

PANTEX QUARTERLY PROGRESS REPORT

Remedial Action Progress

4th Quarter 2015

In support of Hazardous Waste Permit #50284 and
Pantex Plant Interagency Agreement
March 2016

Pantex Plant
FM 2373 and U.S. Highway 60
P.O. Box 30030
Amarillo, TX 79120



CERTIFICATION STATEMENT

**4th Quarter 2015 Remedial Action Progress Report
Pantex Plant, March 2016**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Deborah R. Franklin *3-8-16*

Deborah R. Franklin Date
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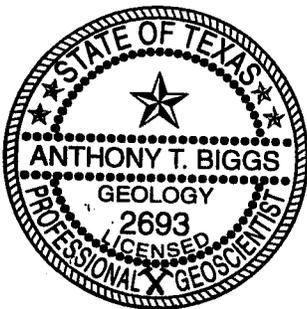
Susan D. Morris *3-11-16*

Susan D. Morris Date
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NNSA Production Office

**Quarterly Progress Report
4th Quarter 2015
in Support of Hazardous Waste Permit #50284
and Pantex Plant Interagency Agreement
for the Pantex Plant, Amarillo, Texas
March 2016**

Prepared by
Consolidated Nuclear Security, LLC
Management and Operating Contractor
for the
Pantex Plant and Y-12 National Security Complex
under Contract No. DE-NA0001942
with the
U.S. Department of Energy
National Nuclear Security Administration

In accordance with 30 TAC §335.553 (g), this report has been prepared and sealed by an appropriately qualified licensed professional engineer or licensed professional geoscientist.





Tony Biggs
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3/2/16
Date

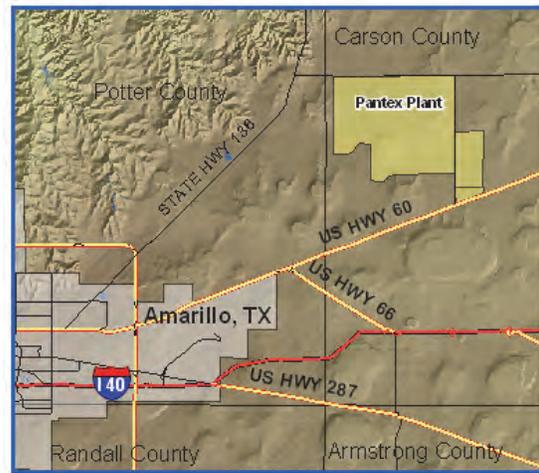
Project Team: Tony Biggs
Michelle Jarrett

LIST OF ACRONYMS

CatOX	catalytic oxidation
COC	contaminant of concern
Cr(VI)	hexavalent chromium
CSIA	compound-specific isotope analysis
DCE	dichloroethene
DHC	<i>Dehalococcoides sp.</i>
DNT	dinitrotoluene
DNX	hexahydro-1,3-dinitroso-5-nitro-1,3,5-triazine
FGZ	fine-grained zone
gpm	gallons per minute
gpd	gallons per day
GWPS	groundwater protection standard
HE	high explosive
HW-50284	Hazardous Waste Permit #50284
IAG	Interagency Agreement
ISPM	in situ performance monitoring
ISB	in situ bioremediation
Mgal	million gallons
MNX	hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine
mV	millivolts
NAPL	non-aqueous phase liquid
ORP	oxidation reduction potential
P1PTS	Playa 1 Pump and Treat System
PCE	perchloroethene
PID	photoionization detector
PQL	practical quantitation limit
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
SEPTS	Southeast Pump and Treat System
SVE	soil vapor extraction
SWMUs	Solid Waste Management Units
TCE	trichloroethene
TNX	hexahydro-1,3,5-trinitroso-1,3,5-triazine
TOC	total organic carbon
TZM	treatment zone monitoring
VFA	volatile fatty acid
VOC	volatile organic compound
WWTF	Wastewater Treatment Facility

INTRODUCTION

The Pantex Plant, located in the Texas Panhandle 17 miles northeast of Amarillo, has implemented a response action to remediate perched groundwater and soils. Two types of systems have been installed for the groundwater response action: pump and treat systems in two areas and in situ bioremediation (ISB) systems in two areas. A soil vapor extraction (SVE) system has been installed to remediate volatile organic compounds in soils at the Burning Ground area. This quarterly report addresses progress achieved through implementation of the Remedial Actions for the 4th quarter of 2015.



This report provides an intermediate data summary for response action systems throughout the year. More intensive data reporting is included in the annual progress reports. The quarterly progress reports address three of the five evaluations included in the annual progress reports: response action effectiveness, uncertainty management, and early detection. The reports provide required information from HW-50284 CP Table VII and the Pantex Interagency Agreement.

Maps of the plumes, remedial action systems, sampling locations, and system wells are provided in Appendix A. Graphs of operation and flow rates for the pump and treat systems are provided in Appendix B. Graphs of important parameters for the ISB treatment zone and downgradient wells are provided in Appendix C.

RESPONSE ACTION EFFECTIVENESS

This quarterly progress report focuses on specific criteria for the pump and treat systems, ISB systems, and a small-scale SVE system. System operation, mass removal, and evaluation of effluent in reference to established operational goals are reported for the pump and treat systems. For the ISB systems, this report evaluates geochemical conditions and availability of food source in the treatment zone and reduction of contaminants of concern (COCs) in downgradient performance monitoring wells to evaluate whether the treatment zone is working effectively. System operation, mass removal, and effluent photoionization detector (PID) readings are evaluated for the SVE system.

PUMP AND TREAT SYSTEMS

The Remedial Action at the Pantex Plant includes two pump and treat systems: Southeast (SEPTS) and Playa 1 (P1PTS). The pump and treat systems are designed to extract water and remove contaminant mass from the water before the effluent is beneficially used by the wastewater treatment facility (WWTF) and irrigation system, general Plant needs, or for amendment injections

at the in situ bioremediation (ISB) systems. The systems were also designed to remove water from the perched aquifer to reduce saturated thickness. This reduction in saturated thickness reduces migration of contaminants both vertically and horizontally so that natural breakdown processes can occur over time. Reducing migration provides protection for the underlying High Plains Aquifer (also known as and referred to herein as the Ogallala Aquifer). The SEPTS has the capability to inject the treated water back into the perched aquifer when beneficial use is not possible. Operational priorities for the pump and treat systems emphasize beneficial use of water.

The pump and treat systems operation was near or exceeded goals during 4th quarter (see operational graphs in Appendix B). The throughput was low at both systems. P1PTS throughput was primarily affected by the loss of 1-2 wells during the quarter. Pantex is troubleshooting the problem and working towards getting the wells operational. Pantex has installed a new extraction well and has contracted for the connection of the well to the system. SEPTS operation and throughput was affected by a combination of events including power loss, carbon change-out, and problems with wells (not operating or wells drying up). Overall, the primary goal of beneficial use was met while continuing to operate the systems.

The P1PTS removes primarily RDX and the SEPTS removes primarily RDX and hexavalent chromium [Cr(VI)]. Figures 1 and 2 provide the mass removal information for RDX and other HEs for the 4th quarter, as well as totals since startup of the system. Concentrations near Playa 1 are much lower due to the source declining, so mass removal is much lower at this system. The primary

Pump and Treat System 4th Quarter Operation	
<i>Playa 1 Pump and Treat System (P1PTS)</i>	
Days Operated	91
% Operation Time	97%
Volume Water Treated (Mgal)	24.7
HE Mass Removal (lbs)	10.5
Beneficial Use of Water	100%
<i>Southeast Pump and Treat System (SEPTS)</i>	
Days Operated	83
% Operation Time	87%
Volume Water Treated (Mgal)	30.9
HE Mass Removal (lbs)	198.9
Chromium Mass Removal (lbs)	29.2
Beneficial Use of Water	100%

Value below operational goals

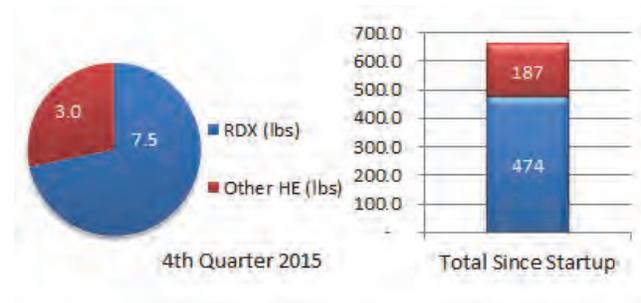


Figure 1. P1PTS Mass Removal

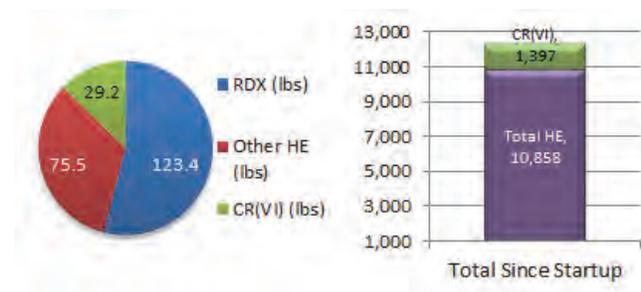


Figure 2. SEPTS Mass Removal

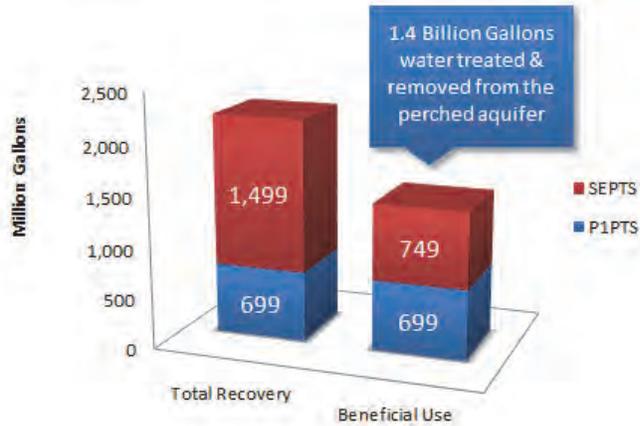


Figure 3. System Recovery and Use

irrigation system. The recovery and beneficial use totals are presented in Figure 3. Evaluation of effluent data from both systems indicate all COCs were treated to levels below the GWPS.

ISB SYSTEMS

Two ISB systems (Zone 11 ISB and Southeast ISB) were installed at Pantex. The systems are designed with closely spaced wells to set up a treatment zone in areas of the perched groundwater where pump and treat may not be as effective or the area is sensitive to vertical migration of COCs to the Ogallala Aquifer. Amendment is injected into these systems to establish treatment zones where COCs are degraded. Monitoring wells were installed downgradient of the treatment zone to monitor whether the system is effectively degrading the COCs (see maps in Appendix A). The primary COCs at the Zone 11 ISB are trichloroethene (TCE) and perchlorate, with RDX and hexavalent chromium being the primary COCs at the Southeast ISB.

For the treatment zone wells, this report evaluates whether the conditions are present to degrade the COCs in each area, as well as the presence of a continued food source for the microbial reduction of COCs (see Table 1). Downgradient monitoring wells are evaluated to determine if the ISB systems are effective in degrading the COCs as well as any breakdown products of the COCs. Graphs of data from sampled treatment zone wells and downgradient in situ performance monitoring (ISPM) wells are included in Appendix C.

Installation of the Zone 11 ISB Remedial Action was completed in 2009 with an expansion completed in early 2015. Seven injection events have been completed at the current system, with the first complete injection event occurring in the expansion zone in 2015. Because of the substantial saturated thickness of the perched aquifer in that area, the requirement for deep reducing conditions to treat TCE completely, and a high groundwater velocity, Pantex has planned for yearly injections at this system. Pantex completed the seventh injection event in November so 4th quarter results reflect post-injection conditions. The seventh injection event included bioaugmentation of the western side of the Zone 11 ISB where reducing conditions are established.

goal of the P1PTS is water removal to decrease saturated thickness with mass removal as a secondary goal.

The total recovery and treatment from both systems since startup has been calculated at about 2.2 billion gallons. Because the SEPTS was originally designed to inject treated water, all of the treated water prior to 2005 was injected. However, a significant volume of treated water has been used beneficially since 2005, with a total of about 1.4 billion gallons extracted and treated from the perched aquifer since startup of the

Table 1. ISB System Performance

System	Treatment Zone Wells		Downgradient Performance Monitoring Wells		
	Reducing Conditions	Food Source Available	Primary COCs Reduced?	COCs < GWPS?	Degradation Products of COCs Reduced?
Zone 11 ISB	Very Mild to Strong ¹	Yes	Yes	Perchlorate in 4 of 6 wells TCE in 4 of 6 wells	No ¹
Southeast ISB	Mild to Strong	Yes	Yes	RDX in 2 of 3 wells Hexavalent Chromium in 3 of 3 wells ²	Yes

Mild conditions = oxidation reduction potential (ORP) of 0 to -50 millivolts (mV)

Strong conditions = ORP < -100 mV and sulfate and nitrate reduced indicating conditions are present for methanogenesis.

¹ Cis-1,2-dichloroethene concentrations remain high in two downgradient wells while vinyl chloride concentrations (final breakdown compound) remain at low concentrations. Pantex bioaugmented the original wells on the west side of the system during the seventh injection event in 2015. The expanded zone will be bioaugmented once conditions conducive to the growth and survival of DHC are established.

²Pantex has been sampling four downgradient wells at this system. However, one of the wells (PTX06-1123) could not be sampled this quarter because the well did not have enough water to sample. This well had demonstrated complete treatment since October 2012.

Data indicate good reducing conditions for reduction of COCs at the Zone 11 ISB. Food source is adequate for continued reducing conditions. The Zone 11 ISB has been effective at treating perchlorate and partially treating TCE. In the wells sampled in the treatment zone this quarter, perchlorate was not detected. In two non-injected monitor wells in the treatment zone, cis-1,2-dichloroethene (DCE) exceeded the GWPS, with only one exhibiting TCE concentrations above the GWPS. Vinyl chloride continues to be non-detect in the treatment zone. TCE also slightly exceeded GWPS in one other injected treatment zone well. Results do not currently indicate a strong influence from the *Dehalococcoides* (DHC) bioaugmentation event. Pantex plans to conduct DHC and compound specific isotope analysis (CSIA) sampling beginning February 2016, prior to the next scheduled injection event, to determine the impact of the bioaugmentation.

Pantex discontinued injection into PTX06-ISB082 after the fifth injection event in 2013 to evaluate the need for continued injection into the second row wells. Only mild reducing conditions are required for the treatment of perchlorate, and Pantex has begun to see issues with biofouling in the second row wells. PTX06-ISB082 was unable to be sampled in 2013 and most of 2014 until rehabilitation returned the well to sampling conditions. Data collected since that time indicate that this well maintains deep reducing conditions and has ample food source for the continued degradation of perchlorate, even without injection for two events. The current downgradient ISPM well, PTX06-1156, continues to indicate that perchlorate is treated, even though it is downgradient of a single row of injection wells. The *Design Basis Document* (Aquifer Solutions, 2008) did not include a second row of wells for the perchlorate portion of the Zone 11 ISB. Pantex installed those wells to capture a high-concentration portion of the plume that had moved past the first row of

wells. Those wells have adequately reduced perchlorate and based on data evaluated in PTX06-ISB082 and PTX06-1156, treatment can be discontinued in those wells. Pantex currently monitors PTX06-ISB082 in accordance with the SAP. Although not included in the SAP, a second well (PTX06-ISB081) has been monitored to evaluate the effectiveness of the treatment zone. Pantex will change that monitoring point to PTX06-ISB079 to provide better coverage of the monitoring of the treatment zone on the perchlorate side (see ISB map in Appendix A). These changes are planned for implementation in 2016. However, Pantex will rehabilitate the second row wells in 2016 to provide continued sampling opportunities in those wells.

Pantex evaluates performance at six downgradient monitoring wells for the Zone 11 ISB. Four of those wells have demonstrated perchlorate below detection limits. TCE concentrations are demonstrating a decreasing trend (since start of Remedial Action), with concentrations greatly decreased, but remaining above GWPS in wells that are primarily affected by TCE. Two of the wells (PTX06-1148 and 1150) further downgradient continue to demonstrate decreasing perchlorate concentrations.

Pantex had installed a new well (PTX06-1180) north of the Zone 11 ISB expansion area during 3rd quarter 2015 to determine extent of TCE and perchlorate. Samples were collected in December from that well. Results indicate that perchlorate was not detected but TCE was still present at a concentration of 185 ug/L. Pantex plans to install a new well to the north of PTX06-1180 to further define the extent of TCE.

The Southeast ISB was installed in 2007. Five injection events have been completed at this system. Pantex has scheduled the Southeast ISB for injections approximately every 18 months to avoid depletion of food source and possible loss of reducing conditions. The last injection was completed in April 2015.

Evaluation of data in treatment zone wells indicates adequate reducing conditions for the treatment of RDX and hexavalent chromium. Evaluation of COC data indicates no detection of HEs and chromium detected below background. Three wells did not have enough water to sample.

Four downgradient wells have been historically sampled at this system. Two of the closest downgradient monitoring wells for Southeast ISB demonstrate that reduction of RDX, HE degradation products, and hexavalent chromium has occurred resulting in concentrations below the GWPS, with most not detected. PTX06-1123 had demonstrated concentrations below the GWPS; however, this well could not be sampled this quarter because the well did not have enough water to sample. PTX06-1153 continues to exhibit RDX concentrations above 200 ug/L and variable hexavalent chromium concentrations with most results above the GWPS. Pantex continues to monitor this well and other new wells installed nearby to determine if treated water is slow to reach it, or if this well may not be hydraulically connected to the Southeast ISB.

Some of the injection and performance monitoring wells are indicating variable water conditions at the Southeast ISB. Two Southeast ISB performance monitoring wells (one upgradient, one farther downgradient) remain dry and cannot be sampled. PTX06-1123 could not be sampled this quarter.

The inability to sample these wells is expected to continue due to effects from injection and upgradient pump and treat operations that are decreasing the saturated thickness across the area.

BURNING GROUND SVE

The Burning Ground SVE began operation in 2002 as a large-scale catalytic oxidizer (CatOX) system. Due to a large reduction in volatile organic compound (VOC) concentrations, a small CatOX has been operating at the Burning Ground SVE system since April 2012. This small-scale system focuses on treating residual non-aqueous phase liquid (NAPL) and soil gas at a single extraction well, SVE-S-20, near the source area.

The system was intermittently operated during 4th quarter. The system experienced problems with power losses and system trips; however, the system operated 86% of the quarter, with 1898 hours of operation.

Mass removal calculated for 4th quarter for VOCs contributing more than 1% of the total VOC concentration and since startup is presented in Figure 4. The system removed about 142 lbs of VOCs during 4th quarter and has removed over 18,100 lbs of VOCs since startup. System destruction efficiency was at least 97%, based on PID data.

UNCERTAINTY MANAGEMENT AND EARLY DETECTION

Uncertainty management and early detection wells are evaluated to determine if there are unexpected conditions in areas where previous groundwater contamination has not been detected or confirmed (Ogallala and perched), or in previous plume locations where concentrations have fallen below GWPS, background, and the practical quantitation limit (PQL) (e.g., perched wells at the Burning Ground and Old Sewage Treatment Plant areas). Indicator COCs are evaluated at the uncertainty management/early detection wells in the quarterly report. A map depicting the wells evaluated is included in Appendix A.

Review of the uncertainty management/early detection data collected during 4th quarter indicates unexpected conditions continuing at one Ogallala Aquifer well (PTX06-1056). Data indicate continued detections of the high explosive 4-amino-2,6-dinitrotoluene (DNT) and the VOC 1,2-dichloroethane. No detections exceeded GWPS in the Ogallala Aquifer uncertainty management/early detection wells sampled during 4th quarter.

PTX06-1056 continues to demonstrate detections of 4-amino-2,6-DNT, a breakdown product of the high explosive 2,4-trinitrotoluene (TNT). As agreed with regulatory agencies, Pantex will collect three monthly samples at PTX06-1056 to evaluate the change in concentration for the 4-amino-2,6-DNT, in accordance with the Pantex Contingency Plan. Two of the monthly samples (November and

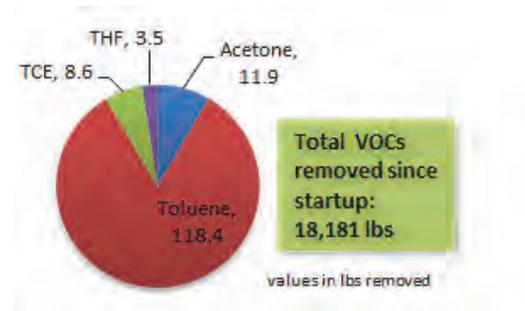


Figure 4. Burning Ground SVE Mass Removal

Summary of Ogallala Detections, 4th Quarter 2015

Well ID	Sample Date	Analyte	Measured Value (ug or pCi/L)	PQL (ug/L)
PTX06-1056	11/18/2015	4-Amino-2,6-Dinitrotoluene	0.273	0.263
PTX06-1056	12/8/2015	4-Amino-2,6-Dinitrotoluene	0.195	0.266

December) were collected during this quarter. Results are provided in the table above. Samples collected to confirm previous detections were included in the 3rd Quarter 2015 Progress Report.

The two monthly samples collected during 4th quarter indicate one detection above PQL, with the second sample indicating a detection below the PQL. The final monthly sample will be collected in January and those results will be reviewed in the next quarterly report.

The concentrations in PTX06-1056 are believed to be a result of a nearby perched well that was drilled deeply into the fine-grained zone possibly causing cross-contamination to the Ogallala Aquifer. Pantex has plugged the perched well, but expects continued detections until the water that has moved past the well has depleted.

Review of the perched uncertainty management/early detection data collected during 4th quarter indicates no unexpected conditions.

SCHEDULE UPDATE

Pantex has provided a detailed schedule of upcoming work in the 2014 Annual Progress Report. Completed work and ongoing and upcoming work to be started or completed by the date of publication of this report are provided here.

Pantex completed the following items prior to the publication of this report:

- Regularly scheduled sampling and well maintenance was completed for 2015.
- Well maintenance and sampling for the Ogallala Aquifer chromium background study was completed in February 2016. This sampling was delayed due to weather conditions that affected rehabilitation and sampling efforts. This delay in sampling will delay completion of the background report.

Pantex continues to progress toward completion of the following items:

- Design and connection of PTX06-EW-81A began in June and is expected to continue through March 2016.
- Upgrade of P1PTS components began in June and will continue through April 2016.

