Outside LL2 RDX Plume, Downgradient of EW-7 and EW-9	Provide Downgradient Data: Long-term Containment Confirmation
MW-84	Outside LL3 RDX Plume, Downgradient of EW-6 and EW-7	Provide Downgradient Data: Long-term Containment Confirmation
MW-85	Outside LL3 RDX Plume, Downgradient of EW-5 and EW-6	Provide Downgradient Data: Long-term Containment Confirmation

Table 2-1
Monitoring Well Clusters Evaluated
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Well Cluster	Location of Well(s)	Rationale for Sampling/Location
MW-95	Outside LL2 RDX Plume, Cross-gradient of EW-10	Provide Cross-Gradient Data: Long-term Containment Evaluation
Perimeter Monitoring Wells		
MW-102	Outside AMA TCE Plume, Eastern Boundary Monitoring	Monitor Eastern Boundary: Long-term Containment Evaluation
MW-103	Outside AMA TCE Plume, Eastern Boundary Monitoring	Monitor Eastern Boundary: Long-term Containment Evaluation
MW-106	Outside LL4/AMA TCE Plume, Eastern Boundary Monitoring	Provide Cross-Gradient Data: Long-term Containment Evaluation
MW-107	Outside LL4/AMA TCE Plume, Eastern Boundary Monitoring	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-108	Outside LL4/AMA TCE Plume, Eastern Boundary Monitoring	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-110	Outside LL4/AMA TCE Plume, Eastern Boundary Monitoring	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-112	Outside LL4/AMA TCE Plume, Eastern Boundary Monitoring	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-113	Outside LL4/AMA TCE Plume, Cross-gradient of EW-1R	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-114	Outside LL4/AMA TCE Plume, Cross-gradient of EW-1R	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-115	Outside LL4/AMA TCE Plume, Cross-gradient of EW-1R	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-116	Outside LL4/AMA TCE Plume, Cross-gradient of EW-1R	Provide Cross-gradient Data: Long-term Containment Evaluation
MW-117	Outside LL4/AMA TCE Plume, Downgradient of EW-3 and EW-4	Provide Downgradient Data: Long-term Containment Evaluation
MW-118	Outside LL3 RDX Plume, Downgradient of EW-6	Provide Downgradient Data: Long-term Containment Evaluation
MW-147	Outside LL2 RDX Plume, Downgradient of EW-9	Provide Downgradient Data: Long-term Containment Confirmation
MW-159	Outside AMA TCE Plume, Eastern Boundary Monitoring	Monitor Eastern Boundary: Long-term Containment Evaluation

Notes:
MW - monitoring well
EW - extraction well
LL - Load Line
TCE - trichloroethene
RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine
AMA - Atlas Missile Area

Table 2-2
TCE and RDX in Compliance Monitoring Wells
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Location	Aquifer Designation	TCE Result	RDX Result	Quarter VOCs/ Explosives Sampled
MW-100A	Intermediate	ND	0.077 J	First Quarter 2012
MW-100B	Shallow	ND	0.14 J	First Quarter 2012
MW-100D	Deep	ND	0.093 J	First Quarter 2012
MW-101A	Intermediate	ND	ND	First Quarter 2012
MW-101B	Shallow	ND	ND	First Quarter 2012
MW-101D	Deep	ND	ND	First Quarter 2012
MW-158A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-158B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-158D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-20A	Deep	ND	ND	First Quarter 2012
MW-20B	Intermediate	ND	ND	First Quarter 2012
MW-20C	Shallow	ND	ND	First Quarter 2012
MW-61A	Intermediate	ND	ND	First Quarter 2012
MW-61B	Shallow	ND	ND	First Quarter 2012
MW-61D	Deep	ND	ND	First Quarter 2012
MW-82A	Intermediate	ND	ND	First Quarter 2012
MW-82B	Shallow	ND	ND	First Quarter 2012
MW-82D	Deep	ND	ND	First Quarter 2012
MW-86A	Intermediate	ND	ND	First Quarter 2012
MW-86B	Shallow	ND	ND	First Quarter 2012
MW-86D	Deep	ND	1.3	First Quarter 2012
MW-88A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-88B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-88D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-96A	Intermediate	ND	ND	First Quarter 2012
MW-96B	Shallow	ND	ND	First Quarter 2012
MW-96D	Deep	ND	ND	First Quarter 2012
MW-97A	Intermediate	ND	ND	First Quarter 2012
MW-97B	Shallow	ND	ND	First Quarter 2012
MW-97D	Deep	ND	ND	First Quarter 2012
MW-98A	Intermediate	ND	ND	First Quarter 2012
MW-98B	Shallow	ND	ND	First Quarter 2012
MW-98D	Deep	ND	ND	First Quarter 2012

Notes:

ND = Sample result below detection limit, J = Estimated

Results for remaining COCs are provided in Table 3-3 of the 2012 Annual Summary Report (ECC, 2013).

All results in µg/L (micrograms per liter)

COC = contaminant of concern

VOC = volatile organic compound

TCE = trichloroethene

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

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Table 2-3
TCE and RDX in Perimeter Monitoring Wells
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Location	Aquifer Designation	TCE Result	RDX Result	Quarter VOCs/ Explosives Sampled
MW-35B	Shallow	ND	ND	First Quarter 2012
		--	0.28 J	Third Quarter 2012
MW-35A	Intermediate	ND	0.4 J	First Quarter 2012
		--	0.4 J	Third Quarter 2012
MW-35D	Deep	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-38A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-38D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-41B	Shallow	ND	--	First Quarter 2012
MW-41A	Intermediate	ND	--	First Quarter 2012
MW-41D	Deep	ND	--	First Quarter 2012
MW-46B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-46A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-46D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-80B	Shallow	0.99 J	--	First Quarter 2012
		0.88 J	ND	Third Quarter 2012
MW-80A	Intermediate	ND	--	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-80D	Deep	ND	--	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-81B	Shallow	ND	--	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-81A	Intermediate	ND	--	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-81D	Deep	ND	--	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-83B	Shallow	ND	0.15 J	First Quarter 2012
		--	0.13 J	Third Quarter 2012
MW-83A	Intermediate	ND	0.24 J	First Quarter 2012
		--	0.33 J	Third Quarter 2012
MW-83D	Deep	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-84B	Shallow	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-84A	Intermediate	ND	0.34 J	First Quarter 2012
		--	0.23 J	Third Quarter 2012

Table 2-3
TCE and RDX in Perimeter Monitoring Wells
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Location	Aquifer Designation	TCE Result	RDX Result	Quarter VOCs/ Explosives Sampled
MW-84D	Deep	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-85B	Shallow	ND	1.4	First Quarter 2012
		--	1.3	Third Quarter 2012
MW-85A	Intermediate	ND	0.91	First Quarter 2012
		--	0.91	Third Quarter 2012
MW-85D	Deep	ND	ND	First Quarter 2012
		--	0.12 J	Third Quarter 2012
MW-95B	Shallow	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-95A	Intermediate	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-95D	Deep	ND	0.11 J	First Quarter 2012
		--	0.098 J	Third Quarter 2012
MW-102B	Shallow	ND	--	First Quarter 2012
MW-102A	Intermediate	ND	--	First Quarter 2012
MW-102D	Deep	ND	--	First Quarter 2012
MW-103B	Shallow	ND	--	First Quarter 2012
MW-103A	Intermediate	ND	--	First Quarter 2012
MW-103D	Deep	ND	--	First Quarter 2012
MW-106B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-106A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-106D	Deep	ND	ND	First Quarter 2012
		ND	0.31 J	Third Quarter 2012
MW-107B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-107A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-107D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-108B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-108A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-108D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012

Table 2-3
TCE and RDX in Perimeter Monitoring Wells
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Location	Aquifer Designation	TCE Result	RDX Result	Quarter VOCs/ Explosives Sampled
MW-110B	Shallow	ND	0.29 J	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-110A	Intermediate	ND	ND	First Quarter 2012
		ND	0.24 J	Third Quarter 2012
MW-110D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-112B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-112A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-113B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-113A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-113D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-114B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-114A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-114D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-115B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-115A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-115D	Deep	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-116B	Shallow	ND	ND	First Quarter 2012
		ND	--	Second Quarter 2012
		ND	ND	Third Quarter 2012
		0.23 J	--	Fourth Quarter 2012
MW-116A	Intermediate	1.4	ND	First Quarter 2012
		4.1	--	Second Quarter 2012
		7.3	2.0 J	Third Quarter 2012
		ND	--	Fourth Quarter 2012
MW-116D	Deep	ND	ND	First Quarter 2012
		ND	--	Second Quarter 2012
		ND	ND	Third Quarter 2012
		ND	--	Fourth Quarter 2012

Table 2-3
TCE and RDX in Perimeter Monitoring Wells
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Location	Aquifer Designation	TCE Result	RDX Result	Quarter VOCs/ Explosives Sampled
MW-117B	Shallow	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-117A	Intermediate	ND	0.14 J	First Quarter 2012
		--	0.24 J	Third Quarter 2012
MW-117D	Deep	ND	0.12 J	First Quarter 2012
		--	0.21 J	Third Quarter 2012
MW-118B	Shallow	ND	0.81	First Quarter 2012
		--	0.83	Third Quarter 2012
MW-118A	Intermediate	ND	0.67	First Quarter 2012
		--	0.69	Third Quarter 2012
MW-147B	Shallow	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-147A	Intermediate	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-147D	Deep	ND	ND	First Quarter 2012
		--	ND	Third Quarter 2012
MW-159B	Shallow	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012
MW-159A	Intermediate	ND	ND	First Quarter 2012
		ND	ND	Third Quarter 2012

Notes:

-- = Not Sampled, ND =not detected over limit of detection, J = Estimated

TCE was the only COC detected above Final Target Groundwater Cleanup Goals in 2012 (shaded cells).

Results for remaining COCs are provided in Table 3-2 of the 2012 Annual Report (ECC, 2013).

All results in µg/L (micrograms per liter)

COC = contaminant of concern

MW = monitoring well

TCE = trichloroethene

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

Table 2-4
Water Supply Wells Sampled in 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Water Supply Well	Required Analyses	GPS Location Northing (NAD 83 SP feet)	GPS Location Easting (NAD 83 SP feet)
27	E, V	491314	2633452
29	E, V	493553	2632818
29A	E, V	494120	2632506
32	E, V	493237	2629736
34	E, V	493445	2627371
36	E, V	492605	2622751
50A	E, V	495657	2632261
50B	E, V	496332	2632399
51	E, V	497399	2632494
51A	E, V	498189	2632594
52A [1]	TSS, E, V	497518	2629718
52A	E, V	497518	2629718
52B	E, V	496817	2632452
52C [1]	TSS, E, V	500793	2632544
52C	E, V	500793	2632544
53 [1]	TSS, E, V	501678	2632682
53	E, V	501678	2632682
54 [1]	TSS, E, V	502782	2632795
54	E, V	502782	2632795
55	E, V	502159	2636409
56	E, V	504584	2633233
57	E, V	506221	2631593
58	E, V	508317	2629362
59	E, V	505914	2632317
60	E, V	506720	2632396
61	E, V	505448	2633182
62	E, V	506004	2633401
63	E, V	508978	2633939
64	E, V	508313	2634110
65	E, V	491734	2614640
66	E, V	492959	2616348
67	E, V	492635	2617043
68	E, V	493041	2618954
73	E, V	495422	2640114
74	E, V	495424	2640477
75	E, V	494855	2638732
76	E, V	494924	2639193
77	E, V	494926	2639589
79	E, V	494931	2640348
80	E, V	517293	2623788
81	E, V	515756	2628719
82	E, V	516109	2624422
86	E, V	495576	2638562
87	E, V	497785	2639967
89	E, V	509317	2629604
90	E, V	508507	2634670
91	E, V	505420	2634717
92	E, V	504970	2634886

Table 2-4
Water Supply Wells Sampled in 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Water Supply Well	Required Analyses	GPS Location Northing (NAD 83 SP feet)	GPS Location Easting (NAD 83 SP feet)
93	E, V	504166	2638589
94	E, V	504539	2638753
95	E, V	497660	2640417
96	E, V	495637	2640886
97	E, V	496114	2637891
99	E, V	494364	2638966
100	E, V	495185	2615279
101	E, V	488282	2613804
102	E, V	506314	2634797
103	E, V	498075	2639207
104	E, V	498343	2639997
105	E, V	494537	2640496
106	E, V	496389	2638316
107	E, V	499376	2640196
108	E, V	512118	2630546
109	E, V	493992	2640254
110	E, V	494087	2639143
111	E, V	506408	2634660
112	E, V	506936	2630157
113	E, V	498325	2638308
114	E,V	507998	2630015
115	E,V	511088	2628624
117	E,V	505450	2634665
UNFL-9A	E,V	510413	2613507
UNFL-10A	E, V	503105	2605889
UNFL-23	E, V	497127	2608843
UNFL-12	E, V	506617	2602709
UNFL-27	E, V	510015	2618683

Notes:

[1]= sample taken before GAC system
GAC = Granular Activated Carbon
GPS = Global Positioning System
GPS locations are general not for other use
NAD 83 = North American Datum 1983
UNFL - University of Nebraska - Lincoln
WSW = Water Supply Well

Analyses Required:

E = explosive compounds (contaminants of concern: 2,4,6 trinitrotoluene (TNT), trinitrobenzene (TNB), 2,4-Dinitrotoluene (2,4-DNT), and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX));
V = volatile organic compound (contaminants of concern: trichloroethene (TCE), Dichloropropane (DCP), and methylene chloride); analysis by EPA SW-846 Method 524.2
TSS = Total Suspended Solids

Table 2-5
Water Supply Wells with Detections over Final Target Groundwater Cleanup Goals
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Sample Location	Quarter (2012)	TCE Result (µg/L)	RDX Result (µg/L)
WSW-50-B	1st	ND*	2.2
WSW-51A	4th	5.3	1.4*
WSW-52C-B	1st	140	ND*
WSW-52C-B	3rd	120	ND*
WSW-53-B	1st	2.5*	8.2
WSW-53-B	3rd	2.2*	6.4
WSW-54-B	1st	7.0	3.8
WSW-54-B	3rd	4.2*	2.6

Notes:
ND - The analyte was not detected above the reported sample quantitation limit.
µg/L - micrograms per liter
TCE - trichloroethene
RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine
* Does not exceed Final Target Groundwater Cleanup Goals

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Table 3-1
Groundwater Elevations - March 2012 and August 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant

Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
EW-1R		1079.43	3/29/12	200.00	1068.60	8/27/12	200.00	1066.20
EW-3		1150.01	3/29/12	300.00	1080.10	8/27/12	300.00	1079.40
EW-4		1148.68	3/29/12	97.00	1065.80	8/27/12	92.00	1065.30
EW-6		1147.98	3/29/12	50.00	1092.00	8/27/12	50.00	1091.40
EW-7		1148.38	3/29/12	288.00	1077.10	8/27/12	287.00	1076.20
EW-9		1154.67	3/29/12	139.00	1082.70	8/27/12	137.00	1081.90
EW-10		1150.64	3/29/12	0.00	1101.10	8/27/12	0.00	1100.60
FEW-11		1162.77	3/29/12	540.00	1096.90	8/27/12	540.00	1096.60
EW-12		1113.72	3/29/12	325.00	1032.56	8/27/12	299.00	NM
FEW-14		1155.99	3/29/12	188.00	1076.40	8/27/12	183.00	1075.20
FEW-15		1169.64	3/29/12	495.00	1119.20	8/27/12	484.00	1118.80
EW-16		1146.97	3/29/12	104.00	1079.20	8/27/12	95.00	1078.50
MW-02A	Intermediate	1174.77	3/29/12	39.21	1135.56	8/27/12	39.68	1135.09
MW-03A	Intermediate	1177.06	3/29/12	41.38	1135.68	8/27/12	43.15	1133.91
MW-04A	Intermediate	1168.73	3/29/12	35.13	1133.60	8/27/12	36.85	1131.88
MW-05A	Intermediate	1168.12	3/29/12	33.31	1134.81	8/27/12	34.20	1133.92
MW-07A	Intermediate	1164.85	3/29/12	36.84	1128.01	8/27/12	38.31	1126.54
MW-08A	Intermediate	1165.92	3/29/12	46.57	1119.35	8/27/12	48.53	1117.39
MW-09A	Intermediate	1171.46	3/29/12	51.87	1119.59	8/27/12	53.81	1117.65
MW-10A	Intermediate	1150.35	3/29/12	39.53	1110.82	8/27/12	41.13	1109.22
MW-11	Intermediate	1153.22	3/29/12	29.31	1123.91	8/27/12	31.59	1121.63
MW-16B	Intermediate	1188.68	3/29/12	31.40	1157.28	8/27/12	33.31	1155.37
MW-17B	Intermediate	1128.50	3/29/12	7.42	1121.08	8/27/12	7.78	1120.72
MW-18A	Deep	1145.43	3/29/12	42.00	1103.43	8/27/12	45.13	1100.30
MW-18B	Intermediate	1145.57	3/29/12	42.48	1103.09	8/27/12	45.61	1099.96
MW-18C	Shallow	1146.05	3/29/12	40.00	1106.05	8/27/12	41.93	1104.12
MW-19B	Intermediate	1158.59	3/29/12	8.80	1149.79	8/27/12	10.74	1147.85
MW-20B	Intermediate	1160.29	3/29/12	58.61	1101.68	8/27/12	59.55	1100.74
MW-21A	Intermediate	1165.63	3/29/12	34.89	1130.74	8/27/12	35.93	1129.70
MW-22B	Shallow	1176.67	3/29/12	29.08	1147.59	8/27/12	29.81	1146.86
MW-24A	Intermediate	1163.41	3/29/12	39.91	1123.50	8/27/12	40.32	1123.09
MW-25A	Intermediate	1175.25	3/29/12	43.06	1132.19	8/27/12	44.93	1130.32
MW-27B	Shallow	1176.06	3/29/12	36.84	1139.22	8/27/12	37.88	1138.18

Table 3-1
Groundwater Elevations - March 2012 and August 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant

Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
MW-28A	Intermediate	1172.22	3/29/12	49.82	1122.40	8/27/12	50.87	1121.35
MW-29A	Intermediate	1160.06	3/29/12	48.75	1111.31	8/27/12	49.31	1110.75
MW-29B	Shallow	1161.03	3/29/12	49.87	1111.16	8/27/12	50.24	1110.79
MW-31A	Intermediate	1167.38	3/29/12	47.46	1119.92	8/27/12	48.44	1118.94
MW-32A	Intermediate	1154.17	3/29/12	47.85	1106.32	8/27/12	48.03	1106.14
MW-33A	Intermediate	1160.32	3/29/12	50.92	1109.40	8/27/12	51.85	1108.47
MW-34A	Intermediate	1156.79	3/29/12	59.09	1097.70	8/27/12	59.59	1097.20
MW-35A	Intermediate	1139.81	3/29/12	54.19	1085.62	8/27/12	55.19	1084.62
MW-38A	Intermediate	1082.32	3/29/12	6.36	1075.96	8/27/12	9.31	1073.01
MW-39A	Intermediate	1082.82	3/29/12	4.32	1078.50	8/27/12	7.31	1075.51
MW-40A	Intermediate	1172.09	3/29/12	40.79	1131.30	8/27/12	41.84	1130.25
MW-41A	Intermediate	1168.63	3/29/12	38.25	1130.38	8/27/12	40.82	1127.81
MW-42A	Intermediate	1146.53	3/29/12	51.77	1094.76	8/27/12	53.85	1092.68
MW-43A	Intermediate	1142.90	3/29/12	44.34	1098.56	8/27/12	46.94	1095.96
MW-44A	Intermediate	1093.66	3/29/12	9.23	1084.43	8/27/12	10.80	1082.86
MW-44B	Shallow	1094.14	3/29/12	10.41	1083.73	8/27/12	13.61	1080.53
MW-44D	Deep	1092.43	3/29/12	8.01	1084.42	8/27/12	9.56	1082.87
MW-46A	Intermediate	1082.70	3/29/12	4.15	1078.55	8/27/12	6.98	1075.72
MW-46B	Shallow	1082.81	3/29/12	4.24	1078.57	8/27/12	7.08	1075.73
MW-46D	Deep	1082.65	3/29/12	4.08	1078.57	8/27/12	6.82	1075.83
MW-52A	Intermediate	1155.22	3/29/12	37.20	1118.02	8/27/12	38.70	1116.52
MW-52B	Shallow	1155.65	3/29/12	37.79	1117.86	8/27/12	39.23	1116.42
MW-53A	Intermediate	1136.36	3/29/12	26.40	1109.96	8/27/12	29.23	1107.13
MW-53B	Shallow	1136.91	3/29/12	25.04	1111.87	8/27/12	25.97	1110.94
MW-54A	Intermediate	1121.58	3/29/12	9.77	1111.81	8/27/12	12.58	1109.00
MW-54B	Shallow	1121.59	3/29/12	7.36	1114.23	8/27/12	9.32	1112.27
MW-55A	Intermediate	1126.49	3/29/12	16.46	1110.03	8/27/12	19.36	1107.13
MW-56A	Intermediate	1125.96	3/29/12	16.57	1109.39	8/27/12	19.48	1106.48
MW-56B	Shallow	1126.24	3/29/12	16.08	1110.16	8/27/12	15.98	1110.26
MW-57B	Shallow	1196.27	3/29/12	35.72	1160.55	8/27/12	37.35	1158.92
MW-60A	Intermediate	1145.83	3/29/12	53.11	1092.72	8/27/12	59.55	1086.28
MW-61A	Intermediate	1108.96	3/29/12	6.37	1102.59	8/27/12	8.00	1100.96
MW-65A	Intermediate	1165.02	3/29/12	32.55	1132.47	8/27/12	33.75	1131.27

Table 3-1
Groundwater Elevations - March 2012 and August 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant

Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
MW-66B	Shallow	1163.08	3/29/12	31.81	1131.27	8/27/12	32.97	1130.11
MW-71B	Shallow	1166.34	3/29/12	34.06	1132.28	8/27/12	35.17	1131.17
MW-72A	Intermediate	1170.37	3/29/12	39.43	1130.94	8/27/12	40.43	1129.94
MW-73A	Intermediate	1166.95	3/29/12	36.51	1130.44	8/27/12	37.58	1129.37
MW-73B	Shallow	1166.90	3/29/12	36.51	1130.39	8/27/12	37.52	1129.38
MW-74A	Intermediate	1166.94	3/29/12	36.54	1130.40	8/27/12	37.52	1129.42
MW-75A	Intermediate	1167.13	3/29/12	36.67	1130.46	8/27/12	37.70	1129.43
MW-76A	Intermediate	1166.24	3/29/12	35.74	1130.50	8/27/12	36.78	1129.46
MW-77A	Intermediate	1165.73	3/29/12	35.23	1130.50	8/27/12	36.36	1129.37
MW-78A	Intermediate	1165.27	3/29/12	34.69	1130.58	8/27/12	35.74	1129.53
MW-79A	Intermediate	1109.34	3/29/12	9.28	1100.06	8/27/12	10.60	1098.74
MW-80A	Intermediate	1107.43	3/29/12	7.55	1099.88	8/27/12	8.90	1098.53
MW-80B	Shallow	1107.65	3/29/12	7.84	1099.81	8/27/12	9.15	1098.50
MW-80D	Deep	1107.40	3/29/12	7.47	1099.93	8/27/12	8.84	1098.56
MW-81A	Intermediate	1108.48	3/29/12	8.26	1100.22	8/27/12	9.45	1099.03
MW-81B	Shallow	1108.47	3/29/12	8.39	1100.08	8/27/12	9.62	1098.85
MW-81D	Deep	1108.53	3/29/12	8.16	1100.37	8/27/12	9.50	1099.03
MW-82A	Intermediate	1149.14	3/29/12	48.96	1100.18	8/27/12	49.95	1099.19
MW-83A	Intermediate	1152.41	3/29/12	55.28	1097.13	8/27/12	55.79	1096.62
MW-83B	Shallow	1152.28	3/29/12	55.11	1097.17	8/27/12	55.60	1096.68
MW-83D	Deep	1152.32	3/29/12	55.24	1097.08	8/27/12	55.74	1096.58
MW-84A	Intermediate	1145.34	3/29/12	50.16	1095.18	8/27/12	50.69	1094.65
MW-84B	Shallow	1145.62	3/29/12	50.00	1095.62	8/27/12	50.48	1095.14
MW-84D	Deep	1145.37	3/29/12	50.38	1094.99	8/27/12	50.90	1094.47
MW-85A	Intermediate	1132.58	3/29/12	44.24	1088.34	8/27/12	49.08	1083.50
MW-86A	Intermediate	1114.15	3/29/12	32.11	1082.04	8/27/12	33.76	1080.39
MW-87A	Intermediate	1078.38	3/29/12	4.20	1074.18	8/27/12	NM	NM
MW-87B	Shallow	1078.38	3/29/12	4.23	1074.15	8/27/12	NM	NM
MW-87D	Deep	1078.39	3/29/12	4.25	1074.14	8/27/12	NM	NM
MW-88A	Intermediate	1081.22	3/29/12	6.16	1075.06	8/27/12	9.25	1071.97
MW-89A	Intermediate	1160.99	3/29/12	55.84	1105.15	8/27/12	57.25	1103.74
MW-90A	Intermediate	1151.11	3/29/12	45.05	1106.06	8/27/12	46.72	1104.39
MW-91A	Intermediate	1152.04	3/29/12	46.04	1106.00	8/27/12	47.52	1104.52

Table 3-1
Groundwater Elevations - March 2012 and August 2012
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Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
MW-92A	Intermediate	1108.78	3/29/12	8.21	1100.57	8/27/12	9.57	1099.21
MW-93A	Intermediate	1124.26	3/29/12	19.67	1104.59	8/27/12	20.65	1103.61
MW-94A	Intermediate	1153.06	3/29/12	47.59	1105.47	8/27/12	48.08	1104.98
MW-95A	Intermediate	1156.81	3/29/12	53.53	1103.28	8/27/12	53.98	1102.83
MW-95B	Shallow	1156.46	3/29/12	53.16	1103.30	8/27/12	53.63	1102.83
MW-95D	Deep	1156.82	3/29/12	54.68	1102.14	8/27/12	55.48	1101.34
MW-96A	Intermediate	1148.56	3/29/12	51.09	1097.47	8/27/12	51.95	1096.61
MW-97A	Intermediate	1143.08	3/29/12	48.29	1094.79	8/27/12	49.05	1094.03
MW-97B	Shallow	1143.18	3/29/12	48.35	1094.83	8/27/12	49.55	1093.63
MW-97D	Deep	1143.18	3/29/12	48.41	1094.77	8/27/12	49.65	1093.53
MW-98A	Intermediate	1141.52	3/29/12	49.67	1091.85	8/27/12	51.00	1090.52
MW-99A	Intermediate	1163.04	3/29/12	69.95	1093.09	8/27/12	70.50	1092.54
MW-99B	Shallow	1163.19	3/29/12	70.09	1093.10	8/27/12	70.68	1092.51
MW-99D	Deep	1162.76	3/29/12	69.71	1093.05	8/27/12	70.30	1092.46
MW-100A	Intermediate	1141.18	3/29/12	54.92	1086.26	8/27/12	56.09	1085.09
MW-101A	Intermediate	1107.43	3/29/12	7.88	1099.55	8/27/12	9.30	1098.13
MW-102A	Intermediate	1170.90	3/29/12	34.20	1136.70	8/27/12	35.22	1135.68
MW-103A	Intermediate	1173.58	3/29/12	40.90	1132.68	8/27/12	42.02	1131.56
MW-104A	Intermediate	1081.26	3/29/12	2.49	1078.77	8/27/12	4.00	1077.26
MW-104O	Overburden	1081.69	3/29/12	3.78	1077.91	8/27/12	5.12	1076.57
MW-105A	Intermediate	1079.60	3/29/12	3.87	1075.73	8/27/12	5.91	1073.69
MW-105O	Overburden	1080.04	3/29/12	7.91	1072.13	8/27/12	9.36	1070.68
MW-106A	Intermediate	1118.06	3/29/12	17.42	1100.64	8/27/12	21.29	1096.77
MW-106B	Shallow	1117.98	3/29/12	17.28	1100.70	8/27/12	20.44	1097.54
MW-106D	Deep	1118.18	3/29/12	17.68	1100.50	8/27/12	21.64	1096.54
MW-107A	Intermediate	1135.79	3/29/12	38.92	1096.87	8/27/12	43.26	1092.53
MW-107B	Shallow	1136.72	3/29/12	39.84	1096.88	8/27/12	41.09	1095.63
MW-107D	Deep	1136.35	3/29/12	39.50	1096.85	8/27/12	43.81	1092.54
MW-108A	Intermediate	1126.74	3/29/12	29.99	1096.75	8/27/12	35.38	1091.36
MW-108B	Shallow	1126.98	3/29/12	31.01	1095.97	8/27/12	32.46	1094.52
MW-108D	Deep	1126.87	3/29/12	31.11	1095.76	8/27/12	35.55	1091.32
MW-109A	Intermediate	1086.25	3/29/12	2.37	1083.88	8/27/12	5.14	1081.11
MW-109O	Overburden	1085.88	3/29/12	5.88	1080.00	8/27/12	5.84	1080.04

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Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
MW-110A	Intermediate	1094.10	3/29/12	5.79	1088.31	8/27/12	9.46	1084.64
MW-111A	Intermediate	1082.82	3/29/12	4.22	1078.60	8/27/12	6.75	1076.07
MW-111B	Shallow	1082.61	3/29/12	3.99	1078.62	8/27/12	6.47	1076.14
MW-111O	Overburden	1082.48	3/29/12	5.69	1076.79	8/27/12	NM	NM
MW-112A	Intermediate	1082.03	3/29/12	0.51	1081.52	8/27/12	3.69	1078.34
MW-112B	Shallow	1082.02	3/29/12	0.44	1081.58	8/27/12	3.61	1078.41
MW-113A	Intermediate	1080.47	3/29/12	0.49	1079.98	8/27/12	3.45	1077.02
MW-113B	Shallow	1080.42	3/29/12	0.38	1080.04	8/27/12	3.41	1077.01
MW-113D	Deep	1080.49	3/29/12	0.55	1079.94	8/27/12	3.48	1077.01
MW-114A	Intermediate	1080.32	3/29/12	3.72	1076.60	8/27/12	6.47	1073.85
MW-115A	Intermediate	1081.67	3/29/12	6.04	1075.63	8/27/12	9.01	1072.66
MW-116A	Intermediate	1080.53	3/29/12	5.38	1075.15	8/27/12	8.03	1072.50
MW-116B	Shallow	1080.49	3/29/12	5.31	1075.18	8/27/12	7.98	1072.51
MW-116D	Deep	1080.46	3/29/12	5.31	1075.15	8/27/12	7.99	1072.47
MW-117A	Intermediate	1122.26	3/29/12	38.39	1083.87	8/27/12	39.58	1082.68
MW-118A	Intermediate	1143.87	3/29/12	50.78	1093.09	8/27/12	51.25	1092.62
MW-119A	Intermediate	1159.14	3/29/12	43.02	1116.12	8/27/12	43.16	1115.98
MW-120A	Intermediate	1166.32	3/29/12	51.83	1114.49	8/27/12	51.96	1114.36
MW-120E	Intermediate	1166.43	3/29/12	51.88	1114.55	8/27/12	52.05	1114.38
MW-121A	Intermediate	1170.04	3/29/12	54.25	1115.79	8/27/12	54.35	1115.69
MW-122A	Intermediate	1165.76	3/29/12	53.22	1112.54	8/27/12	53.92	1111.84
MW-123A	Intermediate	1168.99	3/29/12	53.86	1115.13	8/27/12	53.62	1115.37
MW-124A	Intermediate	1161.89	3/29/12	41.38	1120.51	8/27/12	41.55	1120.34
MW-124B	Shallow	1161.59	3/29/12	41.07	1120.52	8/27/12	41.26	1120.33
MW-124D	Deep	1161.82	3/29/12	41.76	1120.06	8/27/12	41.89	1119.93
MW-125A	Intermediate	1162.05	3/29/12	44.80	1117.25	8/27/12	45.76	1116.29
MW-126A	Intermediate	1170.87	3/29/12	38.66	1132.21	8/27/12	40.09	1130.78
MW-126D	Deep	1170.26	3/29/12	37.89	1132.37	8/27/12	39.40	1130.86
MW-127A	Intermediate	1168.95	3/29/12	30.63	1138.32	8/27/12	32.38	1136.57
MW-128A	Intermediate	1156.97	3/29/12	60.55	1096.42	8/27/12	61.01	1095.96
MW-129A	Intermediate	1149.77	3/29/12	60.74	1089.03	8/27/12	61.29	1088.48
MW-130A	Intermediate	1145.47	3/29/12	58.98	1086.49	8/27/12	59.90	1085.57
MW-131A	Intermediate	1148.09	3/29/12	55.81	1092.28	8/27/12	56.28	1091.81

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MW-131B	Shallow	1147.94	3/29/12	55.64	1092.30	8/27/12	56.10	1091.84
MW-131D	Deep	1148.10	3/29/12	55.76	1092.34	8/27/12	56.23	1091.87
MW-132A	Intermediate	1160.09	3/29/12	65.39	1094.70	8/27/12	65.82	1094.27
MW-133A	Intermediate	1167.41	3/29/12	43.82	1123.59	8/27/12	44.92	1122.49
MW-133B	Shallow	1167.55	3/29/12	43.81	1123.74	8/27/12	44.70	1122.85
MW-133D	Deep	1167.19	3/29/12	43.84	1123.35	8/27/12	44.95	1122.24
MW-134A	Intermediate	1168.44	3/29/12	46.08	1122.36	8/27/12	47.52	1120.92
MW-134B	Shallow	1168.55	3/29/12	46.12	1122.43	8/27/12	47.60	1120.95
MW-134D	Deep	1168.68	3/29/12	45.96	1122.72	8/27/12	47.60	1121.08
MW-135A	Intermediate	1165.77	3/29/12	43.09	1122.68	8/27/12	44.35	1121.42
MW-135B	Shallow	1165.71	3/29/12	43.06	1122.65	8/27/12	44.30	1121.41
MW-135D	Deep	1165.51	3/29/12	42.19	1123.32	8/27/12	43.52	1121.99
MW-136A	Intermediate	1167.96	3/29/12	42.78	1125.18	8/27/12	41.37	1126.59
MW-137A	Intermediate	1166.31	3/29/12	35.38	1130.93	8/27/12	36.36	1129.95
MW-138A	Intermediate	1175.83	3/29/12	41.69	1134.14	8/27/12	42.50	1133.33
MW-139A	Intermediate	1180.32	3/29/12	42.80	1137.52	8/27/12	43.69	1136.63
MW-140A	Intermediate	1092.50	3/29/12	5.99	1086.51	8/27/12	9.25	1083.25
MW-140O	Overburden	1092.60	3/29/12	9.21	1083.39	8/27/12	11.30	1081.30
MW-141A	Intermediate	1162.07	3/29/12	36.19	1125.88	8/27/12	36.94	1125.13
MW-142A	Intermediate	1154.43	3/29/12	46.44	1107.99	8/27/12	48.31	1106.12
MW-143B	Shallow	1155.87	3/29/12	44.63	1111.24	8/27/12	45.32	1110.55
MW-144A	Intermediate	1164.17	3/29/12	39.23	1124.94	8/27/12	40.13	1124.04
MW-145A	Intermediate	1160.75	3/29/12	47.12	1113.63	8/27/12	47.43	1113.32
MW-146A	Intermediate	1148.18	3/29/12	47.14	1101.04	8/27/12	47.70	1100.48
MW-147A	Intermediate	1148.92	3/29/12	49.70	1099.22	8/27/12	50.31	1098.61
MW-148B	Shallow	1160.53	3/29/12	42.11	1118.42	8/27/12	43.32	1117.21
MW-149A	Intermediate	1152.23	3/29/12	44.44	1107.79	8/27/12	45.20	1107.03
MW-150A	Intermediate	1147.59	3/29/12	47.46	1100.13	8/27/12	48.09	1099.50
MW-151A	Intermediate	1158.65	3/29/12	42.77	1115.88	8/27/12	44.91	1113.74
MW-152B	Shallow	1148.37	3/29/12	40.25	1108.12	8/27/12	41.37	1107.00
MW-153A	Intermediate	1146.17	3/29/12	44.20	1101.97	8/27/12	46.19	1099.98
MW-154A	Intermediate	1141.11	3/29/12	46.71	1094.40	8/27/12	50.41	1090.70
MW-154B	Shallow	1141.16	3/29/12	46.15	1095.01	8/27/12	49.68	1091.48

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MW-155A	Intermediate	1141.95	3/29/12	46.46	1095.49	8/27/12	48.69	1093.26
MW-156A	Intermediate	1093.89	3/29/12	5.58	1088.31	8/27/12	5.17	1088.72
MW-156B	Shallow	1093.96	3/29/12	5.58	1088.38	8/27/12	7.29	1086.67
MW-157A	Intermediate	1102.64	3/29/12	19.09	1083.55	8/27/12	20.79	1081.85
MW-158A	Intermediate	1076.69	3/29/12	2.21	1074.48	8/27/12	4.94	1071.75
MW-158B	Shallow	1076.36	3/29/12	1.90	1074.46	8/27/12	4.36	1072.00
MW-158D	Deep	1076.63	3/29/12	2.20	1074.43	8/27/12	4.63	1072.00
MW-159A	Intermediate	1163.51	3/29/12	47.94	1115.57	8/27/12	50.97	1112.54
OW-05	Intermediate	1080.35	3/29/12	9.57	1070.78	8/27/12	11.76	1068.59
OW-06	Intermediate	1079.22	3/29/12	6.67	1072.55	8/27/12	9.19	1070.03
OW-07	Intermediate	1079.06	3/29/12	6.22	1072.84	8/27/12	8.41	1070.65
OW-08	Intermediate	1078.43	3/29/12	5.03	1073.40	8/27/12	7.21	1071.22
OW-09	Intermediate	1080.96	3/29/12	8.36	1072.60	8/27/12	10.60	1070.36
OW-10	Intermediate	1079.79	3/29/12	6.38	1073.41	8/27/12	10.37	1069.42
OW-11	Intermediate	1078.66	3/29/12	4.64	1074.02	8/27/12	8.89	1069.77
OW-12	Intermediate	1080.19	3/29/12	5.09	1075.10	8/27/12	7.74	1072.45
OW-13	Intermediate	1081.25	3/29/12	8.57	1072.68	8/27/12	10.81	1070.44
OW-14	Intermediate	1080.52	3/29/12	6.88	1073.64	8/27/12	9.09	1071.43
OW-15	Intermediate	1080.66	3/29/12	6.65	1074.01	8/27/12	8.09	1072.57
OW-16	Intermediate	1078.22	3/29/12	1.70	1076.52	8/27/12	3.15	1075.07
OW-18	Intermediate	1162.21	3/29/12	45.76	1116.45	8/27/12	45.63	1116.58
OW-22	Intermediate	1161.24	3/29/12	45.31	1115.93	8/27/12	45.46	1115.78
OW-23	Intermediate	1162.08	3/29/12	44.88	1117.20	8/27/12	45.03	1117.05
OW-24	Intermediate	1153.07	3/29/12	NM	NM	8/27/12	NM	NM
OW-25	Intermediate	1155.71	3/29/12	70.35	1085.36	8/27/12	71.41	1084.30
OW-26	Intermediate	1148.64	3/29/12	61.96	1086.68	8/27/12	62.89	1085.75
OW-27	Intermediate	1153.30	3/29/12	68.31	1084.99	8/27/12	69.33	1083.97
OW-28	Intermediate	1153.81	3/29/12	68.71	1085.10	8/27/12	69.73	1084.08
OW-30	Intermediate	1131.58	3/29/12	NM	NM	8/27/12	NM	NM
OW-31	Intermediate	1155.78	3/29/12	58.29	1097.49	8/27/12	58.73	1097.05
OW-32	Intermediate	1153.87	3/29/12	56.36	1097.51	8/27/12	56.81	1097.06
OW-33	Intermediate	1154.67	3/29/12	57.14	1097.53	8/27/12	57.55	1097.12
OW-34	Intermediate	1154.70	3/29/12	57.70	1097.00	8/27/12	58.12	1096.58

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OW-35	Intermediate	1154.10	3/29/12	57.06	1097.04	8/27/12	47.56	1106.54
OW-36	Intermediate	1157.23	3/29/12	60.64	1096.59	8/27/12	61.11	1096.12
OW-37	Intermediate	1157.36	3/29/12	NM	NM	8/27/12	61.38	1095.98
OW-38	Intermediate	1151.19	3/29/12	57.40	1093.79	8/27/12	57.85	1093.34
OW-39	Intermediate	1151.39	3/29/12	55.38	1096.01	8/27/12	55.76	1095.63
OW-40	Intermediate	1157.66	3/29/12	60.05	1097.61	8/27/12	60.45	1097.21
OW-41	Intermediate	1150.22	3/29/12	57.27	1092.95	8/27/12	57.71	1092.51
OW-42	Intermediate	1151.21	3/29/12	56.14	1095.07	8/27/12	56.53	1094.68
OW-43	Intermediate	1156.74	3/29/12	60.08	1096.66	8/27/12	60.44	1096.30
OW-44	Intermediate	1147.84	3/29/12	50.45	1097.39	8/27/12	50.91	1096.93
OW-45	Intermediate	1152.47	3/29/12	51.51	1100.96	8/27/12	52.13	1100.34
OW-46	Intermediate	1151.55	3/29/12	50.30	1101.25	8/27/12	50.96	1100.59
OW-47	Intermediate	1153.44	3/29/12	51.64	1101.80	8/27/12	52.20	1101.24
OW-48	Intermediate	1153.38	3/29/12	52.42	1100.96	8/27/12	53.09	1100.29
OW-49	Intermediate	1154.09	3/29/12	53.38	1100.71	8/27/12	54.02	1100.07
OW-50	Intermediate	1151.16	3/29/12	50.63	1100.53	8/27/12	51.30	1099.86
OW-51	Intermediate	1149.86	3/29/12	49.78	1100.08	8/27/12	50.36	1099.50
OW-52	Intermediate	1107.14	3/29/12	13.96	1093.18	8/27/12	14.50	1092.64
OW-53	Intermediate	1107.13	3/29/12	11.98	1095.15	8/27/12	12.70	1094.43
OW-54	Intermediate	1115.39	3/29/12	11.98	1103.41	8/27/12	13.10	1102.29
OW-55	Intermediate	1107.05	3/29/12	15.22	1091.83	8/27/12	15.72	1091.33
OW-56	Intermediate	1112.15	3/29/12	9.01	1103.14	8/27/12	10.00	1102.15
OW-57	Intermediate	1114.84	3/29/12	11.31	1103.53	8/27/12	12.30	1102.54
OW-58	Intermediate	1109.00	3/29/12	8.15	1100.85	8/27/12	9.30	1099.70
OW-59	Intermediate	1110.50	3/29/12	8.47	1102.03	8/27/12	9.50	1101.00
OW-60	Intermediate	1149.15	3/29/12	59.16	1089.99	8/27/12	59.59	1089.56
OW-61	Intermediate	1148.81	3/29/12	58.14	1090.67	8/27/12	58.60	1090.21
OW-62	Intermediate	1151.40	3/29/12	59.90	1091.50	8/27/12	60.49	1090.91
OW-63	Intermediate	1152.90	3/29/12	61.89	1091.01	8/27/12	62.49	1090.41
OW-64	Intermediate	1148.12	3/29/12	58.07	1090.05	8/27/12	58.51	1089.61
OW-65	Intermediate	1147.36	3/29/12	57.85	1089.51	8/27/12	58.43	1088.93
OW-66	Intermediate	1147.09	3/29/12	49.93	1097.16	8/27/12	50.38	1096.71
OW-67	Intermediate	1149.64	3/29/12	52.41	1097.23	8/27/12	52.88	1096.76

Table 3-1
Groundwater Elevations - March 2012 and August 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant

Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
OW-68	Intermediate	1146.89	3/29/12	50.10	1096.79	8/27/12	50.52	1096.37
OW-69	Intermediate	1147.02	3/29/12	50.01	1097.01	8/27/12	50.49	1096.53
OW-70	Intermediate	1146.14	3/29/12	49.36	1096.78	8/27/12	50.29	1095.85
OW-71	Intermediate	1158.23	3/29/12	61.29	1096.94	8/27/12	61.73	1096.50
OW-72	Intermediate	1156.05	3/29/12	58.48	1097.57	8/27/12	59.00	1097.05
OW-73	Intermediate	1157.61	3/29/12	59.26	1098.35	8/27/12	59.81	1097.80
OW-74	Intermediate	1148.38	3/29/12	48.82	1099.56	8/27/12	49.45	1098.93
OW-75	Intermediate	1154.51	3/29/12	56.36	1098.15	8/27/12	56.89	1097.62
OW-76	Intermediate	1148.68	3/29/12	50.27	1098.41	8/27/12	50.83	1097.85
OW-77	Intermediate	1157.82	3/29/12	60.66	1097.16	8/27/12	61.12	1096.70
OW-78	Intermediate	1163.94	3/29/12	52.51	1111.43	8/27/12	52.21	1111.73
OW-79	Intermediate	1167.29	3/29/12	53.77	1113.52	8/27/12	53.54	1113.75
OW-80	Intermediate	1169.30	3/29/12	54.27	1115.03	8/27/12	54.01	1115.29
OW-81	Intermediate	1164.13	3/29/12	49.84	1114.29	8/27/12	49.72	1114.41
OW-82	Intermediate	1169.05	3/29/12	54.41	1114.64	8/27/12	54.56	1114.49
OW-83	Intermediate	1173.20	3/29/12	57.18	1116.02	8/27/12	57.22	1115.98
OW-89	Intermediate	1092.56	3/29/12	12.63	1079.93	8/27/12	14.08	1078.48
OW-90	Intermediate	1153.30	3/29/12	59.21	1094.09	8/27/12	59.70	1093.60
OW-92	Intermediate	1154.30	3/29/12	57.48	1096.82	8/27/12	58.97	1095.33
OW-93	Intermediate	1156.87	3/29/12	63.16	1093.71	8/27/12	63.75	1093.12
OW-94	Intermediate	1153.21	3/29/12	57.62	1095.59	8/27/12	58.11	1095.10
OW-95	Intermediate	1150.04	3/29/12	54.81	1095.23	8/27/12	55.28	1094.76
OW-96	Intermediate	1146.64	3/29/12	58.46	1088.18	8/27/12	59.18	1087.46
OW-97	Intermediate	1146.21	3/29/12	58.44	1087.77	8/27/12	59.19	1087.02
OW-98	Intermediate	1150.67	3/29/12	62.54	1088.13	8/27/12	63.33	1087.34
OW-99	Intermediate	1146.97	3/29/12	59.57	1087.40	8/27/12	60.34	1086.63
OW-100	Intermediate	1147.39	3/29/12	60.55	1086.84	8/27/12	61.39	1086.00
OW-101	Intermediate	1168.26	3/29/12	46.79	1121.47	8/27/12	47.85	1120.41
OW-102	Intermediate	1166.49	3/29/12	43.46	1123.03	8/27/12	44.61	1121.88
OW-103	Intermediate	1169.13	3/29/12	43.84	1125.29	8/27/12	45.10	1124.03
OW-104	Intermediate	1167.73	3/29/12	45.43	1122.30	8/27/12	46.80	1120.93
OW-105	Intermediate	1165.40	3/29/12	42.71	1122.69	8/27/12	44.00	1121.40
PZ-01	Intermediate	1116.38	3/29/12	34.10	1082.28	8/27/12	34.19	1082.19

Table 3-1
Groundwater Elevations - March 2012 and August 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant

Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
PZ-02	Intermediate	1130.80	3/29/12	47.20	1083.60	8/27/12	44.06	1086.74
PZ-03	Intermediate	1087.47	3/29/12	0.77	1086.70	8/27/12	3.26	1084.21
PZ-04	Intermediate	1086.65	3/29/12	NM	NM	8/27/12	NM	NM
PZ-05	Intermediate	1085.66	3/29/12	NM	NM	8/27/12	NM	NM
PZ-06	Intermediate	1088.42	3/29/12	NM	NM	8/27/12	NM	NM
PZ-11	Deep	1094.18	3/29/12	5.72	1088.46	8/27/12	8.31	1085.87
PZ-12	Deep	1101.36	3/29/12	17.90	1083.46	8/27/12	18.97	1082.39
PZ-13	Intermediate	1081.23	3/29/12	1.54	1079.69	8/27/12	2.76	1078.47
PZ-14	Intermediate	1080.52	3/29/12	0.61	1079.91	8/27/12	2.16	1078.36
TH-EW-12	Intermediate	1107.37	3/29/12	29.66	1077.71	8/27/12	29.55	1077.82
TH-EW-13	Intermediate	1111.04	3/29/12	9.19	1101.85	8/27/12	10.25	1100.79
TH-EW-14R1	Intermediate	1156.72	3/29/12	62.85	1093.87	8/27/12	63.42	1093.30
TH-EW-14R2	Intermediate	1151.08	3/29/12	56.20	1094.88	8/27/12	56.64	1094.44
TH-EW-15	Intermediate	1172.51	3/29/12	49.57	1122.94	8/27/12	50.66	1121.85
TH-EW-16	Intermediate	1147.71	3/29/12	60.48	1087.23	8/27/12	61.18	1086.53
Brabec		1150.00	3/29/12	48.86	1101.14	8/27/12	50.06	1099.94
D.Starns		1064.50	3/29/12	8.58	1055.92	8/27/12	21.61	1042.89
Frahm		1146.00	3/29/12	54.25	1091.75	8/27/12	55.80	1090.20
Hanson		1144.40	3/29/12	48.62	1095.78	8/27/12	49.69	1094.71
LPN 06-01		1066.68	3/29/12	1.62	1065.06	8/27/12	4.28	1062.40
LPN 06-18		1088.45	3/29/12	1.91	1086.54	8/27/12	5.56	1082.89
LPN 06-19		1140.81	3/29/12	35.93	1104.88	8/27/12	44.70	1096.11
LPN 06-20		1208.77	3/29/12	58.76	1150.01	8/27/12	60.44	1148.33
LPN 06-21		1204.53	3/29/12	49.25	1155.28	8/27/12	60.07	1144.46
M90-01		1074.38	3/29/12	2.42	1071.96	8/27/12	6.20	1068.18
M90-02		1075.70	3/29/12	4.36	1071.34	8/27/12	6.87	1068.83
M90-04		1071.08	3/29/12	2.85	1068.23	8/27/12	6.16	1064.92
M90-05R		1076.50	3/29/12	10.19	1066.31	8/27/12	12.53	1063.97
M90-09		1067.97	3/29/12	3.32	1064.65	8/27/12	6.01	1061.96
M90-12R		1070.00	3/29/12	6.17	1063.83	8/27/12	10.38	1059.62
M90-15		1065.39	3/29/12	4.75	1060.64	8/27/12	7.67	1057.72
M90-16R		1063.57	3/29/12	2.45	1061.12	8/27/12	7.23	1056.34
M90-17R		1067.54	3/29/12	7.31	1060.23	8/27/12	13.65	1053.89

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2012 Containment Evaluation
Former Nebraska Ordnance Plant

Location ID	Zone Designation	Top of Casing (TOC) Elevation (ft AMSL)	Date	Depth to Water from TOC (feet) or flow (gpm) March 2012	Groundwater Elevation (ft AMSL) March 2012	Date	Depth to Water from TOC (feet) or flow (gpm) August 2012	Groundwater Elevation (ft AMSL) August 2012
M90-20R		1066.45	3/29/12	7.93	1058.52	8/27/12	10.93	1055.52
M90-21		1064.09	3/29/12	6.81	1057.28	8/27/12	8.92	1055.17
M90-22R		1063.17	3/29/12	6.43	1056.74	8/27/12	16.87	1046.30
M90-23R		1056.70	3/29/12	3.34	1053.36	8/27/12	19.69	1037.01
M90-24R		1059.05	3/29/12	8.22	1050.83	8/27/12	18.04	1041.01
M90-26R		1057.07	3/29/12	3.98	1053.09	8/27/12	8.97	1048.10
M90-36R		1059.30	3/29/12	6.07	1053.23	8/27/12	8.65	1050.65
M90-37		1054.19	3/29/12	2.33	1051.86	8/27/12	5.26	1048.93
MUD 90-10		1099.56	3/29/12	8.49	1091.07	8/27/12	12.60	1086.96
MUD 94-3		1085.52	3/29/12	6.25	1079.27	8/27/12	8.49	1077.03
MUD 94-4		1094.81	3/29/12	9.95	1084.86	8/27/12	12.83	1081.98
MUD 94-5		1097.79	3/29/12	4.40	1093.39	8/27/12	8.25	1089.54
MUD 94-6		1085.55	3/29/12	2.73	1082.82	8/27/12	6.00	1079.55
MUD 94-7		1083.07	3/29/12	7.14	1075.93	8/27/12	10.28	1072.79
N.Keiser		1104.20	3/29/12	22.95	1081.25	8/27/12	24.32	1079.88
N.Wann		1107.30	3/29/12	3.17	1104.13	8/27/12	5.54	1101.76
PV-37		1100.90	3/29/12	9.85	1091.05	8/27/12	14.52	1086.38
PV-38		1100.00	3/29/12	5.20	1094.80	8/27/12	8.30	1091.70
PV-39		1084.00	3/29/12	1.15	1082.85	8/27/12	3.95	1080.05
PV-40		1088.90	3/29/12	7.89	1081.01	8/27/12	10.08	1078.82
PV-41		1096.20	3/29/12	5.09	1091.11	8/27/12	8.97	1087.23
S.Keiser		1114.20	3/29/12	33.78	1080.42	8/27/12	35.40	1078.80
TV-16		1140.30	3/29/12	45.68	1094.62	8/27/12	47.52	1092.78
TV-17A		1137.75	3/29/12	50.00	1087.75	8/27/12	53.20	1084.55
13N_10E32ADDD1_M90-30R		1055.83(1)	3/6/12	3.74	1052.09	8/27/12	9.44	1046.39
13N_10E32DBBA1_M28R_ISLAND_NORTH_WELL		1057.81(1)	3/14/12	3.67	1054.14	8/27/12	6.48	1051.33
13N_10E32DCAA1_M91-58R		1056.35(3)	3/14/12	10.61	1045.74	9/5/12	14.14	1042.21
13N_10E32DCAC1_M90-29R		1054.43(3)	3/14/12	8.31	1046.12	9/5/12	12.25	1042.18
13N_10E32DCAD1_M91-50R		1055.84(1)	3/14/12	15.61	1040.23	8/27/12	16.32	1039.52
13N_10E32DDBC1_M91-54R		1055.34(1)	3/14/12	10.07	1045.27	9/5/12	14.77	1040.57
14N_8E14CC1		1175.85(5)	3/29/12	NM	NM	8/27/12	NM	NM
14N_8E24ACD2_MEAD		1175.09(5)	3/9/12	40.21	1134.88	8/27/12	NM	NM
14N_8E27BAAB1		1167.67(5)	3/29/12	34.50	1133.17	8/27/12	NM	NM

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2012 Containment Evaluation
Former Nebraska Ordnance Plant

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14N_8E2ADDA1		1205 (2)	3/29/12	25.18	1179.82	8/27/12	NM	NM
14N_8E36DD1		1151.80(5)	NM	NM	NM	8/27/12	NM	NM
14N_8E3AACC1		1194.51(5)	3/28/12	19.05	1175.46	8/27/12	NM	NM
14N_9E20DD1		1160.64(5)	NM	NM	NM	8/27/12	NM	NM
14N_9E26CBAB1		1082 (2)	3/29/12	1.15	1080.85	8/27/12	NM	NM
14N_9E32DD1		1137.03(5)	NM	NM	NM	8/27/12	NM	NM

Notes:
AMSL - Above mean sea level
ft- feet
gpm - gallons per minute
NM - No Measurement
TOC - Top of Casing
(1) Ground surface elevation from Lincoln Water Service
(2) Ground surface elevation from USGS reference elevation
(3) Ground surface elevation from Digital Elevation Model
(4) Location from Nebraska Department of Natural Resourses registration database
(5) Location and ground surface elevation from USACE survey
(6) Location from USGS on-line water level database

USGS Source: http://nwis.waterdata.usgs.gov/ne/nwis/gwlevels?search_criteria=search_station_nm&submitted_form=introduction

Table 3-2
2012 Vertical Gradient Directions and Values, March 2012 and August 2012
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Monitoring Event	Vertical Flow Direction	Flow Between Shallow Zone and Intermediate Zone		Flow Between Intermediate Zone and Deep Zone	
		Well Cluster	Gradient*	Well Cluster	Gradient*
March 2012	Downward Flow	MW-84	0.022	MW-124	0.024
		MW-154	0.029	MW-84	0.032
		MW-53	0.032	MW-95	0.039
		MW-54	0.054	MW-108	0.067
	Upward Flow	MW-44	-0.058	MW-135	-0.043
		MW-52	-0.027	MW-134	-0.021
		MW-108	-0.021		
August 2012	Downward Flow	MW-106	0.024	MW-133	0.020
		MW-84	0.024	MW-124	0.022
		MW-154	0.037	MW-84	0.030
		MW-53	0.064	MW-97	0.034
		MW-54	0.073	MW-95	0.052
		MW-56	0.078		
		MW-108	0.087		
		MW-107	0.092		
	Upward Flow	MW-44	-0.191	MW-135	-0.039
		MW-156	-0.119		
		MW-97	-0.023		

* Positive gradient indicates downward flow between the two zones. Negative gradient indicates upward flow between the two zones.
MW = monitoring well

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Table 3-3
Extraction Well Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska
(gallons per minute)

Month	EW-01/ EW-01R	EW-02	EW-03	EW-04	EW-05	EW-06	EW-07	EW-08	EW-09	EW-10	FEW-11	EW-12	EW-13	FEW-14	FEW-15	EW-16	Total
Feb-02	185	175	236	132	252	306	331	316	268	428	0	0	0	0	0	0	2,629
Mar-02	181	175	227	132	251	305	329	322	263	420	0	0	0	0	0	0	2,605
Apr-02	180	175	228	124	250	307	328	324	261	419	0	0	0	0	0	0	2,596
May-02	179	175	220	119	251	310	328	319	250	418	0	0	0	0	0	0	2,569
Jun-02	177	174	220	120	249	309	328	320	250	414	0	0	0	0	0	0	2,561
Jul-02	175	176	220	123	250	311	330	321	231	410	0	0	0	0	0	0	2,547
Aug-02	174	175	221	120	250	309	330	322	231	409	0	0	0	0	0	0	2,541
Nov-02	171	175	220	115	250	314	320	323	226	376	0	0	0	0	0	0	2,490
Feb-03	168	175	220	110	249	294	315	319	221	379	0	0	0	0	0	0	2,450
May-03	164	174	219	109	250	290	314	312	216	380	0	0	0	0	0	0	2,428
Aug-03	160	173	218	105	251	292	299	310	215	392	0	0	0	0	0	0	2,415
Nov-03	154	169	221	107	249	280	300	312	215	396	0	0	0	0	0	0	2,403
Mar-04	148	168	220	117	245	264	299	310	210	375	0	0	0	0	0	0	2,356
Apr-04	148	168	219	116	244	253	280	310	185	374	0	0	0	0	0	0	2,297
Aug-04	198	150	220	122	250	276	298	335	194	401	0	0	0	0	0	0	2,444
Oct-04	200	150	220	119	248	260	302	336	185	400	0	0	0	0	0	0	2,420
Jan-05	197	151	220	115	249	240	274	338	180	406	0	0	0	0	0	0	2,370
May-05	200	151	219	110	252	233	264	333	180	409	0	0	0	0	0	0	2,351
Aug-05	197	150	219	105	251	276	305	305	178	401	0	0	0	0	0	0	2,387
Oct-05	187	150	220	104	249	276	304	304	171	396	0	0	0	0	0	0	2,361
Jan-06	177	149	219	105	229	252	308	305	158	345	0	0	0	0	0	0	2,247
Feb-06	163	143	209	95	210	231	294	291	143	228	0	0	0	0	0	0	2,006
Mar-06	171	153	223	89	225	255	316	314	152	270	0	350	0	0	0	0	2,517
Apr-06	156	142	207	98	221	243	294	292	141	276	0	275	0	0	0	0	2,343
May-06	157	148	216	103	229	250	312	306	145	308	0	303	0	0	0	0	2,477
Jun-06	85	111	208	90	210	215	284	277	138	289	0	268	0	0	0	0	2,174
Jul-06	134	99	215	83	211	275	302	295	144	351	0	323	0	0	0	0	2,434
Aug-06	74	54	215	102	201	245	308	296	125	289	0	321	0	0	0	0	2,230
Sep-06	220	119	205	109	191	252	300	281	129	284	0	306	0	0	0	0	2,395
Oct-06	234	149	217	115	201	268	303	299	137	303	0	318	0	0	0	0	2,543
Nov-06	204	148	122	96	128	168	194	298	86	181	0	316	0	0	0	0	1,943
Dec-06	183	138	130	81	76	268	281	269	148	260	0	263	0	0	0	0	2,096
Jan-07	211	151	168	84	155	260	294	297	137	273	0	307	0	0	0	0	2,336
Feb-07	198	147	243	81	194	250	290	290	129	255	0	300	0	0	0	0	2,377
Mar-07	187	140	186	79	149	253	288	279	121	248	0	280	0	0	0	0	2,210
Apr-07	188	148	253	81	181	261	308	287	96	195	0	313	0	0	0	0	2,310
May-07	140	139	139	72	181	253	269	281	109	274	0	249	0	0	0	0	2,106
Jun-07	202	153	261	80	218	270	321	278	157	398	0	182	0	0	0	0	2,519
Jul-07	202	149	247	65	214	264	310	290	154	402	0	329	0	0	0	0	2,624
Aug-07	184	137	231	73	191	231	274	255	127	214	0	238	0	0	0	0	2,156
Sep-07	190	145	247	79	199	251	292	0	146	381	0	315	0	0	0	0	2,245
Oct-07	190	152	255	81	131	232	296	0	148	405	0	320	0	0	0	0	2,211
Nov-07	116	154	261	77	207	259	301	0	151	402	0	325	0	0	0	0	2,252
Dec-07	193	154	262	70	204	255	299	0	150	401	0	324	0	0	0	0	2,312
Jan-08	168	138	238	59	185	231	286	36	138	387	0	313	0	0	0	0	2,178
Feb-08	177	148	258	64	193	244	293	63	147	395	0	324	0	0	0	0	2,306
Mar-08	181	152	263	65	183	145	177	0	87	391	236	305	0	0	0	0	2,185
Apr-08	181	156	266	68	169	256	314	0	156	418	441	325	0	0	0	0	2,752
May-08	167	147	249	64	148	239	292	0	143	380	459	323	0	0	0	0	2,612
Jun-08	160	148	246	69	186	238	277	0	144	351	328	320	0	0	0	0	2,465
Jul-08	166	159	279	78	210	270	304	0	160	414	277	321	0	0	0	0	2,639
Aug-08	160	156	266	77	210	267	309	0	161	418	542	324	0	0	0	0	2,889
Sep-08	156	154	270	73	206	263	245	0	160	414	545	323	0	0	0	0	2,808
Oct-08	96	154	272	66	202	258	261	0	159	388	495	320	0	0	0	0	2,672
Nov-08	48	160	282	44	205	264	319	0	164	417	562	324	0	0	0	0	2,789
Dec-08	81	156	280	61	203	254	313	0	158	267	548	314	0	0	0	0	2,635

Table 3-3
Extraction Well Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska
(gallons per minute)

Month	EW-01/ EW-01R	EW-02	EW-03	EW-04	EW-05	EW-06	EW-07	EW-08	EW-09	EW-10	FEW-11	EW-12	EW-13	FEW-14	FEW-15	EW-16	Total
Jan-09	185	151	279	93	200	265	322	0	166	419	542	308	0	0	0	0	2,932
Feb-09	185	85	260	86	118	245	314	0	159	442	585	313	0	0	0	0	2,794
Mar-09	169	0	201	93	0	184	231	0	112	268	467	321	0	0	0	0	2,044
Apr-09	189	0	233	92	0	212	237	0	134	304	476	307	0	0	0	0	2,183
May-09	178	0	217	93	0	203	227	0	125	305	379	301	0	0	0	0	2,028
Jun-09	186	0	276	91	0	259	298	0	165	399	480	317	0	165	0	140	2,776
Jul-09	172	0	290	88	0	65	302	0	139	406	520	212	0	184	0	94	2,470
Aug-09	168	0	274	73	0	63	216	0	137	569	441	175	0	186	0	90	2,391
Sep-09	169	0	263	77	0	74	278	0	131	203	491	196	0	176	0	88	2,145
Oct-09	177	0	275	78	0	68	293	0	142	385	530	269	0	188	0	90	2,495
Nov-09	173	0	257	81	0	70	288	0	126	386	526	321	0	188	0	90	2,505
Dec-09	147	0	263	68	0	63	254	0	122	345	426	260	0	164	0	81	2,192
Jan-10	160	0	286	76	0	76	277	0	133	377	477	273	0	179	9	88	2,411
Feb-10	155	0	294	79	0	78	287	0	135	315	533	303	0	187	0	87	2,454
Mar-10	151	0	290	77	0	62	282	0	140	0	506	320	0	185	0	84	2,098
Apr-10	148	0	299	78	0	56	288	0	144	0	523	322	0	191	110	85	2,244
May-10	143	0	302	77	0	57	292	0	147	0	533	320	0	194	329	87	2,482
Jun-10	140	0	302	76	0	48	261	0	131	0	173	306	0	195	340	92	2,066
Jul-10	131	0	297	75	0	53	294	0	140	0	347	294	0	194	345	105	2,275
Aug-10	109	0	303	76	0	53	300	0	146	0	391	277	0	204	372	105	2,335
Sep-10	138	0	294	75	0	54	292	0	144	0	285	291	0	202	246	117	2,137
Oct-10	166	0	273	71	0	59	274	0	126	0	536	237	0	205	221	111	2,279
Nov-10	121	0	177	39	0	45	292	0	146	0	547	120	0	205	495	105	2,292
Dec-10	168	0	229	78	0	50	288	0	142	0	534	255	0	171	480	90	2,485
Jan-11	162	0	293	94	0	58	287	0	141	0	534	306	0	188	489	103	2,656
Feb-11	176	0	297	95	0	58	292	0	143	0	535	323	0	192	487	101	2,699
Mar-11	176	0	299	95	0	59	292	0	144	0	489	323	0	194	496	98	2,664
Apr-11	171	0	290	93	0	55	284	0	140	0	512	310	0	189	474	95	2,613
May-11	179	0	303	98	0	57	277	0	145	0	518	315	0	195	344	96	2,526
Jun-11	141	0	293	93	0	62	270	0	135	0	432	306	0	186	304	95	2,317
Jul-11	190	0	296	97	0	61	289	0	130	0	501	306	0	190	297	99	2,454
Aug-11	214	0	297	97	0	52	172	0	84	0	245	291	0	189	319	98	2,059
Sep-11	196	0	298	93	0	50	285	0	140	0	514	279	0	192	458	97	2,601
Oct-11	196	0	297	93	0	50	288	0	140	0	543	292	0	192	497	105	2,692
Nov-11	140	0	297	88	0	50	281	0	140	0	494	120	0	191	317	101	2,219
Dec-11	199	0	290	96	0	50	286	0	135	0	540	261	0	182	493	99	2,631
Jan-12	200	0	300	89	0	50	287	0	139	0	546	313	0	183	528	99	2,734
Feb-12	97	0	290	95	0	48	279	0	135	0	515	306	0	183	487	96	2,531
Mar-12	250	0	290	93	0	48	276	0	135	0	513	319	0	184	485	96	2,688
Apr-12	198	0	289	93	0	51	280	0	133	0	518	296	0	179	466	105	2,608
May-12	196	0	292	92	0	50	280	0	130	0	522	309	0	186	476	99	2,631
Jun-12	199	0	298	94	0	51	284	0	142	0	517	316	0	188	467	98	2,653
Jul-12	199	0	298	94	0	50	284	0	129	0	N/A	307	0	190	487	93	2,130
Aug-12	197	0	295	75	0	50	282	0	134	0	312	120	0	184	483	94	2,228
Sep-12	165	0	247	77	0	41	240	0	118	0	391	175	0	156	451	82	2,143
Oct-12	194	0	299	90	0	50	281	0	144	0	508	237	0	176	447	90	2,514
Nov-12	200	0	299	76	0	49	287	0	136	0	280	210	0	180	444	100	2,259
Dec-12	185	0	260	64	0	44	264	0	137	0	455	210	0	173	415	91	2,297

Notes:
N/A - Not available
EW - Extraction Well
FEW - Focused Extraction Well
Values reported from 2006 -2012 are the cumulative monthly average, calculated by the total gallons pumped in a time period divided by the total number of minutes in that time period

Figures

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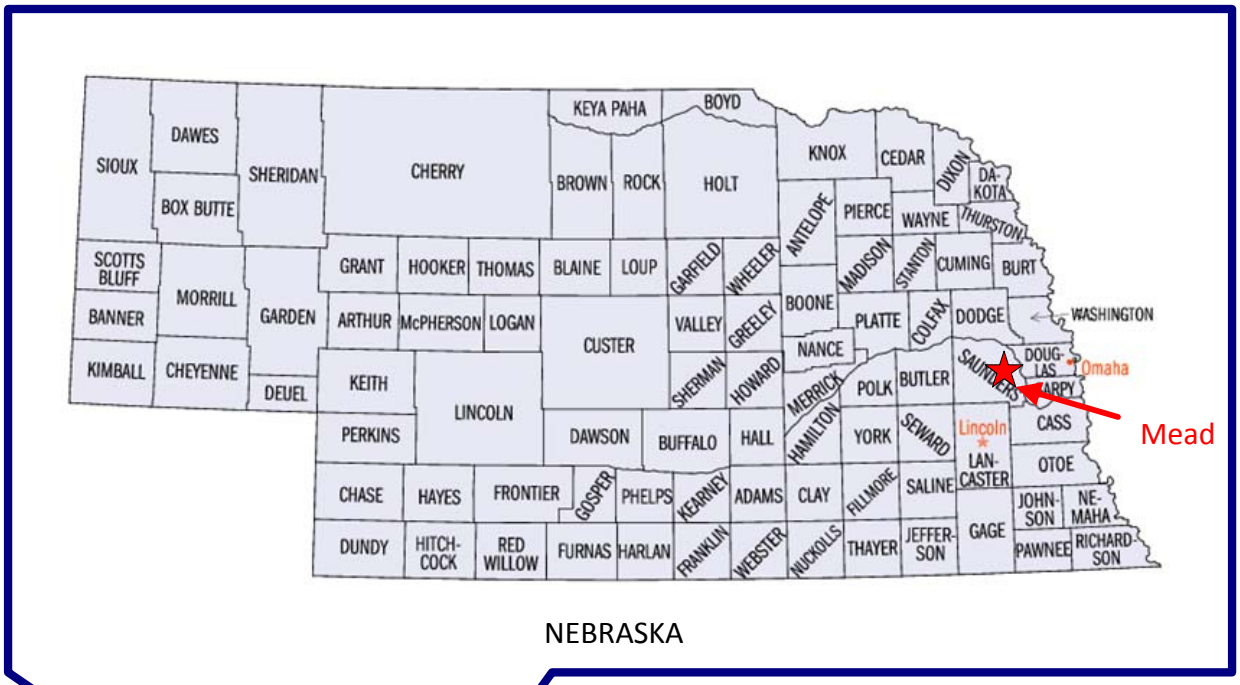

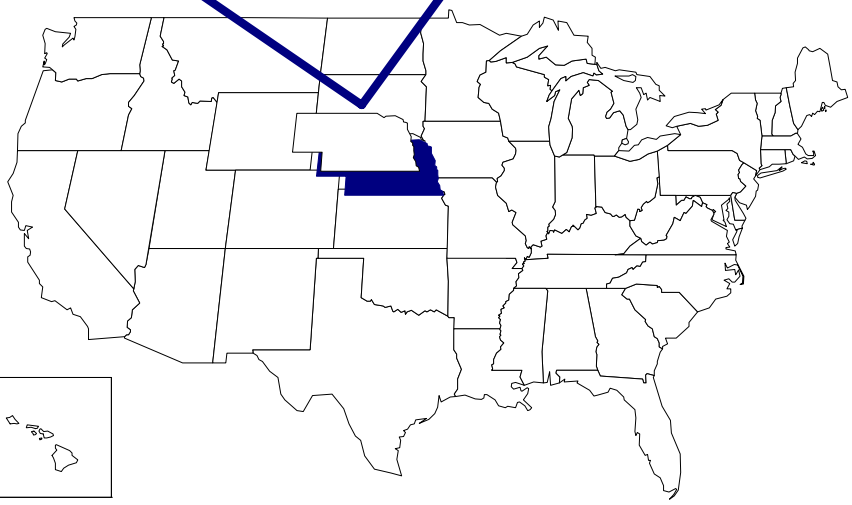

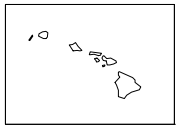

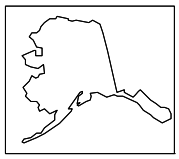

US Army Corps of Engineers ®
Kansas City District

Designed by: DM	FORMER NEBRASKA ORDNANCE PLANT MEAD, NEBRASKA	
Drawn by: ROW	Site Location Map	
Checked by: BB		
Submitted by: MJ	Drawing No: Figure 1-1	Date: 1/8/2010

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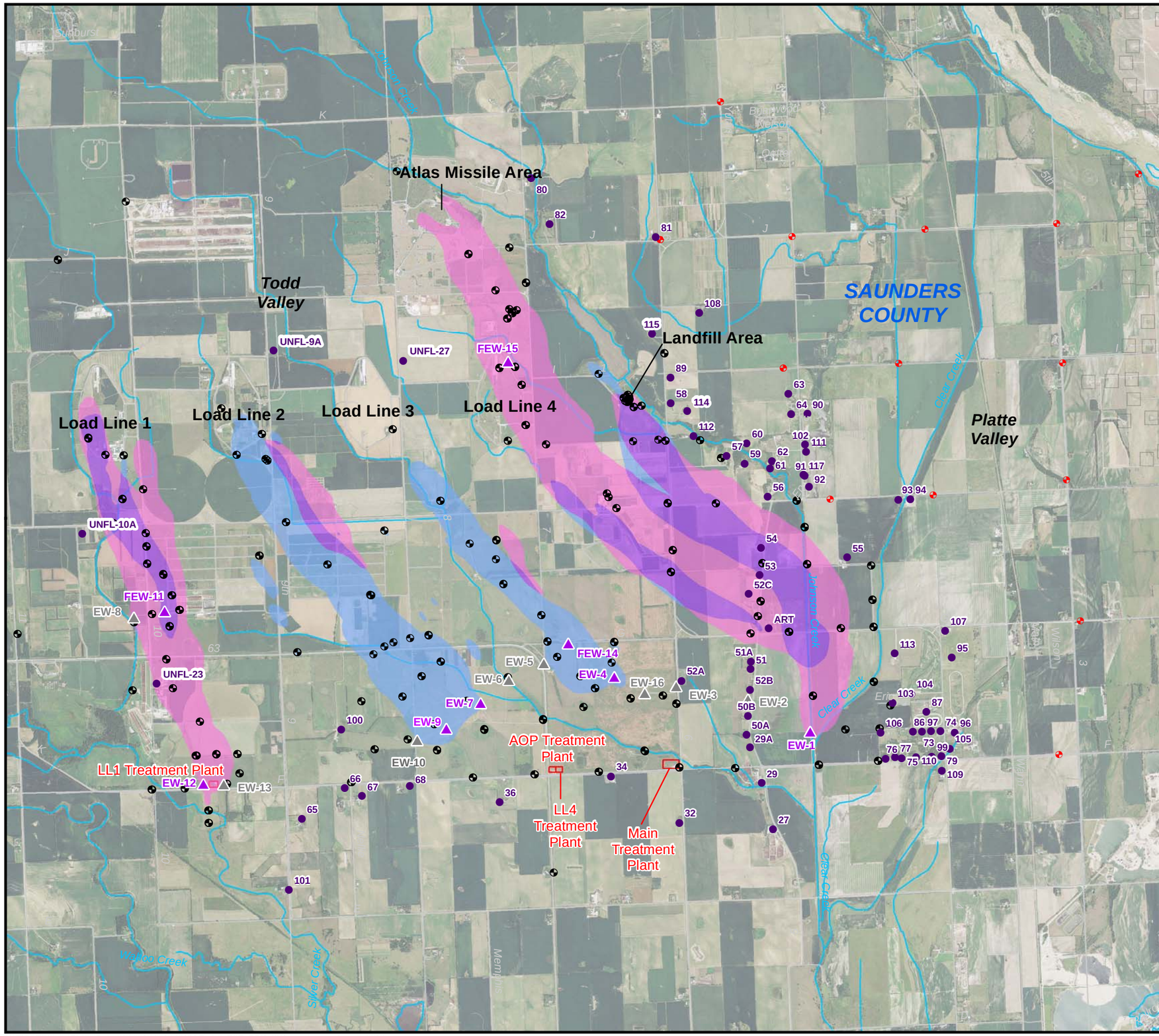

Legend

- USACE Extraction Well - Active
- USACE Extraction Well - Inactive
- USACE Monitoring Well
- Water Supply Well
- Metropolitan Utility District Monitoring Well
- Approximate Area of TCE at a Concentration of 5 ug/L or Greater (2012)
- Approximate Area of RDX at a Concentration of 2 ug/L or Greater (2012)
- Approximate Area of Both TCE at a Concentration of 5 ug/L or Greater and RDX at a Concentration of 2 ug/L or Greater (2012)
- Treatment Plant
- Metropolitan Utility District Extraction Well

Notes:

1. TCE and RDX Plume Delineations for 2012 are based on Groundwater Monitoring Program Data, Direct-Push Data, and other Data. The Plume Delineations represent a Combination of the Shallow Zone Data and the Intermediate Zone Data.

