PANTEX QUARTERLY PROGRESS REPORT

Remedial Action Progress

1st Quarter 2018

In support of Hazardous Waste Permit #50284 and

Pantex Plant Interagency Agreement

June 2018

Pantex Plant

FM 2373 and U.S. Highway 60

P.O. Box 30030

Amarillo, TX 79120

CERTIFICATION STATEMENT

1st Quarter 2018 Remedial Action Progress Report
Pantex Plant, June 2018

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.

6/11/2018

James C. Cantwell — Date
Director
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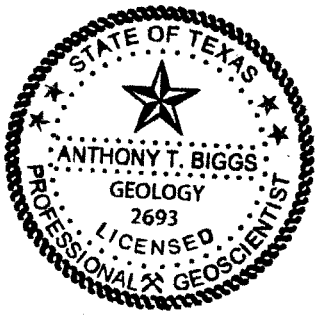
Consolidated Nuclear Security, LLC

Quarterly Progress Report
1st Quarter 2018
in Support of Hazardous Waste Permit #50284
and Pantex Plant Interagency Agreement
for the Pantex Plant, Amarillo, Texas
June 2018

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.



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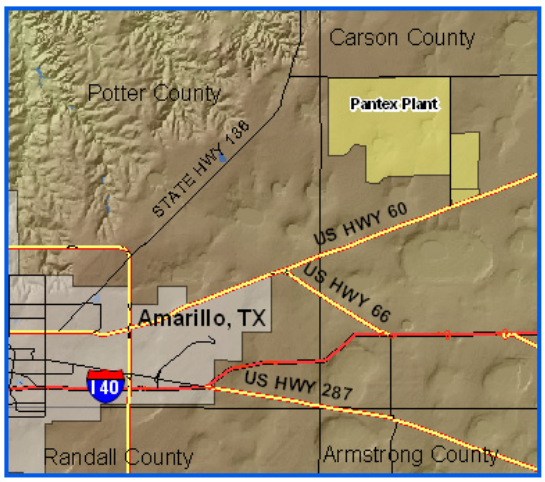
List of Acronyms

µg/L	micrograms per liter
CatOX	catalytic oxidation
COC	contaminant of concern
Cr(VI)	hexavalent chromium
CSIA	compound-specific isotope analysis
DCE	dichloroethene
DHC	*Dehalococcoides* spp.
DNT4A	4-amino-2,6-dinitrotoluene
DO	dissolved oxygen
FGZ	fine-grained zone
FYR	five-year review
GAC	granular activated carbon
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
lb	pound
Mgal	million gallons
mV	millivolts
NAPL	non-aqueous phase liquid
ORP	oxidation-reduction potential
P1PTS	Playa 1 Pump and Treat System
PFM	passive flux meter
PID	photoionization detector
PQL	practical quantitation limit
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
SAP	sampling and analysis plan
SEPTS	Southeast Pump and Treat System
SVE	soil vapor extraction
SWMU	Solid Waste Management Units
TCE	trichloroethene
TNT	trinitrotoluene
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 (VOCs) in soils at the Burning Ground area. This quarterly report addresses progress achieved through implementation of the remedial actions for 1st quarter 2018.



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 Hazardous Waste Permit #50284 (HW-50284) CP Table VII and the Pantex Interagency Agreement (IAG).

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 concentrations 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 groundwater remedial action at the Pantex Plant includes two pump and treat systems: Southeast Pump and Treat System (SEPTS) and Playa 1 Pump and Treat System (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, for general Plant needs, or for amendment injections at the 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). 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.

Pump and Treat System
1st Quarter 2018 Operation

Playa 1 Pump and Treat System (P1PTS)	
Days Operated	75
% Operation Time	82%
Volume Water Treated (Mgal)	20
HE Mass Removal (lbs)	9.7
Beneficial Use of Water	0
Southeast Pump and Treat System (SEPTS)	
Days Operated	62
% Operation Time	68%
Volume Water Treated (Mgal)	15.8
HE Mass Removal (lbs)	63.9
Chromium Mass Removal (lbs)	16.2
Beneficial Use of Water	<1%

Value below operational goals

SEPTS and P1PTS operation and throughput were impacted in 1st quarter by a filter bank break at the irrigation system that occurred in late June 2017. Due to the severity of the break, engineering evaluation, contracting, and major repairs will be required, and the irrigation system is expected to be offline for more than one year. Pantex started releasing all WWTF water to Playa 1 in accordance with our wastewater permit. The flow to Playa 1 is restricted by permit, so flow from the systems must also be restricted until the irrigation system is repaired. Current and future operations will be impaired by the restricted flow to the WWTF. SEPTS has the capability to reinject, so the system has operated at a lower capacity, with the treated water injected into the two available injection wells for the system and/or released to the WWTF and Playa 1. A small amount of water was beneficially used for testing the new ISB lines at the Southeast ISB.

Consistent with pump and treat goals, the systems operated at a lower capacity during 1st quarter when release to the WWTF was restricted or injection was required. For these reasons, operation and throughput were lower than the usual goal of 90%. Graphs of monthly operation and throughput are included in Appendix B. Over 99% of the treated water was either released to Playa 1 or injected into perched injection wells. Pantex has focused on operating the highest priority wells at SEPTS to continue capture of water along the eastern fence line and along the

highest plume concentrations to the south on Texas Tech property. Most wells were operating at P1PTS.

Pantex is currently looking for other irrigation alternatives on the property east of FM 2373 to provide additional long-term use of the treatment system water. Other permit options with the State of Texas are also under evaluation for long-term use of the treated water.

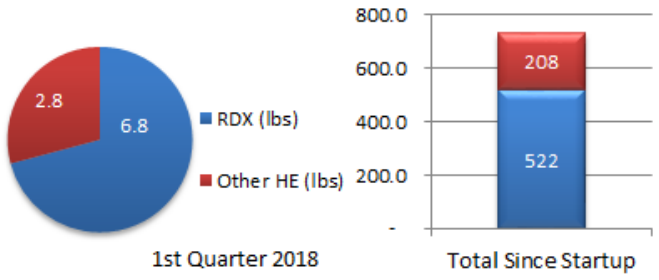


Figure 1. P1PTS Mass Removal

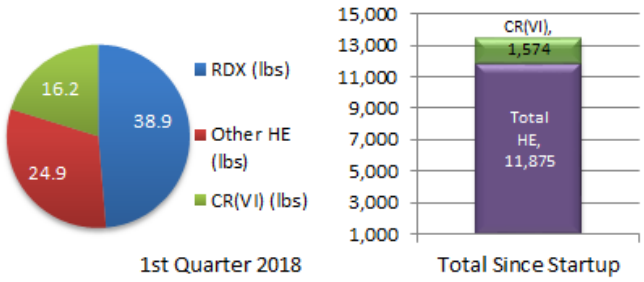


Figure 2. SEPTS Mass Removal

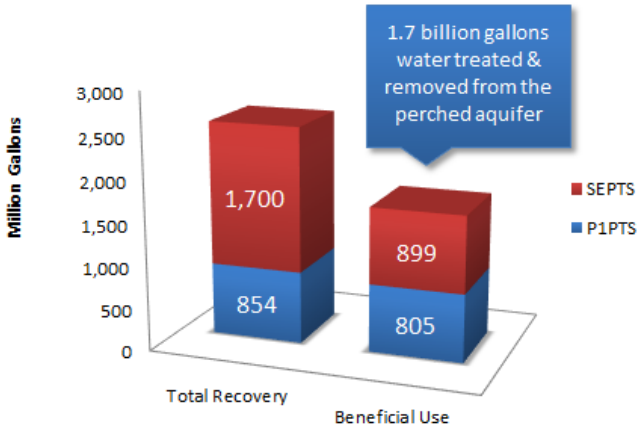


Figure 3. System Recovery and Use

P1PTS removes primarily RDX and SEPTS removes primarily RDX and hexavalent chromium [Cr(VI)]. Figures 1 and 2 provide mass removal information for RDX and other high explosives (HEs) and Cr(VI) for the 1st quarter, as well as totals since system startup. Concentrations near Playa 1 are much lower due to declining source concentrations; therefore, mass removal is much lower at P1PTS. The primary goal of P1PTS is water removal to decrease saturated thickness and remove head that pushes groundwater out horizontally, with mass removal as a secondary goal. Overall, the systems have removed about 14,180 lbs of contaminants from perched groundwater since operations began.

The total recovery and treatment from both systems since startup has been calculated at over 2.5 billion gallons. Because 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 1.7 billion gallons of treated water beneficially used since startup of the irrigation system. The recovery and beneficial use totals are presented in Figure 3. Note that the beneficial use data have been corrected since the last quarterly report. The previous two reports incorrectly added the discharge to the WWTF as beneficial

use. However, water from the WWTF is currently routed to Playa 1, which is not considered a beneficial use of the treated water.

Evaluation of effluent data from both systems indicates that all COCs were treated to levels below the groundwater protection standards (GWPS).

ISB Systems

Three ISB systems (Zone 11 ISB, Southeast ISB, and Southeast ISB Extension) are 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 where 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. The primary COCs at the Southeast ISB are RDX and hexavalent chromium. The primary COC at the Southeast ISB Extension is RDX.

No treatment data are presented in this report for the Southeast ISB Extension, as the system was installed in late 2017 and injection is scheduled to begin in September 2018. A brief discussion of the baseline data collected at the system is included. Treatment zone data will not be collected until 1st quarter 2019.

For the treatment zone wells, this report evaluates whether the conditions are present to degrade the COCs in each area, and evaluates 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 and 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. Table 1 summarizes ISB system performance.

Table 1. ISB System Performance

	Treatment Zone Wells		Downgradient Performance Monitoring Wells		
System	**Reducing Conditions**	**Food Source Available**	**Primary COCs Reduced?**	**COCs < GWPS?**	**Degradation Products of COCs Reduced?**
Zone 11 ISB	Very mild to strong	Yes	Yes	Perchlorate in 6 of 9 wells TCE in 7 of 9 wells	No [1]
Southeast ISB	Medium to strong	Yes	Yes	RDX in 2 of 3 wells Cr(VI) in 3 of 3 wells [2]	No [3]

Mild conditions = oxidation-reduction potential (ORP) of 0 to -50 millivolts (mV)
Strong conditions = ORP < -100 mV and sulfate and nitrate reduced, indicating that conditions are present for reductive dechlorination.

[1] cis-1,2-Dichloroethene (DCE) concentrations remain above GWPS in one downgradient well, while vinyl chloride concentrations (final breakdown compound) remain at low concentrations or not detected. However, during the 1st quarter, only one cis-1,2-DCE concentration (91 µg/L) slightly exceeded the GWPS of 70 µg/L in one downgradient well. Pantex bioaugmented the original wells on the west side of the system during the seventh injection event in 2015. Pantex is continuing to monitor the effectiveness of the bioaugmentation.

[2] Pantex formerly sampled 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 of HEs and Cr(VI) since October 2012.

[3] PTX06-1153 is currently demonstrating partial treatment. Therefore, the degradation products of RDX are now observed slightly above the GWPS.

ZONE 11 ISB

Installation of the Zone 11 ISB remedial action was completed in 2009, and an expansion was completed in early 2015 (see Appendix A maps). Eight injection events have been completed at the current system, with the first injection event occurring in the expansion zone in 2015 and the eighth injection event completed in August 2016 for the original system. As documented in the *2016 Annual Progress Report* (Pantex, 2017), data indicate that moving to a two-year injection frequency in the original portion of the system is appropriate for future injections. The expansion area will continue to be injected yearly until the system is established. Pantex continues to evaluate the expansion area to determine the appropriate timing for bioaugmentation with *Dehalococcoides* spp. (DHC) to potentially boost the treatment efficiency for TCE.

The system has a well-established treatment zone in the original portion of the system, where injection has occurred since 2009. The expansion area (see map in Appendix A) has only received two injections, so deeper reducing conditions are just being established at the injection wells. Deep reducing conditions may not be fully demonstrated at all of the wells that are monitored in the expansion area due to their placement between injection wells. Additionally, wells downgradient of the expansion area are not expected to fully demonstrate treatment until up to two years following the second injection, which occurred in 2016.

Evaluation of data in the treatment zone wells indicates mild to strong reducing conditions on the perchlorate (eastern) side of the Zone 11 ISB. Reducing conditions across the TCE side (see plume

map in Appendix A) ranged from very mild (ORP > 0 and sulfate rebounding in some wells) to strong. Monitored conditions indicate that sulfate was reduced in 5 of 13 wells inside the treatment zone. A total of 4 of the wells that do not have deep reducing conditions are non-injected treatment zone wells, indicating that deeper reducing conditions are present near the injected wells for the reduction of TCE. Review of data at injection wells versus treatment zone wells that are located between injection wells indicate that reducing conditions 25 to 50 ft from injection wells are mild and are likely not conducive to reduction of TCE. However, methane concentrations were high in most treatment zone wells this quarter, indicating that strong reducing conditions continue to occur in many areas. TCE continues to be reduced to cis-1,2-dichloroethene (DCE), with TCE concentrations near or below GWPS in all but 4 wells inside of the treatment zone and cis-1,2-DCE present at concentrations above the GWPS in 3 of the wells. The presence of TCE and cis-1,2-DCE continues to indicate partial treatment in the non-injected treatment zone wells, as concentrations tend to be higher in the non-injected wells. When greater amounts of TCE and cis-1,2-DCE are being degraded, ethene and vinyl chloride are expected to be detected. Vinyl chloride was detected in one well inside the treatment zone. Ethene was detected at low concentrations in two wells, indicating that TCE is being completely degraded in limited amounts in some areas of the treatment zone. When TCE concentrations inside the treatment zone are low (< 300 µg/L), these low degradation rates may be enough to treat TCE and its breakdown products to GWPS. Upgradient data still indicate TCE concentrations periodically fluctuating above 300 µg/L.

Pantex evaluates performance at nine downgradient ISPM wells for the Zone 11 ISB, including the wells in the expansion area. Six of these wells (PTX06-1012, PTX06-1149, PTX06-1155, PTX06-1156, PTX06-1173, and PTX06-1174) have perchlorate concentrations below the GWPS. PTX06-1148, which is farther downgradient, has been slower to respond due to expected longer travel times. One of the new wells downgradient of the expansion area (PTX06-1175) does not yet demonstrate treatment of perchlorate. The perchlorate concentration detected in PTX06-1150 remains slightly above the GWPS. TCE concentrations are below the GWPS in seven of nine ISPM wells. Two wells (PTX06-1150 and PTX06-1175) demonstrate TCE concentrations above the GWPS, although concentrations are near the GWPS in PTX06-1150. The first breakdown product of TCE, cis-1,2-DCE, continues to be detected above the GWPS in in only one downgradient well, PTX06-1155. However, the current concentration is near GWPS, indicating that treatment of TCE and its breakdown products are very close to meeting the GWPS in treated water from the original portion of the system. The only downgradient well that is not demonstrating strong treatment is PTX06-1175.

Two former ISB injection wells (PTX06-ISB079 and PTX06-ISB082) are now monitored to evaluate conditions on the perchlorate (eastern) side of the ISB, in the second row of injection wells. Pantex will no longer inject into the second row of wells, and will evaluate these wells to ensure that treatment continues on the perchlorate side of the ISB. Additionally, the results for upgradient well PTX06-1127 indicate that TCE is increasing on the eastern side of the ISB, so treatment of the TCE will also be evaluated to determine if changes in the system will be required. Currently, perchlorate and the low concentrations of TCE that occur on the eastern side are treated to non-detect. No degradation products of TCE were detected.

Although there are areas in the treatment zone that indicate mild reducing conditions, the downgradient data indicate that treatment is effectively reducing contaminants and risk.

Due to a delay in contracting, Pantex will inject the expansion area and two wells that were skipped in 2016 on the perchlorate side of the ISB in 2nd quarter 2018. Due to very mild conditions that occur in the new treatment zone wells in the expansion area, Pantex will continue to evaluate data to determine the appropriate timing for bioaugmentation and moving to a two-year injection frequency.

SOUTHEAST ISB

The Southeast ISB was installed in 2007. Six injection events have been completed at this system. The Southeast ISB continues to demonstrate declining water levels at the system; as a result, only 50% of the system was injected during 2016. A discussion of the injection and issues encountered during injection are provided in the 2016 Annual Progress Report. Based on review of system data and ISB Pilot Study data, Pantex recommended waiting three years for the next injection in the Southeast ISB (see 2016 Annual Progress Report).

Due to low water or dry conditions, only four of eight treatment zone monitoring wells were sampled in 1st quarter. Evaluation of treatment zone data indicates that strong reducing conditions are present for treatment of HEs and hexavalent chromium. ORP is less than -50 mV and sulfate is reduced to values less than 2 µg/L, indicating that reducing conditions are present for continued reduction of HEs and hexavalent chromium. Total organic carbon results indicate that a continued food source is available to maintain the deep reducing conditions. All COCs were non-detect in the sampled treatment zone wells.

Four downgradient wells have historically been sampled at this system. Two of the closest downgradient monitoring wells for the Southeast ISB, PTX06-1037 and PTX06-1154, demonstrate reduction of RDX, RDX degradation products, and hexavalent chromium, with all primary COCs not detected. PTX06-1123 had demonstrated COC concentrations below the GWPS; however, this well has not been sampled since August 2015 due to insufficient water being present in the well. PTX06-1153 continues to exhibit RDX concentrations above the GWPS, but hexavalent chromium concentrations continue to demonstrate a decreasing trend below the GWPS. During 1st quarter, this well continued to demonstrate signs of partial treatment. Breakdown products of RDX were detected at concentrations above the GWPS. Upgradient dry wells were injected in 2013 and 2015 in an attempt to affect this well. It is possible that those injections were slow to respond at this location and may only be partially affecting the water that continues to move into PTX06-1153. As with other locations, water levels at this well continue to decline. Pantex will continue to monitor PTX06-1153 for contaminant concentrations and water levels over time.