- Pantex is in the process of contracting for long-term maintenance of landfills to address holes/voids, lack of vegetation, and erosion of landfill covers as needed. Contracting is expected to commence in March 2016. Work is expected to be completed annually, as needed, for filling holes/voids and seeding.
- Pantex plans to address erosion of Landfill 3 slopes in specific areas noted in the 2014 and 2015 inspections by contracting for a design to prevent erosion in those areas. Contracting commenced in early 2016, with a design completion expected in July.
- DHC and CSIA sampling started in February and will conclude by the end of March 2016. Results are expected to be available for the 1st quarter reporting.

Upcoming work includes:

- Pantex is preparing to contract for replacement of the SWMU 2 and SWMU 5/5 ditch liner. Inspection of the liner during 2nd quarter 2015 indicated that the liner had multiple tears and the edges are no longer anchored in some areas. Due to the age of the liner and the expected lifetime of 10 years, Pantex will replace the liner. Contracting will commence in 2016 and work is expected to start in summer 2016.
- Rehabilitation efforts at the Zone 11 ISB are scheduled to begin in March 2016, with injection starting in April. Injection is scheduled for completion in July.
- Rehabilitation efforts will begin at the Southeast ISB in May 2016, with injection activities starting in July.
- Pantex plans to install nine wells this summer. Pantex will install six injection wells in the Zone 11 ISB to replace wells that are having difficulty with injection. PTX06-1071 has failed and will be replaced prior to the five-year sampling event. A new well will be installed between PTX06-1133A and PTX06-1158 at the southeast lobe to determine extent in that area. A new well will also be installed north of the Zone 11 ISB expansion well, PTX06-1180, to further define extent of the TCE plume on the western side of Zone 11.

CONCLUSIONS AND RECOMMENDATIONS FOR CHANGE

The Remedial Actions continue to operate and meet short-term expectations for cleanup of the perched groundwater in areas under influence of the remediation systems. The pump and treat systems continue to remove COC mass and water from the perched aquifer thus decreasing head driving vertical and lateral movement of perched groundwater.

The ISB systems continue to demonstrate that treatment downgradient of the system has been generally effective and many COC concentrations have been greatly reduced or now meet the GWPS at the Southeast ISB. One downgradient well (PTX06-1153) for the Southeast ISB is not responding as well as others. Pantex continues to evaluate conditions in that area to determine if the well is impacted by water from the western end of the Southeast ISB or if it is not hydraulically connected

to that system. Pantex replaced PTX06-1051 to the west of the Southeast ISB to confirm dry conditions in that area. That well was confirmed to be dry when drilled; and dry conditions continue to be confirmed at that well. Monitoring will continue at PTX06-1153 as described in the SAP as the quarterly samples will provide adequate information for this well. Further recommendations will be made based on the evaluation of the water level and concentration data over time.

Downgradient wells at the Zone 11 ISB are generally demonstrating treatment. Four of the six downgradient ISPM wells exhibit perchlorate concentrations below the GWPS and perchlorate concentrations are continuing to decline in the other two wells. TCE concentrations since the start of the Remedial Action continue to indicate a decreasing trend near GWPS in downgradient ISPM wells PTX06-1012 and PTX06-1155. Elevated *cis*-1,2-DCE and the lack of vinyl chloride concentrations at wells inside and downgradient of the treatment zone continue to suggest that there may be an absence of DHC that are necessary for the complete dechlorination of TCE. The current system completed injection and bioaugmentation with DHC in November. Injection of amendment was completed in the 2015 injection event for the newly expanded portion of the system and bioaugmentation will occur when conditions conducive to survival and growth of DHC are present. Pantex will evaluate the effectiveness of the bioaugmentation over time. The first sampling event for the bioaugmentation (collection of DHC census and CSIA) will begin in February 2016.

Pantex has evaluated discontinuing treatment in the second row of wells on the perchlorate (eastern) side of the Zone 11 ISB as perchlorate reduction only requires mild reducing conditions. The second row of treatment wells were not originally included in the *Design Basis Document* (Aquifer Solutions, 2008) for the Zone 11 ISB and downgradient data indicate that treatment from a single row of treatment wells is adequate to meet the treatment goals. Therefore, Pantex will discontinue injection in the second row of wells on the eastern side of the Zone 11 ISB. Pantex will also move sampling of PTX06-ISB081 to PTX06-ISB079 to provide better coverage of sampling on the eastern side of the ISB. These changes are planned for implementation in 2016.

The SVE system continues to treat soil gas and residual NAPL in the SEP/CBP area of the Burning Ground thereby mitigating vertical movement of VOCs to groundwater. Pantex has continued to have problems with completing rebound tests, so progress toward a path to closure for this system will continue after evaluating other options.

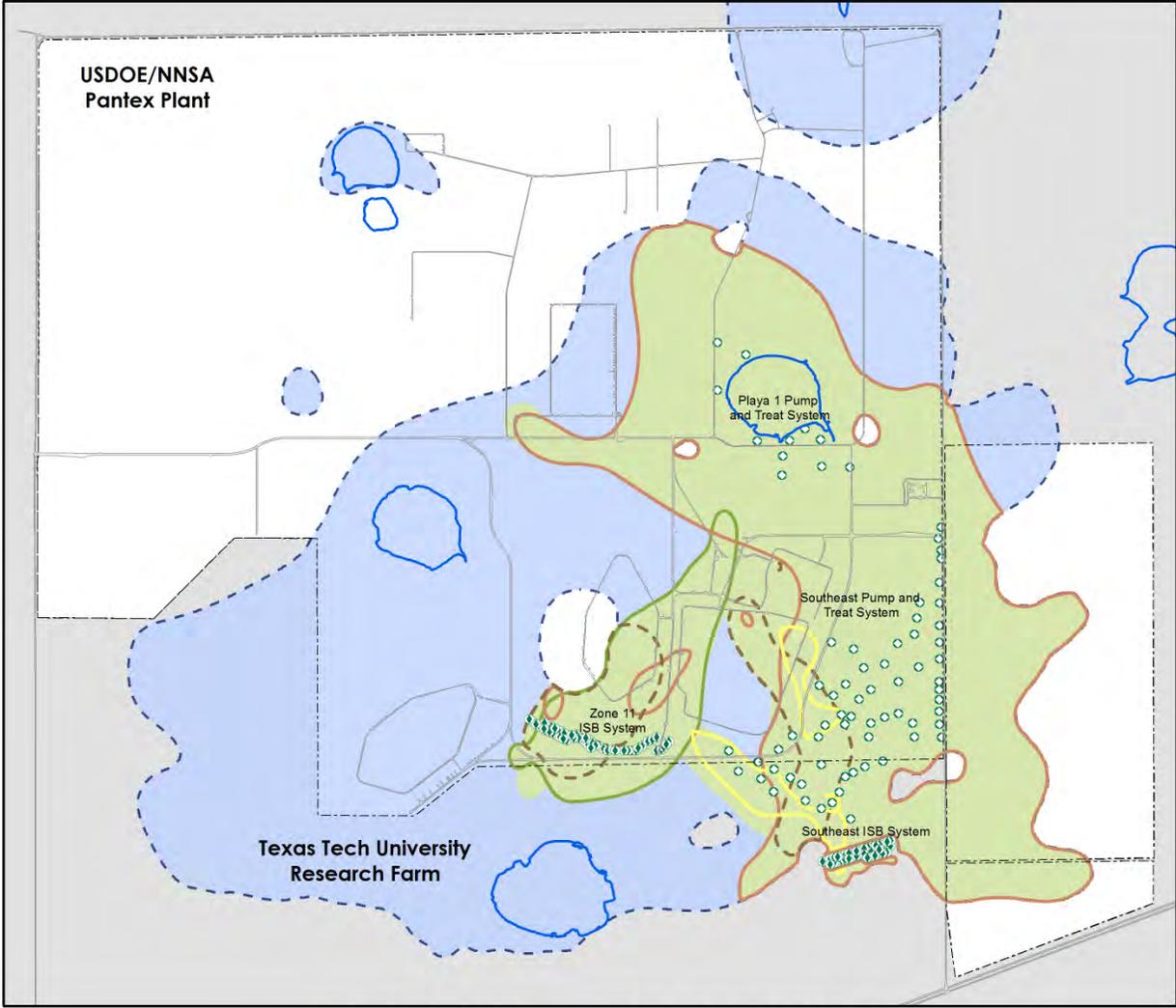
The groundwater remedies are considered to be protective for the short-term as untreated perched groundwater use is controlled to prevent human contact and monitoring data continue to indicate that the Remedial Actions remain protective of the Ogallala Aquifer. Although detections of 4-amino-2,6-DNT and 1,2-dichloroethane, and hexavalent chromium have occurred in Ogallala wells, Pantex is actively following the Groundwater Contingency Plan. Pantex has proactively conducted work to determine possible causes of the detections. These detections are believed to be related to background (hexavalent chromium) or cross-contamination from a perched well, PTX06-1108, drilled deeply into the FGZ. Pantex plugged PTX06-1108 in 2014 to eliminate this potential pathway. Pantex has increased sampling to monthly for 4-amino-2,6-DNT at PTX06-1056 to evaluate the slightly elevated detection during 3rd quarter and to determine appropriate future

action based on closer evaluation. Pantex is conducting a chromium background study to improve understanding of low-level detections of hexavalent chromium.

Pantex continues to evaluate options for the southeast lobe of perched groundwater east of FM 2373. Two new wells were installed in that area to conduct pump testing, with testing completed in October. Pantex will evaluate the data and make a recommendation for a path forward in the 2015 Annual Progress Report.

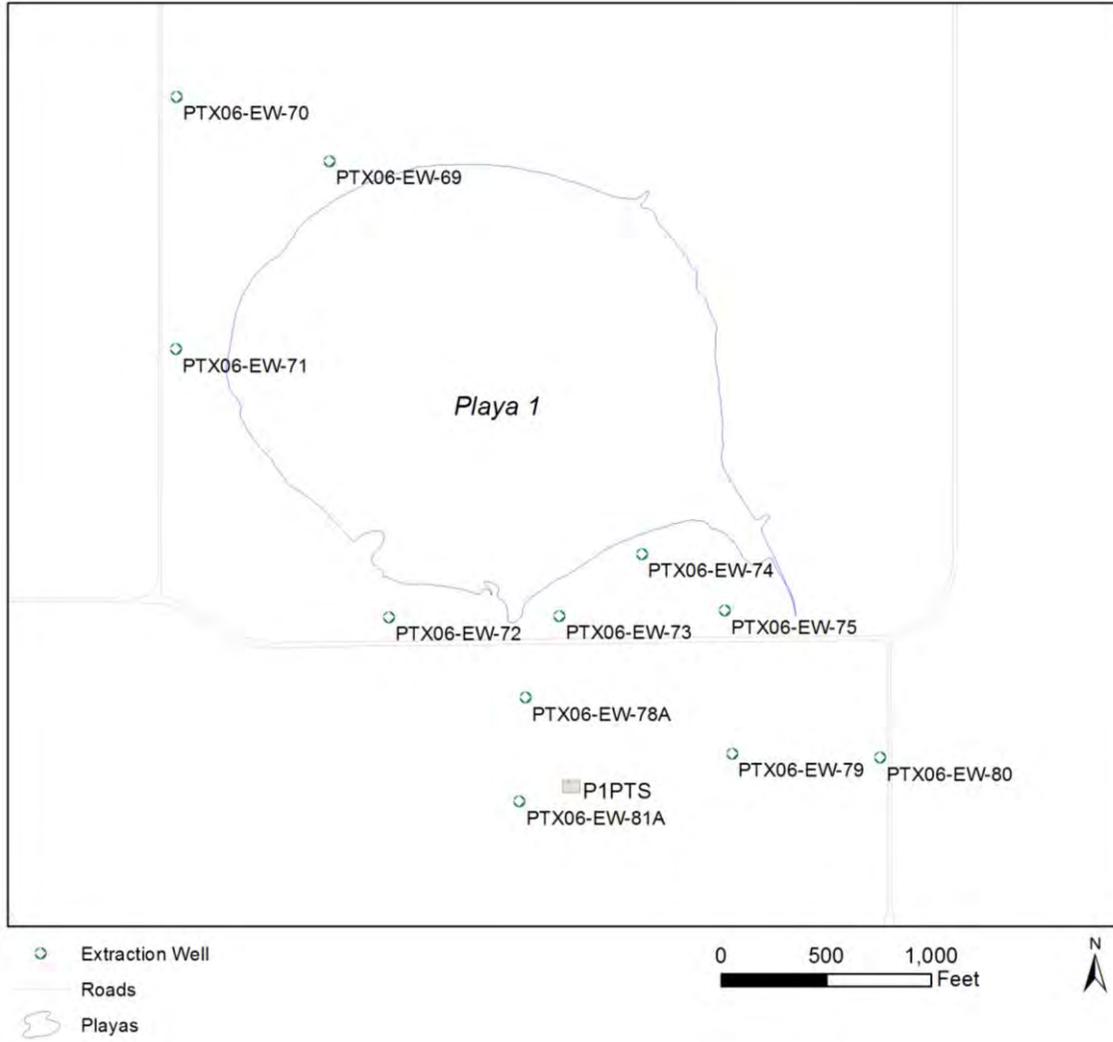
Appendix A

Maps

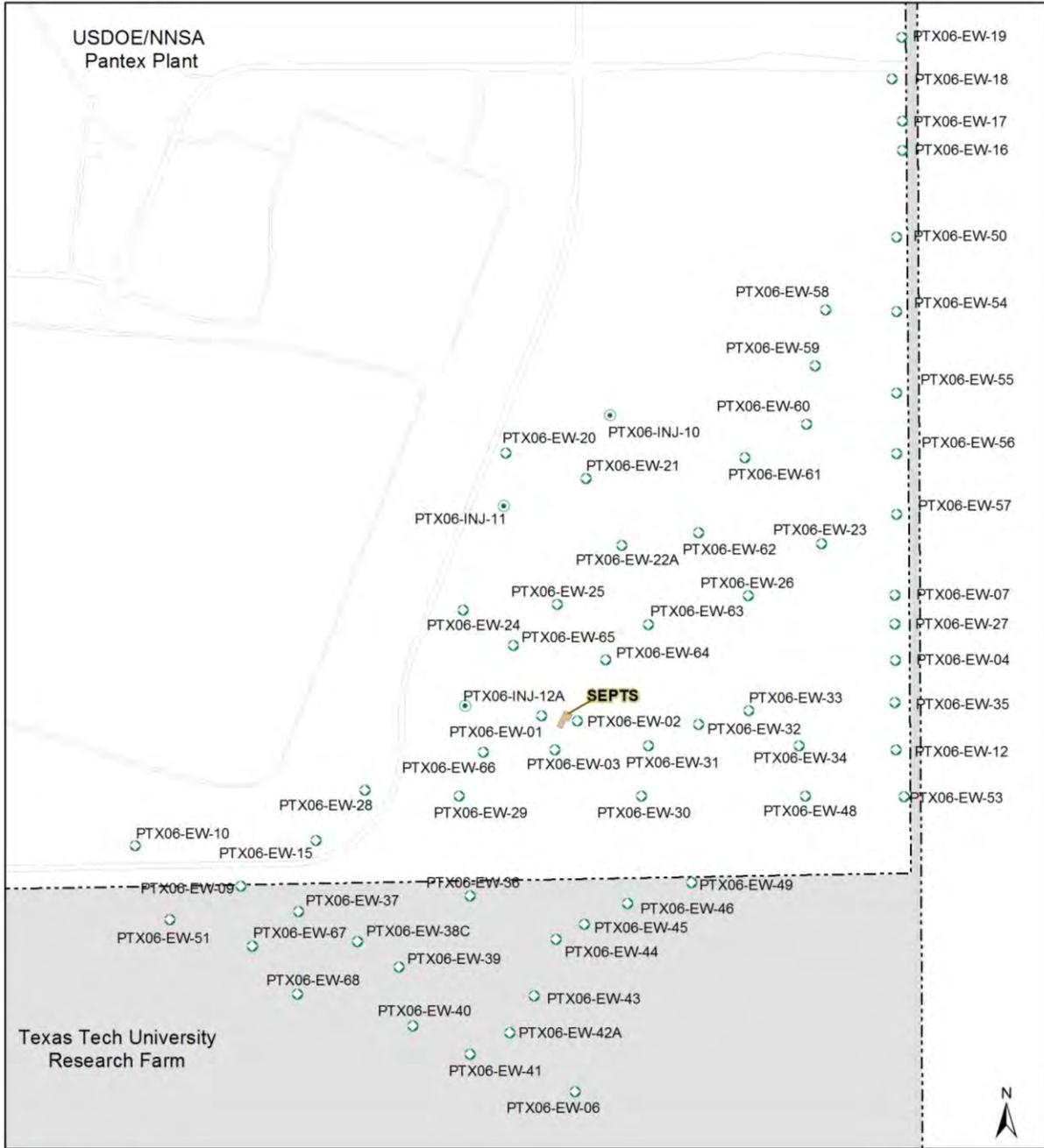


- | | |
|-----------------------------|-----------------------------------|
| USDOE/NNSA Property | Perched Groundwater Plumes |
| Playas | All Contaminants of Concern |
| Extent of Perched Aquifer | Cr(VI) |
| Extraction Well | Perchlorate |
| In Situ Bioremediation Well | TCE |
| | RDX |

Extent of Perched Groundwater and Contaminant Plumes

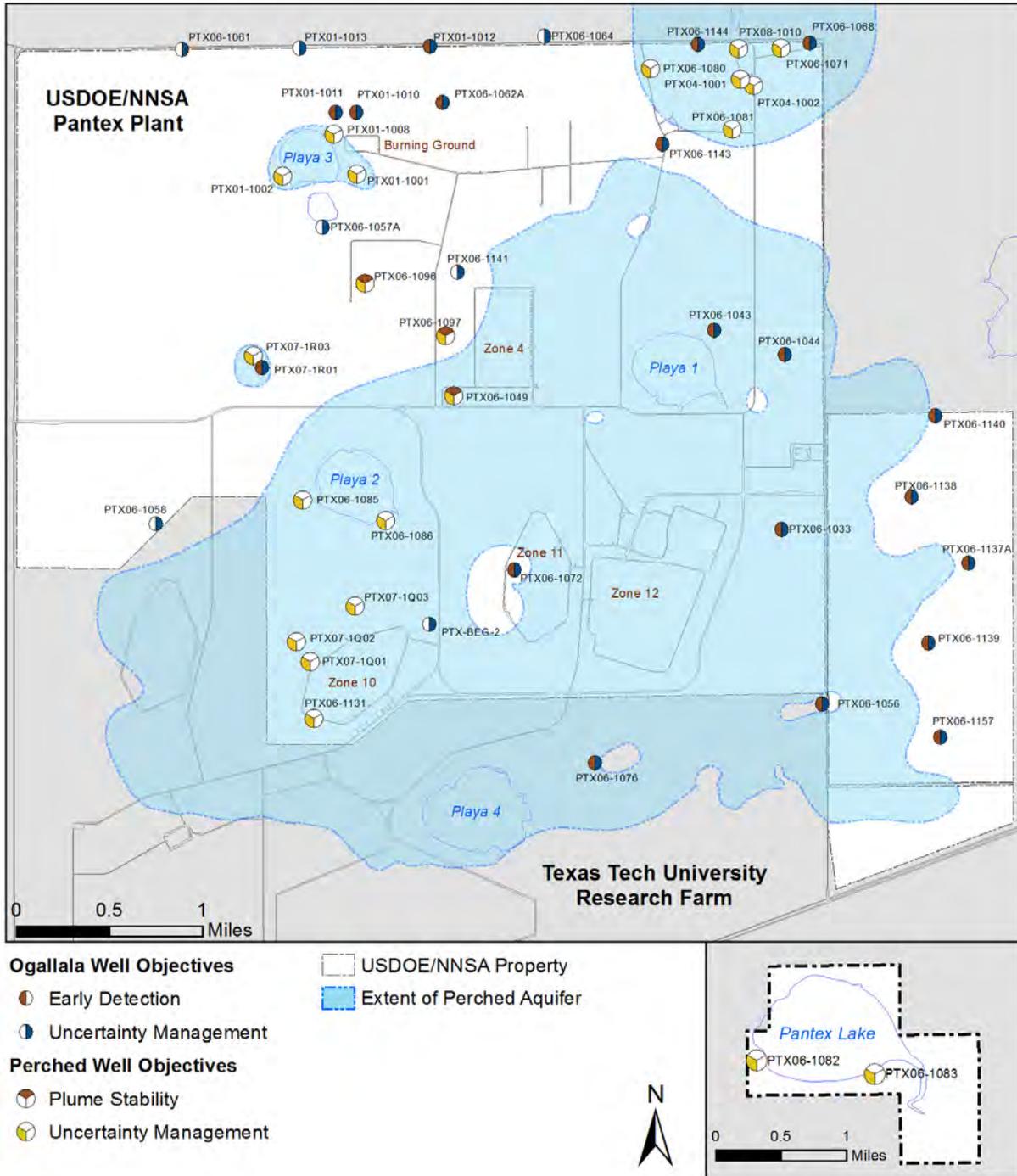


Playa 1 Pump and Treat System Wells



- Extraction Well
- Injection Well

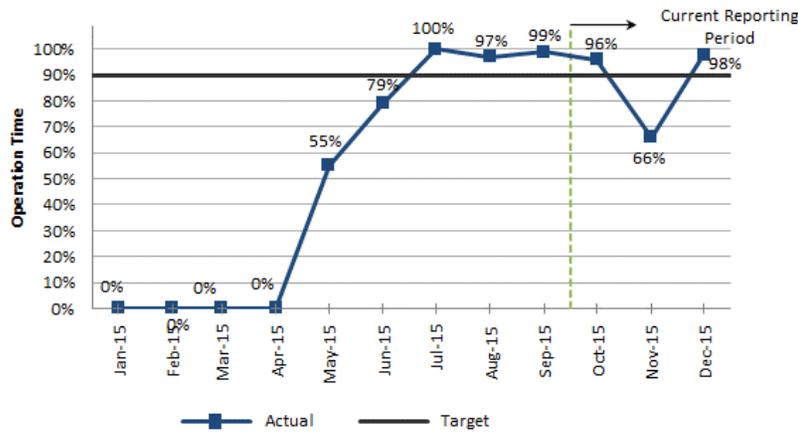
Southeast Pump and Treat System Wells



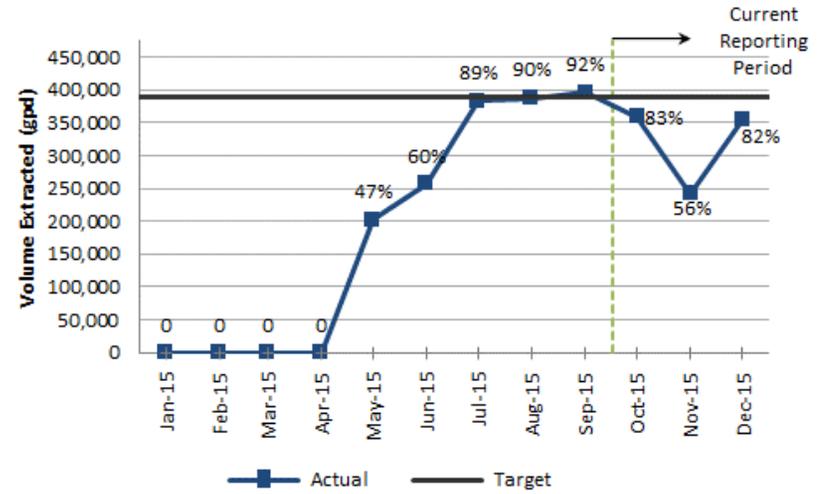
Uncertainty Management and Early Detection Wells
Evaluated in the Quarterly Progress Report