2. EW-3, EW-6 and EW-16 shown as inactive were turned off January 1, 2013

TCE - trichloroethene

RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine

ug/L - micrograms per liter

USACE - United States Army Corps of Engineers

2012 Aerial Photography
Saunders County
USDA-APFO NAIP

0 4,000
SCALE IN FEET

N

US Army Corps of Engineers
Kansas City District

Figure 1-2

TCE and RDX in Groundwater

2012 Containment Evaluation
Former NOP

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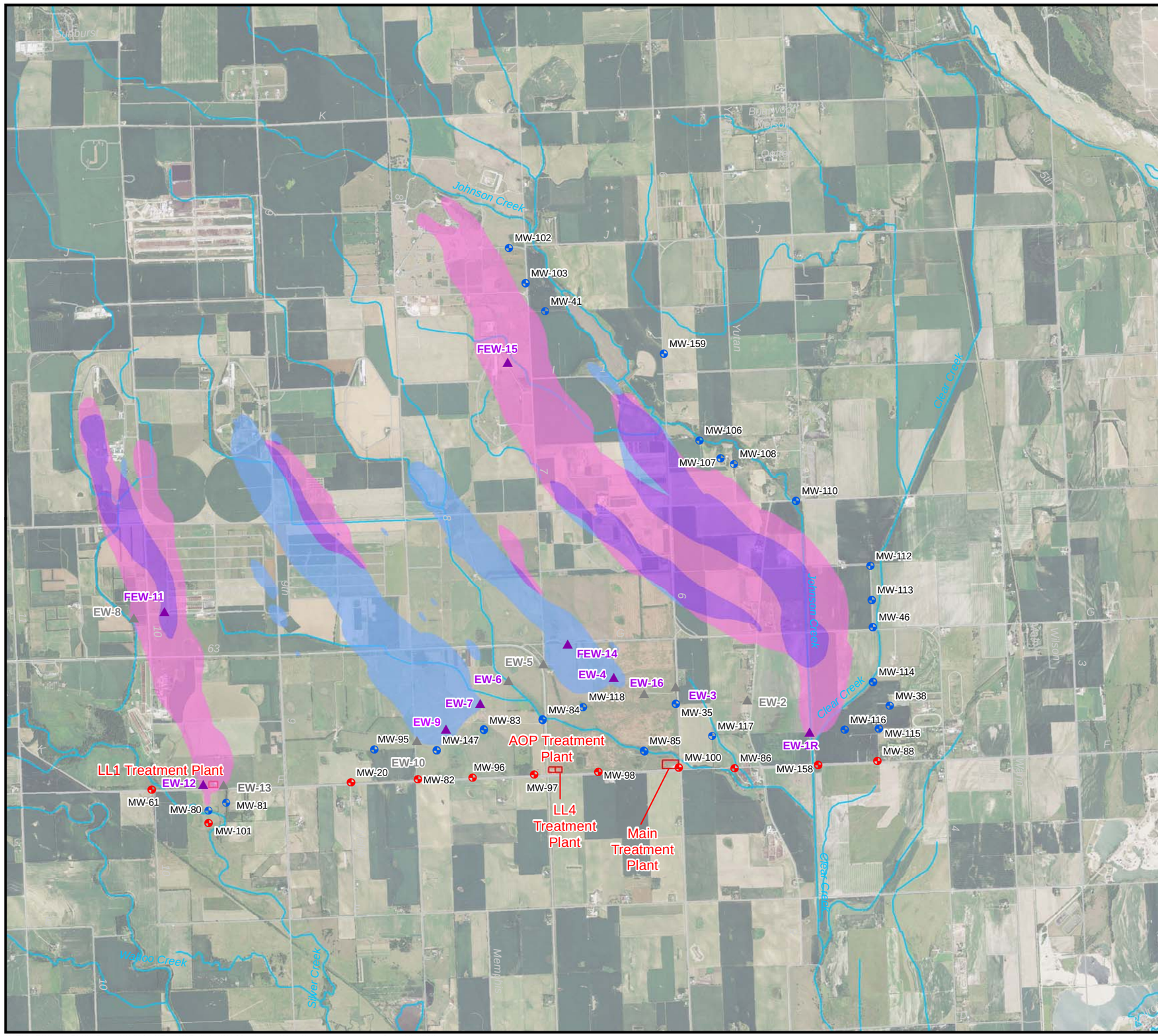

Legend

- Compliance Monitoring Well
- Perimeter Monitoring Well
- Extraction Well - Active
- Extraction Well - Inactive
- Approximate Area of TCE at a Concentration of 5 ug/L or Greater (2012)
- Approximate Area of RDX at a Concentration of 2 ug/L or Greater (2012)
- Approximate Area of Both TCE at a Concentration of 5 ug/L or Greater and RDX at a Concentration of 2 ug/L or Greater (2012)
- Treatment Plant

Notes:

1. TCE and RDX plume delineations for 2012 (ECC & B&McD, 2012) are based on Groundwater Monitoring Program data, Direct-Push data, and other data. The plume delineations represent a combination of the Shallow Zone data and the Intermediate Zone data.
2. EW-3, EW-6 and EW-16 shown as inactive were turned off January 1, 2013.

TCE - trichloroethene

RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine

ug/L - micrograms per liter

NOP - Nebraska Ordnance Plant

2012 Aerial Photography
Saunders County
USDA-APFO NAIP

0 4,000
SCALE IN FEET

N

US Army Corps of Engineers
Kansas City District

Figure 2-1

Groundwater Monitoring Well Clusters Evaluated

2012 Containment Evaluation
Former NOP

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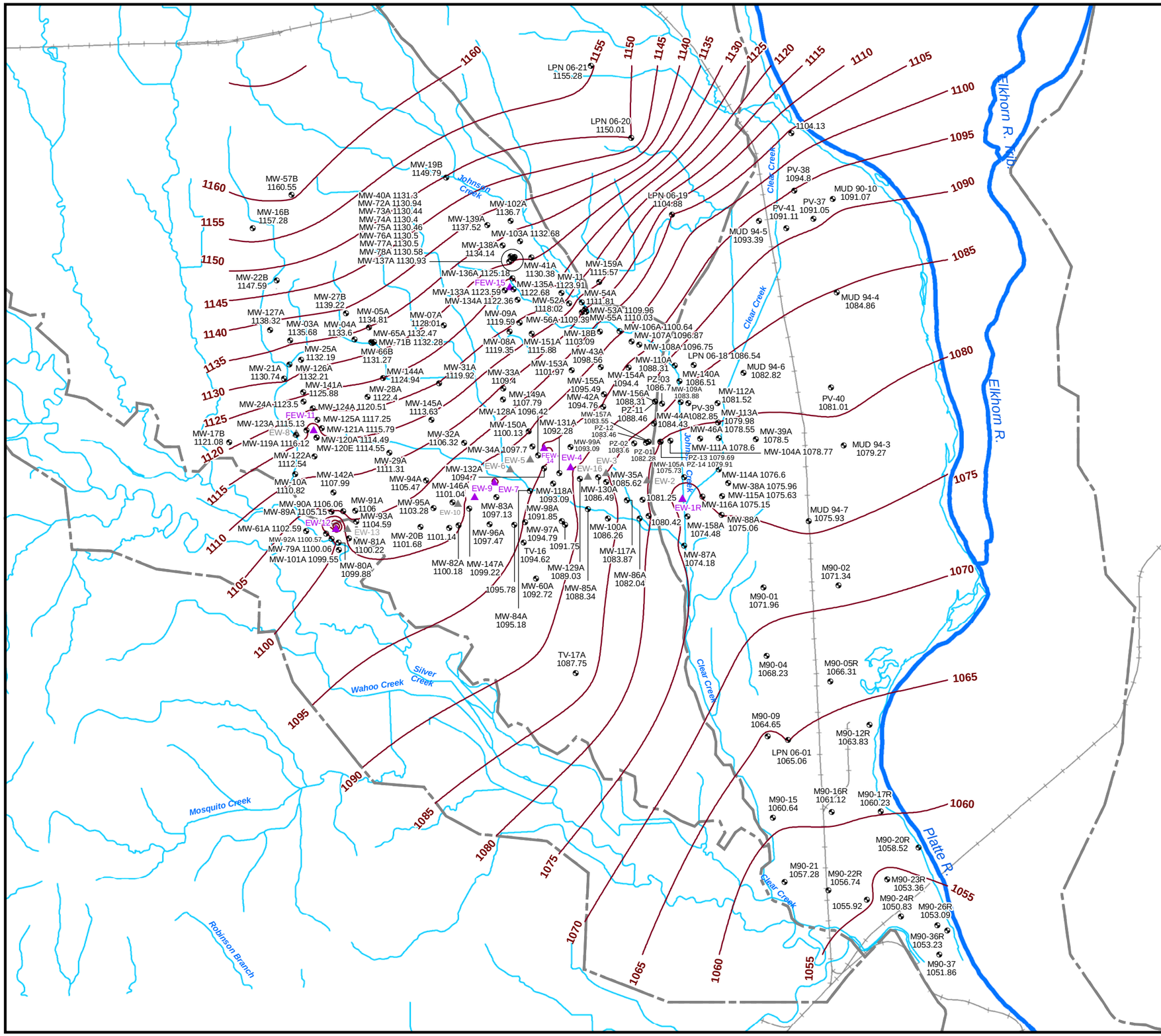

Legend

- Monitoring Well with March 2012 Water Level (Feet Above Mean Sea Level)
- USACE Extraction Well - Inactive
- USACE Extraction Well (Active)
- March 2012 Groundwater Contour in Feet Above Mean Sea Level (Contour Interval 5 Feet)
- Basin Boundaries

Notes:

1. Observation well data were not plotted on this map; however, they were used in its construction.
2. March 2012 data collected on 3/29/12.

NOP - Nebraska Ordnance Plant

USACE - United States Army Corps of Engineers

N

0 7,000 14,000

SCALE IN FEET

US Army Corps of Engineers
Kansas City District

Figure 3-1

Interpreted Potentiometric Surface Intermediate Zone - March 2012
2012 Containment Evaluation
Former NOP

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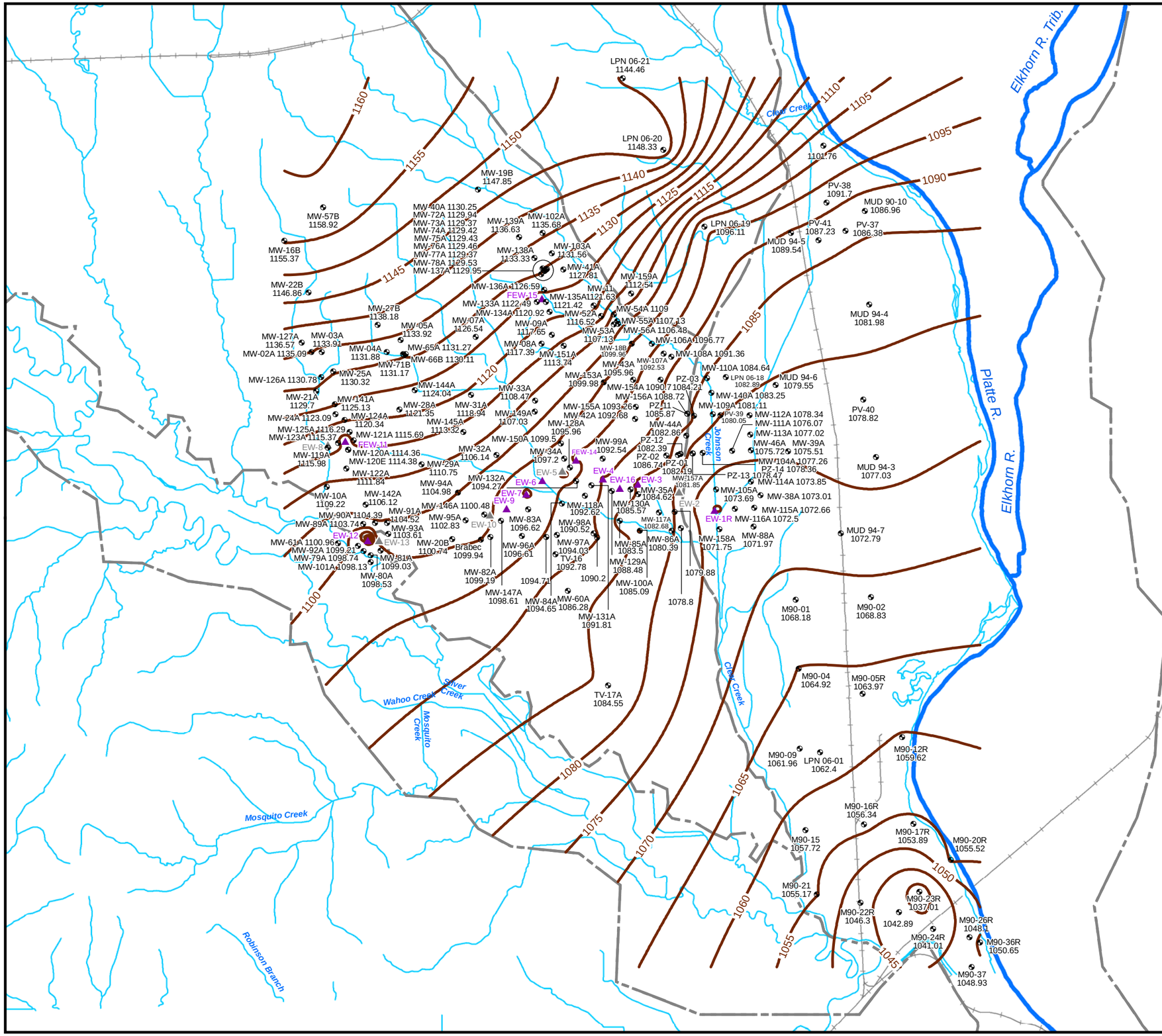

Legend

- 2012_WaterLevels
- USACE Extraction Well - Active
- USACE Extraction Well - Inactive
- August 2012 Groundwater Contour in Feet Above Mean Sea Level (Contour Interval 5 Feet)
- Basin Boundaries

Notes:

1. Observation well data were not plotted on this map; however, they were used in its construction.
2. August 2012 data collected on 8/27/12

NOP - Nebraska Ordnance Plant

USACE - United States Army Corps of Engineers

US Army Corps of Engineers ®
Kansas City District

Figure 3-2

Interpreted Potentiometric Surface
Intermediate Zone - August 2012
2012 Containment Evaluation
Former NOP

K:\ENV\ECC\site\51469\Data\GIS\2013\CE 2012\Fig3-2_Interpreted_Potentiometric_Surface_ Aug26_2012.mxd jmf sos April 10, 2013

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Appendix A
Concentration Trend Charts for Compliance Monitoring Wells

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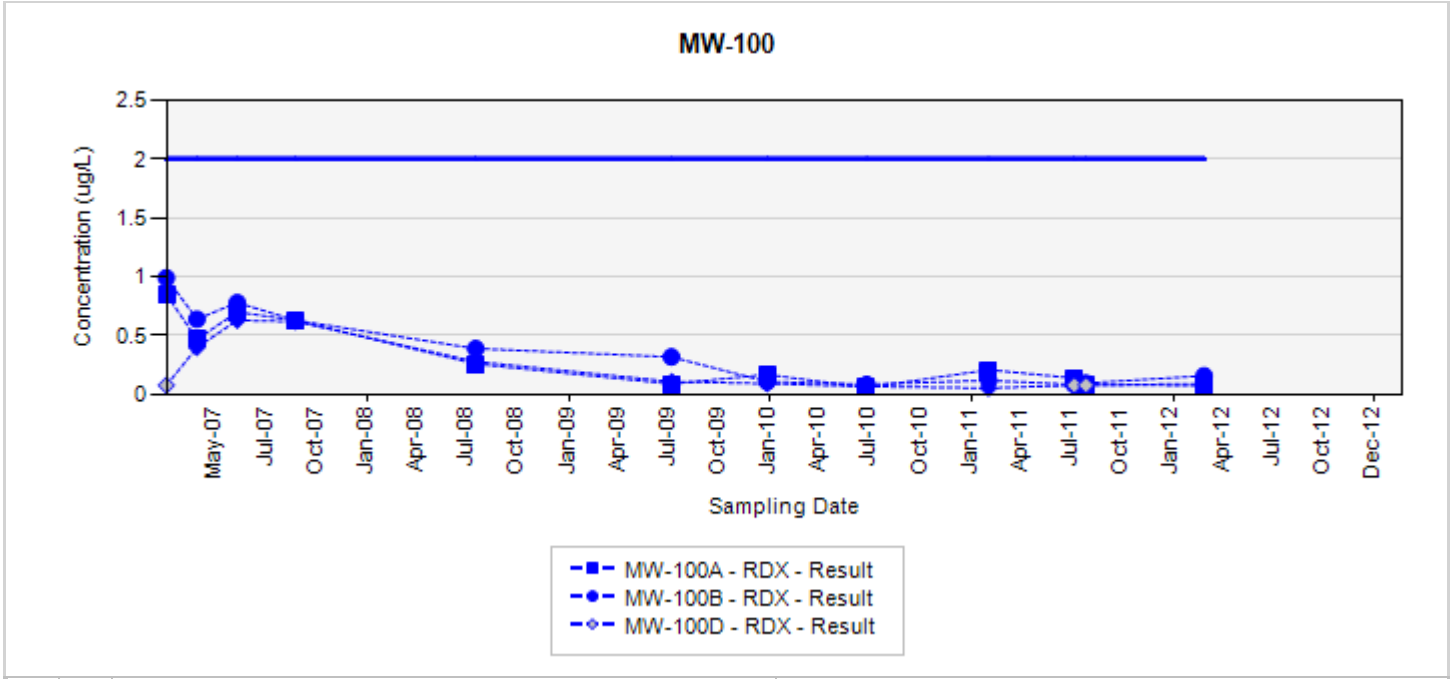
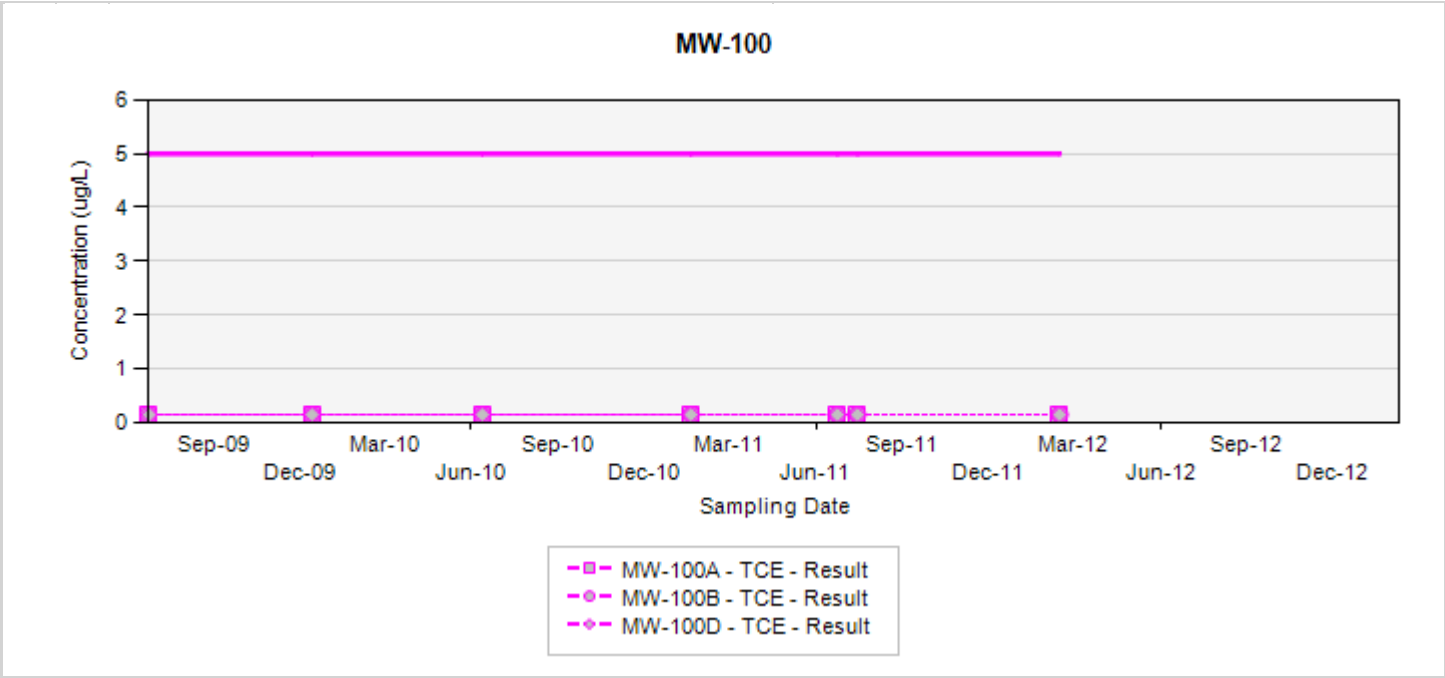
Appendix A
Concentration Trend Charts for Compliance Monitoring Wells



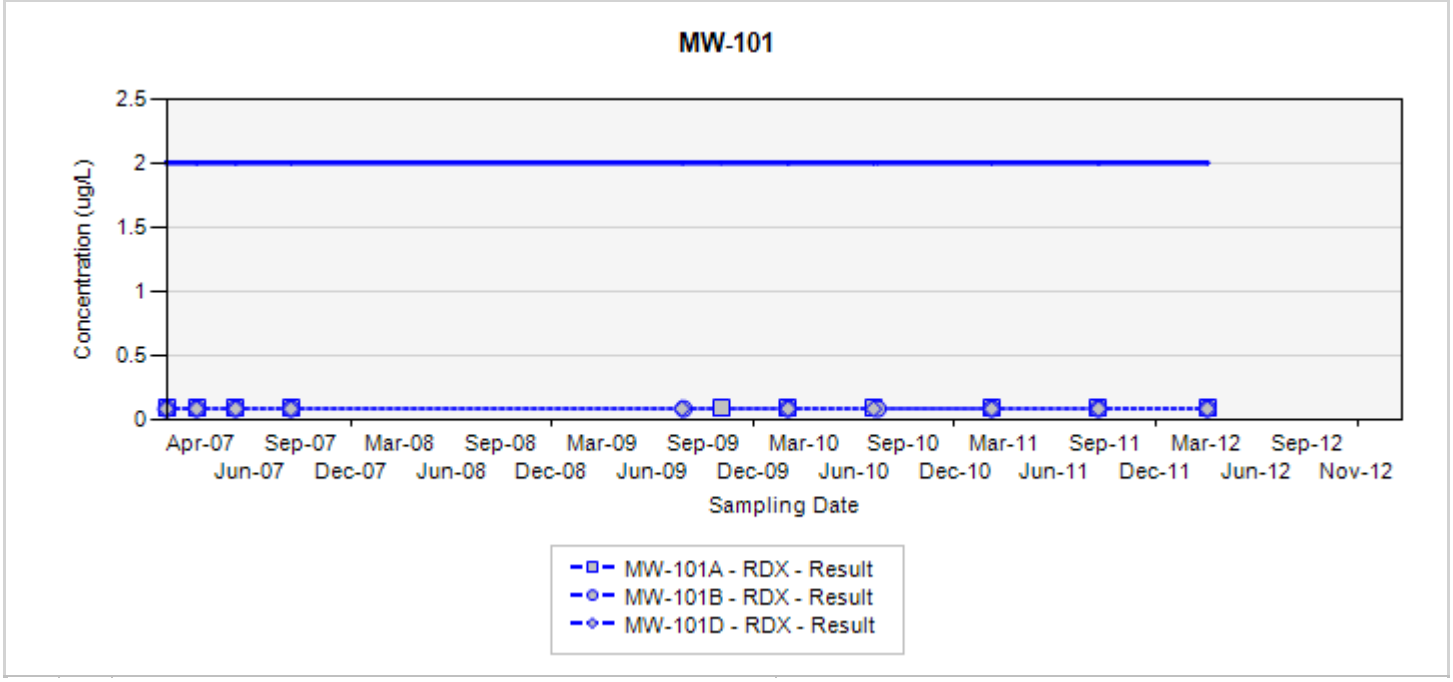


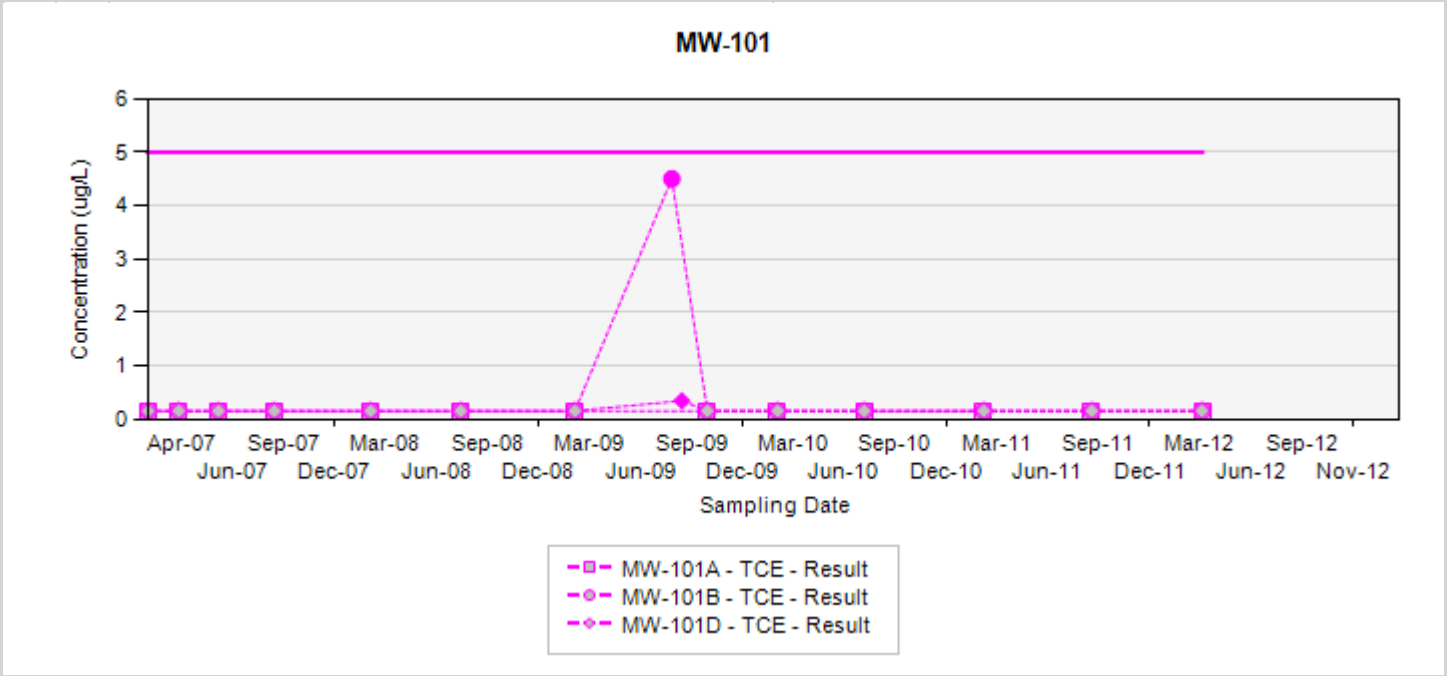
TCE - trichloroethene
RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine
Final Target Groundwater Cleanup Goals for TCE is 5 UG/L
Final Target Groundwater Cleanup Goals for RDX is 2 UG/L

In the event that both a normal sample and a field duplicate were collected, the higher of the two results will be displayed on the chart

ug/L: micrograms per liter
Silver markers indicate non-detected results

Appendix A
Concentration Trend Charts for Compliance Monitoring Wells





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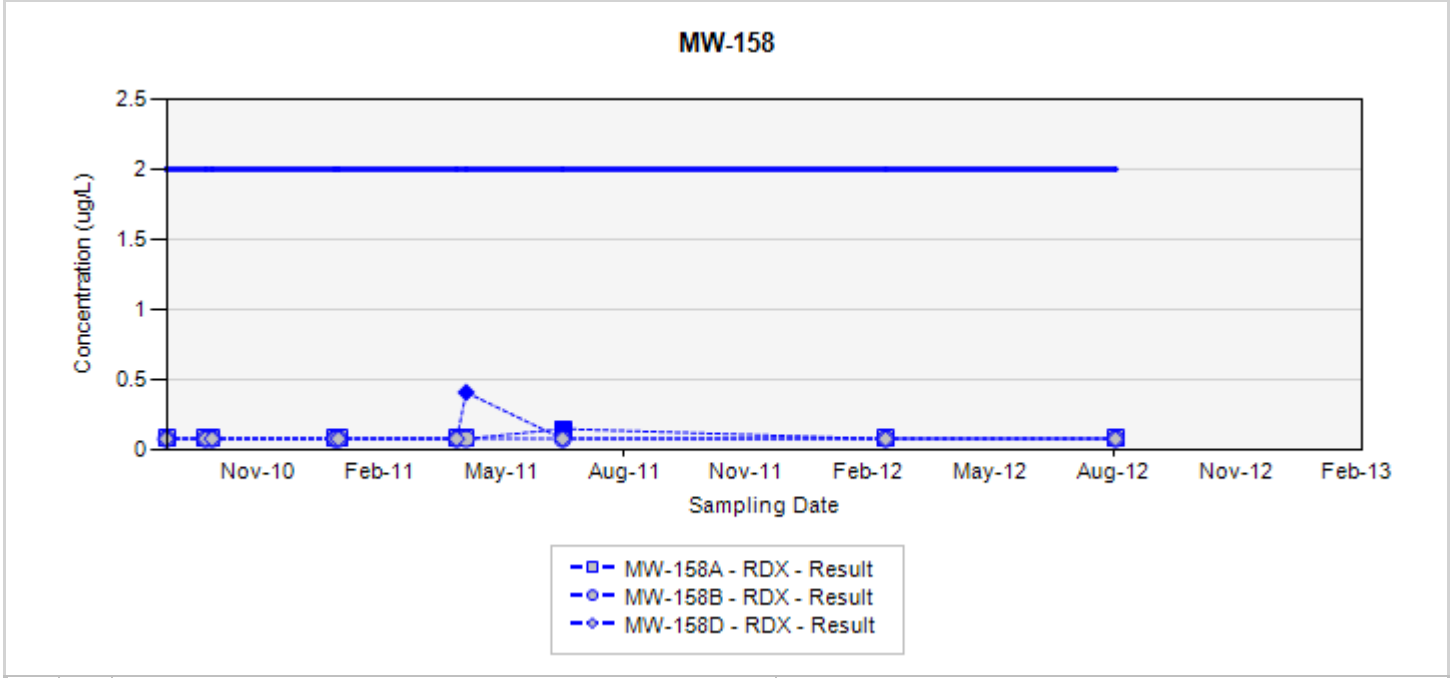

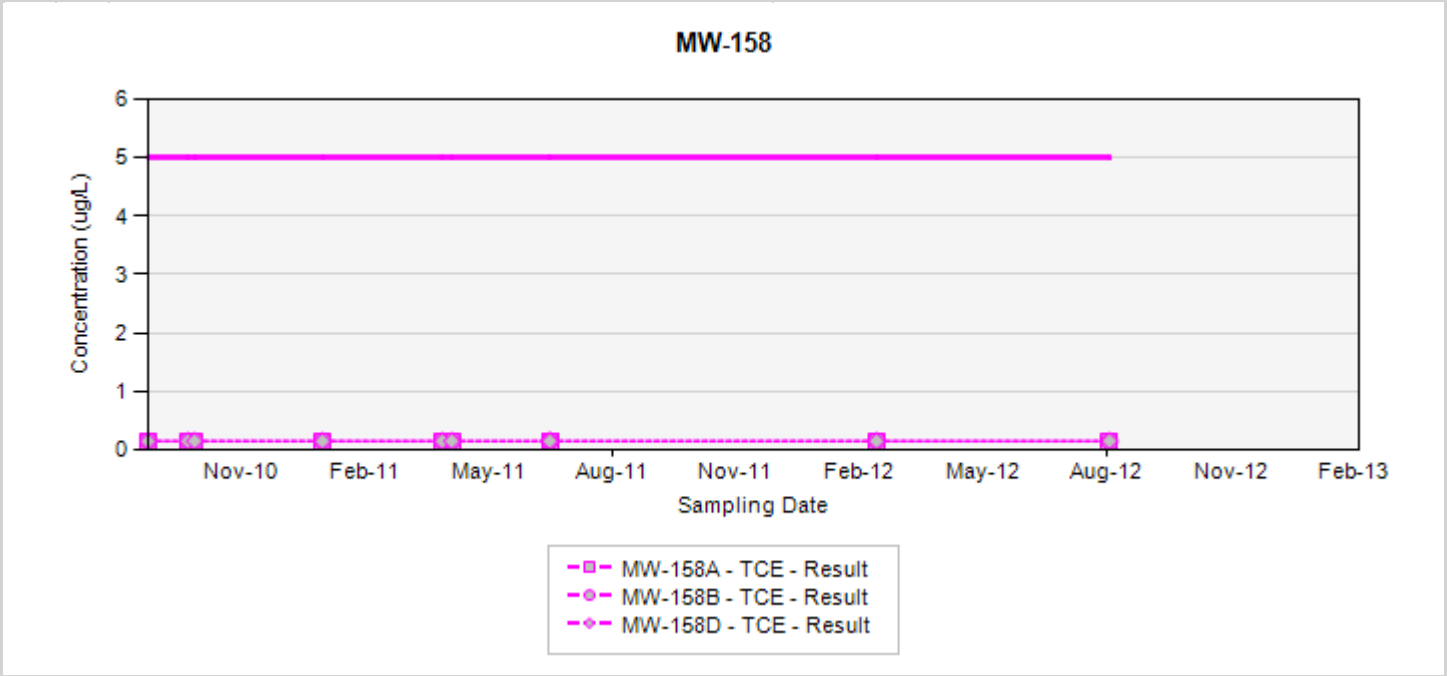

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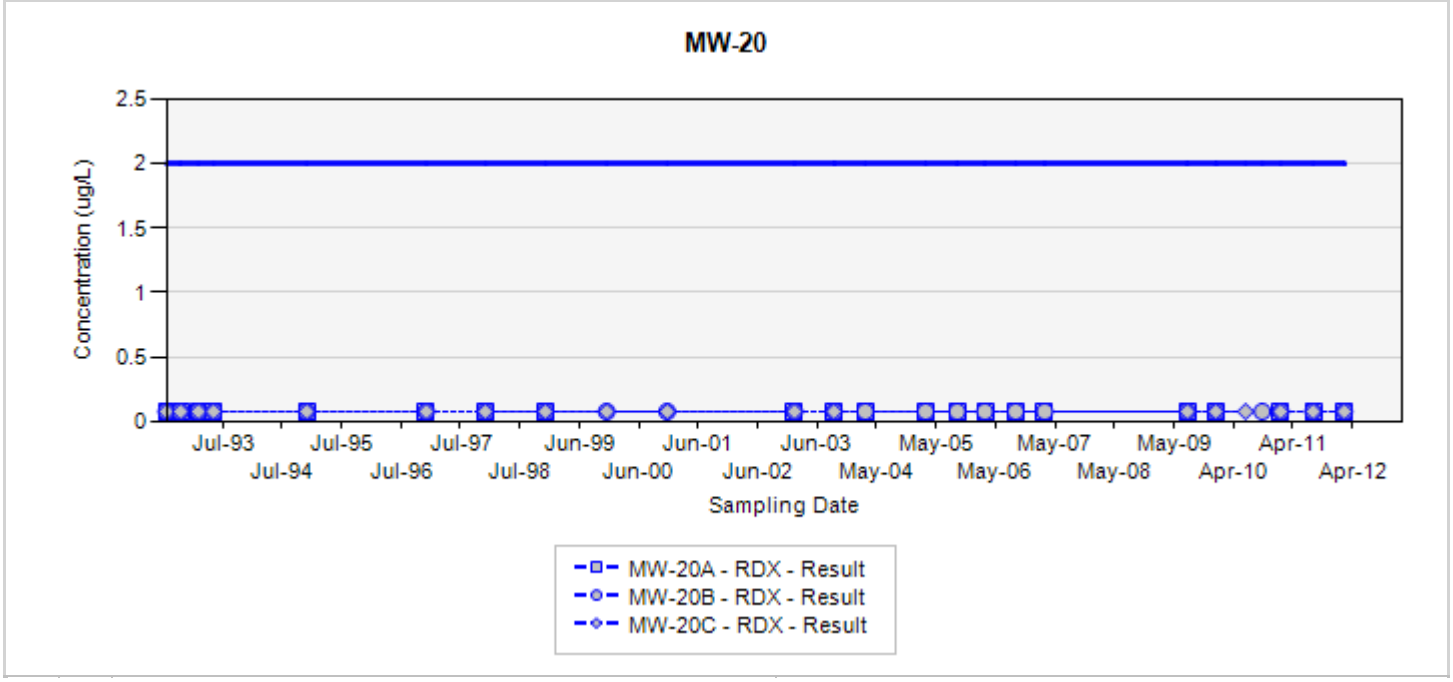

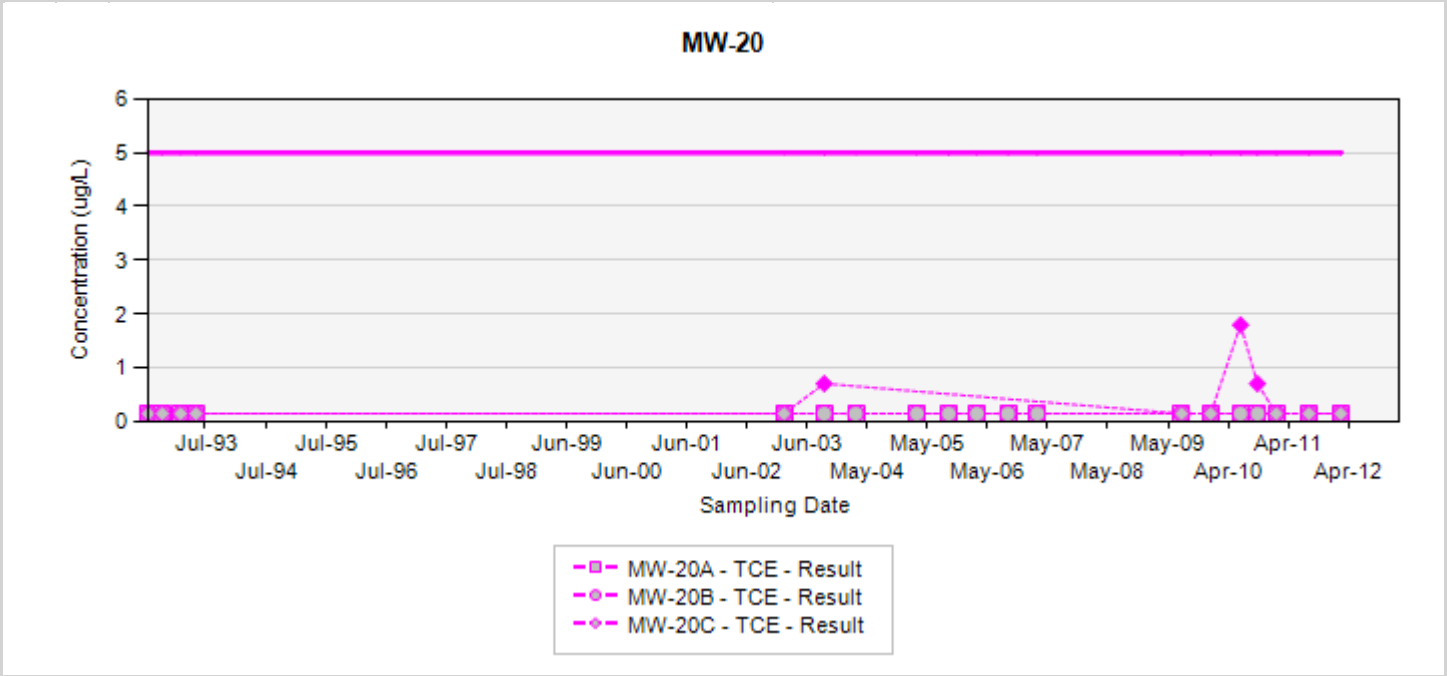

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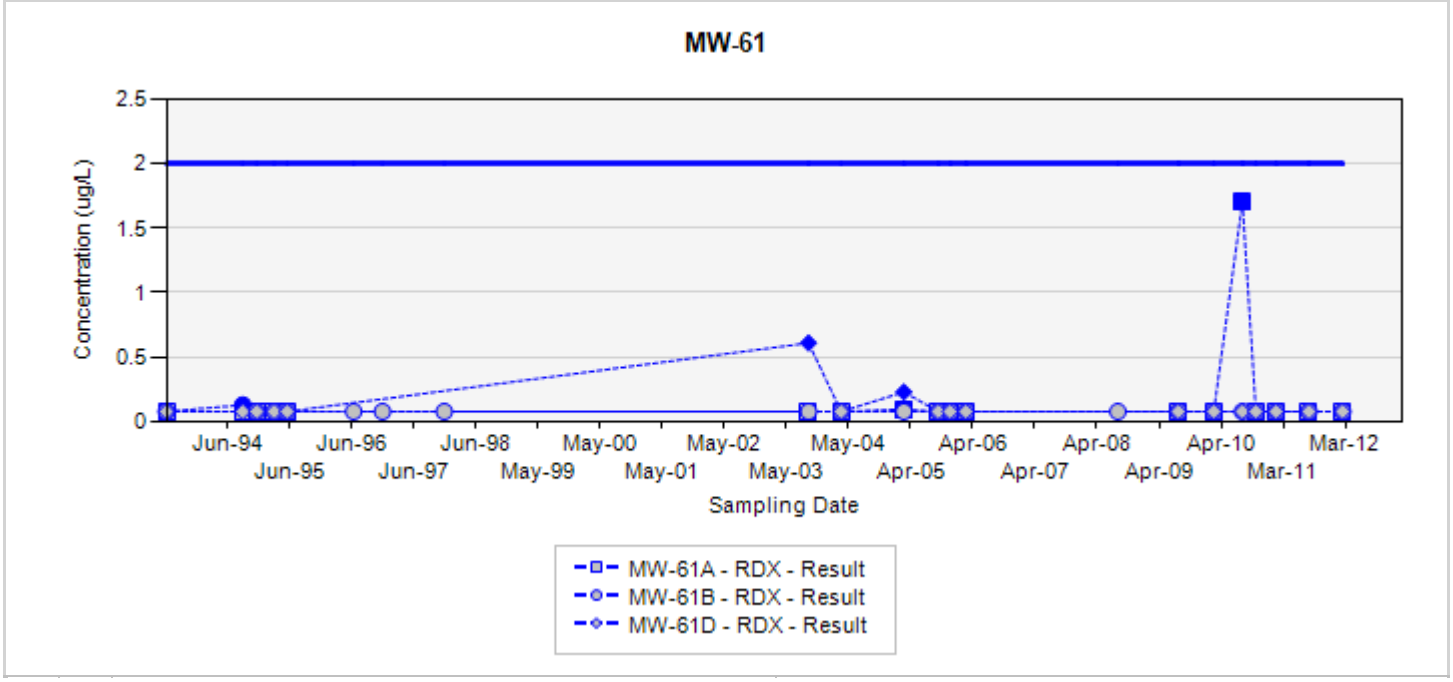

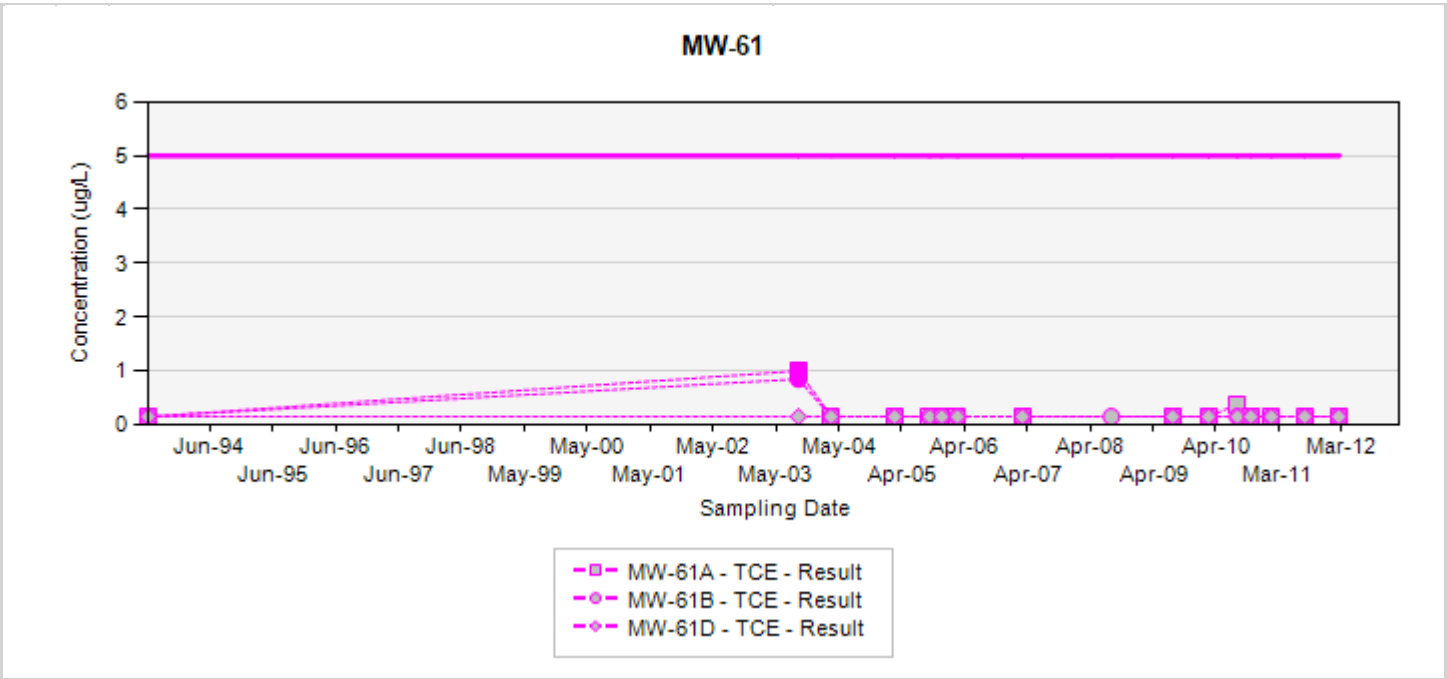

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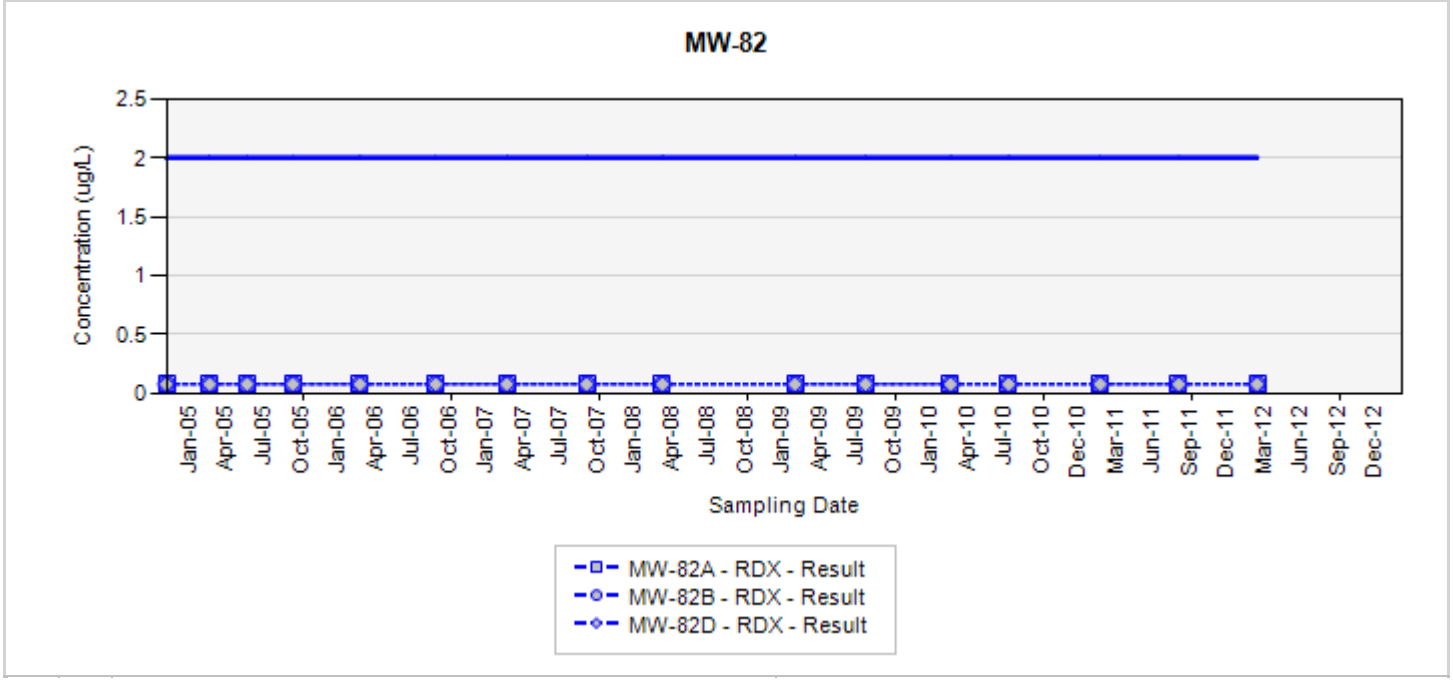

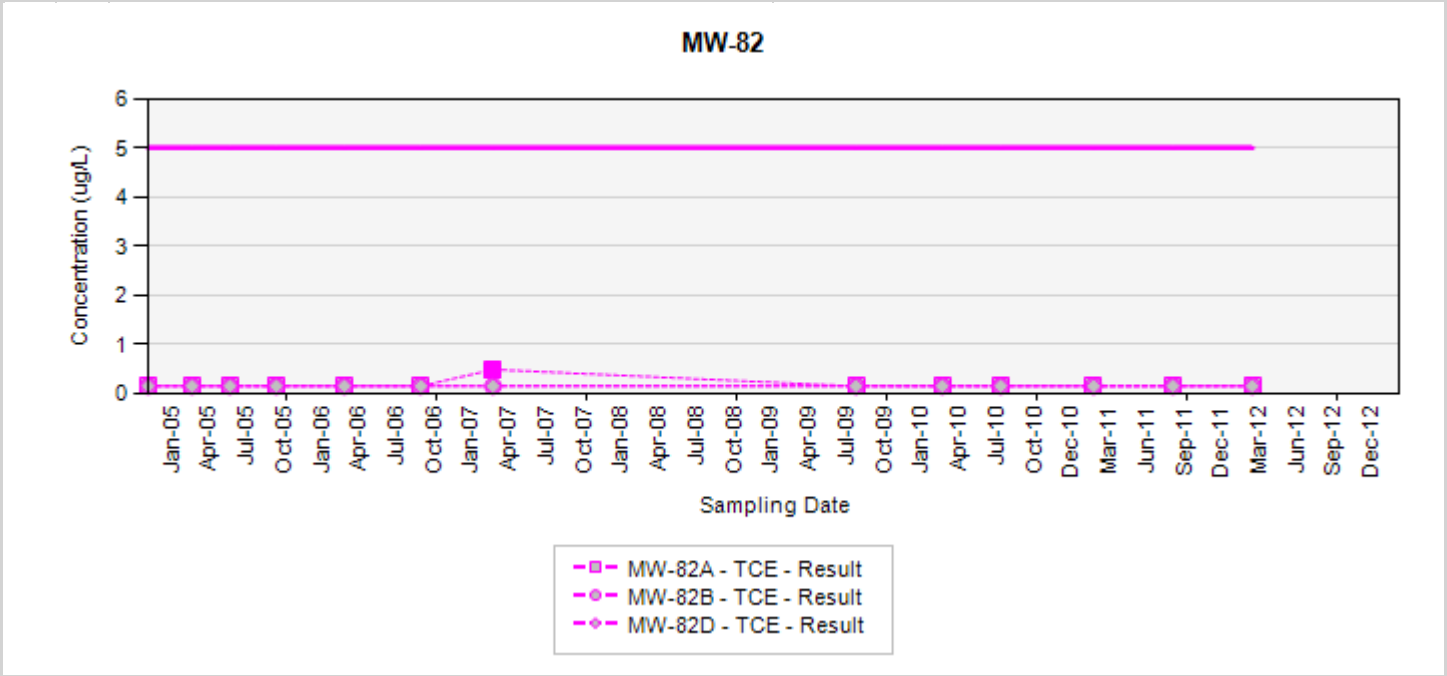

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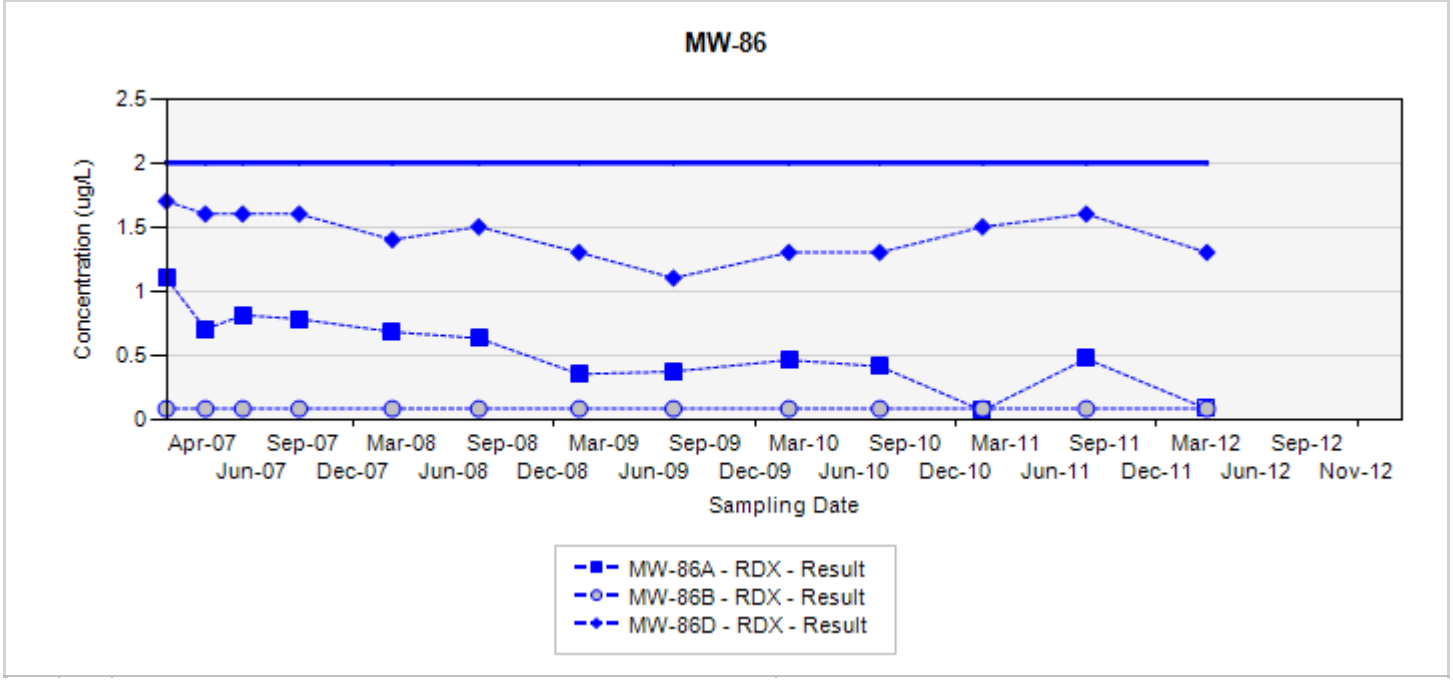
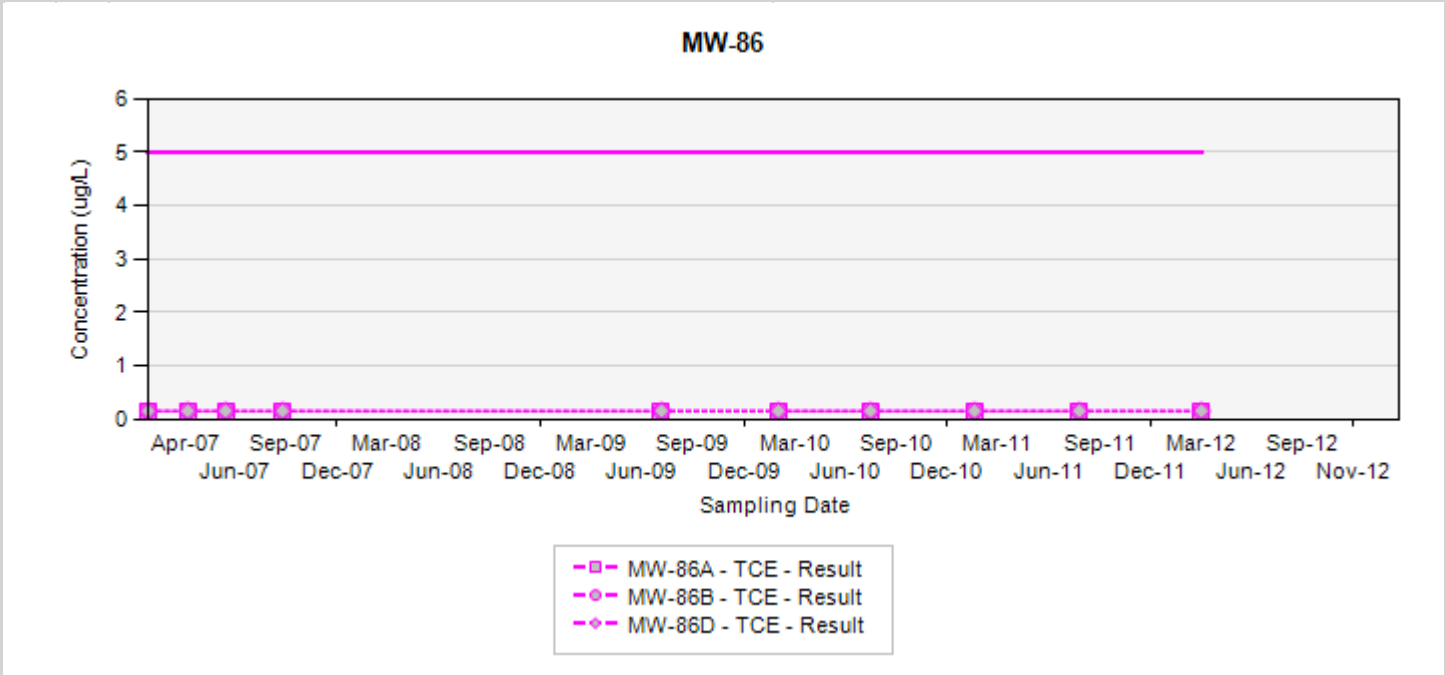
Concentration Trend Charts for Compliance Monitoring Wells