Many of the injection and performance monitoring wells indicate variable water conditions at the Southeast ISB. Two Southeast ISB performance monitoring wells (one upgradient and one farther downgradient) remain dry and cannot be sampled. PTX06-1123, a downgradient performance monitoring well, has not been sampled since August 2015 due to low water conditions. The remaining three downgradient wells demonstrate declining water levels, with only PTX06-1153

containing more than 4 ft of water above the bottom of screen. PTX06-1037 was sampled only for the highest priority constituents, as this well now goes dry during sampling. Only four of eight monitoring wells in the treatment zone could be sampled in the 1st quarter due to insufficient water. Injection was completed at only 50% of the injection wells during the 2016 injection event due to dry or low water (< 1 ft) conditions in the wells. The inability to sample or inject into these wells is expected to persist with continued upgradient removal of water by the SEPTS. Evaluation of data indicates that most wells in the Southeast ISB will not contain appreciable water by 2022. Pantex will evaluate the timing and need for further injections after the 2019 injection event.

Southeast ISB Extension

The Southeast ISB Extension was installed in 2017 as an extension of the chosen remedy for the southeast perched groundwater. No injection events have been completed for this system, as the system was completed in December 2017. Pantex is currently contracting to install the roads, pads, and infrastructure to inject. Pantex plans to begin injection at the system in September 2018.

Baseline data for the treatment zone wells were collected in 1st quarter 2018. Two downgradient ISPM wells were installed on the neighboring property to the south of the system and one more ISPM well is planned to be installed to the southeast once an agreement is reached with the landowner. Samples were also collected at the installed ISPM wells. A summary of the COC minimum and maximum detections for the treatment zone and ISPM wells is included in Table 2.

Table 2. Summary of COC Detections at Treatment Zone and Downgradient Monitoring Wells at the Southeast ISB Extension

Analyte	Min Detect (µg/L)	Max Detect (µg/L)	GWPS (µg/L)
Treatment Zone Wells			
RDX	0.12	1280	2
4-amino-2,6-Dinitrotoluene	0.175	7.83	1.2
2,6-Dinitrotoluene	0.098	0.188	1
HMX	0.099	2.27	360
MNX	0.098	21.4	2
DNX	0.24	11.5	2
TNX	0.23	27	2
1,3,5-Trinitrobenzene	0.095	0.116	220
1,2-Dichloroethane	0.43	0.43	5
Trichloroethene (TCE)	0.41	0.83	5
Total Chromium	4.1	21	100
Hexavalent Chromium	0.01	4.05	100
Downgradient In Situ Performance Monitoring (ISPM) Wells (PTX06-1191 and PTX06-1194)			
RDX	0.137	93.5	2
4-amino-2,6-Dinitrotoluene	1.81	1.81	1.2
TNX	0.297	0.297	2
Hexavalent Chromium	0.776	2.3	100

Burning Ground SVE

The Burning Ground SVE system began operation in 2002 as a large-scale catalytic oxidizer (CatOX) system. Due to a large reduction in VOC concentrations, a small CatOX system 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 1st quarter. It was shut down due to low process flow alarms and low pH levels in January and February, with the system operating about 81% of the quarter (about 1,754 hours of operation). Figure 4 shows mass removal calculated for the 1st quarter and since startup for VOCs contributing more than 2% of the total VOC concentration.

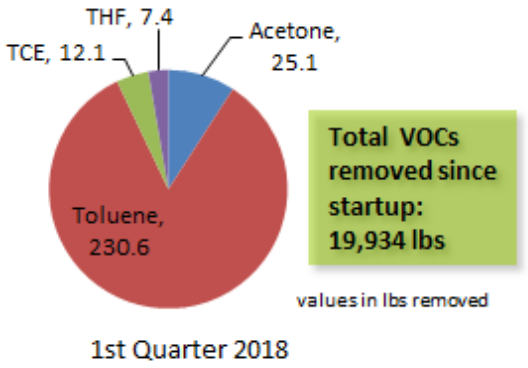


Figure 4. SVE Mass Removal

The system removed about 275 lbs of VOCs during 1st quarter, and has removed over 19,930 lbs of VOCs since startup. Based on PID data collected at the system effluent port, system destruction efficiency was at least 96%. The system operated at a higher flow due to the modifications to the system, with the flow increased from 32 standard cubic feet per minute (scfm) to the current level of 44.5 scfm. The hourly VOC removal rates increased with the increased flow until 1st quarter. The removal rates are beginning to decline at the system. Pantex will continue to evaluate the effectiveness of removal with the increased flow rates to determine when removal appreciably decreases.

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 aquifers), 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 the 1st quarter indicates unexpected conditions at one Ogallala Aquifer well. No detections exceeded the GWPS in the Ogallala Aquifer uncertainty management/early detection wells sampled during the 1st quarter. No uncertainty management perched wells were sampled in the 1st quarter.

PTX06-1056 continues to demonstrate detections of 4-amino-2,6-dinitrotoluene (DNT4A), a breakdown product of the HE 2,4,6-trinitrotoluene (TNT), with the initial detection occurring in

Summary of Unexpected Ogallala Detections, 1st Quarter 2018

Well ID	Sample Date	Analyte	Measured Value (µg/L)	PQL (µg/L)	GWPS (µg/L)
PTX06-1056	2/26/2018	1,2-Dichloroethane	0.2	1	5
PTX06-1056	2/26/2018	4-Amino-2,6-Dinitrotoluene	0.309	0.26	1.2

April 2014. Sample results collected since that time have been variable, with a few values slightly exceeding the PQL. DNT4A concentrations exceeded the PQL during 1st quarter 2018. 1,2-Dichloroethane (DCA12) has been variably detected since August 2015, with all detections below the PQL. Trends of these analytes were performed using Mann-Kendall statistics; DNT4A continues to demonstrate a slight increasing trend when evaluating all data collected at the well. However, DNT4A is demonstrating a stable trend in recent data (last four samples). DCA12 is demonstrating no trend across all data and an increasing trend across recent data (last four samples).

Pantex has proactively evaluated potential sources for the contamination. A nearby perched well that was drilled deep into the fine-grained zone (FGZ) was plugged to address that potential source. An outside review indicated that, based on fate and transport modeling, the perched well was the most likely source of the contamination. A cement bond log was run on PTX06-1056 in October 2016 to determine the competency of the concrete seal at the FGZ. The log indicates that the seal is competent and that PTX06-1056 is likely not acting as a preferential pathway for contamination to reach the Ogallala Aquifer. As agreed with regulatory agencies, Pantex will continue with quarterly sampling to evaluate trends in these detections. Further actions will be determined based on results of sampling and in accordance with the Pantex Groundwater Contingency Plan.

Two detections of 1,4-dioxane were observed in two Ogallala wells (PTX06-1068 and PTX07-1R01) during 4th quarter 2017, with one detection above the PQL and the other below. The Contingency Plan does not require a resample when the concentration is below the PQL; the well can continue to be evaluated through the regularly scheduled sampling in the Sampling and Analysis Plan. Pantex resampled PTX06-1068 during 1st quarter 2018, with results indicating that 1,4-dioxane was not confirmed. This well will continue to be monitored in accordance with the approved Sampling and Analysis Plan.

Other Unexpected Conditions

Pantex routinely evaluates data as they come in from the laboratory to determine if data are off-trend, at an all-time high, or represent a new detection that may require further sampling or evaluation. Through the well maintenance program, Pantex also inspects wells at least every five years to ensure they are not silting in and to evaluate whether the well remains in contact with the formation.

As discussed in the three previous quarterly reports, Pantex drilled PTX06-1182 in 2016 to evaluate water conditions in the southeastern lobe of perched groundwater based on the continued

evaluation that indicates that some portions of the southeast perched groundwater are not under the influence of the pump and treat systems. Water containing HEs at concentrations above the GWPS was discovered in PTX06-1182. In response to that information, Pantex installed three new wells (PTX06-1184, PTX06-1185, and PTX06-1186 [subsequently changed to PTX06-ISB107, the first well on the west side of the ISB]) during 2nd quarter 2017 to define the extent of the plume to the southeast (see figure in Attachment A maps for well locations). Water was discovered in PTX06-1184 and PTX06-1186 and data confirmed the presence of the HEs RDX and DNT4A.

As previously recommended, Pantex obtained additional funding to extend the Southeast ISB remedy to the southeast boundary of the site and add new monitoring wells. Pantex completed drilling the wells in December 2017. Pantex also obtained an agreement with the landowner to the south. Drilling was completed for those four wells in January 2018. Water was present in three of the wells; the other (PTX06-1193) was dry. Pantex has completed sampling at the newly completed ISB wells and on the neighboring property. The ISB and ISPM data are summarized in the Southeast ISB Extension section. Only one of the new wells on the neighboring property demonstrated detections of COCs above GWPS. In January, Pantex also installed another monitoring well (PTX06-1195) along the eastern fence line, north of the final Southeast ISB Extension well to define extent in that area. Results indicate that the well had no detections of COCs above background concentrations or GWPS. The new wells are depicted in Appendix A. These data were included in the 2017 Annual Progress Report plume and perched extent mapping to provide a depiction of the known extent of contamination in that area as of February 2018. Those extents are also depicted in Appendix A maps. Pantex is continuing to work with the neighboring landowner to the southeast to obtain an agreement to drill wells on their property to aid in determining extent of contamination.

SCHEDULE UPDATE

Pantex provided a detailed schedule of upcoming work in the 2017 Annual Progress Report. An update of the activities scheduled to be started or completed by the publication date of this report is provided below.

Pantex completed the following:

- A draft Five-Year Review (FYR) report was completed and submitted to regulatory agencies in May 2018 for comment.

Pantex continues progress toward completion of the following items:

- Pantex continues to work with the neighbor to the southeast to obtain an agreement to drill wells to aid in determining contaminant extent in the southeast perched groundwater lobe.
- The RDX natural attenuation study has been contracted and groundwater samples have been collected. Laboratory analysis and data evaluation are underway. The study is expected to be completed by June 2018.

- Rehabilitation and injection of the Zone 11 ISB Expansion area began in April 2018. The injection is expected to be completed in July 2018.
- Pantex is contracting for construction of Landfill 3 erosion control. Work is expected to be completed in 2018.
- Pantex is contracting for the construction of the SEPTS extension tie-in of the new wells east of FM 2373. The construction is expected to be completed by October 2018.
- Contracting for the design and construction of the Southeast ISB Extension injection components, electrical, water conveyance, roads and pad began in December 2017. The design and construction is expected to be completed in November 2018.
- Pantex is in the process of contracting services with Willowstick for a specialized geophysical study of the southeast lobe of perched groundwater to attempt to identify preferential flow paths. This study may help identify locations that are conveying most of the contaminants to the southeast.
- Pantex contracted for passive flux meters (PFMs) to be developed for wells in the southeast lobe of contamination, east of FM 2373. The PFMs will be used to evaluate water flux in the southeast lobe, east of FM 2373 and south of the Pantex property. The PFMs were deployed by Pantex in April 2018. The PFMs were removed in late April and samples were sent to Enviroflux for analysis. Results are expected to be available for the 2nd quarter progress report.
- Pantex has contracted for an evaluation of the best methods to treat the plume that extends northwest of the Zone 11 ISB. That evaluation is scheduled for completion by June 2018.
- Pantex is preparing for the 2018 landfill repair work. The work focuses on filling holes/voids, reseeding, and maintenance of the Landfill 1 Closure Turf. This work is expected to be completed by October 2018.

Upcoming work includes the following:

- The Southeast ISB Extension injection is expected to begin in September 2018. Work will begin using generators to expedite the injection while the electrical infrastructure continues to be constructed.
- Comment resolution for the FYR. The FYR is expected to be finalized by September 2018.

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 the influence of the remediation systems. Perched water levels are declining, mass is being removed or reduced, and institutional controls provide

protection for use of impacted groundwater, while the remedial actions continue to operate to meet long-term goals. Pantex is working to extend treatment systems to areas that are not currently under the influence of the existing remediation systems.

The pump and treat systems continue to remove COC mass and water from critical areas in the perched aquifer, thus decreasing head that is driving vertical and lateral movement of perched groundwater. The systems have been impacted by the shutdown of the irrigation system and Pantex is evaluating other options for release or use of the treated water. Pantex will continue to inject and release water to Playa 1 until the irrigation system is repaired or other uses can be identified and constructed.

Monitoring results for areas downgradient of the ISB systems continue to demonstrate that system treatment has been generally effective. COC concentrations meet the GWPS at the Southeast ISB at three downgradient wells. 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. Data collected this quarter continue to indicate that partially treated water has entered the well. The well may be responding to injections at upgradient dry wells in 2013 and 2015. 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 evaluation of data over time.

Downgradient wells at the Zone 11 ISB are generally demonstrating treatment. Six of the nine downgradient ISPM wells exhibit perchlorate concentrations below the GWPS, with perchlorate concentrations near GWPS in one of the three wells above GWPS. Long-term declining concentrations occur in the other two wells. Since the start of the remedial action, TCE concentrations continue to indicate a decreasing trend, with current concentrations below the GWPS in seven of nine downgradient wells. Detected concentrations of the TCE breakdown product cis-1,2-DCE persist, although the latest results indicate that it is being treated to concentrations near the GWPS in the original part of the system that has been injected the longest. Sampling results indicated some presence of vinyl chloride and ethene this quarter, indicating that complete reduction of TCE is occurring on a limited basis. Pantex will collect samples again in 2018 to further evaluate the effectiveness of the bioaugmentation. Rehabilitation and injection began in the expanded area in 2nd quarter 2018.

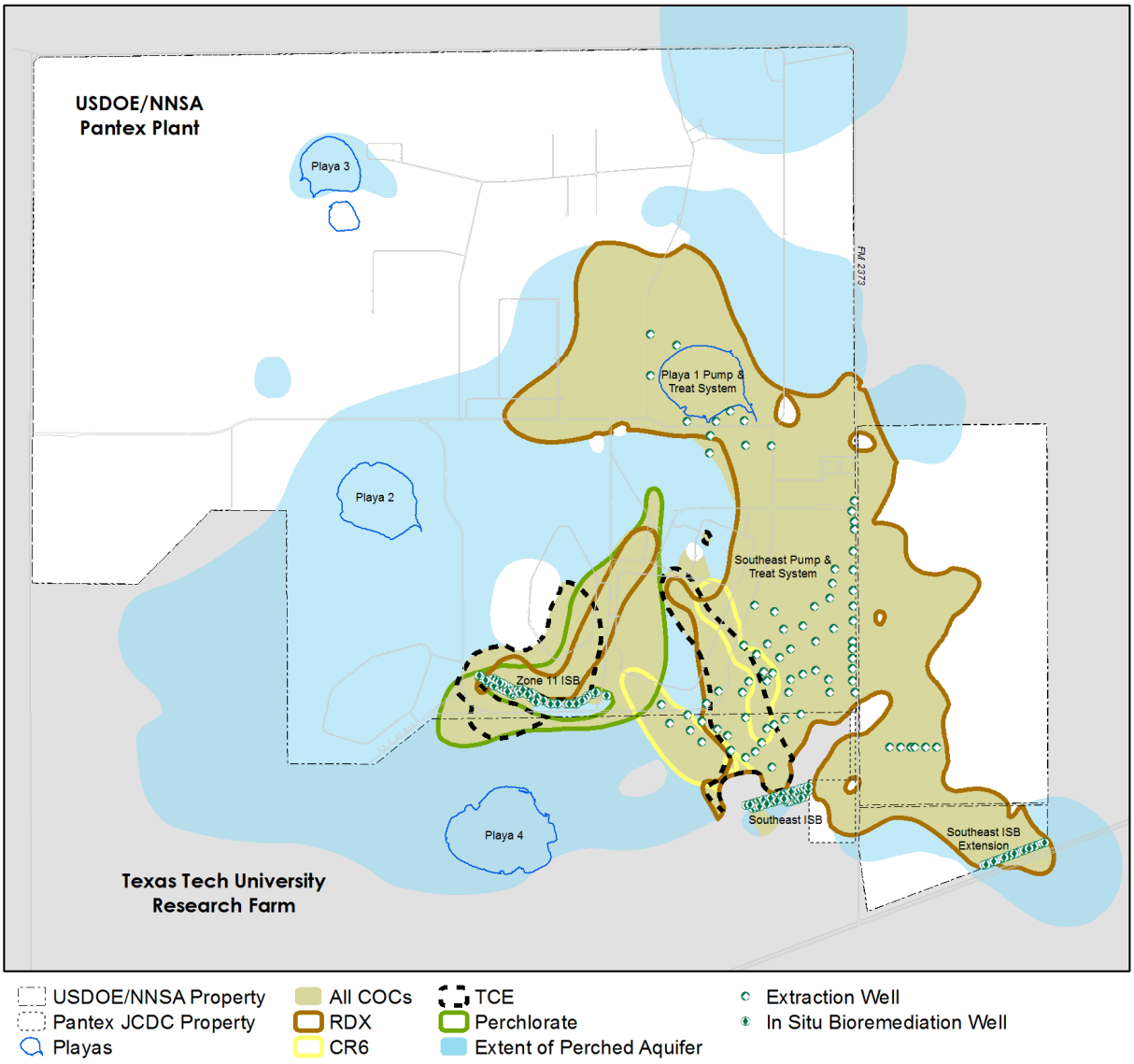
The SVE system continues to treat soil gas and residual NAPL in the solvent evaporation pit/ chemical burn pit area of the Burning Ground, thereby mitigating vertical movement of VOCs to groundwater. Pantex has continued to have problems with completing rebound tests, and has been unable to prepare a path to closure as recommended in the first FYR. Therefore, Pantex has evaluated other paths to closure for this system. In May 2017, Pantex completed a modification to six inactive SVE extraction wells surrounding the active extraction well SVE-S-20 to open the wells to ambient air. This modification will enhance air flow through the formation while the system is operating. The air flow was increased from 32 scfm to about 45 scfm over time. Evaluation of hourly VOC removal indicates that the mass removal rate initially increased with the increase in influent air flow. Current data indicate a decline in the mass removal rate. Pantex will continue to

evaluate the VOC removal to determine when the removal rates appreciably decrease. Pantex will provide further recommendations based on review of influent SVE data over time.