Appendix B
Pump and Treat Systems Graphs

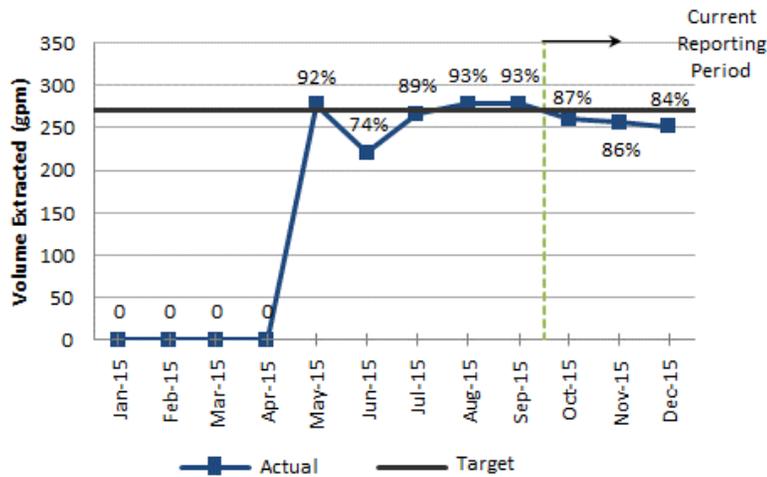
Southeast Pump and Treat Graphs



SEPTS Operation Time vs Target



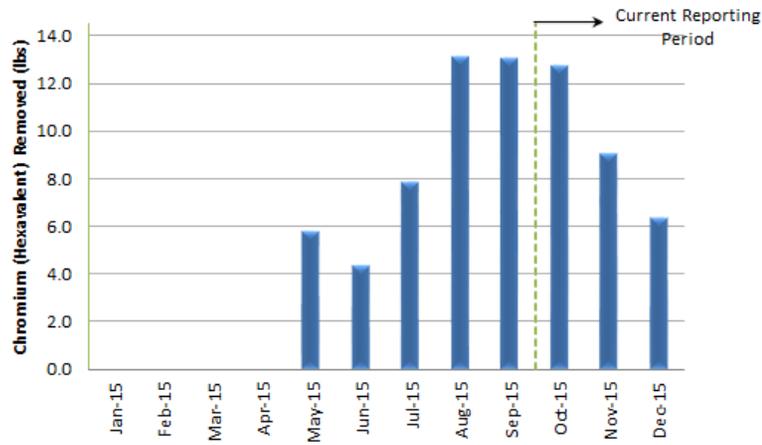
SEPTS GPD and % Capacity



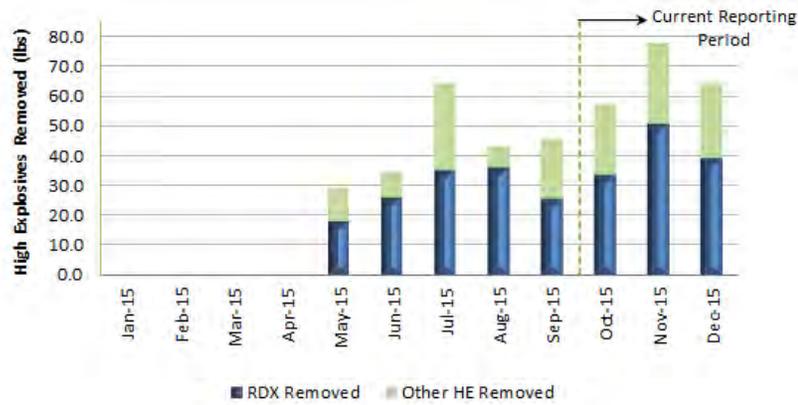
SEPTS Average GPM and % Capacity



SEPTS Monthly Total Flow

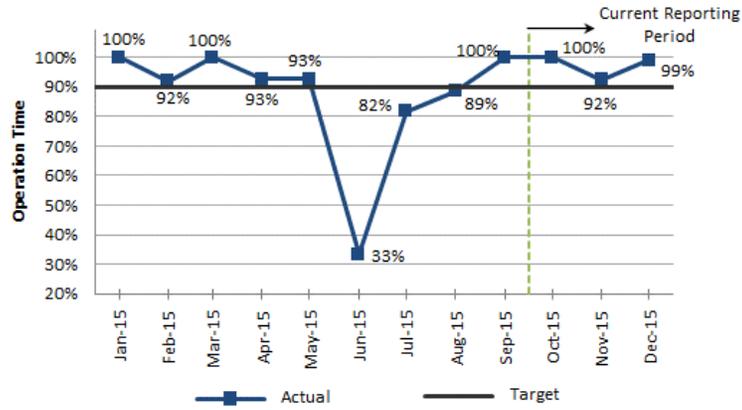


SEPTS Chromium Mass Removal by Month

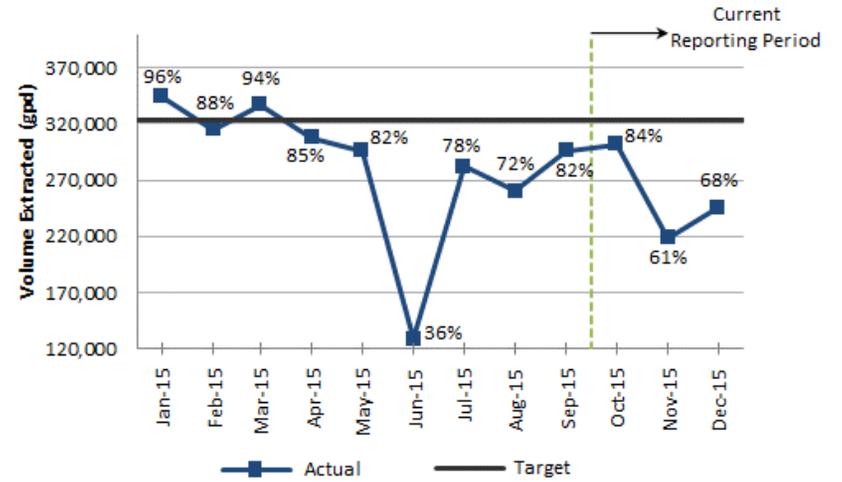


SEPTS HE Mass Removal by Month

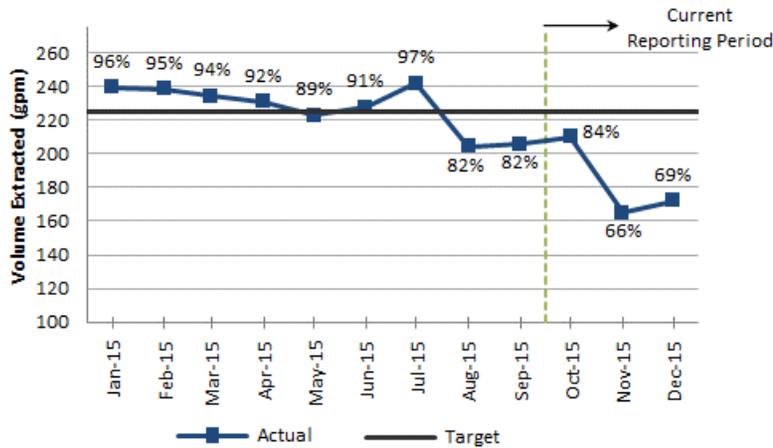
Playa 1 Pump and Treat Graphs



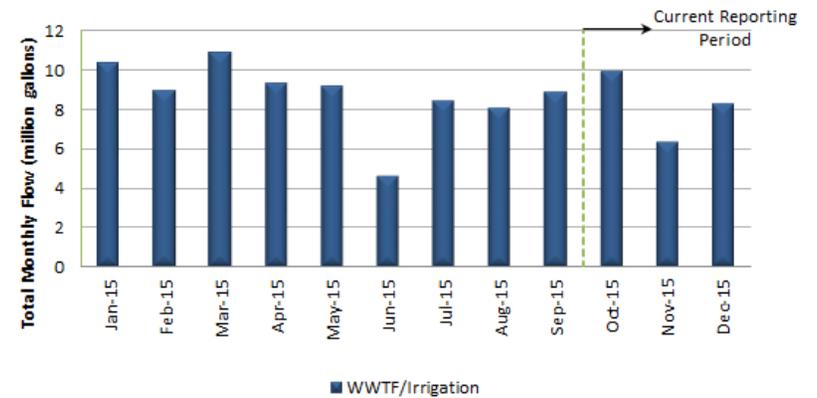
P1PTS Operational Time Vs Target



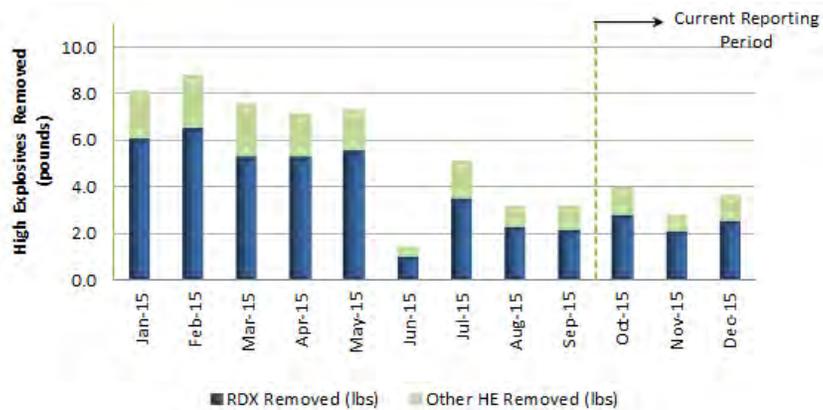
P1PTS Average GPD and % Capacity



P1PTS Average GPM and % Capacity



P1PTS Monthly System Total Flow



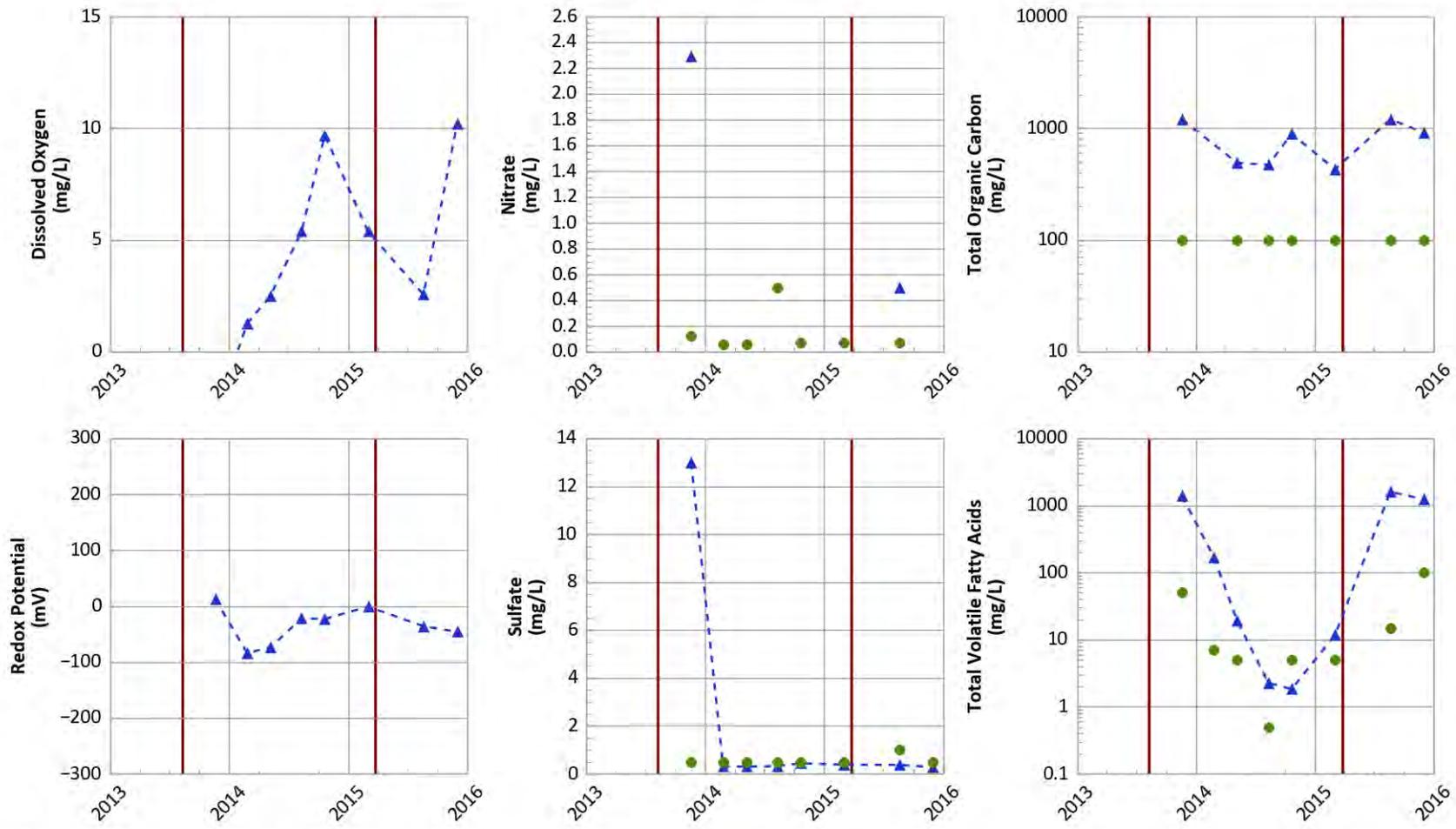
P1PTS HE Mass Removal by Month

Appendix C

ISB Graphs

Southeast ISB Graphs

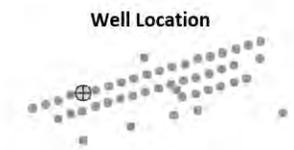
PTX06-ISB014 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



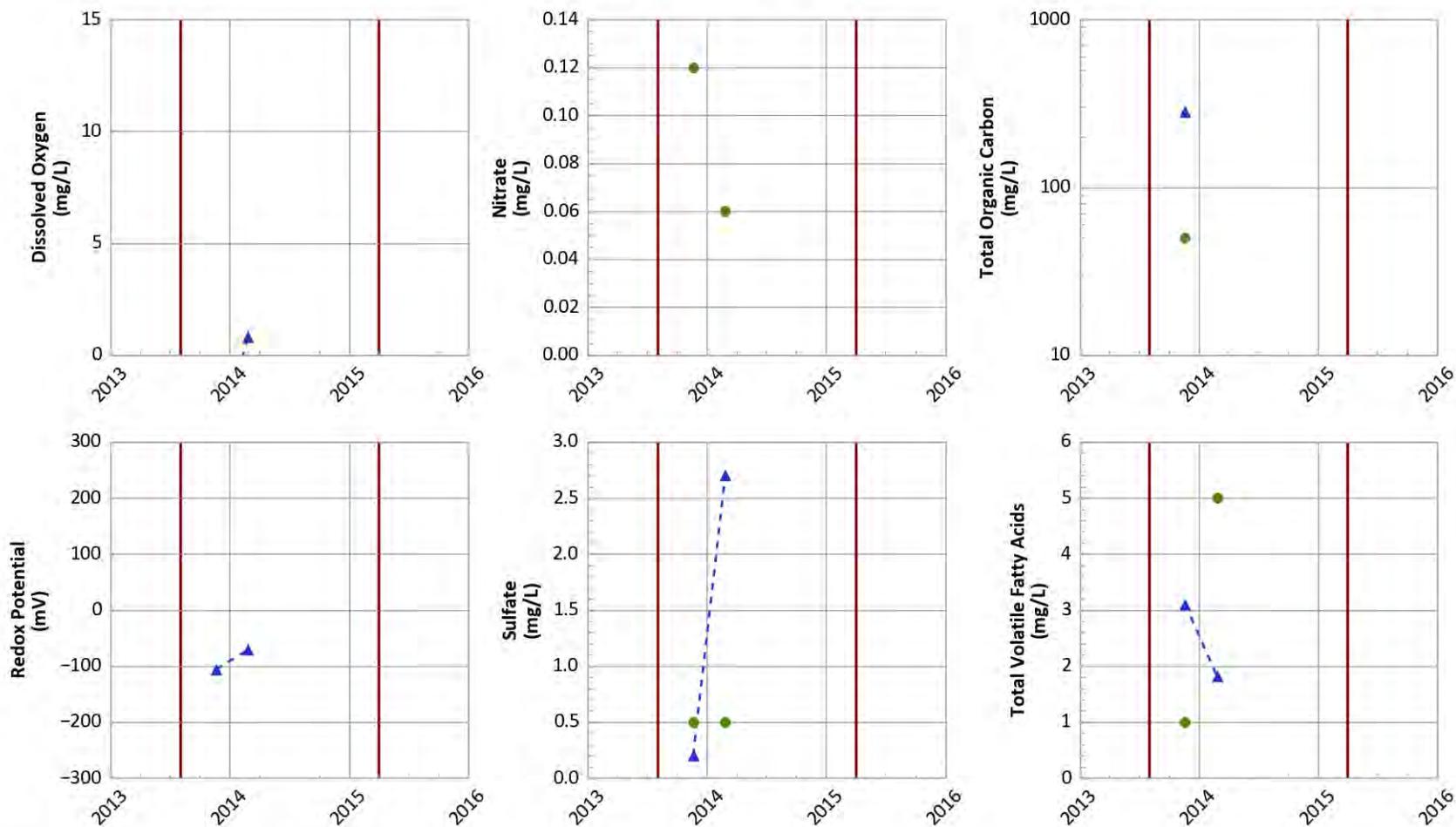
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



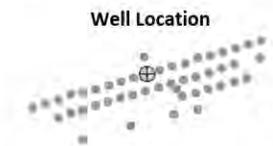
PTX06-ISB019 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



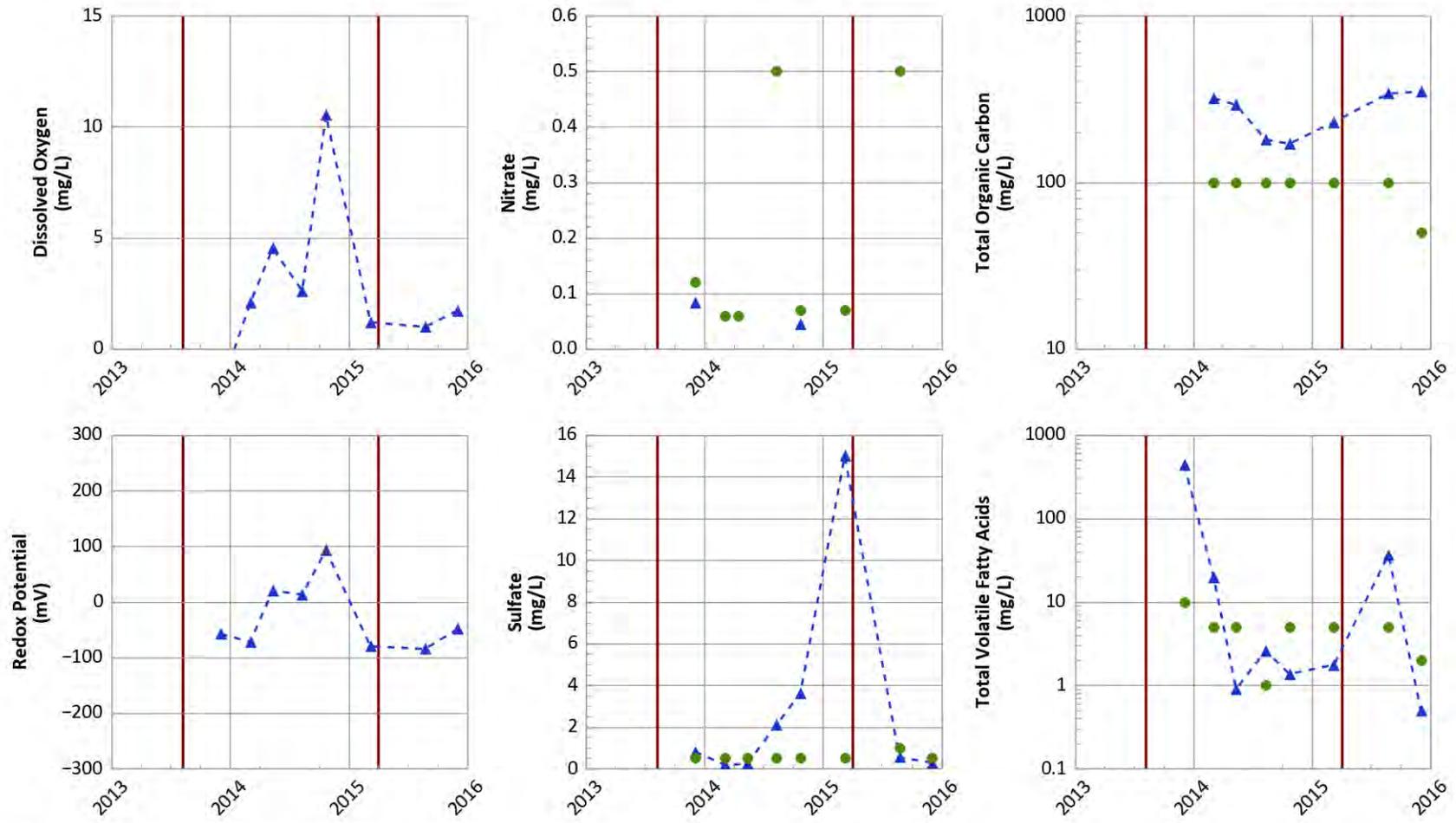
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- Concentration Trend
- Injection Dates



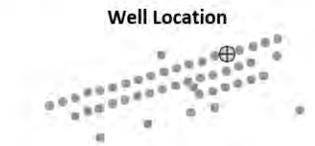
PTX06-ISB024 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