TCE - trichloroethene
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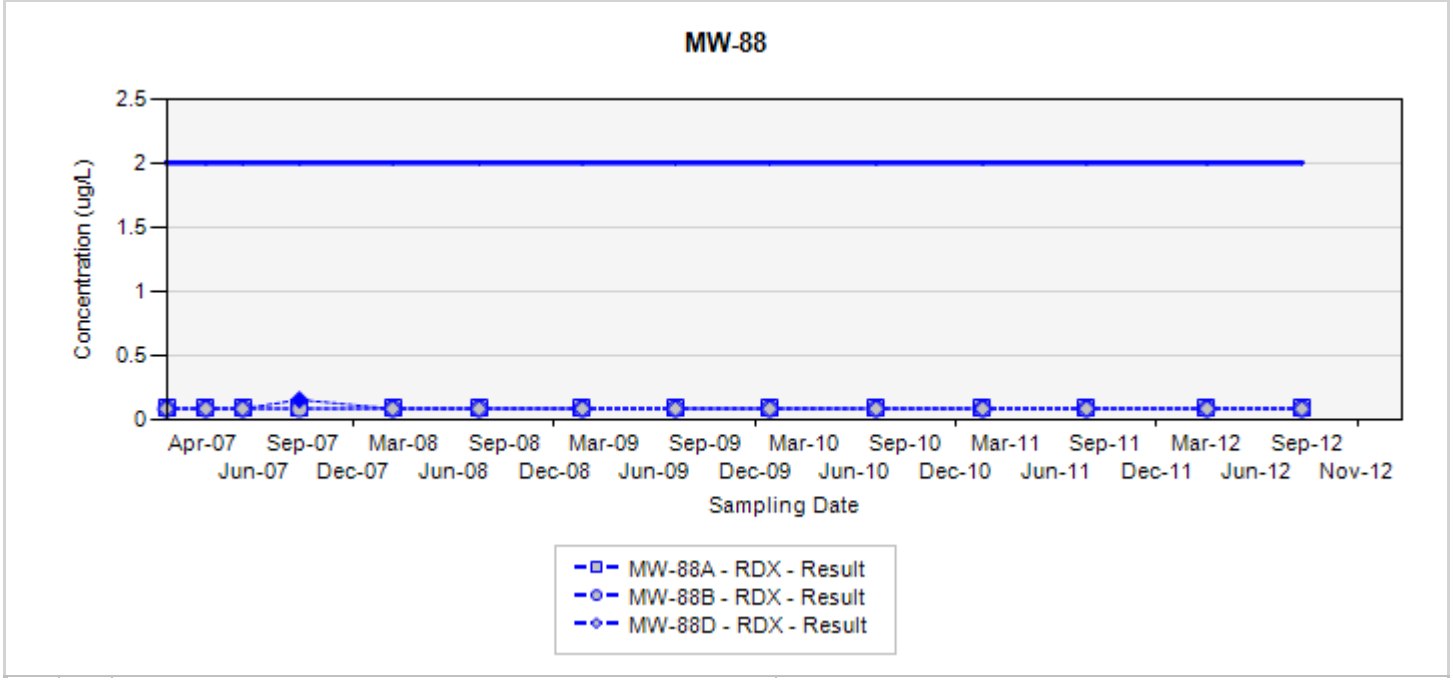

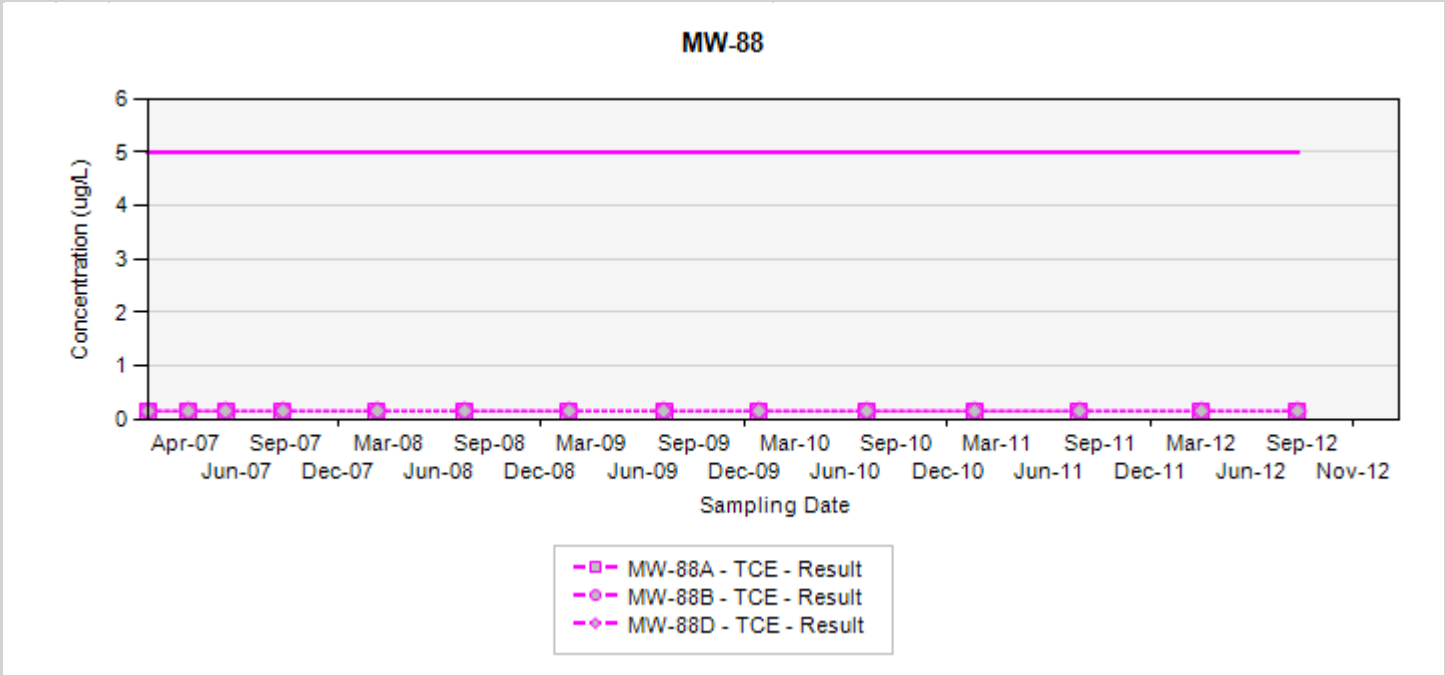

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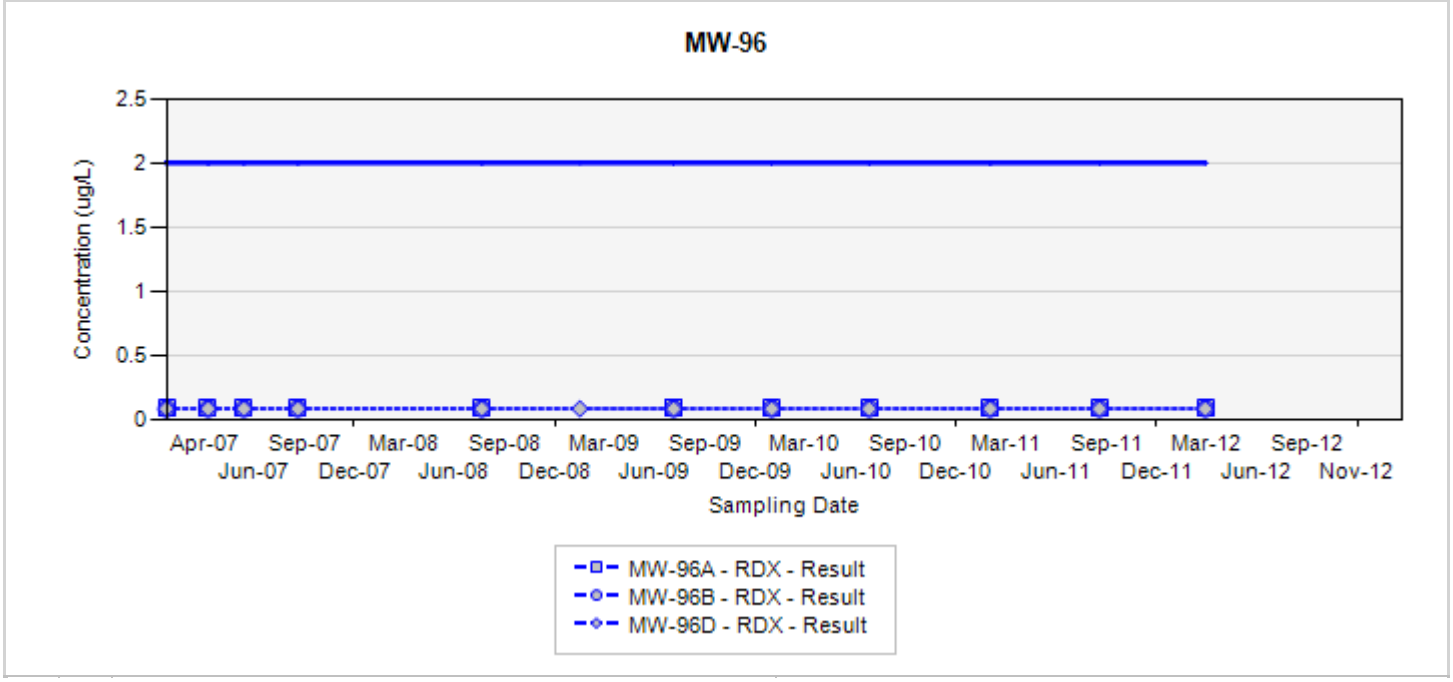

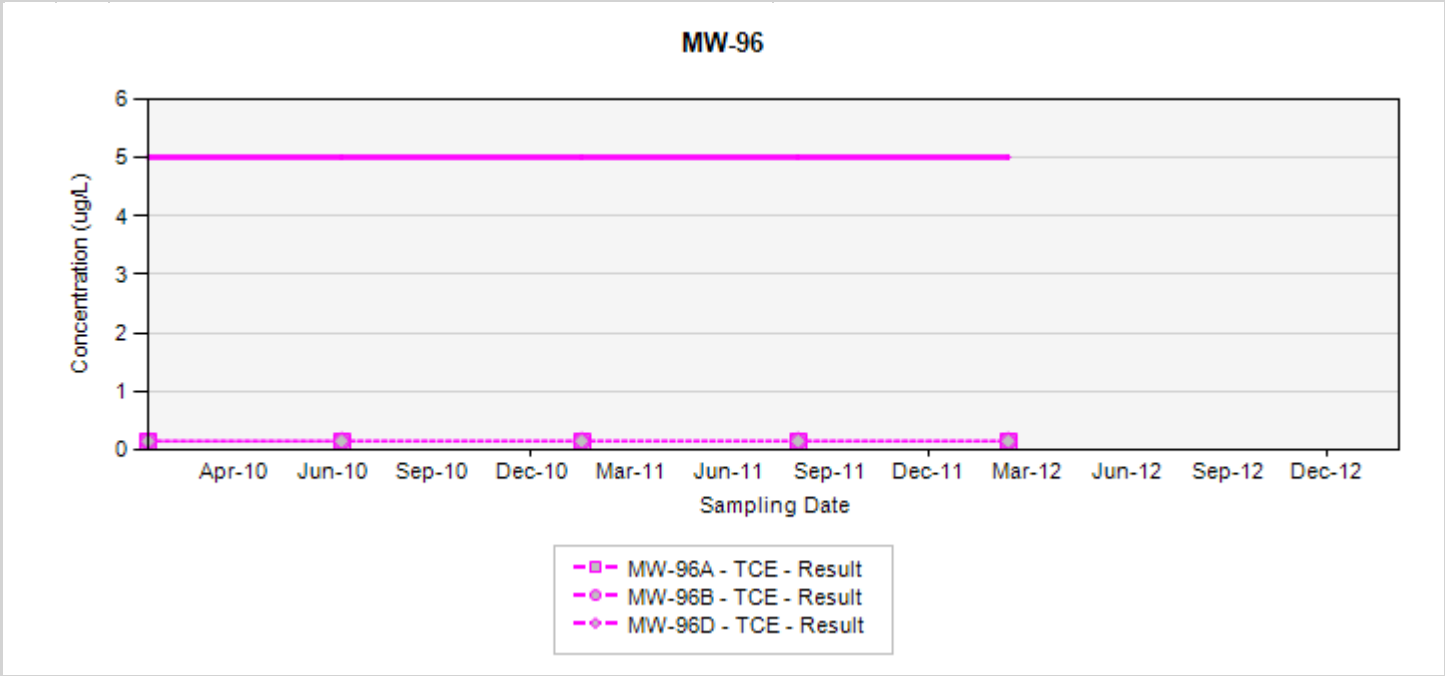

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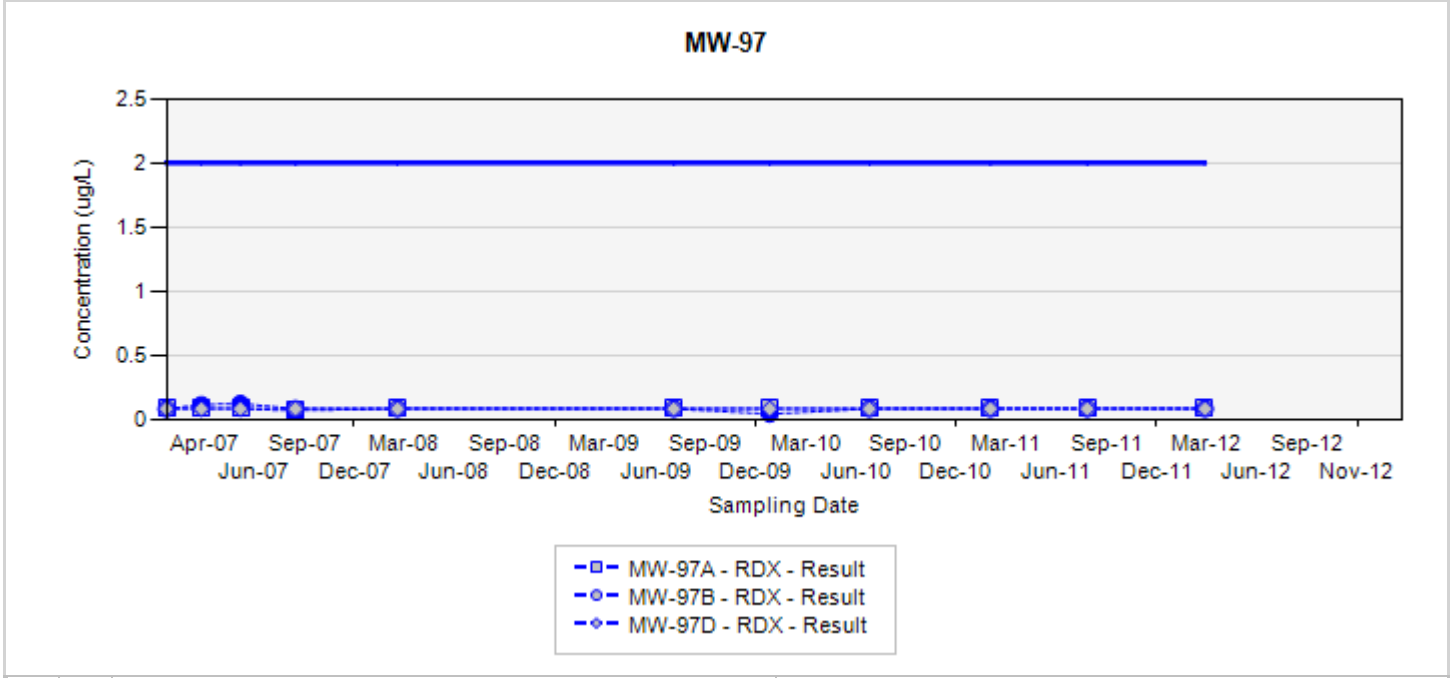

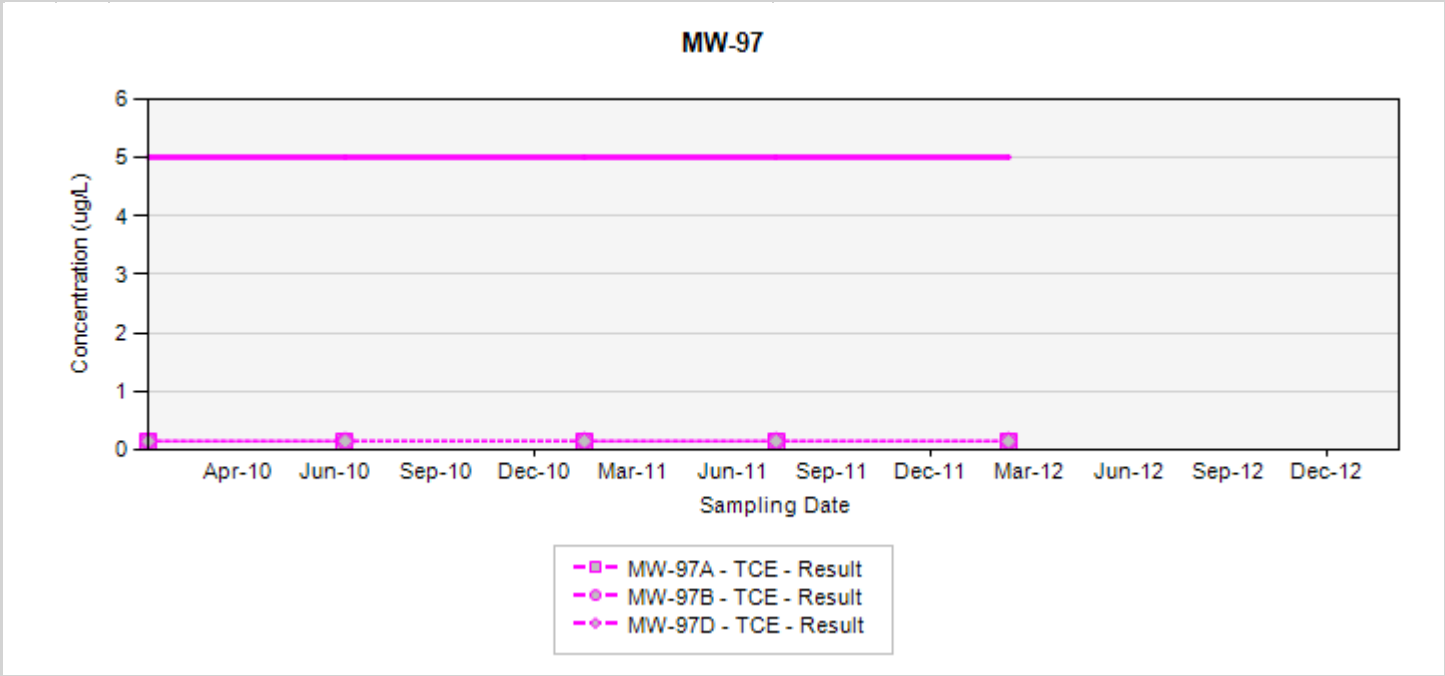

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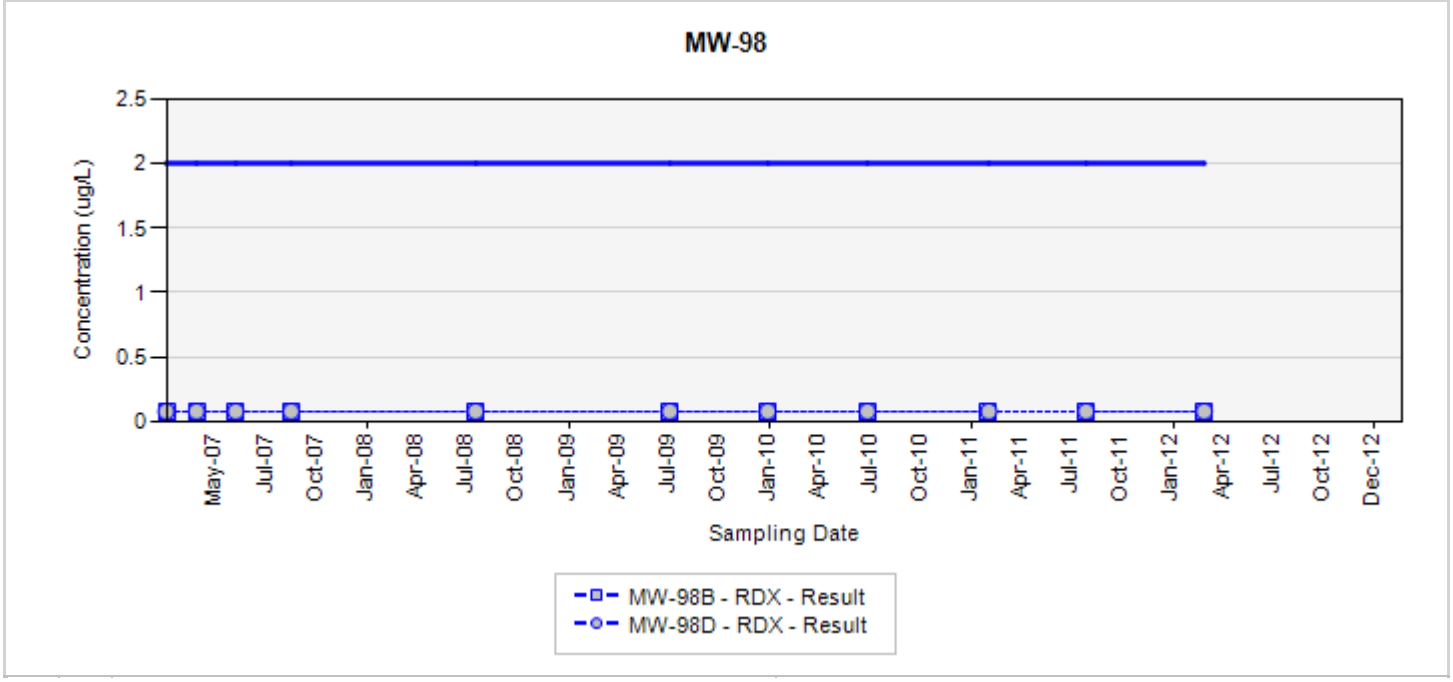

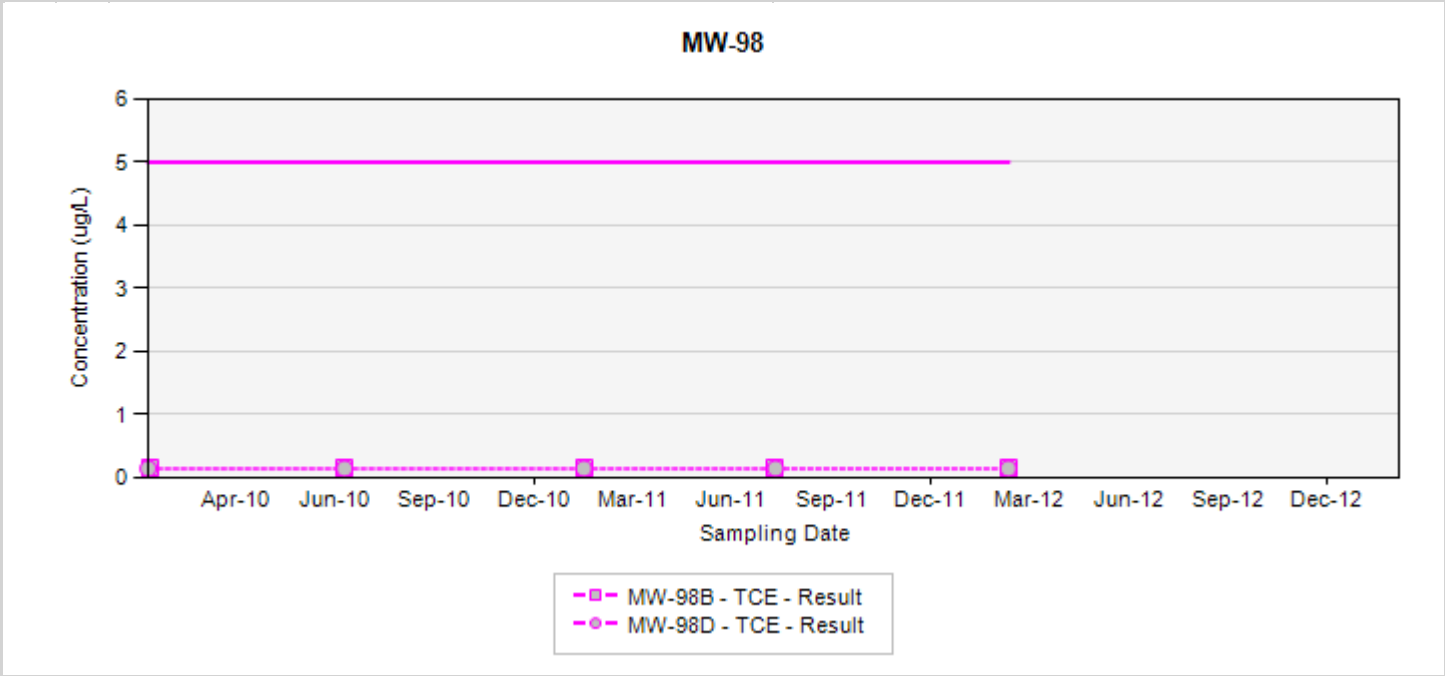

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Appendix B
Concentration Trend Charts for Perimeter Monitoring Wells

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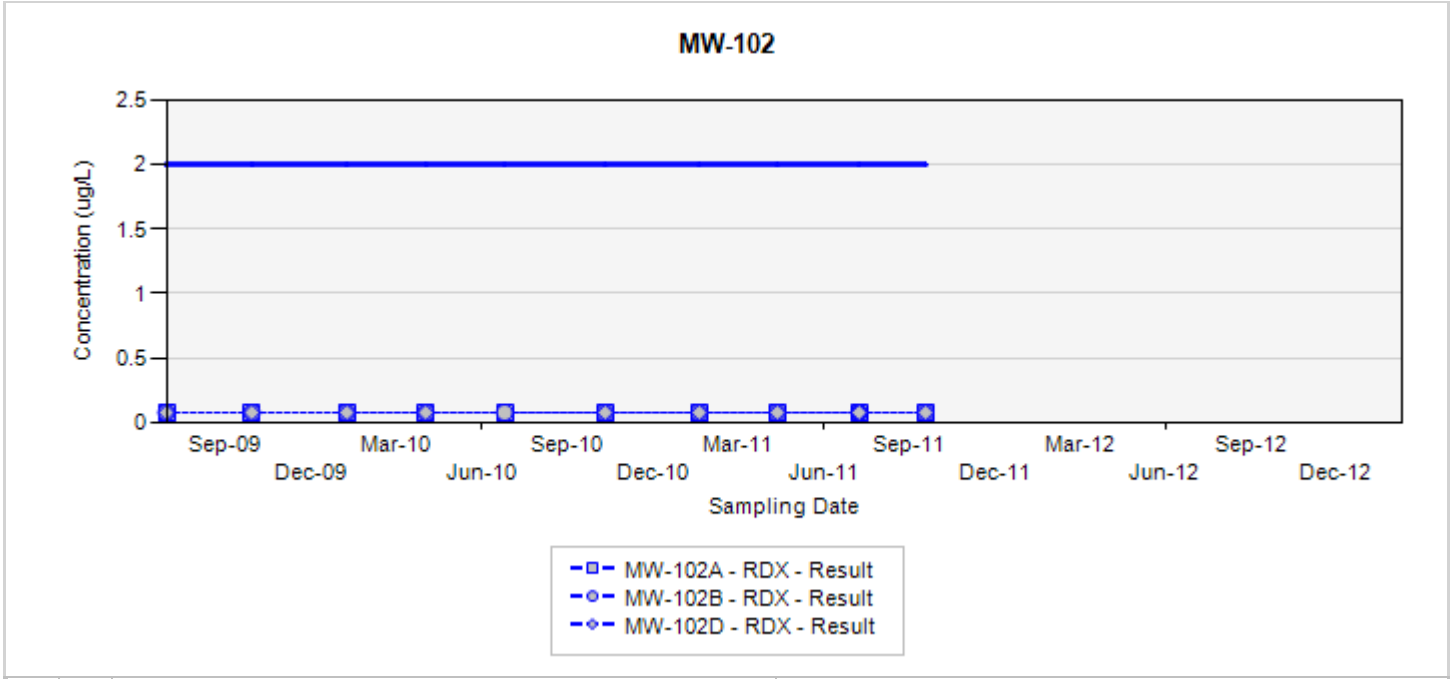

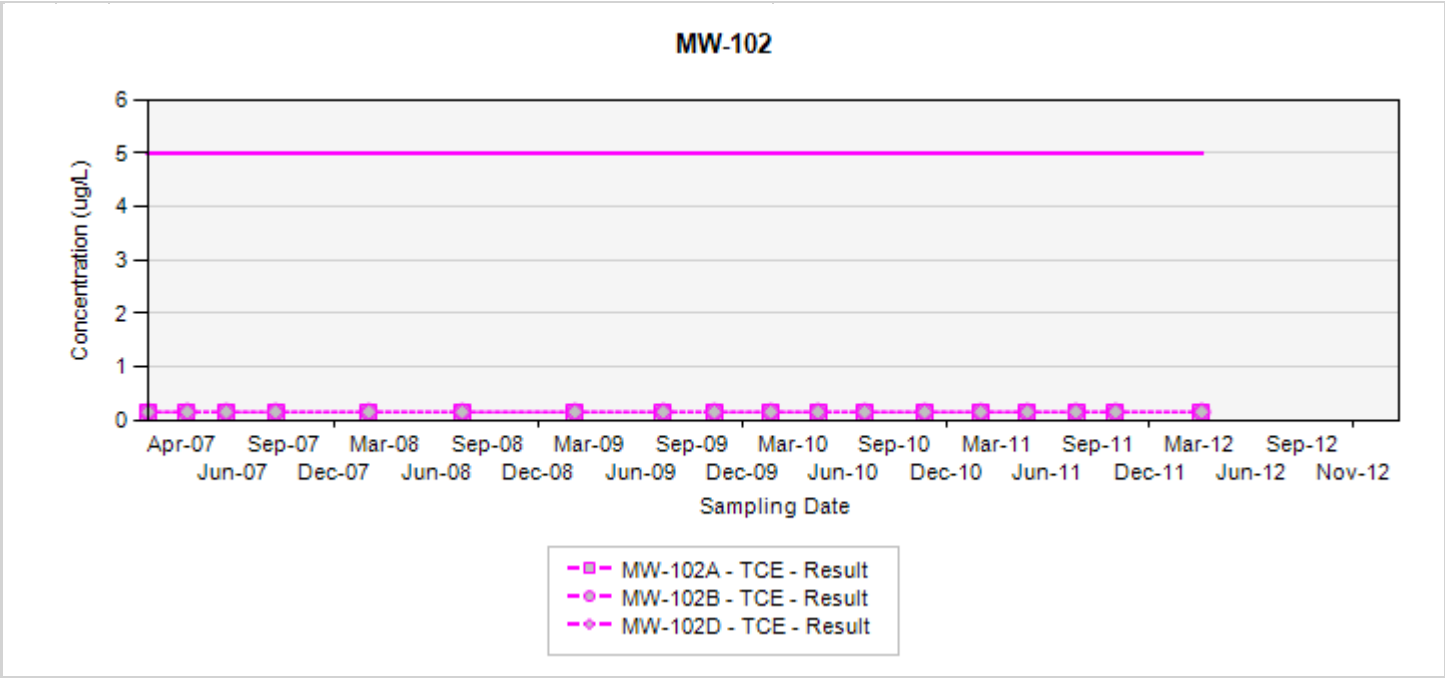

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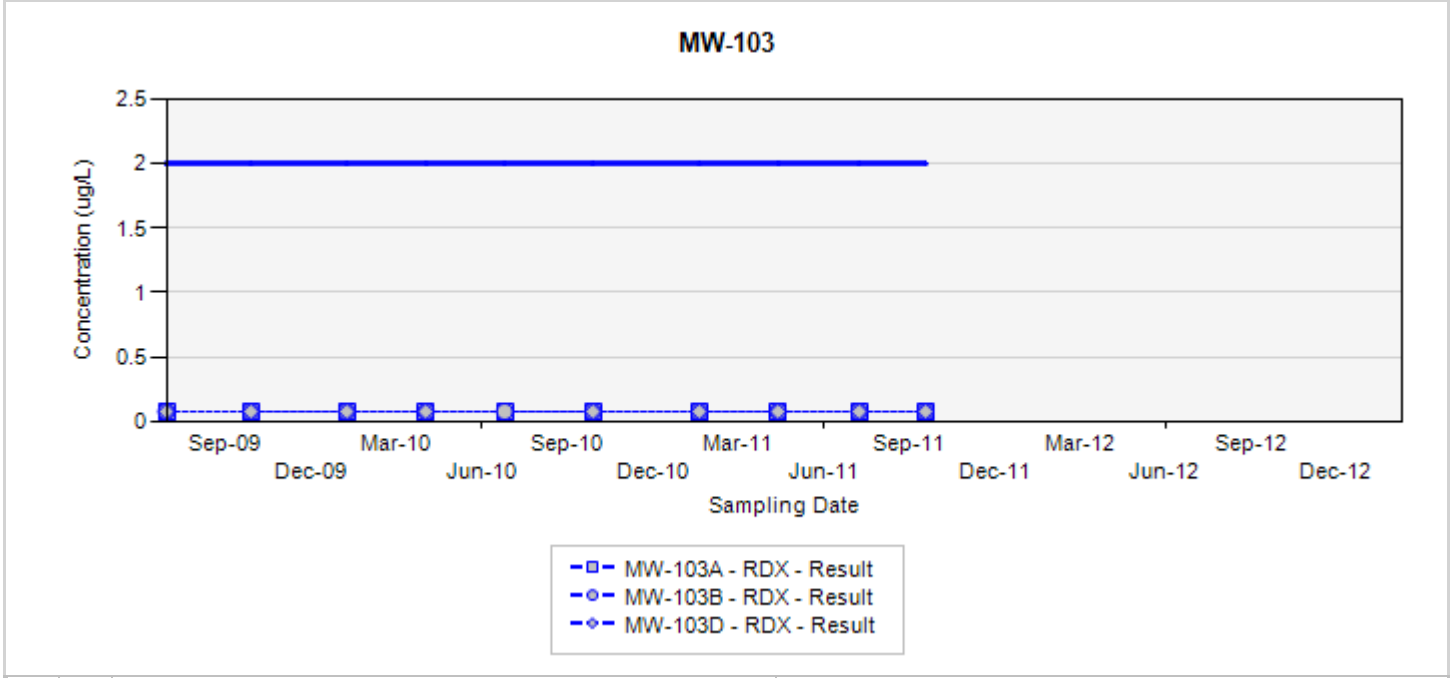

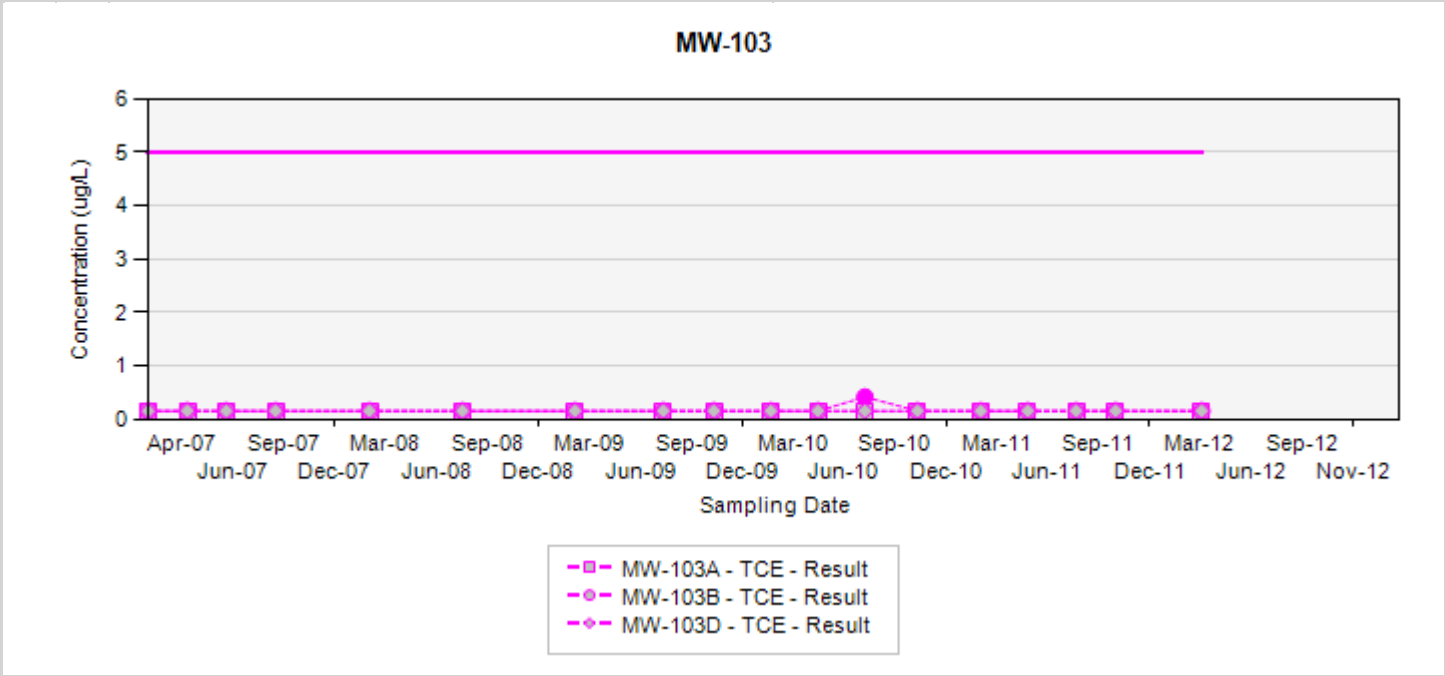

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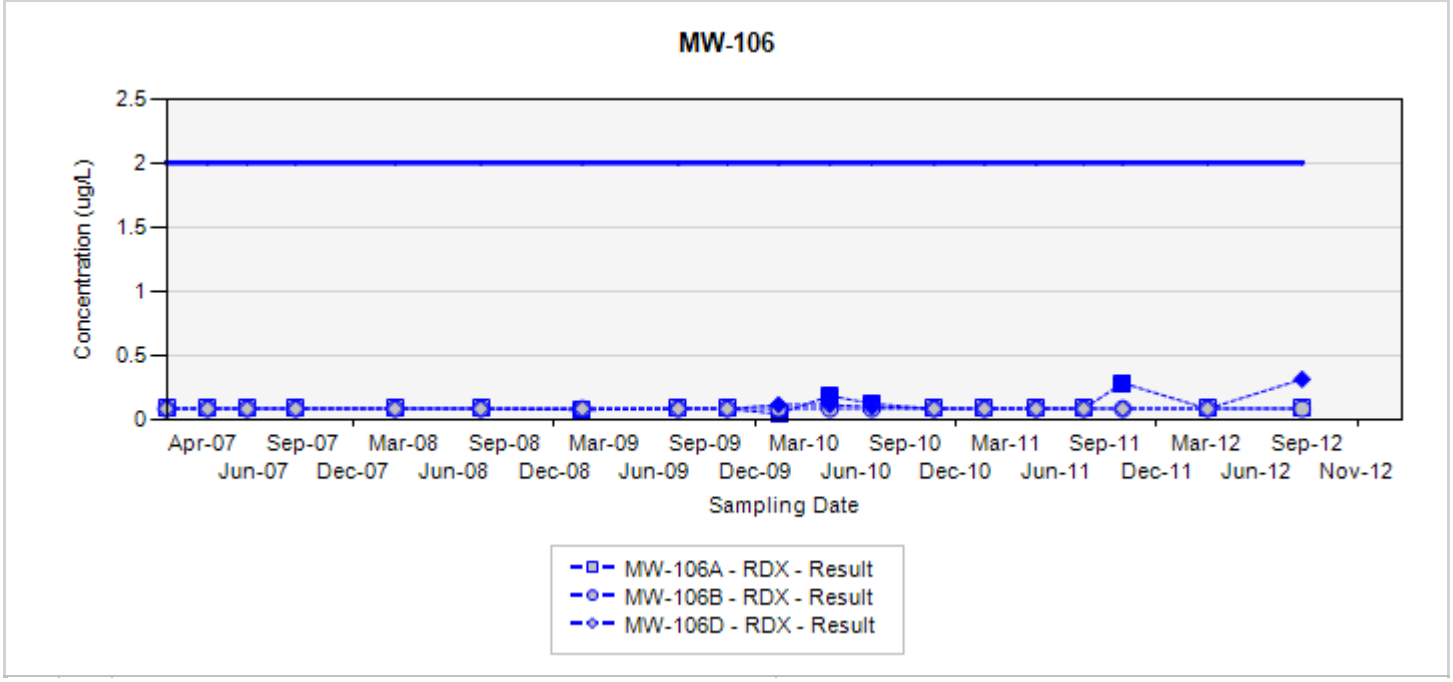

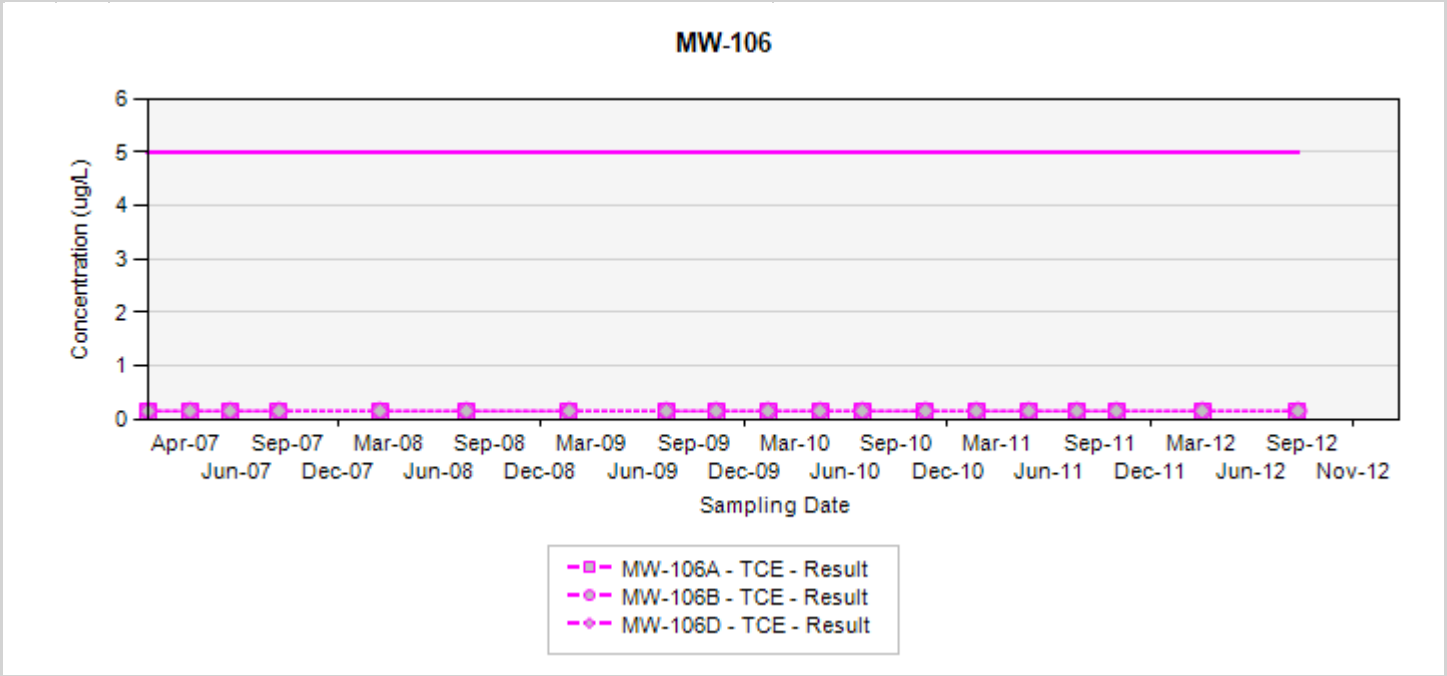

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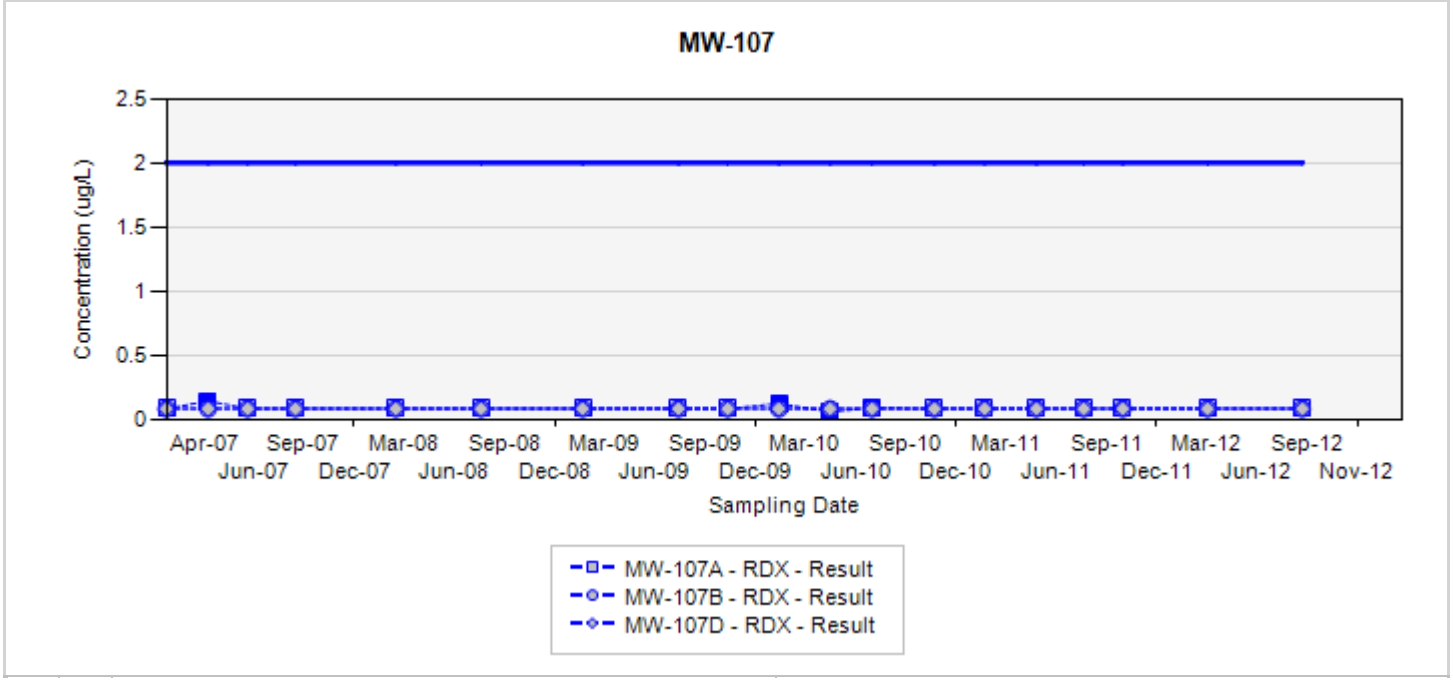

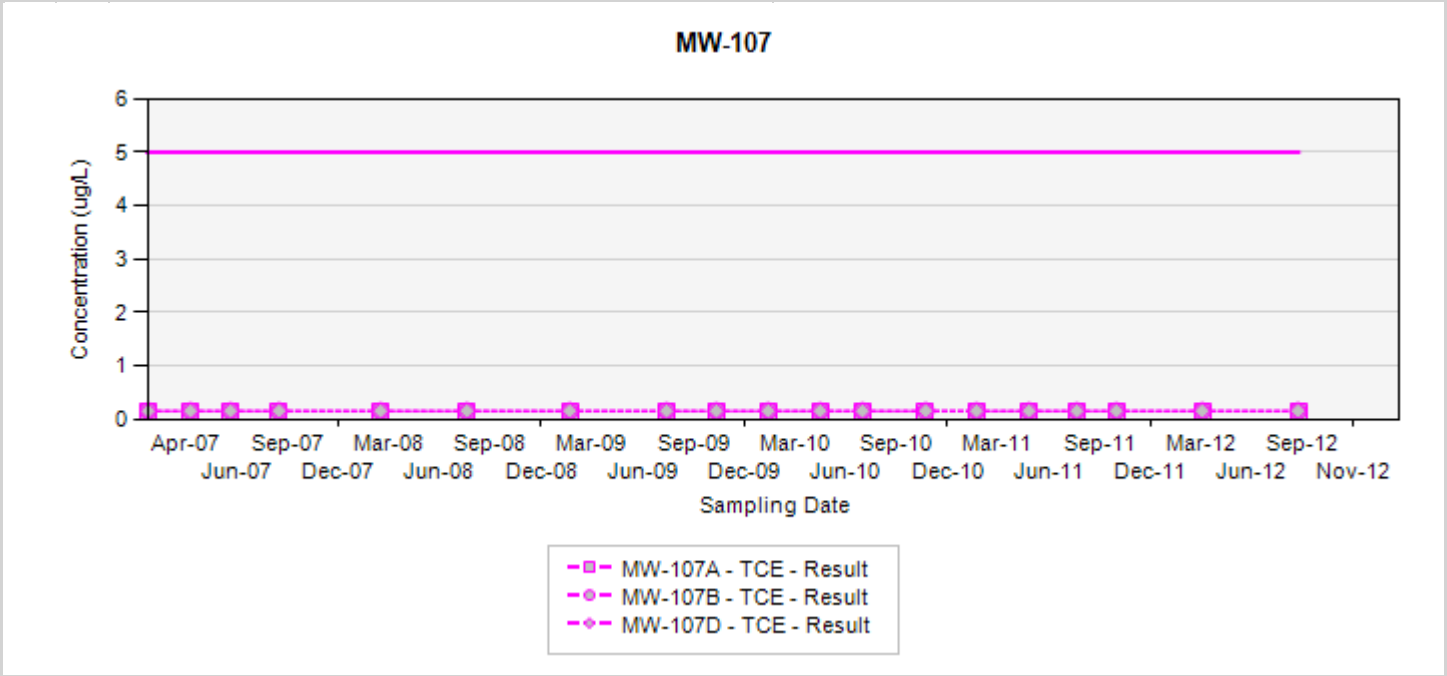

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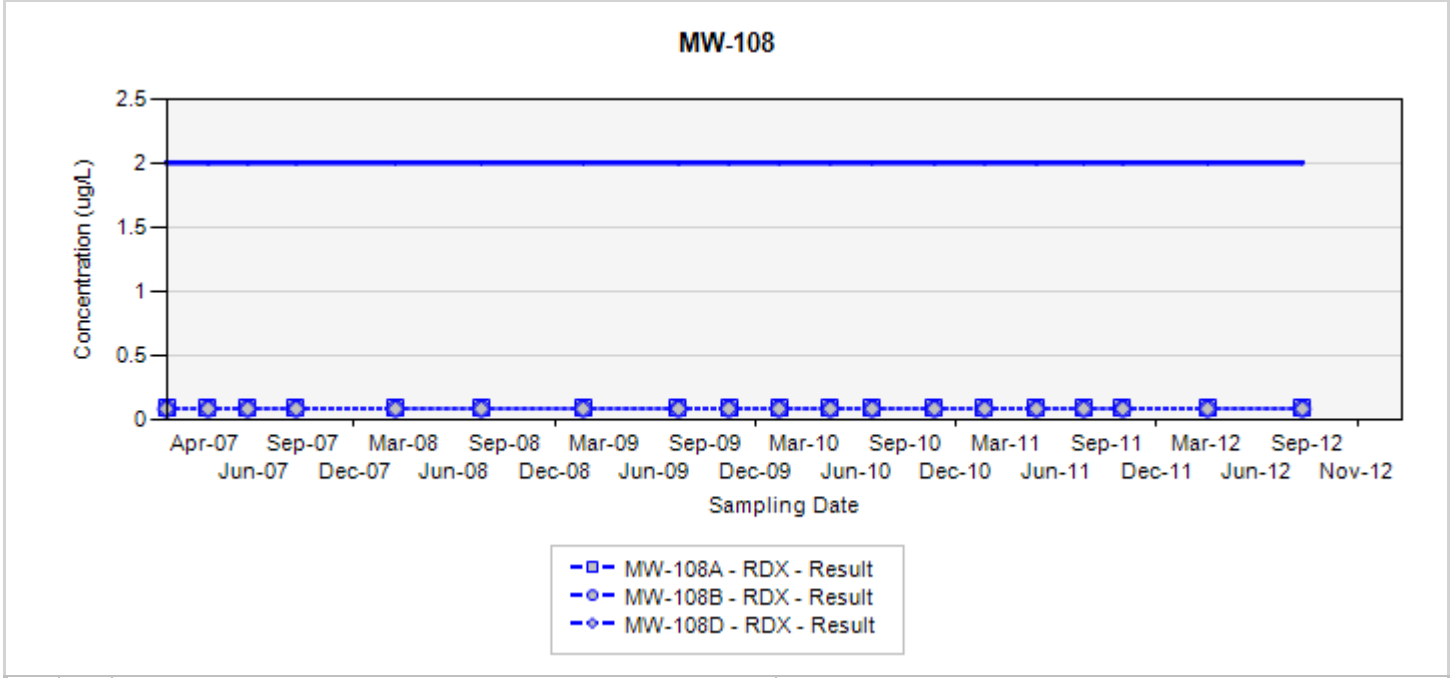

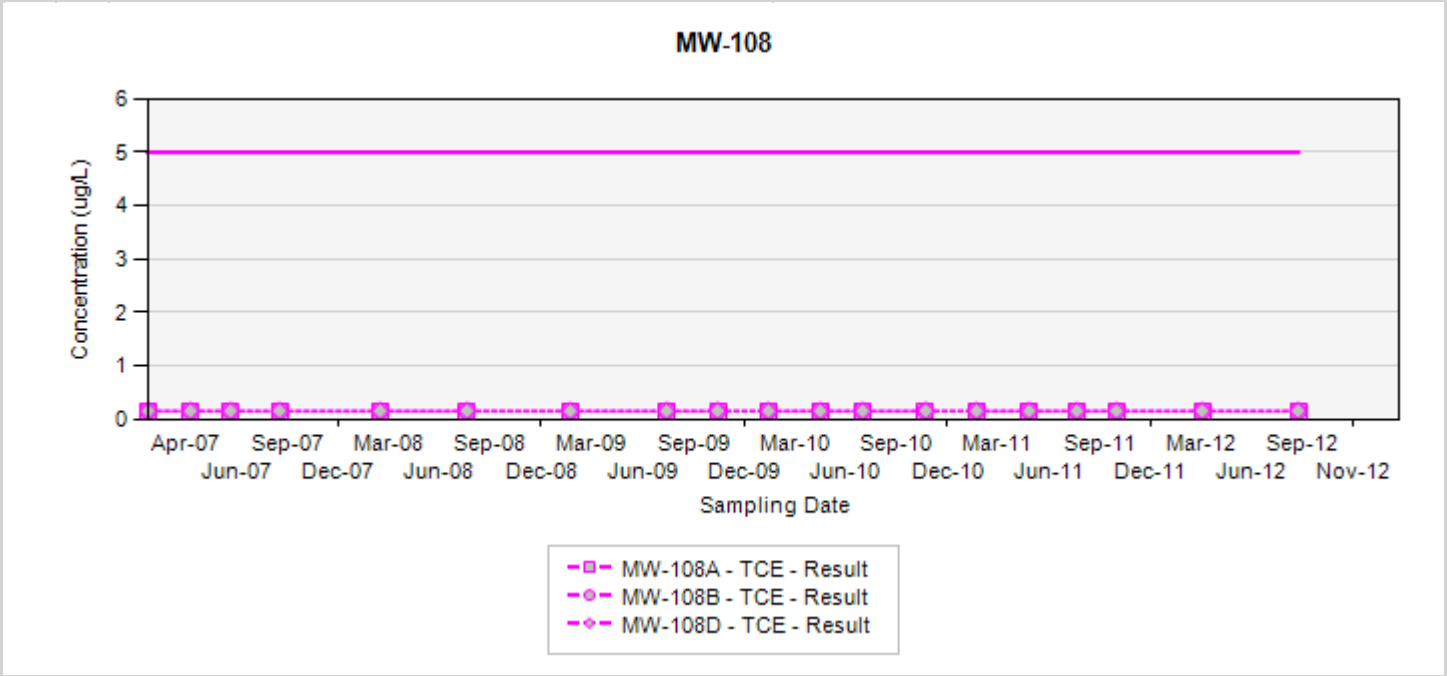

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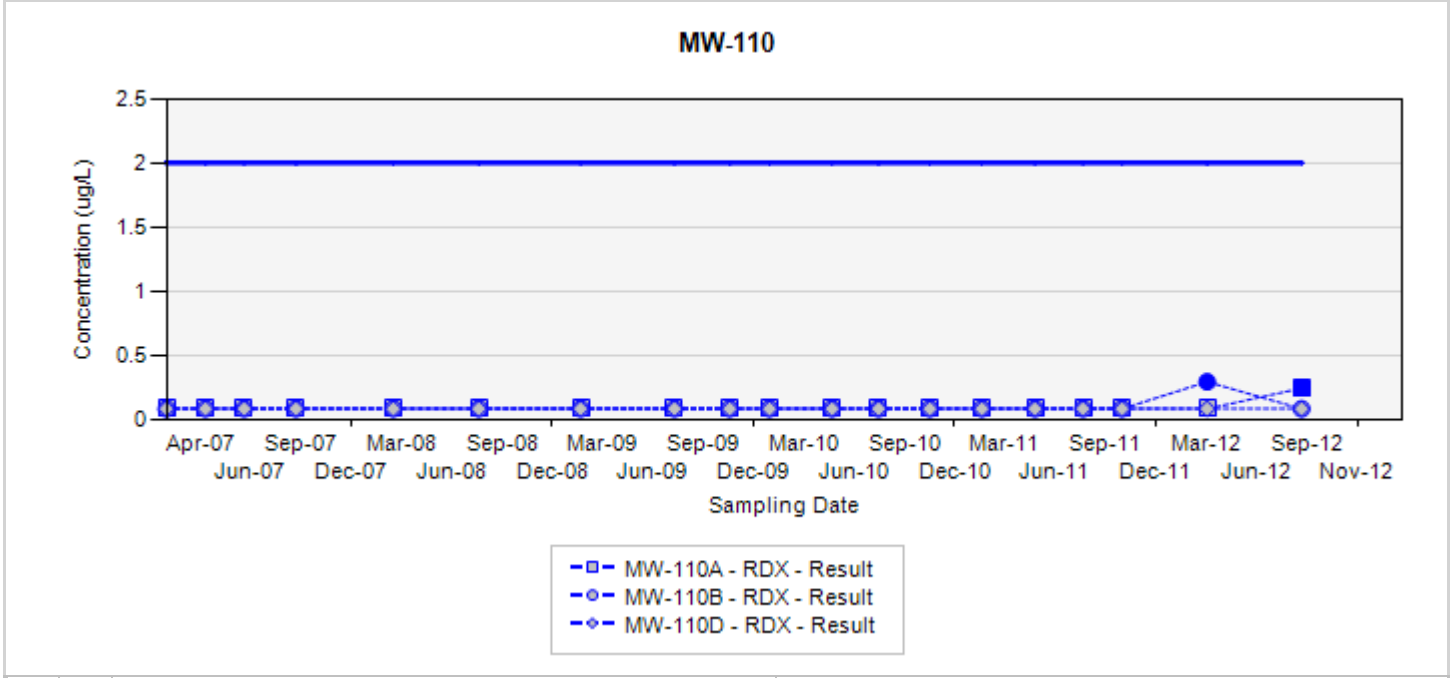

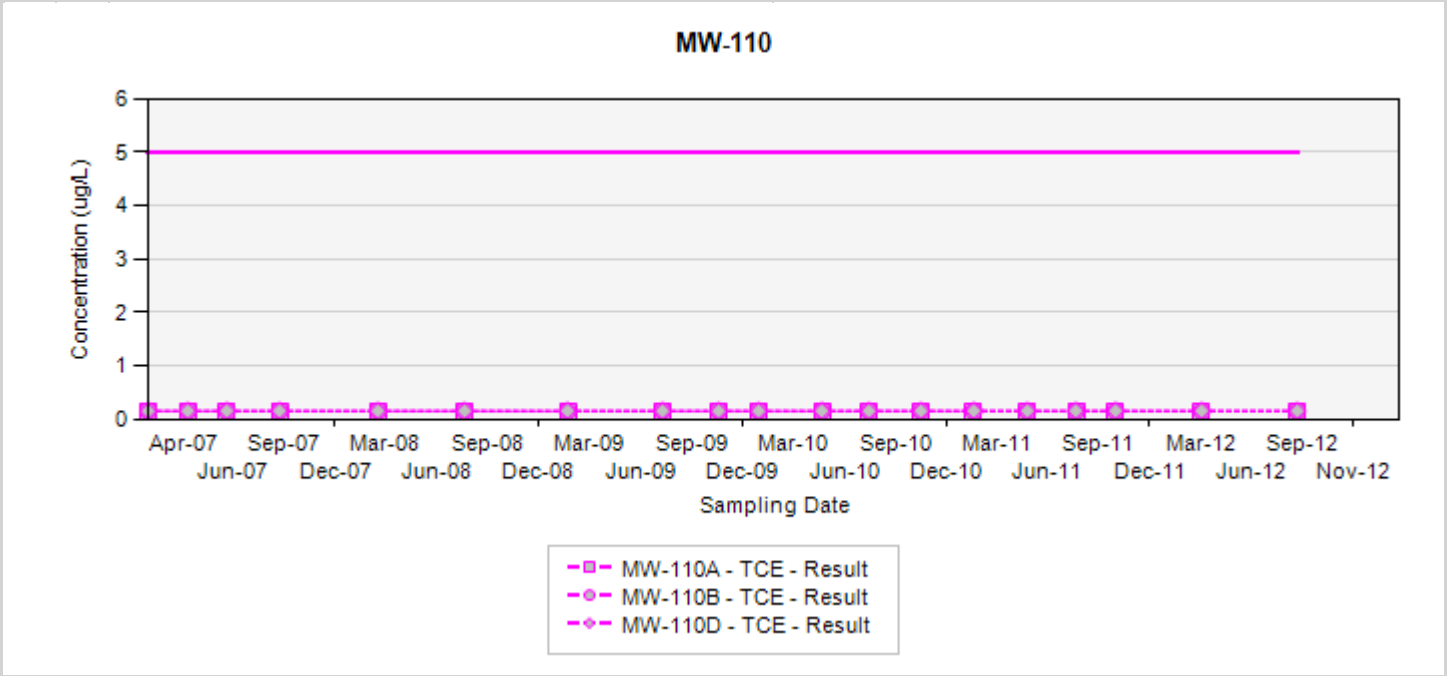

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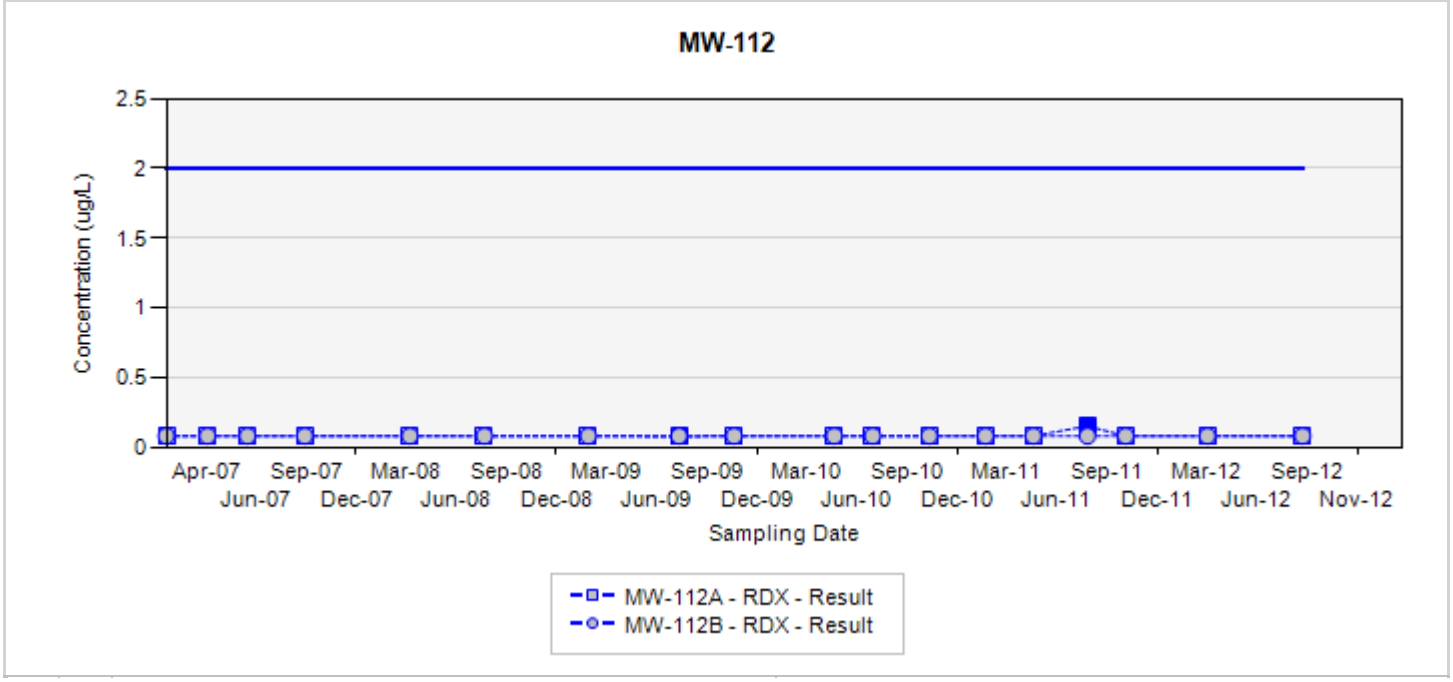

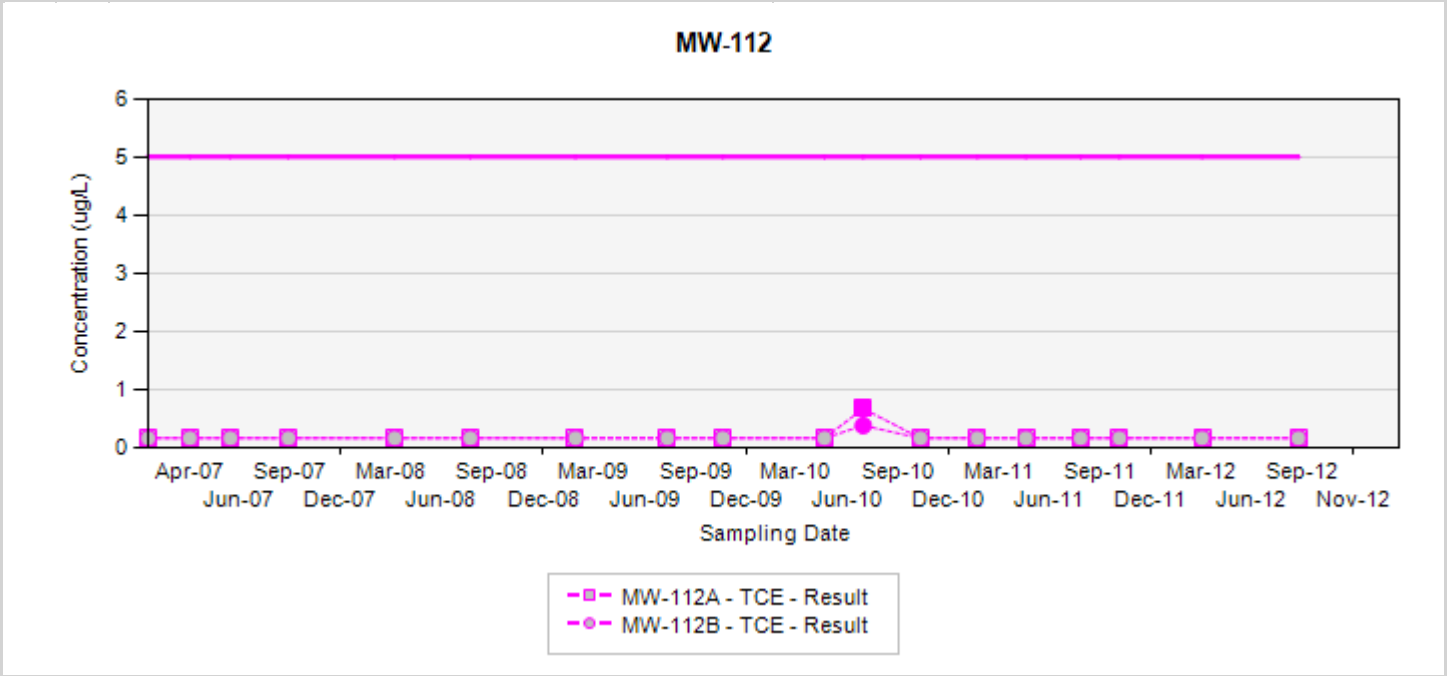

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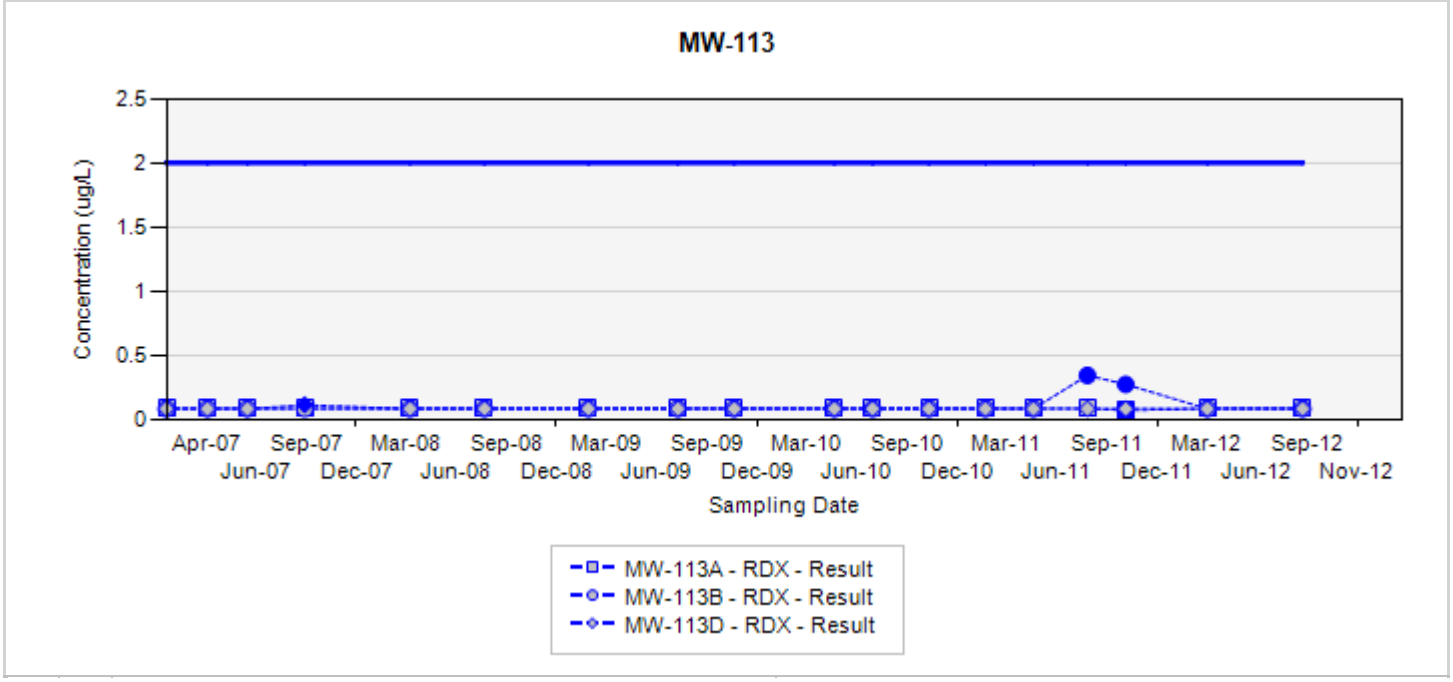