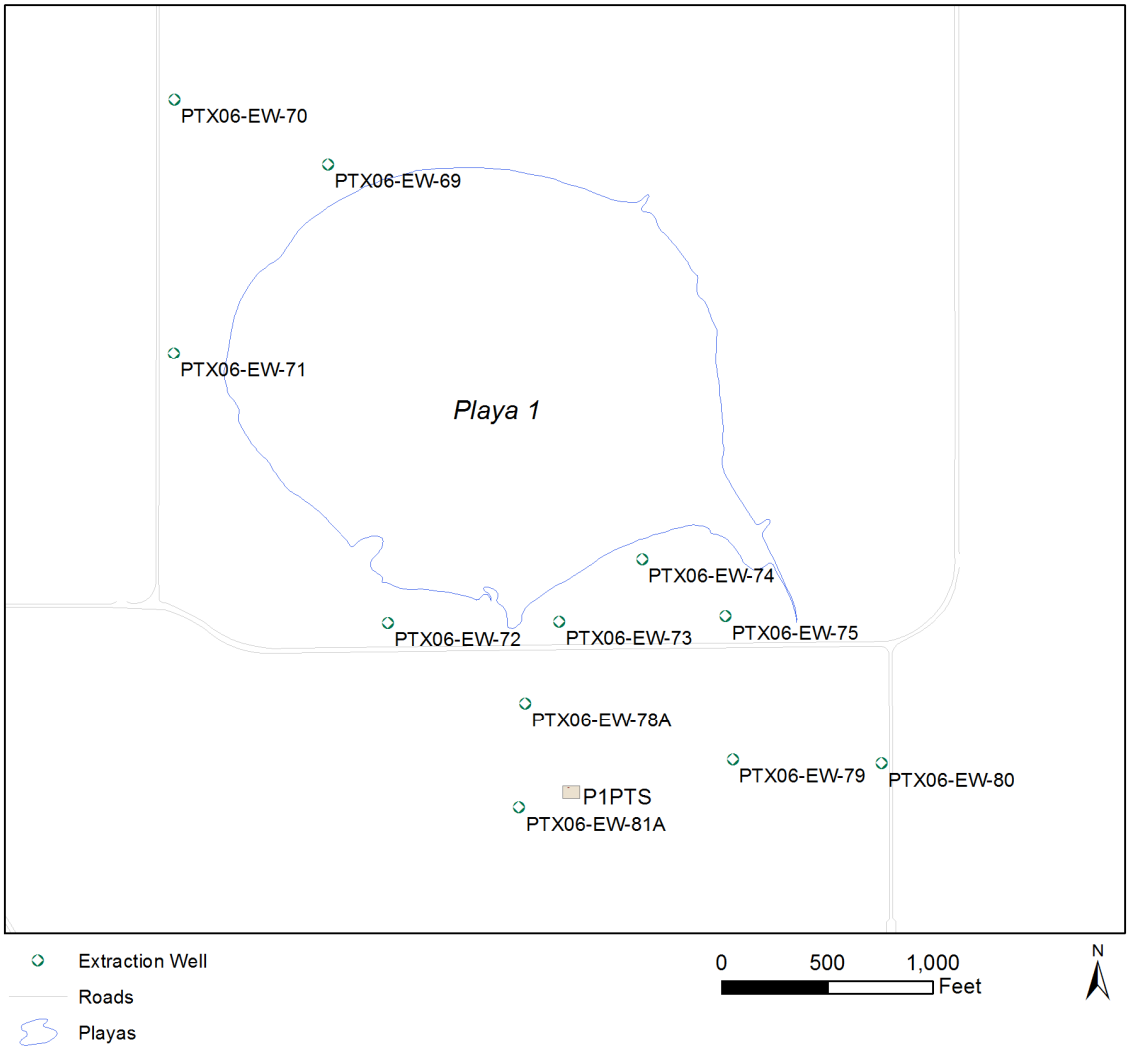
The groundwater remedies are considered to be protective for the short-term, as untreated perched groundwater use is controlled to prevent human contact and monitoring data continue to indicate that the remedial actions remain protective of the Ogallala Aquifer. Detections of DNT4A and 1,2-dichloroethane at concentrations below the GWPS continue to occur in one Ogallala well, and Pantex is actively following the Groundwater Contingency Plan to guide the response. Pantex proactively conducted work to determine possible causes of the detections; those results indicate that the most likely cause is the nearby perched well that was drilled deep into the FGZ. Pantex plugged the nearby perched well in November 2014. Pantex will continue to monitor this Ogallala well quarterly to determine if a trend emerges, and will determine if further steps are necessary for the protection of the Ogallala Aquifer. Another Ogallala well demonstrated a low-level detection of 1,4-dioxane above the PQL during 4th quarter 2017. The result of the resample of this well indicates that 1,4-dioxane was not confirmed, with the result being non-detect.

Pantex continues to evaluate options for the southeast lobe of perched groundwater east of FM 2373. As recommended in the 2016 Annual Progress Report, Pantex is actively working toward extending the SEPTS operation to that area to address the continued plume movement to the south. Pantex has obtained additional funding to extend the Southeast ISB to the southeast boundary of the site. Pantex completed drilling of the ISB wells in December 2017. After gaining an access agreement, Pantex also installed four wells south of the Pantex property. Water is present in three wells; the other well is dry. Results collected this quarter indicate one well with concentrations that exceed the GWPS for RDX and 4-amino-2,6-DNT. The new extraction wells are scheduled to be tied in and operating by October 2018, and injection will begin in the Southeast ISB Extension in September 2018.

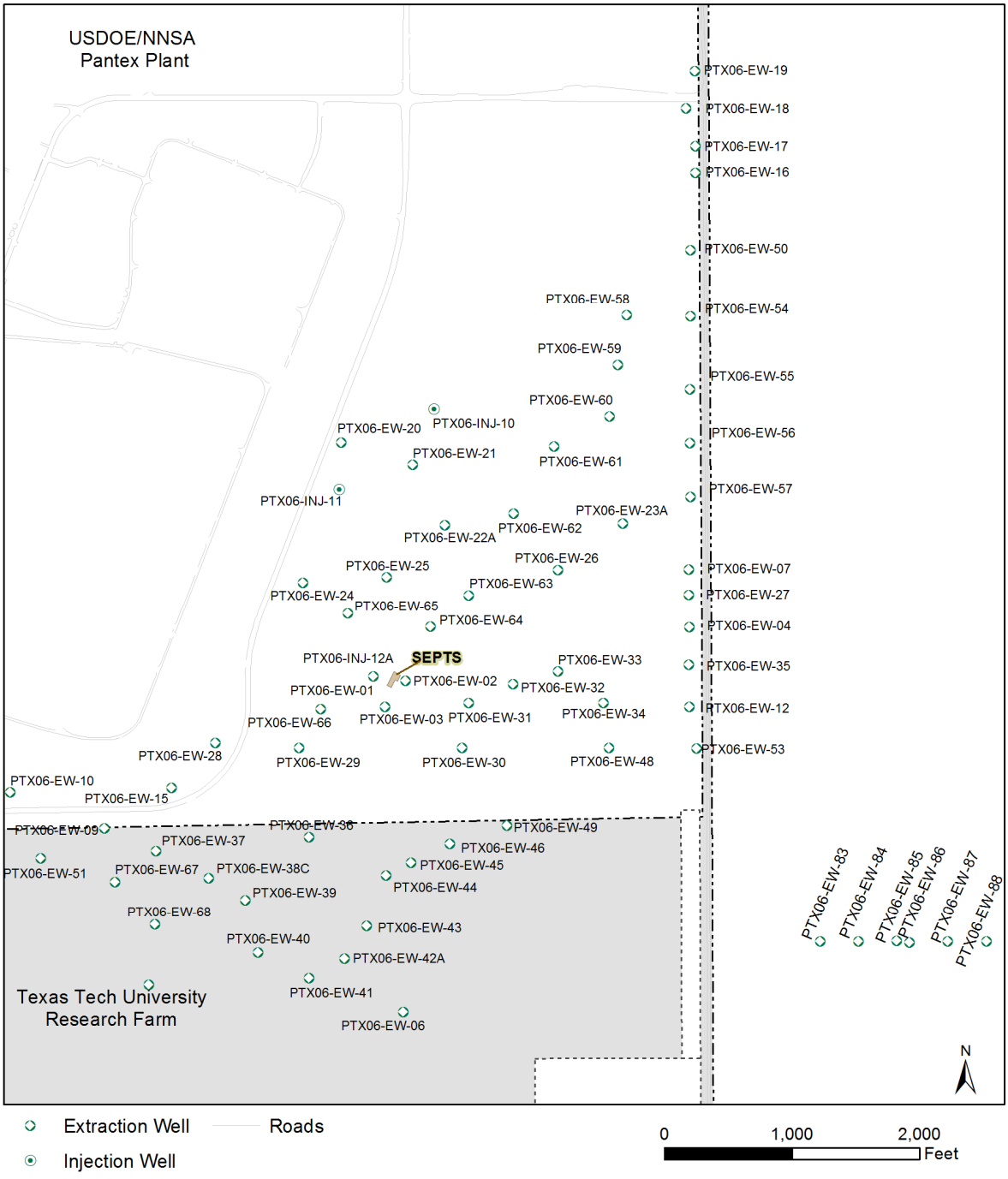
Appendix A
Maps



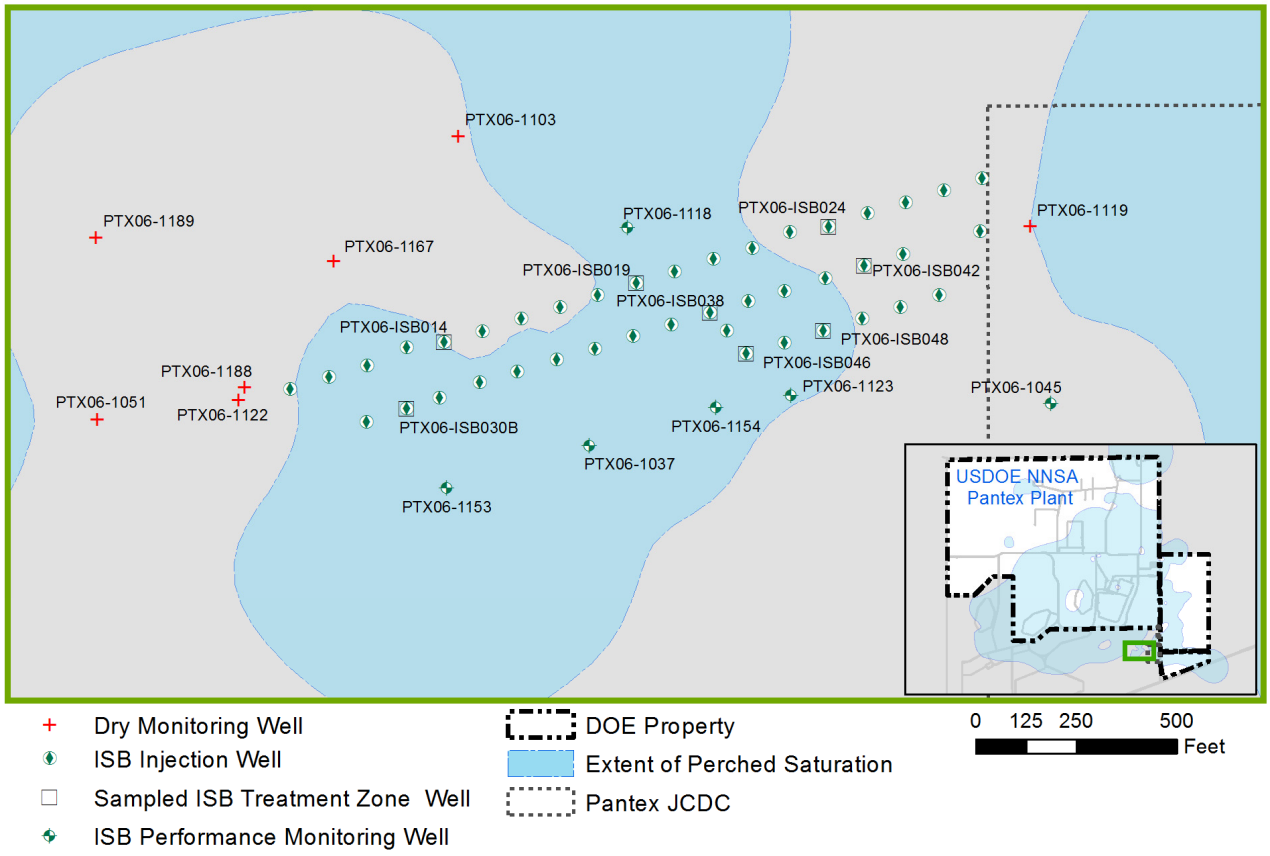
Extent of Perched Groundwater and Contaminant Plumes