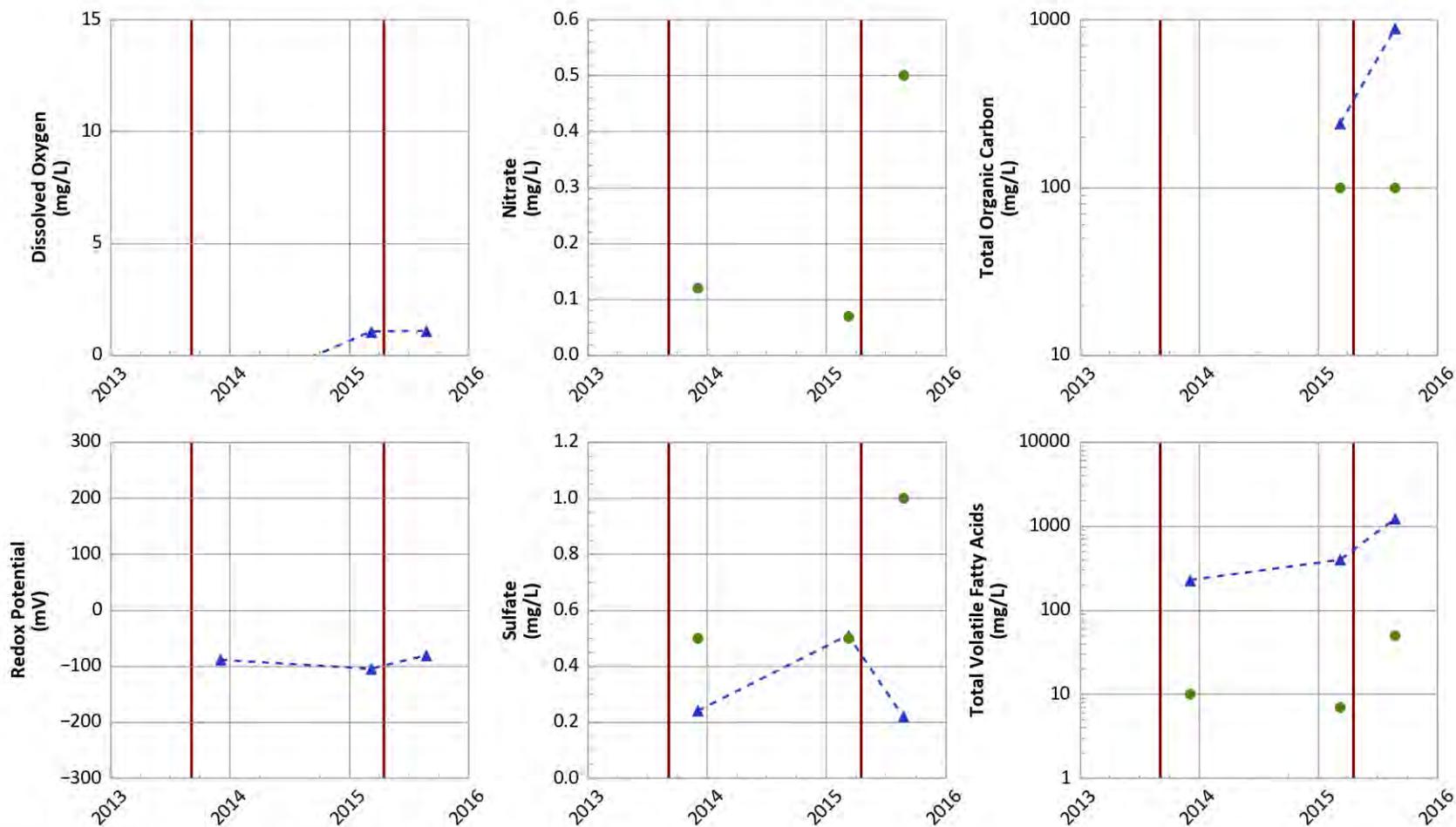
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



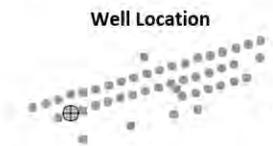
PTX06-ISB030B Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



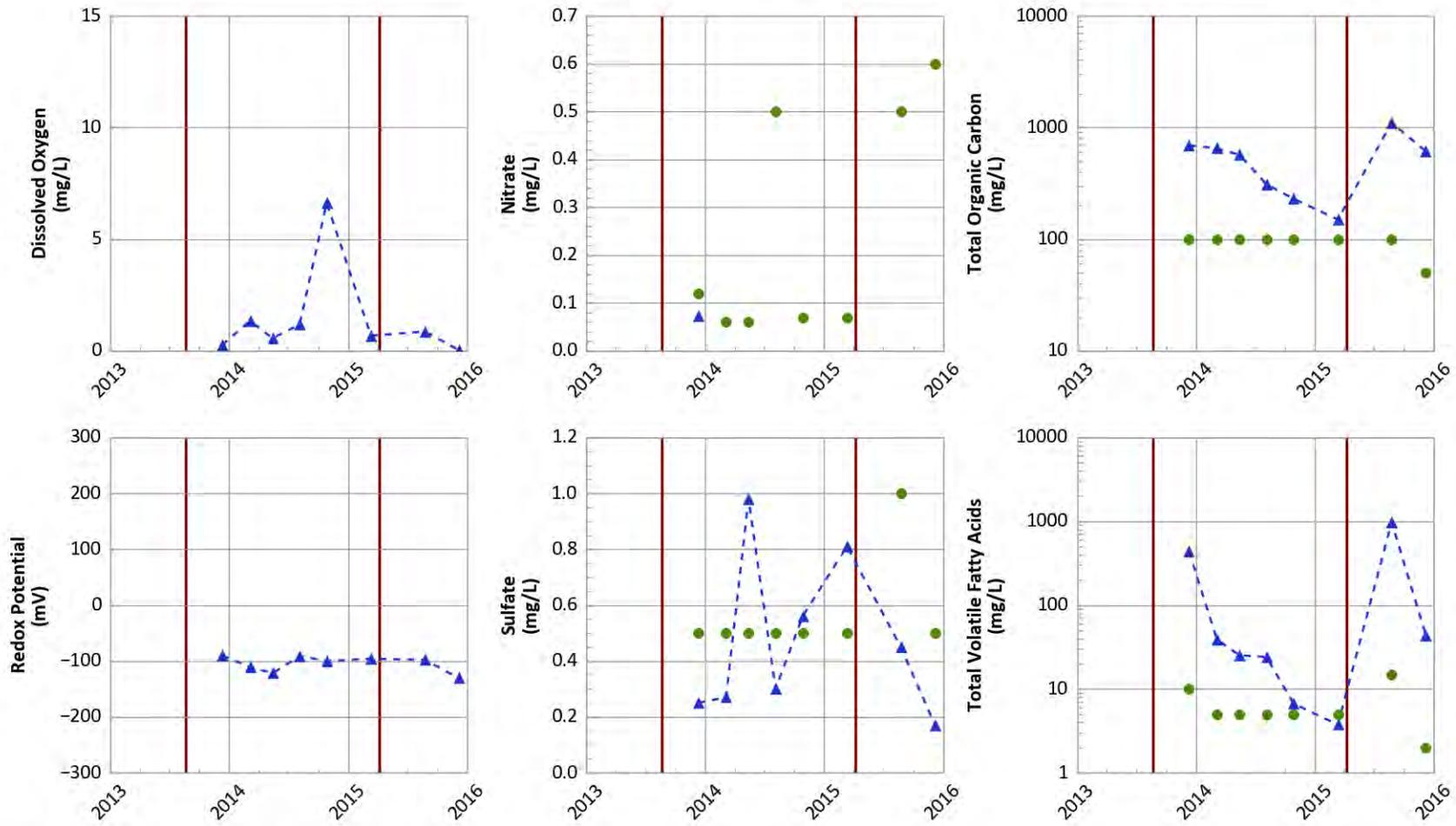
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



**PTX06-ISB038 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**

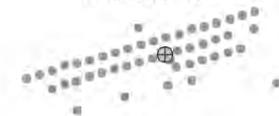


Typical Baseline Concentrations in Perched Groundwater

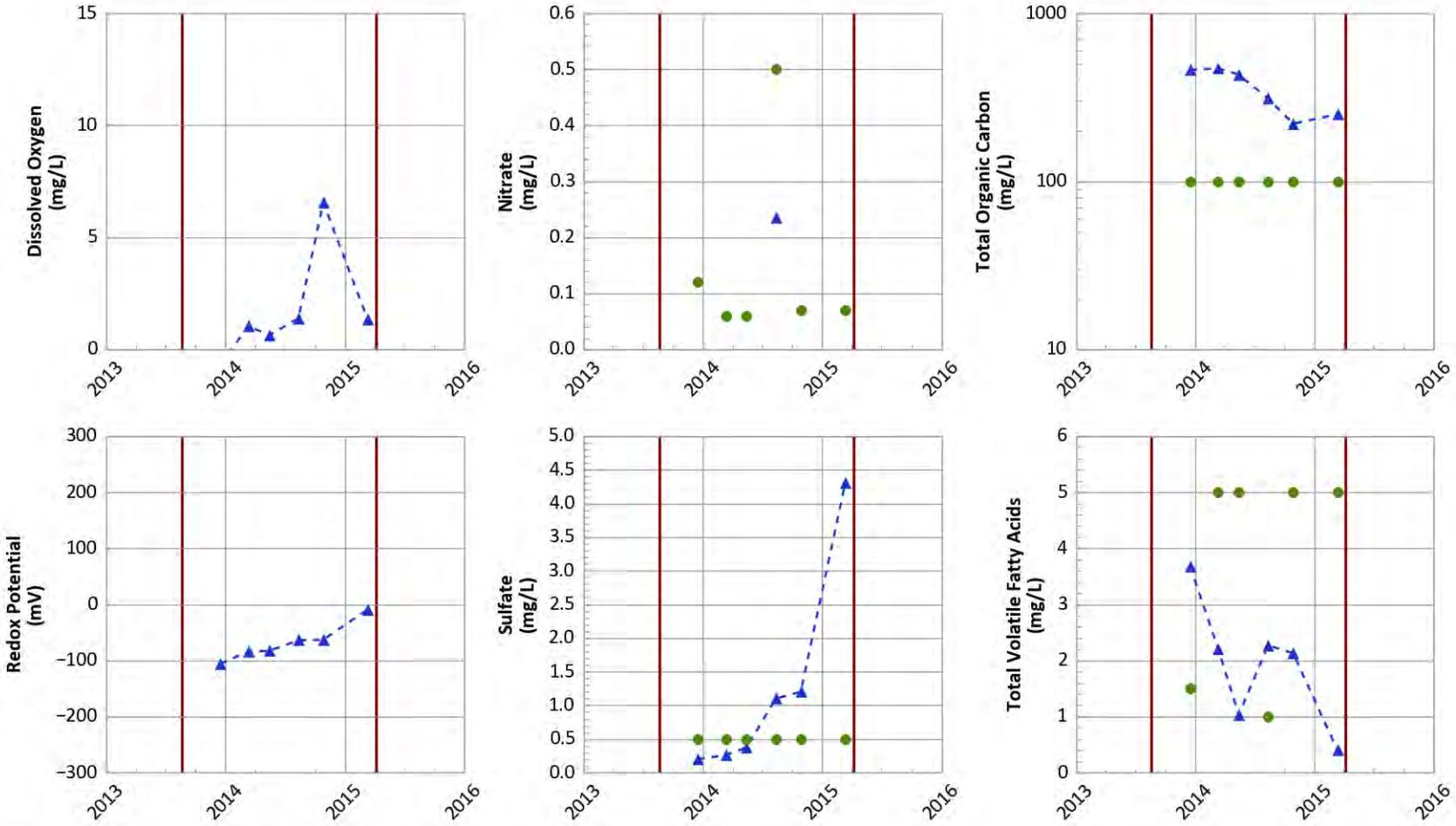
- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates

Well Location



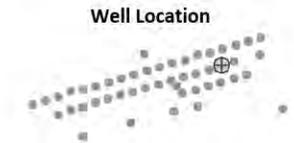
PTX06-ISB042 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



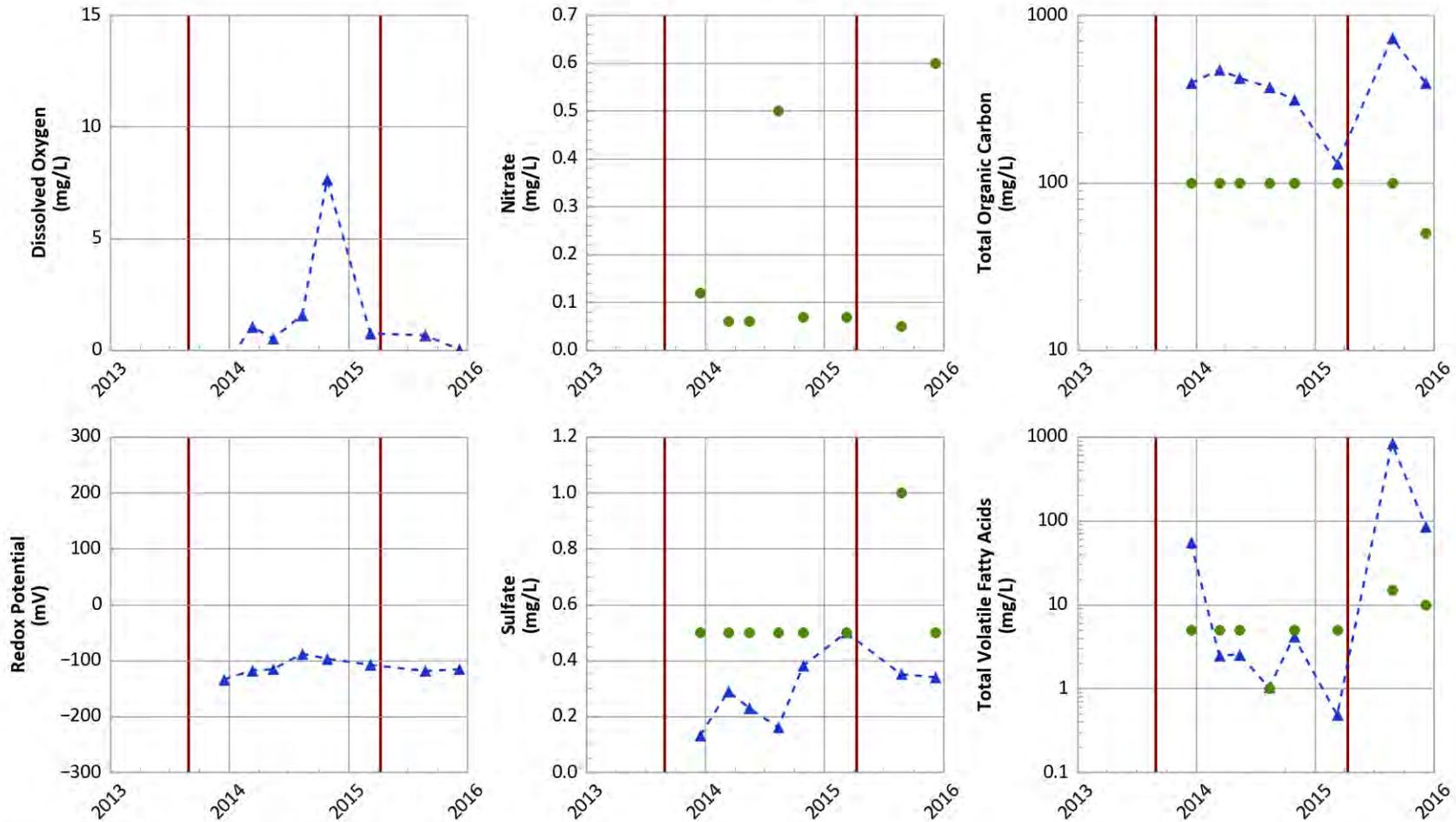
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



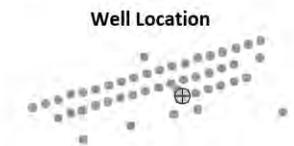
PTX06-ISB046 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



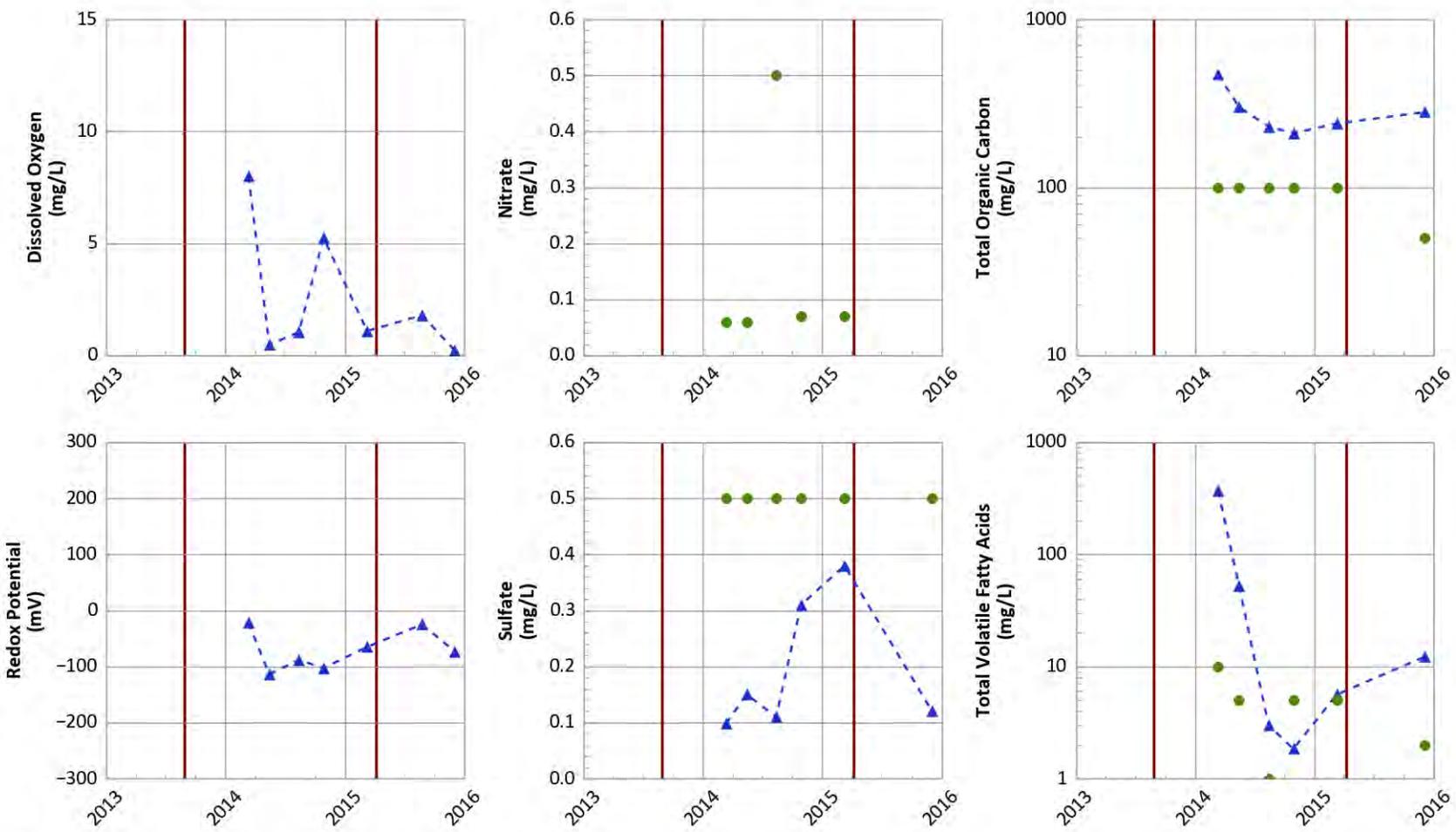
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



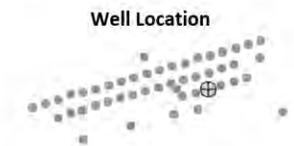
PTX06-ISB048 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