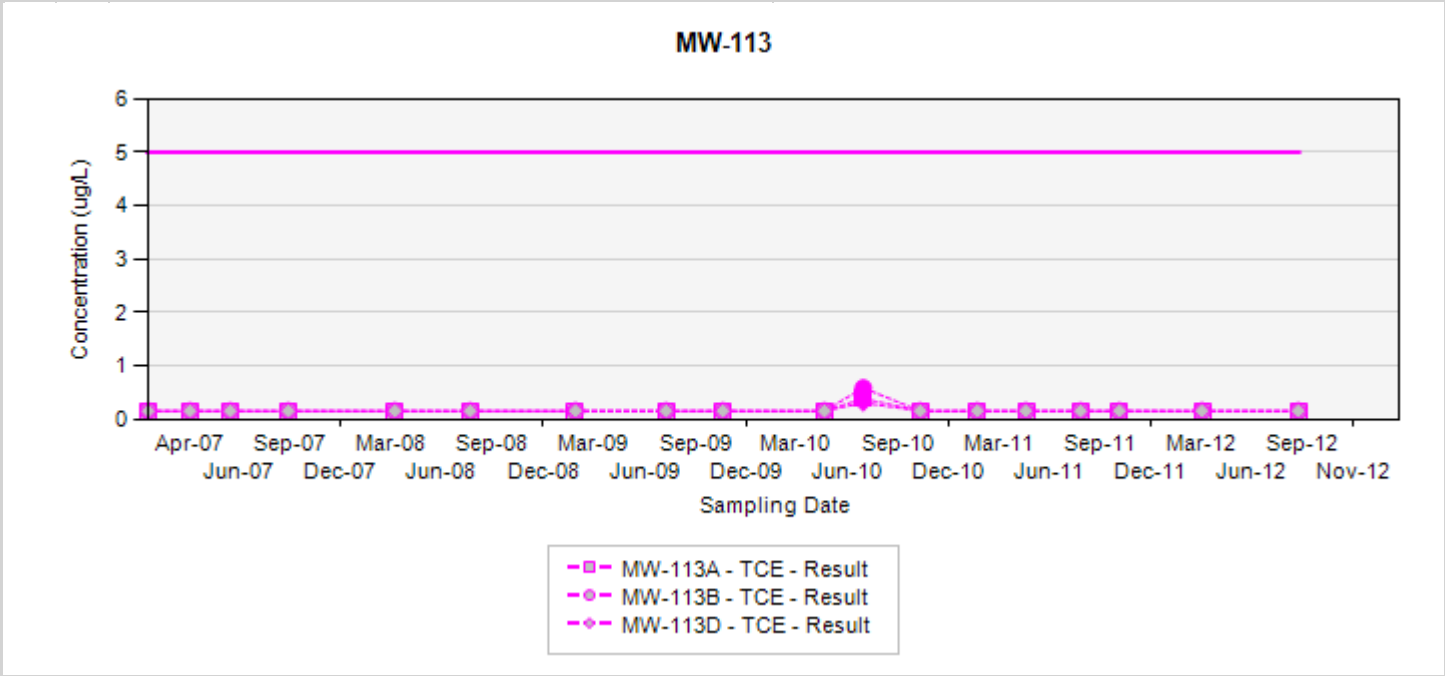

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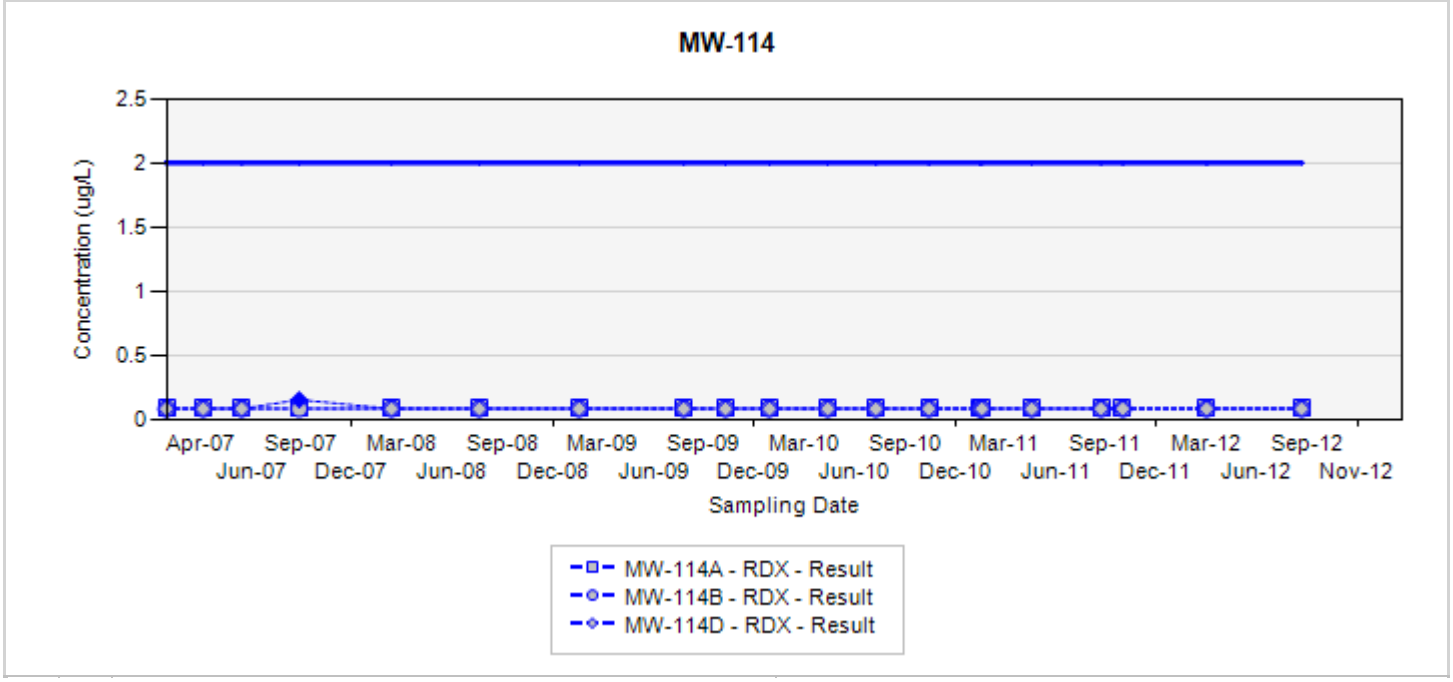

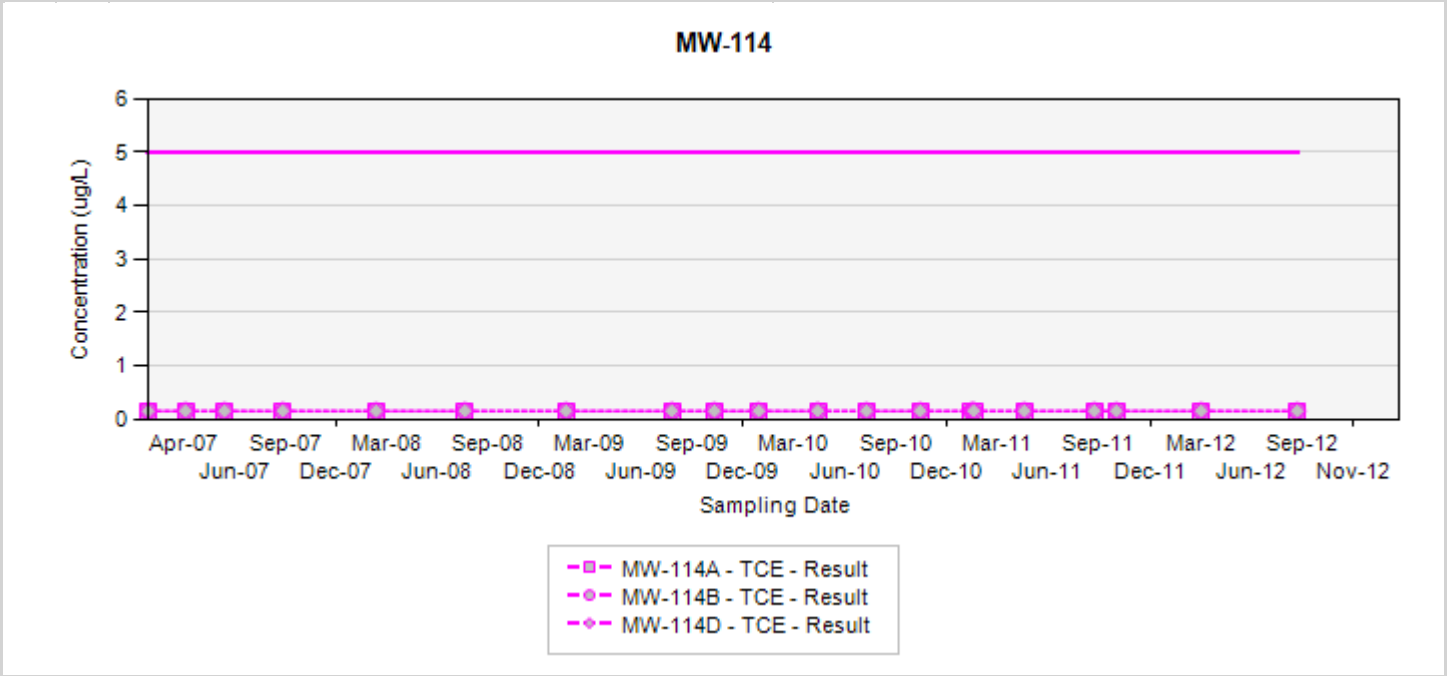

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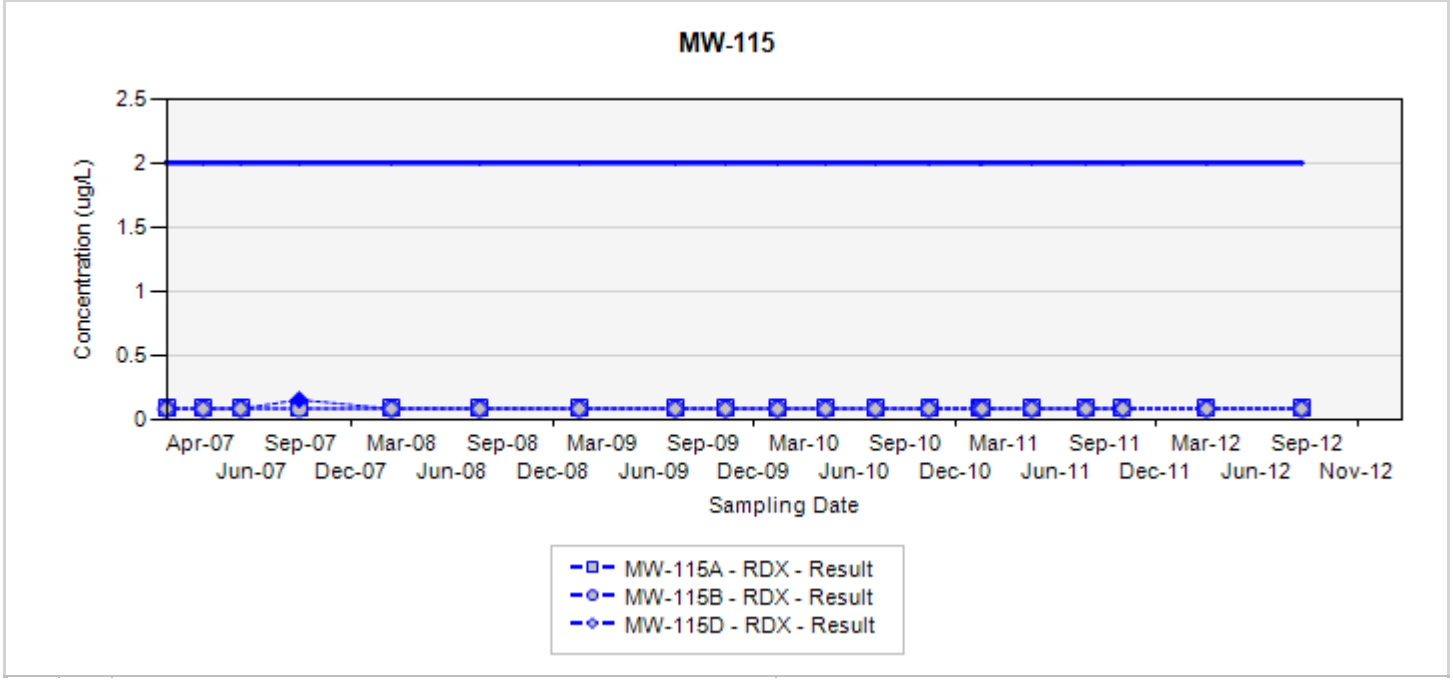

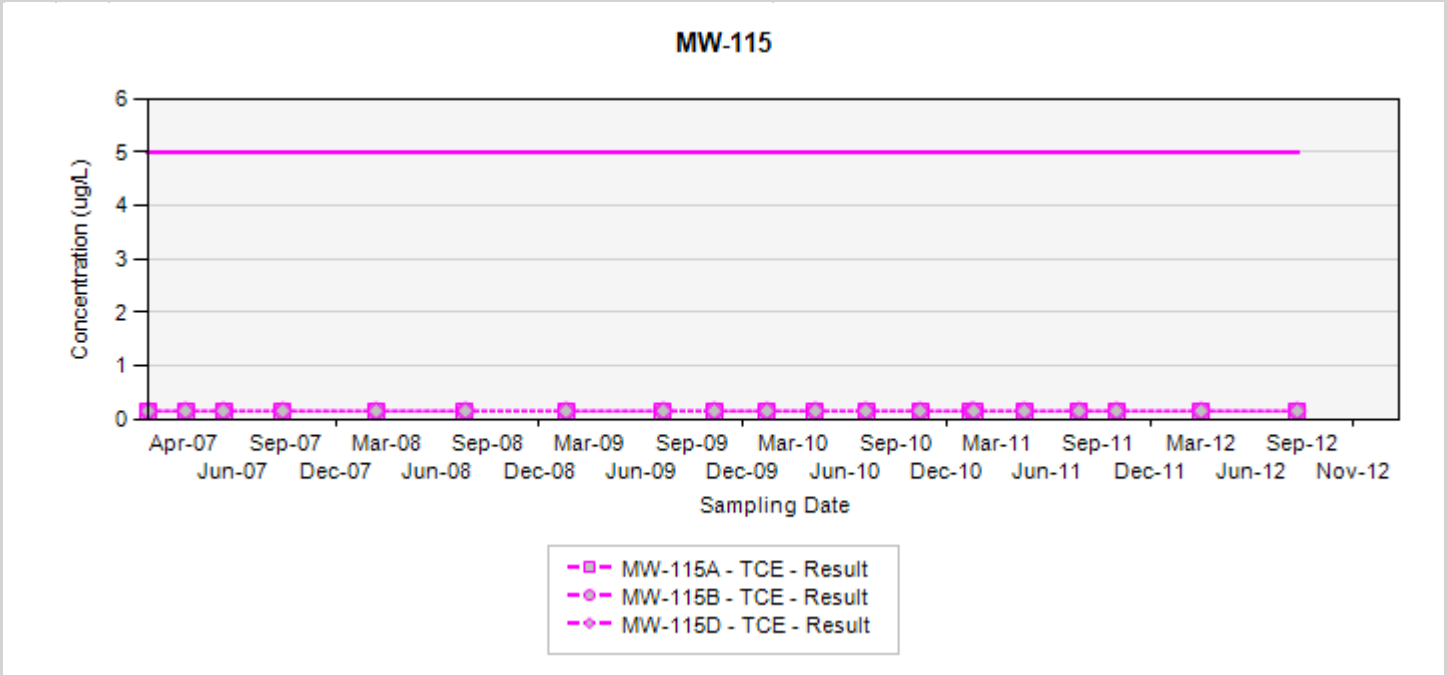

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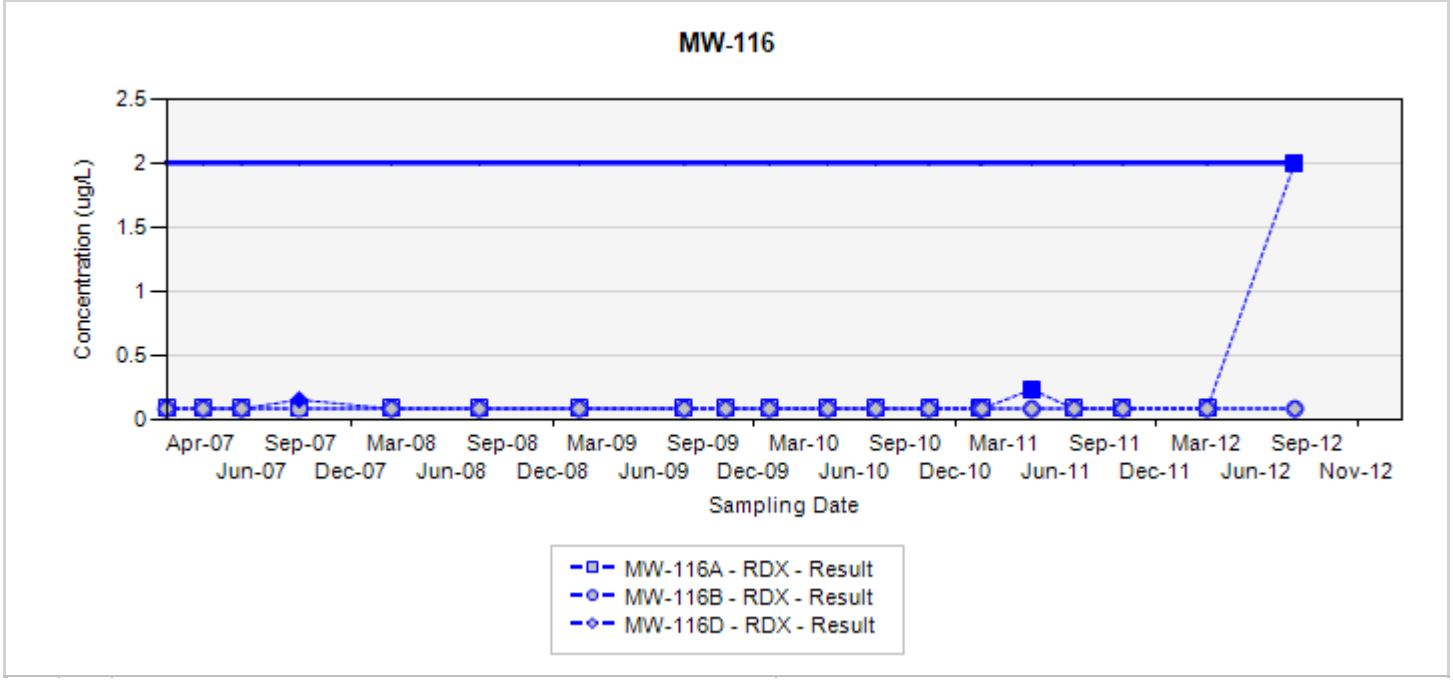

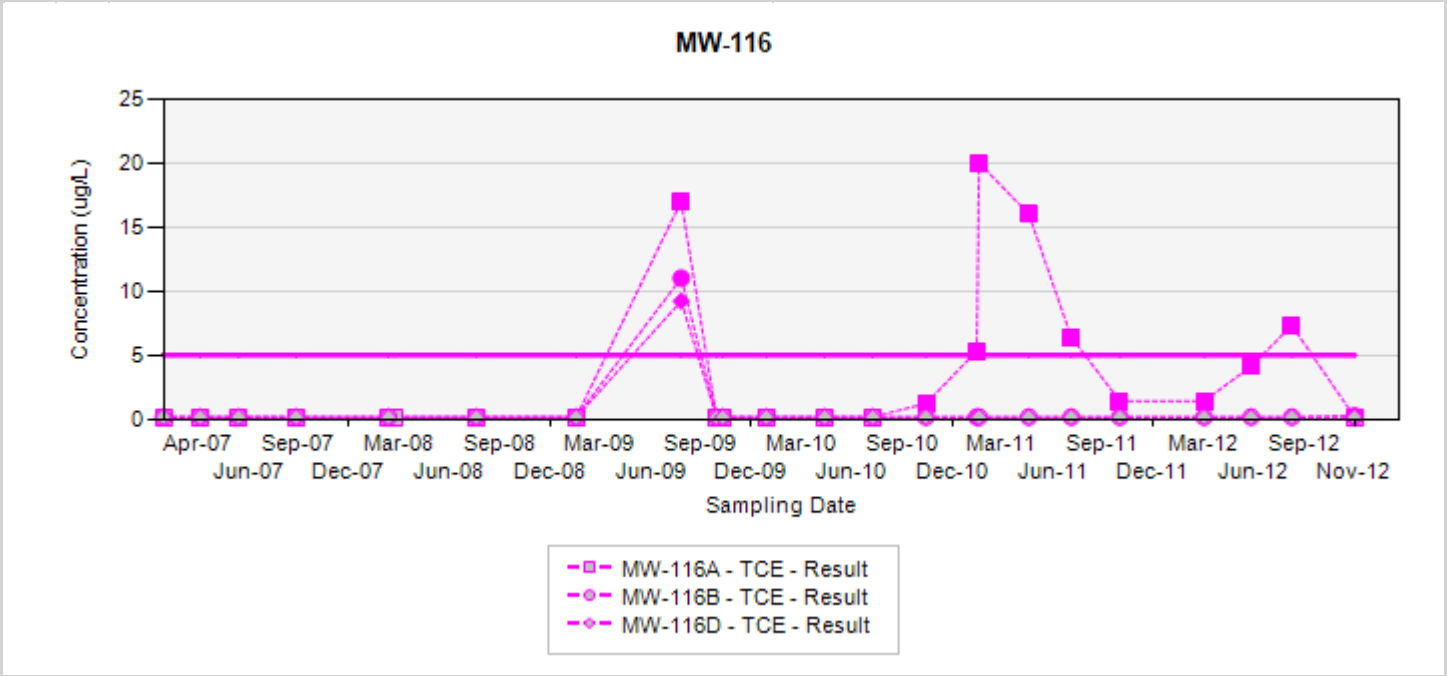

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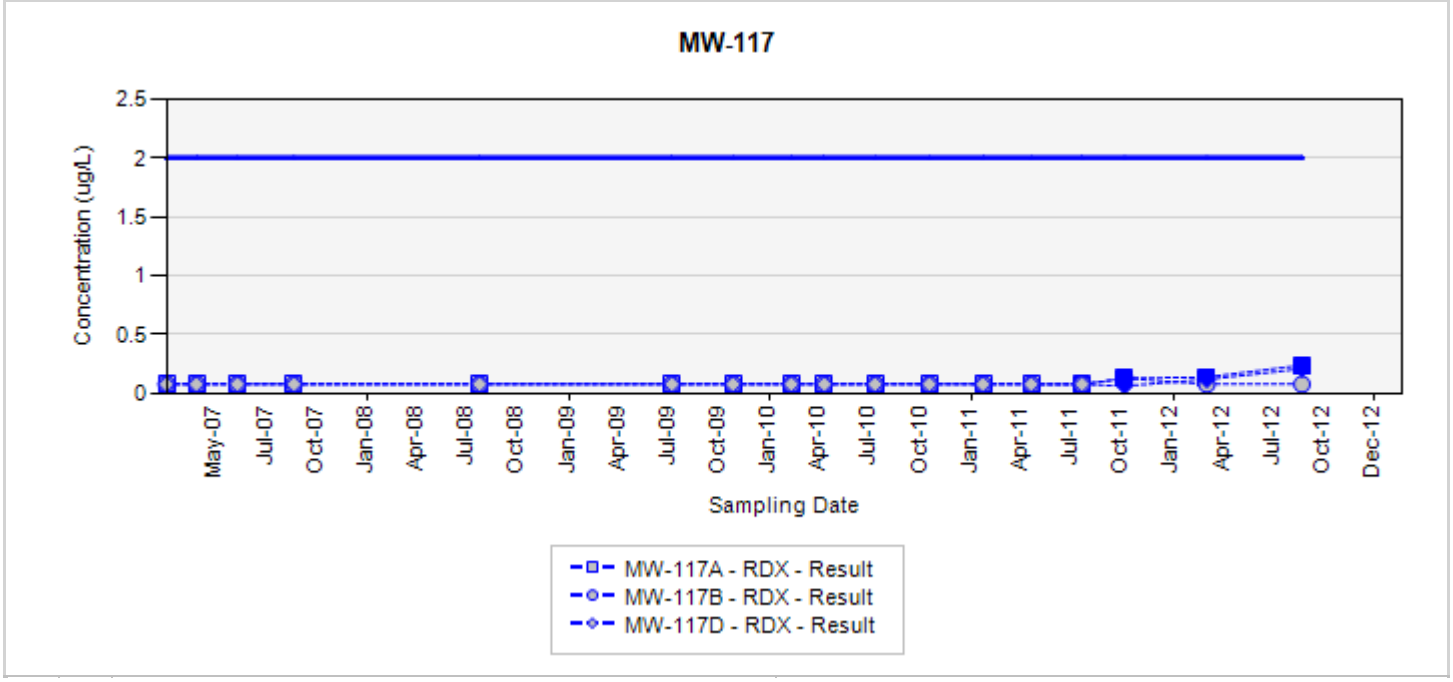

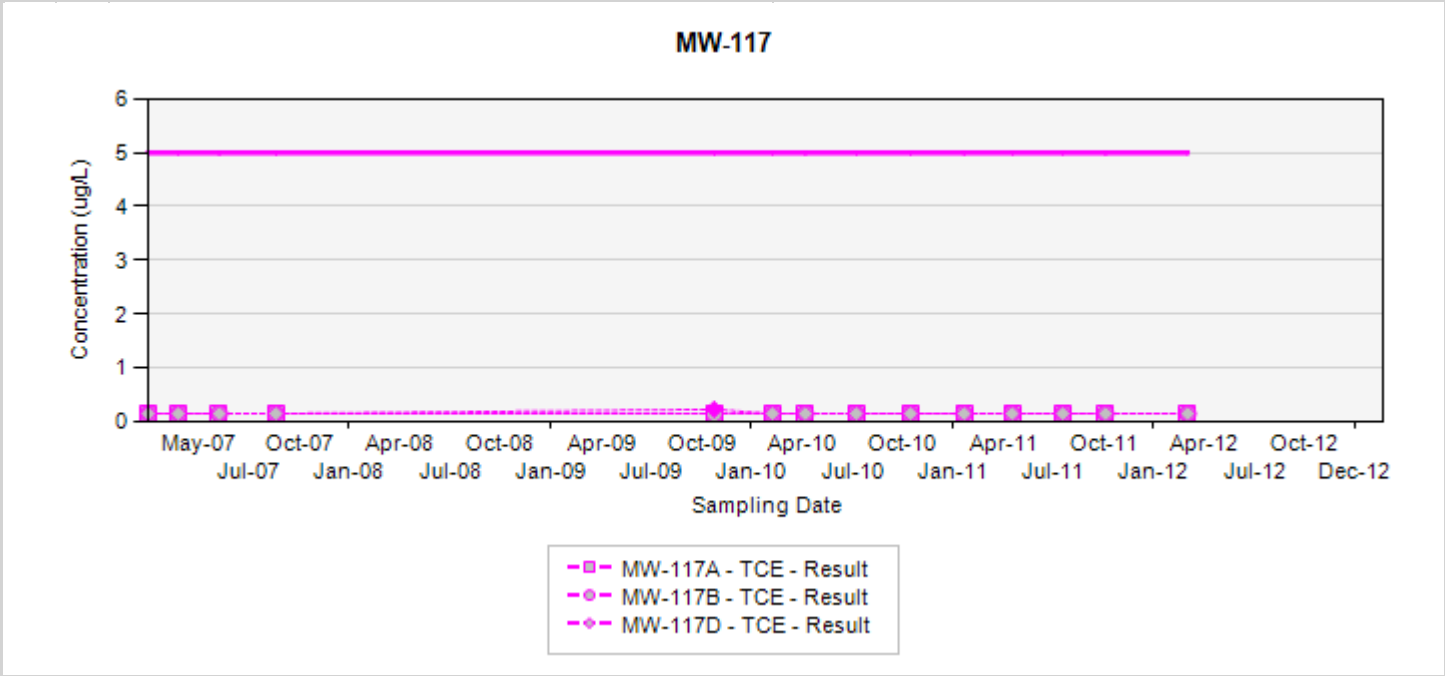

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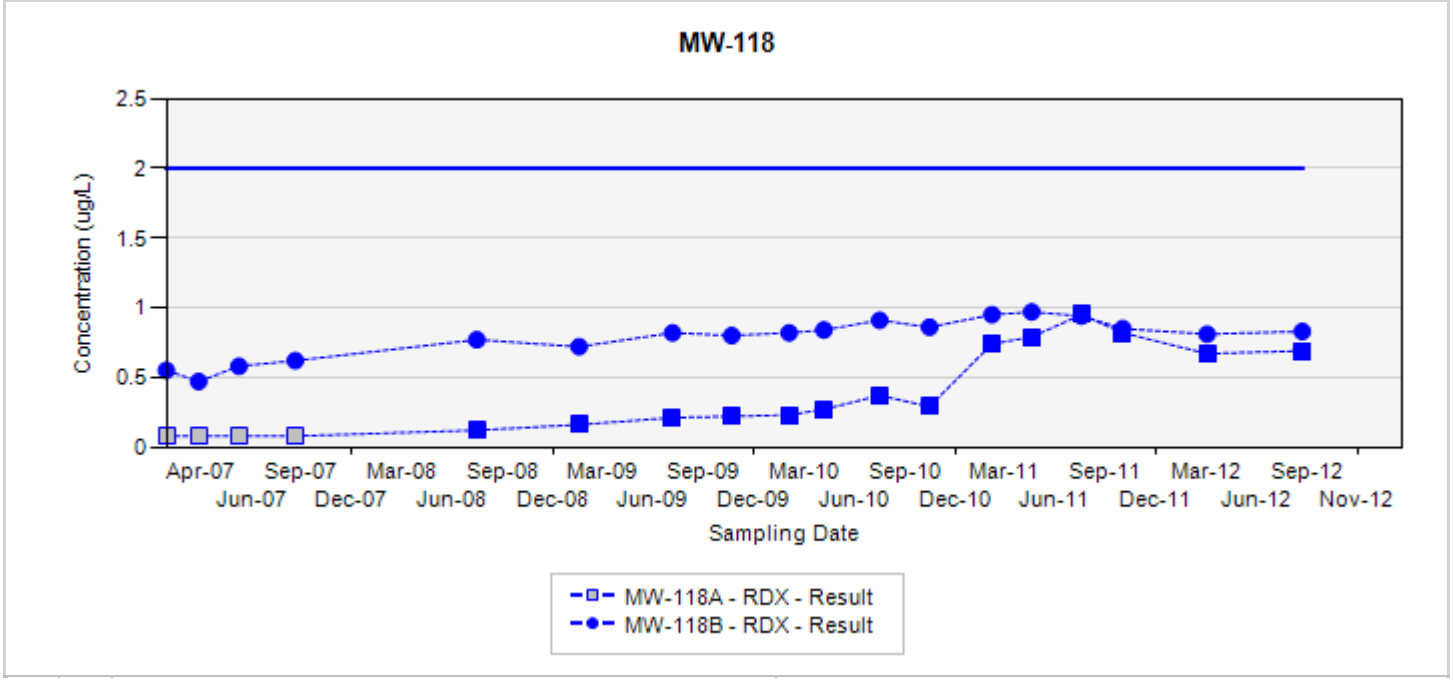

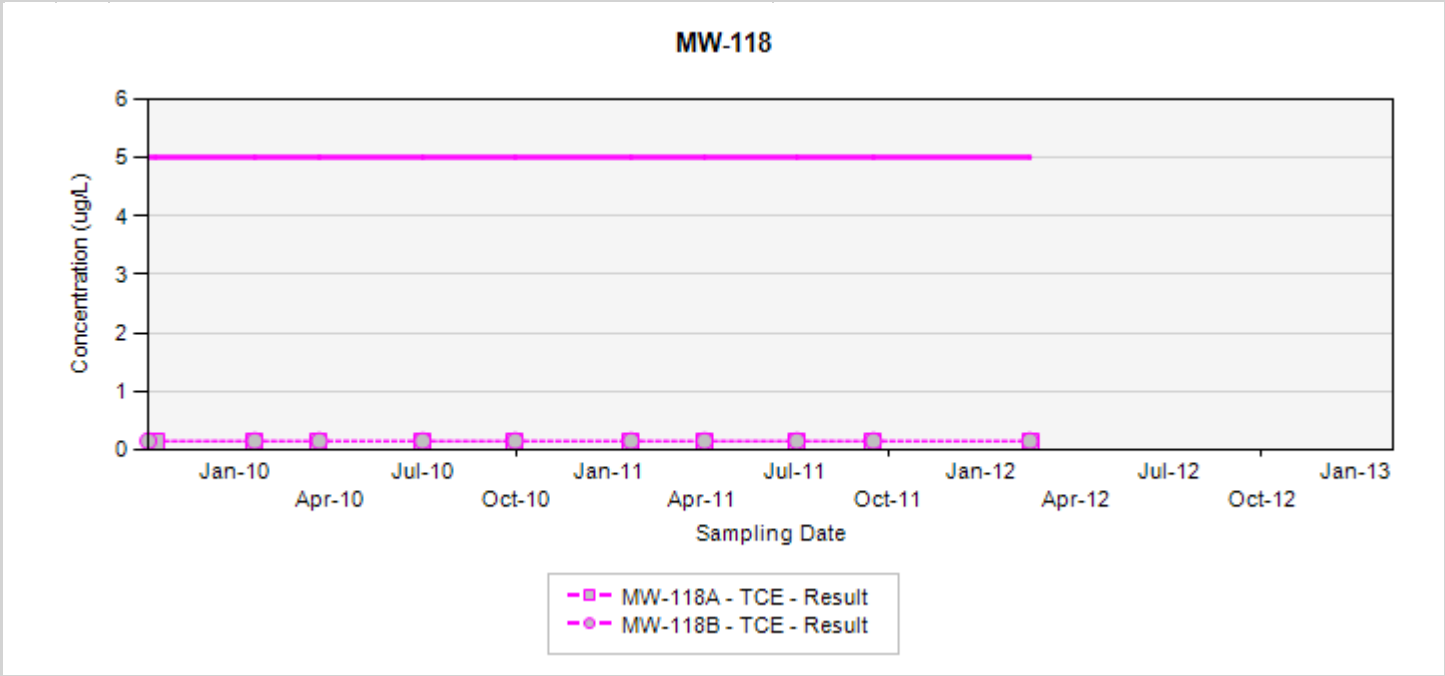

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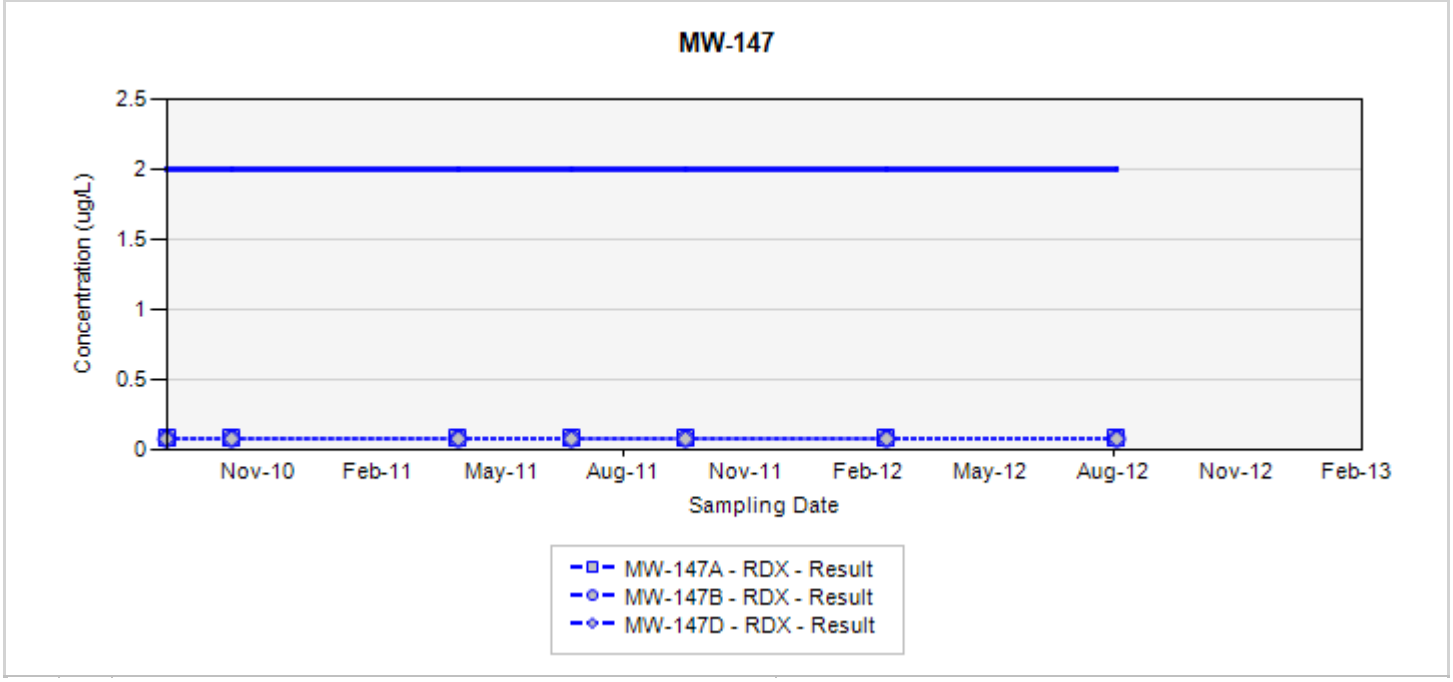

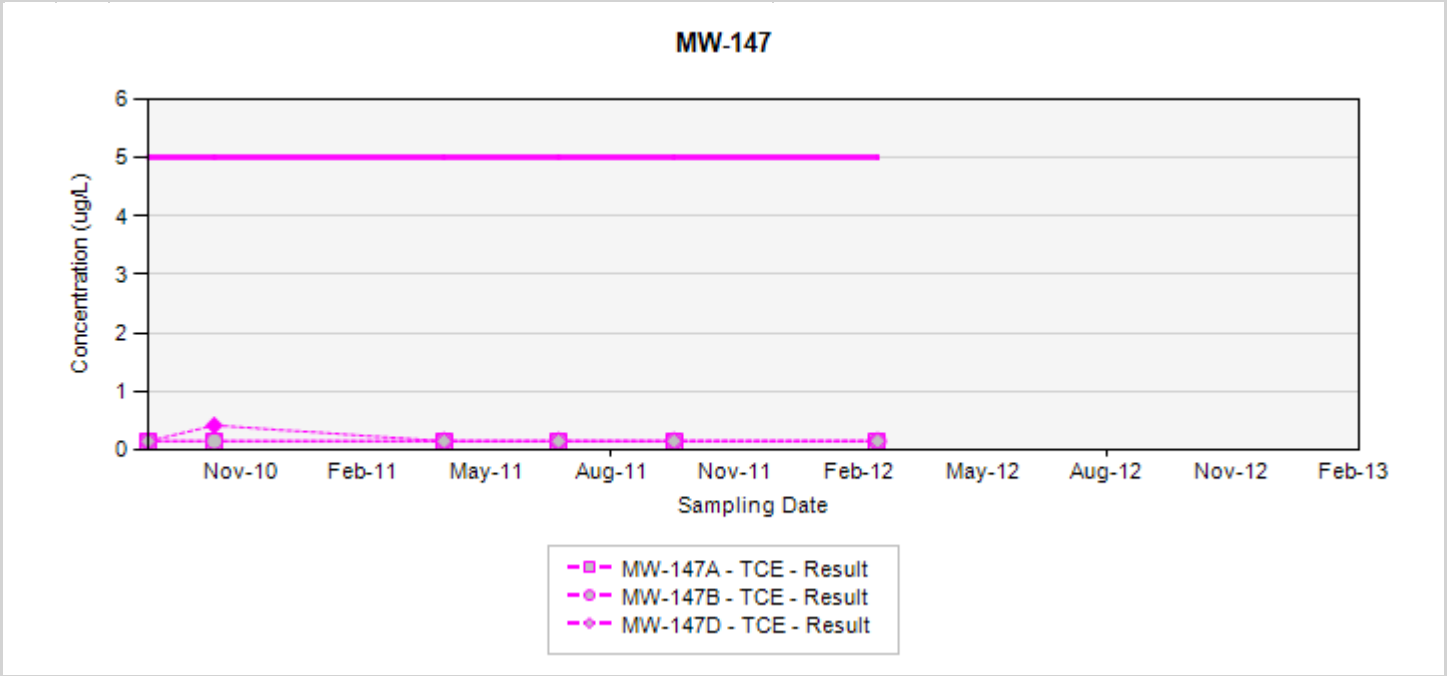

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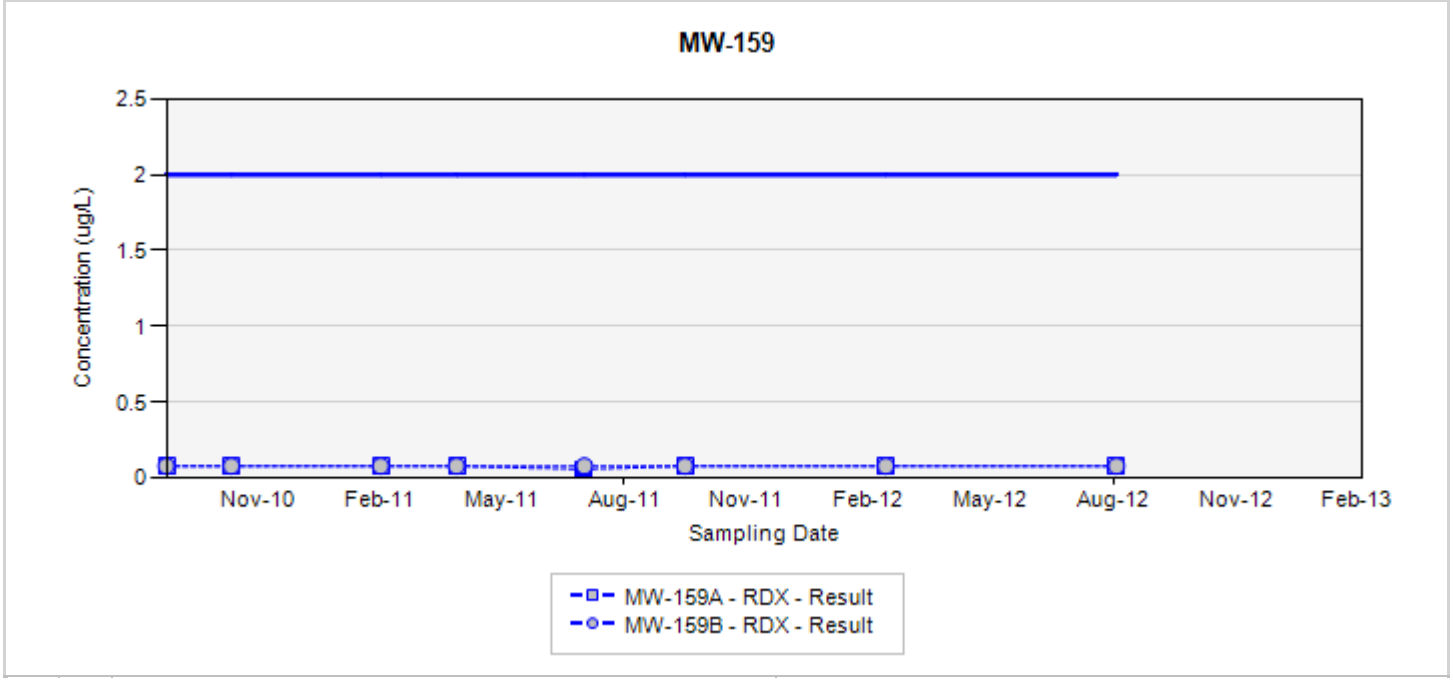

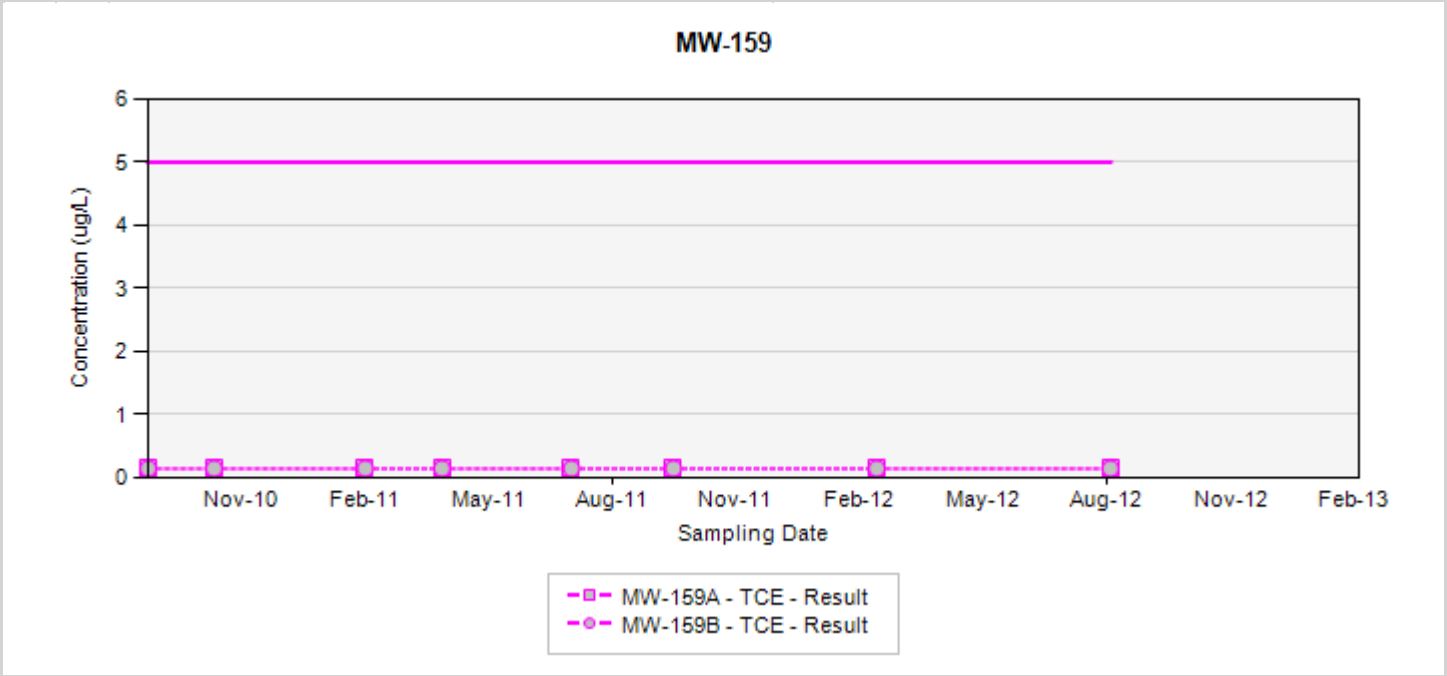

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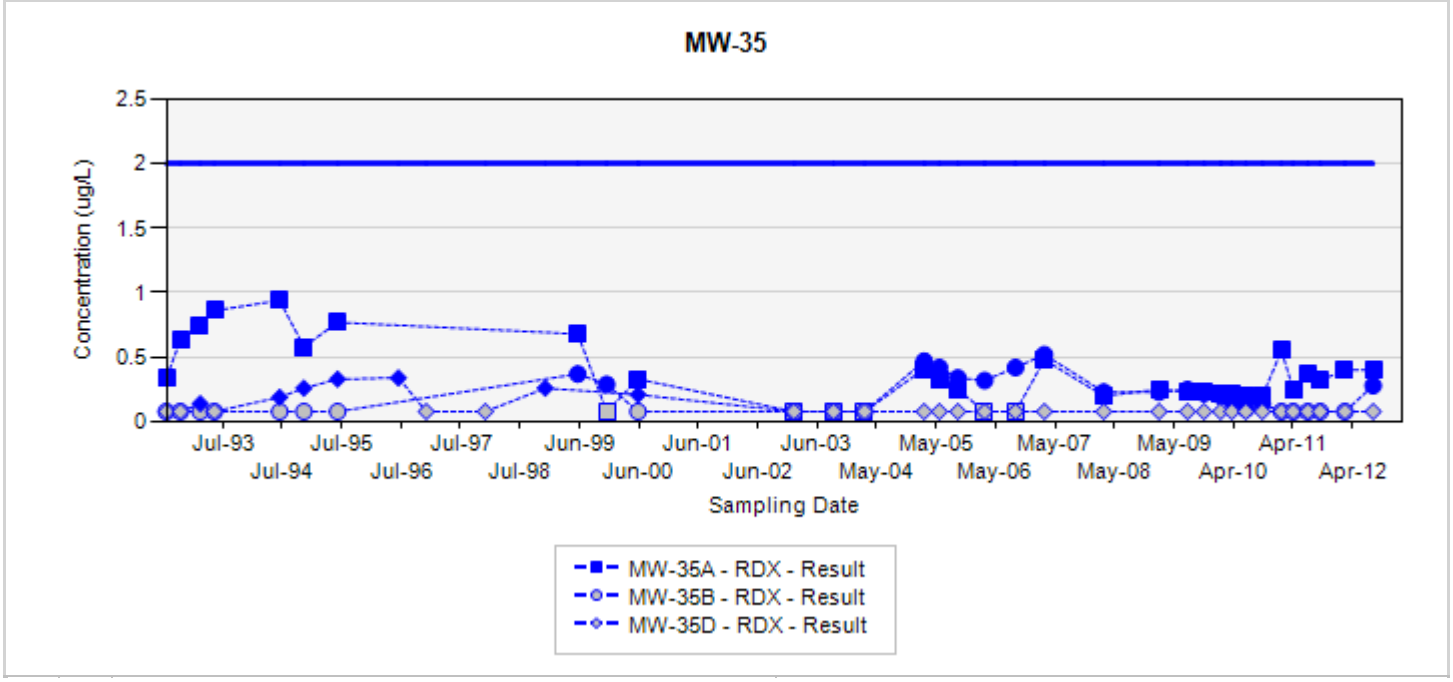

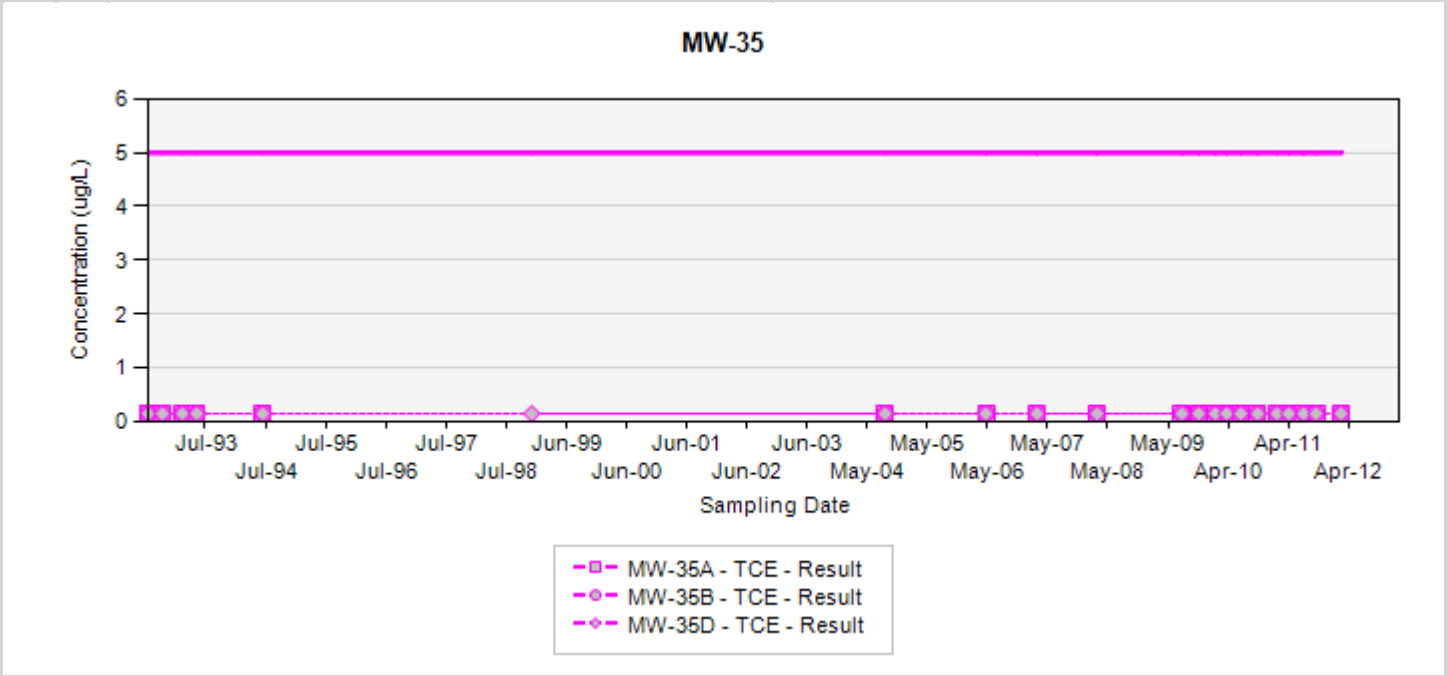

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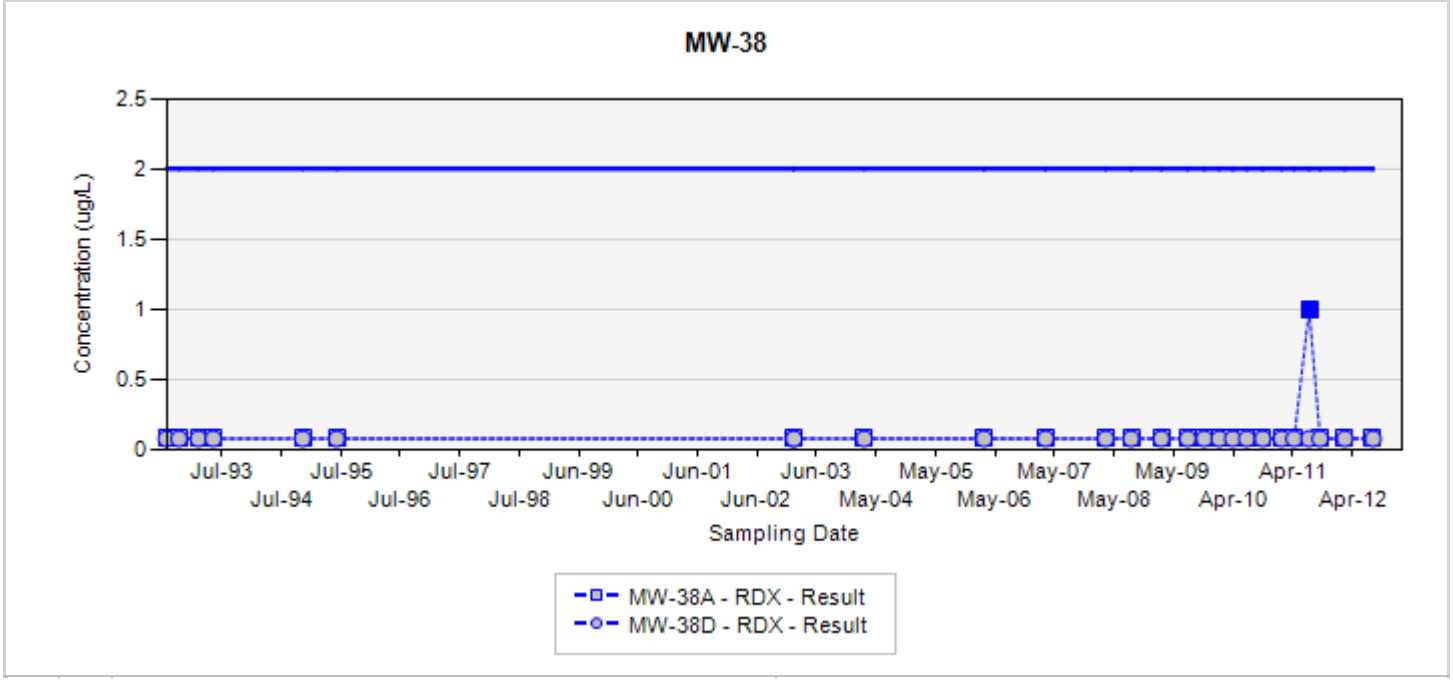

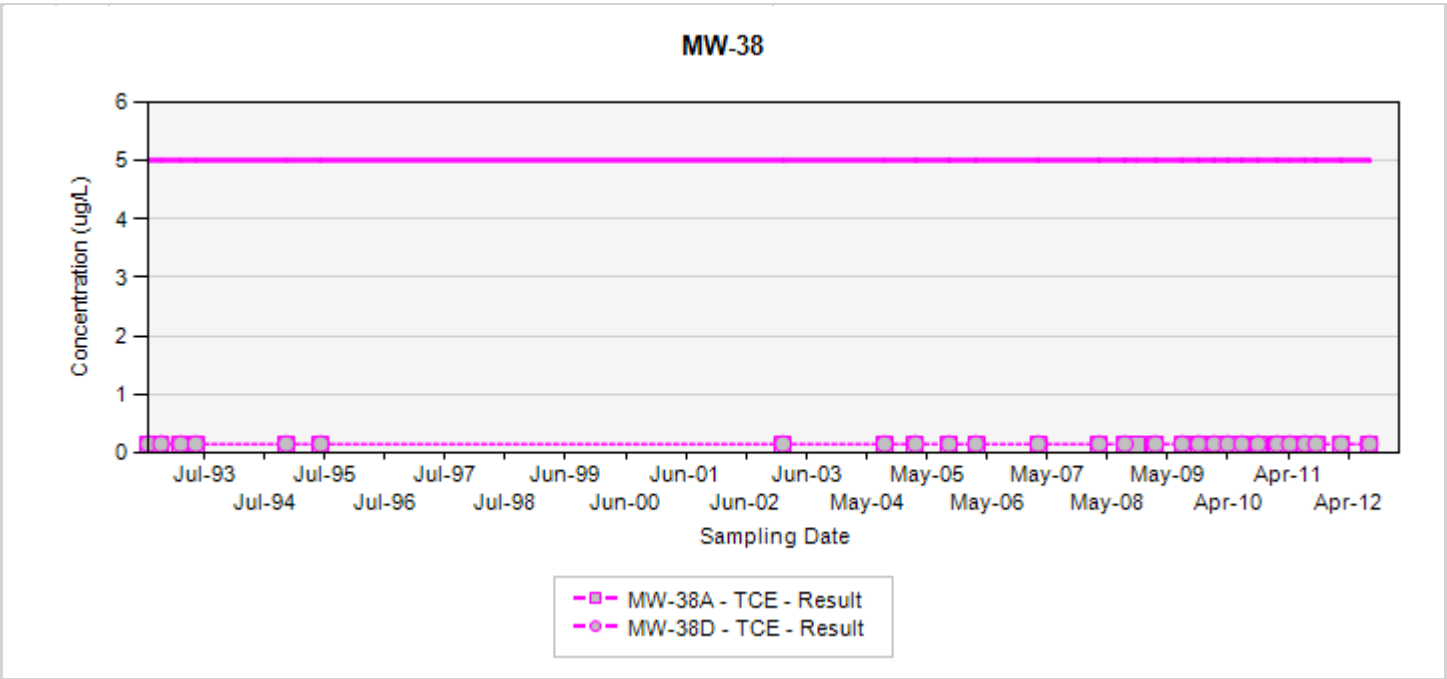

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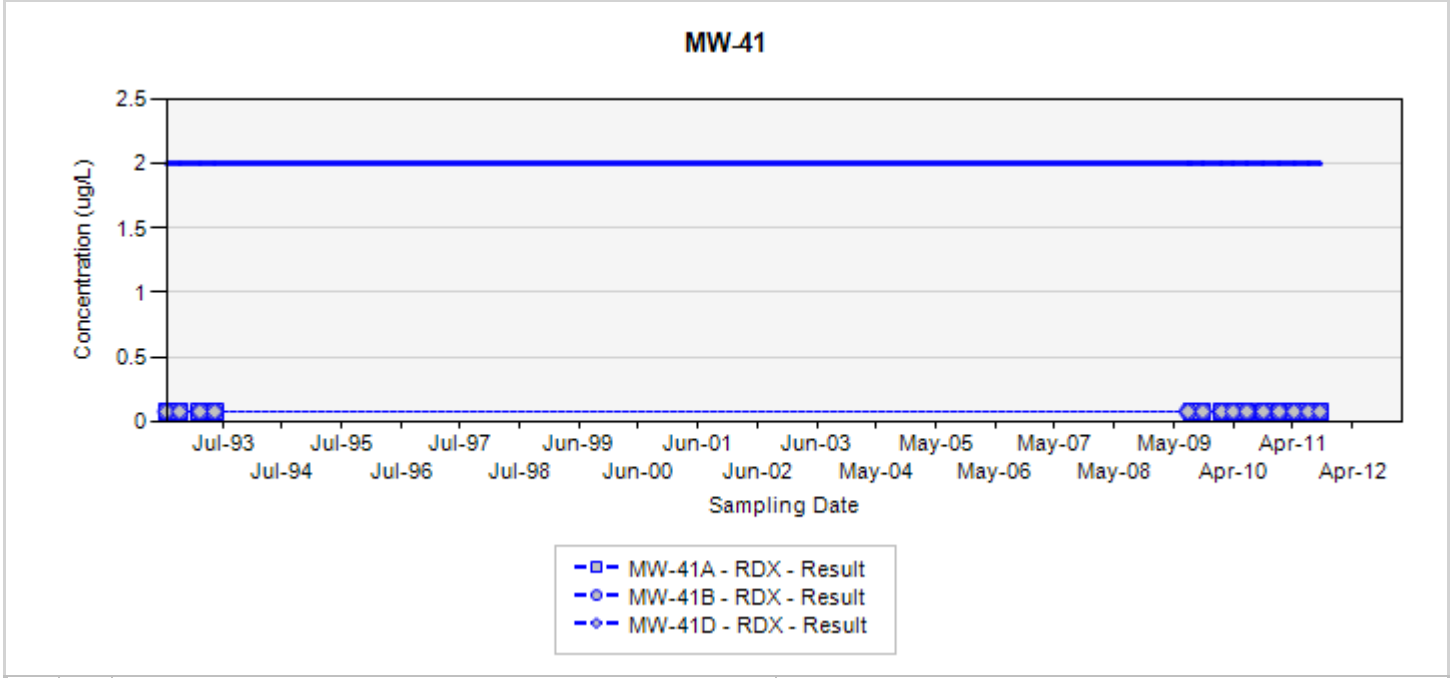

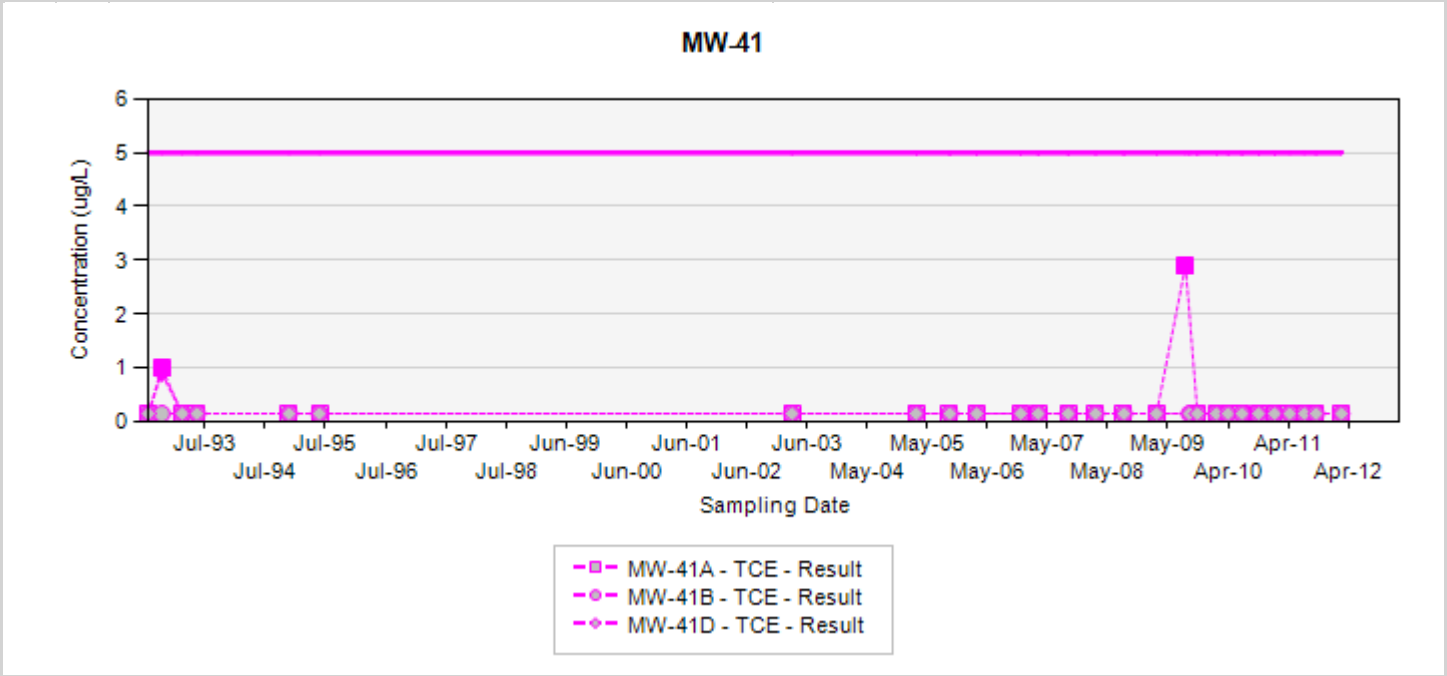

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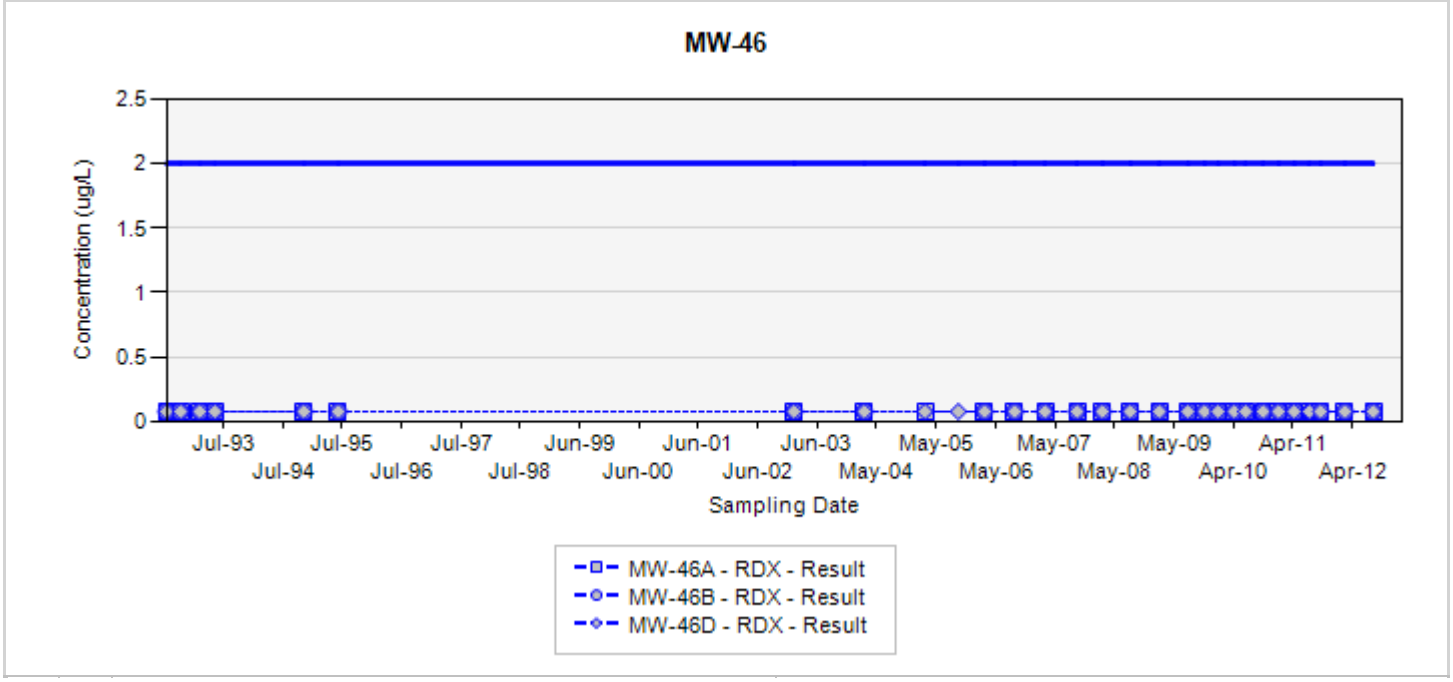