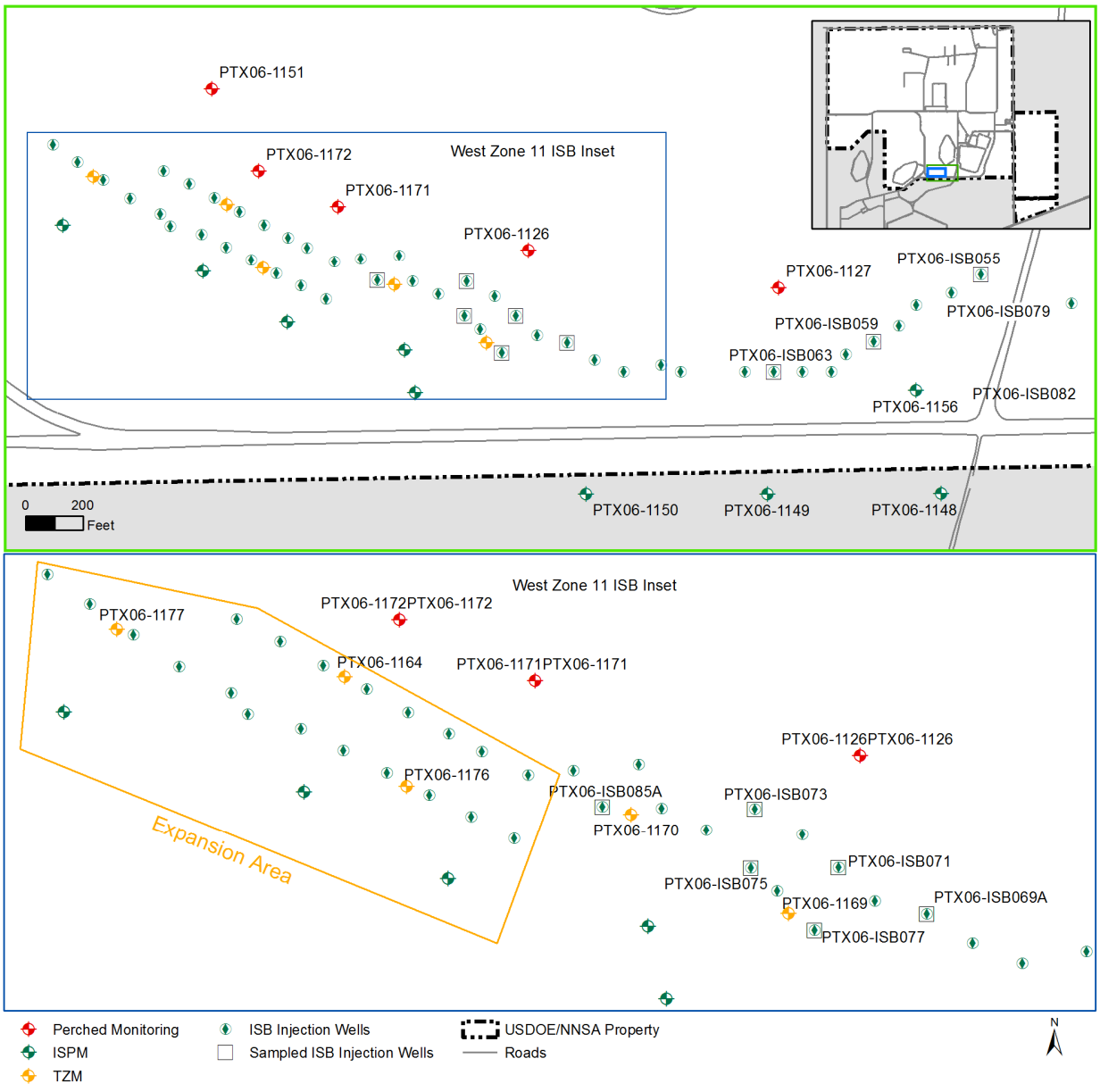
Playa 1 Pump and Treat System Wells



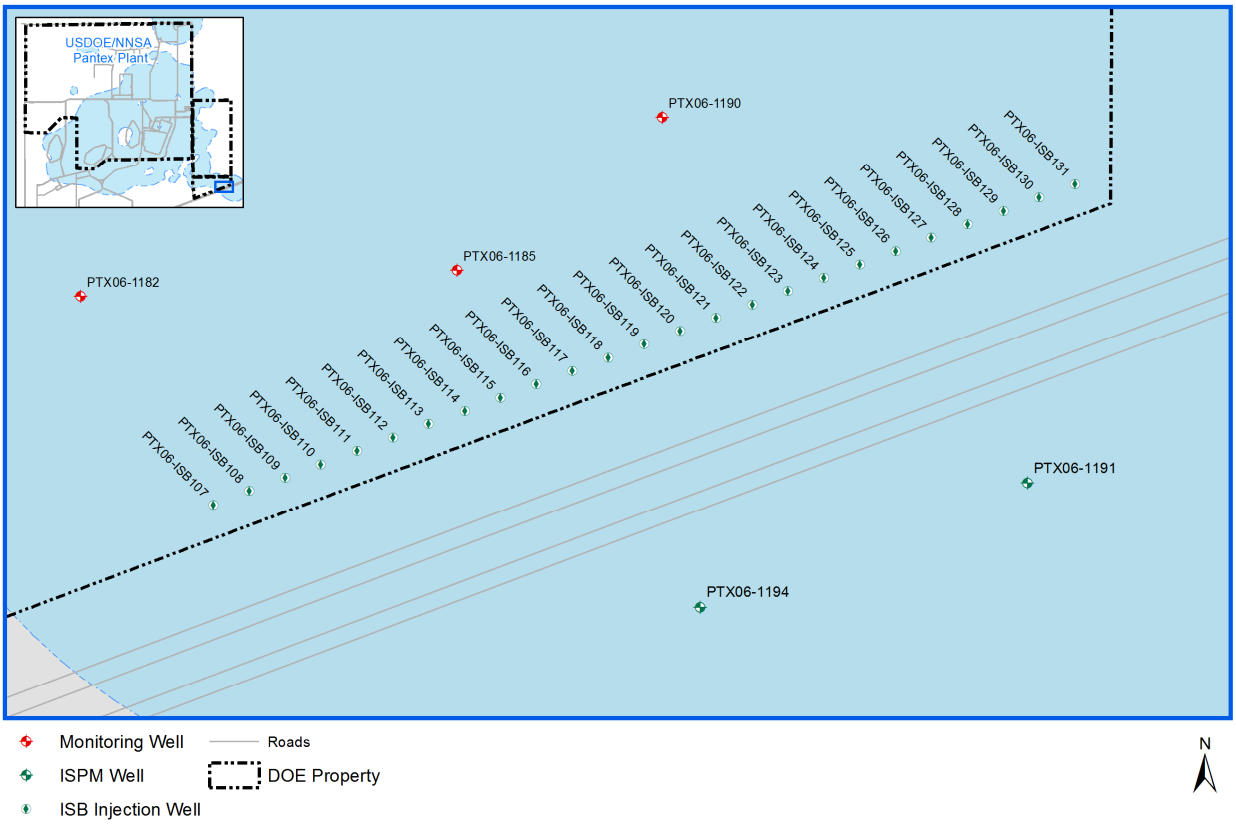
Southeast Pump and Treat System Wells



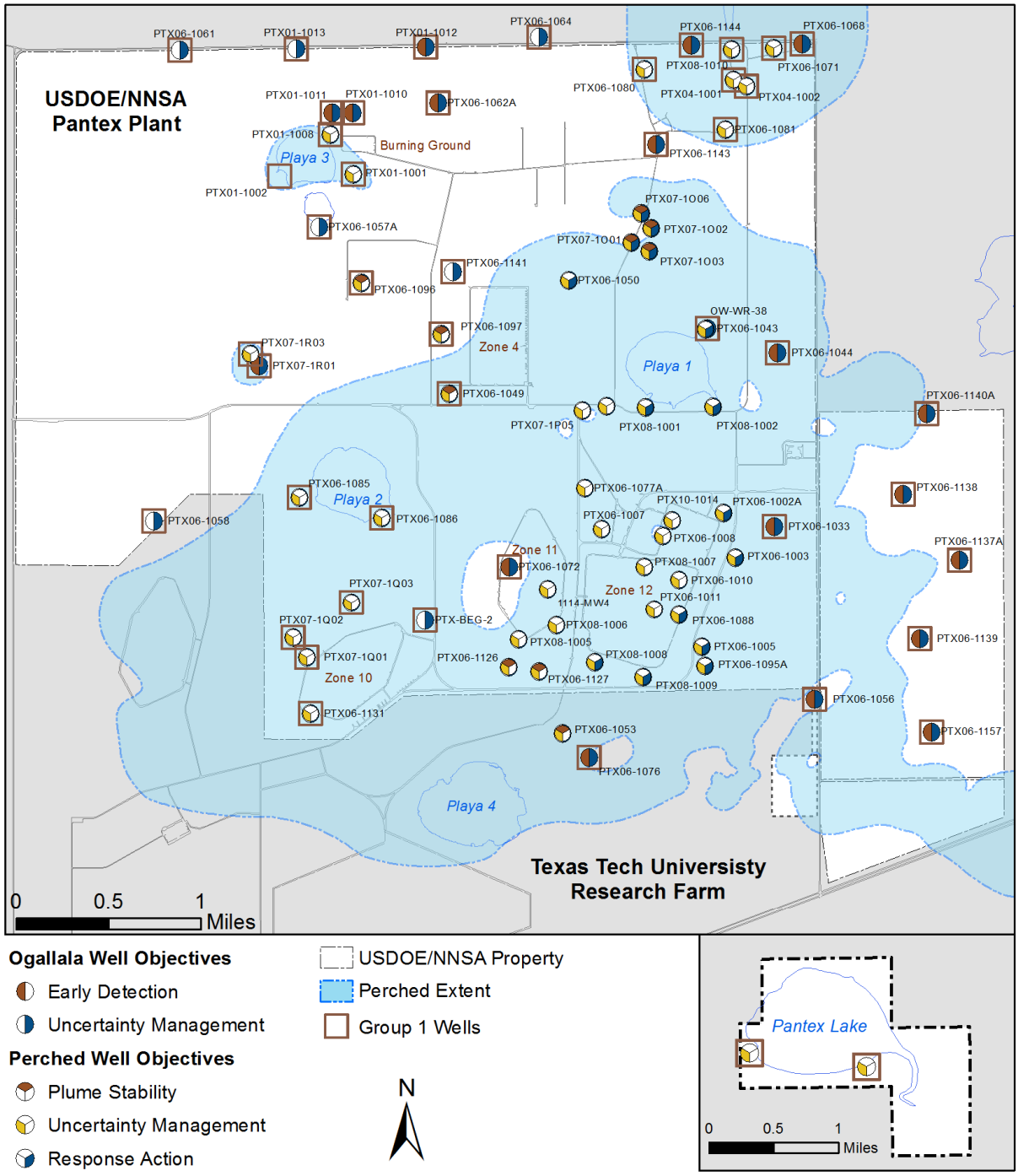
Southeast ISB Wells and Sampling Locations



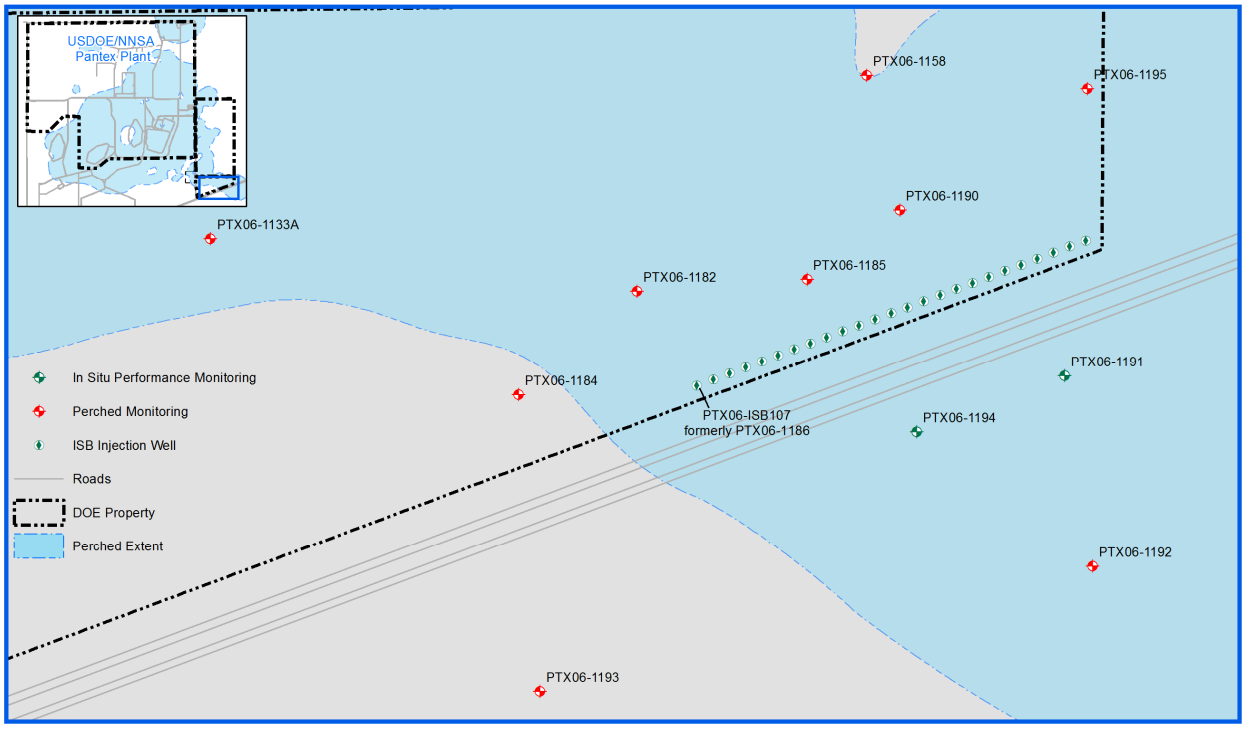
Zone 11 ISB Wells and Sampling Locations



Southeast ISB Extension Wells



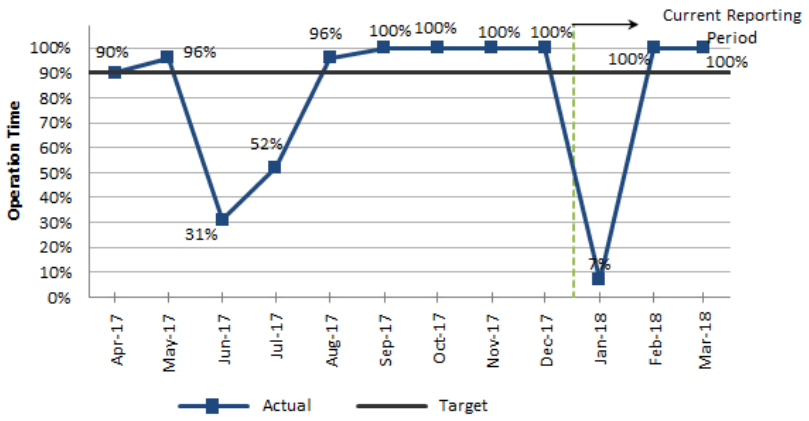
Uncertainty Management and Early Detection Wells Evaluated in the Quarterly Progress Report