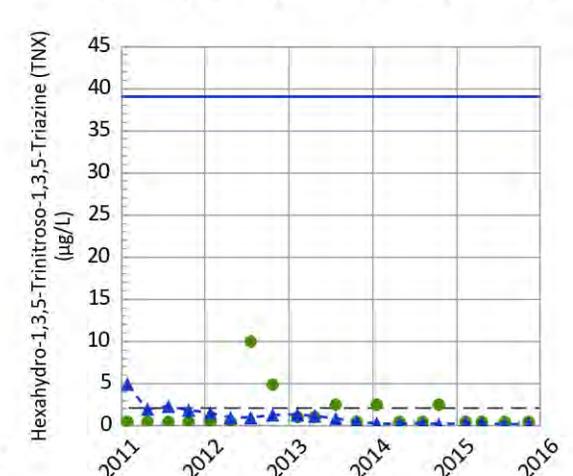
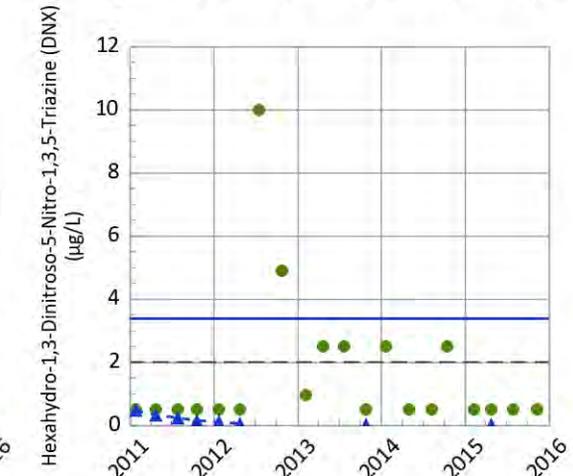
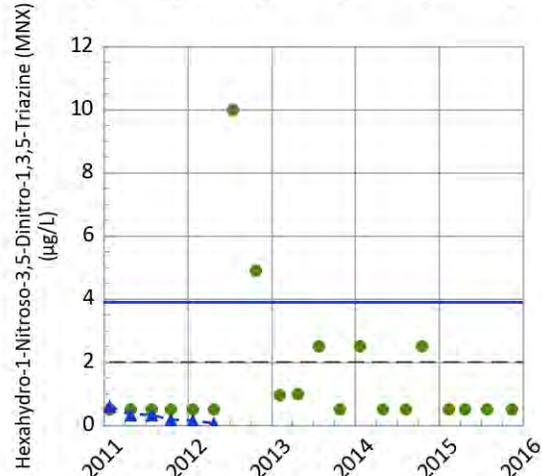
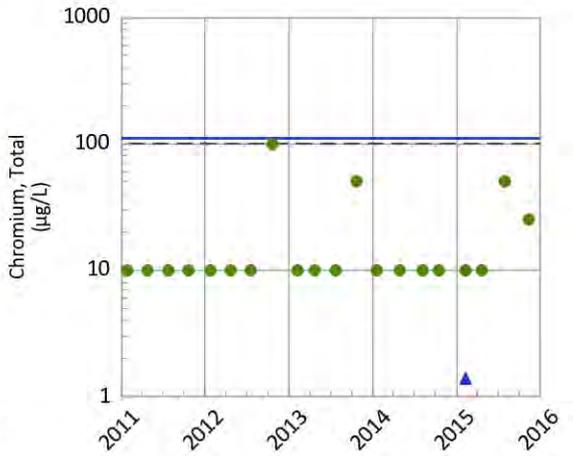
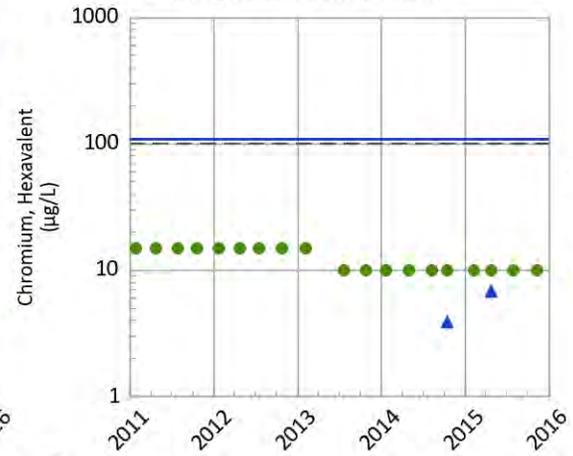
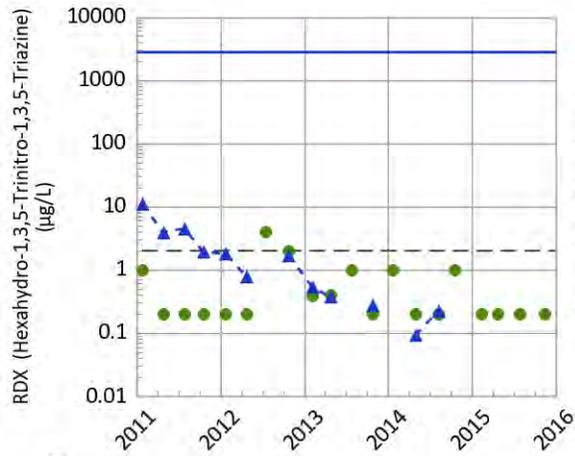
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- Concentration Trend
- | Injection Dates



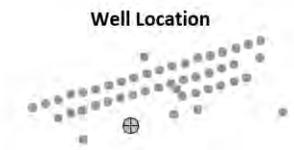
**PTX06-1037 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



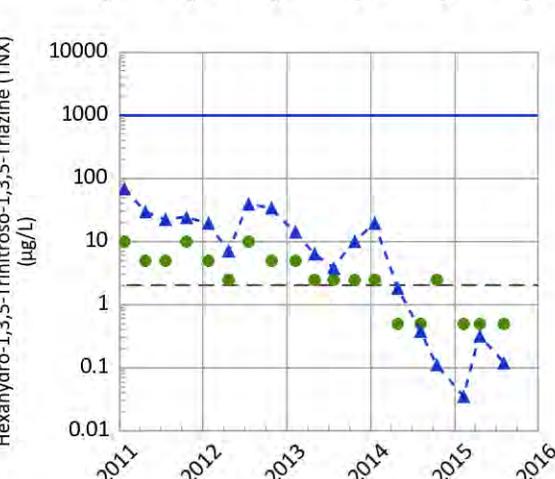
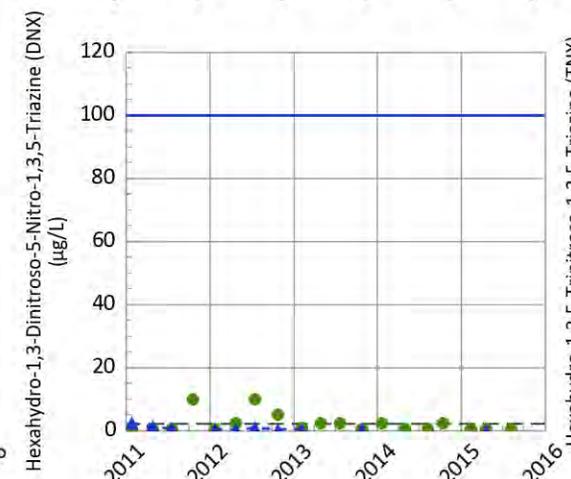
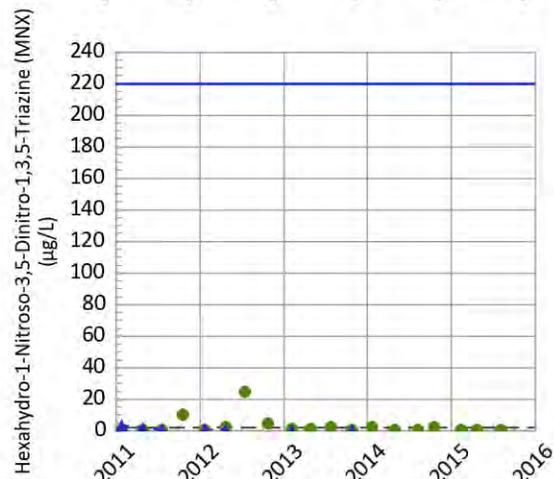
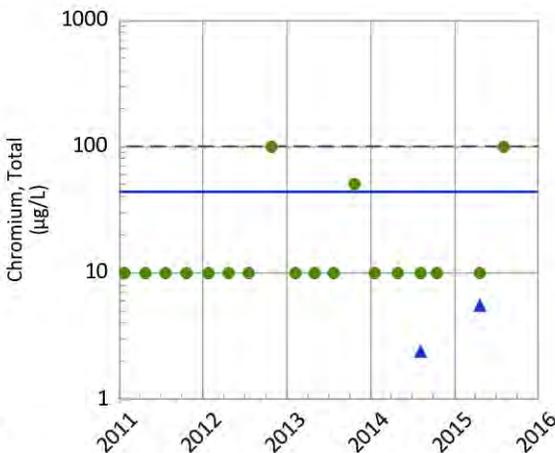
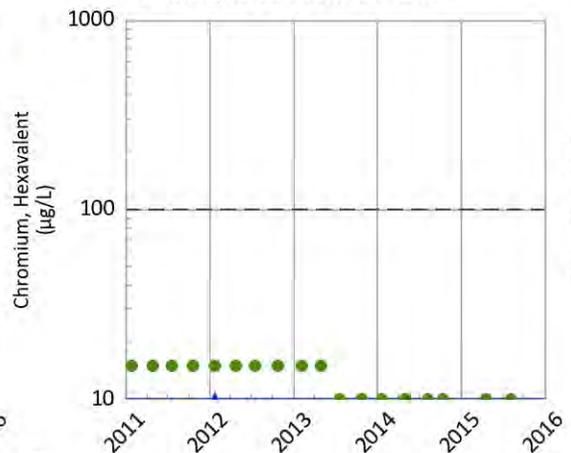
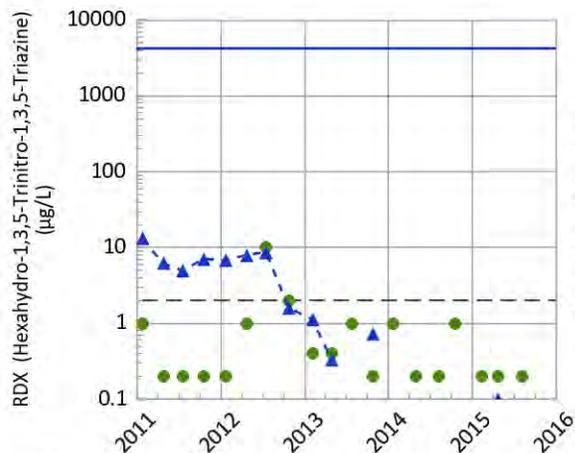
Most Recent Measured COC Concentrations (Nov 11, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	Non-Detect	2.0
MNX	Non-Detect	2.0
CR-6	Non-Detect	100.0
DNX	Non-Detect	2.0
CR	Non-Detect	100.0
TNX	0.16	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



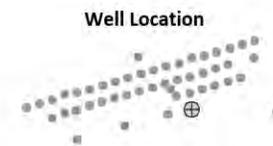
**PTX06-1123 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



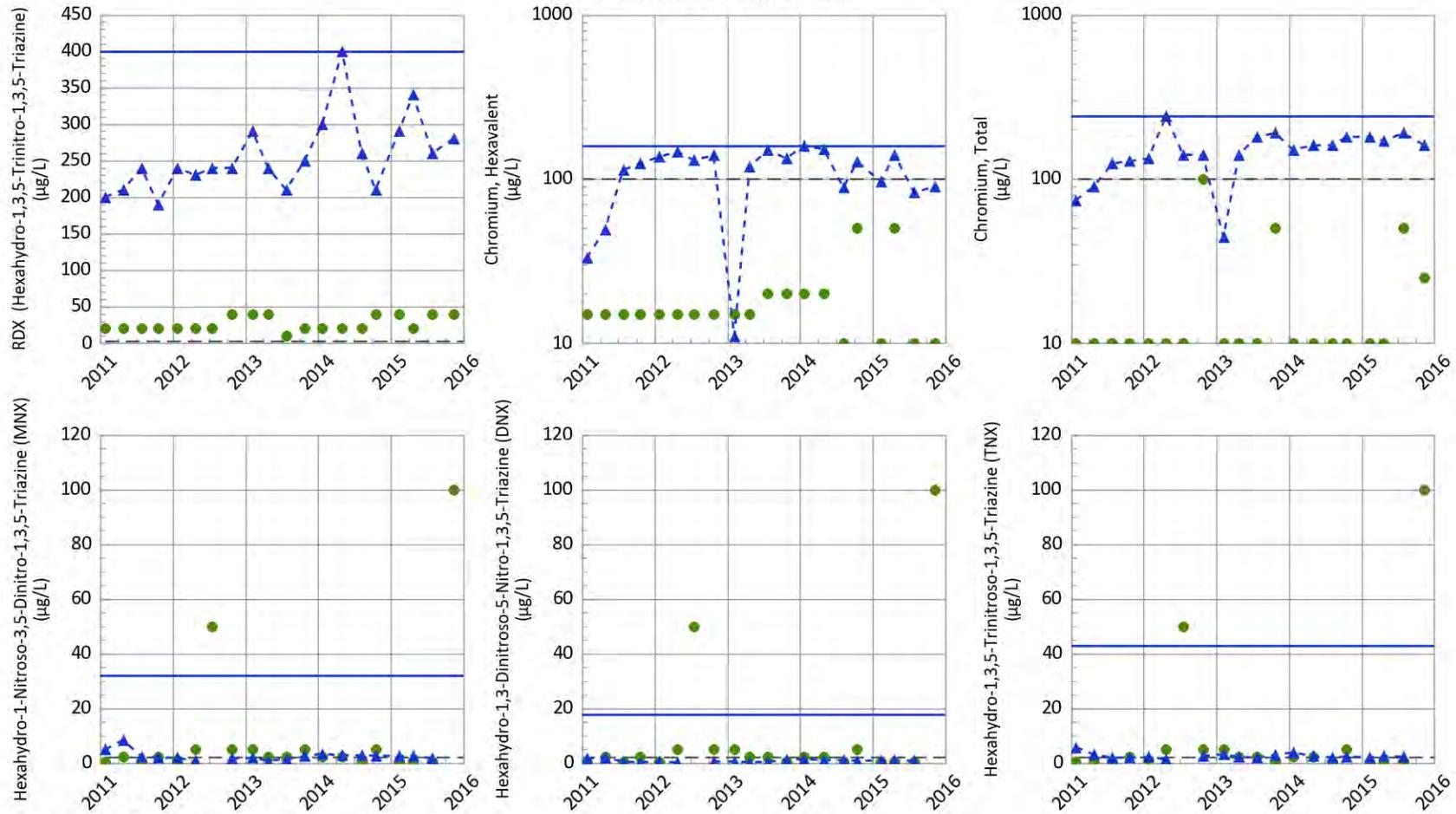
Most Recent Measured COC Concentrations (Aug 05, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	Non-Detect	2.0
MNX	Non-Detect	2.0
CR-6	Non-Detect	100.0
DNX	Non-Detect	2.0
CR	Non-Detect	100.0
TNX	0.12	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



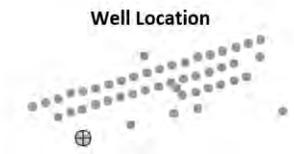
**PTX06-1153 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



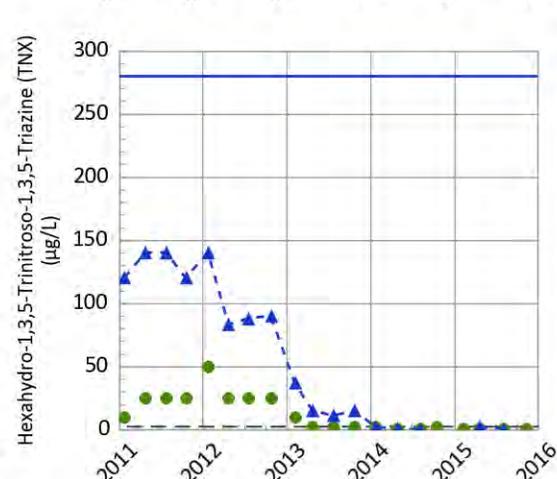
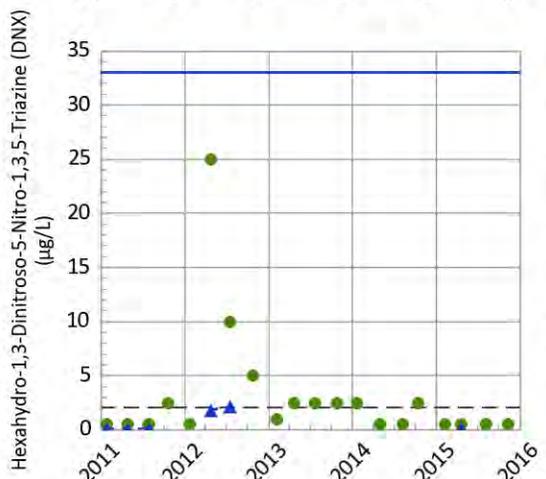
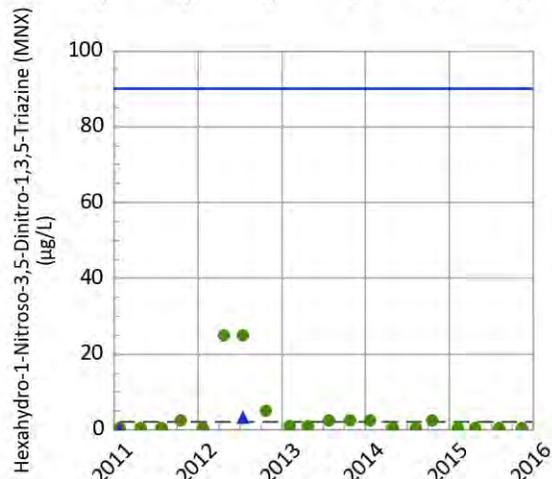
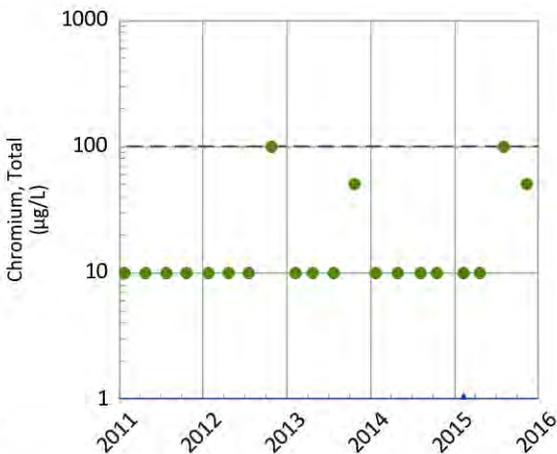
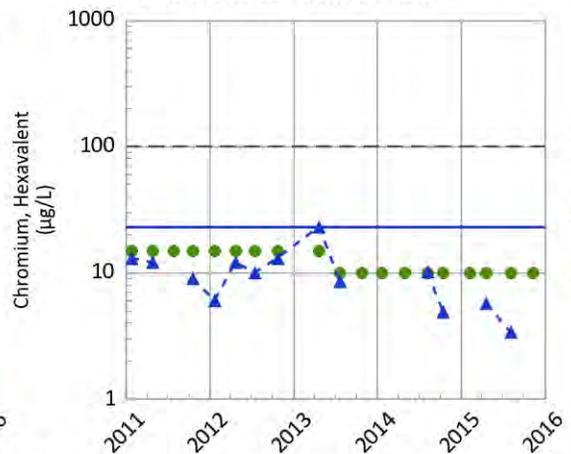
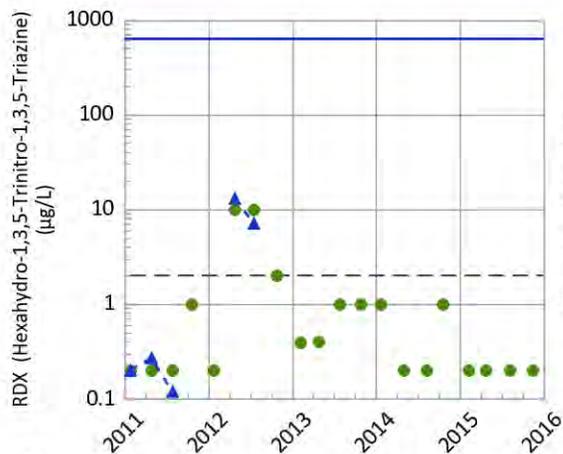
Most Recent Measured COC Concentrations (Jul 29, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	280.0	2.0
MNX	Non-Detect	2.0
CR-6	89.6	100.0
DNX	Non-Detect	2.0
CR	160.0	100.0
TNX	Non-Detect	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



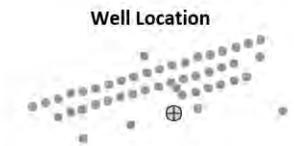
**PTX06-1154 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (Aug 05, 2015)

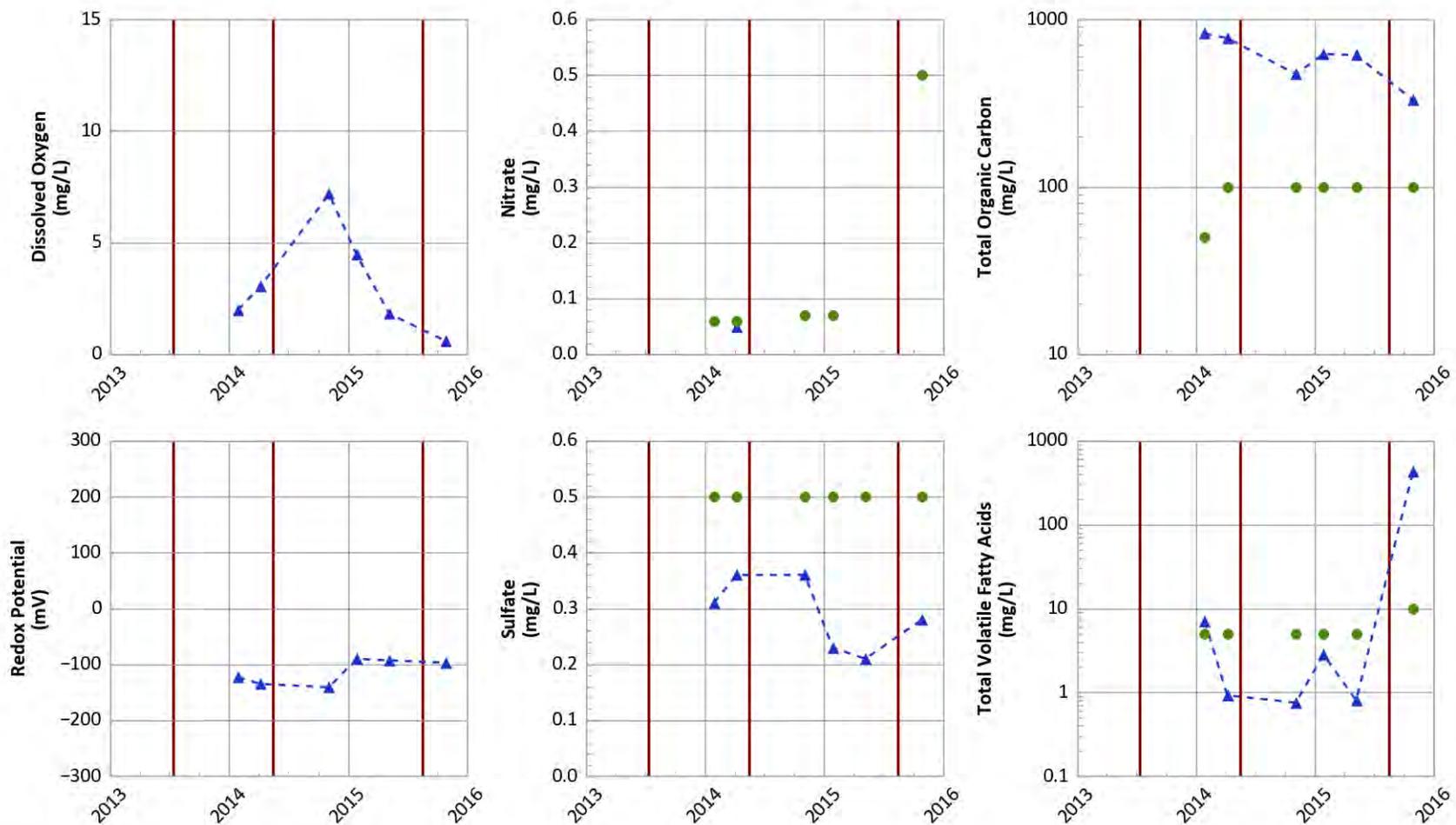
COC	Concentration (µg/L)	GWPS (µg/L)
RDX	Non-Detect	2.0
MNX	Non-Detect	2.0
CR-6	Non-Detect	100.0
DNX	Non-Detect	2.0
CR	Non-Detect	100.0
TNX	Non-Detect	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