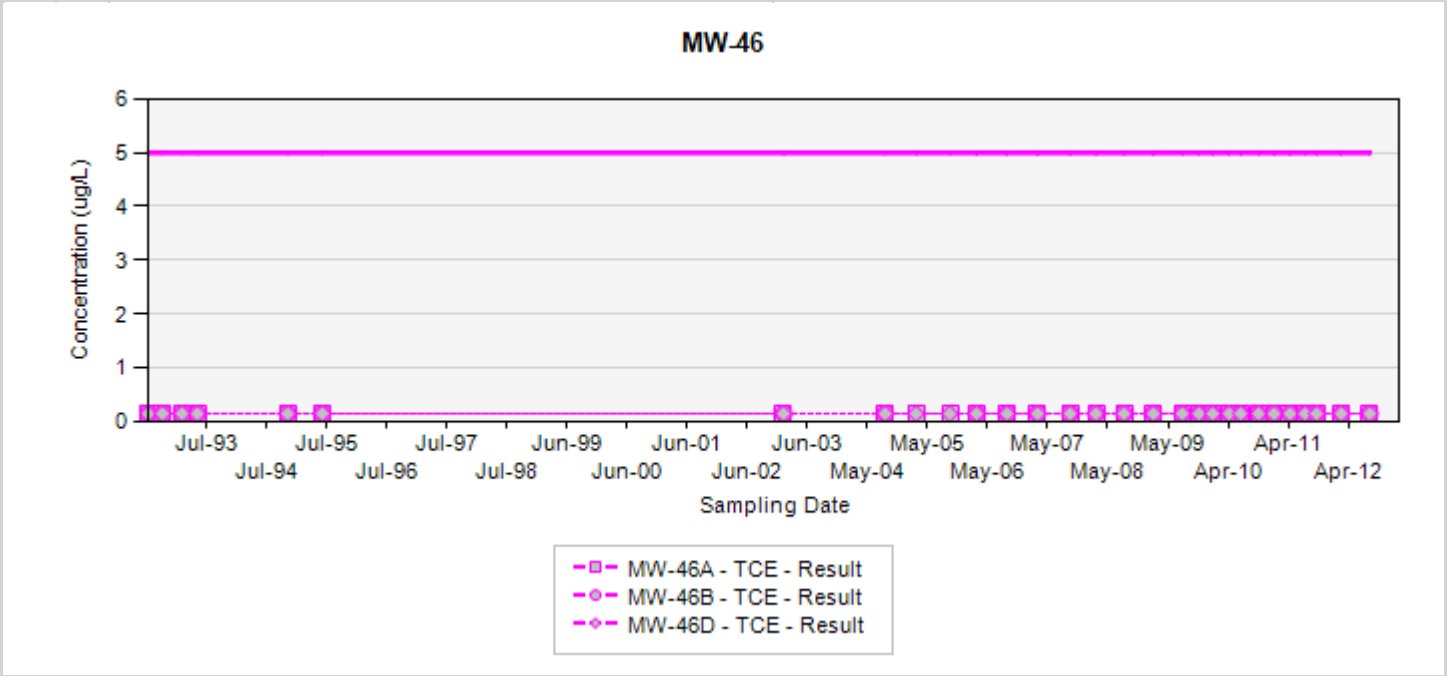

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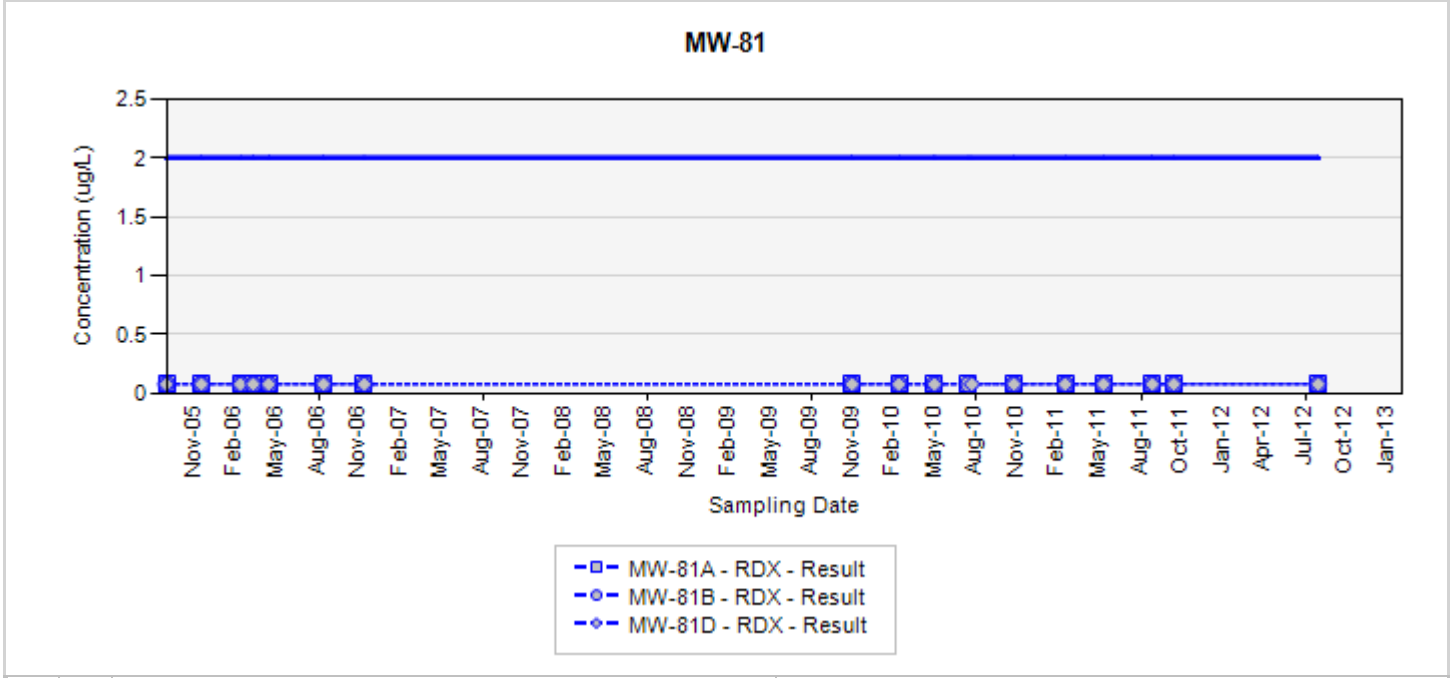

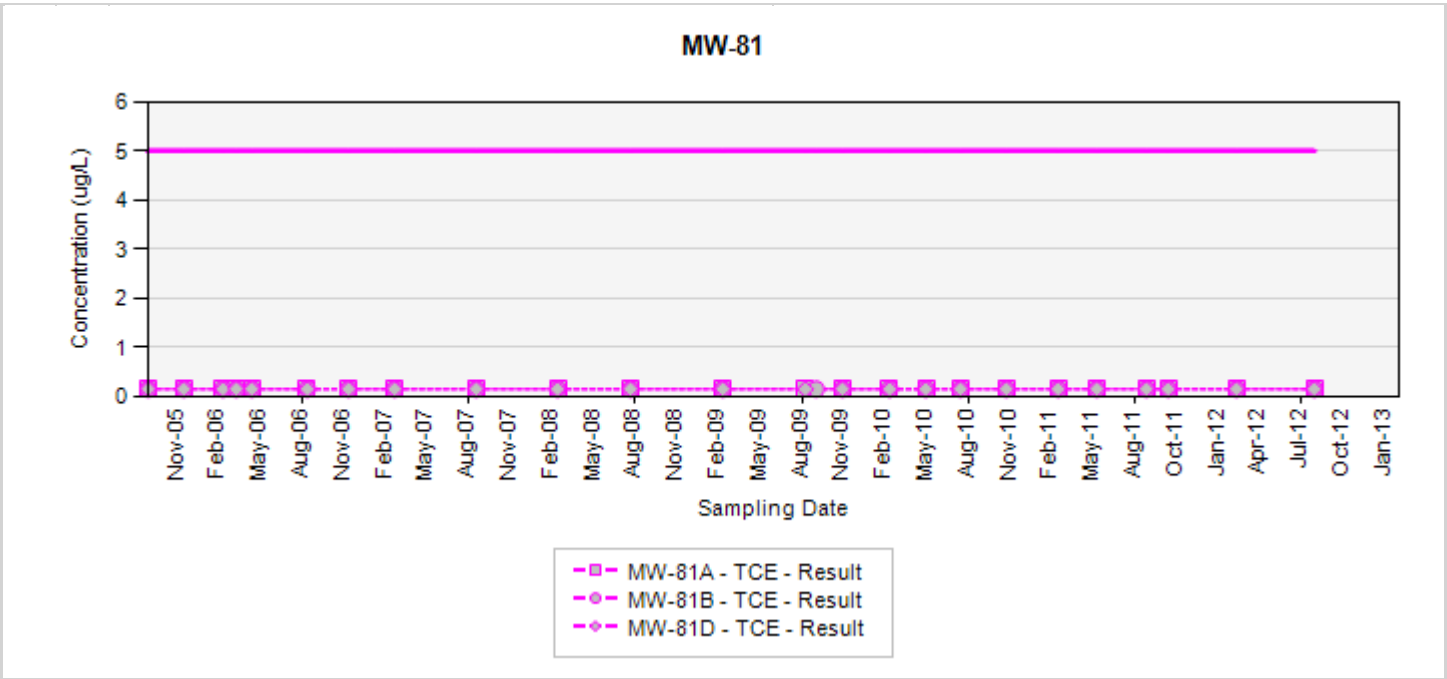

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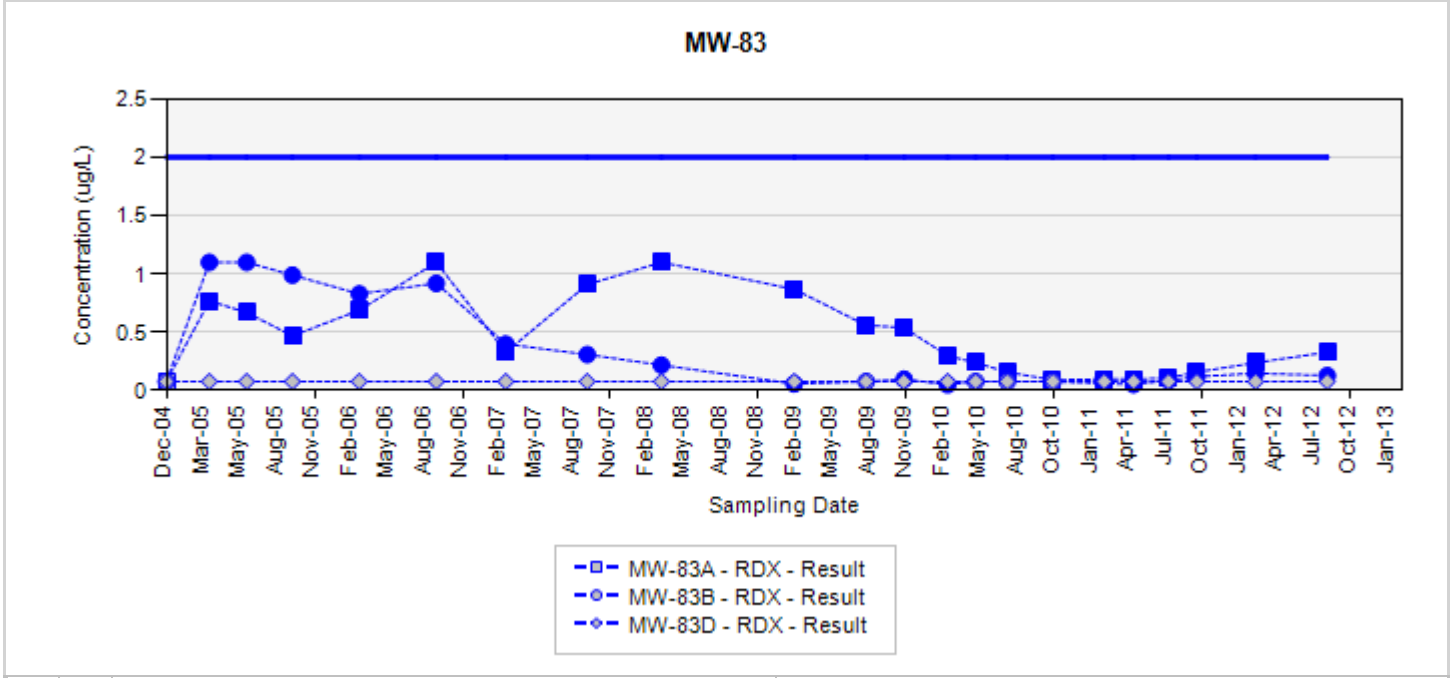

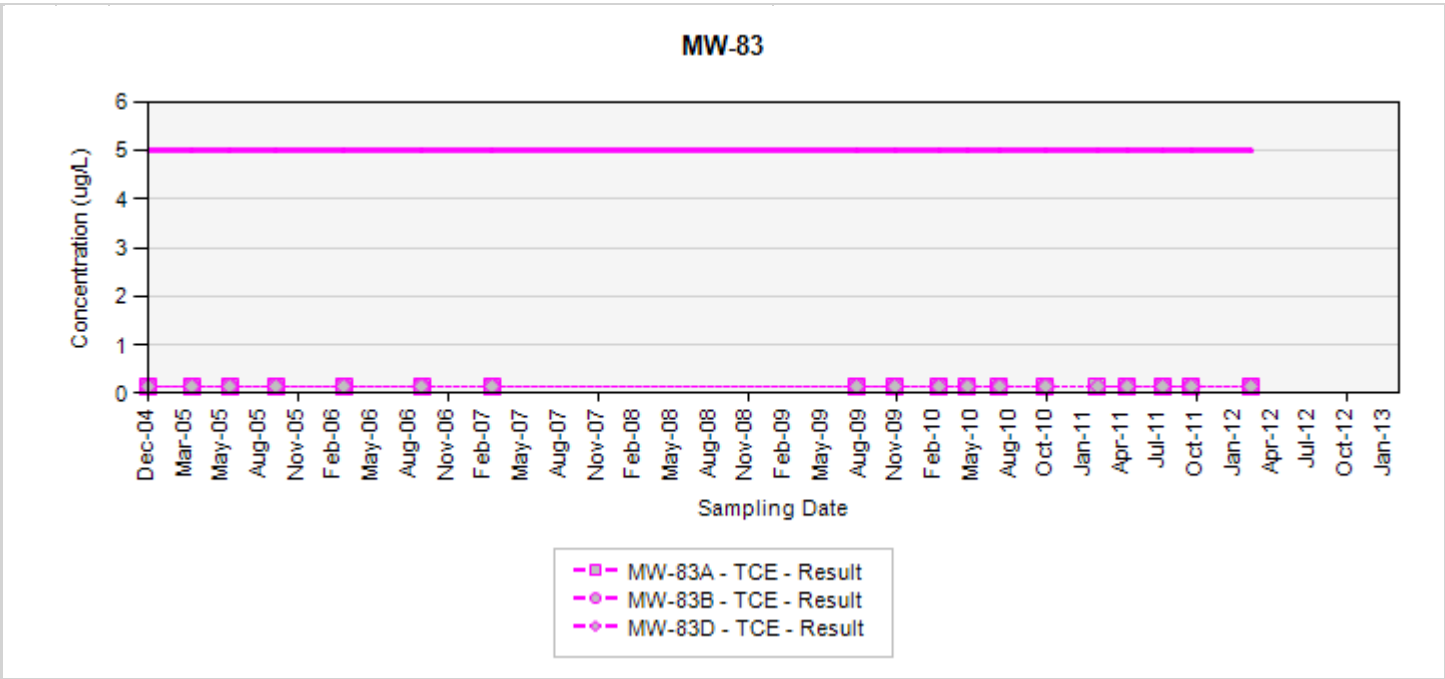

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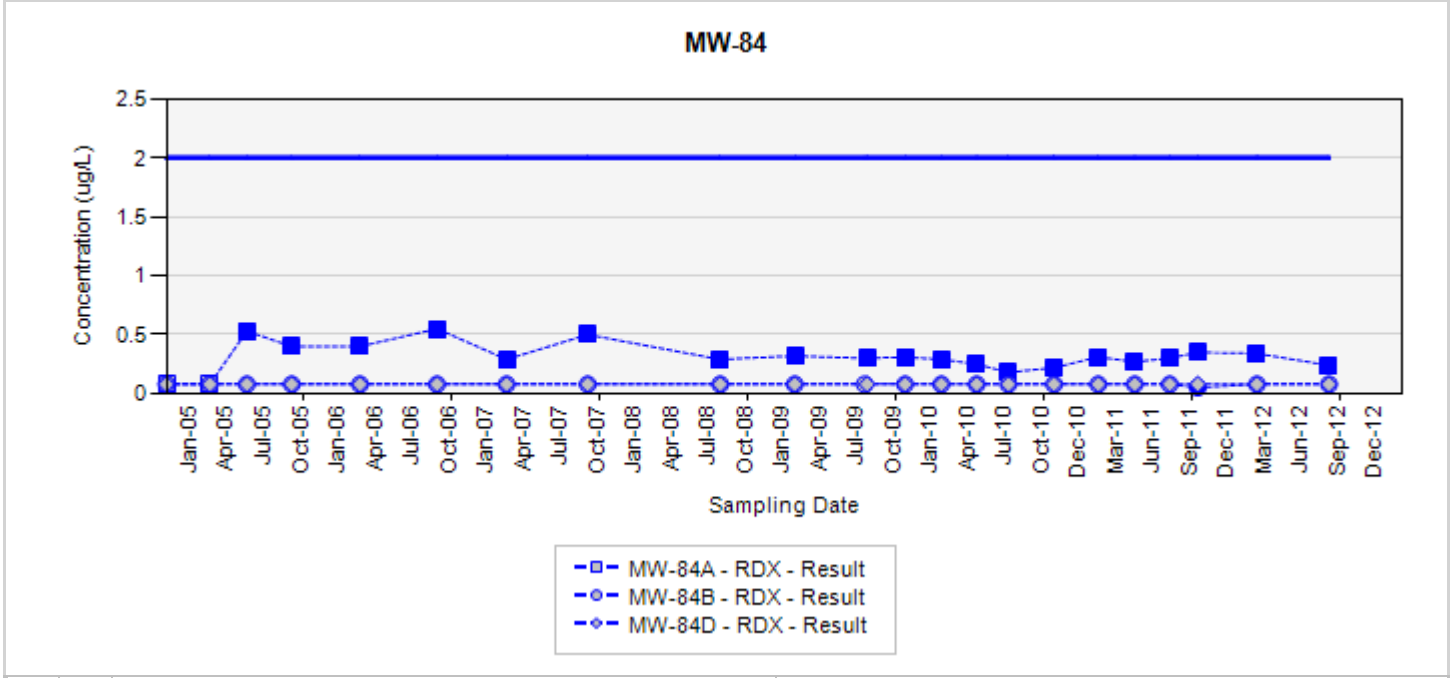

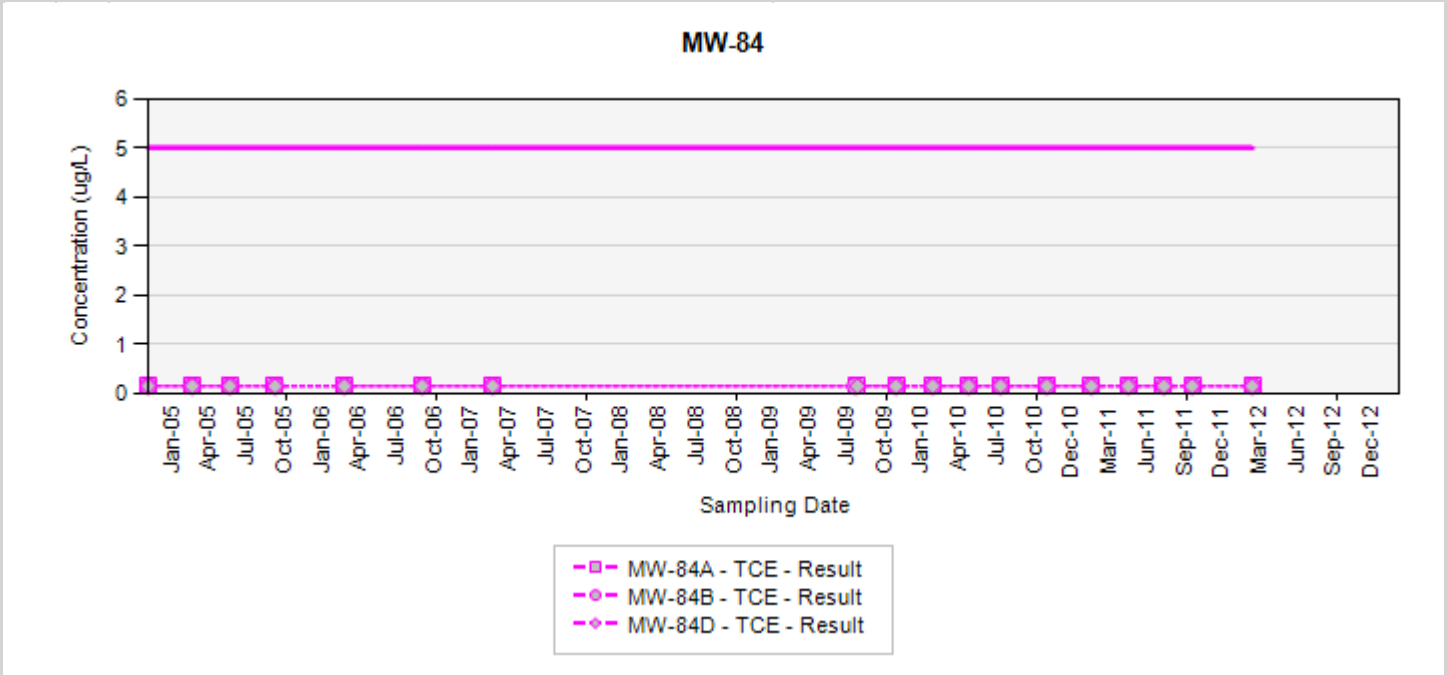

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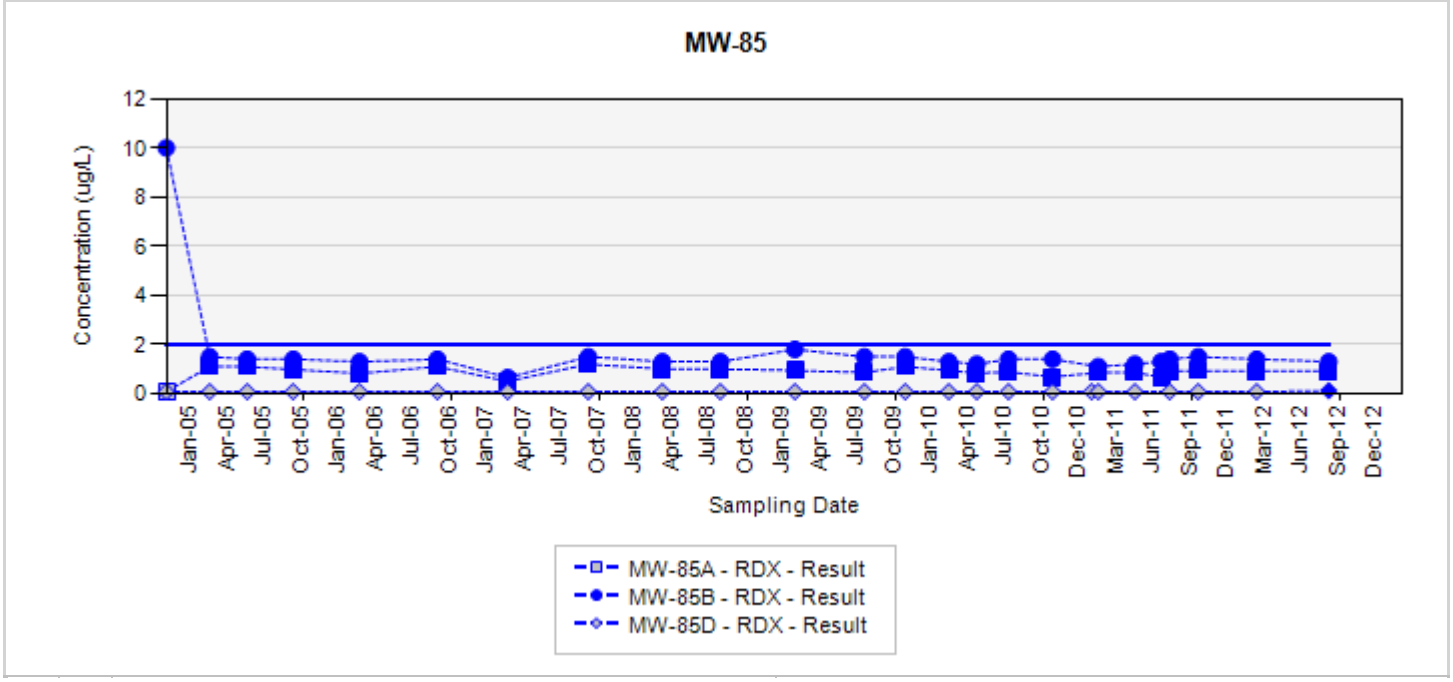

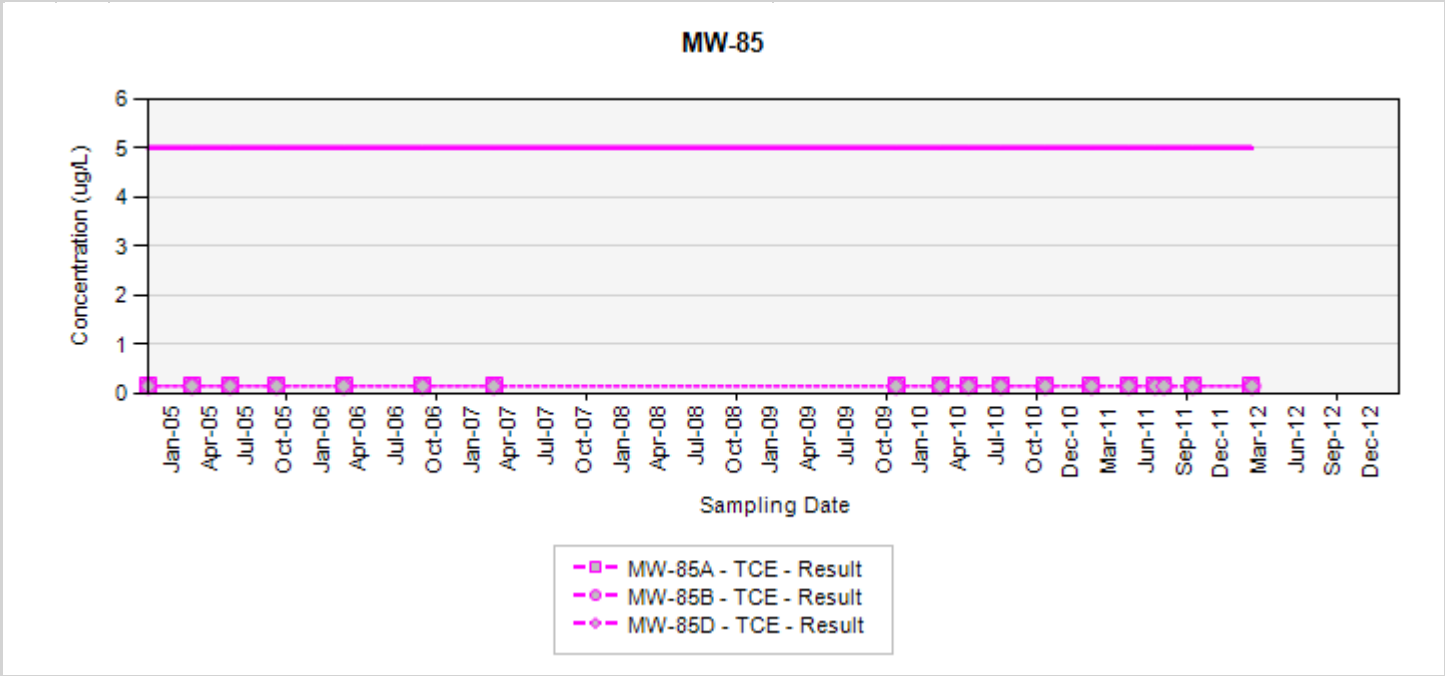

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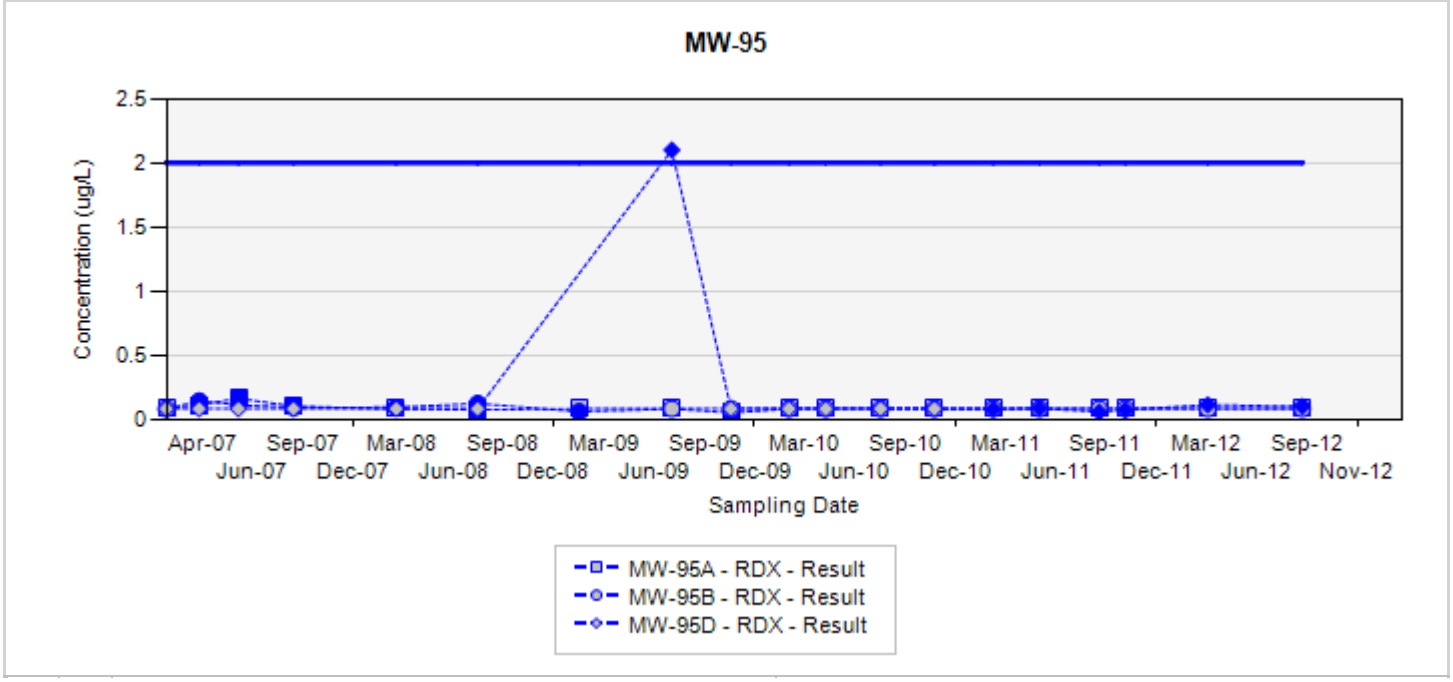

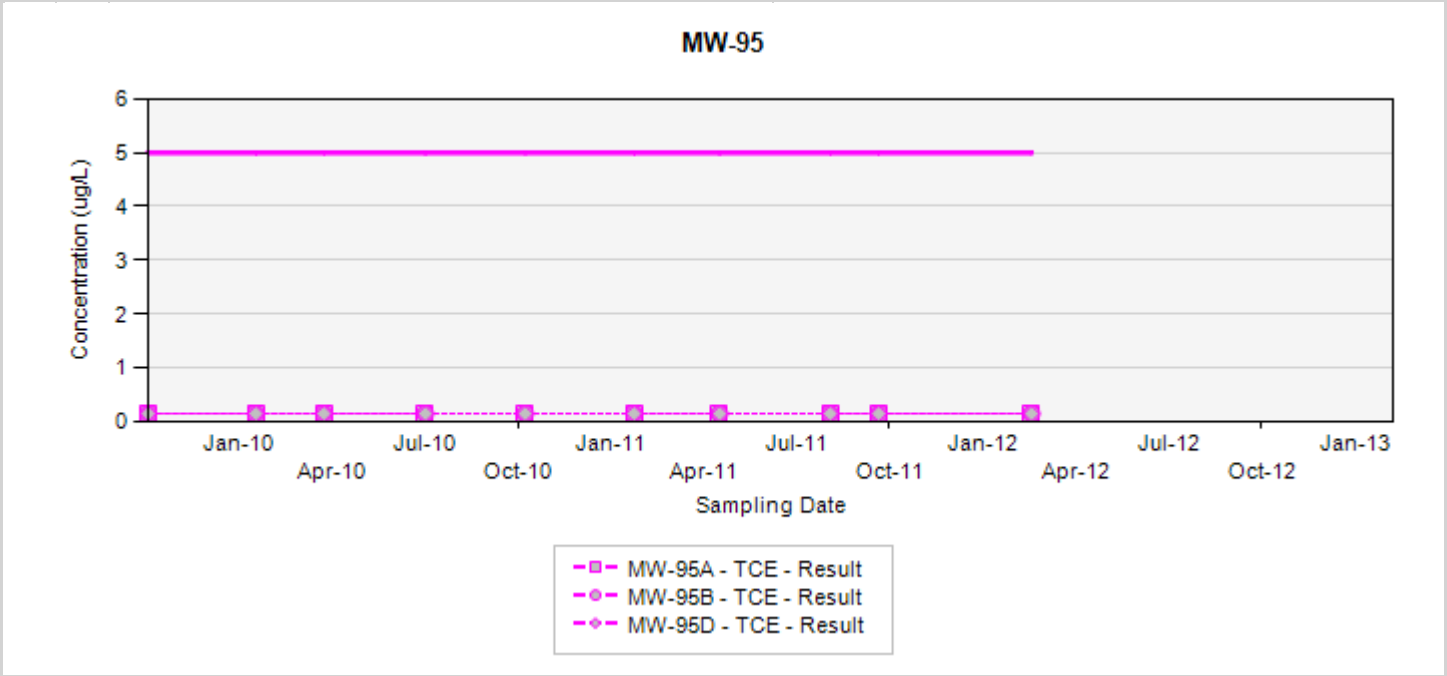

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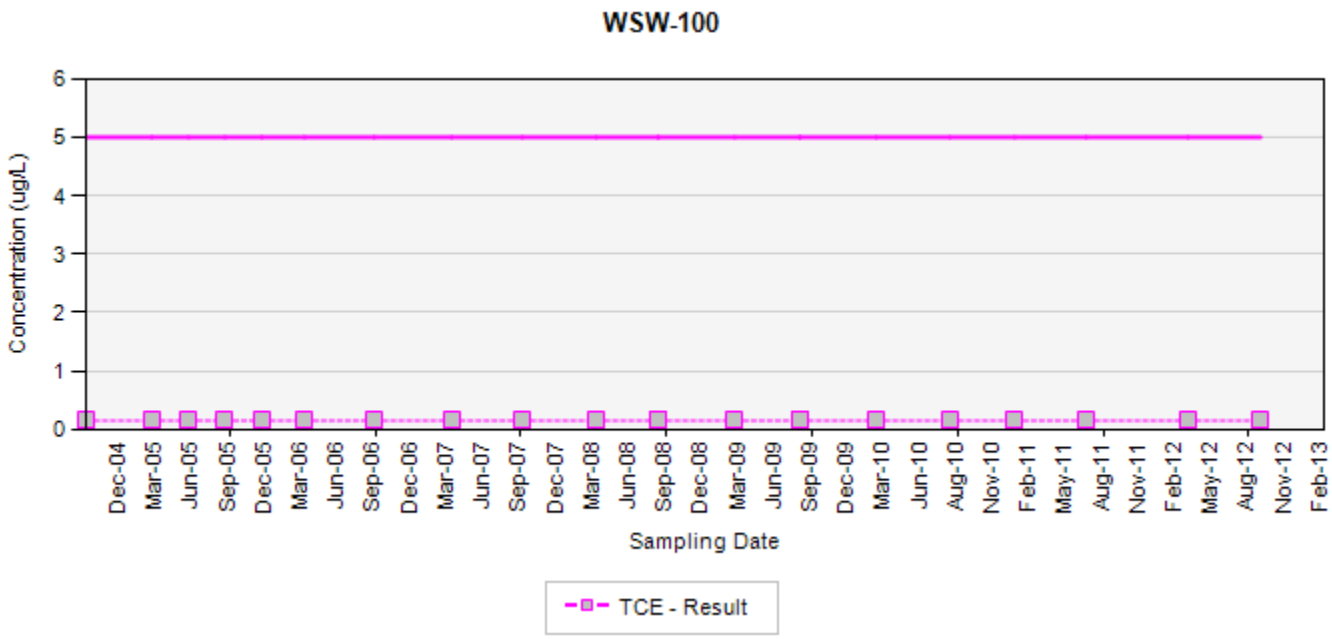

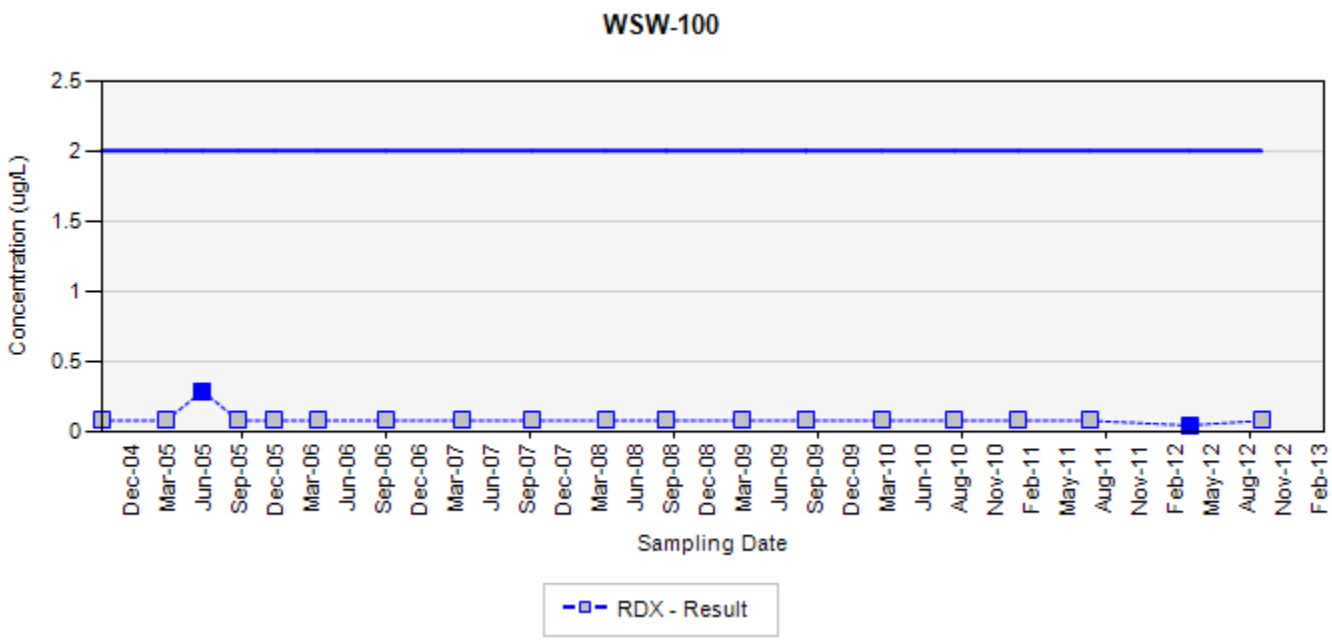

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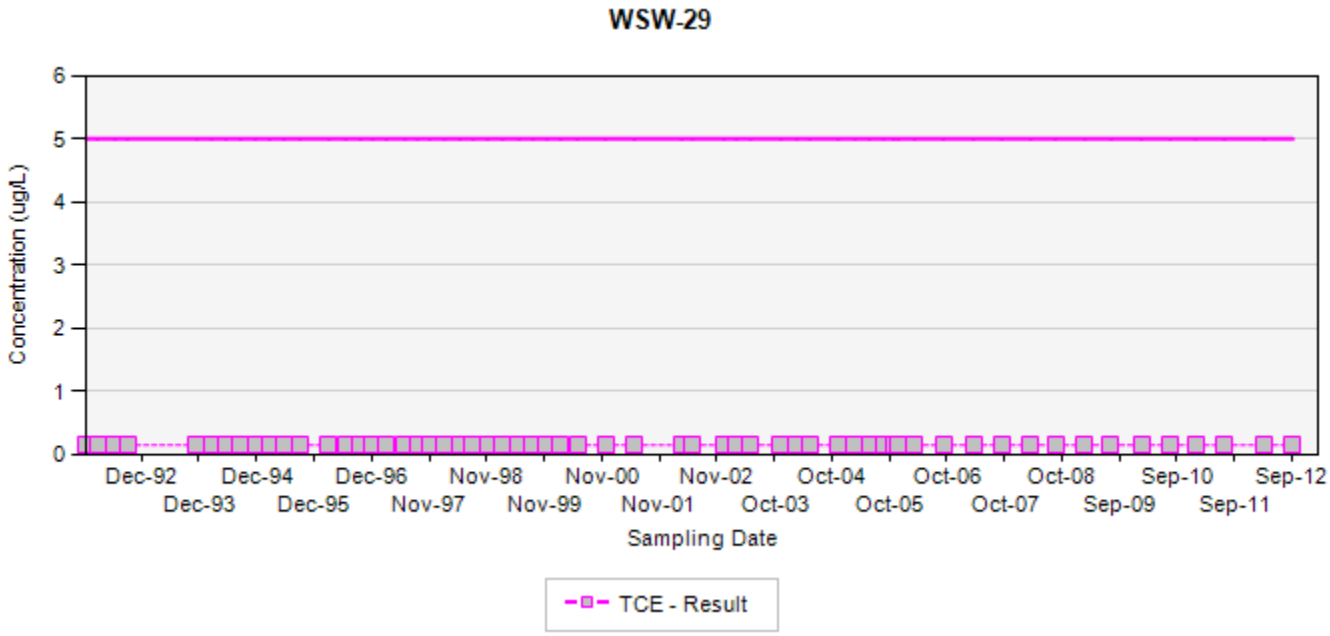

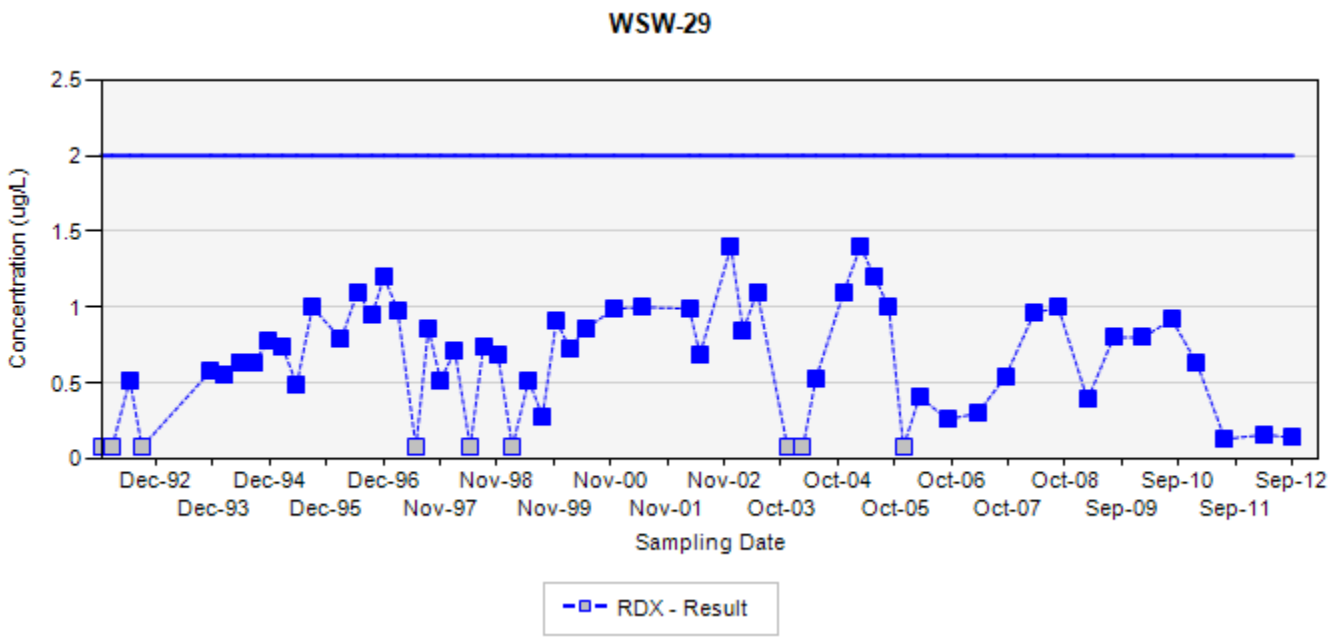

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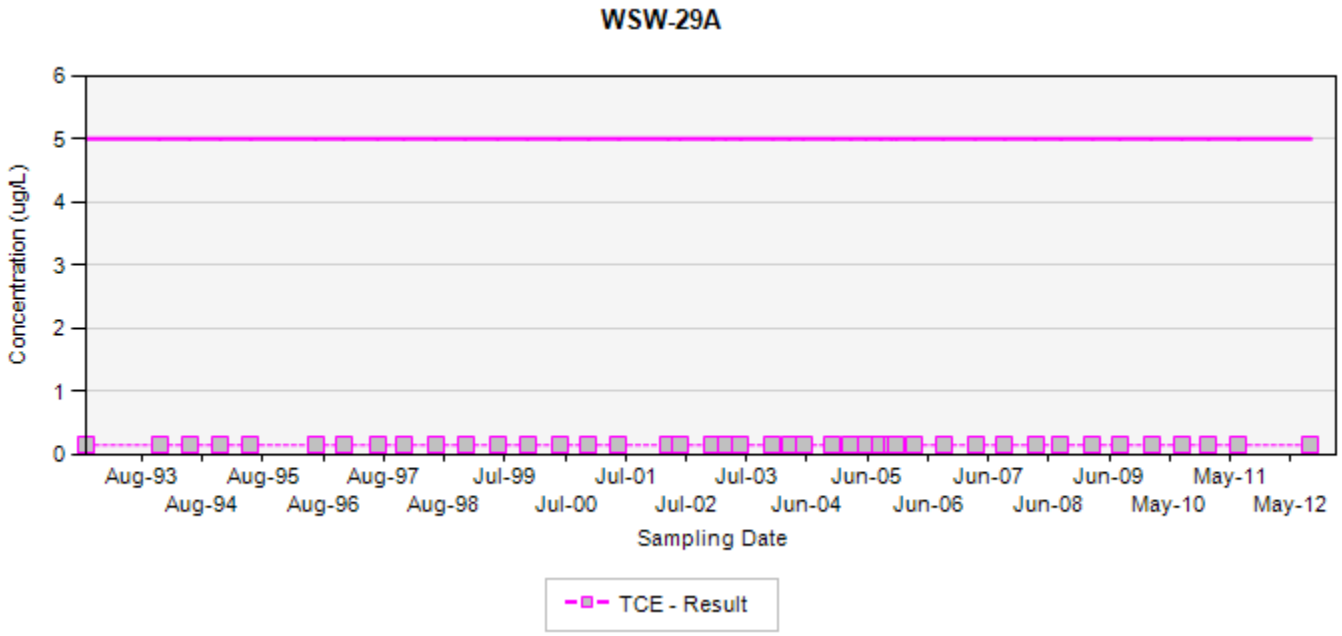

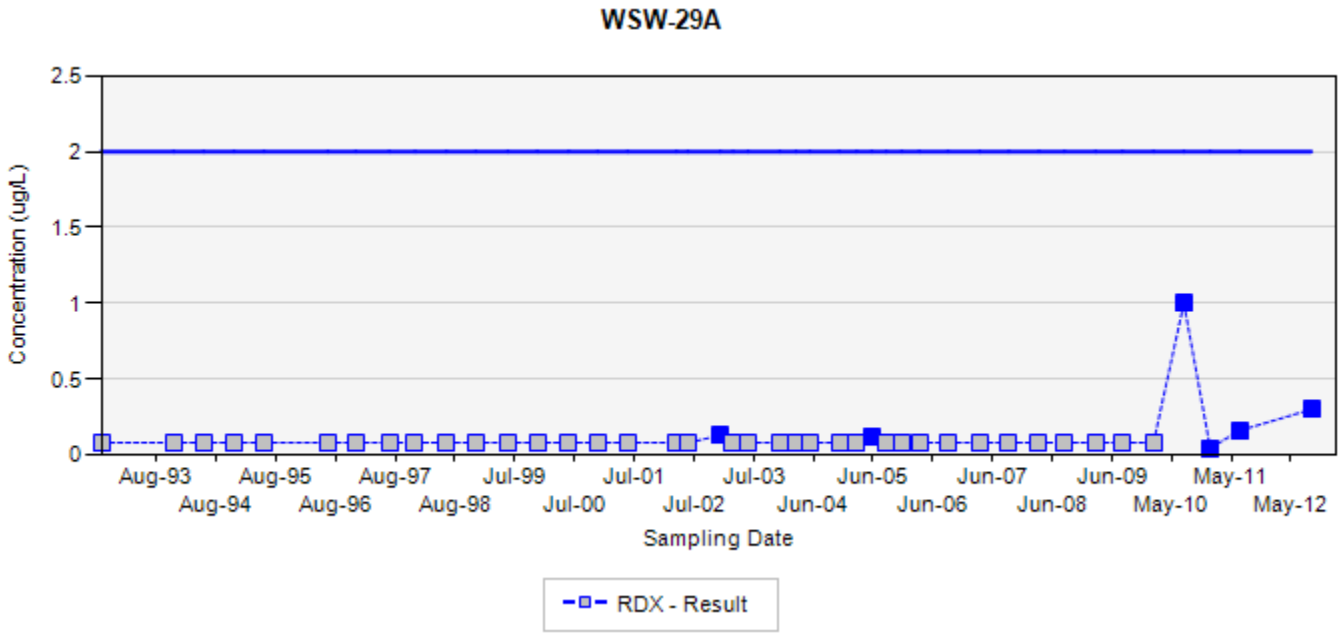

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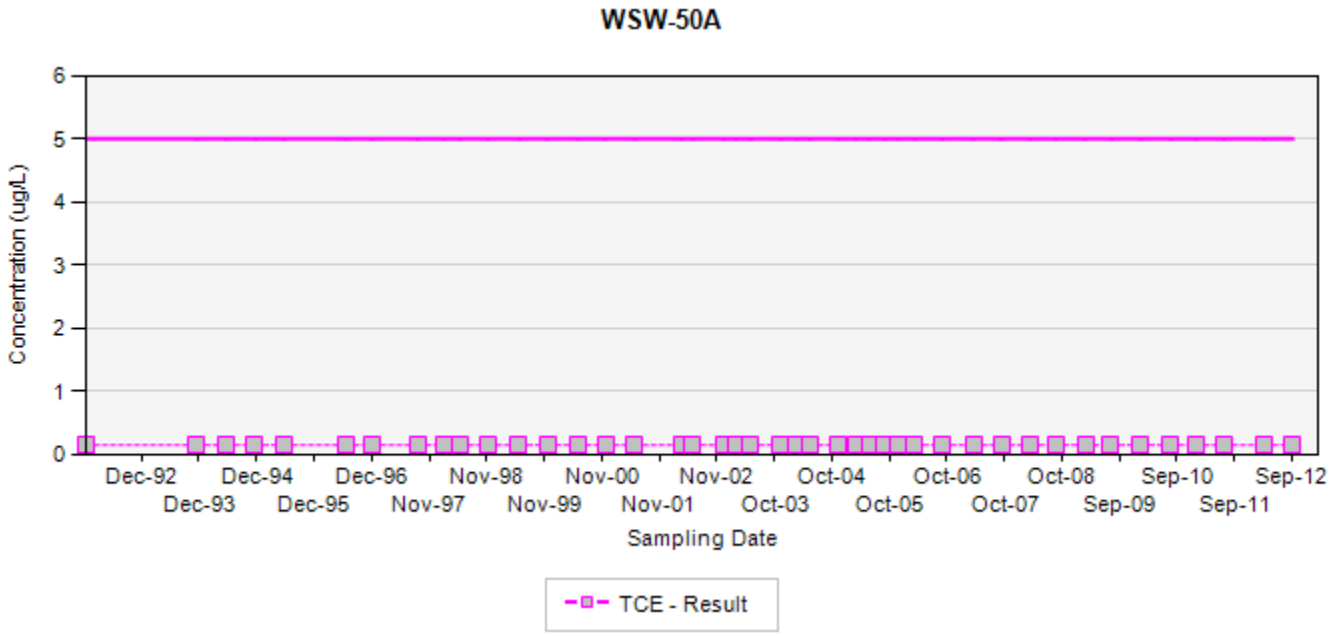

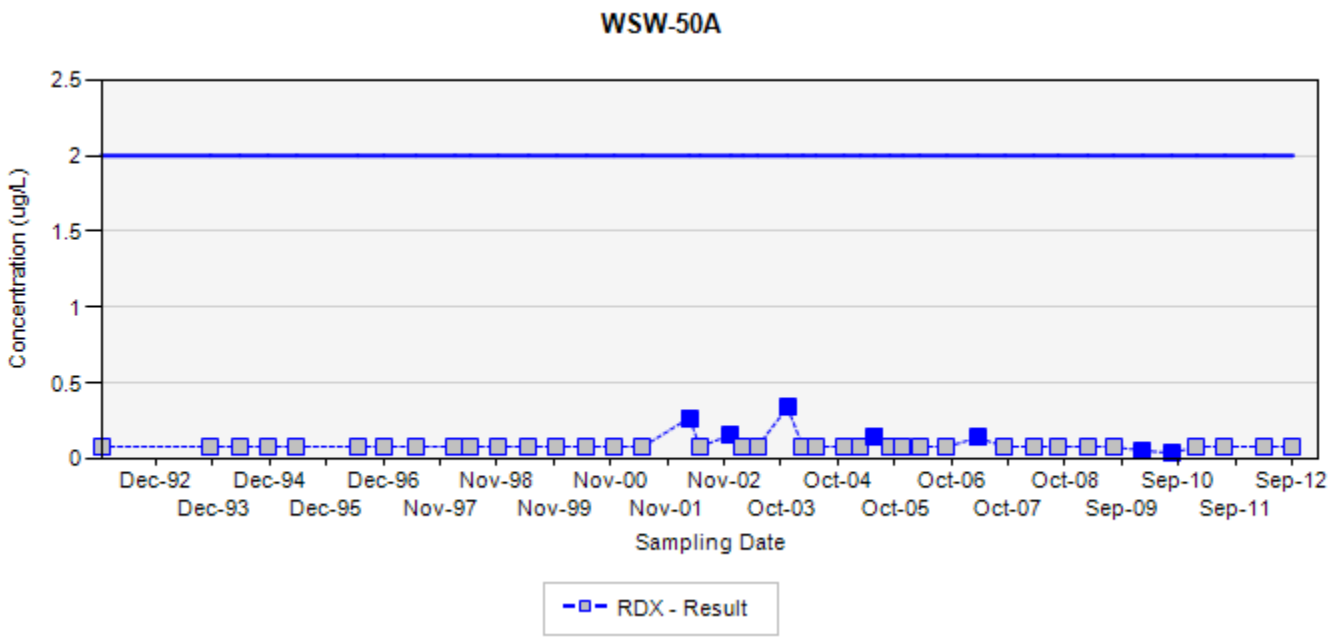

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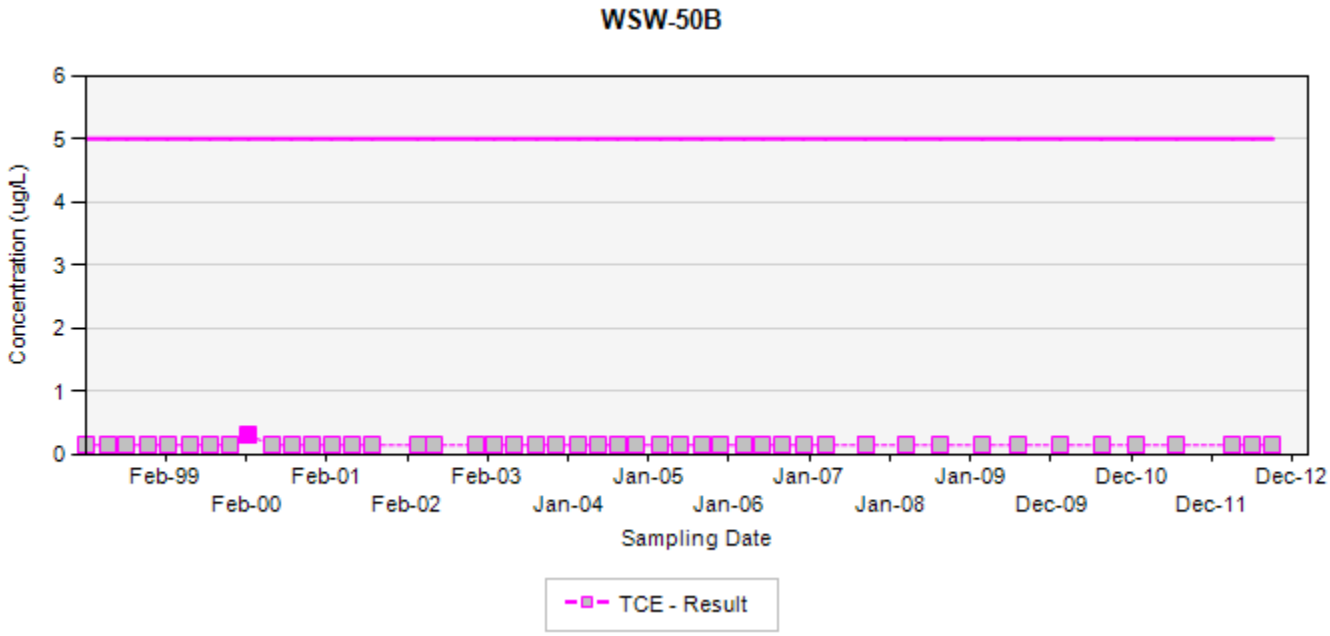

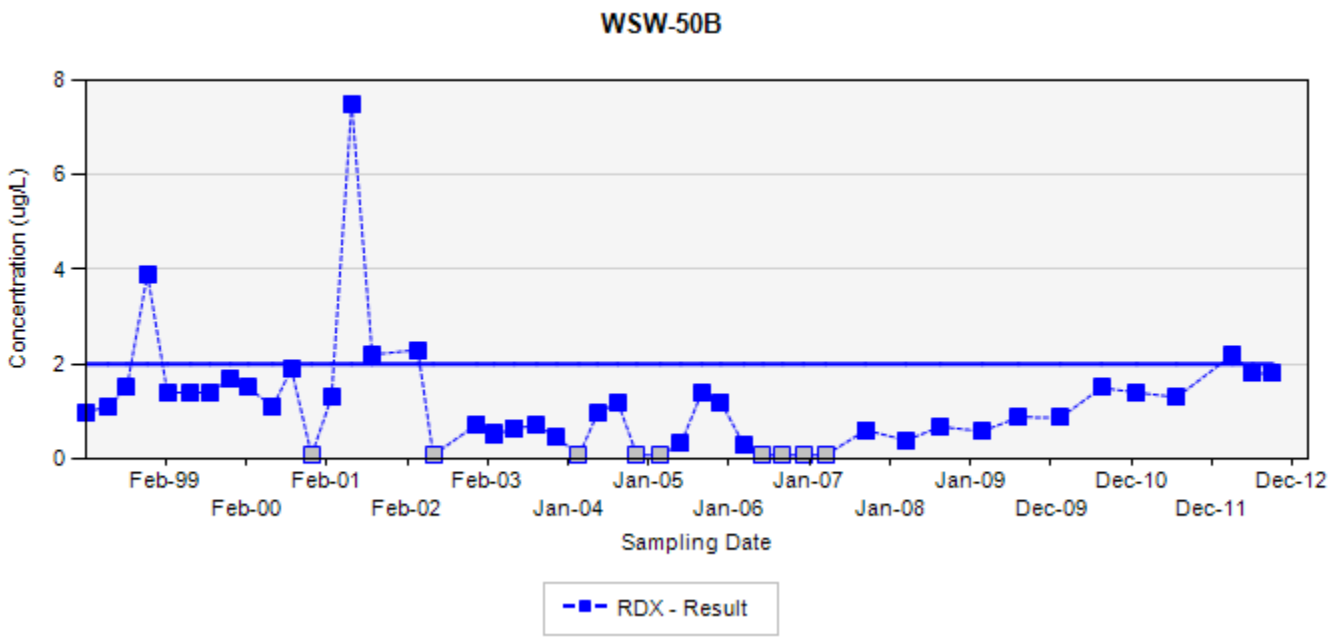

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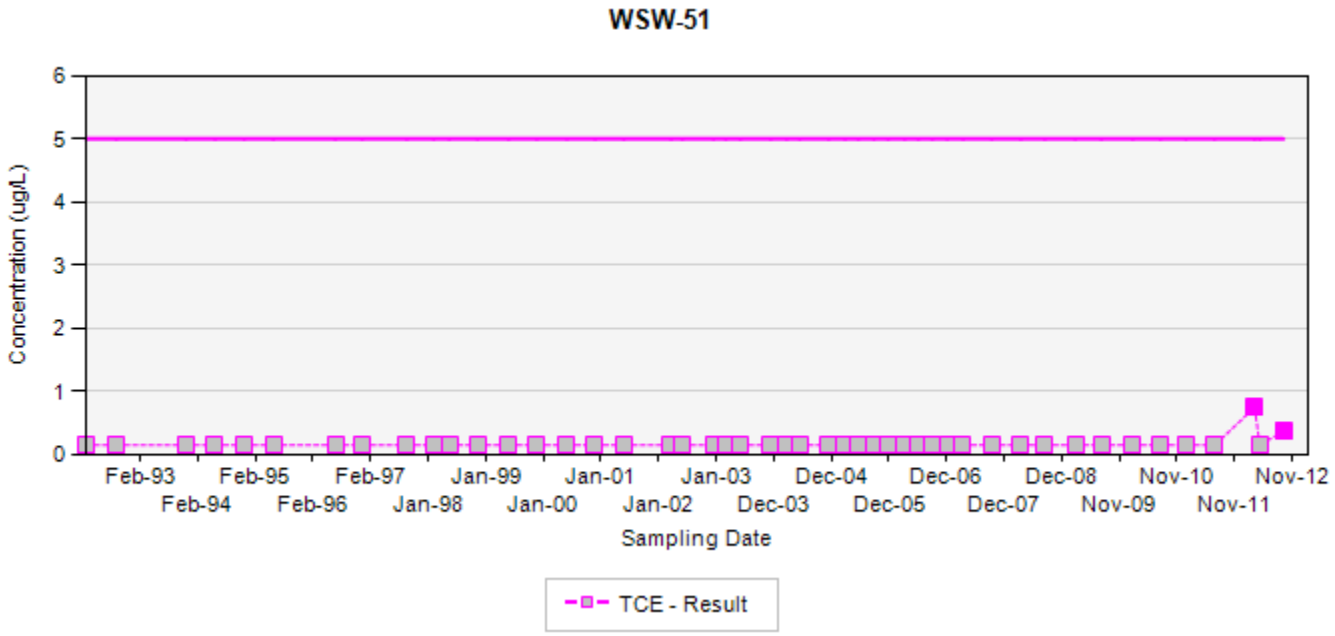

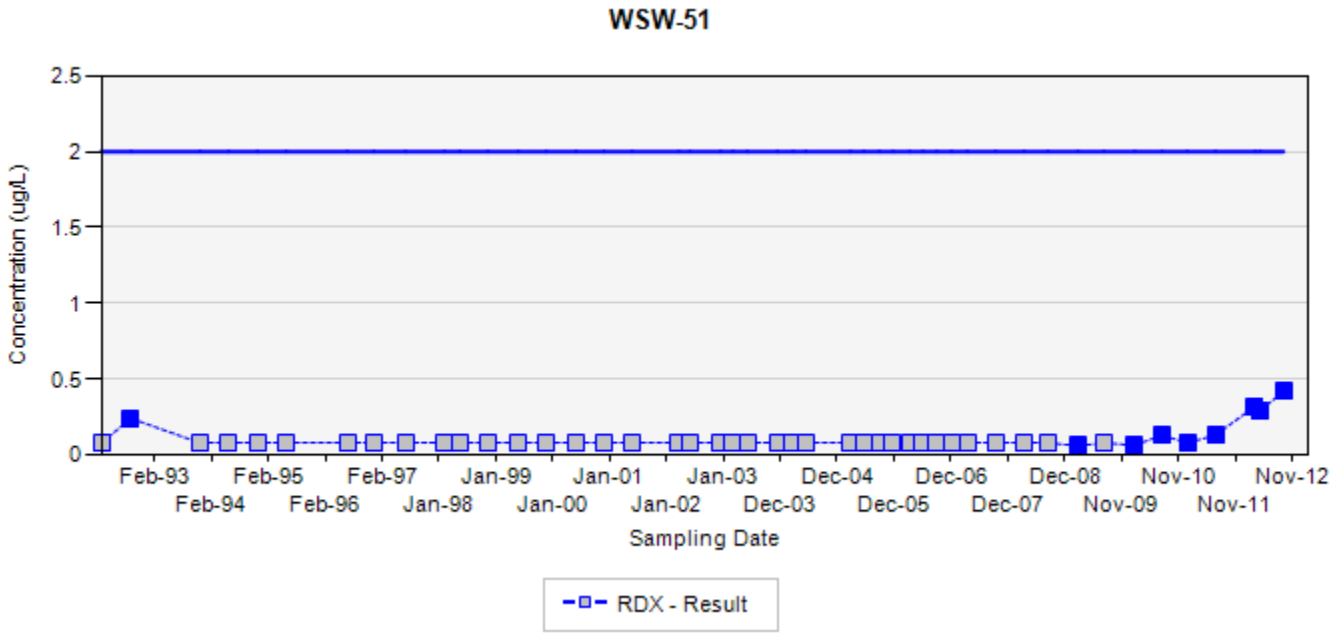

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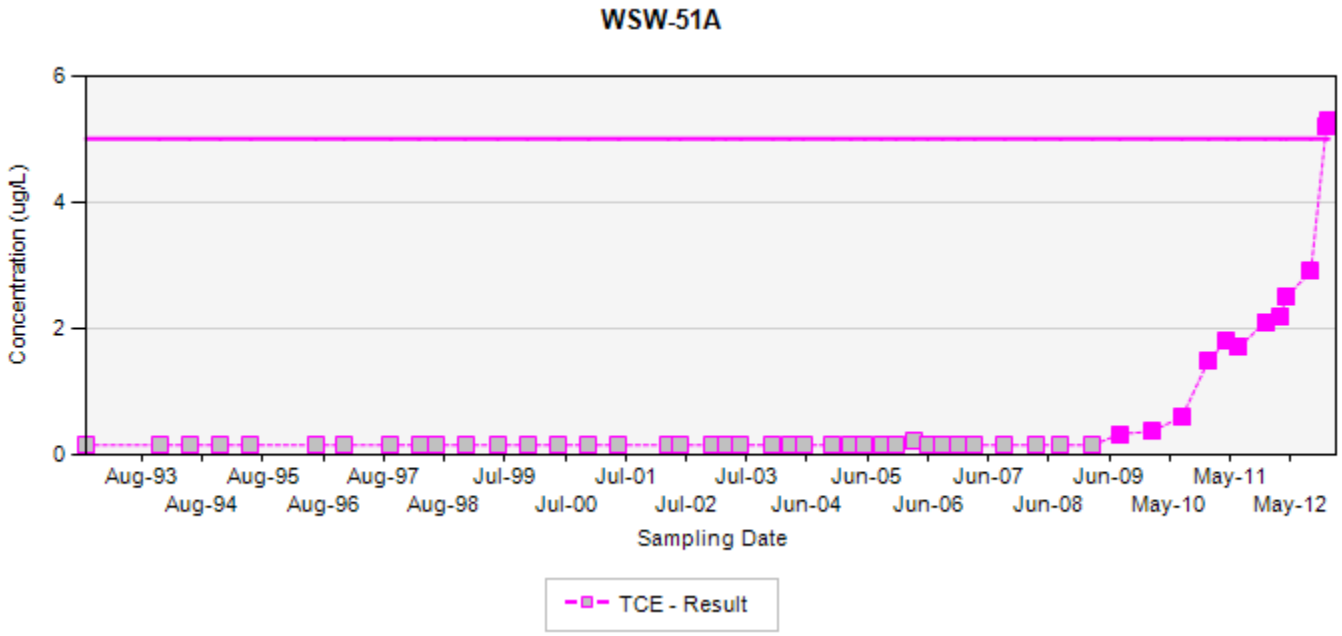