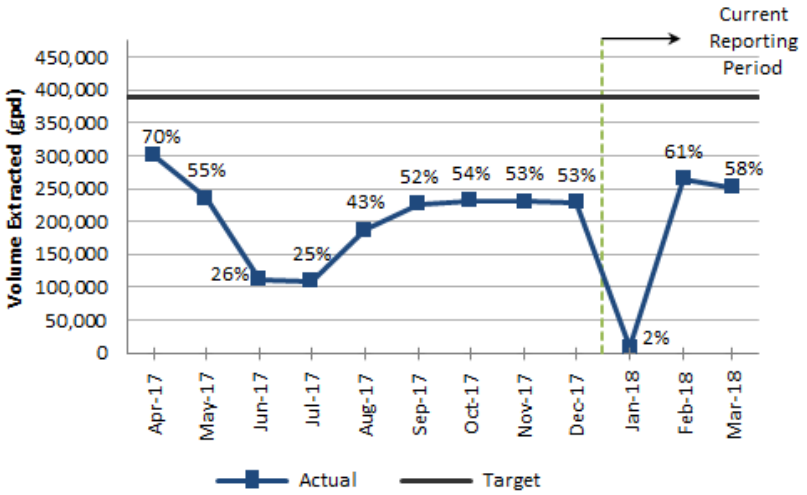
Other Unexpected Conditions Wells

Appendix B
Pump and Treat System Graphs

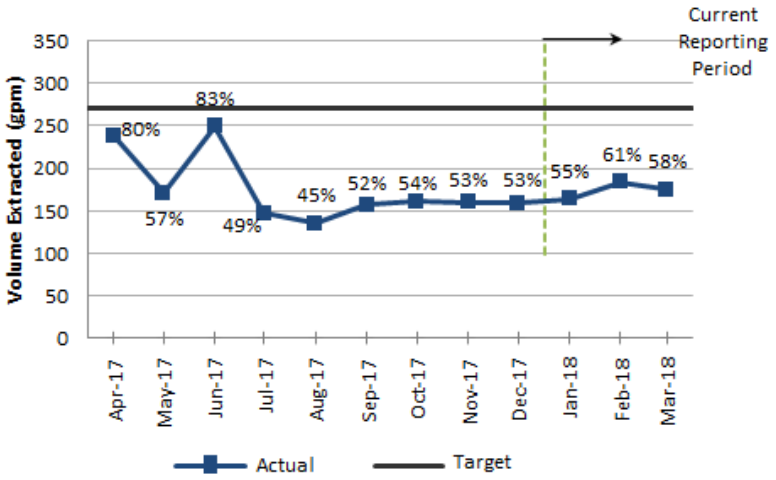
Southeast Pump and Treat System Graphs



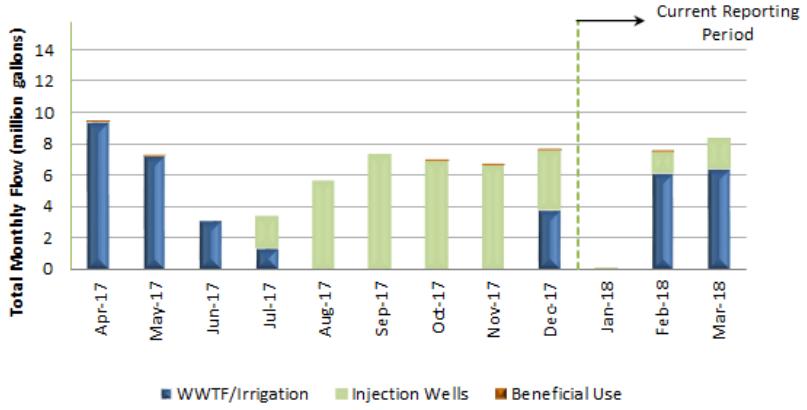
SEPTS Operation Time vs Target



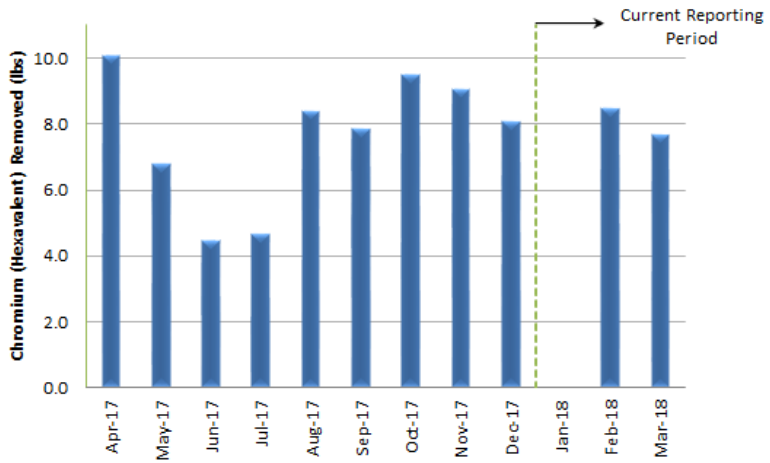
SEPTS GPD and % Capacity



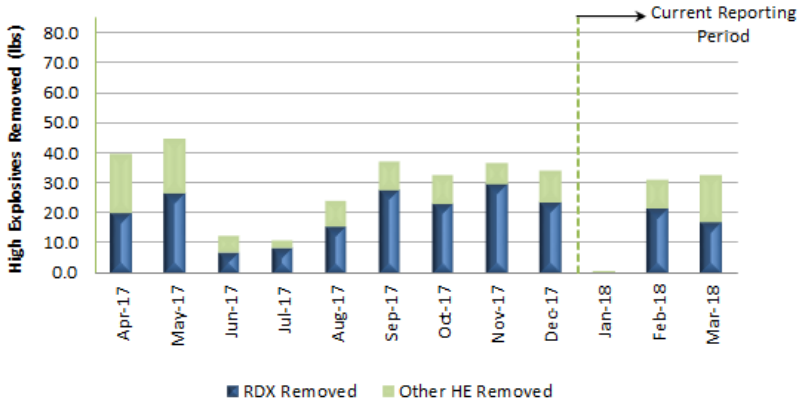
SEPTS Average GPM and % Capacity



SEPTS Monthly Total Flow

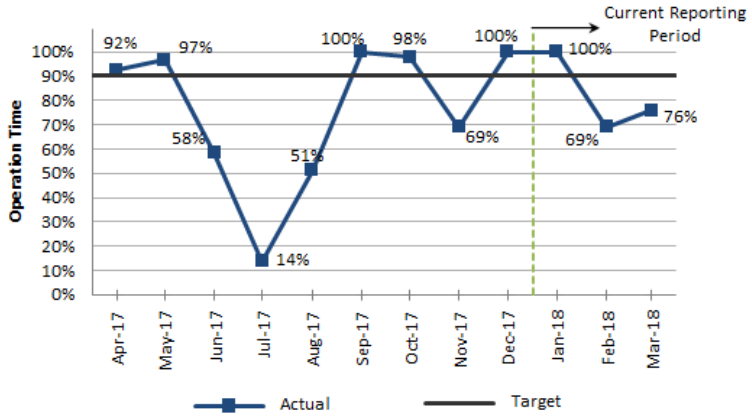


SEPTS Chromium Mass Removal by Month

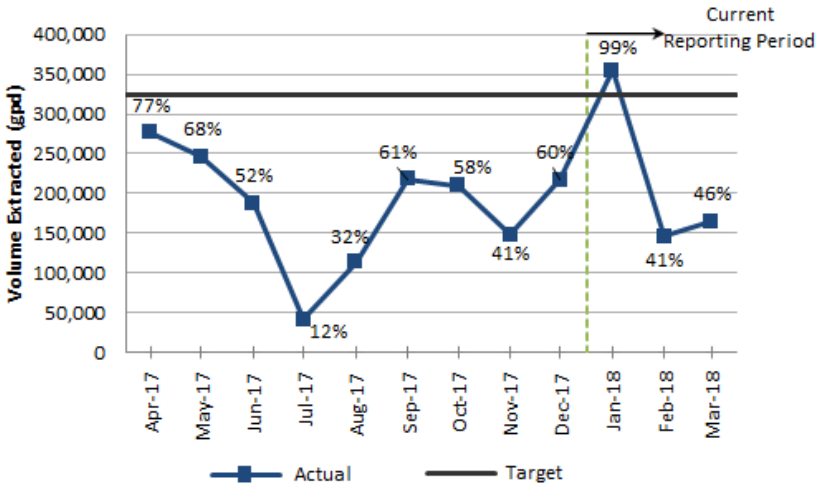


SEPTS HE Mass Removal by Month

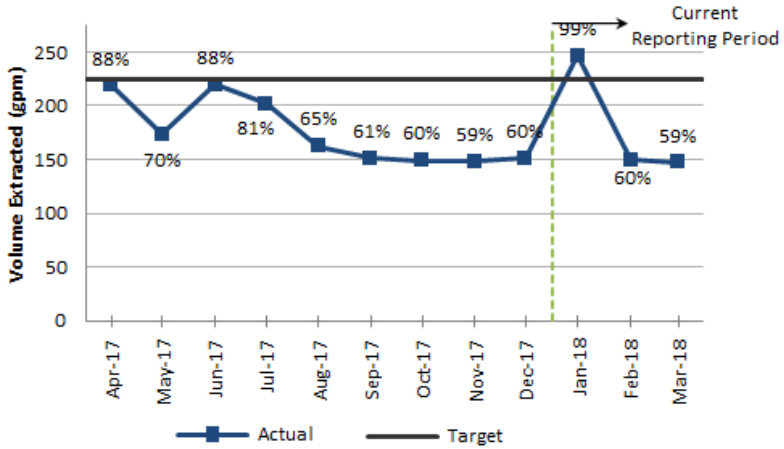
Playa 1 Pump and Treat System Graphs



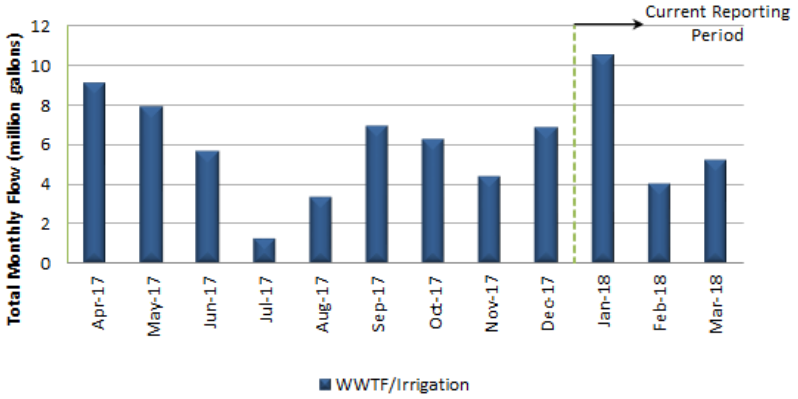
P1PTS Operational Time Vs Target



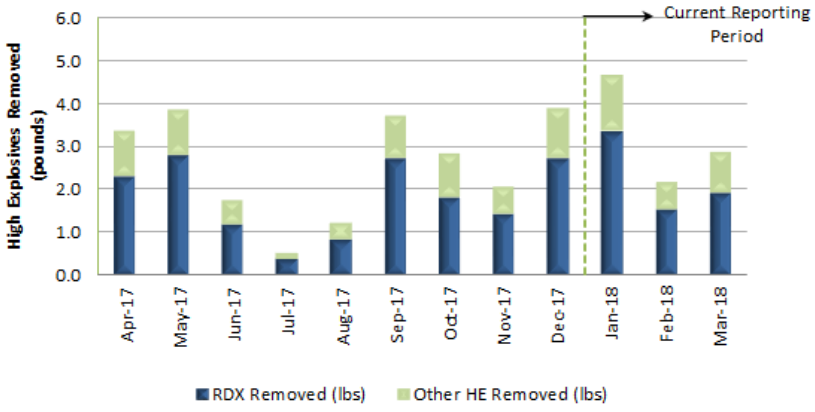
P1PTS Average GPD and % Capacity



P1PTS Average GPM and % Capacity



P1PTS Monthly System Total Flow



P1PTS HE Mass Removal by Month

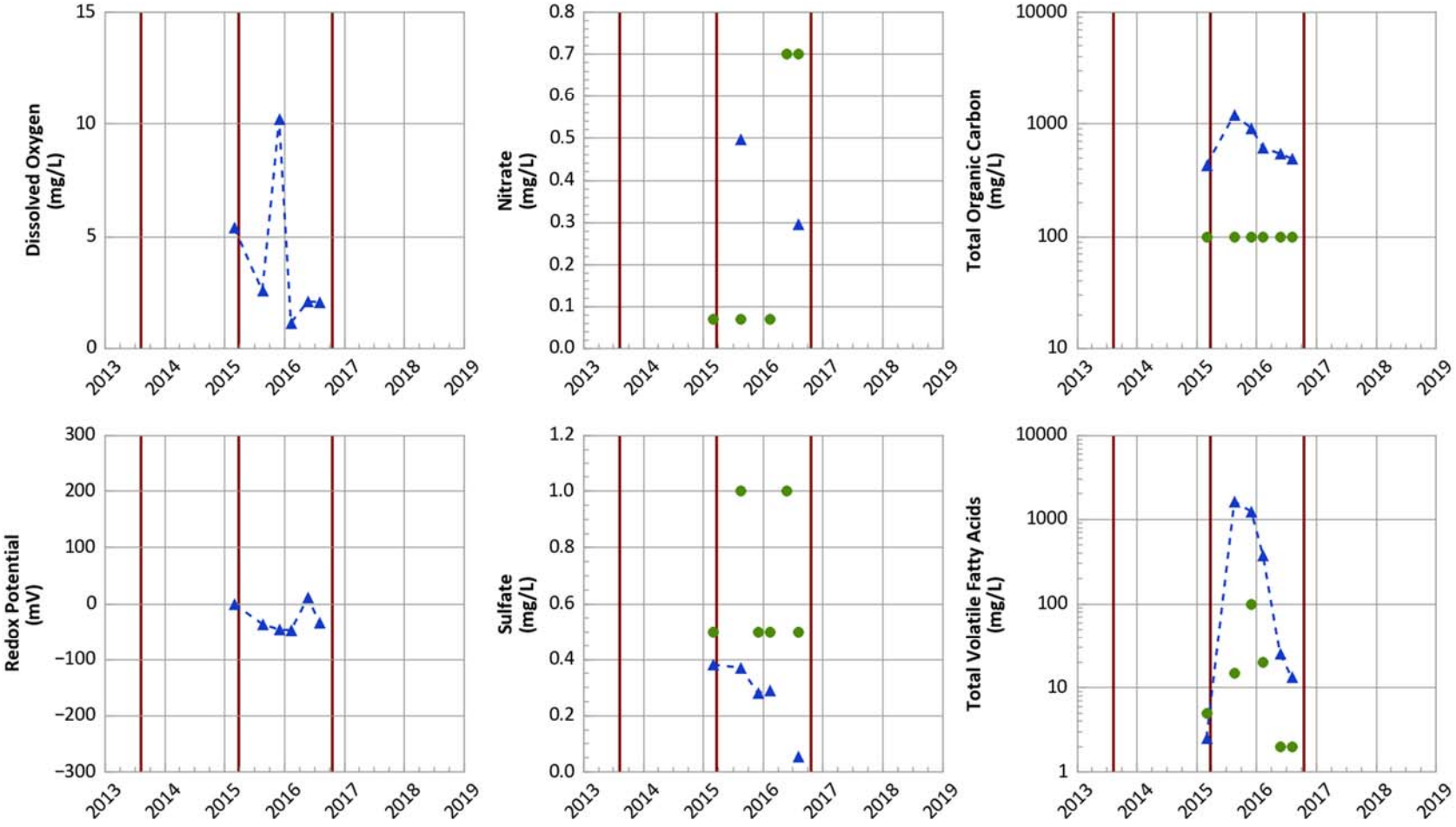
Appendix B Glossary

Operation Time	Operation time represents the percentage of the total number of hours the system was actually operated vs. the total possible hours the system could have operated on a monthly basis.
GPM Extraction	The gallons per minute (GPM) extraction rate represents the extraction rate from the well field while the system was operating. This is a measurement of the well field's capability to support the overall system throughput goals. Low well field rates can occur due to inoperable wells or decline in saturated thickness that makes extraction difficult.
GPD Extraction	The gallons per day (GPD) extraction rate represents the system's ability to meet overall throughput goals, considering the well field extraction rate and the system's operational rate. This rate is affected by the ability to extract water from the well field and the system downtime.
Total Monthly Flow	Total monthly flow is the total volume of extracted water measured at the influent point of the pump and treat system. Individual well measurements and flow rates are provided in the annual progress report.

Appendix C
ISB Graphs

Southeast ISB Graphs

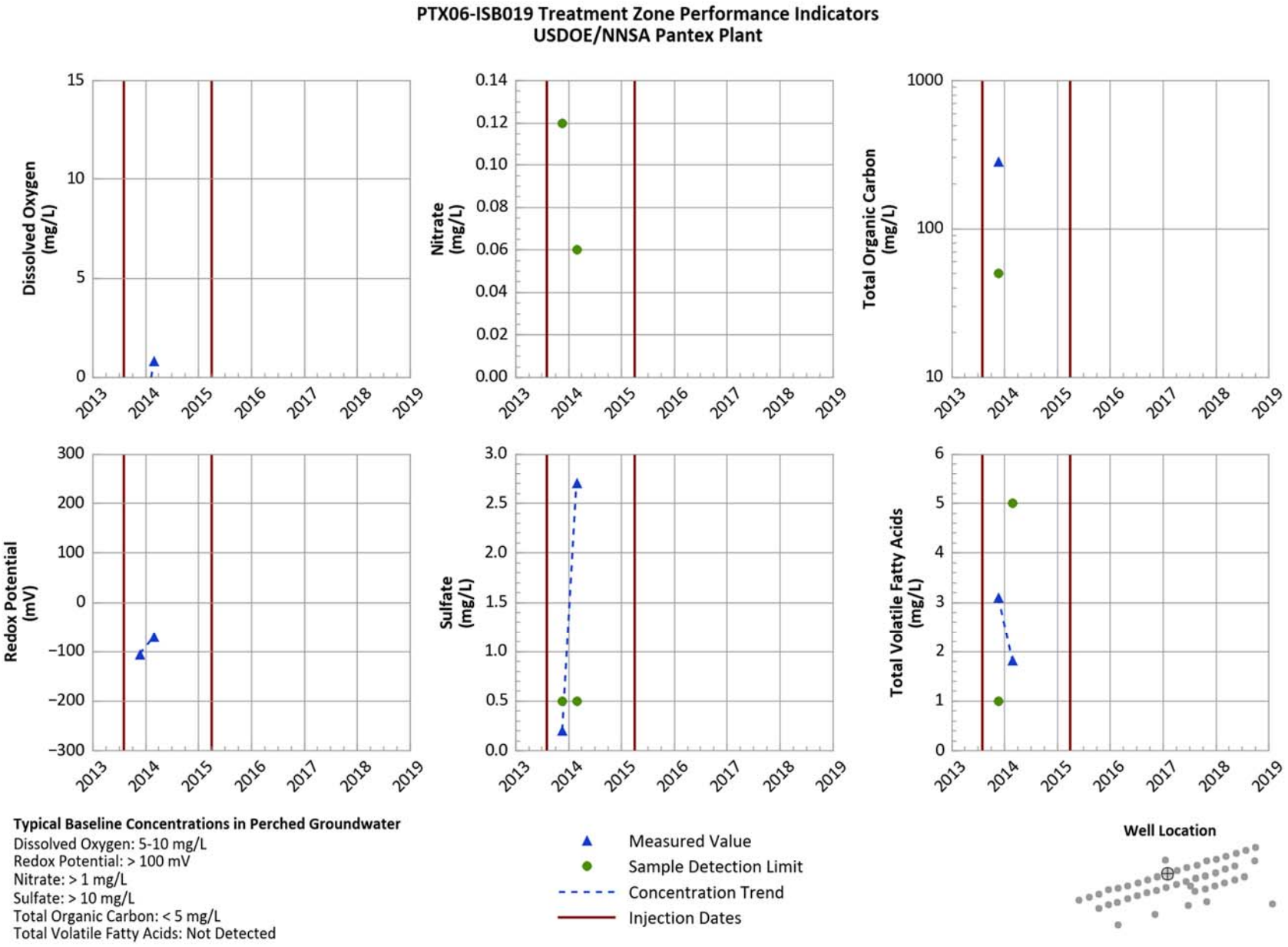
PTX06-ISB014 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



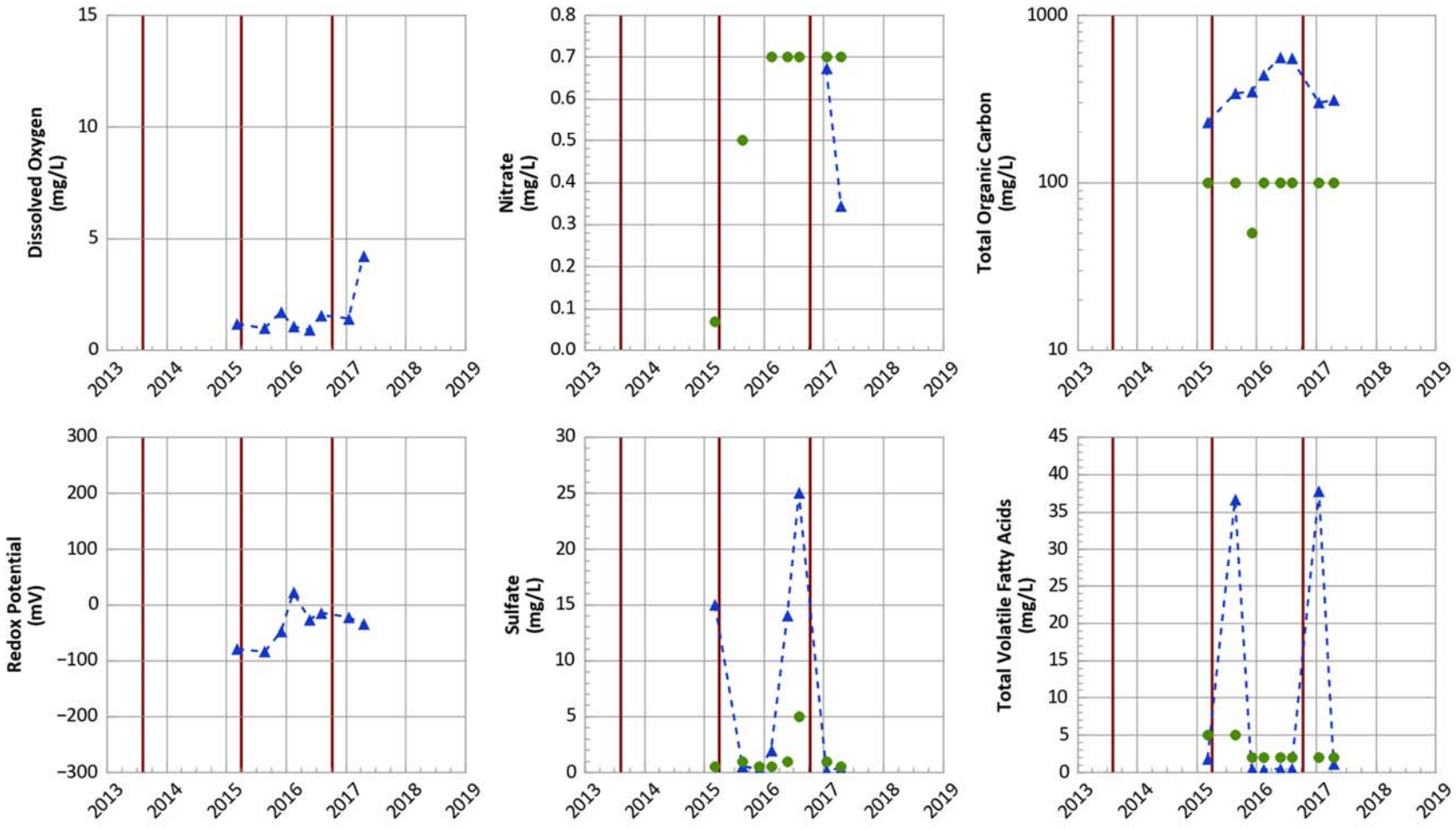
Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

Well Location


PTX06-ISB019 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
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

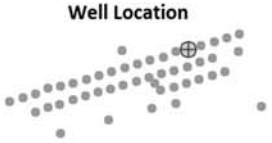
PTX06-ISB024 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant

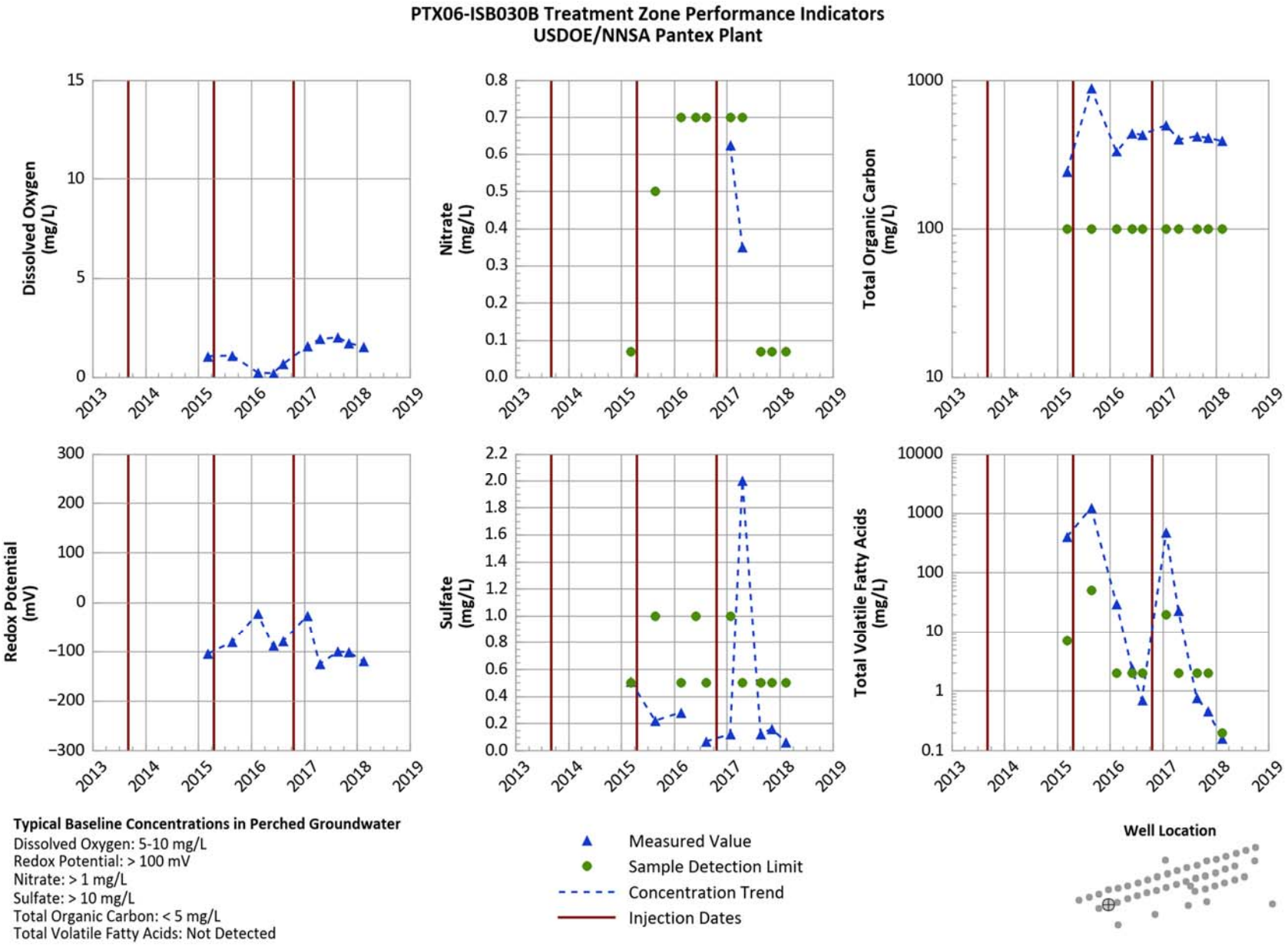


Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

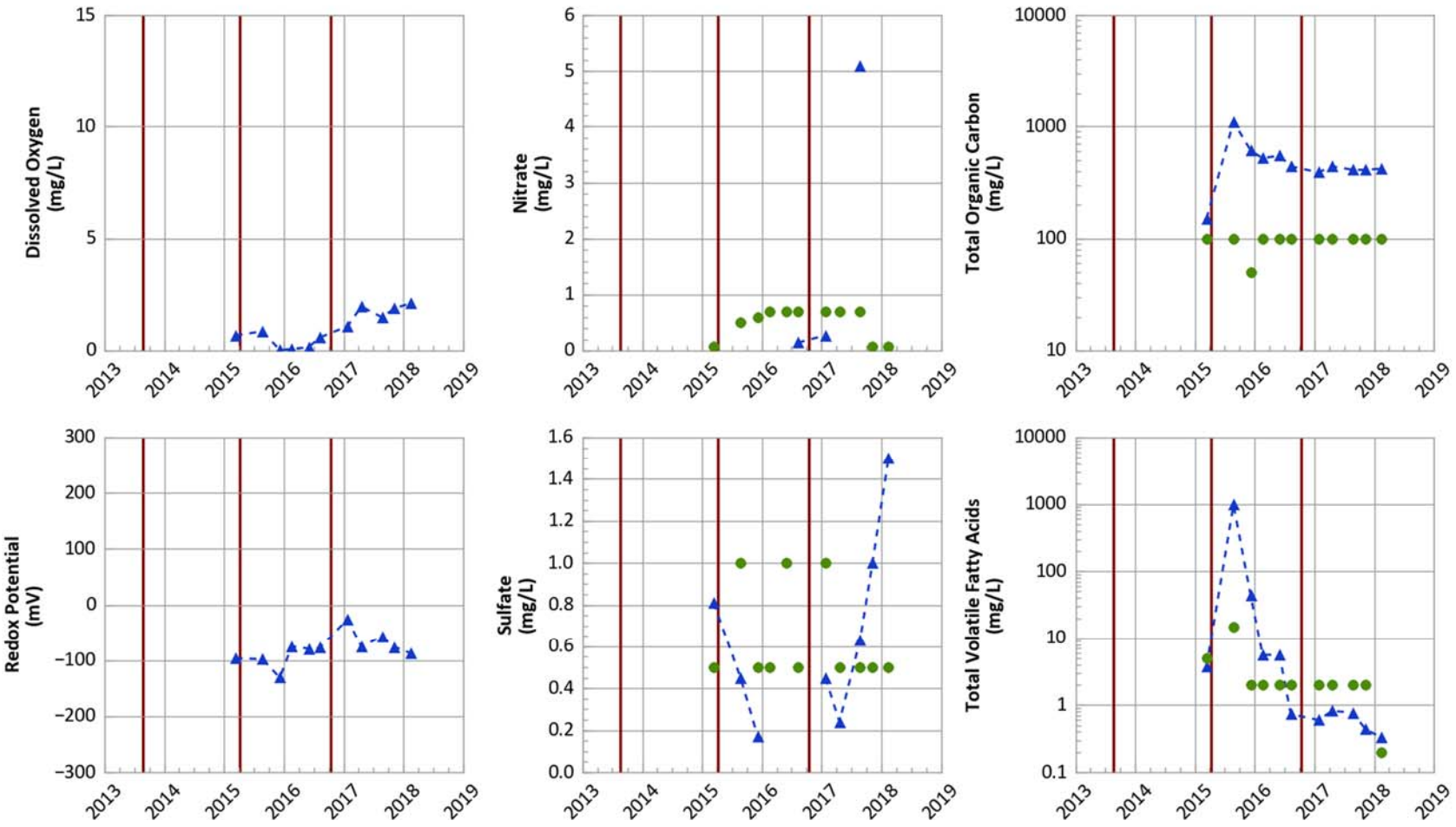
Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

Well Location




PTX06-ISB030B Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
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-ISB038 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant

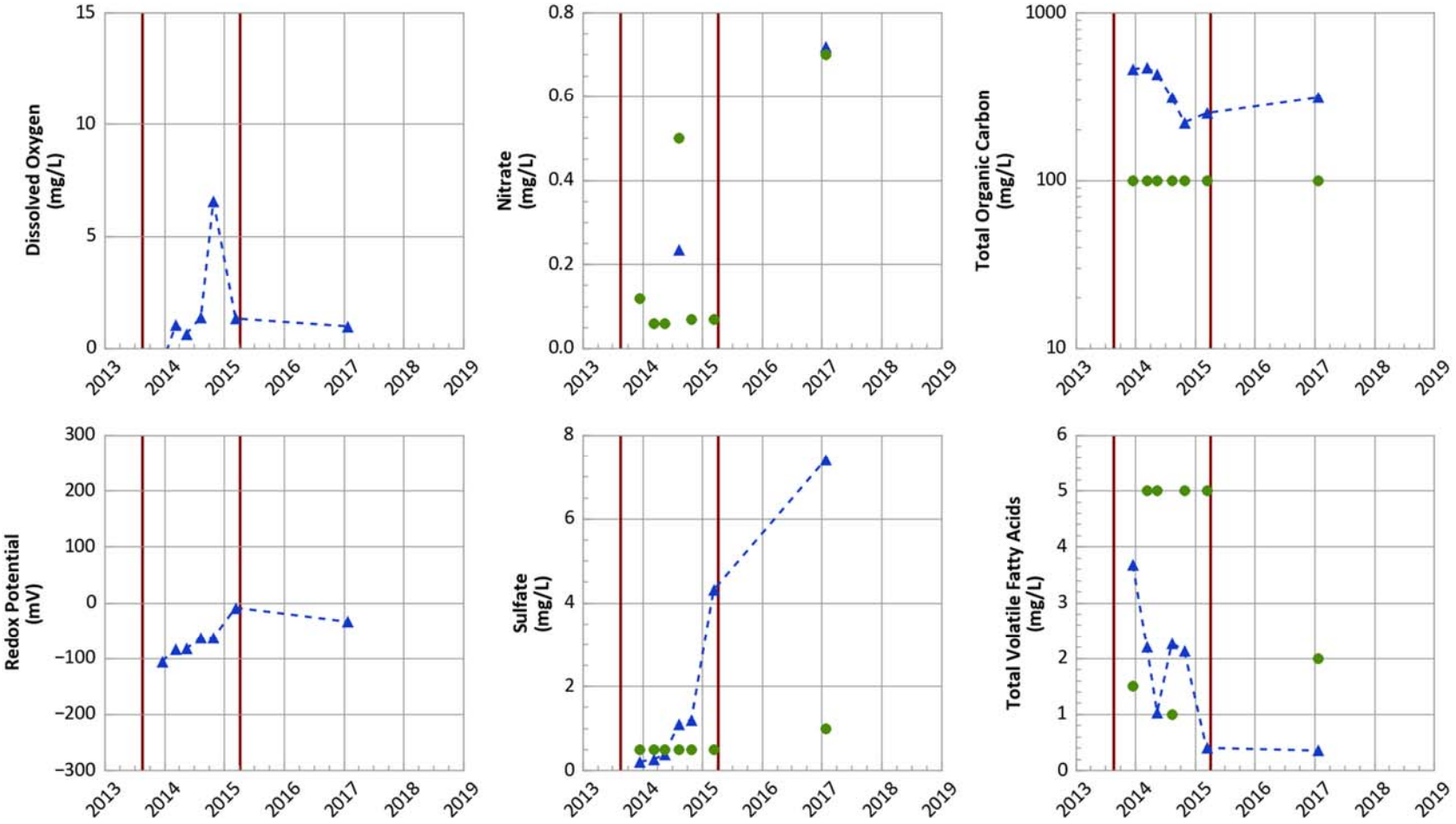


Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

Well Location

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

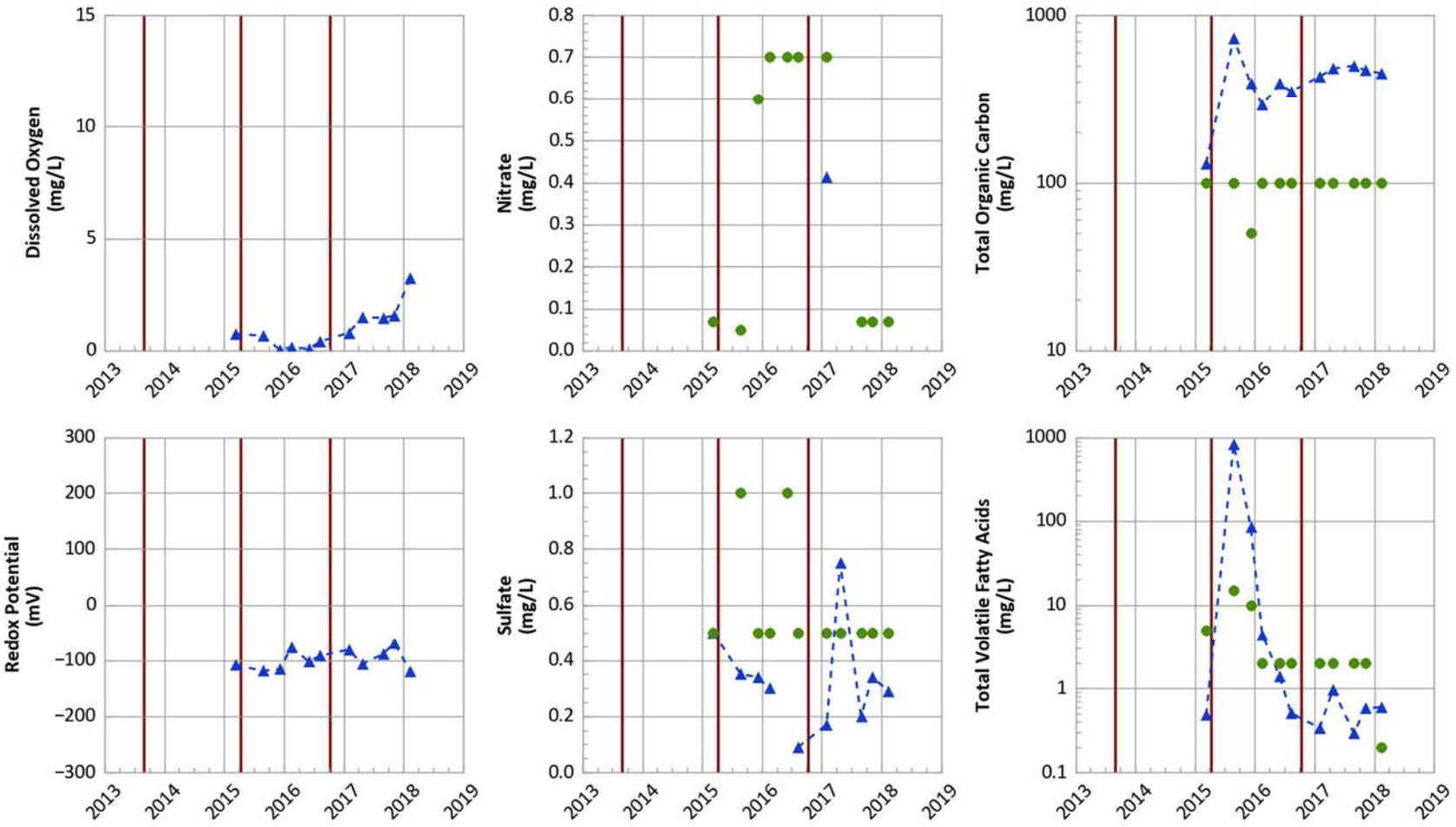


Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

Well Location

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

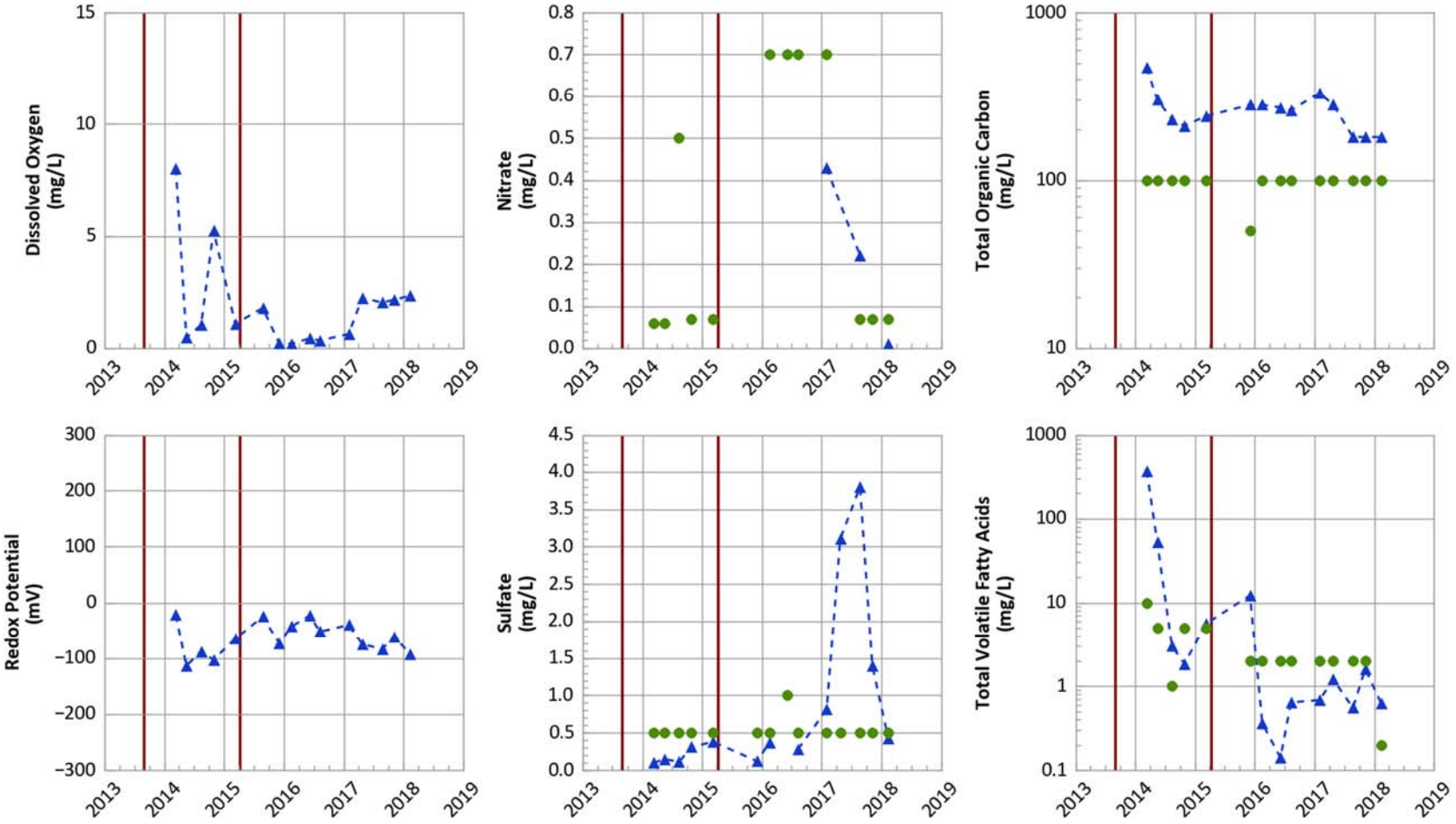


Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

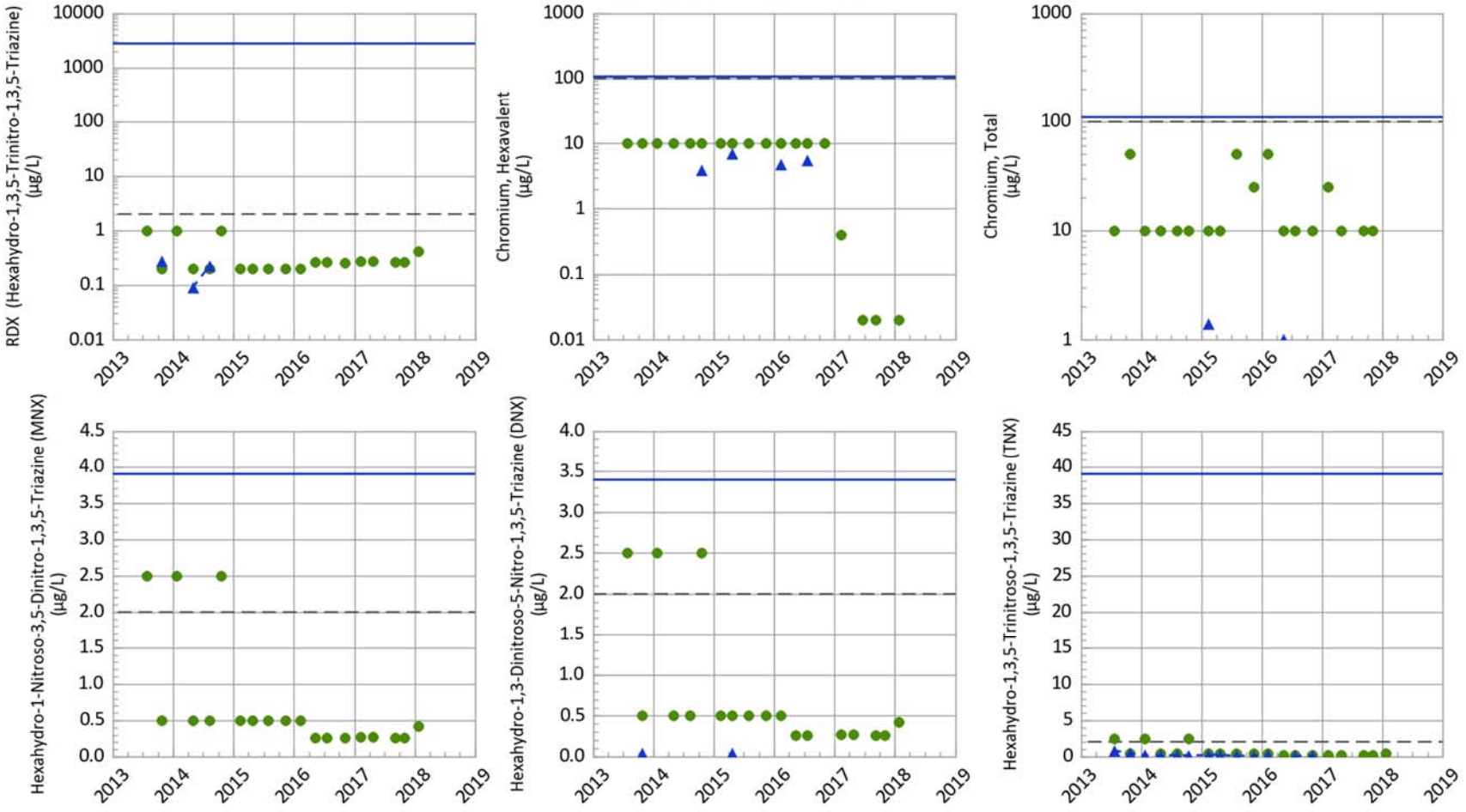
Well Location

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



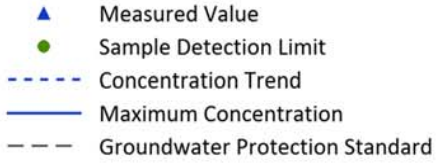
Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

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



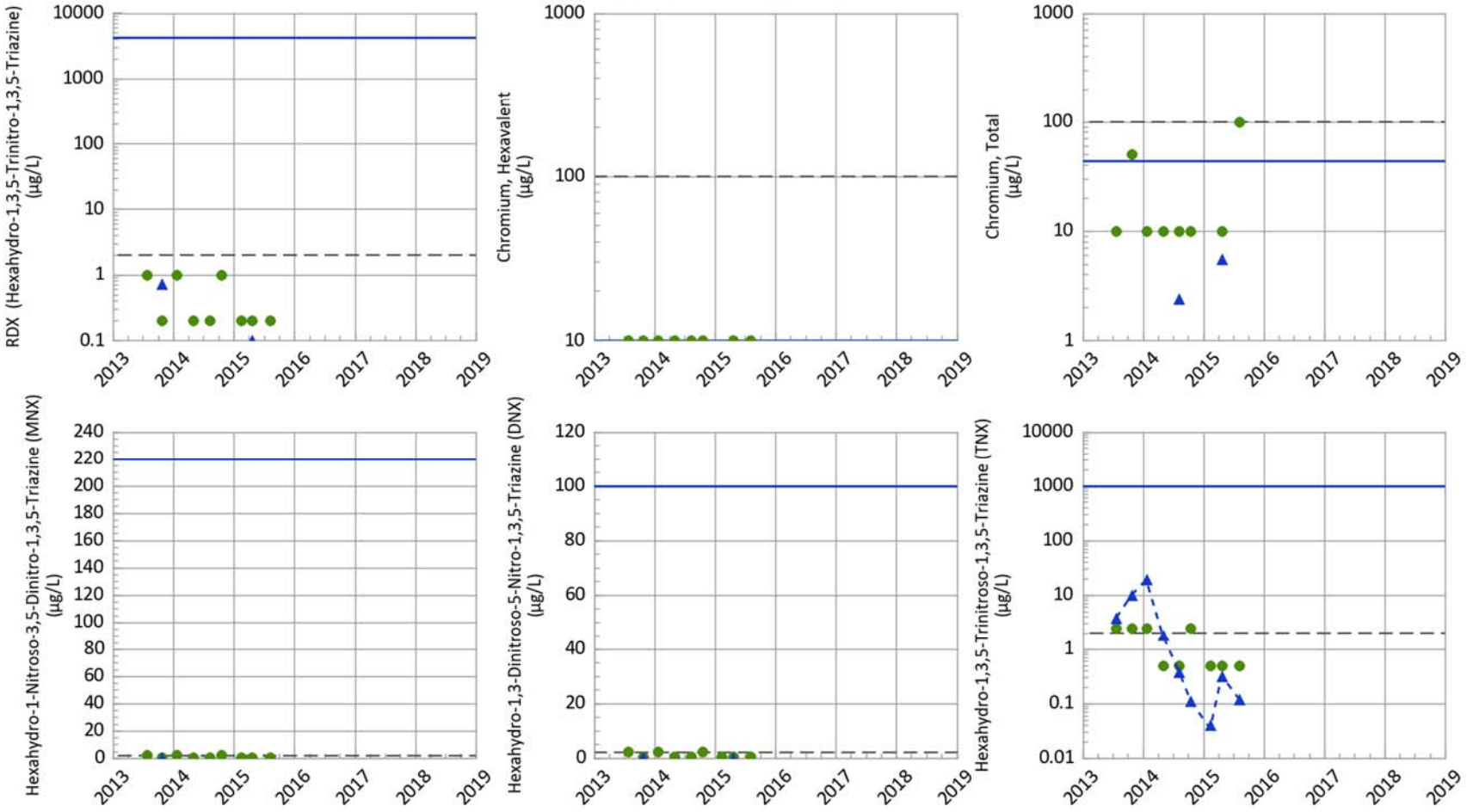
Most Recent Measured COC Concentrations (Nov 02, 2016)

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



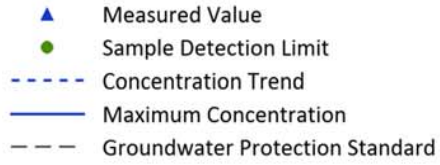
Well Location

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



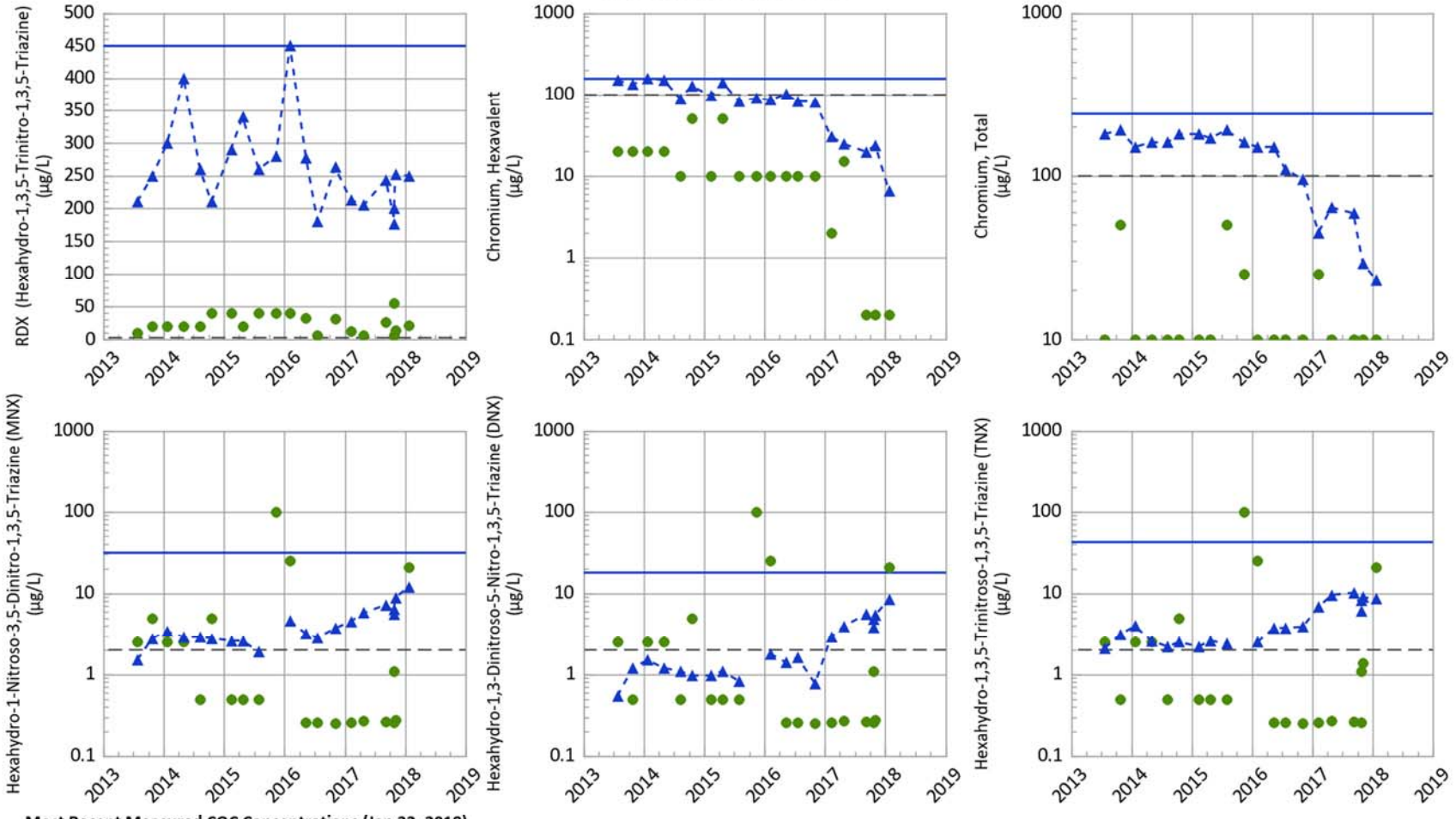
Most Recent Measured COC Concentrations (Aug 05, 2015)

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



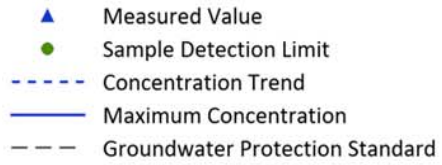
Well Location

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



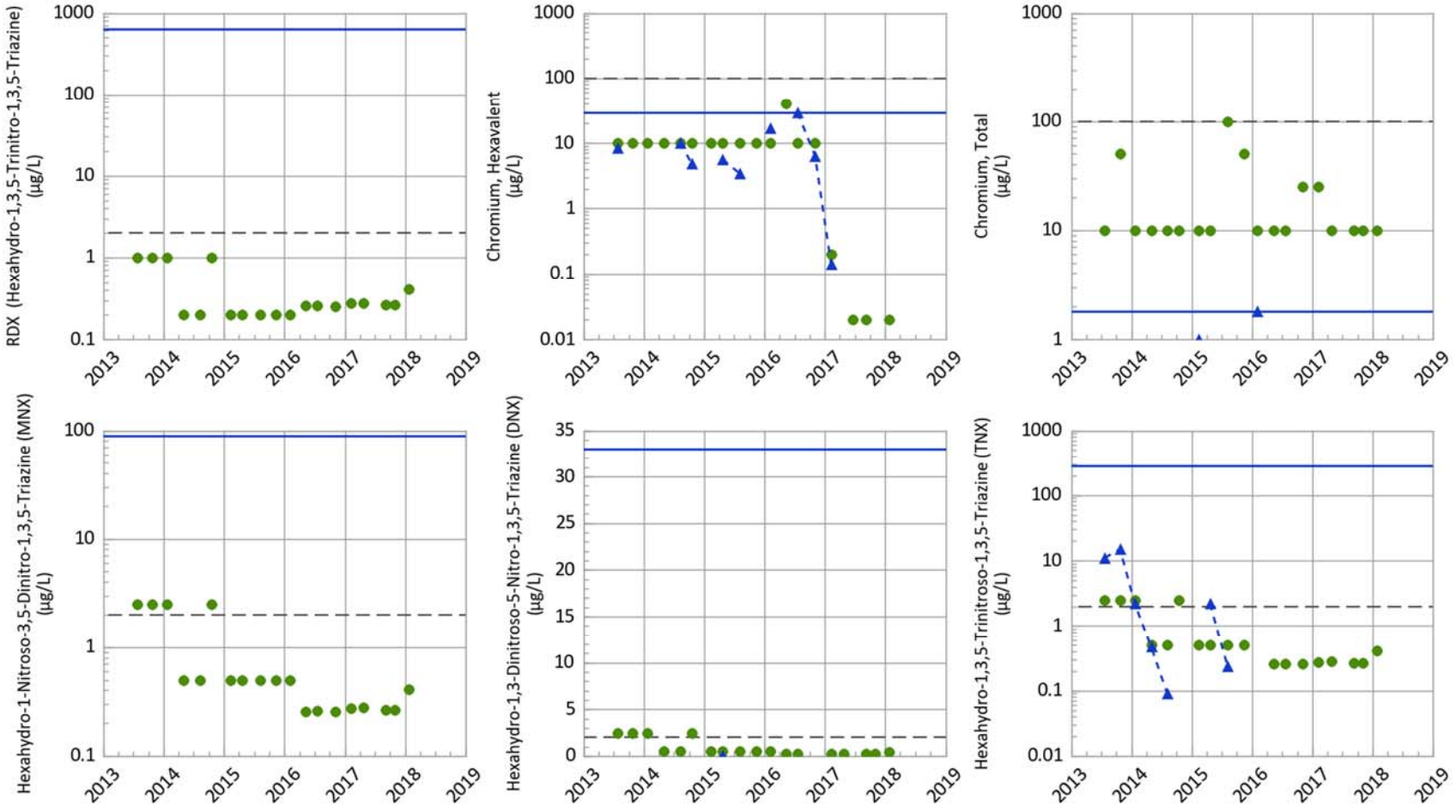
Most Recent Measured COC Concentrations (Jan 22, 2018)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	250.0	2.0
MNX	12.0	2.0
CR-6	6.57	100.0
DNX	8.5	2.0
CR	23.0	100.0
TNX	8.6	2.0



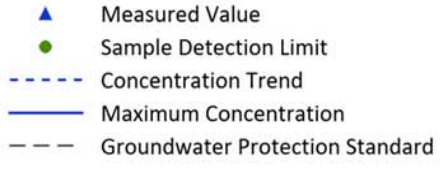
Well Location

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



Most Recent Measured COC Concentrations (Aug 05, 2015)

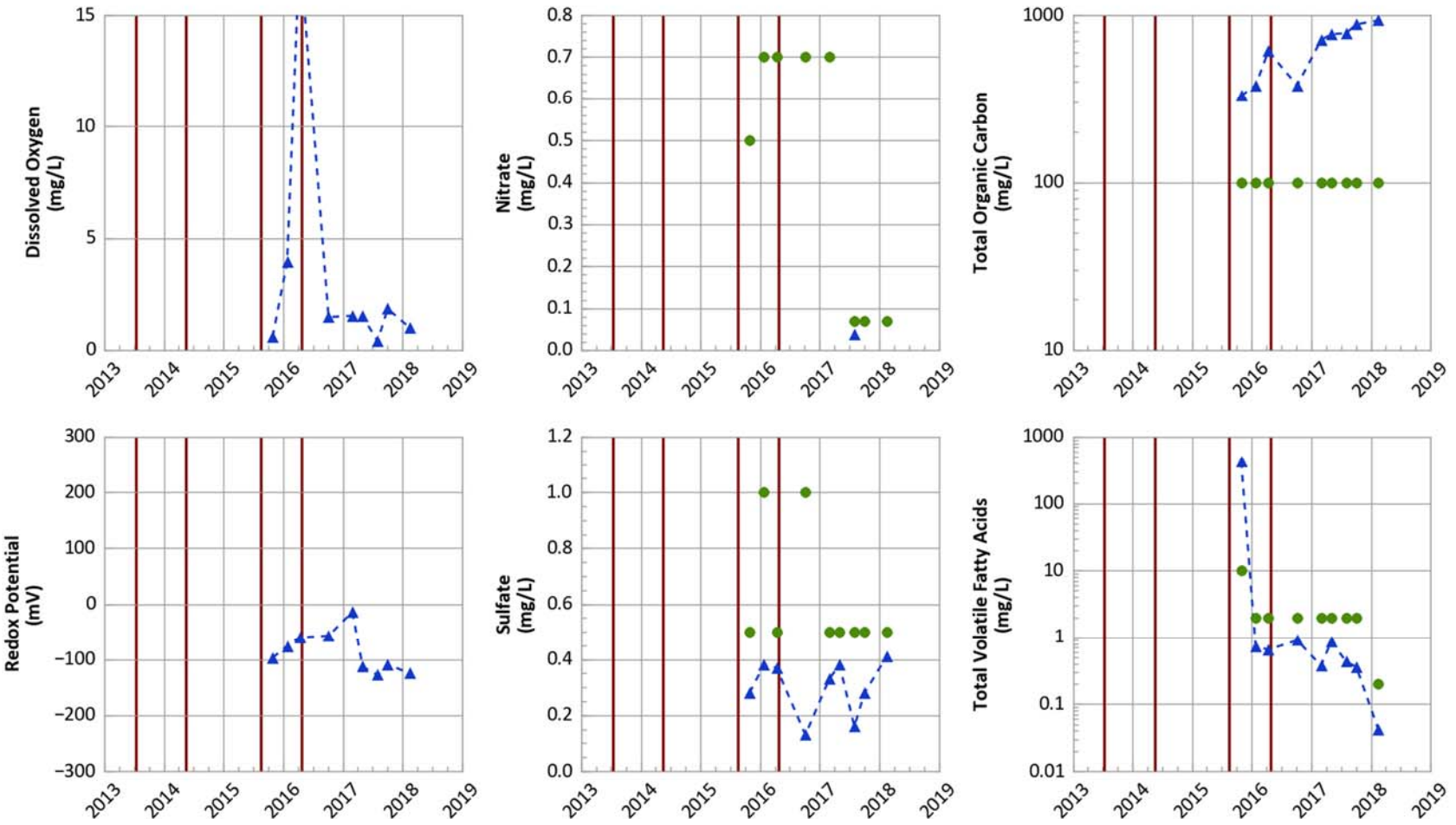
COC	Concentration (µg/L)	GWPS (µg/L)
RDX	Non-Detect	2.0
MNX	Non-Detect	2.0
CR-6	Non-Detect	100.0
DNX	Non-Detect	2.0
CR	Non-Detect	100.0
TNX	Non-Detect	2.0