Zone 11 ISB Graphs

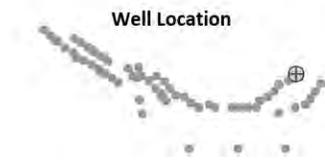
PTX06-ISB055 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



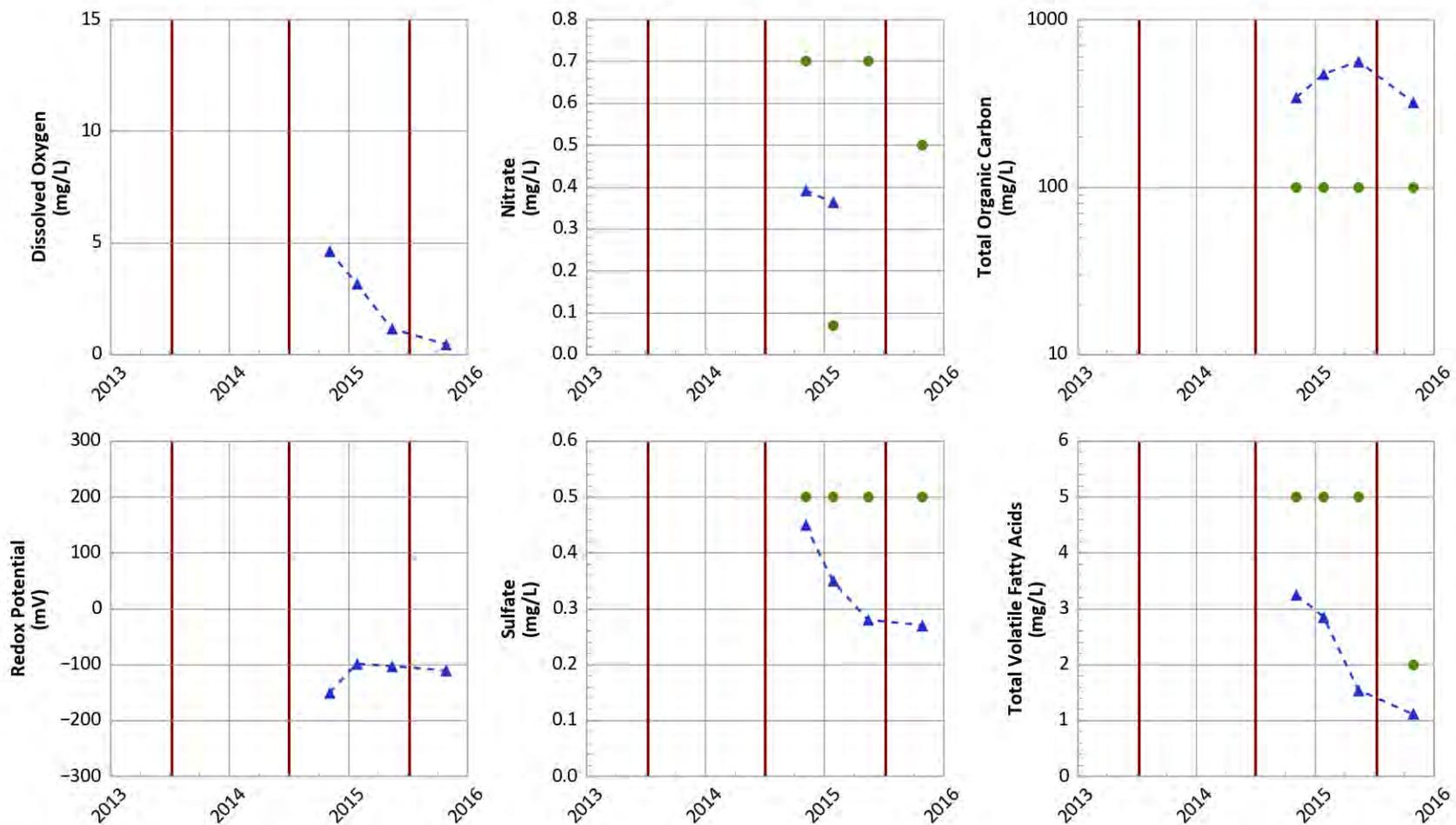
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



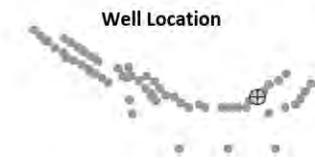
PTX06-ISB059 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



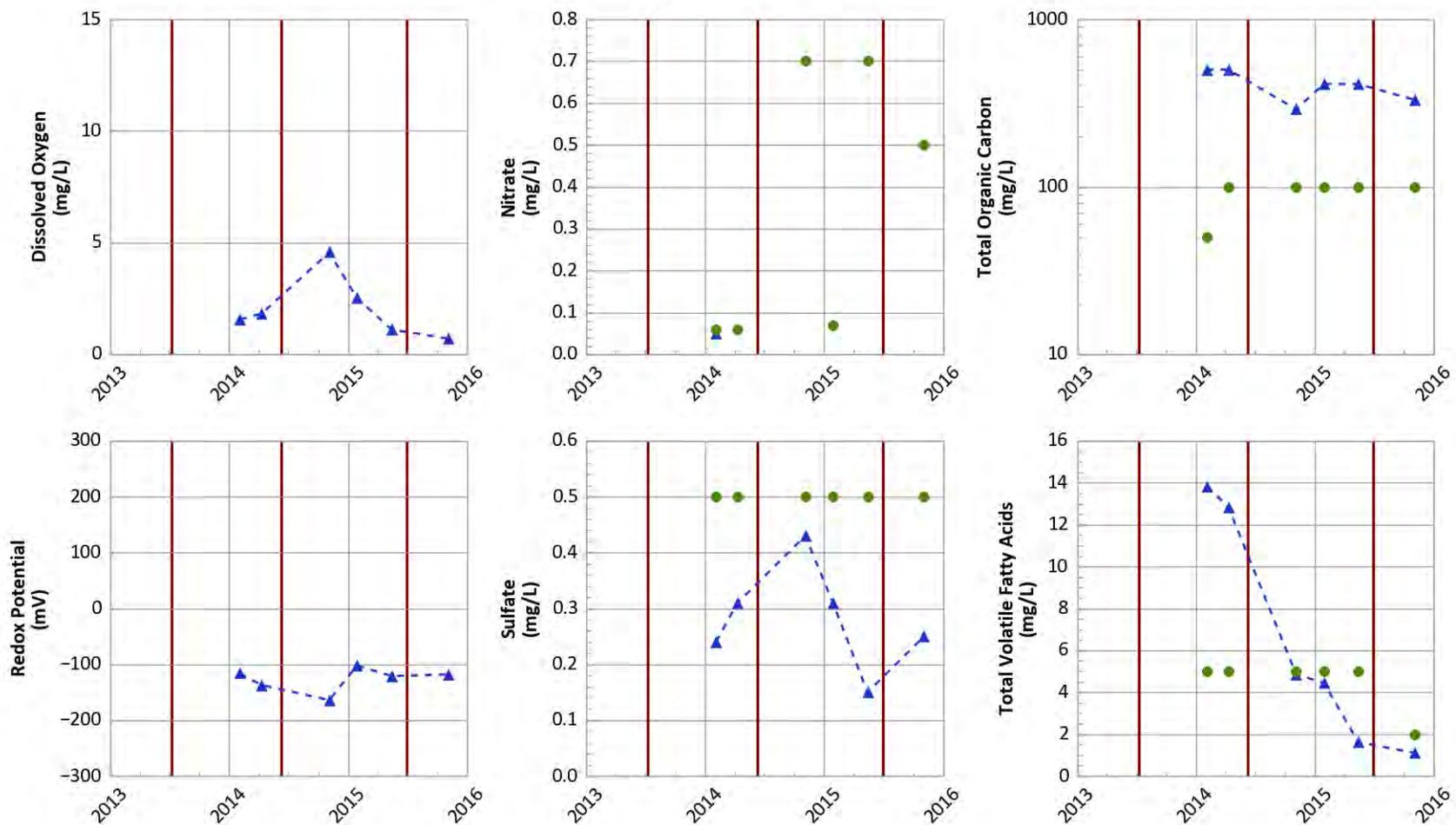
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



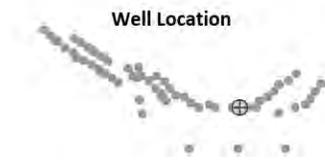
PTX06-ISB063 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



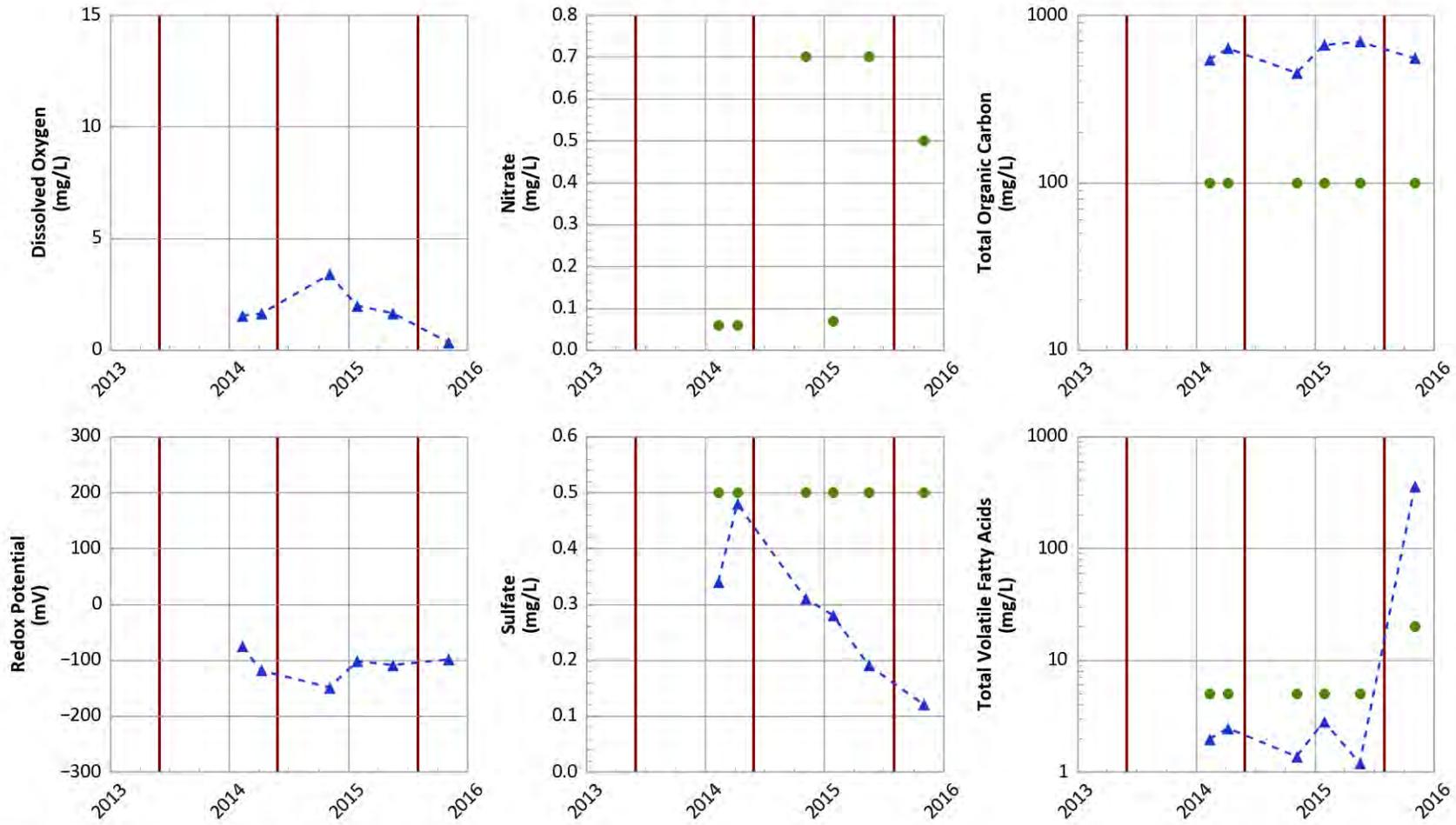
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



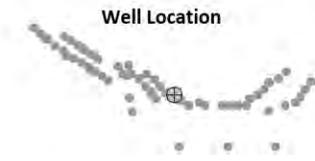
PTX06-ISB069A Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



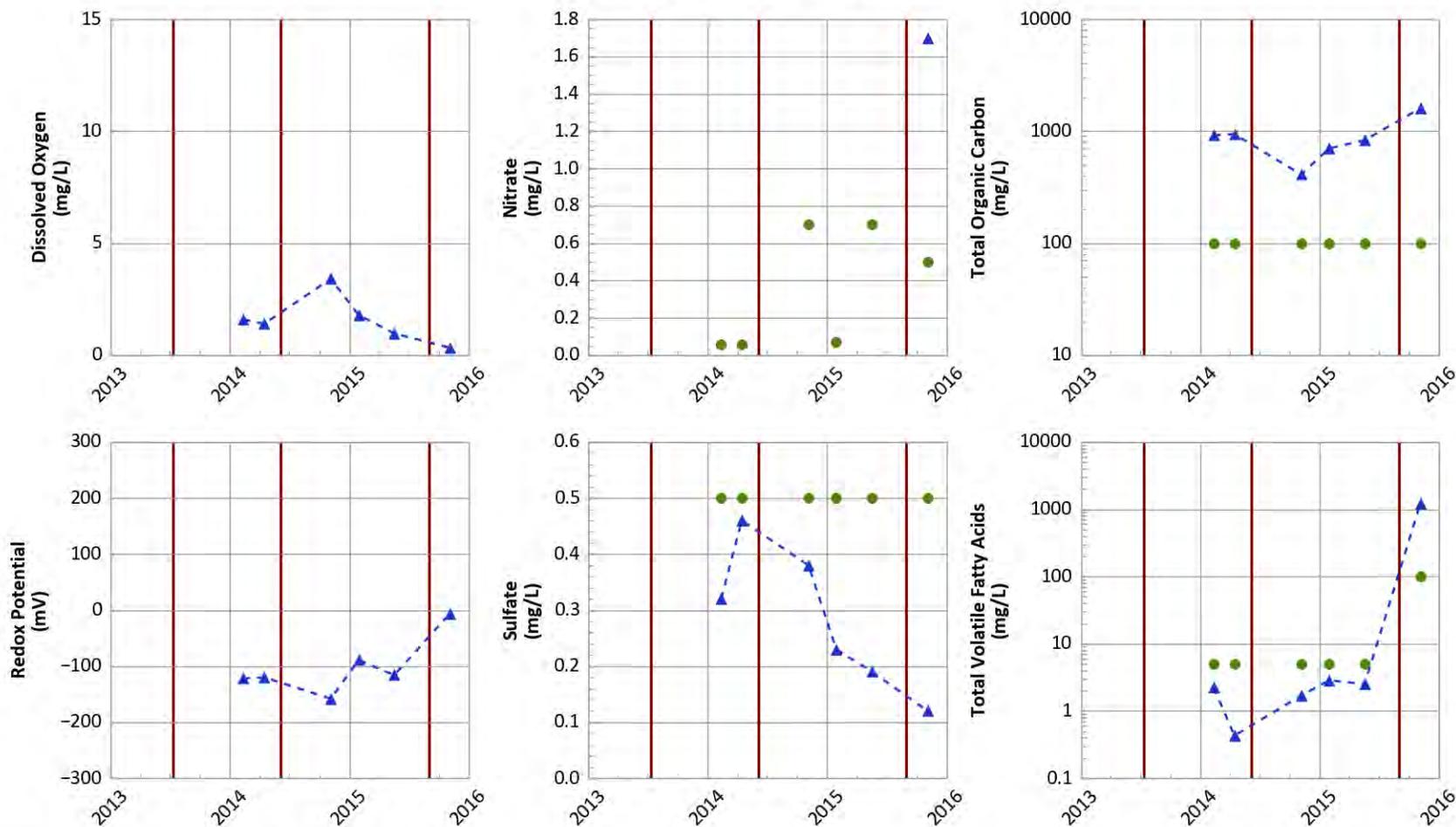
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



PTX06-ISB071 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



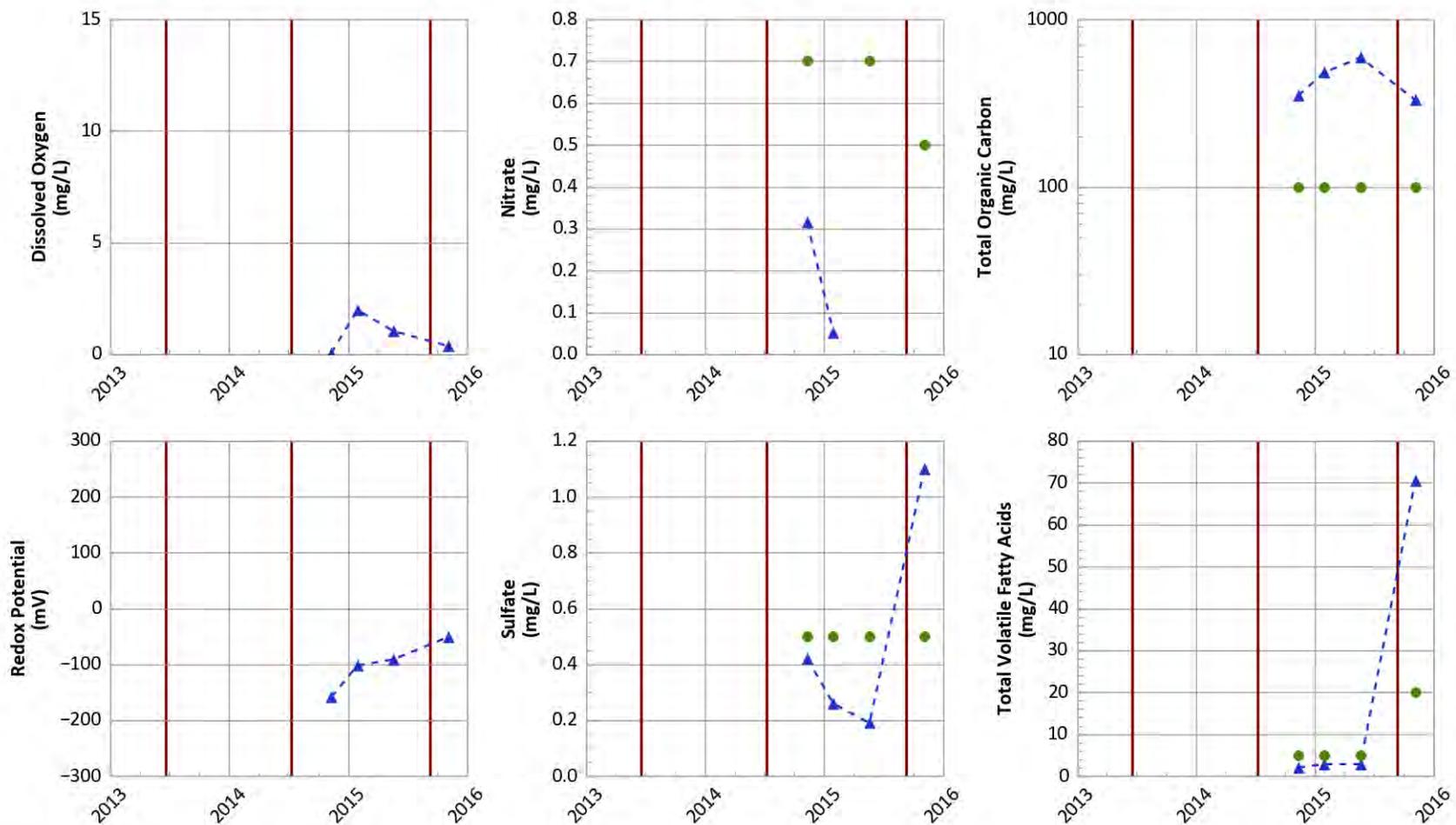
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



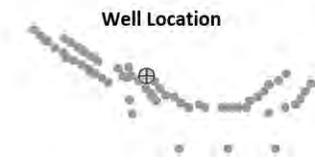
PTX06-ISB073 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



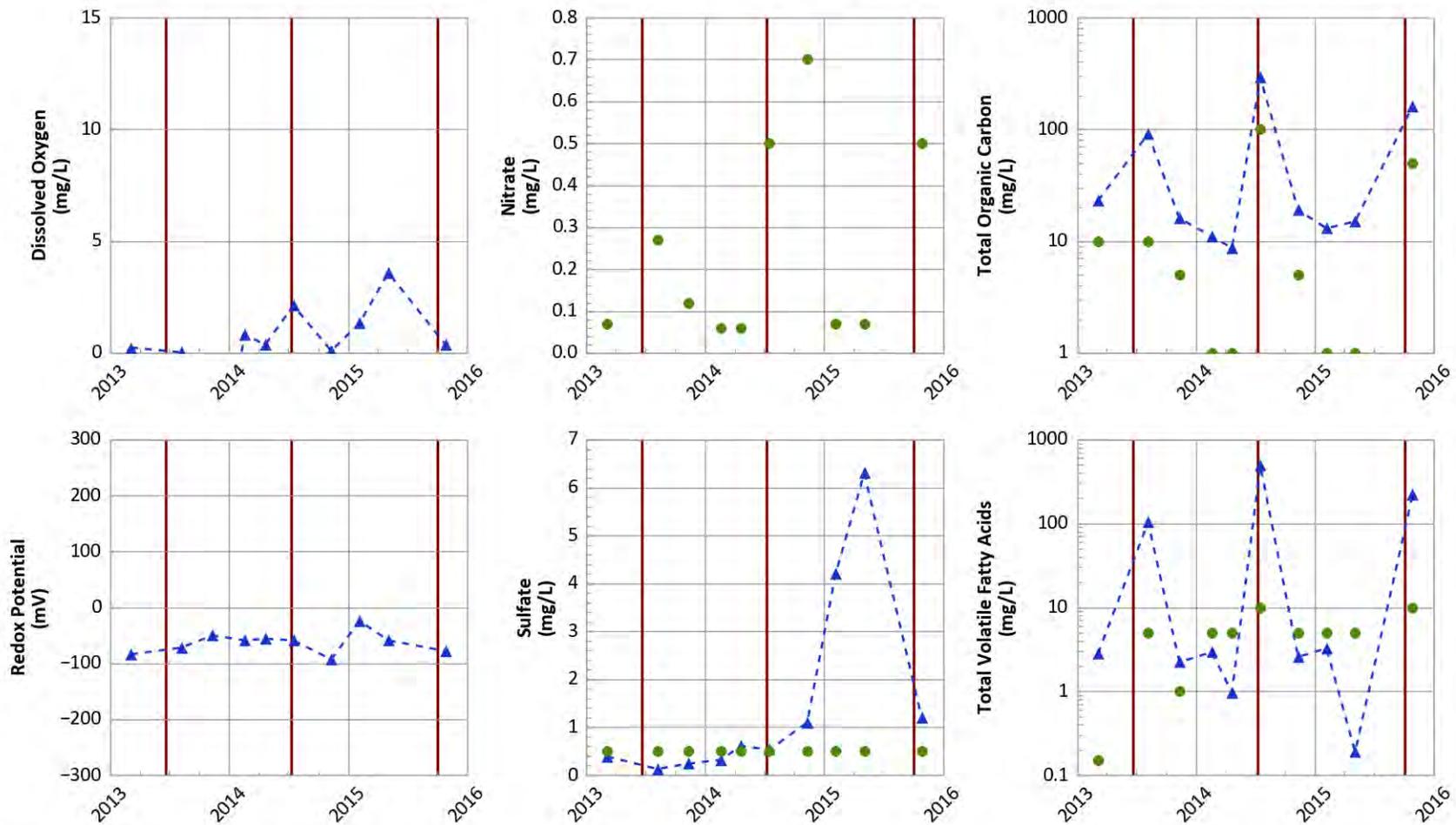
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