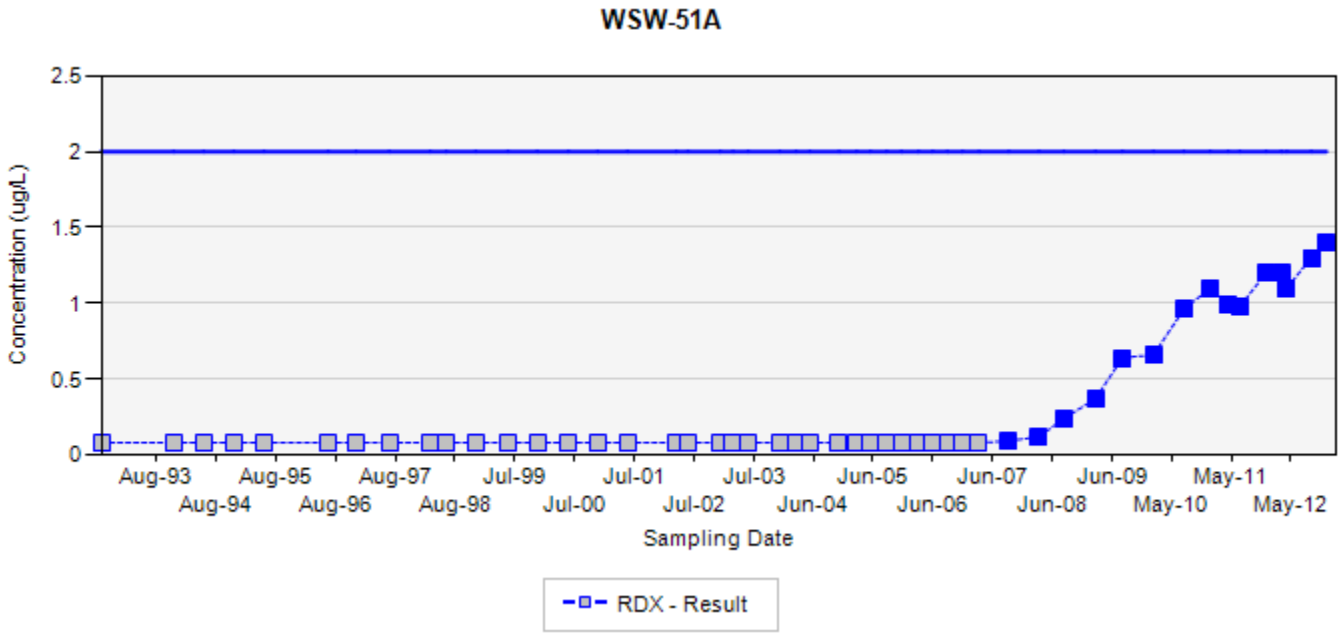

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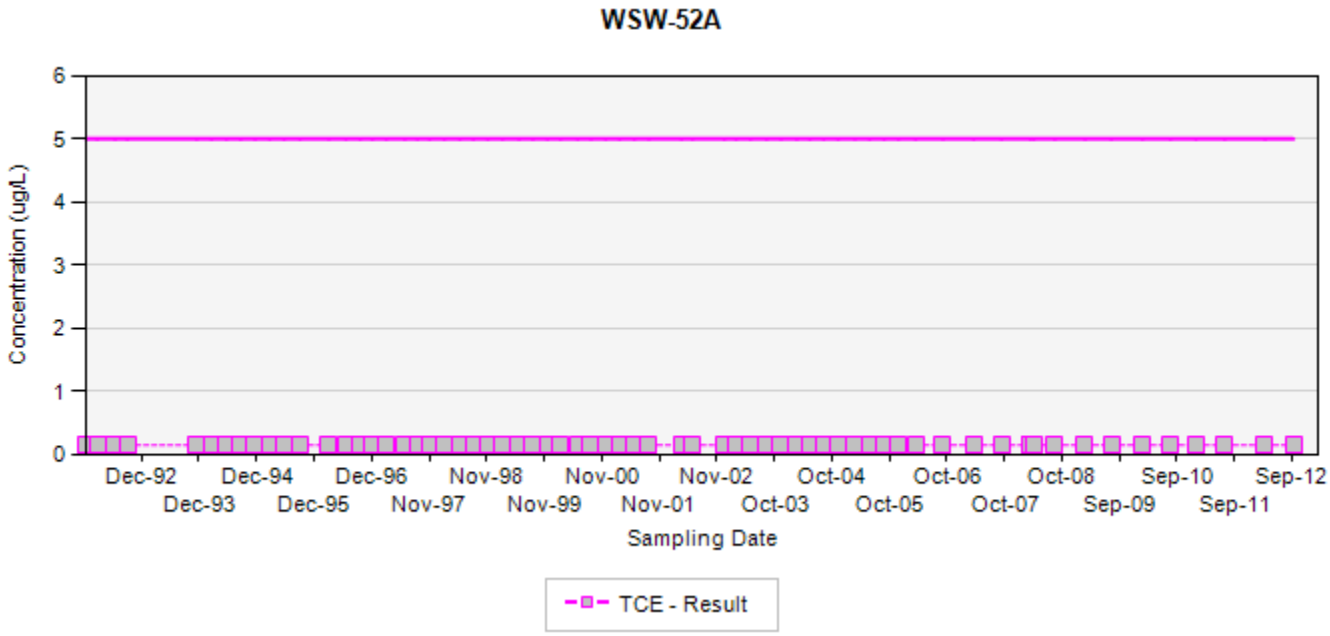

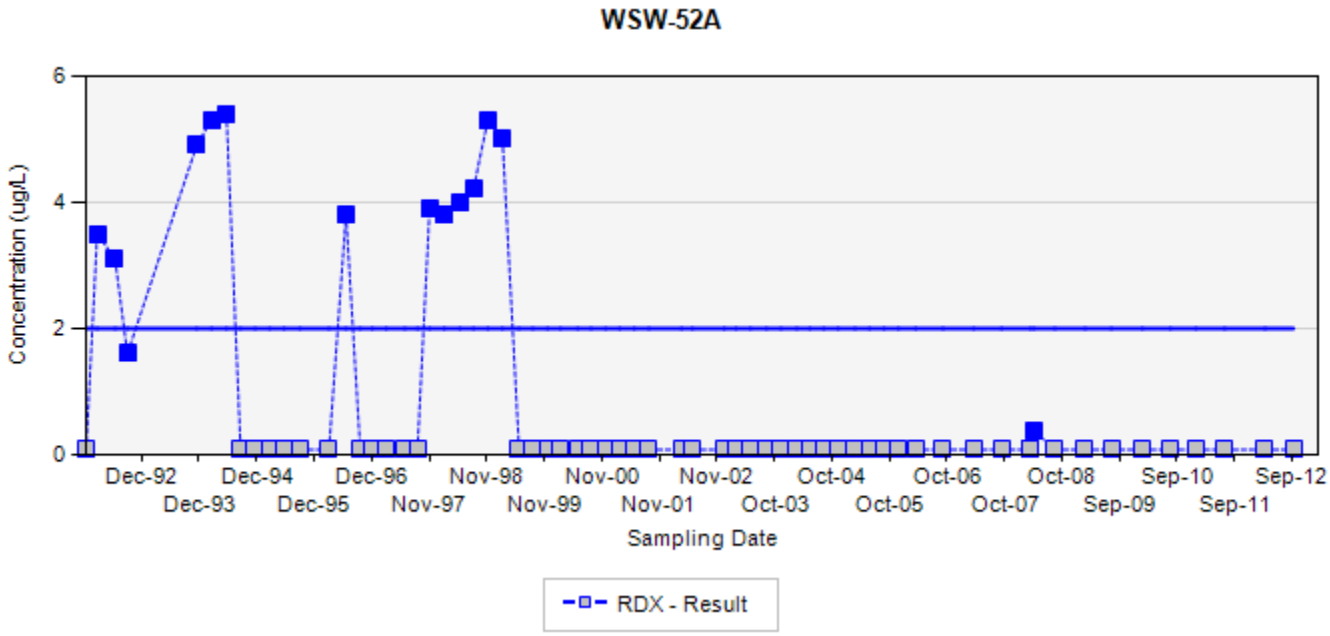

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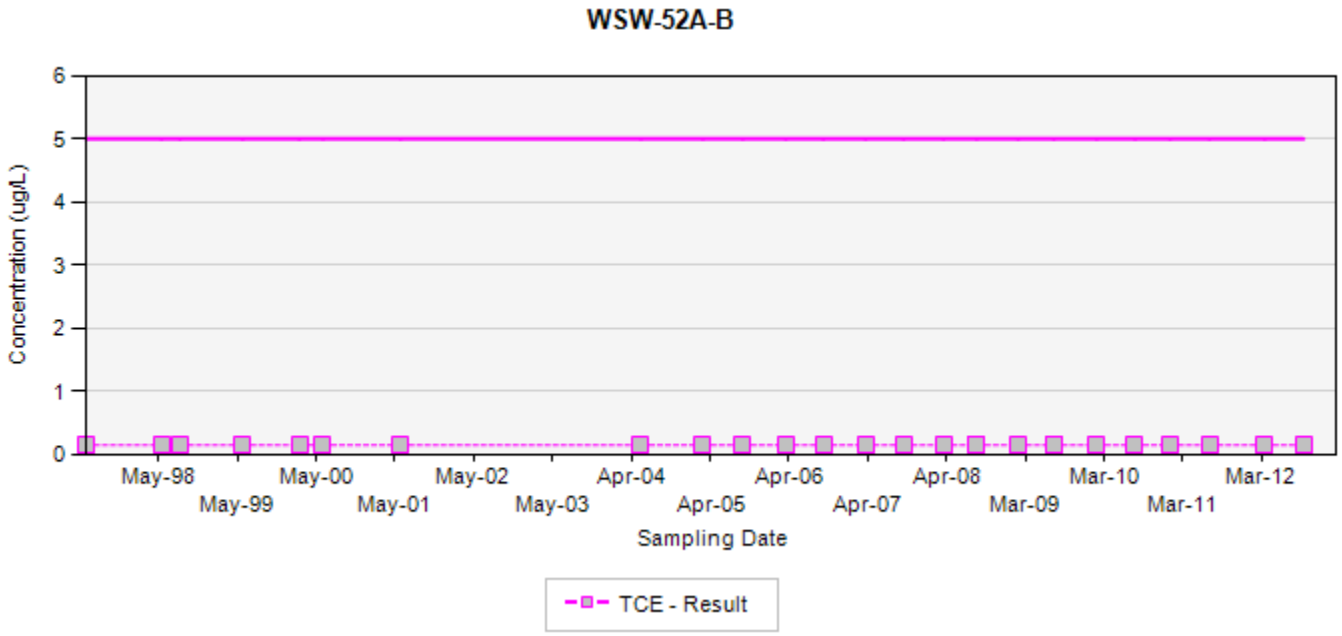

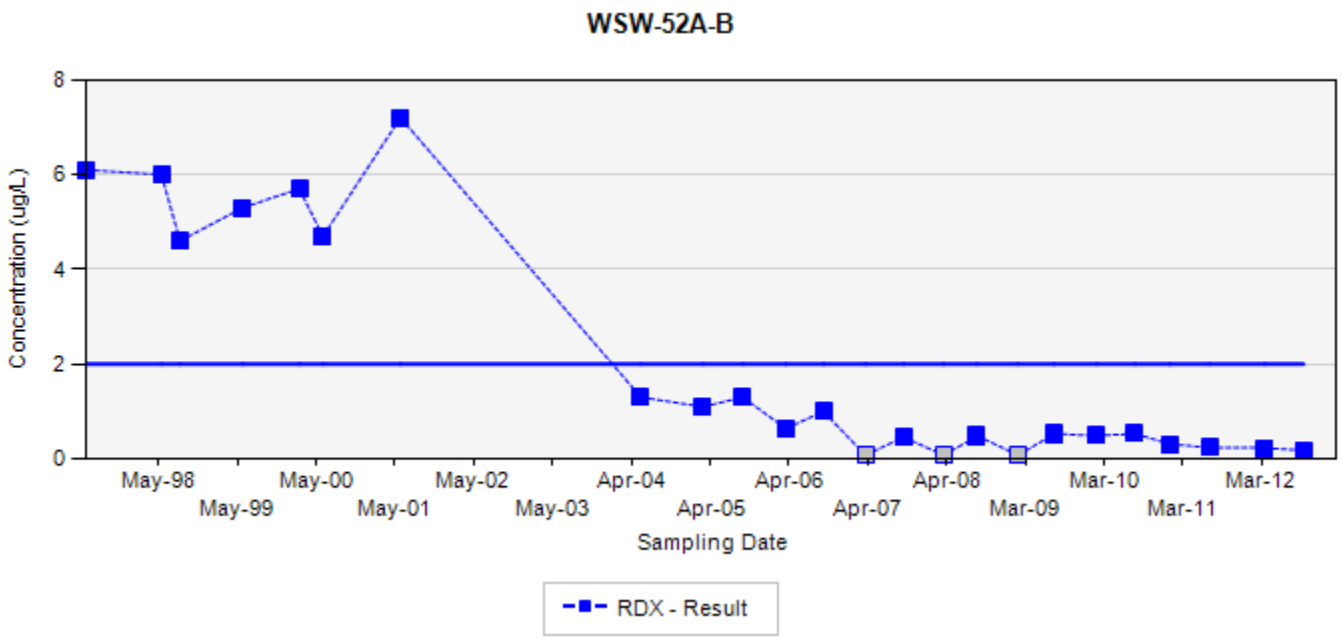

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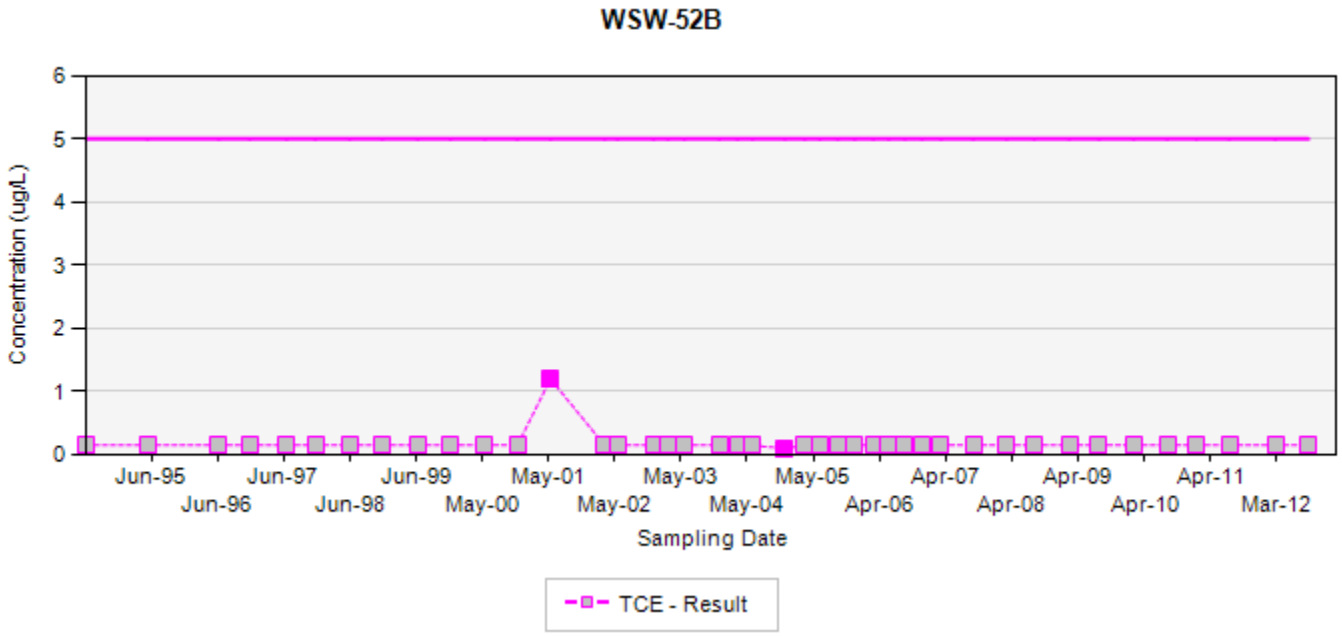

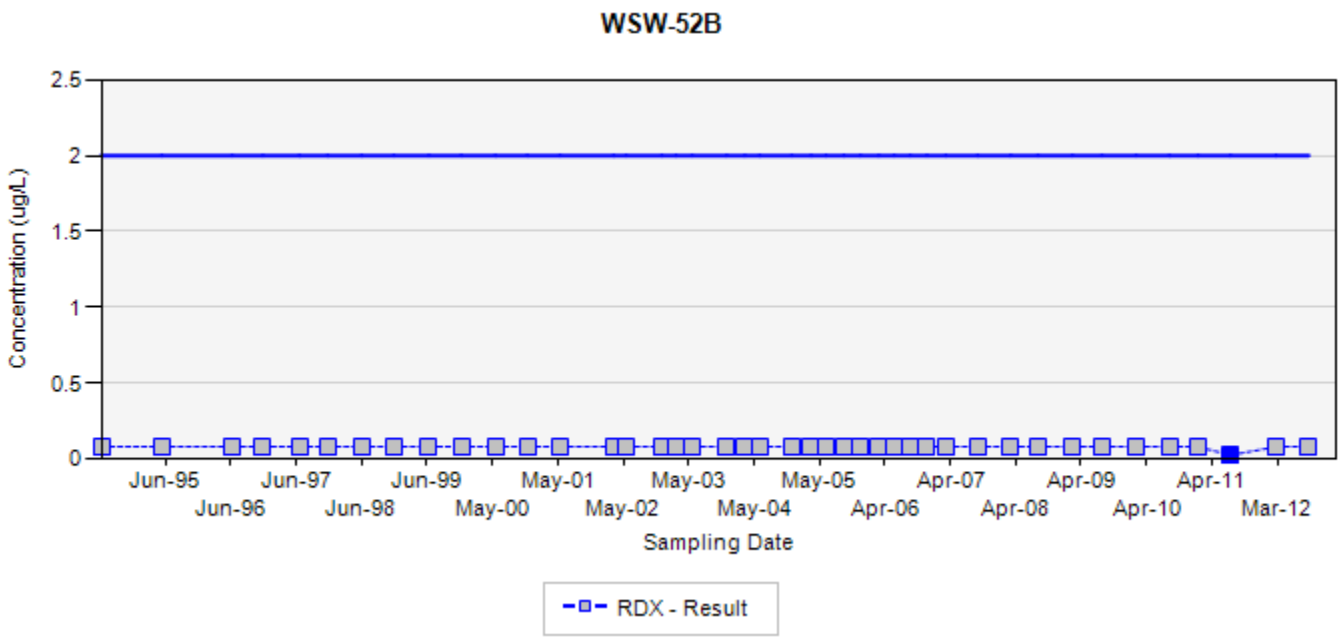

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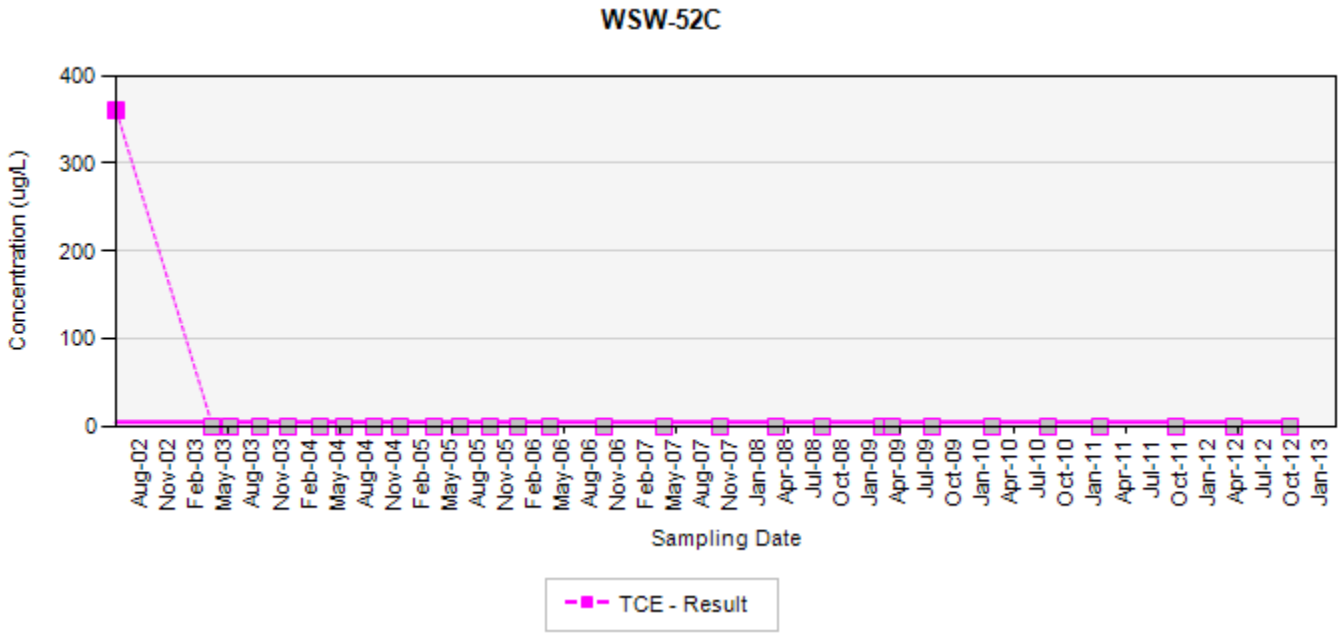

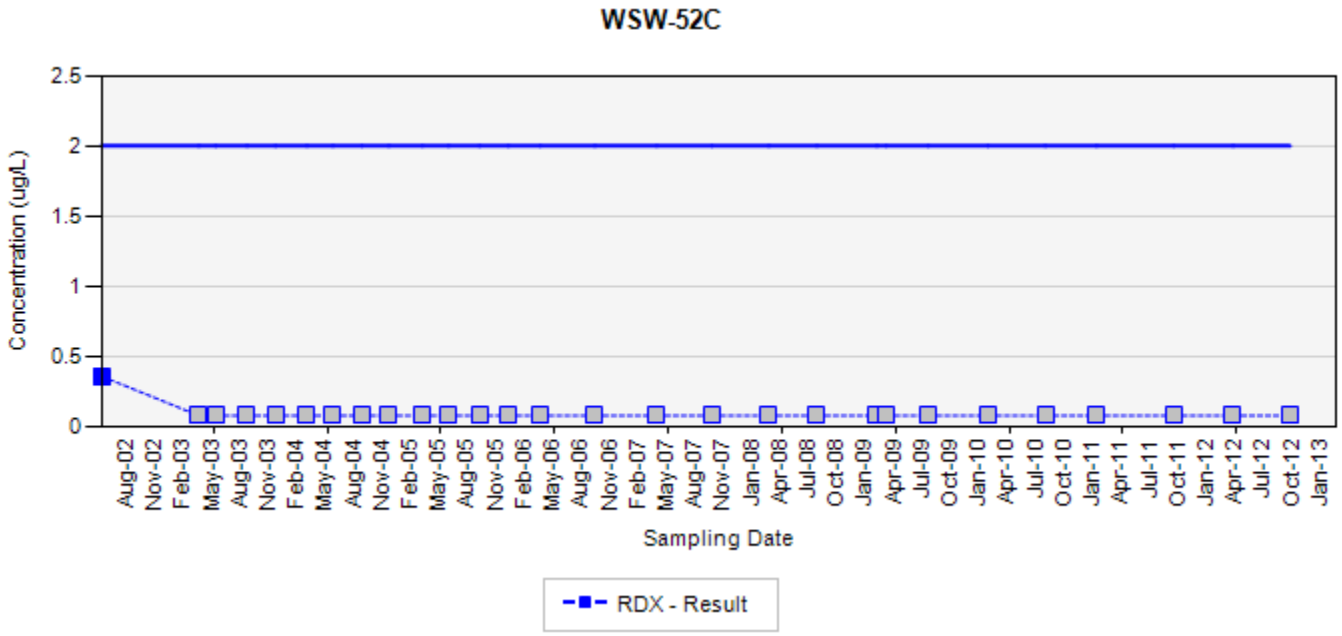

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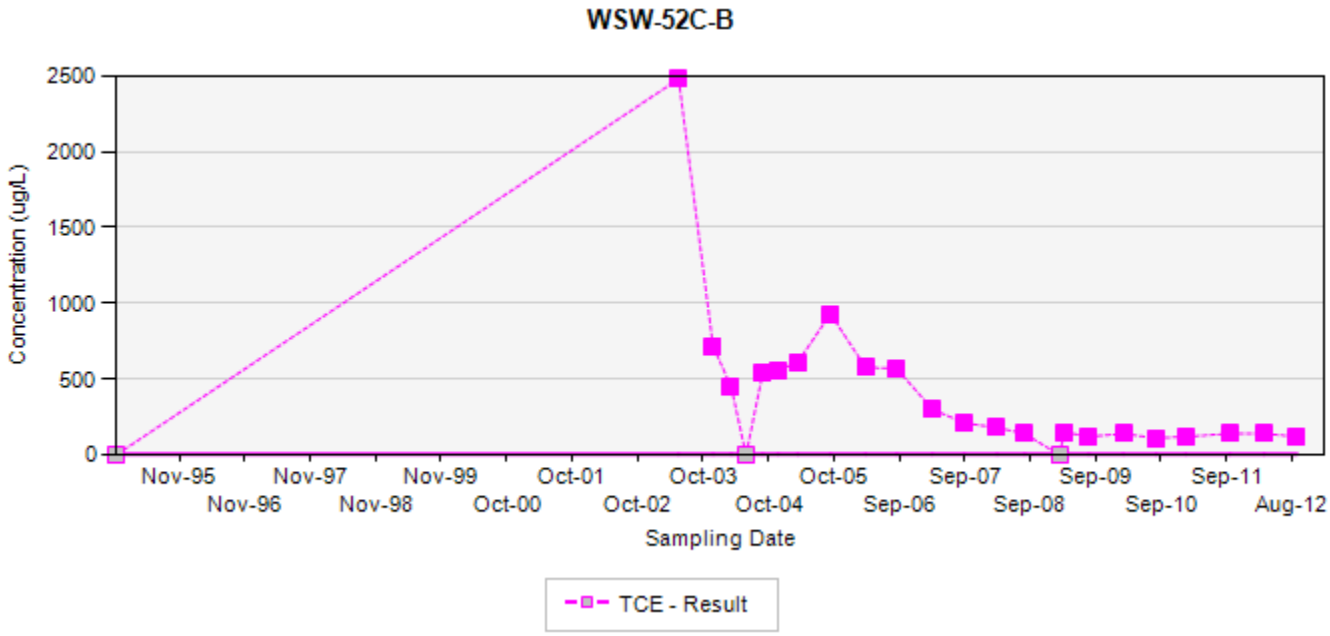
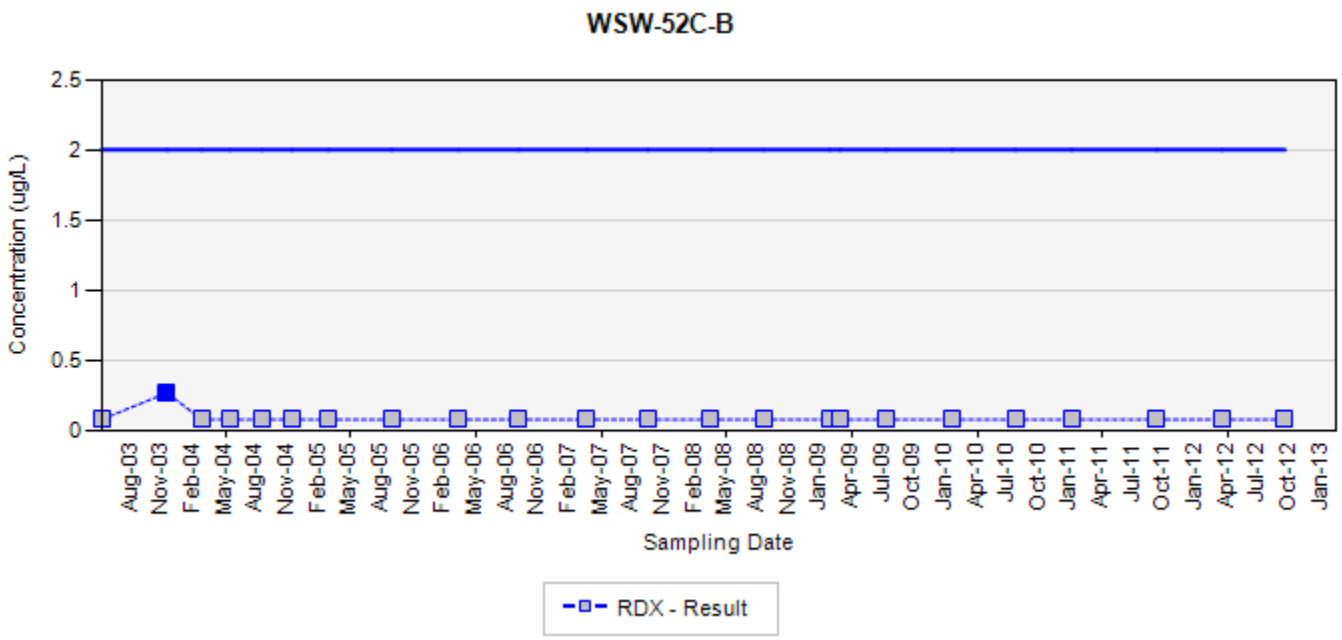
Concentration Trend Charts for Water Supply Wells



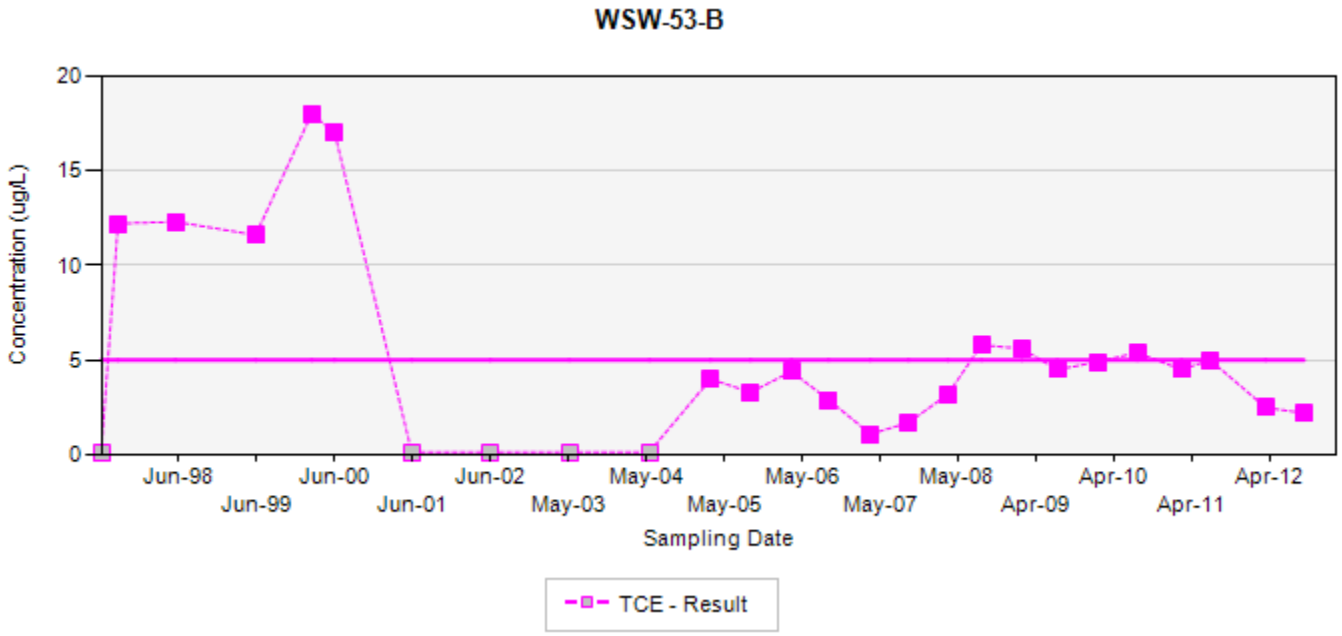


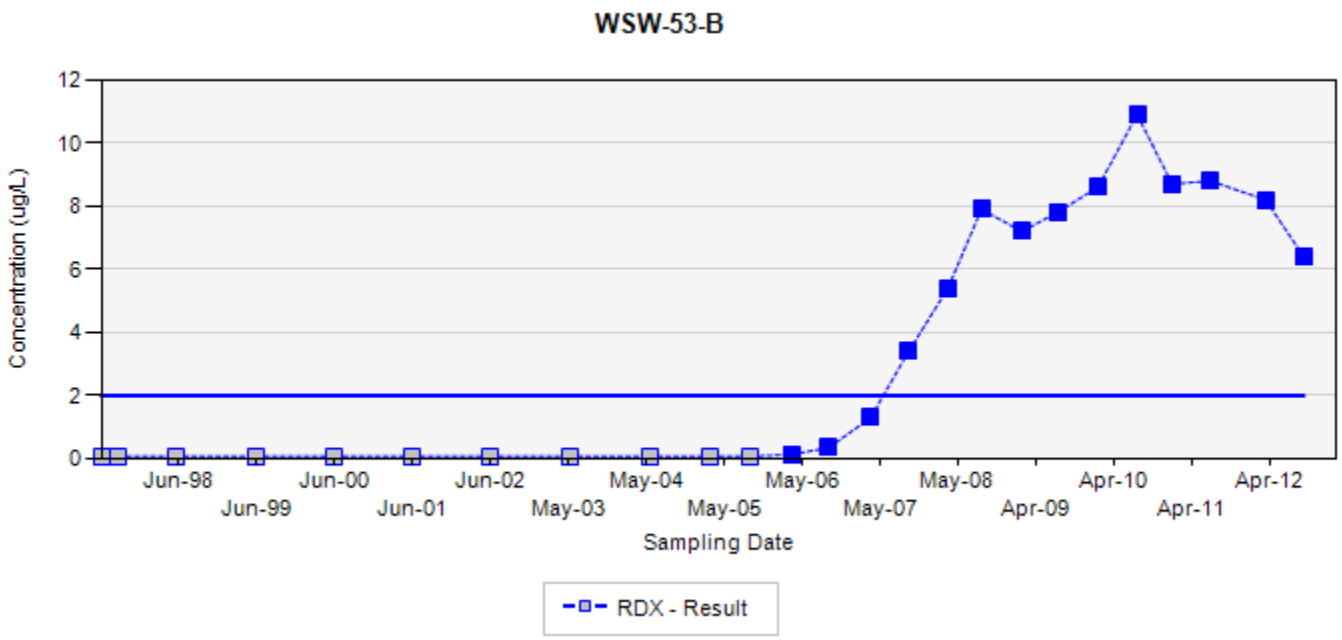
TCE - trichloroethene
RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine
Final Target Groundwater Cleanup Goals for TCE is 5 UG/L
Final Target Groundwater Cleanup Goals for RDX is 2 UG/L

In the event that both a normal sample and a field duplicate were collected, the higher of the two results will be displayed on the chart

ug/L: micrograms per liter
Silver markers indicate non-detected results

Appendix C
Concentration Trend Charts for Water Supply Wells





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Appendix C
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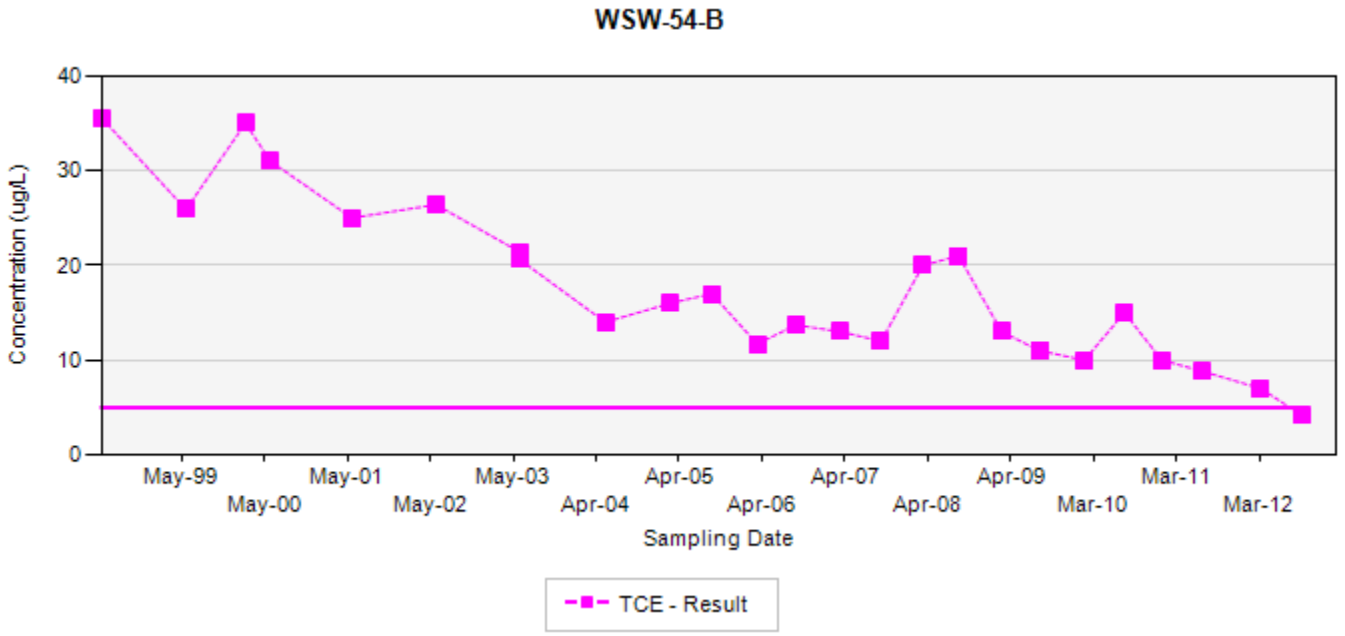

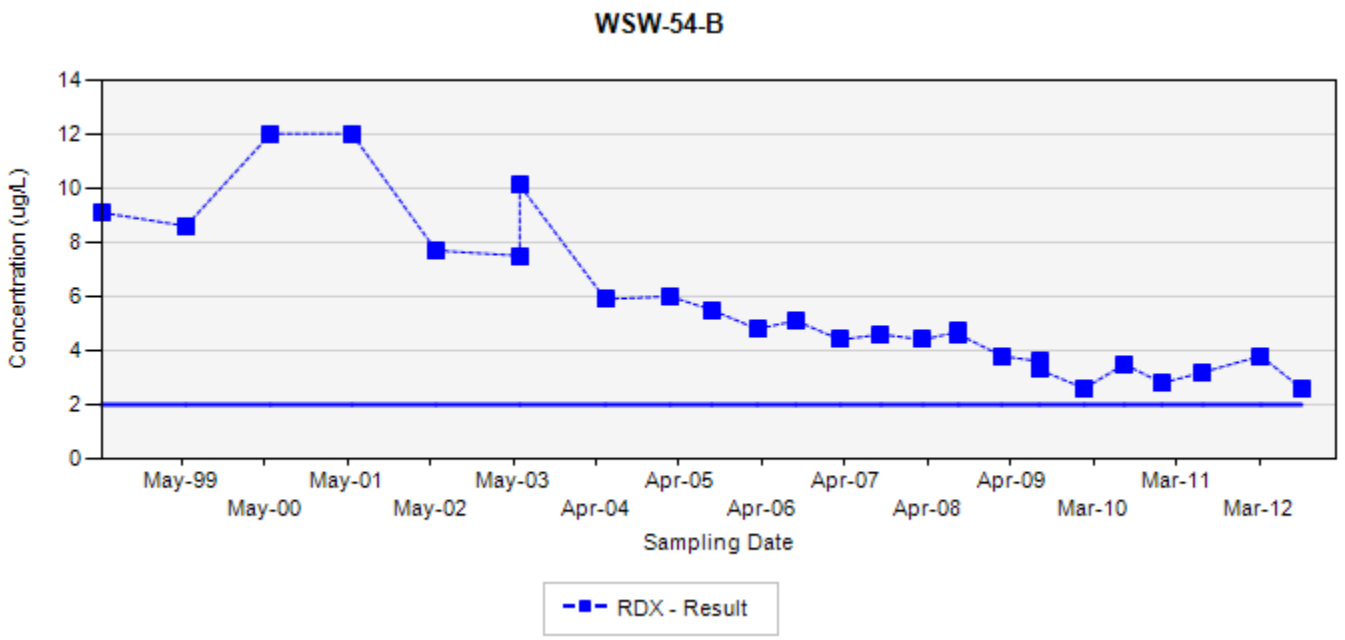

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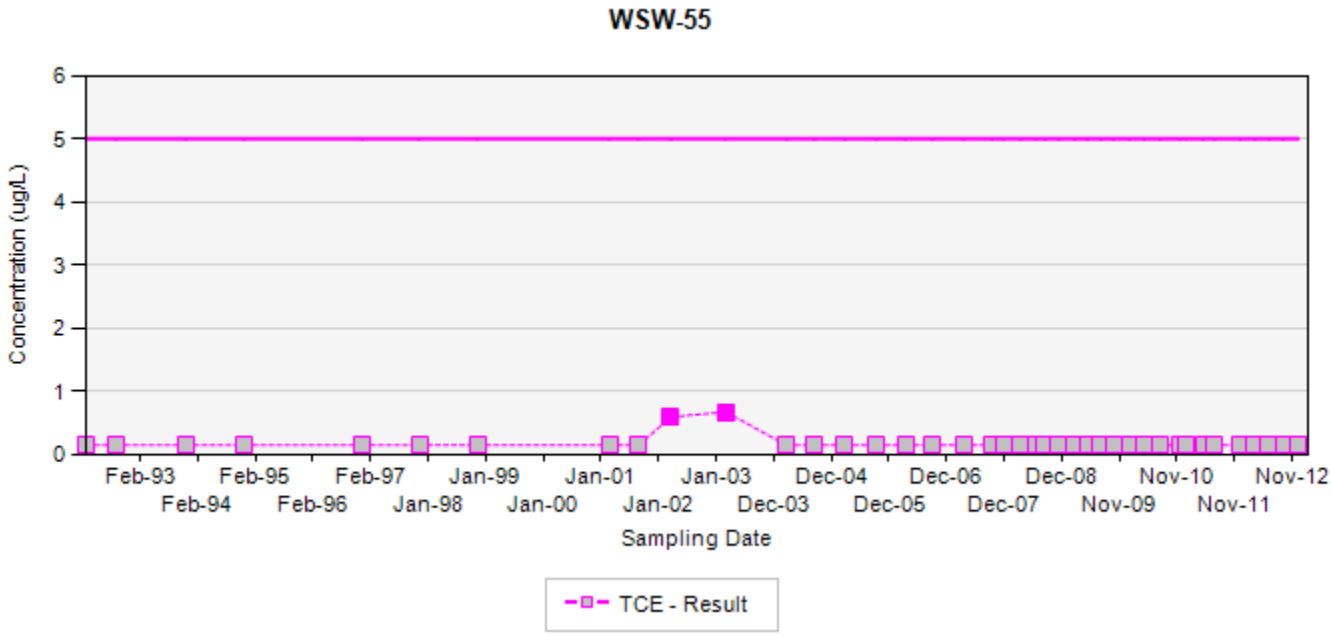
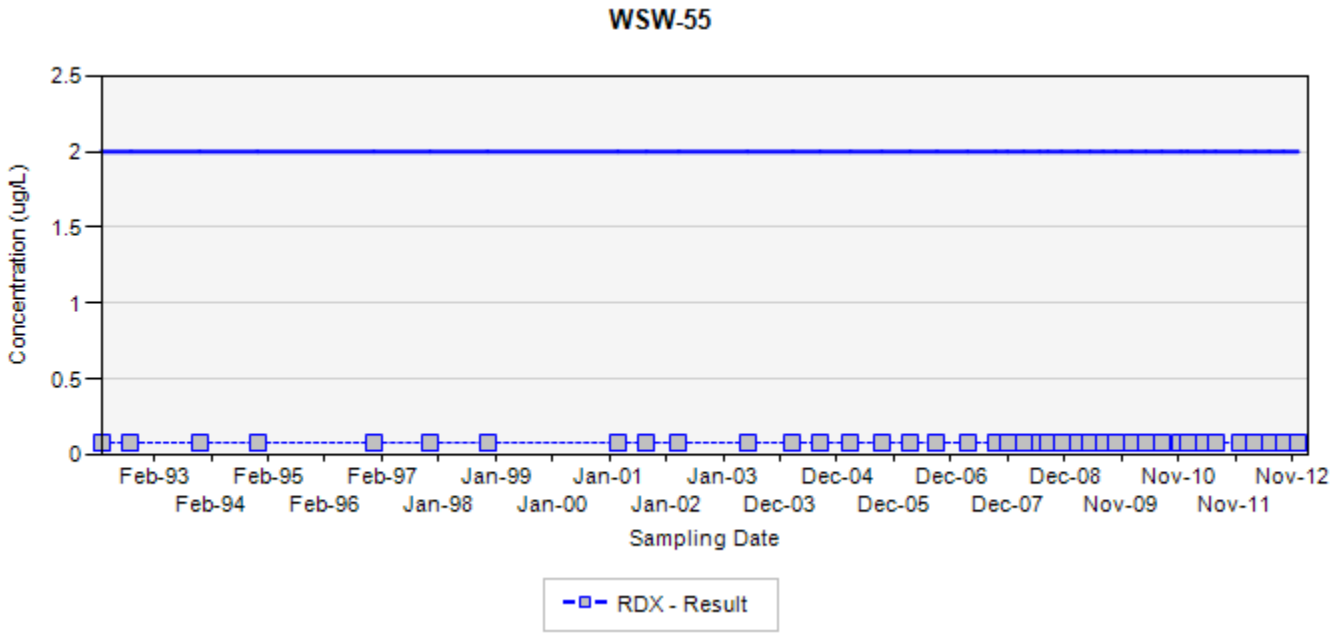
Appendix C
Concentration Trend Charts for Water Supply Wells





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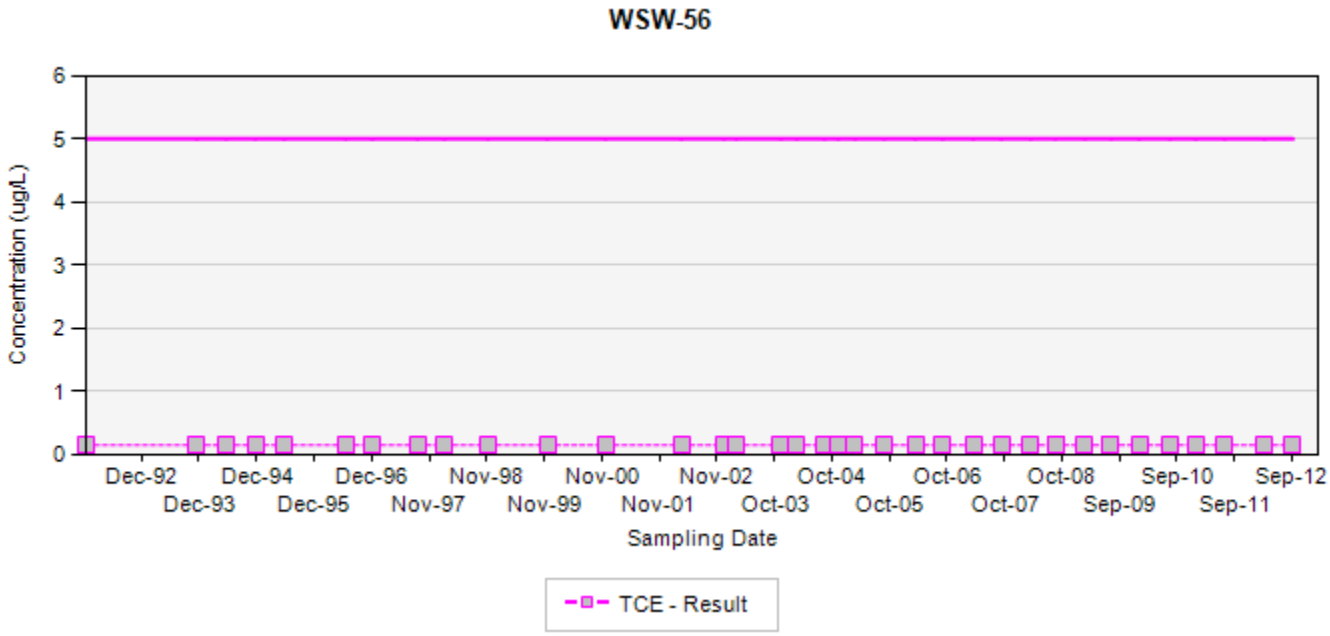
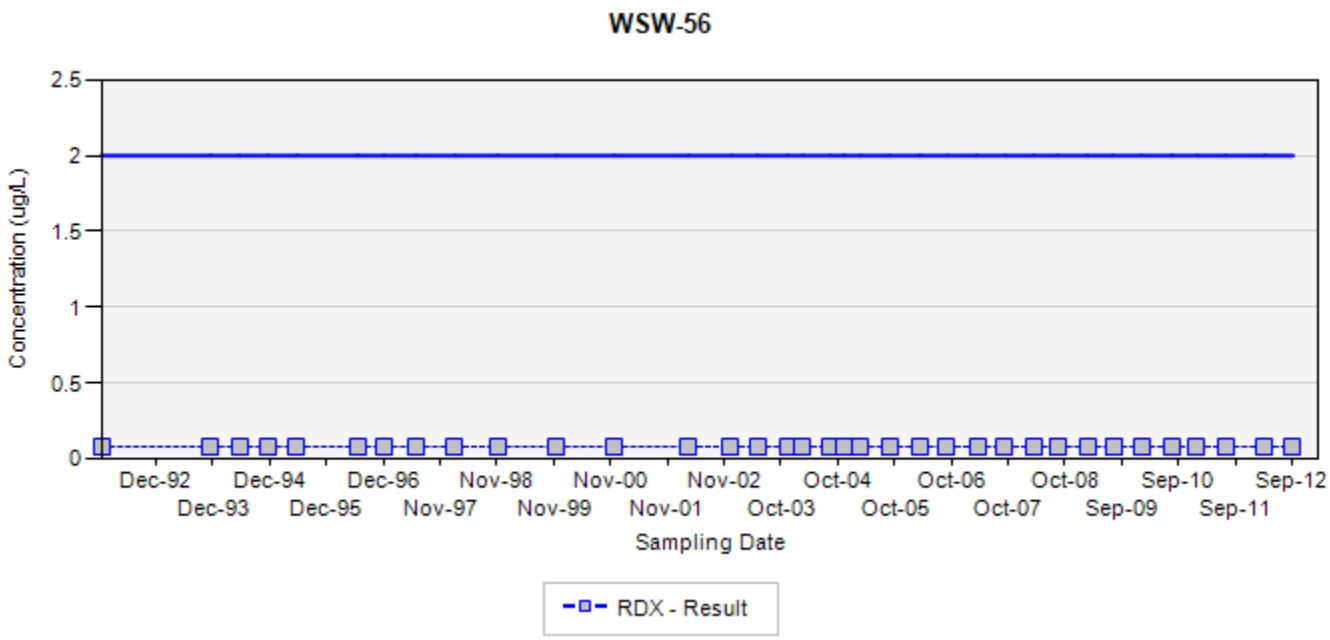
Appendix C
Concentration Trend Charts for Water Supply Wells





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ug/L: micrograms per liter
Silver markers indicate non-detected results

Appendix D
Inputs and Assumptions for Transport Simulations

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Appendix D
Table D-1
General Assumptions for CE Transport Simulations
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Assumptions	Reference	Figure, Table, or Section
Initial Plumes	GWM12 Update	Figures 3-1 through 3-16
Former Nebraska Ordnance Plant Extraction Wells Pumping Rates	2012 CE (this document)	Table D-4
Metropolitan Utilities District (Omaha) Pumping Rates	2012 CE (this document)	Table D-5
Lincoln Water Service Pumping Rates	2012 CE (this document)	Table D-6
Other Municipal Wells (Memphis, Mead, Ithaca, Ashland)	2012 CE (this document)	Table D-7
Irrigation Wells Pumping Rates	2012 CE (this document)	Table D-8
Initial Heads	GWM12 Calibration, Stress Period 29, Time Step 10 (8/27/2012), GWM12 Update	Section 5.2.2
Boundary Conditions	GWM12 Update	Section 4.4
Hydraulic Conductivity	GWM12 Update	Section 5.4.1
Storage Coefficients	GWM12 Update	Table 5-9
Effective porosity	GWM12 Update	Table 5-9
Boundary Conductance	GWM12 Update	Section 5.4.5
Evapotranspiration, Platte Valley (1)	GWM12 Update	Section 5.4.3
Evapotranspiration, Phreatophyte Zone (1)	GWM12 Update	Section 5.4.3
Recharge, Platte Valley(2)	GWM12 Update	Section 5.4.2
Recharge, Todd Valley and Wahoo Valley (2)	GWM12 Update	Section 5.4.2
Dispersivity	GWM12 Update	Table 6-1
Bulk Density	GWM12 Update	Table 6-1
TCE Half-Life	GWM12 Update	Table 6-1
MT3DMS Computation Algorithm	GWM12 Update	Section 6.1
Distribution Coefficient	GWM12 Update	Table 6-1

Notes:
(1) Refer to Table D-2 for details
(2) Refer to Table D-3 for details
(3) CE = Containment Evaluation
(4) GWM12 = 2012 Groundwater Model

Appendix D
Table D-2
Evapotranspiration Assumptions
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	Evapotranspiration Rate (feet/day)		**Evapotranspiration Rate (inches/day)**	
Transient (2 Stress Periods):	Non-Irrigation Season	Irrigation Season	Non-Irrigation Season	Irrigation Season
Phreatophyte Zone	9.4E-03	1.88E-02	7.83E-04	1.57E-03
Platte Valley	4.0E-03	8.0E-03	3.33E-04	6.67E-04
Todd Valley, Wahoo Valley	1.0E-03	1.8E-03	8.33E-05	1.5E-04

Appendix D
Table D-3
Recharge Assumptions
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	Recharge Rate (feet/day)		**Recharge Rate (inches/day)**	
Transient (2 Stress Periods):	Non-Irrigation Season	Irrigation Season	Non-Irrigation Season	Irrigation Season
Todd Valley,Wahoo Valley	7.75E-04	1.49E-03	6.46E-05	1.24E-04
Platte Valley	1.03E-03	1.98E-03	8.61E-05	1.65E-04

Table D-4
Proposed former NOP Pumping Schedule for Next 30 Years
2012 Containment Evaluation
Former NOP, Mead, Nebraska

	gallons per minute							
Stress Period:	1	2	3-11	12-21	22-31	32-41	42-51	52-61
Management Period:	1	1	1	2	3	4	5	6
Start Date:	10/30/12	1/1/13	6/1/13	9/1/17	9/1/22	9/1/27	9/1/32	9/1/37
End Date:	12/31/12	5/31/13	8/31/17	8/31/22	8/31/27	8/31/32	8/31/37	8/31/42
EW-1R	193	200	200	200	200	200	200	200
EW-2	0	0	0	0	0	0	0	0
EW-3	286	0	0	0	0	0	0	0
EW-4	77	100	100	100	100	100	100	100
EW-5	0	0	0	0	0	0	0	0
EW-6	48	0	0	0	0	0	0	0
EW-7	277	290	290	290	290	290	290	290
EW-9	123	140	175	175	175	175	175	175
EW-10	0	0	0	0	0	0	0	0
FEW-11	414	550	550	550	550	550	550	550
EW-12	220	225	225	225	225	225	225	225
EW-13	0	0	0	0	0	0	0	0
FEW-14	176	250	250	250	250	250	250	250
FEW-15	435	500	500	500	500	500	500	500
EW-16	93	0	0	0	0	0	0	0
EW-17	0	0	275	275	275	275	275	275

	feet^3/day							
Stress Period:	1	2	3-11	12-21	22-31	32-41	42-51	52-61
Management Period:	1	1	1	2	3	4	5	6
Start Date:	10/30/12	1/1/13	6/1/13	9/1/17	9/1/22	9/1/27	9/1/32	9/1/37
End Date:	12/31/12	5/31/13	8/31/17	8/31/22	8/31/27	8/31/32	8/31/37	8/31/42
EW-1R	37,156	38,504	38,504	38,504	38,504	38,504	38,504	38,504
EW-2	0	0	0	0	0	0	0	0
EW-3	54,984	0	0	0	0	0	0	0
EW-4	14,728	19,252	19,252	19,252	19,252	19,252	19,252	19,252
EW-5	0	0	0	0	0	0	0	0
EW-6	9,183	0	0	0	0	0	0	0
EW-7	53,347	55,831	55,831	55,831	55,831	55,831	55,831	55,831
EW-9	23,734	26,953	33,691	33,691	33,691	33,691	33,691	33,691
EW-10	0	0	0	0	0	0	0	0
FEW-11	79,755	105,886	105,886	105,886	105,886	105,886	105,886	105,886
EW-12	42,354	43,317	43,407	43,317	43,317	43,317	43,317	43,317
EW-13	0	0	0	0	0	0	0	0
FEW-14	33,941	48,130	48,130	48,130	48,130	48,130	48,130	48,130
FEW-15	83,746	96,260	96,260	96,260	96,260	96,260	96,260	96,260
EW-16	17,981	0	0	0	0	0	0	0
EW-17	0	0	52,943	52,943	52,943	52,943	52,943	52,943

Notes:

(1) Values reported for Stress Period 1 is based on average of November 2012 through December 2012 pumping rates.

EW - Extraction Well

FEW - Focused Extraction Well

NOP - Nebraska Ordnance Plant

Table D-5
MUD Platte West Well Field Estimated Pumping Rates (ft^3/day)
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Stress Period	1	2	3	4	5,7…199	6,8…200
Start Date	10/30/2012	1/1/2013	6/1/2013	9/1/2013	6/1	9/1
End Date	12/31/2012	5/31/2013	8/31/2013	5/31/2014	8/31	5/31
PW94-2	103,238	84,775	311,350	103,238	311,350	103,238
PW91-3	596,750	88	596,750	596,750	596,750	596,750
PW04-4	0	4,055	0	0	0	0
PW04-5	110,168	964	334,180	110,168	334,180	110,168
PW04-6	0	168,871	0	0	0	0
PW04-7	0	77	225,206	0	225,206	0
PW04-8	259,509	54,782	334,180	259,509	334,180	259,509
PW04-9	110,168	44	334,180	110,168	334,180	110,168
PW04-10	0	290,906	0	0	0	0
PW04-11	0	142,648	0	0	0	0
PW04-12	86,028	108,150	0	86,028	0	86,028
PW04-13	149,342	27,385	225,206	149,342	225,206	149,342
PW04-14	86,028	68,086	259,452	86,028	259,452	86,028
PW04-15	301,802	88,414	125,549	301,802	125,549	301,802
PW04-16	184,839	180,005	108,974	184,839	108,974	184,839
PW04-17	215,773	121	385,000	215,773	385,000	215,773
PW91-30	596,750	68,502	596,750	596,750	596,750	596,750
PW94-31	276,834	231,686	163,202	276,834	163,202	276,834
PW94-32	0	46,793	0	0	0	0
PW94-33	103,238	189,550	311,350	103,238	311,350	103,238
PW94-34	244,899	0	442,750	244,899	442,750	244,899
PW94-35	215,061	188,937	324,324	215,061	324,324	215,061
PW94-36	418,572	295,687	539,000	418,572	539,000	418,572
PW94-37	392,334	0	500,500	392,334	500,500	392,334
PW04-38	358,339	197,451	0	358,339	0	358,339
PW04-39	0	171,469	272,426	0	272,426	0
PW04-40	316,894	407,845	404,250	316,894	404,250	316,894
PW04-41	0	147,973	0	0	0	0
PW04-42	216,755	145,519	91,014	216,755	91,014	216,755
PW04-43	0	223,971	272,426	0	272,426	0
PW04-44	95,191	154,494	94,152	95,191	94,152	95,191
PW04-45	180,661	163,929	272,426	180,661	272,426	180,661
PW04-46	50,281	156,970	442,750	50,281	442,750	50,281
PW04-47	0	67,516	0	0	0	0
PW04-48	216,755	41,204	279,125	216,755	279,125	216,755
PW04-49	79,580	350,488	239,990	79,580	239,990	79,580
PW04-50	0	39,834	0	0	0	0
PW04-51	31,705	228,826	91,014	31,705	91,014	31,705
PW04-52	0	104,698	207,573	0	207,573	0
PW04-53	122,700	136,379	188,111	122,700	188,111	122,700
PW04-54	94,056	111,591	279,125	94,056	279,125	94,056
PW04-55	0	110,309	0	0	0	0

Notes: MUD - Metropolitan Utilities District

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Appendix D
Table D-6
Lincoln Water System Ashland Well Field Estimated Pumping Rates (ft^3/day)
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Stress Period:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Start Date:	**10/30/12**	**1/1/13**	**6/1/13**	**9/1/13**	**6/1/14**	**9/1/14**	**6/1/15**	**9/1/15**	**6/1/16**	**9/1/16**	**6/1/17**	**9/1/17**	**6/1/18**	**9/1/18**	**6/1/19**	**9/1/19**	**6/1/20**	**9/1/20**	**6/1/21**	**9/1/21**	**6/1/22**
End Date:	**12/31/12**	**5/31/13**	**8/31/13**	**5/31/14**	**8/31/14**	**5/31/15**	**8/31/15**	**5/31/16**	**8/31/16**	**5/31/17**	**8/31/17**	**5/31/18**	**8/31/18**	**5/31/19**	**8/31/19**	**5/31/20**	**8/31/20**	**5/31/21**	**8/31/21**	**5/31/22**	**8/31/22**
LWS56-8	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS56-9	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS56-5	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS54-3	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS56-7	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS54-5	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS325A	104,828	104,828	199,700	106,585	202,921	108,342	205,850	110,099	209,071	111,856	212,292	113,320	215,220	115,077	218,441	116,834	221,662	118,590	224,590	120,055	227,811
LWS54-7	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS32-4-2	53,484	53,484	101,888	54,380	103,531	55,276	105,025	56,173	106,669	57,069	108,312	57,816	109,806	58,713	111,449	59,609	113,093	60,505	114,587	61,252	116,230
LWS54-9	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS32-4A-2	53,484	53,484	101,888	54,380	103,531	55,276	105,025	56,173	106,669	57,069	108,312	57,816	109,806	58,713	111,449	59,609	113,093	60,505	114,587	61,252	116,230
LWS54-6	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS32-3-2	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS54-8	96,271	96,271	183,398	97,884	186,356	99,498	189,046	101,111	192,004	102,725	194,962	104,069	197,651	105,683	200,609	107,296	203,567	108,910	206,256	110,254	209,214
LWS32-2-2	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS54-10	133,709	133,709	254,720	135,950	258,828	138,191	262,563	140,432	266,672	142,673	270,780	144,541	274,515	146,781	278,623	149,022	282,732	151,263	286,467	153,131	290,575
LWS32-1A	106,967	106,967	203,776	108,760	207,063	110,553	210,051	112,346	213,337	114,138	216,624	115,632	219,612	117,425	222,899	119,218	226,185	121,011	229,173	122,505	232,460
LWS56-1	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS49-7	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS49-8	105,096	105,096	200,210	106,857	203,439	108,618	206,375	110,380	209,604	112,141	212,833	113,609	215,769	115,370	218,998	117,132	222,227	118,893	225,163	120,361	228,392
LWS49-6	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS49-9	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS54-1	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS66 - 1	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS76 - 1	160,451	160,451	305,664	163,140	310,594	165,829	315,076	168,519	320,006	171,208	324,936	173,449	329,418	176,138	334,348	178,827	339,278	181,516	343,760	183,757	348,690
LWS66 - 4	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS76 - 2	160,451	160,451	305,664	163,140	310,594	165,829	315,076	168,519	320,006	171,208	324,936	173,449	329,418	176,138	334,348	178,827	339,278	181,516	343,760	183,757	348,690
LWS66 - 5	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS66 - 6	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS76 - 3	160,451	160,451	305,664	163,140	310,594	165,829	315,076	168,519	320,006	171,208	324,936	173,449	329,418	176,138	334,348	178,827	339,278	181,516	343,760	183,757	348,690
LWS76 - 4	160,451	160,451	305,664	163,140	310,594	165,829	315,076	168,519	320,006	171,208	324,936	173,449	329,418	176,138	334,348	178,827	339,278	181,516	343,760	183,757	348,690
LWS68-1A	120,338	120,338	229,248	122,355	232,946	124,372	236,307	126,389	240,004	128,406	243,702	130,086	247,063	132,103	250,761	134,120	254,459	136,137	257,820	137,818	261,517
LWS76 - 5	160,451	160,451	305,664	163,140	310,594	165,829	315,076	168,519	320,006	171,208	324,936	173,449	329,418	176,138	334,348	178,827	339,278	181,516	343,760	183,757	348,690
LWS76 - 6	96,271	96,271	183,398	97,884	186,356	99,498	189,046	101,111	192,004	102,725	194,962	104,069	197,651	105,683	200,609	107,296	203,567	108,910	206,256	110,254	209,214
LWS78574	74,877	74,877	142,643	76,132	144,944	77,387	147,035	78,642	149,336	79,897	151,637	80,943	153,728	82,198	156,029	83,453	158,330	84,707	160,421	85,753	162,722
LWS86-1	117,664	117,664	224,154	119,636	227,769	121,608	231,056	123,580	234,671	125,552	238,286	127,196	241,573	129,168	245,189	131,140	248,804	133,112	252,091	134,755	255,706
LWS86-2	117,664	117,664	224,154	119,636	227,769	121,608	231,056	123,580	234,671	125,552	238,286	127,196	241,573	129,168	245,189	131,140	248,804	133,112	252,091	134,755	255,706
LWS85451	652,501	652,501	1,243,034	663,437	1,263,082	674,373	1,281,309	685,309	1,301,358	696,245	1,321,407	705,358	1,339,633	716,294	1,359,682	727,229	1,379,731	738,165	1,397,957	747,278	1,418,006
LWS86646	652,501	652,501	1,243,034	663,437	1,263,082	674,373	1,281,309	685,309	1,301,358	696,245	1,321,407	705,358	1,339,633	716,294	1,359,682	727,229	1,379,731	738,165	1,397,957	747,278	1,418,006
Total (MGD)	**35.8**	**35.8**	**68.2**	**36.4**	**69.3**	**37.0**	**70.3**	**37.6**	**71.4**	**38.2**	**72.5**	**38.7**	**73.5**	**39.3**	**74.6**	**39.9**	**75.7**	**40.5**	**76.7**	**41.0**	**77.8**

Appendix D
Table D-6
Lincoln Water System Ashland Well Field Estimated Pumping Rates (ft^3/day)
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Stress Period:	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**
Start Date:	**9/1/22**	**6/1/23**	**9/1/23**	**6/1/24**	**9/1/24**	**6/1/25**	**9/1/25**	**6/1/26**	**9/1/26**	**6/1/27**	**9/1/27**	**6/1/28**	**9/1/28**	**6/1/29**	**9/1/29**	**6/1/30**	**9/1/30**	**6/1/31**	**9/1/31**	**6/1/32**	**9/1/32**
End Date:	**5/31/23**	**8/31/23**	**5/31/24**	**8/31/24**	**5/31/25**	**8/31/25**	**5/31/26**	**8/31/26**	**5/31/27**	**8/31/27**	**5/31/28**	**8/31/28**	**5/31/29**	**8/31/29**	**5/31/30**	**8/31/30**	**5/31/31**	**8/31/31**	**5/31/32**	**8/31/32**	**5/31/33**
LWS56-8	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS56-9	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS56-5	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS54-3	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS56-7	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS54-5	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS325A	121,811	231,032	123,568	233,960	125,325	237,181	127,375	241,573	129,717	245,965	132,060	250,065	134,110	254,457	136,452	258,849	138,502	263,242	140,844	267,634	143,187
LWS54-7	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS32-4-2	62,149	117,873	63,045	119,367	63,941	121,011	64,987	123,252	66,182	125,493	67,378	127,584	68,423	129,825	69,618	132,066	70,664	134,307	71,859	136,548	73,055
LWS54-9	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS32-4A-2	62,149	117,873	63,045	119,367	63,941	121,011	64,987	123,252	66,182	125,493	67,378	127,584	68,423	129,825	69,618	132,066	70,664	134,307	71,859	136,548	73,055
LWS54-6	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS32-3-2	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS54-8	111,868	212,172	113,481	214,861	115,095	217,819	116,977	221,853	119,128	225,887	121,280	229,651	123,162	233,685	125,313	237,719	127,196	241,752	129,347	245,786	131,498
LWS32-2-2	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS54-10	155,372	294,683	157,613	298,418	159,854	302,527	162,468	308,129	165,456	313,731	168,444	318,960	171,058	324,563	174,046	330,165	176,661	335,767	179,649	341,370	182,636
LWS32-1A	124,297	235,747	126,090	238,735	127,883	242,021	129,974	246,503	132,365	250,985	134,755	255,168	136,847	259,650	139,237	264,132	141,329	268,614	143,719	273,096	146,109
LWS56-1	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS49-7	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS49-8	122,122	231,621	123,884	234,557	125,645	237,786	127,700	242,189	130,048	246,593	132,397	250,703	134,452	255,106	136,800	259,510	138,855	263,913	141,204	268,317	143,552
LWS49-6	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS49-9	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS54-1	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS66 - 1	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS76 - 1	186,446	353,620	189,135	358,102	191,824	363,032	194,962	369,755	198,547	376,478	202,133	382,752	205,270	389,475	208,855	396,198	211,993	402,921	215,578	409,644	219,164
LWS66 - 4	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS76 - 2	186,446	353,620	189,135	358,102	191,824	363,032	194,962	369,755	198,547	376,478	202,133	382,752	205,270	389,475	208,855	396,198	211,993	402,921	215,578	409,644	219,164
LWS66 - 5	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS66 - 6	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS76 - 3	186,446	353,620	189,135	358,102	191,824	363,032	194,962	369,755	198,547	376,478	202,133	382,752	205,270	389,475	208,855	396,198	211,993	402,921	215,578	409,644	219,164
LWS76 - 4	186,446	353,620	189,135	358,102	191,824	363,032	194,962	369,755	198,547	376,478	202,133	382,752	205,270	389,475	208,855	396,198	211,993	402,921	215,578	409,644	219,164
LWS68-1A	139,835	265,215	141,851	268,576	143,868	272,274	146,221	277,316	148,910	282,358	151,599	287,064	153,952	292,106	156,642	297,148	158,995	302,191	161,684	307,233	164,373
LWS76 - 5	186,446	353,620	189,135	358,102	191,824	363,032	194,962	369,755	198,547	376,478	202,133	382,752	205,270	389,475	208,855	396,198	211,993	402,921	215,578	409,644	219,164
LWS76 - 6	111,868	212,172	113,481	214,861	115,095	217,819	116,977	221,853	119,128	225,887	121,280	229,651	123,162	233,685	125,313	237,719	127,196	241,752	129,347	245,786	131,498
LWS78574	87,008	165,023	88,263	167,114	89,518	169,415	90,982	172,552	92,655	175,690	94,329	178,618	95,793	181,755	97,466	184,892	98,930	188,030	100,603	191,167	102,276
LWS86-1	136,727	259,321	138,699	262,608	140,671	266,223	142,972	271,154	145,601	276,084	148,231	280,685	150,531	285,615	153,161	290,545	155,461	295,475	158,091	300,405	160,720
LWS86-2	136,727	259,321	138,699	262,608	140,671	266,223	142,972	271,154	145,601	276,084	148,231	280,685	150,531	285,615	153,161	290,545	155,461	295,475	158,091	300,405	160,720
LWS85451	758,214	1,438,055	769,150	1,456,281	780,086	1,476,330	792,844	1,503,670	807,425	1,531,009	822,006	1,556,526	834,764	1,583,865	849,345	1,611,205	862,104	1,638,544	876,685	1,665,884	891,266
LWS86646	758,214	1,438,055	769,150	1,456,281	780,086	1,476,330	792,844	1,503,670	807,425	1,531,009	822,006	1,556,526	834,764	1,583,865	849,345	1,611,205	862,104	1,638,544	876,685	1,665,884	891,266
Total (MGD)	**41.6**	**78.9**	**42.2**	**79.9**	**42.8**	**81.0**	**43.5**	**82.5**	**44.3**	**84.0**	**45.1**	**85.4**	**45.8**	**86.9**	**46.6**	**88.4**	**47.3**	**89.9**	**48.1**	**91.4**	**48.9**

Appendix D
Table D-6
Lincoln Water System Ashland Well Field Estimated Pumping Rates (ft^3/day)
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

Stress Period:	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
Start Date:	**6/1/33**	**9/1/33**	**6/1/34**	**9/1/34**	**6/1/35**	**9/1/35**	**6/1/36**	**9/1/36**	**6/1/37**	**9/1/37**	**6/1/38**	**9/1/38**	**6/1/39**	**9/1/39**	**6/1/40**	**9/1/40**	**6/1/41**
End Date:	**8/31/33**	**5/31/34**	**8/31/34**	**5/31/35**	**8/31/35**	**5/31/36**	**8/31/36**	**5/31/37**	**8/31/37**	**5/31/38**	**8/31/38**	**5/31/39**	**8/31/39**	**5/31/40**	**8/31/40**	**5/31/41**	**8/31/41**
LWS56-8	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS56-9	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS56-5	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS54-3	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS56-7	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS54-5	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS325A	271,733	145,237	276,125	147,579	280,518	149,922	284,910	151,971	289,302	154,314	293,402	156,364	297,794	158,706	302,186	161,049	306,578
LWS54-7	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS32-4-2	138,639	74,100	140,880	75,296	143,121	76,491	145,362	77,536	147,603	78,732	149,695	79,777	151,936	80,973	154,177	82,168	156,417
LWS54-9	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS32-4A-2	138,639	74,100	140,880	75,296	143,121	76,491	145,362	77,536	147,603	78,732	149,695	79,777	151,936	80,973	154,177	82,168	156,417
LWS54-6	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS32-3-2	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS54-8	249,551	133,381	253,585	135,532	257,618	137,683	261,652	139,566	265,686	141,717	269,450	143,599	273,484	145,751	277,518	147,902	281,551
LWS32-2-2	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS54-10	346,598	185,251	352,201	188,239	357,803	191,227	363,405	193,841	369,008	196,829	374,237	199,444	379,839	202,431	385,441	205,419	391,044
LWS32-1A	277,279	148,201	281,761	150,591	286,243	152,981	290,724	155,073	295,206	157,463	299,389	159,555	303,871	161,945	308,353	164,335	312,835
LWS56-1	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS49-7	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS49-8	272,426	145,607	276,830	147,956	281,233	150,304	285,637	152,359	290,040	154,708	294,150	156,763	298,553	159,111	302,957	161,460	307,360
LWS49-6	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS49-9	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS54-1	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS66 - 1	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS76 - 1	415,918	222,301	422,641	225,887	429,364	229,472	436,087	232,609	442,809	236,195	449,084	239,332	455,807	242,918	462,530	246,503	469,252
LWS66 - 4	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS76 - 2	415,918	222,301	422,641	225,887	429,364	229,472	436,087	232,609	442,809	236,195	449,084	239,332	455,807	242,918	462,530	246,503	469,252
LWS66 - 5	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS66 - 6	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS76 - 3	415,918	222,301	422,641	225,887	429,364	229,472	436,087	232,609	442,809	236,195	449,084	239,332	455,807	242,918	462,530	246,503	469,252
LWS76 - 4	415,918	222,301	422,641	225,887	429,364	229,472	436,087	232,609	442,809	236,195	449,084	239,332	455,807	242,918	462,530	246,503	469,252
LWS68-1A	311,939	166,726	316,981	169,415	322,023	172,104	327,065	174,457	332,107	177,146	336,813	179,499	341,855	182,188	346,897	184,877	351,939
LWS76 - 5	415,918	222,301	422,641	225,887	429,364	229,472	436,087	232,609	442,809	236,195	449,084	239,332	455,807	242,918	462,530	246,503	469,252
LWS76 - 6	249,551	133,381	253,585	135,532	257,618	137,683	261,652	139,566	265,686	141,717	269,450	143,599	273,484	145,751	277,518	147,902	281,551
LWS78574	194,095	103,741	197,232	105,414	200,370	107,087	203,507	108,551	206,644	110,224	209,573	111,688	212,710	113,362	215,847	115,035	218,984
LWS86-1	305,007	163,021	309,937	165,650	314,867	168,280	319,797	170,580	324,727	173,210	329,328	175,510	334,258	178,140	339,188	180,769	344,118
LWS86-2	305,007	163,021	309,937	165,650	314,867	168,280	319,797	170,580	324,727	173,210	329,328	175,510	334,258	178,140	339,188	180,769	344,118
LWS85451	1,691,400	904,024	1,718,740	918,605	1,746,079	933,186	1,773,419	945,945	1,800,758	960,526	1,826,275	973,284	1,853,615	987,865	1,880,954	1,002,446	1,908,293
LWS86646	1,691,400	904,024	1,718,740	918,605	1,746,079	933,186	1,773,419	945,945	1,800,758	960,526	1,826,275	973,284	1,853,615	987,865	1,880,954	1,002,446	1,908,293
Total (MGD)	**92.8**	**49.6**	**94.3**	**50.4**	**95.8**	**51.2**	**97.3**	**51.9**	**98.8**	**52.7**	**100.2**	**53.4**	**101.7**	**54.2**	**103.2**	**55.0**	**104.7**

Notes:
MGD - Millions of Gallons per day
LWS - Lincoln Water System
ft^3/day - cubic feet per day
(1) Stress Period 1 & 2 based on average of pumping rates from 2012 (Lincoln Water System, 2013)
Source: Lincoln Water System, 2013. Monthly Totals for Well Field Pumpage (MG). Excel© spreadsheet transmitted via email from Julie M. Vales, LWS, to Bradley Brink, USACE. February 4.

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Appendix D
Table D-7
Ashland, Ithaca, Mead, and Memphis Measured and Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day				gallons per minute			
Stress Period	**1**	**2**	**3,5,7…61**	**4,6,8…62**	**1**	**2**	**3,5,7…61**	**4,6,8…62**
Start Date	**10/28/2012**	**1/1/2013**	**6/1**	**9/1**	**1/1/2011**	**6/1/2011**	**6/1**	**9/1**
End Date	**12/31/2012**	**5/31/2013**	**8/31**	**5/31**	**5/31/2011**	**8/31/2011**	**8/31**	**5/31**
Ashland(82-1)	9,573	14,380	16,087	9,765	50	75	84	51
Ashland(#4)	9,573	14,380	16,087	9,765	50	75	84	51
Ashland(#5)	9,573	14,380	16,087	9,765	50	75	84	51
Ashland(2006-1)	9,573	14,380	16,087	9,765	50	75	84	51
Ashland Total	**38,311**	**57,563**	**64,302**	**39,082**	**199**	**299**	**334**	**203**
Ithaca(1)	1,116	1,116	1,116	1,116	5.8	5.8	5.8	5.8
Ithaca(2)	1,116	1,116	1,116	1,116	5.8	5.8	5.8	5.8
Ithaca Total	**2,232**	**2,232**	**2,232**	**2,232**	**12**	**12**	**12**	**12**
Mead(1)	1,989	1,925	2,792	1,989	9	10	15	10
Mead(2)	1,989	1,925	2,792	1,989	9	10	15	10
Mead(3)	1,989	1,925	2,792	1,989	9	10	15	10
Mead(4)	1,989	1,925	2,792	1,989	9	10	15	10
Mead Total	**6,931**	**7,701**	**11,166**	**7,893**	**36**	**40**	**58**	**41**
Memphis(73-1)	729	729	729	729	3.8	3.8	3.8	3.8
Memphis(94-1)	729	729	729	729	3.8	3.8	3.8	3.8
Memphis Total	**1,458**	**1,458**	**1,458**	**1,458**	**7.6**	**7.6**	**7.6**	**7.6**

Notes:

(1) Ashland stress period 1 pumping rates are average of October - December 2012 measured rates (City of Ashland, 2013).

(2) Rates for Ithaca are population based, assuming a 100 gallons per day per capita water use ("Estimated Water Use in Nebraska, 1995", NNRC, 1998), and a 2005 population of 167 ("Population Estimates and Census Data, 2005 Sub-County Population Estimates", NDNR, 2006).

(3) Mead stress period 1 pumping rates are average of October - December 2012 measured rates (Village of Mead, 2013).

(4) Rates for Memphis are population based, assuming a 100 gallons per day per capita water use ("Estimated Water Use in Nebraska, 1995", NNRC, 1998 and a 2005 population of 109 ("Population Estimates and Census Data, 2005 Sub-County Population Estimates", NDNR, 2006).

(5) Ashland and Mead stress period 2-62 pumping rates are based on seasonal average pumping rates.

Sources:

City of Ashland, 2013. Ashland Well Production Since 2004. Excel© spreadsheet transmitted via email from Bill Torpy, City of Ashland, to Bradley Brink, USACE. February 4.

Nebraska Department of Natural Resources (NDNR), 2006. Relational/Tabular Databases, Population Estimates and Census Data, 2005 Sub-County Population Estimates. http://www.dnr.ne.gov/databank/census/SUB-EST2005-04-31.xls. Accessed September 2006.

Nebraska Natural Resources Commission (NNRC), 1998. "Estimated Water Use in Nebraska, 1995". http://www.dnr.ne.gov/otherresources/waterreport95.html. Accessed September 2006.

Village of Mead, 2013. Mead Water Use. Email message transmitted from Nick Raver, Village of Mead, to Bradley Brink, USACE. February 6.

Appendix D
Table D-8
Irrigation Well Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day		gallons per minute	
Stress Period:	**3,5,7,9…61**	**2,4,6,8…62**	**3,5,7,9…61**	**2,4,6,8…62**
Start Date:	**6/1**	**9/1**	**6/1**	**9/1**
End Date:	**8/31**	**5/31**	**8/31**	**5/31**
G-000350	30,278	0	157	0
G-000377	35,200	0	183	0
G-000744	0	0	0	0
G-000745	15,180	0	79	0
G-000961	29,178	0	152	0
G-002172	30,278	0	157	0
G-002341	0	0	0	0
G-003848	15,180	0	79	0
G-004004	9,433	0	49	0
G-004168	6,628	0	34	0
G-004169	6,628	0	34	0
G-004183	0	0	0	0
G-008876	0	0	0	0
G-009033	30,278	0	157	0
G-009205	15,180	0	79	0
G-011280	13,310	0	69	0
G-013220	30,278	0	157	0
G-014161	0	0	0	0
G-014821	0	0	0	0
G-014822	0	0	0	0
G-014865	23,843	0	124	0
G-014866	19,910	0	103	0
G-015211	30,278	0	157	0
G-016190	37,868	0	197	0
G-017199	30,278	0	157	0
G-017201	30,278	0	157	0
G-018285	19,003	0	99	0
G-020313	37,868	0	197	0
G-020550	24,695	0	128	0
G-021194	30,278	0	157	0
G-021492	25,410	0	132	0
G-023385	15,180	0	79	0
G-030654	41,663	0	216	0
G-030678	34,128	0	177	0
G-031913	30,278	0	157	0
G-033472	22,688	0	118	0
G-033505	32,285	0	168	0
G-033747	0	0	0	0
G-033749	16,926	0	88	0
G-033750	14,690	0	76	0
G-033751	0	0	0	0
G-033752	13,448	0	70	0
G-033753	38,991	0	203	0
G-033754	0	0	0	0
G-033755	2,943	0	15	0
G-035213	32,808	0	170	0

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Table D-8
Irrigation Well Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day		gallons per minute	
Stress Period:	**3,5,7,9…61**	**2,4,6,8…62**	**3,5,7,9…61**	**2,4,6,8…62**
Start Date:	**6/1**	**9/1**	**6/1**	**9/1**
End Date:	**8/31**	**5/31**	**8/31**	**5/31**
G-035237	30,278	0	157	0
G-035273	26,538	0	138	0
G-035300	12,898	0	67	0
G-035461	16,033	0	83	0
G-035862	24,695	0	128	0
G-035976	38,610	0	201	0
G-036098	15,180	0	79	0
G-036212 (#12)	2,200	0	11	0
G-036213	15,373	0	80	0
G-036214	1,430	0	7	0
G-037637	26,538	0	138	0
G-037707	30,278	0	157	0
G-037709	22,688	0	118	0
G-037984	27,473	0	143	0
G-040328	45,403	0	236	0
G-040351	45,403	0	236	0
G-041584	29,178	0	152	0
G-041786	26,538	0	138	0
G-042325	30,278	0	157	0
G-044173	28,628	0	149	0
G-044312	16,143	0	84	0
G-046472	15,180	0	79	0
G-046552	21,725	0	113	0
G-046657	25,603	0	133	0
G-047016	7,563	0	39	0
G-047089	28,930	0	150	0
G-047357	25,988	0	135	0
G-047789	15,180	0	79	0
G-047830	22,688	0	118	0
G-048312	41,663	0	216	0
G-048425B	30,278	0	157	0
G-049256	30,278	0	157	0
G-049353	25,988	0	135	0
G-049439	45,403	0	236	0
G-050176	30,278	0	157	0
G-050177	30,278	0	157	0
G-050878	3,850	0	20	0
G-050995	28,408	0	148	0
G-051685	15,180	0	79	0
G-051686	7,563	0	39	0
G-051786	30,278	0	157	0
G-051787	30,278	0	157	0
G-051860	30,278	0	157	0
G-051879	30,278	0	157	0
G-051927	28,628	0	149	0
G-052170	11,413	0	59	0

Appendix D
Table D-8
Irrigation Well Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day		gallons per minute	
Stress Period:	**3,5,7,9…61**	**2,4,6,8…62**	**3,5,7,9…61**	**2,4,6,8…62**
Start Date:	**6/1**	**9/1**	**6/1**	**9/1**
End Date:	**8/31**	**5/31**	**8/31**	**5/31**
G-052354	30,278	0	157	0
G-052414	30,278	0	157	0
G-052415	20,845	0	108	0
G-052563	30,278	0	157	0
G-052785	30,278	0	157	0
G-053077	30,278	0	157	0
G-053428	30,278	0	157	0
G-053470	34,128	0	177	0
G-053629	15,180	0	79	0
G-053630	14,383	0	75	0
G-053656	30,278	0	157	0
G-053658	19,003	0	99	0
G-053764	19,003	0	99	0
G-053801	30,278	0	157	0
G-053963	13,310	0	69	0
G-054654	36,888	0	192	0
G-054655	27,579	0	143	0
G-054656 (#10)	10,615	6,353	55	33
G-055912	25,603	0	133	0
G-055914	37,868	0	197	0
G-055915	28,408	0	148	0
G-056278	7,563	0	39	0
G-056513	5,720	0	30	0
G-056514	7,563	0	39	0
G-056729	22,688	0	118	0
G-057184	26,538	0	138	0
G-057314	0	0	0	0
G-057315	19,003	0	99	0
G-057497	30,278	0	157	0
G-057498	30,278	0	157	0
G-057634	37,868	0	197	0
G-058057	7,563	0	39	0
G-058058	11,413	0	59	0
G-058325	7,563	0	39	0
G-058437	11,413	0	59	0
G-058543	24,695	0	128	0
G-058723	15,180	0	79	0
G-058820	33,220	0	173	0
G-058958	30,278	0	157	0
G-059114	7,563	0	39	0
G-059115	15,180	0	79	0
G-059231	19,003	0	99	0
G-059549	15,180	0	79	0
G-059681	14,218	0	74	0
G-060250	963	0	5	0
G-060417	10,010	0	52	0

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Table D-8
Irrigation Well Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day		gallons per minute	
Stress Period:	**3,5,7,9…61**	**2,4,6,8…62**	**3,5,7,9…61**	**2,4,6,8…62**
Start Date:	**6/1**	**9/1**	**6/1**	**9/1**
End Date:	**8/31**	**5/31**	**8/31**	**5/31**
G-060900	12,320	0	64	0
G-060988	19,003	0	99	0
G-061009	45,403	0	236	0
G-061620	7,563	0	39	0
G-061703	19,910	0	103	0
G-062082	14,548	0	76	0
G-062375	11,413	0	59	0
G-063187	15,180	0	79	0
G-063202	25,218	0	131	0
G-064065	28,408	0	148	0
G-064207	30,278	0	157	0
G-064243	19,168	0	100	0
G-064703	9,433	0	49	0
G-064906	28,408	0	148	0
G-065584	24,888	0	129	0
G-065589	30,278	0	157	0
G-065682	24,695	0	128	0
G-065683	16,033	0	83	0
G-065684	32,285	0	168	0
G-065871	28,408	0	148	0
G-065908	11,413	0	59	0
G-065987	29,343	0	152	0
G-066246	30,278	0	157	0
G-066364	30,278	0	157	0
G-066531	21,725	0	113	0
G-066614	23,100	0	120	0
G-067290	12,320	0	64	0
G-067472	30,278	0	157	0
G-067620	41,663	0	216	0
G-068060	17,147	0	89	0
G-068383	15,180	0	79	0
G-069184	15,180	0	79	0
G-069208	44,468	0	231	0
G-070210	28,930	0	150	0
G-070398	30,277	0	157	0
G-070615	30,278	0	157	0
G-071170	20,845	0	108	0
G-071362	16,995	0	88	0
G-071363	24,695	0	128	0
G-072122	21,038	0	109	0
G-072123	43,505	0	226	0
G-072139	22,688	0	118	0
G-072751	12,320	0	64	0
G-072842	11,413	0	59	0
G-073294	15,208	0	79	0
G-073449	30,278	0	157	0

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Table D-8
Irrigation Well Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day		gallons per minute	
Stress Period:	**3,5,7,9…61**	**2,4,6,8…62**	**3,5,7,9…61**	**2,4,6,8…62**
Start Date:	**6/1**	**9/1**	**6/1**	**9/1**
End Date:	**8/31**	**5/31**	**8/31**	**5/31**
G-073545	12,320	0	64	0
G-073751	24,695	0	128	0
G-073894	27,858	0	145	0
G-074349	22,688	0	118	0
G-074351	15,180	0	79	0
G-076374	25,053	0	130	0
G-076735	14,383	0	75	0
G-077970	24,695	0	128	0
G-078375	24,695	0	128	0
G-078376	15,180	0	79	0
G-081565	23,595	0	123	0
G-081652	25,603	0	133	0
G-081653	14,795	0	77	0
G-082391	29,700	0	154	0
G-084655	7,343	0	38	0
G-085344	25,988	0	135	0
G-085522	45,403	0	236	0
G-087076	17,848	0	93	0
G-087283	14,218	0	74	0
G-087637	22,688	0	118	0
G-087929	37,612	0	195	0
G-088331	25,603	0	133	0
G-089306	12,320	0	64	0
G-090720	25,603	0	133	0
G-091546 (#9)	13,090	13,090	68	68
G-091614	22,688	0	118	0
G-093865	22,688	0	118	0
G-094011	24,695	0	128	0
G-094585	15,180	0	79	0
G-096581	1,700	0	9	0
G-096582	22,617	0	117	0
G-096584	32,301	0	168	0
G-096587	963	0	5	0
G-096588 (#27)	5,583	5,583	29	29
G-096589	11,193	0	58	0
G-096627	11,413	0	59	0
G-096904	24,695	0	128	0
G-096933	34,128	0	177	0
G-097207	6,628	0	34	0
G-098758	25,603	0	133	0
G-101198	19,003	0	99	0
G-104278	26,373	0	137	0
G-105704	9,433	0	49	0
G-105753	37,868	0	197	0
G-105797	24,695	0	128	0
G-105800	42,728	0	222	0

Appendix D
Table D-8
Irrigation Well Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day		gallons per minute	
Stress Period:	**3,5,7,9…61**	**2,4,6,8…62**	**3,5,7,9…61**	**2,4,6,8…62**
Start Date:	**6/1**	**9/1**	**6/1**	**9/1**
End Date:	**8/31**	**5/31**	**8/31**	**5/31**
G-105801	34,708	0	180	0
G-105802	31,412	0	163	0
G-107321	20,845	0	108	0
G-108180	1,870	0	10	0
G-108647	16,033	0	83	0
G-109287	7,563	0	39	0
G-109448	28,408	0	148	0
G-109619	4,978	0	26	0
G-110360	19,003	0	99	0
G-112438	22,688	0	118	0
G-113392	24,695	0	128	0
G-113882	16,033	0	83	0
G-114521	25,218	0	131	0
G-116108	16,995	0	88	0
G-116504	16,995	0	88	0
G-127035	19,003	0	99	0
G-127071	28,408	0	148	0
G-127133	30,278	0	157	0
G-127250	20,845	0	108	0
G-127321	19,003	0	99	0
G-127545	12,320	0	64	0
G-128997	14,218	0	74	0
G-129063	58,493	0	304	0
G-130797	15,180	0	79	0
G-131085	33,578	0	174	0
G-132237	19,003	0	99	0
G-133366	20,845	0	108	0
G-134121	28,408	0	148	0
G-134176	13,310	0	69	0
G-135522	15,260	0	79	0
G-135542	15,180	0	79	0
G-135543	1,485	0	8	0
G-135895	12,320	0	64	0
G-136000	12,898	0	67	0
G-136149	16,775	0	87	0
G-136150	49,225	0	256	0
G-136318	26,538	0	138	0
G-136326	12,320	0	64	0
G-136327	16,390	0	85	0
G-136409	14,933	0	78	0
G-136517	15,180	0	79	0
G-136617	19,003	0	99	0
G-137529	26,538	0	138	0
G-137912	14,795	0	77	0
G-138821	19,003	0	99	0
G-138924	38,913	0	202	0

Appendix D
Table D-8
Irrigation Well Estimated Pumping Rates
2012 Containment Evaluation
Former Nebraska Ordnance Plant, Mead, Nebraska

	feet^3/day		gallons per minute	
Stress Period:	**3,5,7,9…61**	**2,4,6,8…62**	**3,5,7,9…61**	**2,4,6,8…62**
Start Date:	**6/1**	**9/1**	**6/1**	**9/1**
End Date:	**8/31**	**5/31**	**8/31**	**5/31**
G-139140	25,768	0	134	0
G-140041	30,278	0	157	0
G-140862	578	0	3	0
G-140863	15,180	0	79	0
G-144326	12,705	0	66	0
G-146158	26,538	0	138	0
G-146379	19,718	0	102	0
G-146939	20,845	0	108	0
G-149433	22,688	0	118	0
G-151522	7,563	0	39	0
G-152097	578	0	3	0
G-152423	6,628	0	34	0
G-152424	15,180	0	79	0
G-152458	8,305	0	43	0
G-155221	165	0	1	0
G-156154	9,763	0	51	0
G-157943	3,520	0	18	0
G-158669	3,438	0	18	0
G-158991	7,288	0	38	0
G-159854	6,655	0	35	0
G-161181	4,153	0	22	0
G-161182	4,153	0	22	0
G-161915	3,823	0	20	0
G-162095	3,713	0	19	0
G-163023	1,320	0	7	0

Note:
(1) Refer to the GWM12 Update (ECC and BMcD, 2013) for details regarding the estimation of irrigation rates.
(2) Wells shown with non-irrigation season pumping rates are Agricultural Research and Development Center water supply

Appendix E
TCE Transport Simulations

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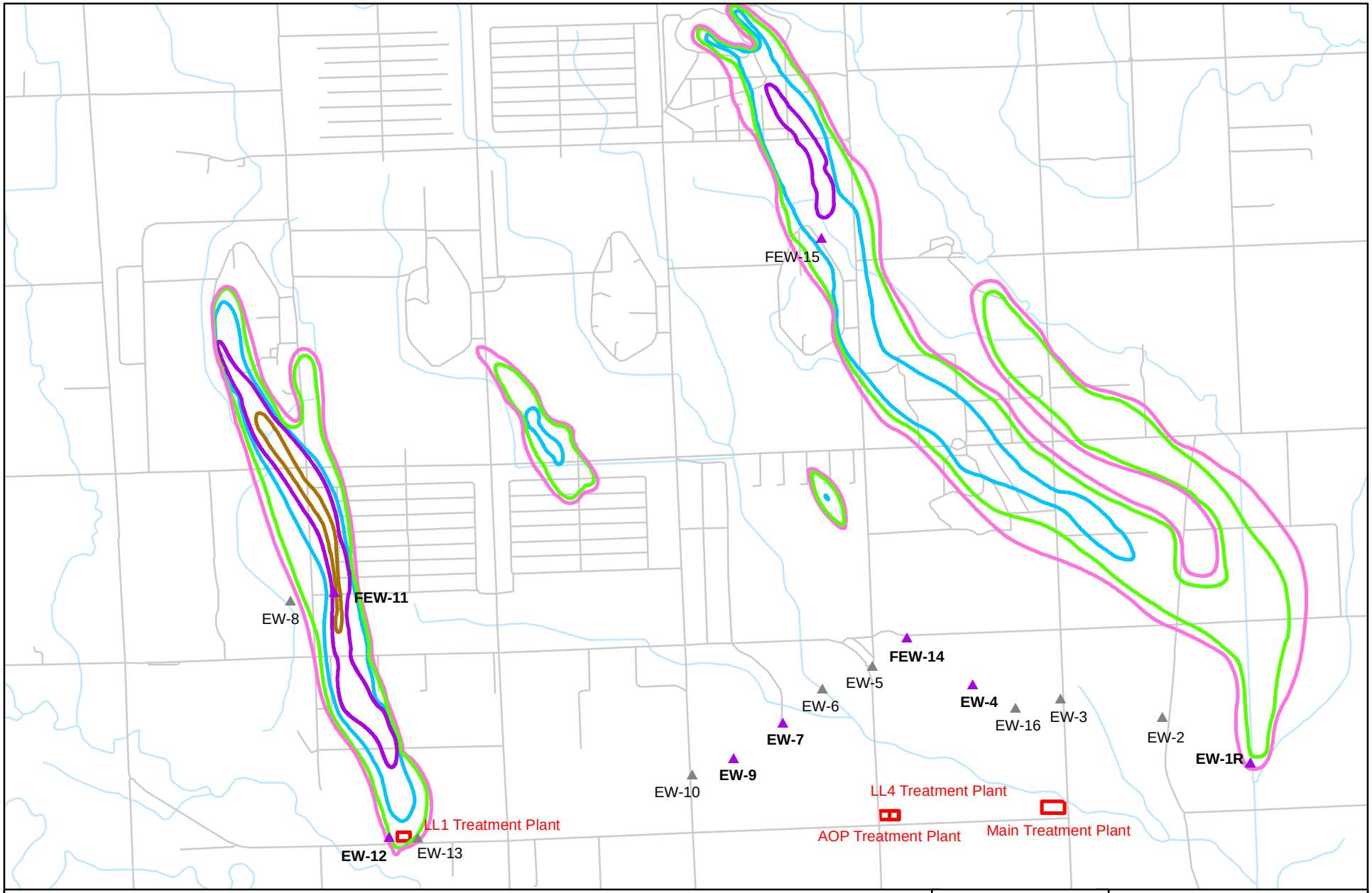


Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours

- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

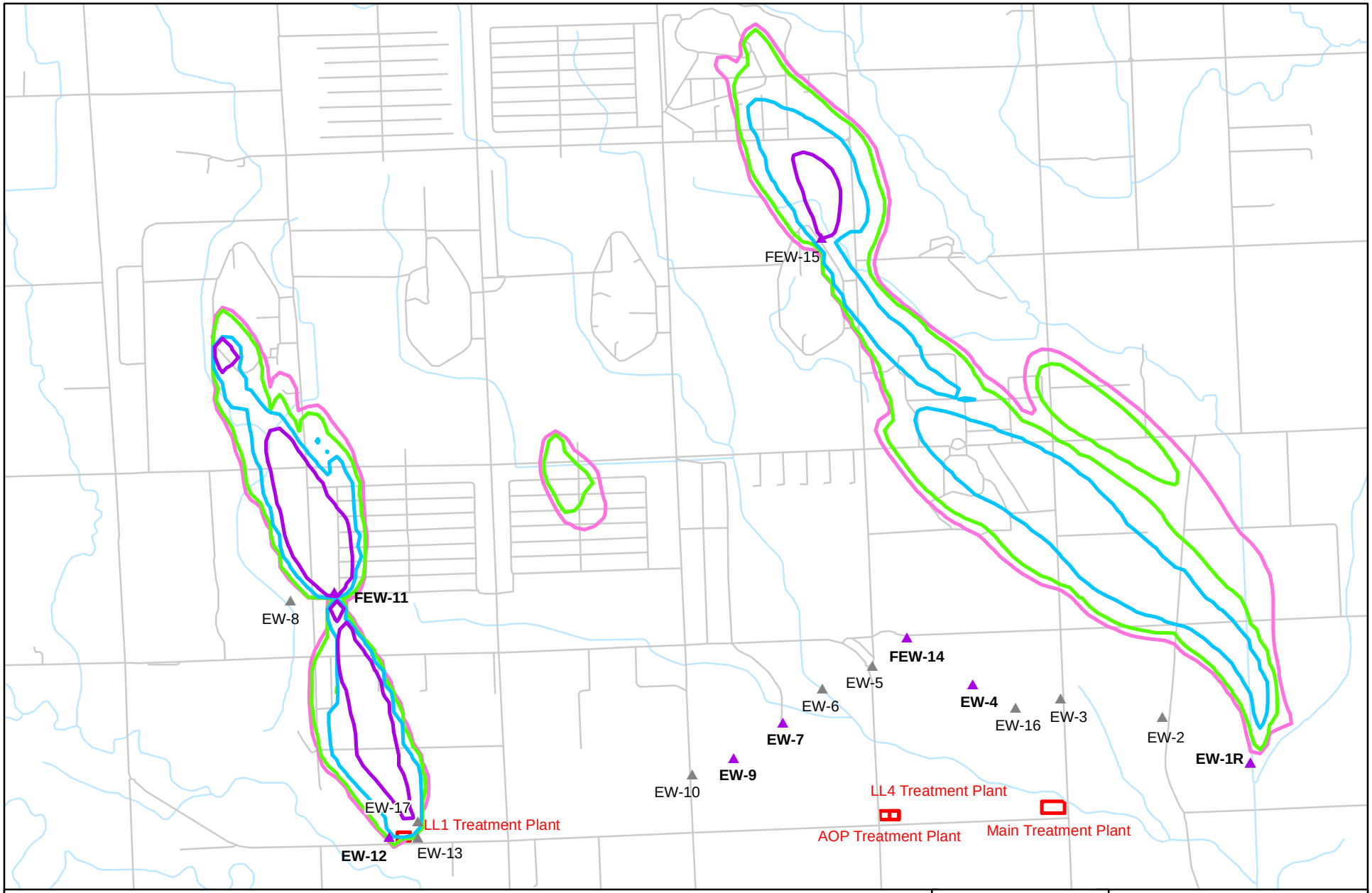
US Army Corps of Engineers
Kansas City District

Figure E-1

TCE
Initial Concentrations
LAYER 2

2012 Containment Evaluation

K:\ENV\ECC\site\51469\Data\GIS\2013\CE 2012\FigE-1_TCE_InitialConcentrations_L2.mxd ro June14, 2013



Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

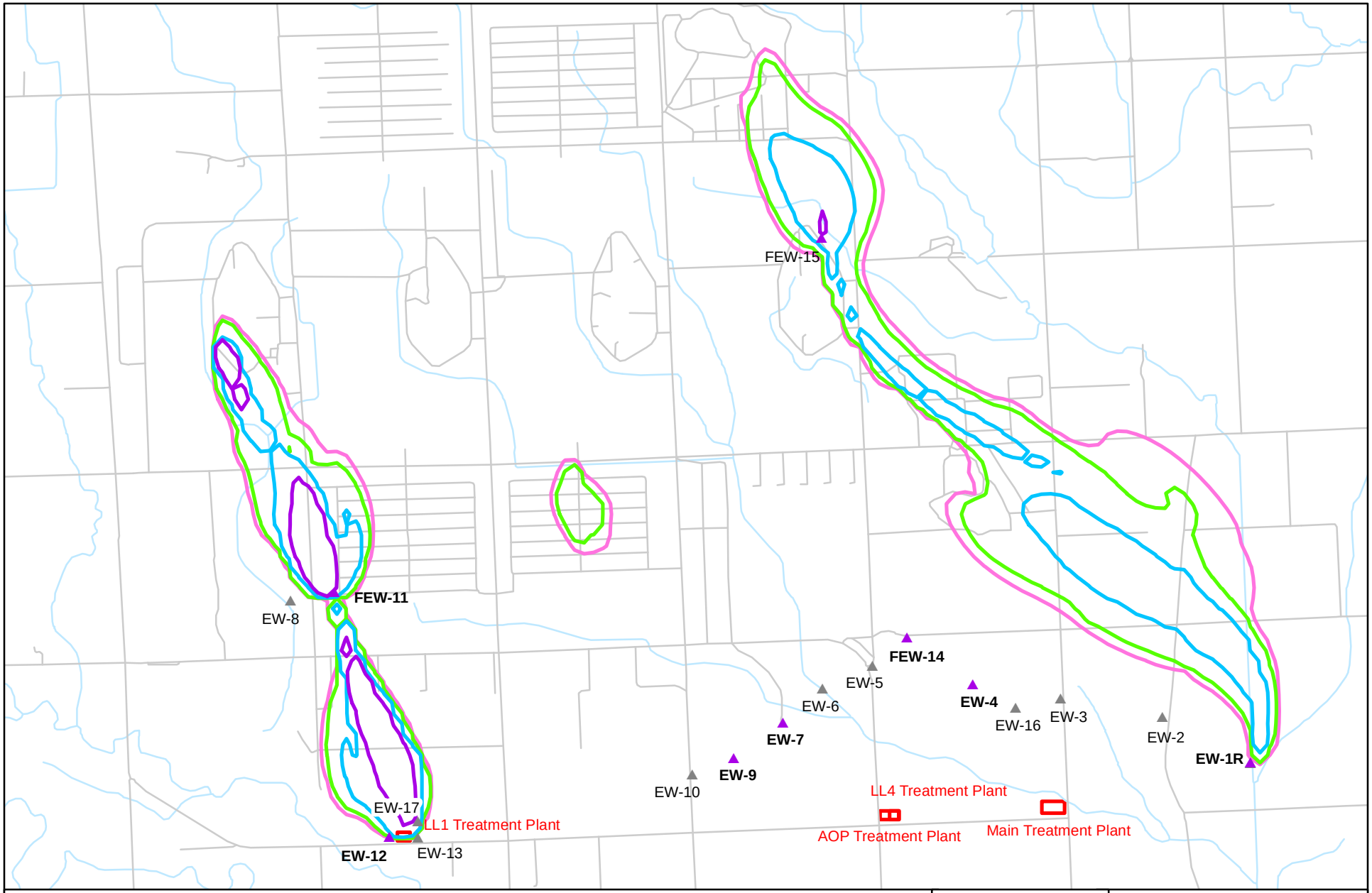
0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-2
PREDICTED TCE
LAYER 2
2017

2012 Containment Evaluation

K:\ENV\ECC\site\51469\Data\GIS\2013\CE 2012\FigE-2_TCE_2017_L2.mxd ro August 2, 2013 rev 01



Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours

- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-3

PREDICTED TCE
LAYER 2
2022

2012 Containment Evaluation

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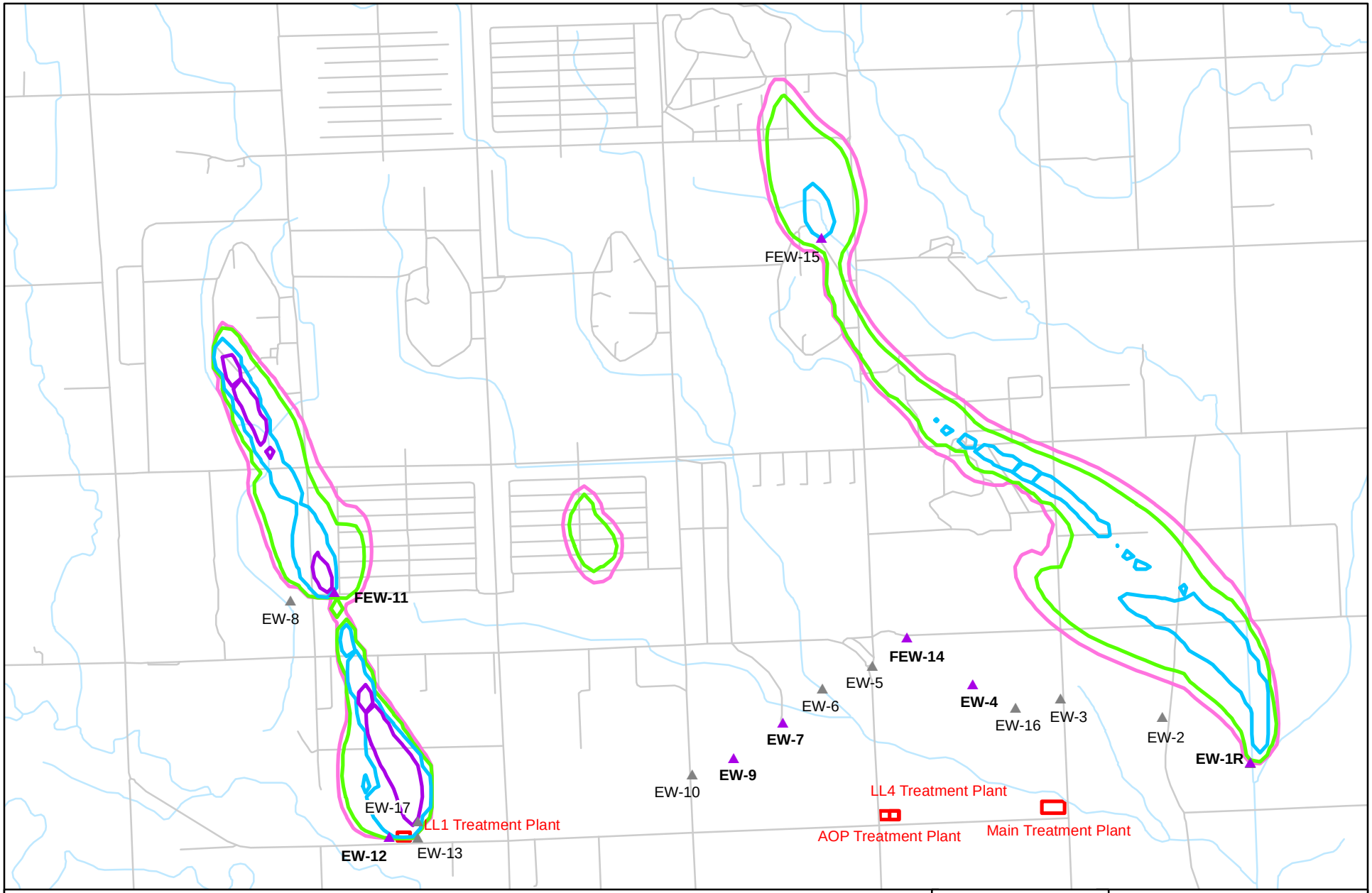

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-4
PREDICTED TCE
LAYER 2
2027

2012 Containment Evaluation

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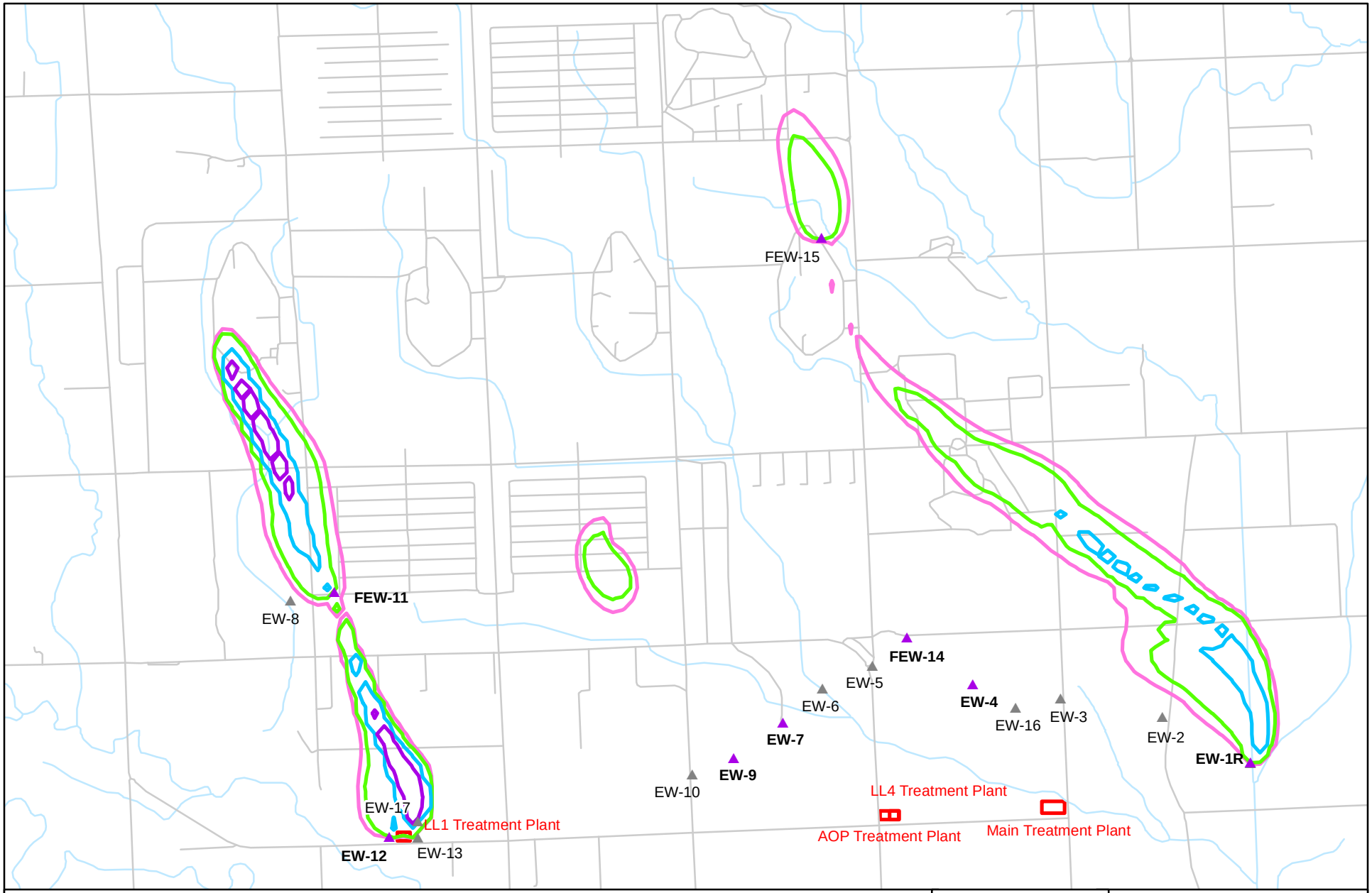

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-5
PREDICTED TCE
LAYER 2
2032

2012 Containment Evaluation

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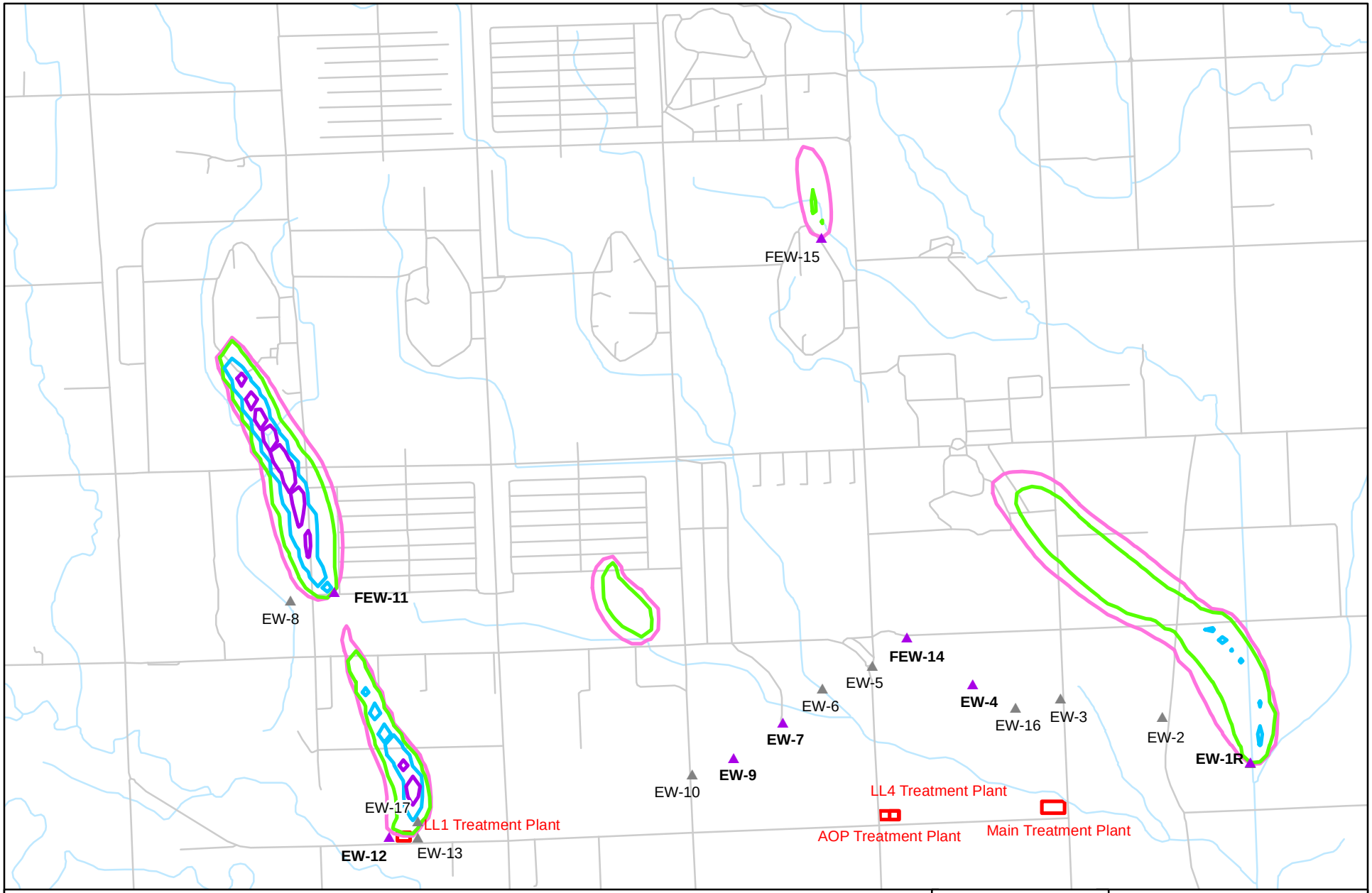

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-6
PREDICTED TCE
LAYER 2
2037

2012 Containment Evaluation

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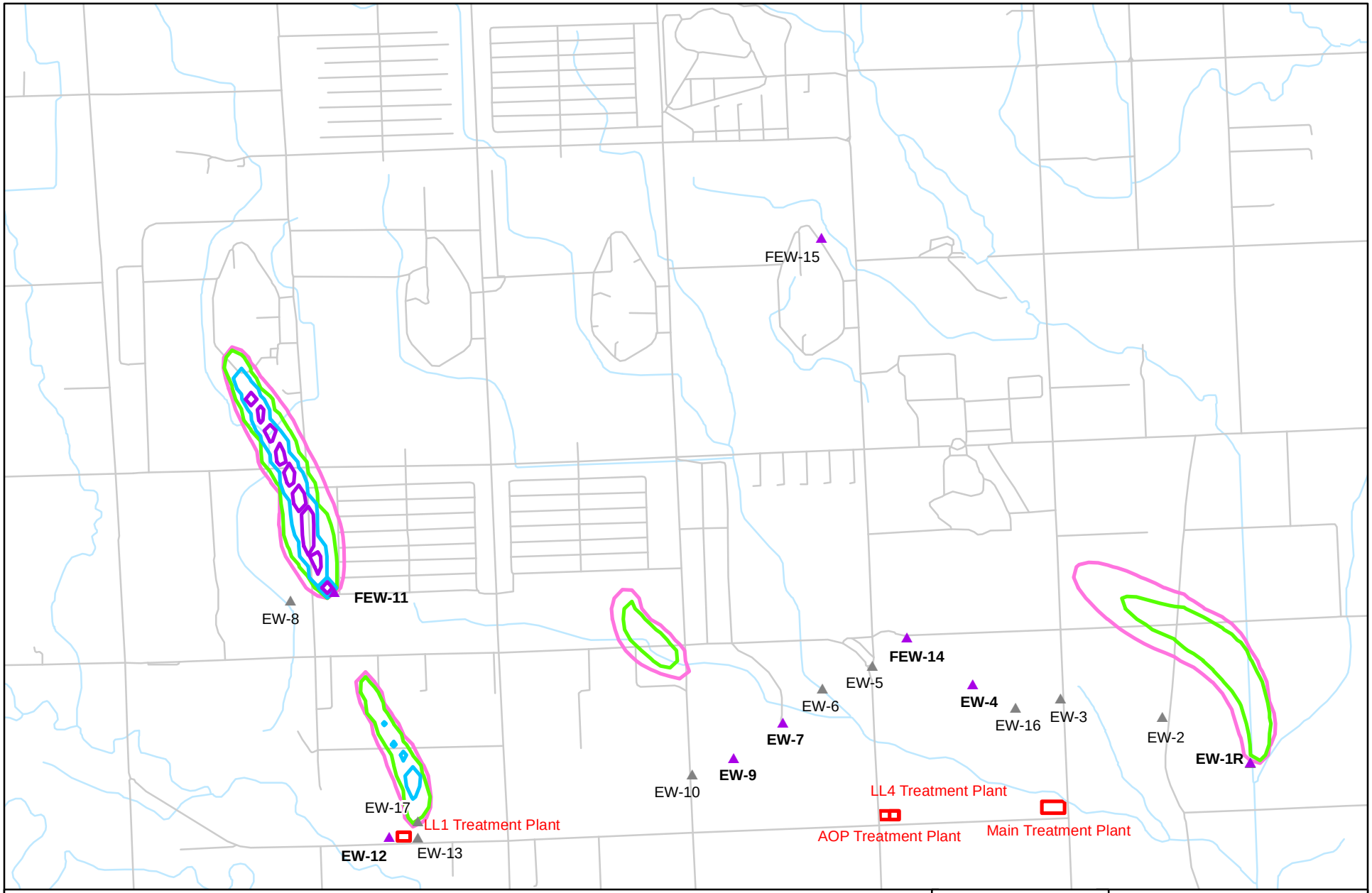

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-7

PREDICTED TCE
LAYER 2
2042

2012 Containment Evaluation

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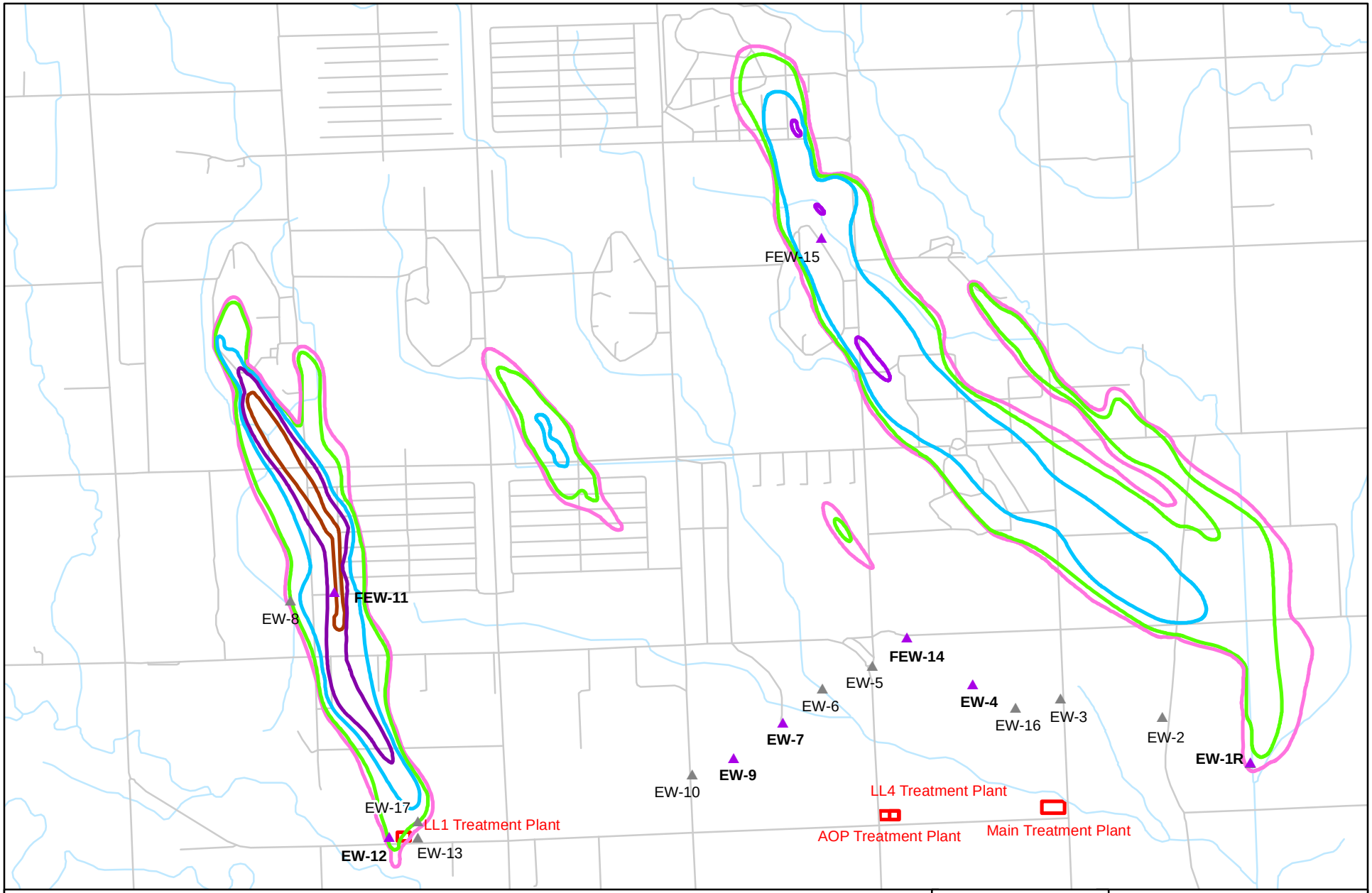

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours

- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-8

TCE
Initial Concentrations
LAYER 3

2012 Containment Evaluation

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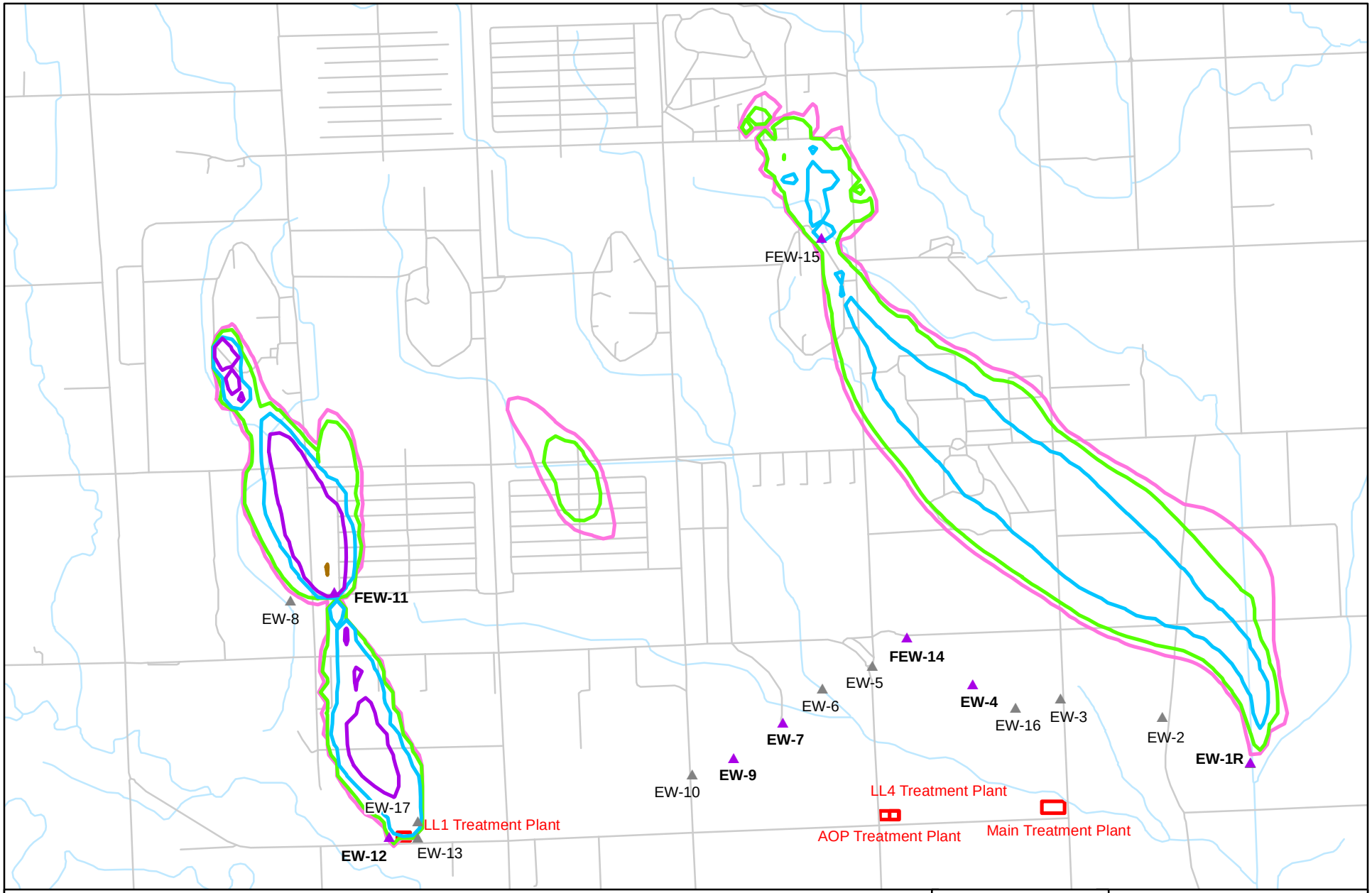

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-9
PREDICTED TCE
LAYER 3
2017

2012 Containment Evaluation

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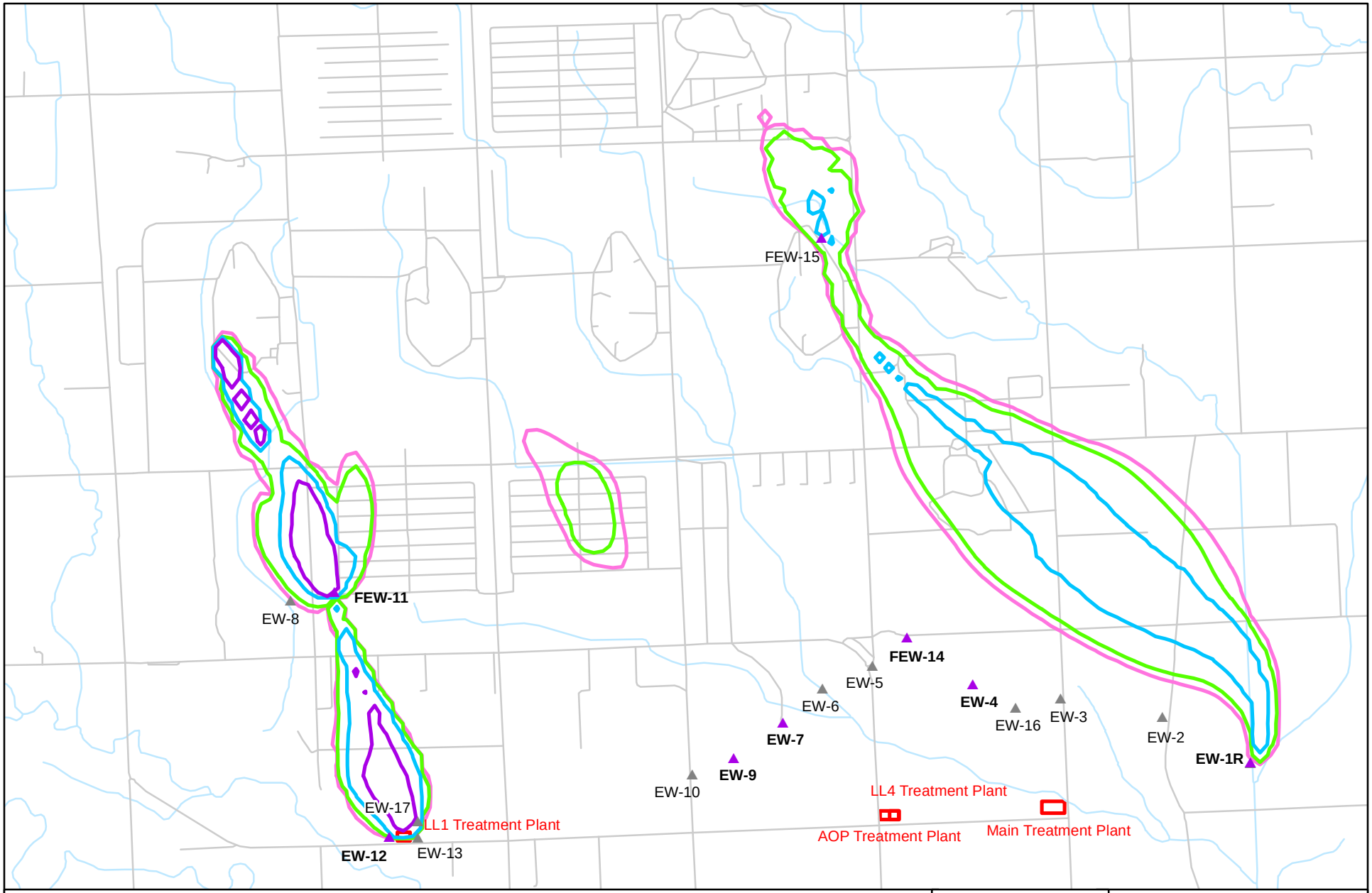

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-10
PREDICTED TCE
LAYER 3
2022

2012 Containment Evaluation

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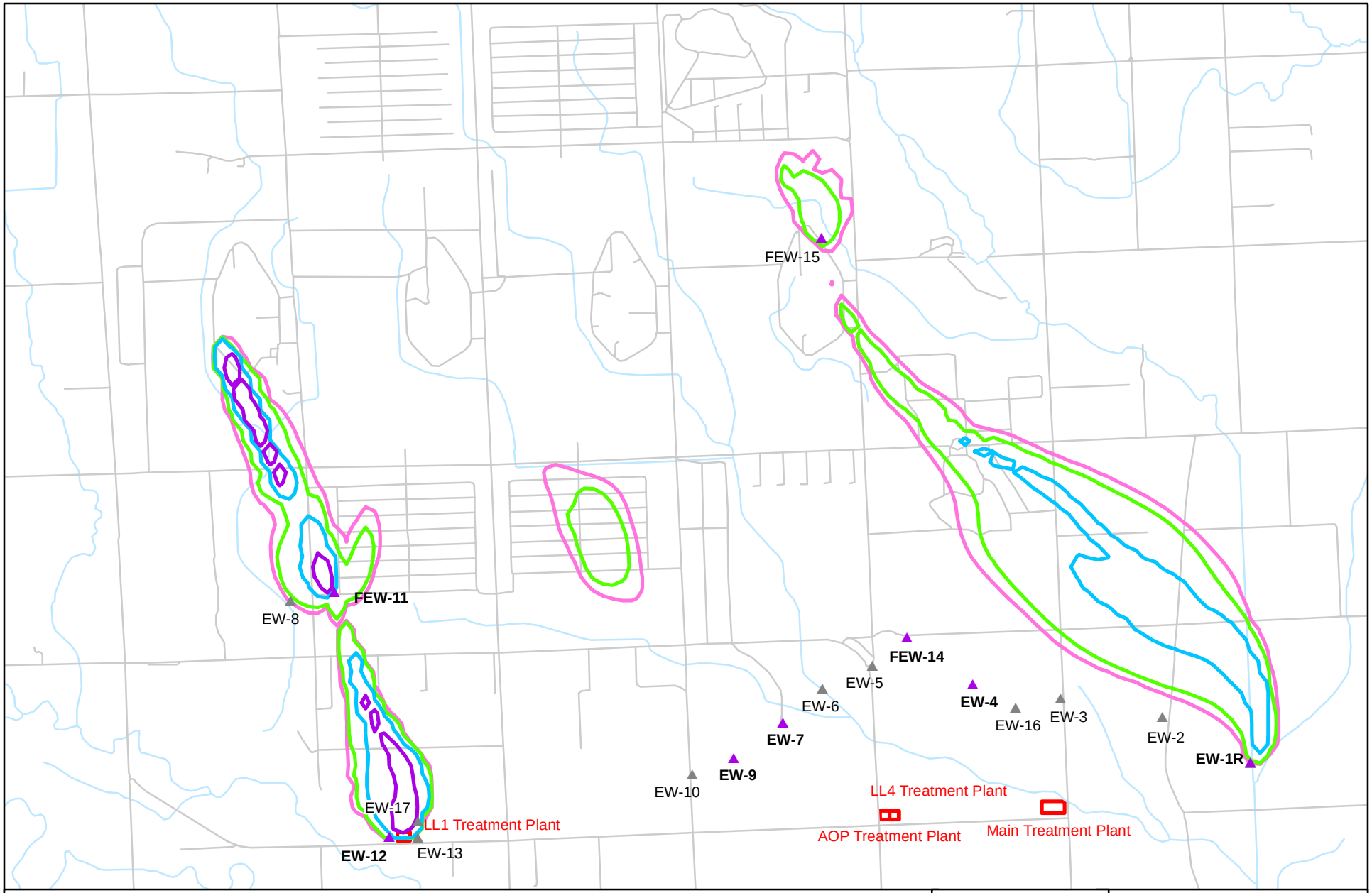