PTX06-ISB075 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



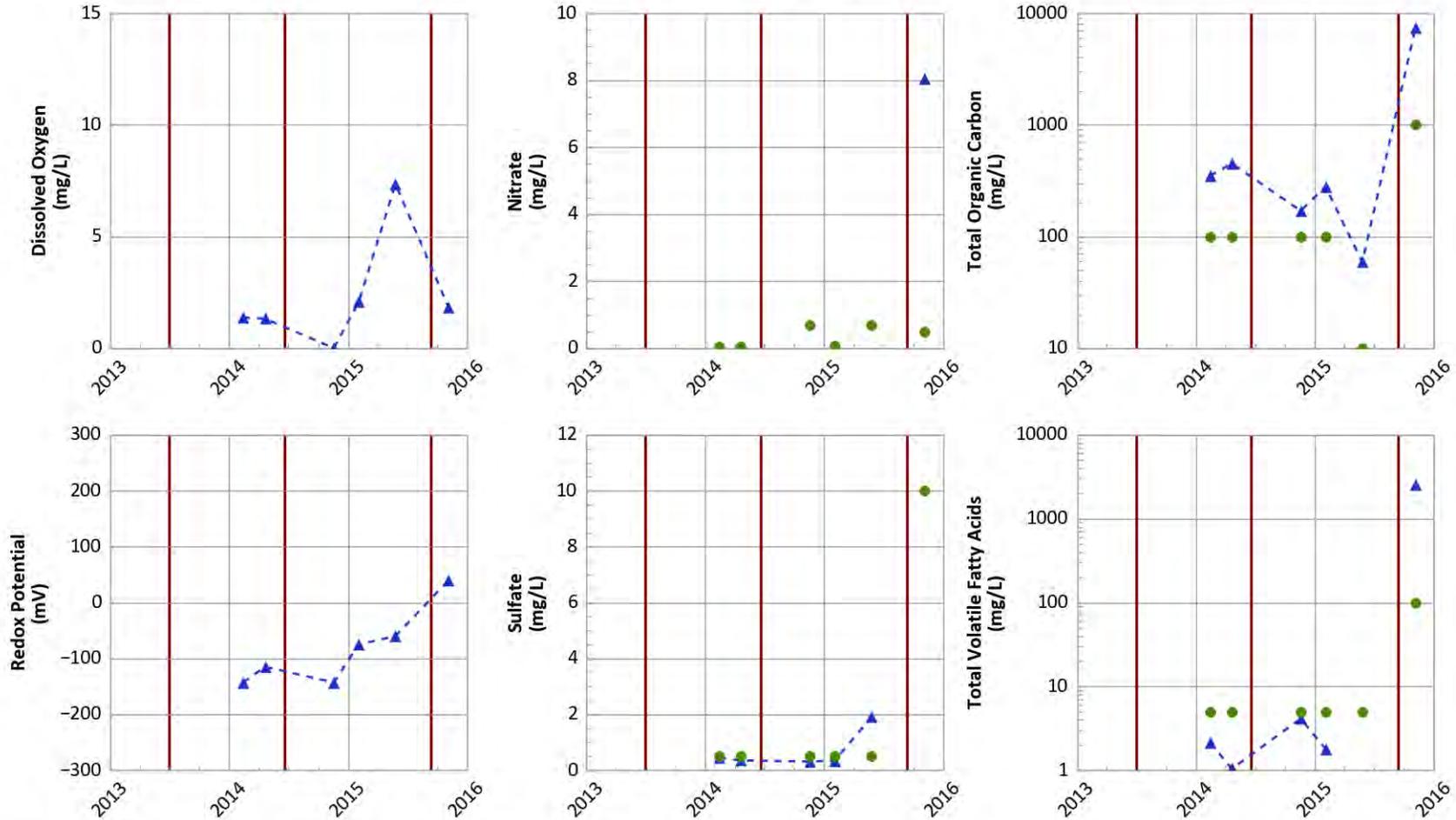
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



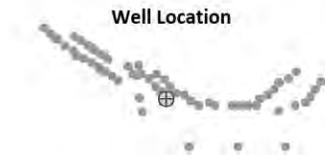
PTX06-ISB077 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



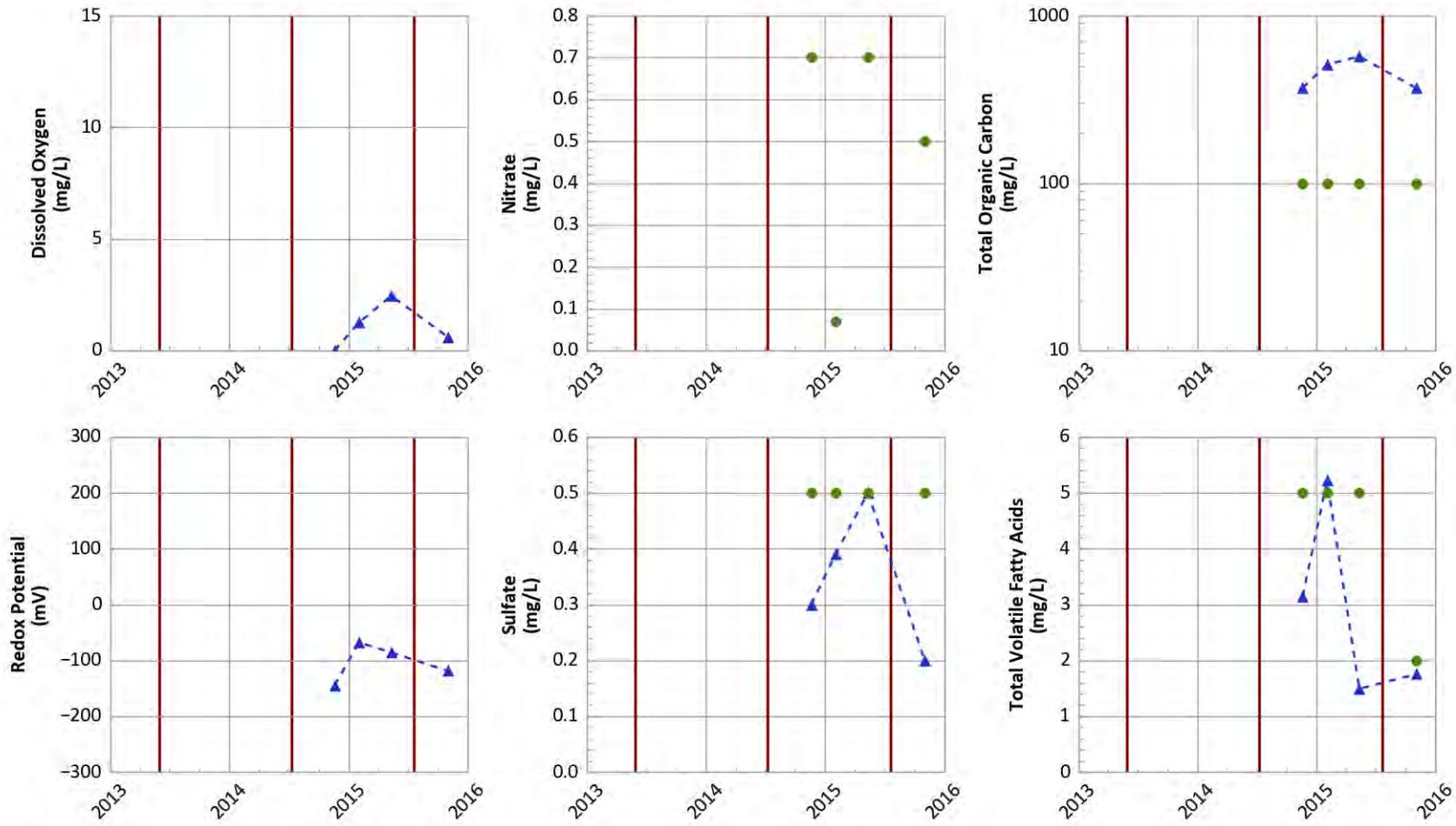
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



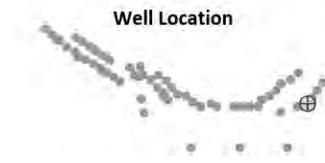
**PTX06-ISB081 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



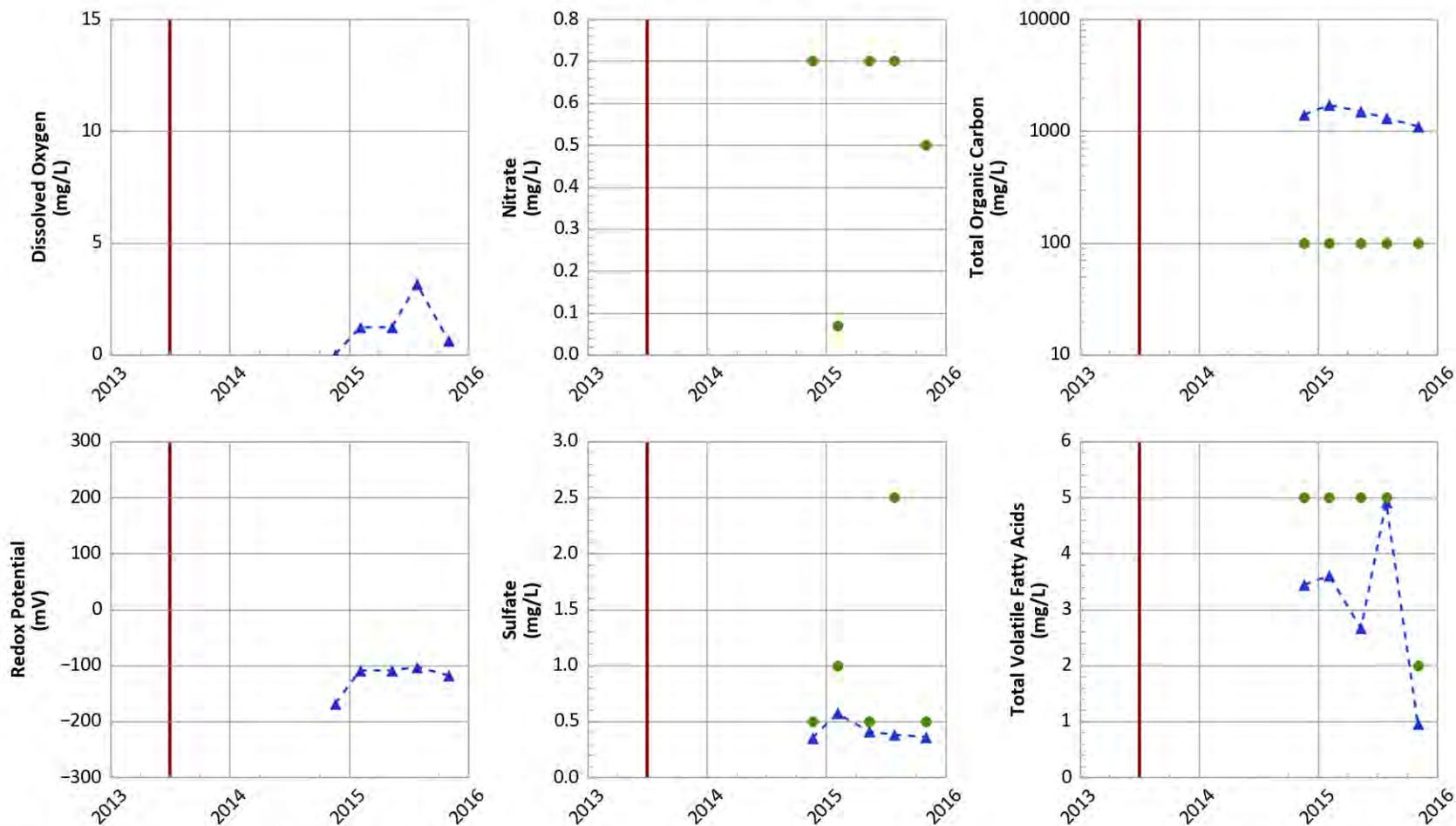
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



PTX06-ISB082 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



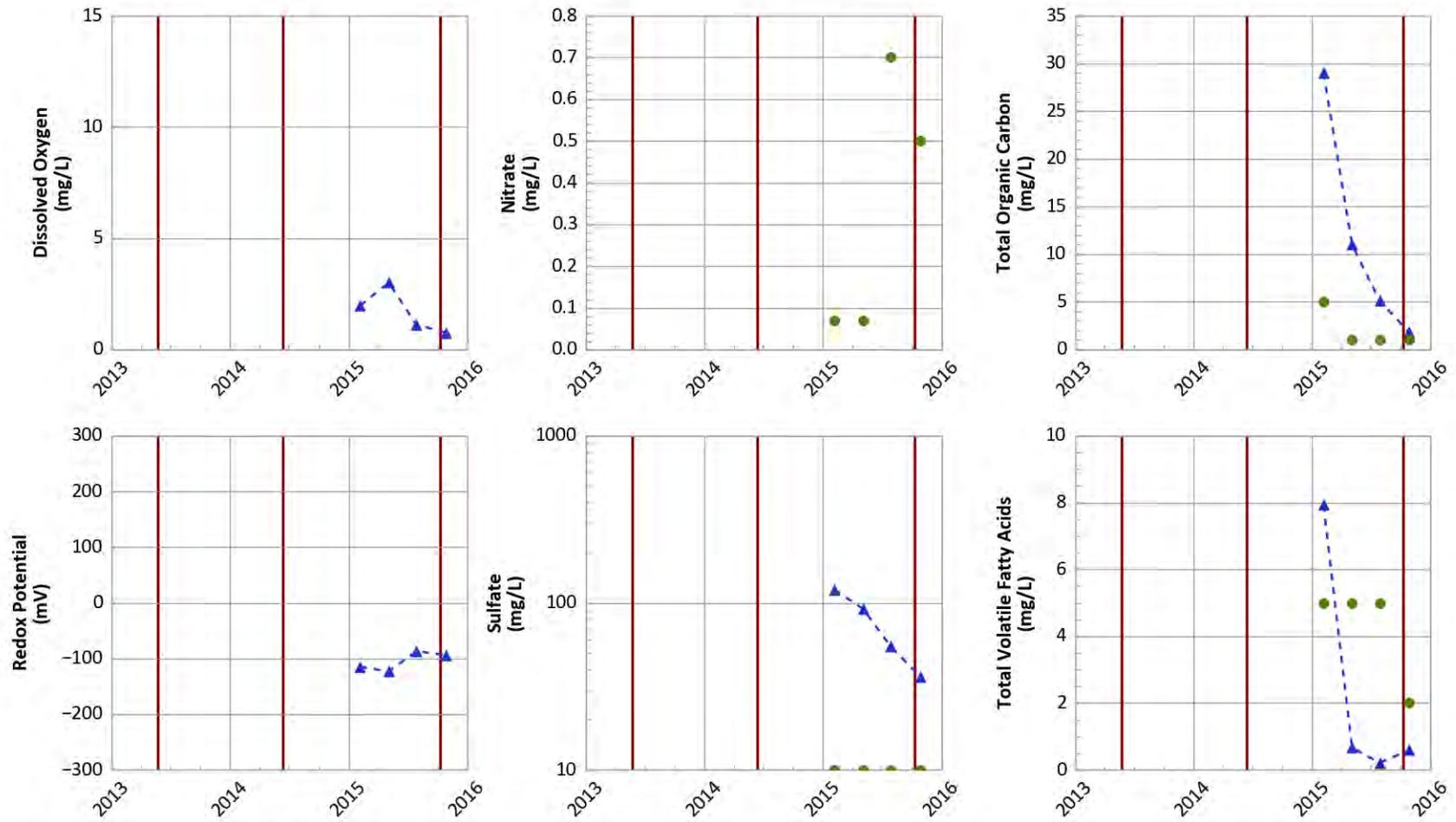
Typical Baseline Concentrations in Perched Groundwater

- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



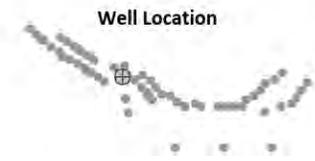
**PTX06-1170 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



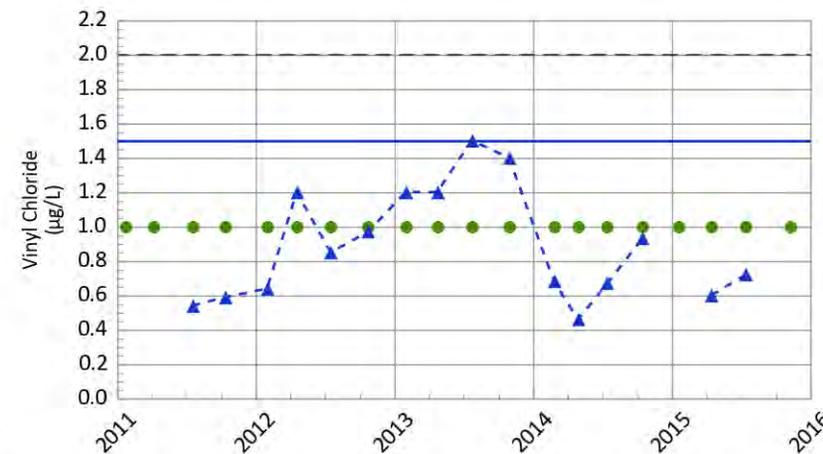
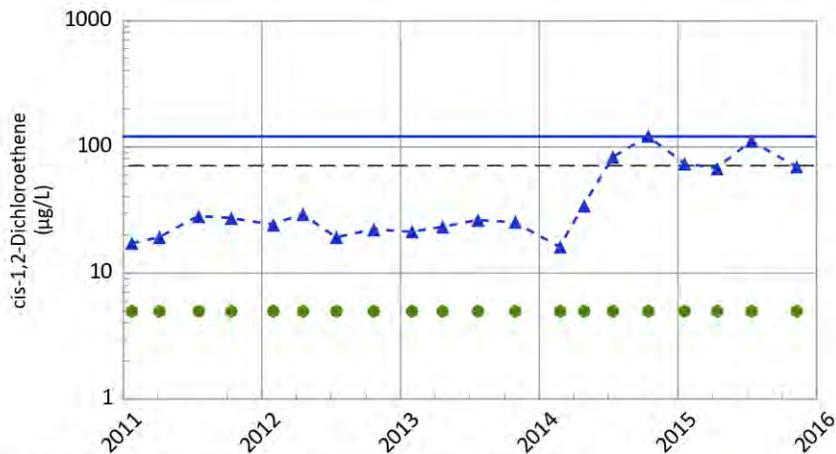
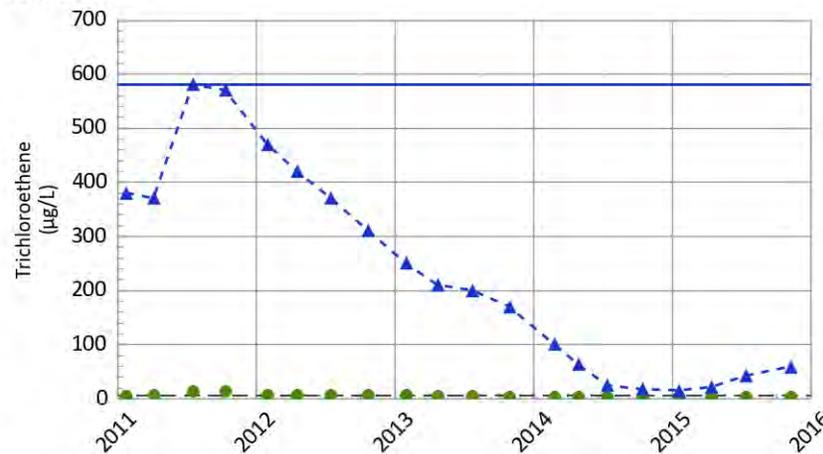
Typical Baseline Concentrations in Perched Groundwater

Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Injection Dates



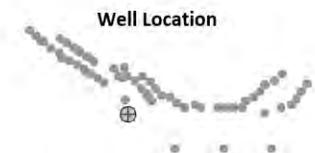
**PTX06-1012 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