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours

- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-11

PREDICTED TCE
LAYER 3
2027

2012 Containment Evaluation

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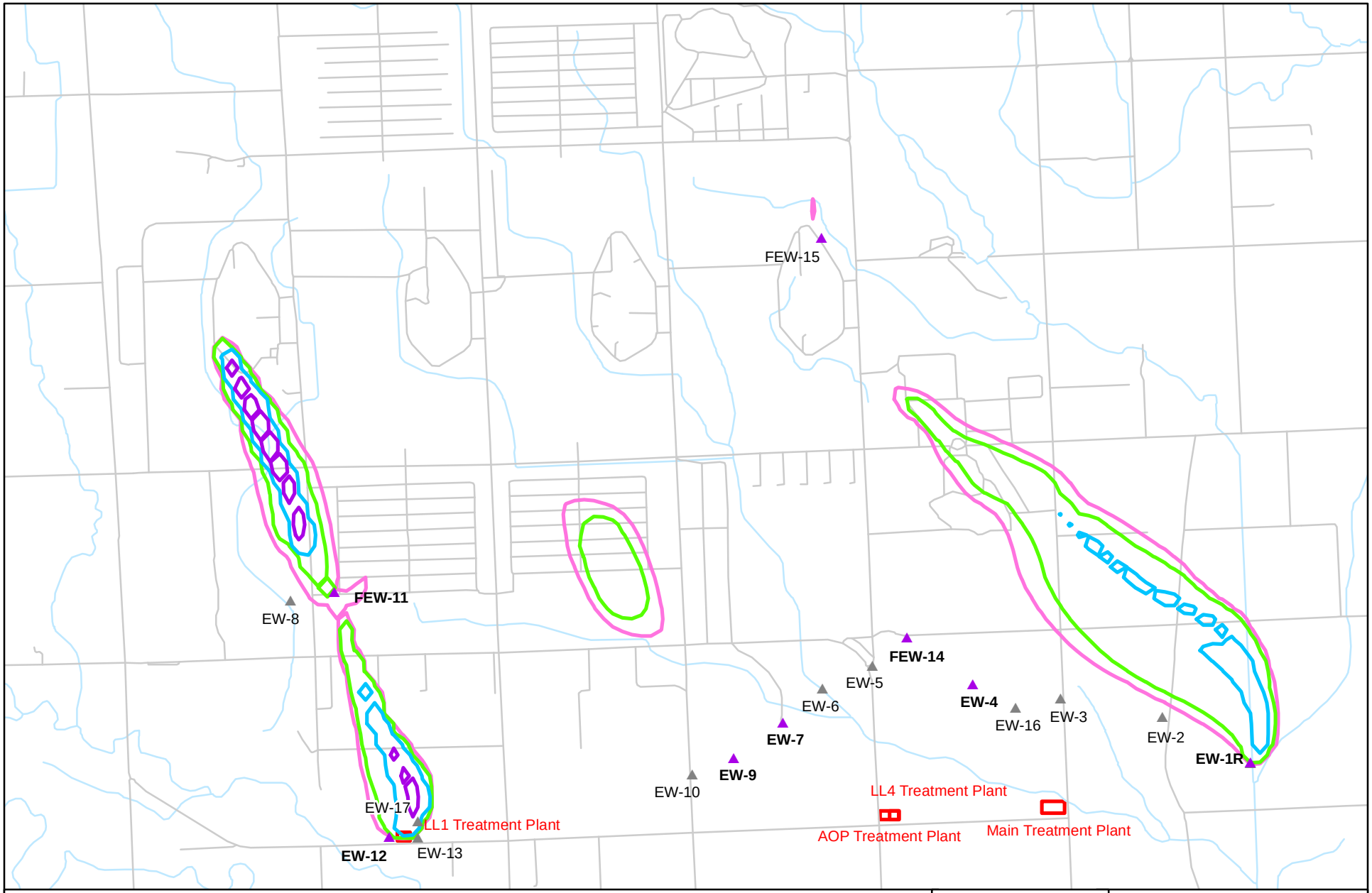

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-12
PREDICTED TCE
LAYER 3
2032

2012 Containment Evaluation

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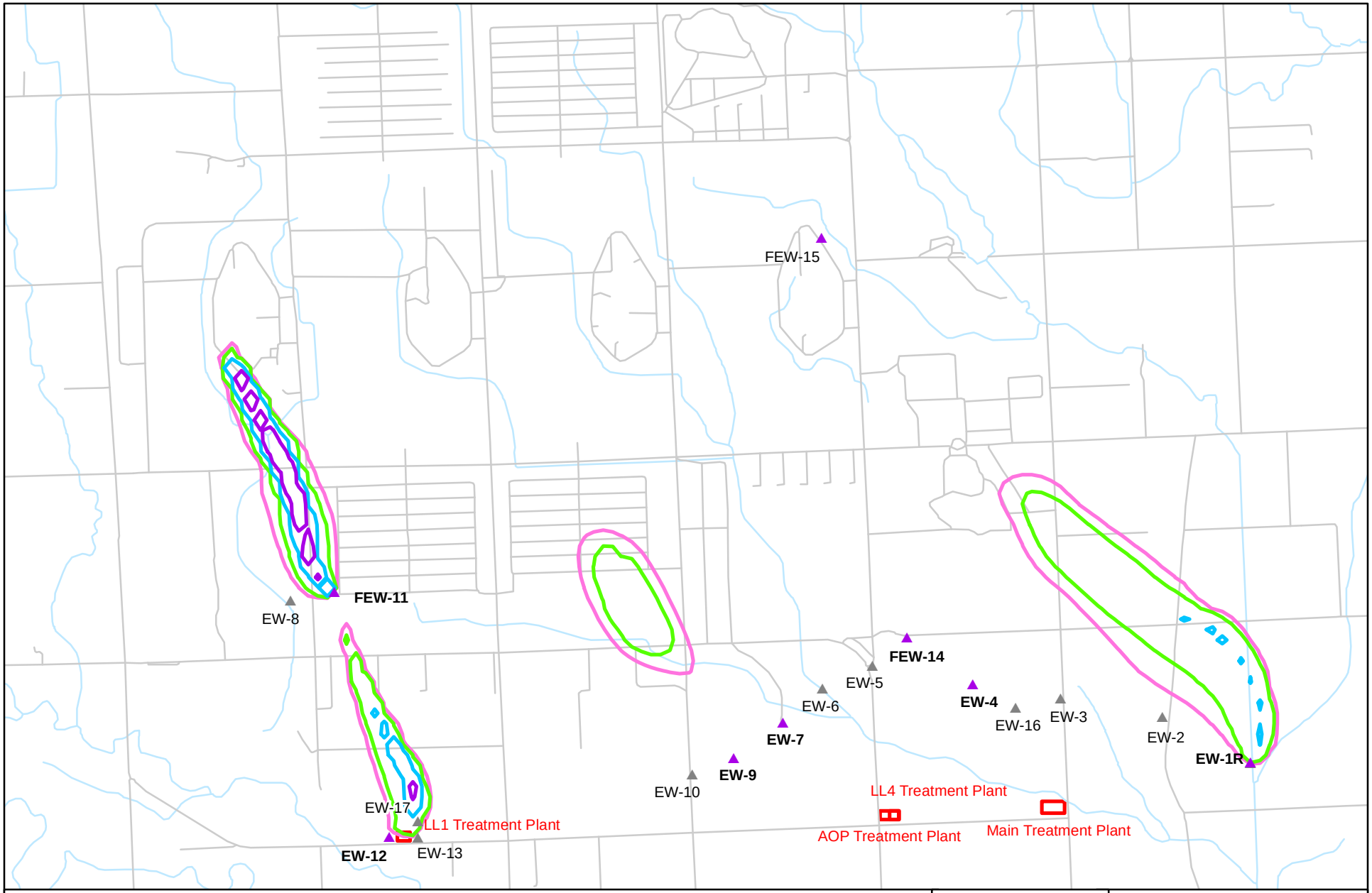

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours

- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-13

PREDICTED TCE
LAYER 3
2037

2012 Containment Evaluation

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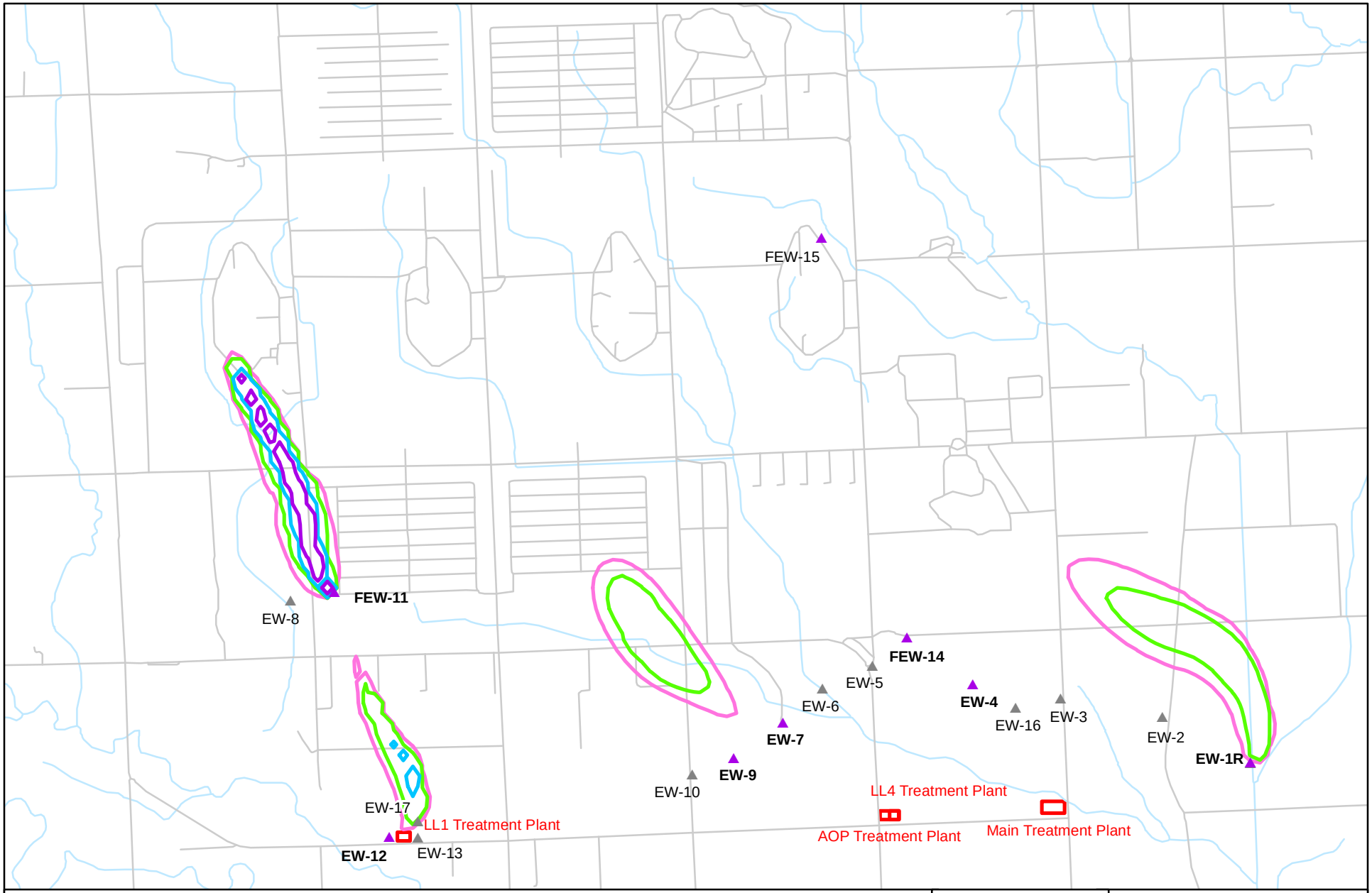

Legend

- Extraction Well
- Extraction Well (Currently Off)
- Treatment Plant

Trichloroethene (TCE) Contours
- 5 ug/L
- 10 ug/L
- 100 ug/L
- 1,000 ug/L
- 10,000 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure E-14
PREDICTED TCE
LAYER 3
2042

2012 Containment Evaluation

K:\ENV\ECC\site\51469\Data\GIS\2013\CE 2012\FigE-14_TCE_2042_L3.mxd ro August 2, 2013

Appendix F
RDX Transport Simulations

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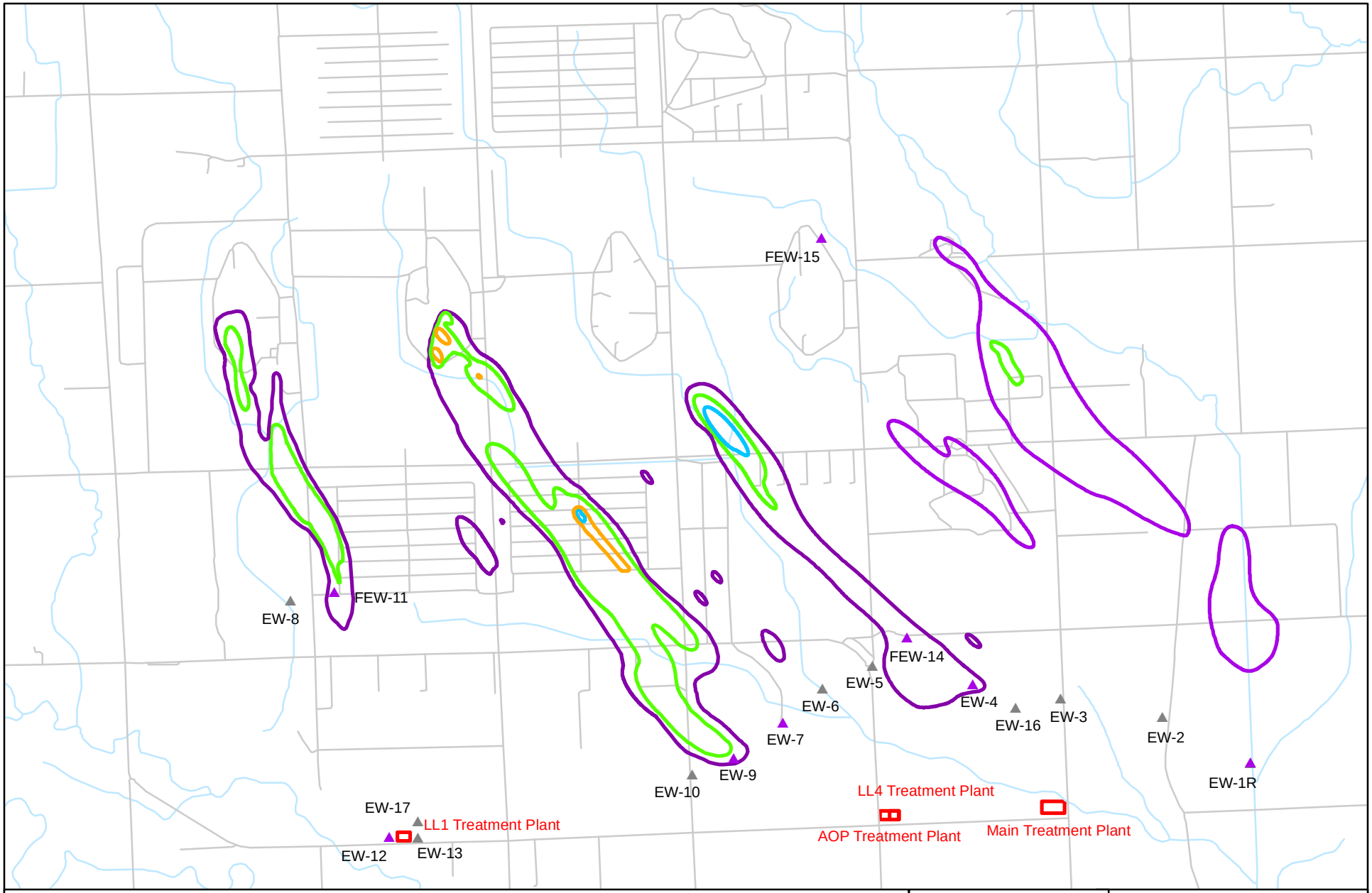

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-1

RDX
INITIAL CONCENTRATIONS
LAYER 2

2012 Containment Evaluation

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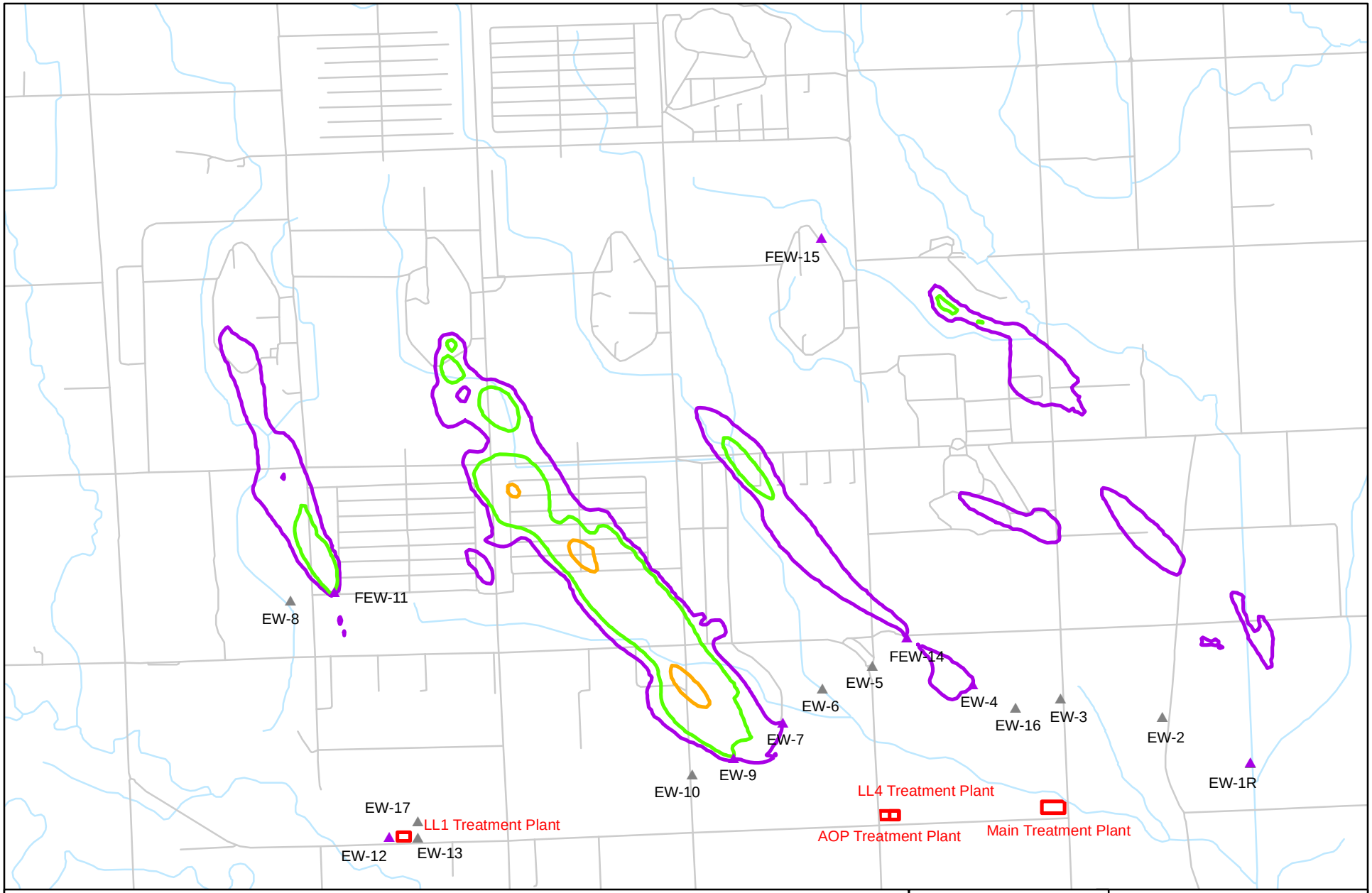

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-2
PREDICTED RDX
LAYER 2
2017

2012 Containment Evaluation

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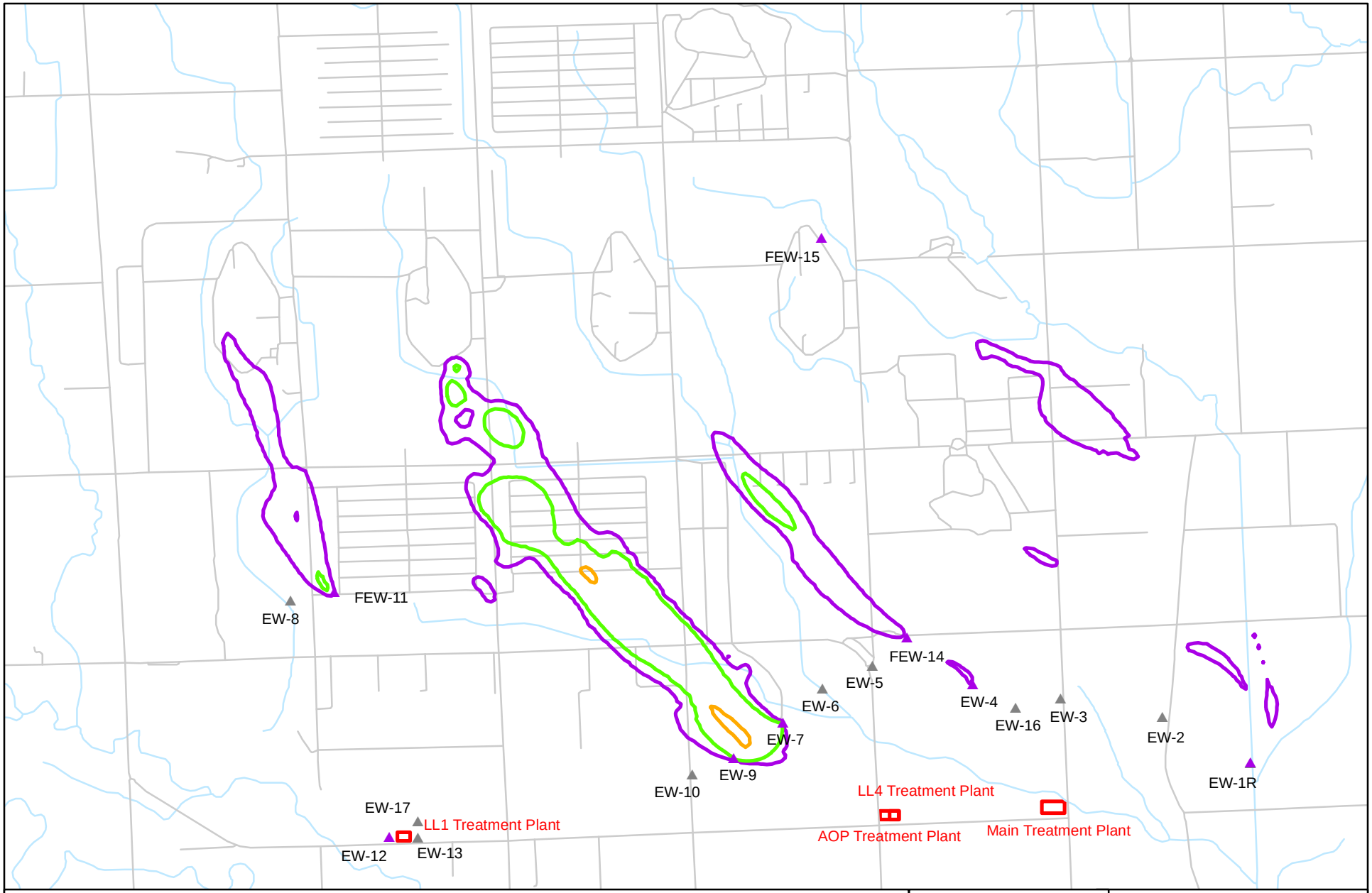

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-3
PREDICTED RDX
LAYER 2
2022

2012 Containment Evaluation

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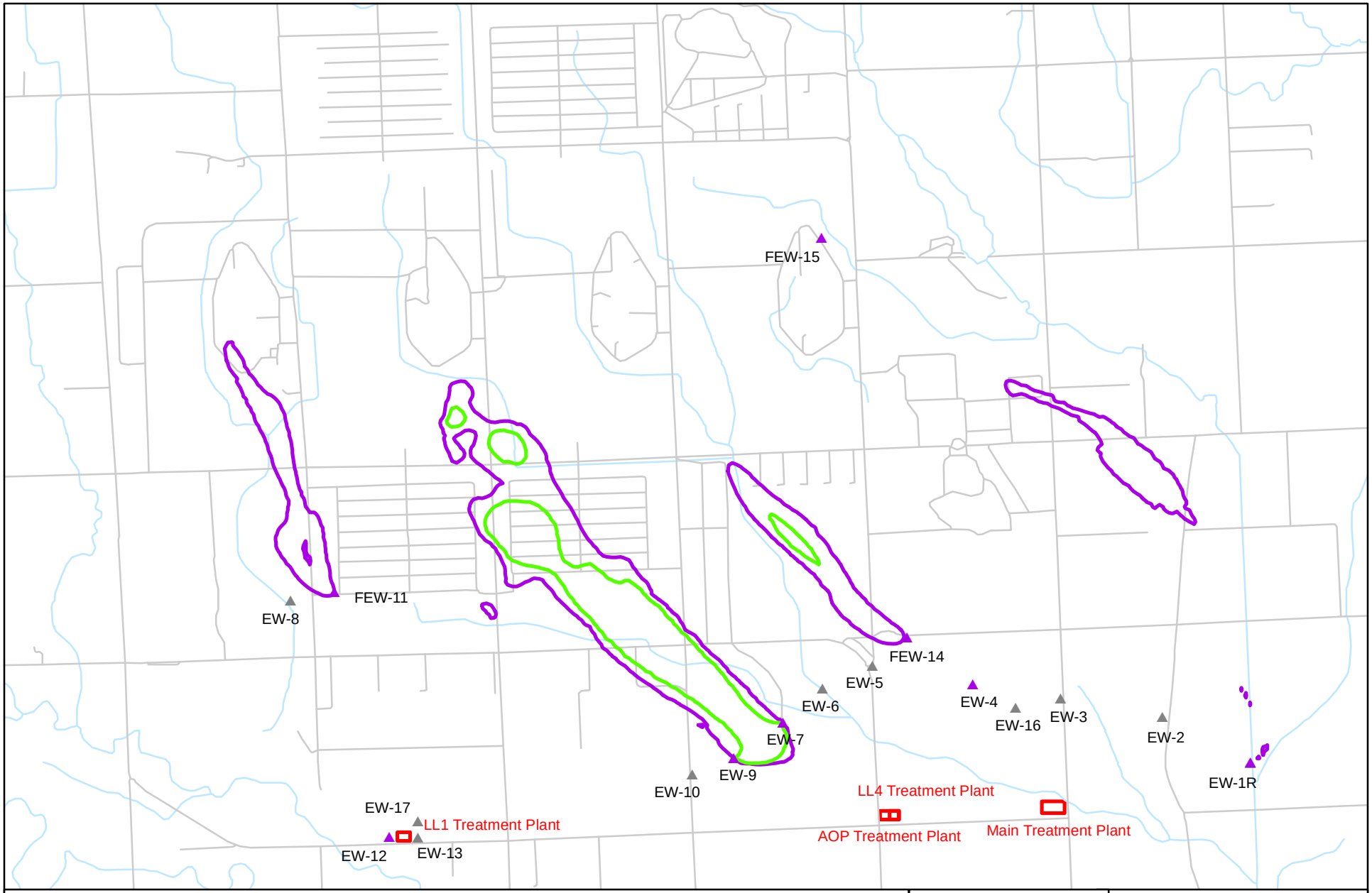

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-4

PREDICTED RDX
LAYER 2
2027

2012 Containment Evaluation

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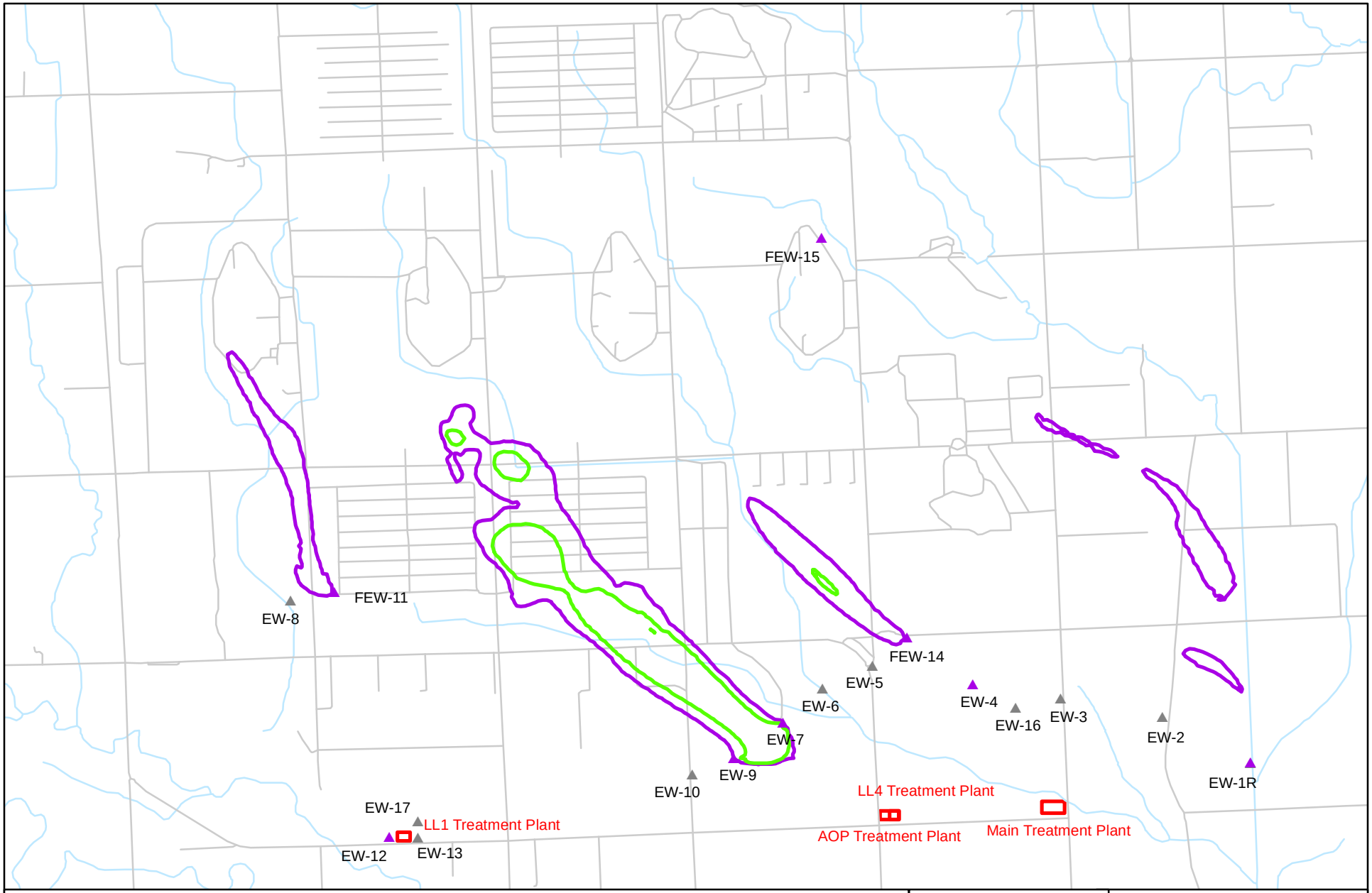

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-5
PREDICTED RDX
LAYER 2
2032

2012 Containment Evaluation

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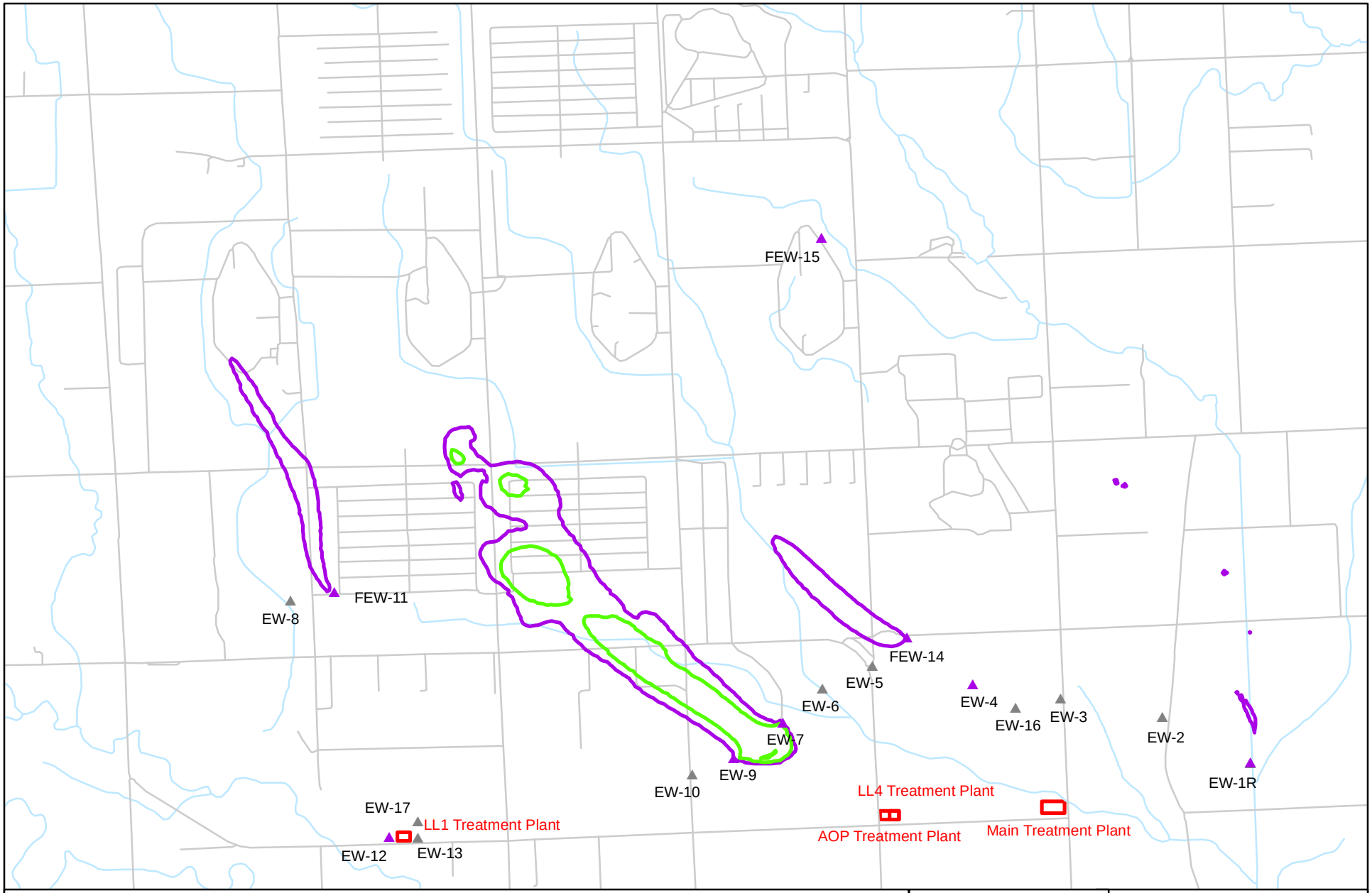

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-6

PREDICTED RDX
LAYER 2
2037
Former NOP

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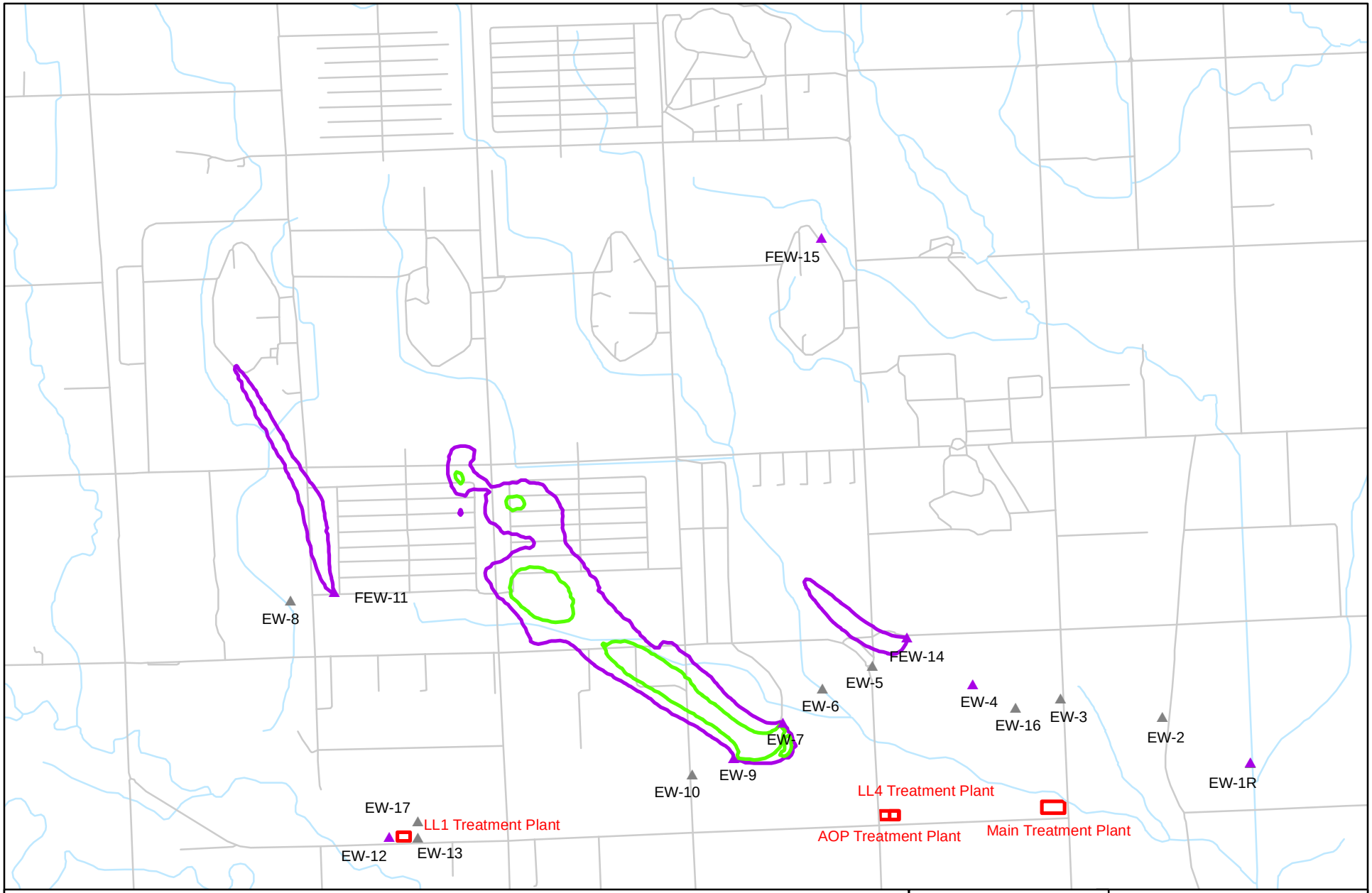

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-7
PREDICTED RDX
LAYER 2
2042

2012 Containment Evaluation

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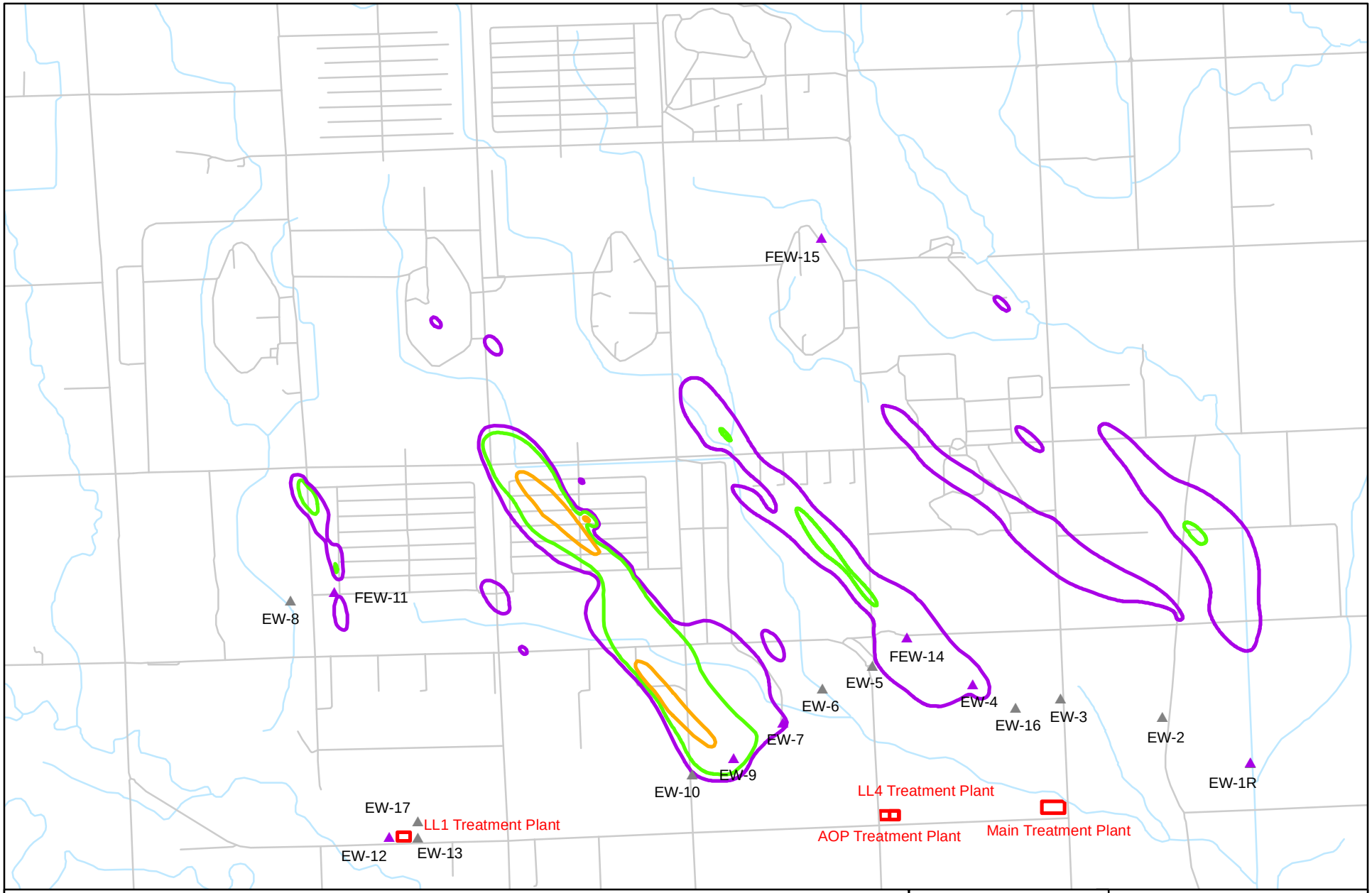

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-8

RDX
INITIAL CONCENTRATIONS
LAYER 3

2012 Containment Evaluation

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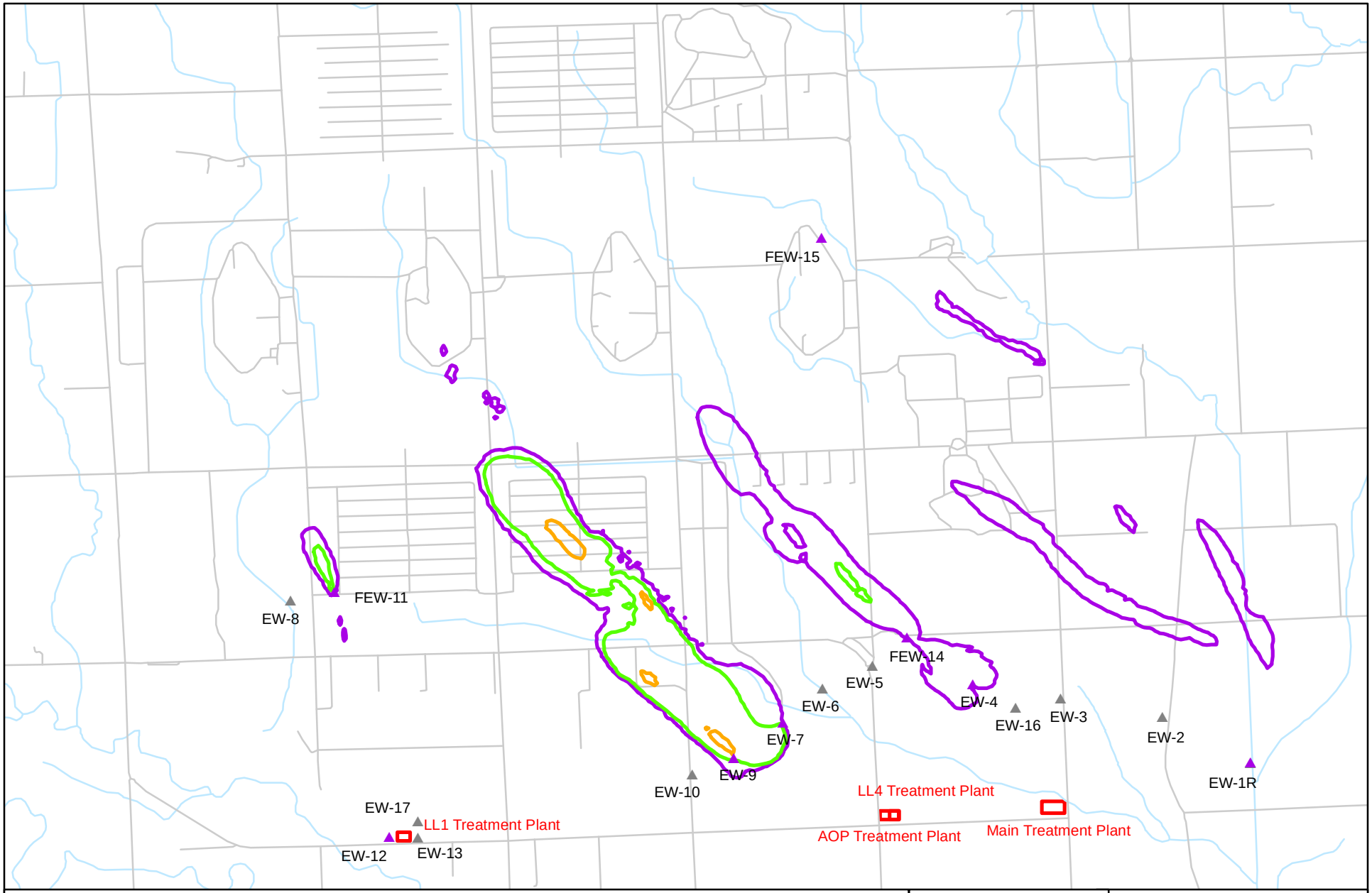

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

US Army Corps of Engineers
Kansas City District

Figure F-9

PREDICTED RDX
LAYER 3
2017

2012 Containment Evaluation

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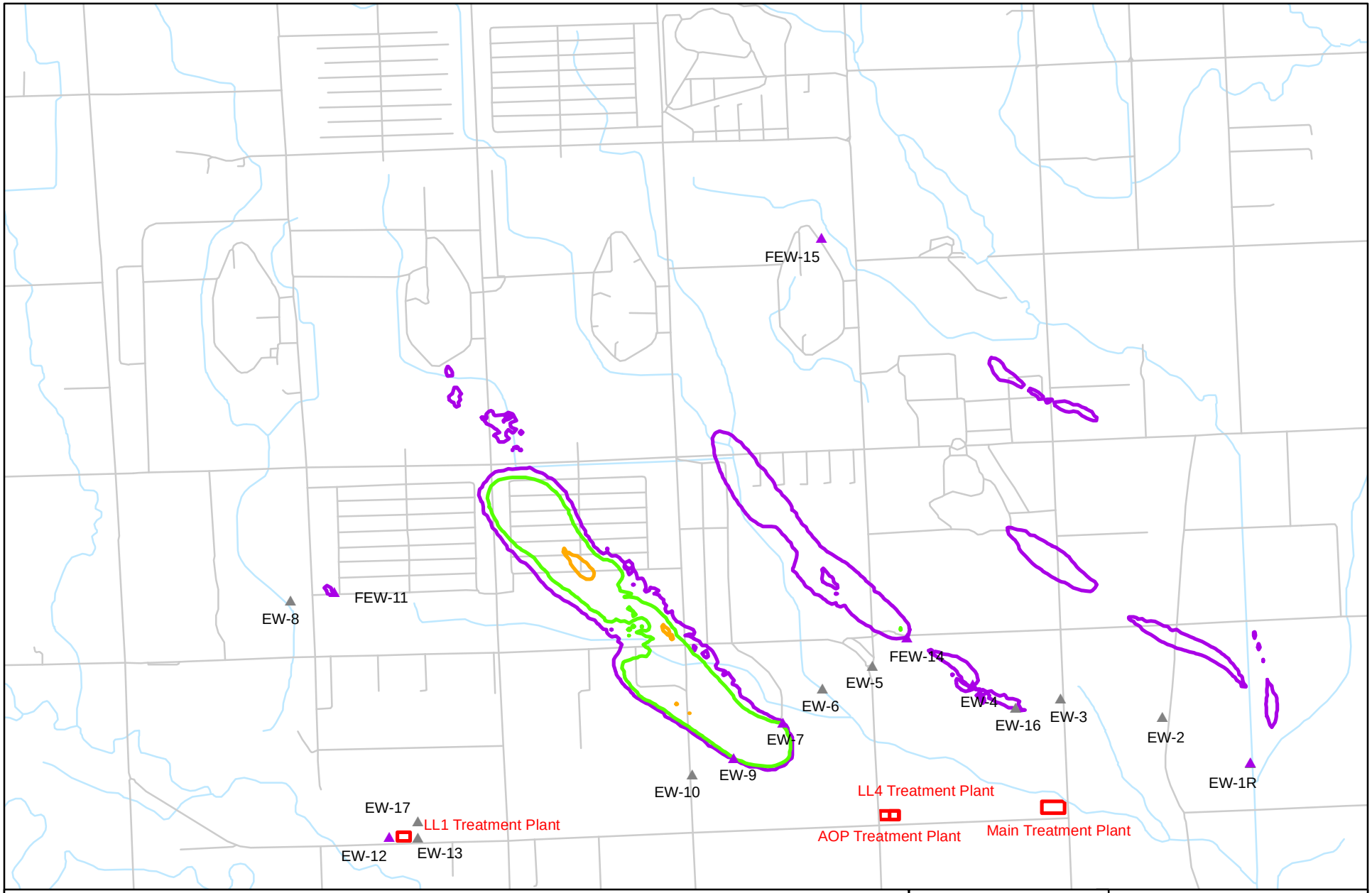

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

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Kansas City District

Figure F-10
PREDICTED RDX
LAYER 3
2022

2012 Containment Evaluation

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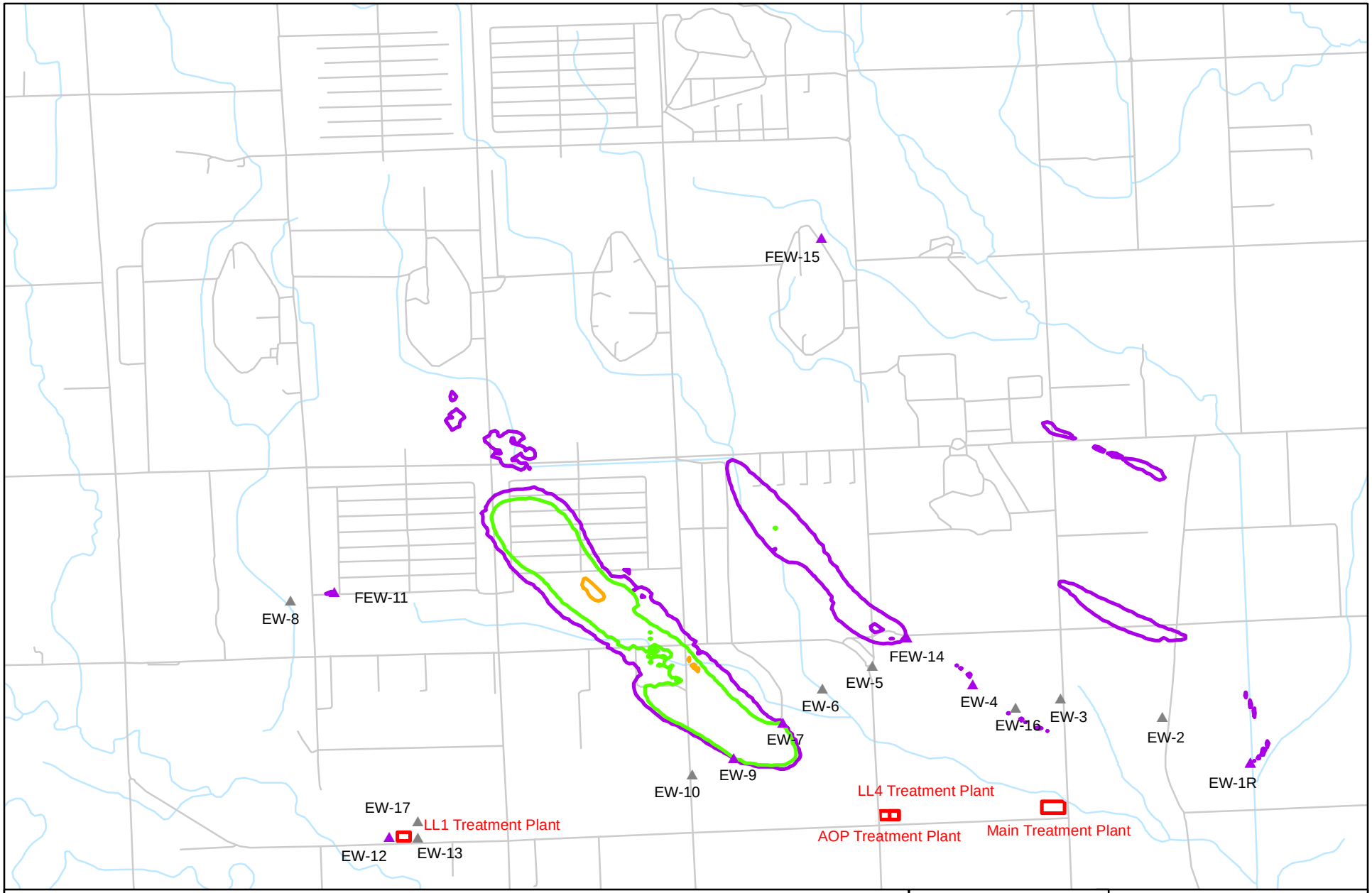

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

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Figure F-11
PREDICTED RDX
LAYER 3
2027

2012 Containment Evaluation

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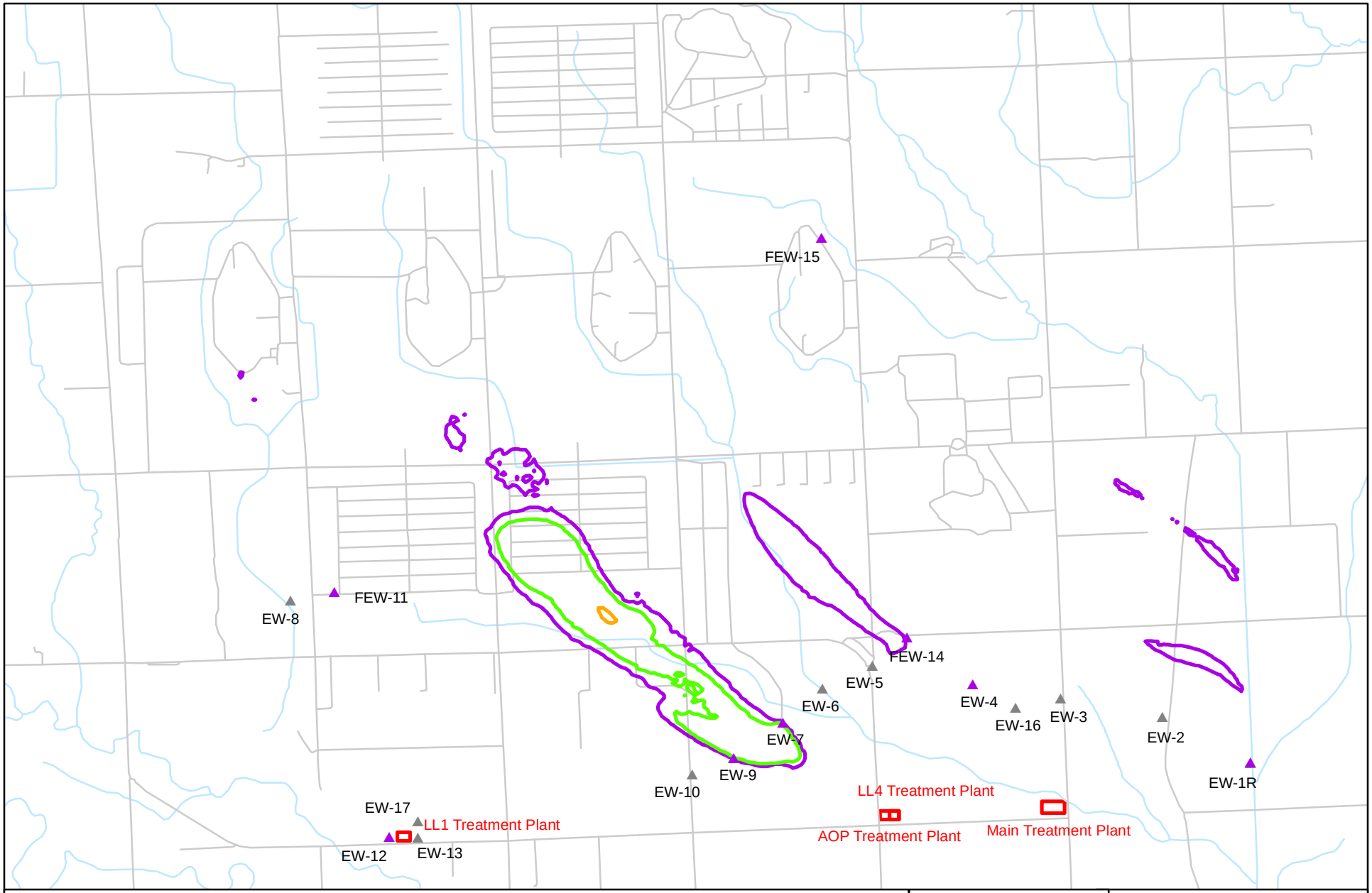

Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

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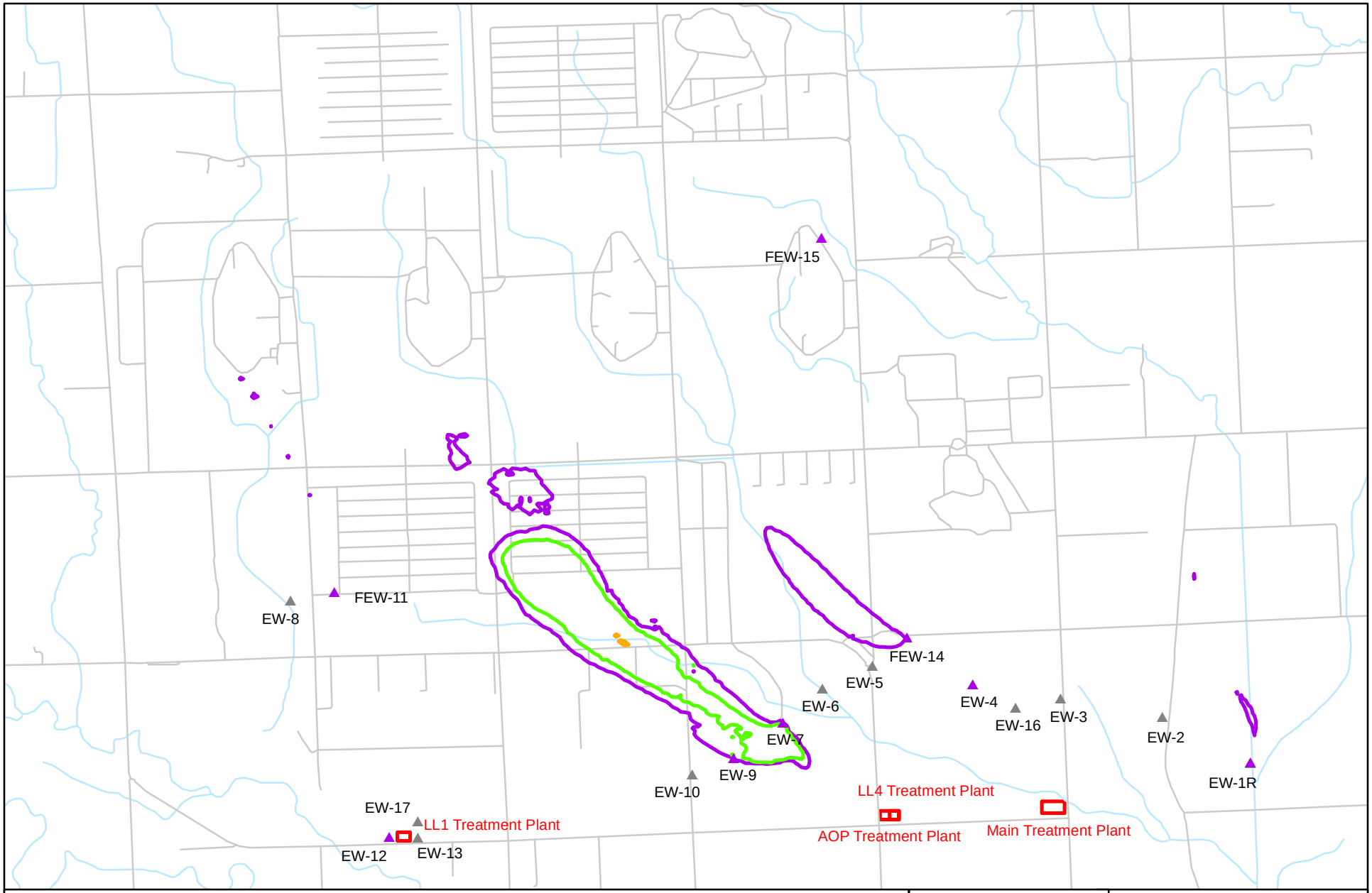
Figure F-12
PREDICTED RDX
LAYER 3
2032

2012 Containment Evaluation

K:\ENV\ECC\site\51469\Data\GIS\2013\CE 2012\FigF-12_RDX_2032_L3.mxd ro August 1, 2013



Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L
- 100 ug/L

N

0 1,500 3,000 6,000 Feet

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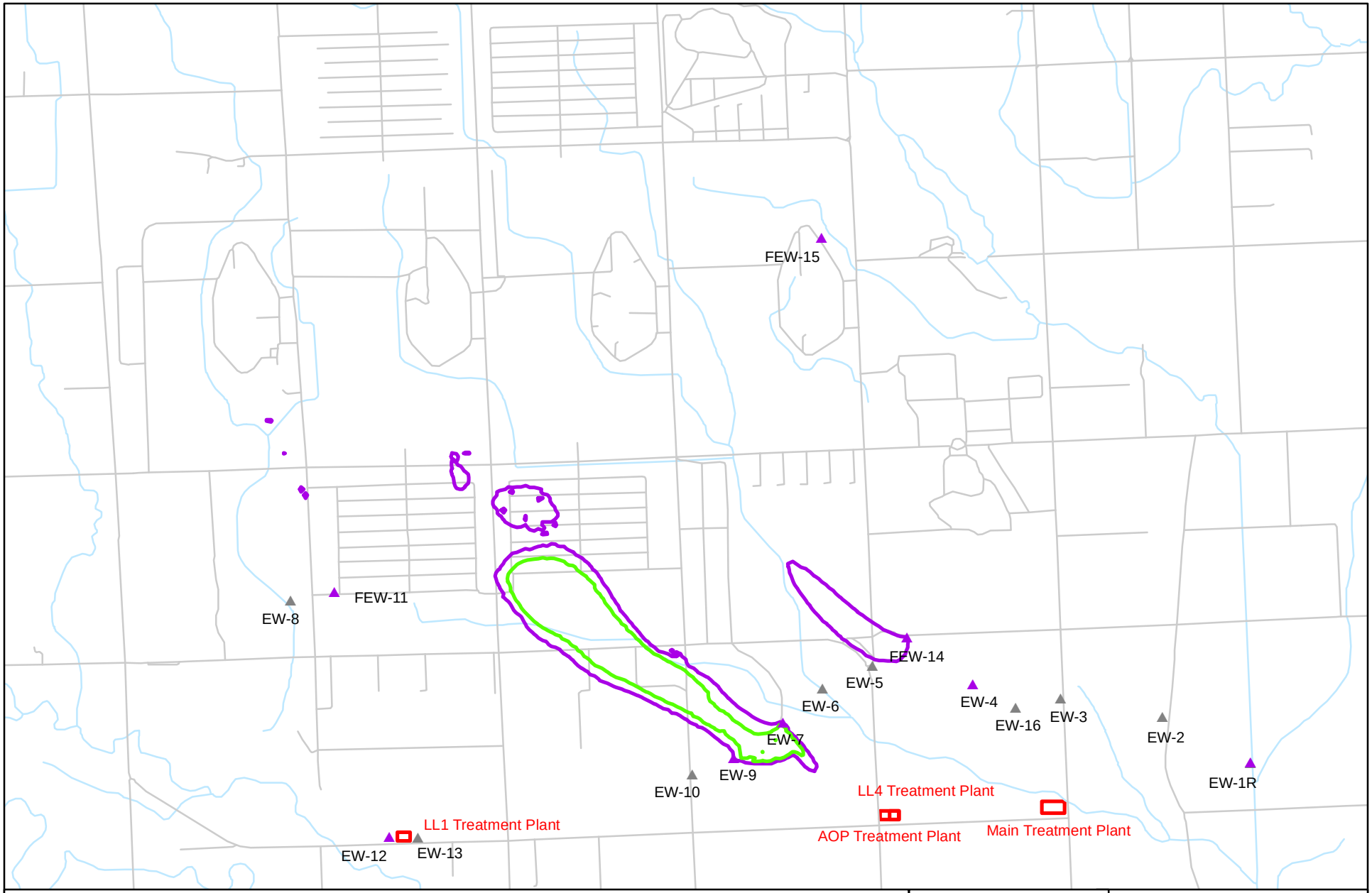
Figure F-13
PREDICTED RDX
LAYER 3
2037

2012 Containment Evaluation

K:\ENV\ECC\site\51469\Data\GIS\2013\CE 2012\FigF-13_RDX_2037_L3.mxd ro August 1, 2013



Legend

- USACE Extraction Well
- Treatment Plant

RDX Contours
- 2 ug/L
- 10 ug/L
- 50 ug/L

N

0 1,500 3,000 6,000 Feet

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Figure F-14

PREDICTED RDX
LAYER 3
2042

2012 Containment Evaluation

K:\ENV\ECC\site\51469\Data\GIS\2013\CE 2012\FigF-14_RDX_2042_L3.mxd ro August 1, 2013 rev 01