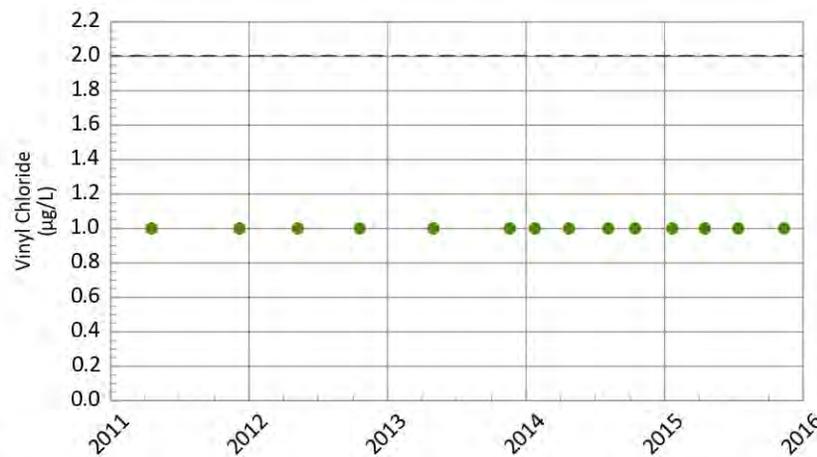
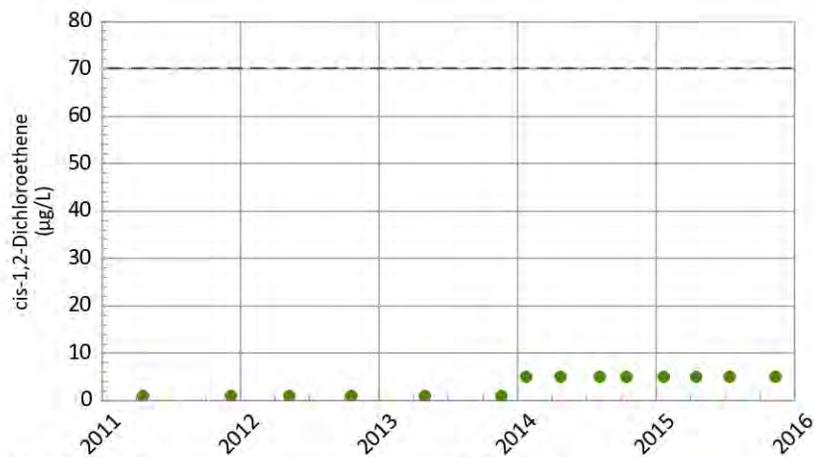
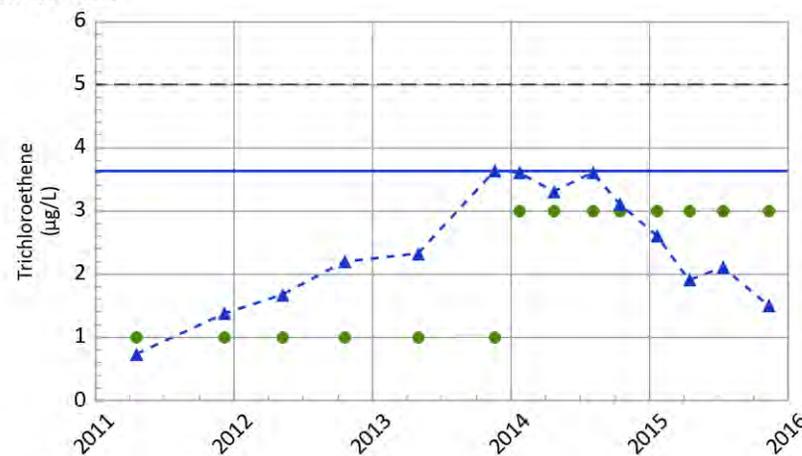
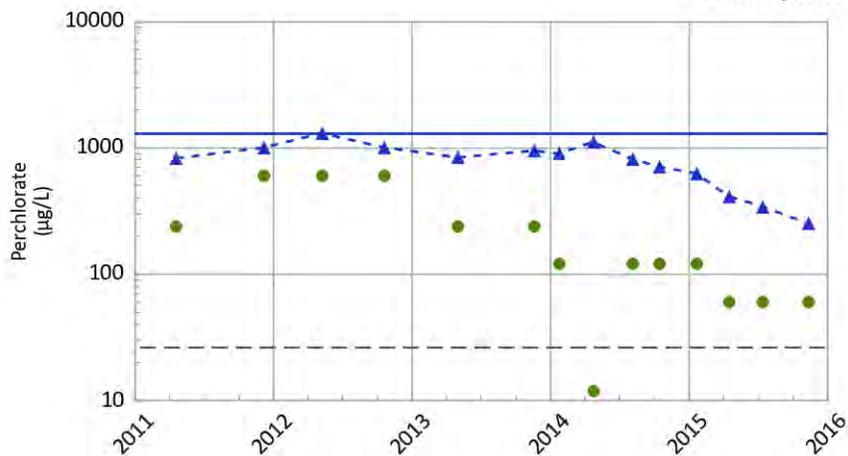
Most Recent Measured COC Concentrations (Jul 13, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	69.0	70.0
TCE	59.0	5.0
VC	Non-Detect	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



**PTX06-1148 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



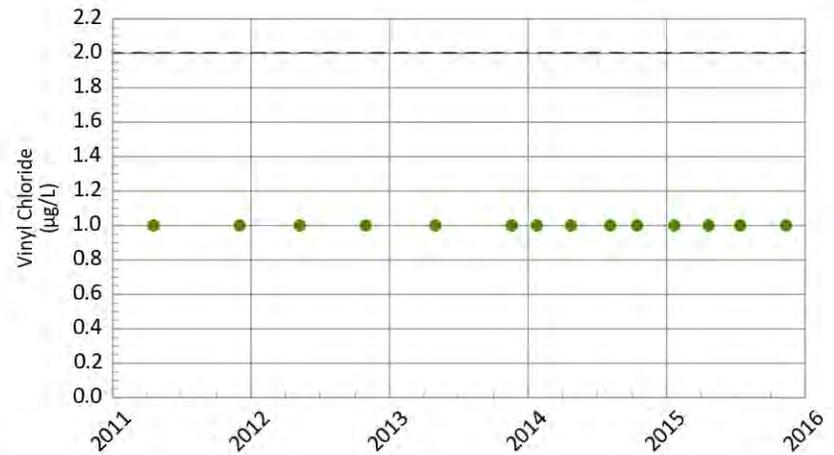
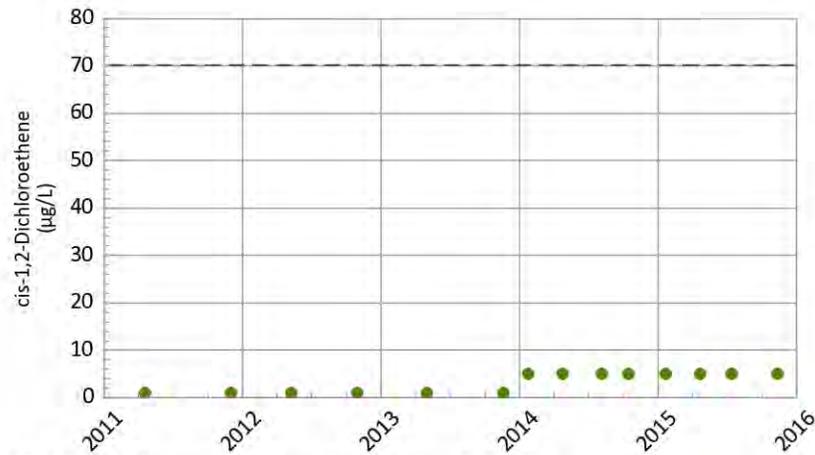
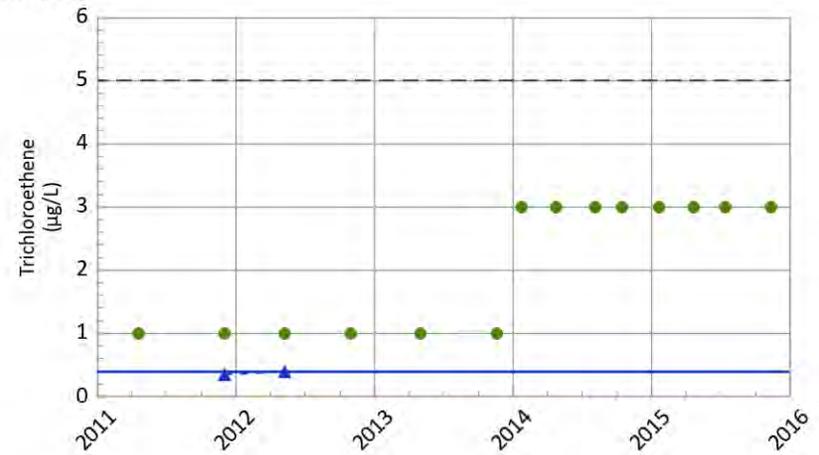
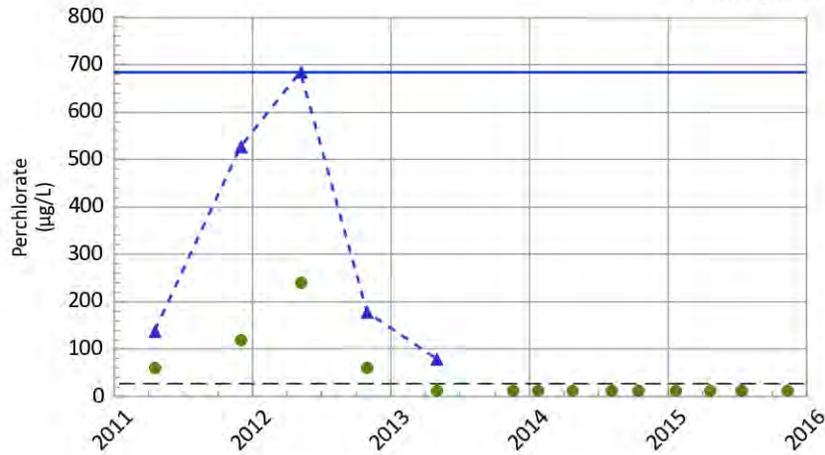
Most Recent Measured COC Concentrations (Nov 10, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	250.0	26.0
DCE12C	Non-Detect	70.0
TCE	1.5	5.0
VC	Non-Detect	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



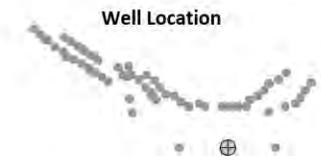
**PTX06-1149 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



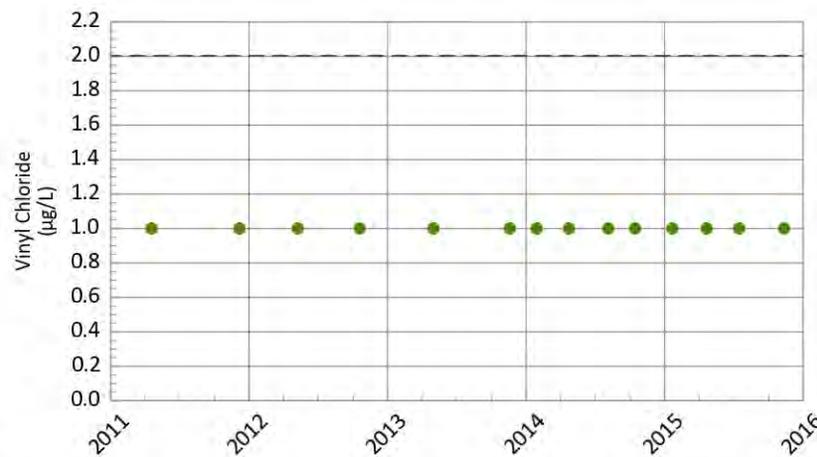
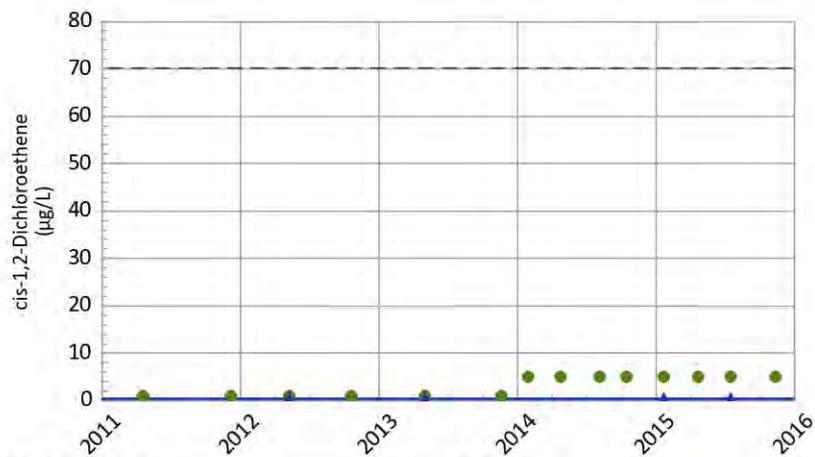
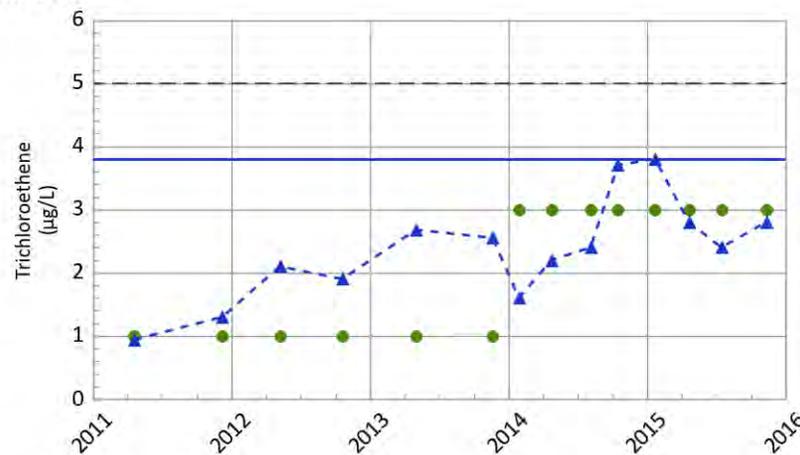
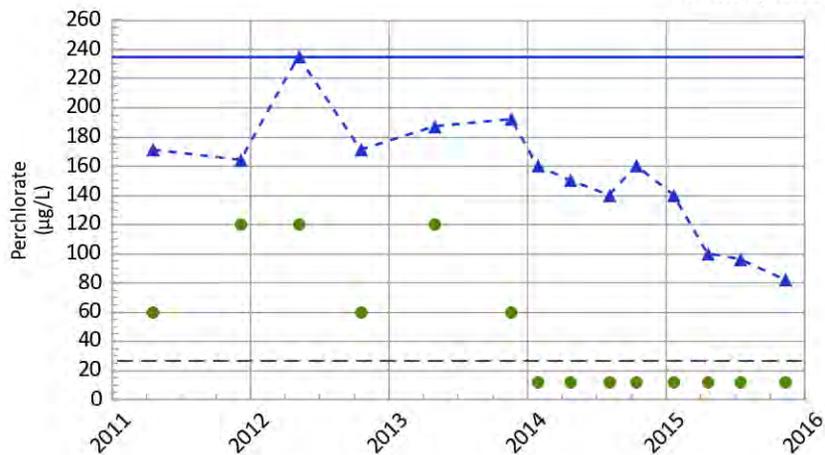
Most Recent Measured COC Concentrations (Nov 10, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	Non-Detect	70.0
TCE	Non-Detect	5.0
VC	Non-Detect	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



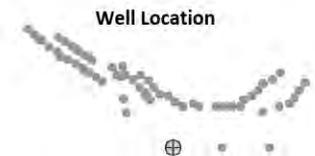
**PTX06-1150 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



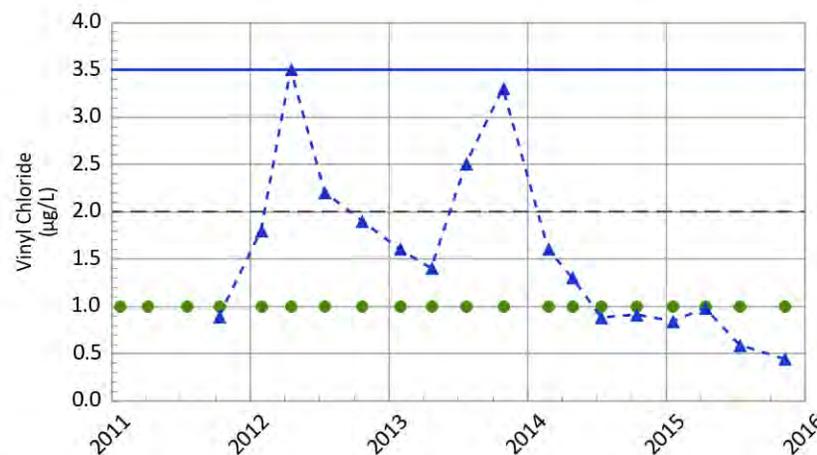
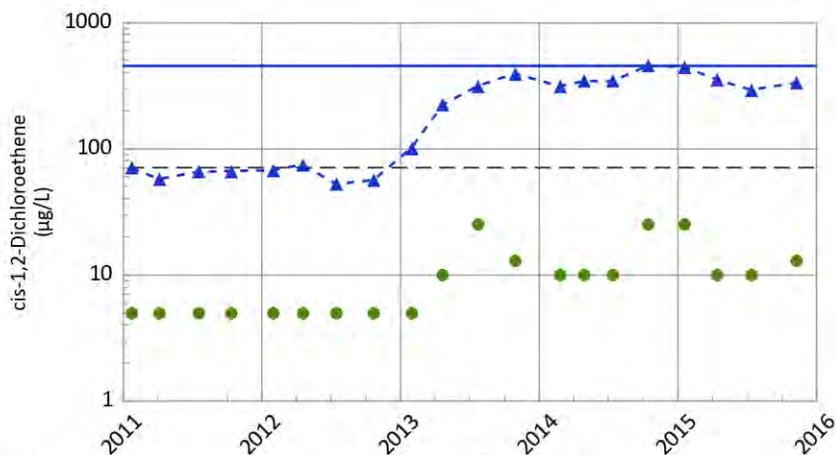
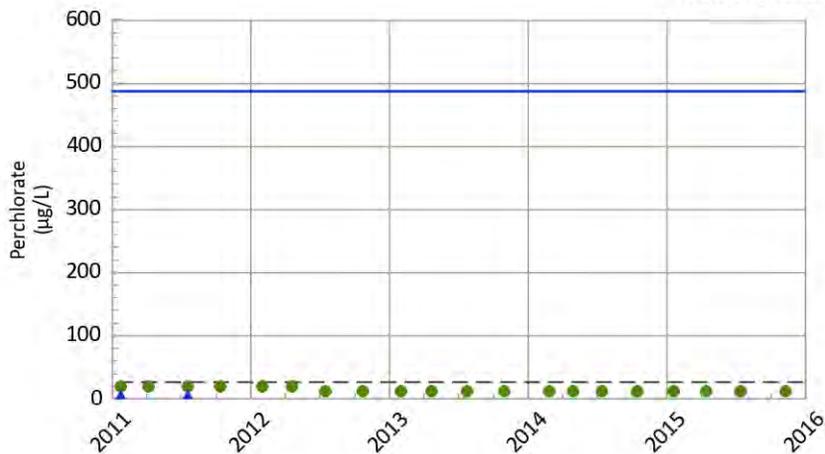
Most Recent Measured COC Concentrations (Nov 10, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	82.0	26.0
DCE12C	Non-Detect	70.0
TCE	2.8	5.0
VC	Non-Detect	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



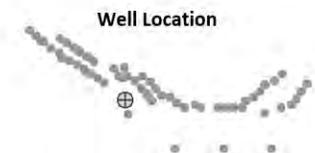
**PTX06-1155 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



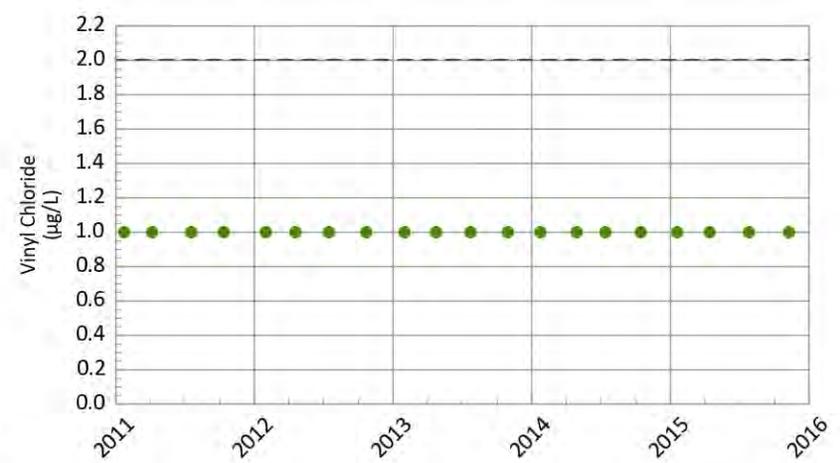
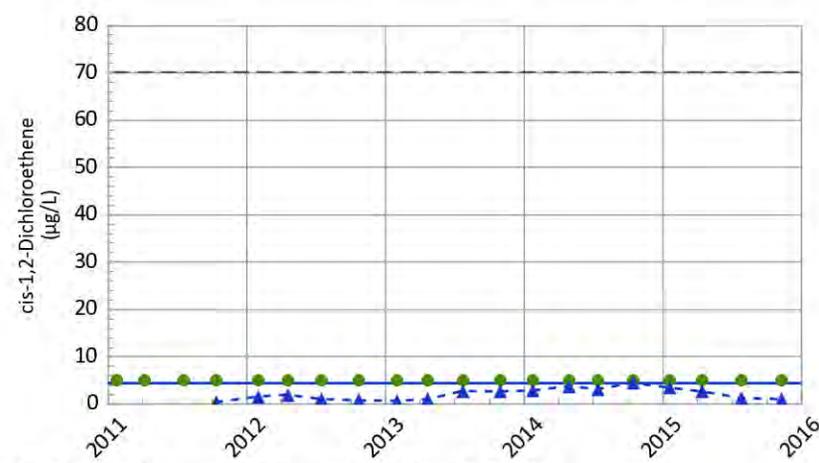
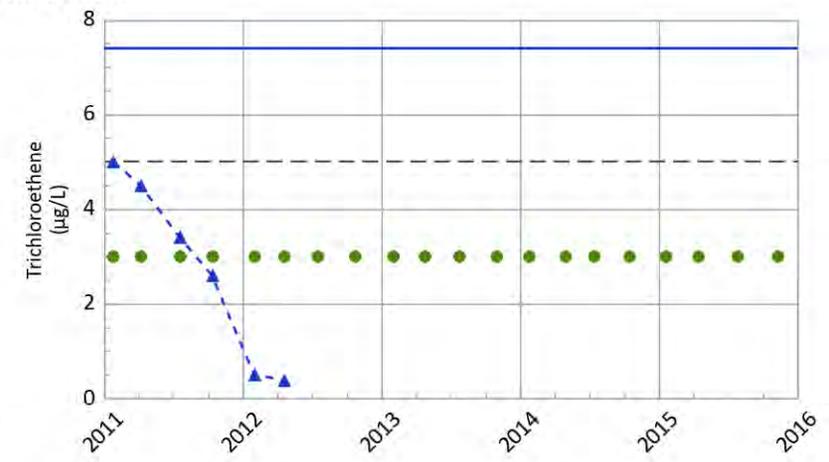
Most Recent Measured COC Concentrations (Nov 09, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	330.0	70.0
TCE	150.0	5.0
VC	0.44	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard



**PTX06-1156 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (Nov 09, 2015)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	0.97	70.0
TCE	Non-Detect	5.0
VC	Non-Detect	2.0

- ▲ Measured Value
- Sample Detection Limit
- - - Concentration Trend
- Maximum Concentration
- - - Groundwater Protection Standard