Well Location

Zone 11 ISB Graphs

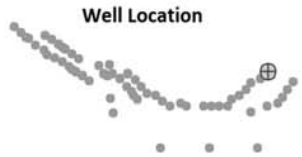
PTX06-ISB055 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant

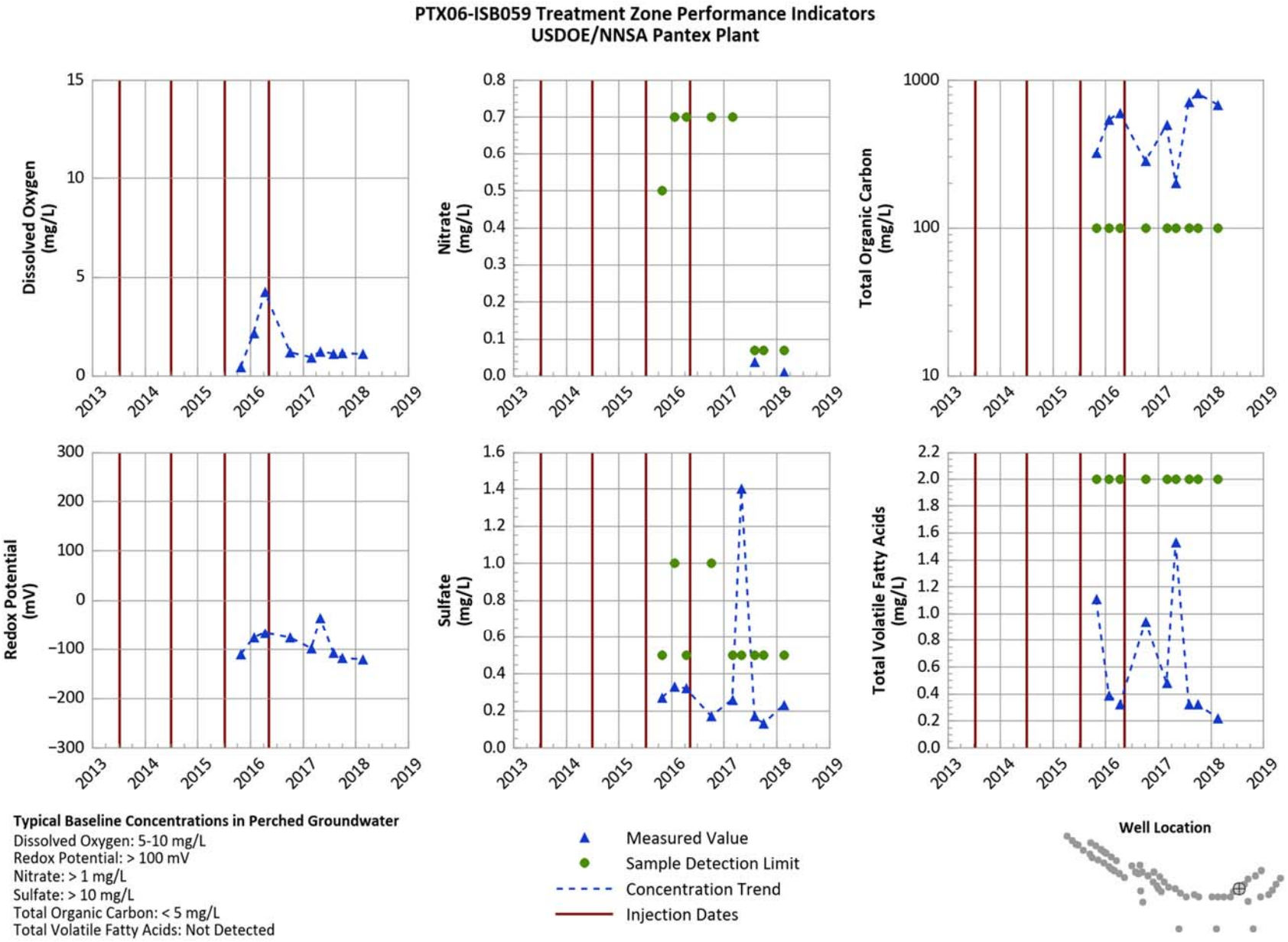


Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

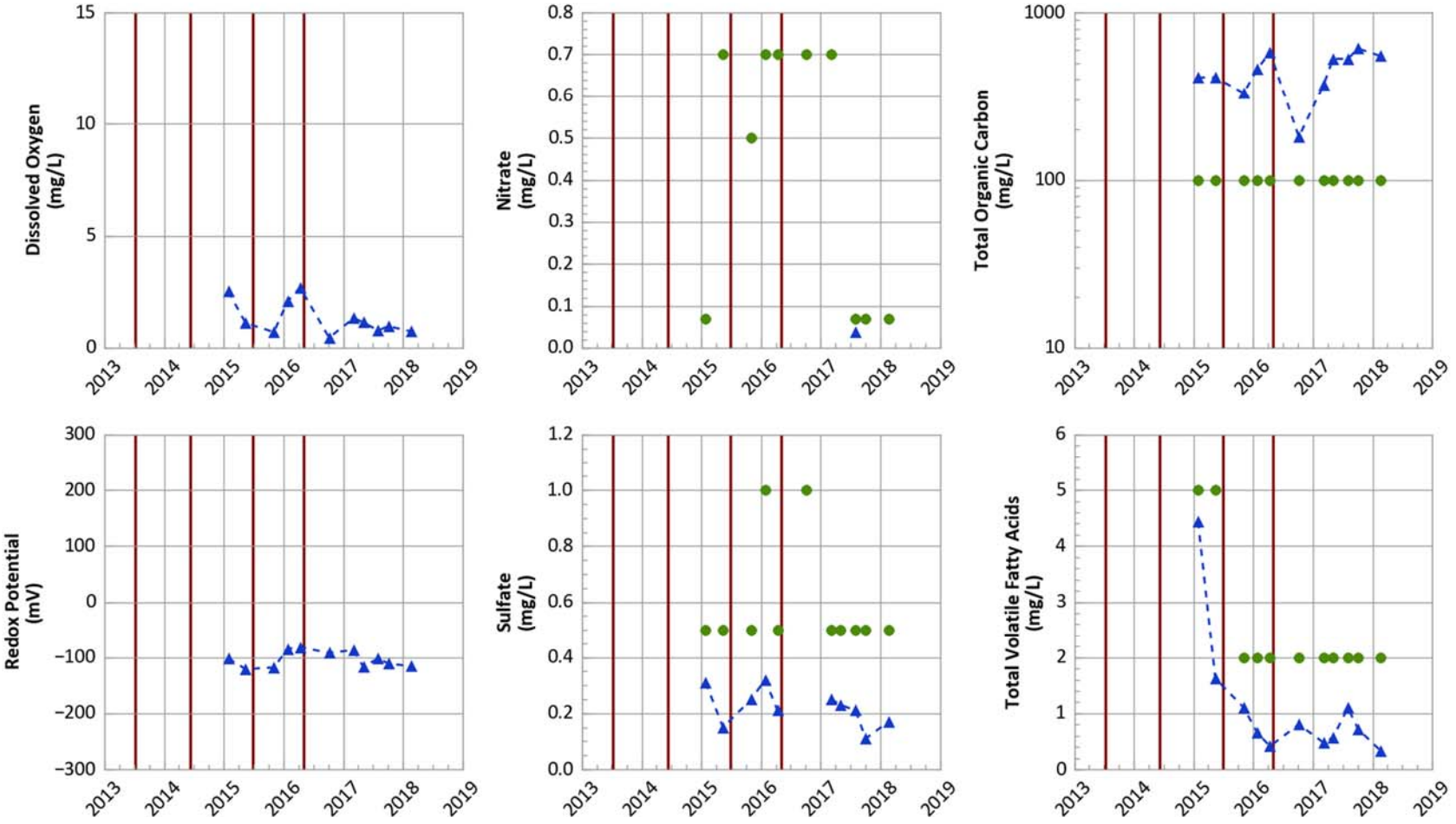
Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

Well Location

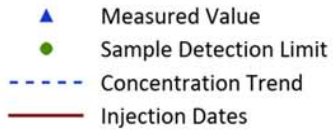


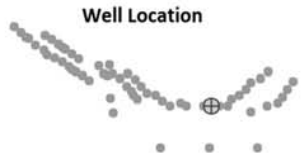

PTX06-ISB059 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
Typical Baseline Concentrations in Perched Groundwater
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

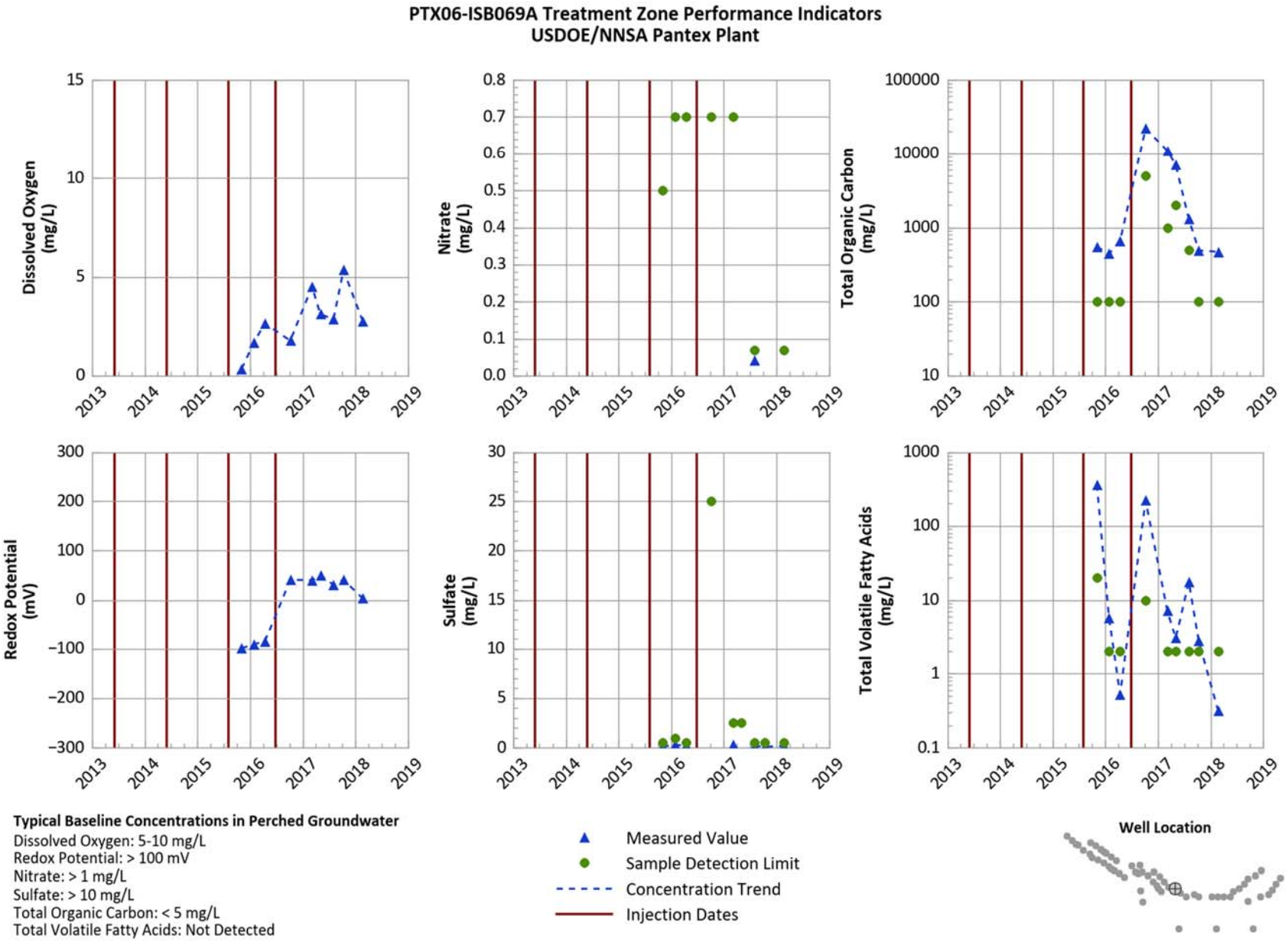
PTX06-ISB063 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



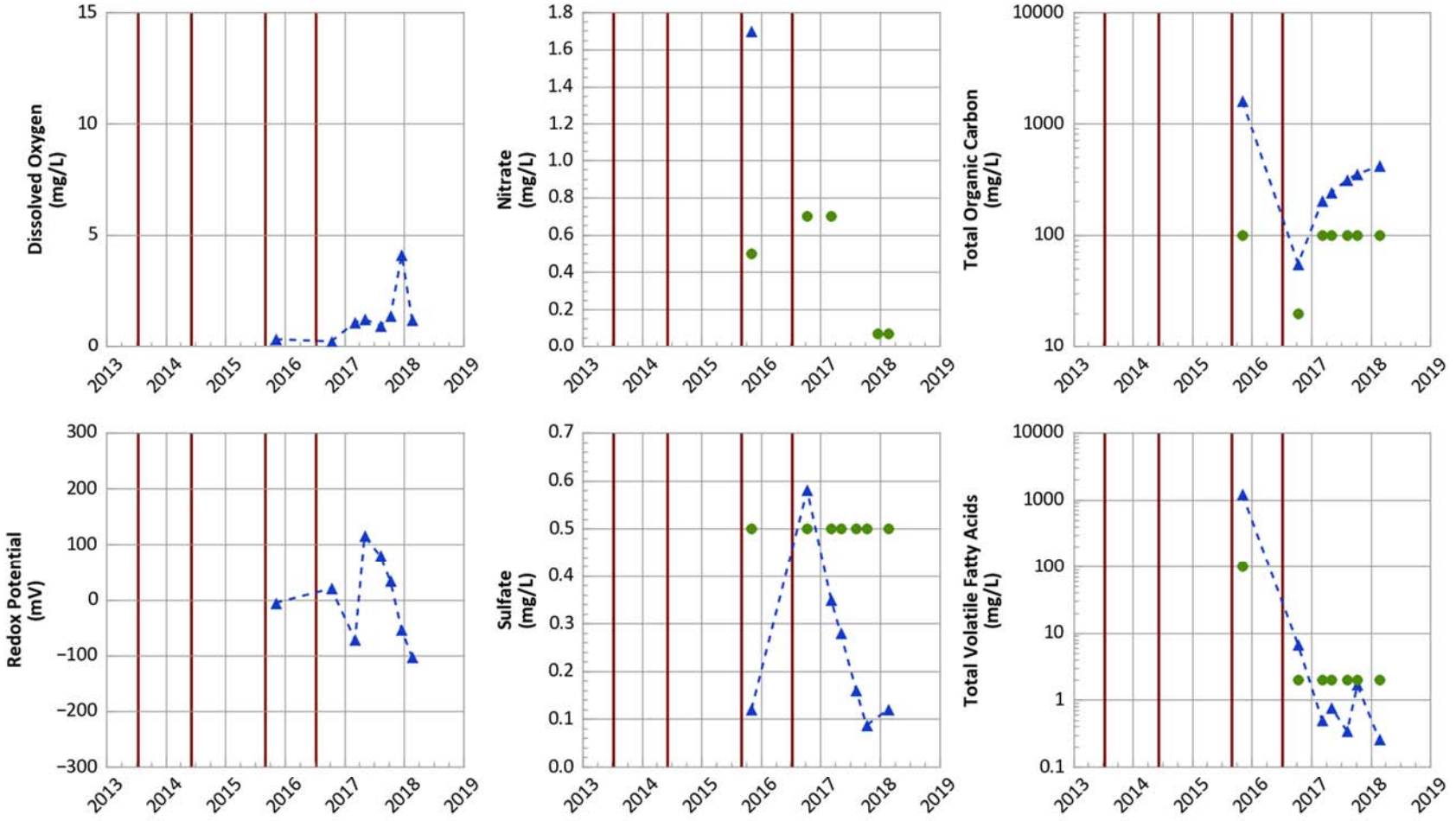
Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected





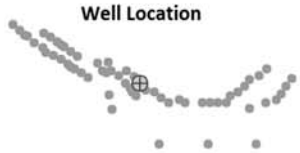

PTX06-ISB069A Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
Typical Baseline Concentrations in Perched Groundwater
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

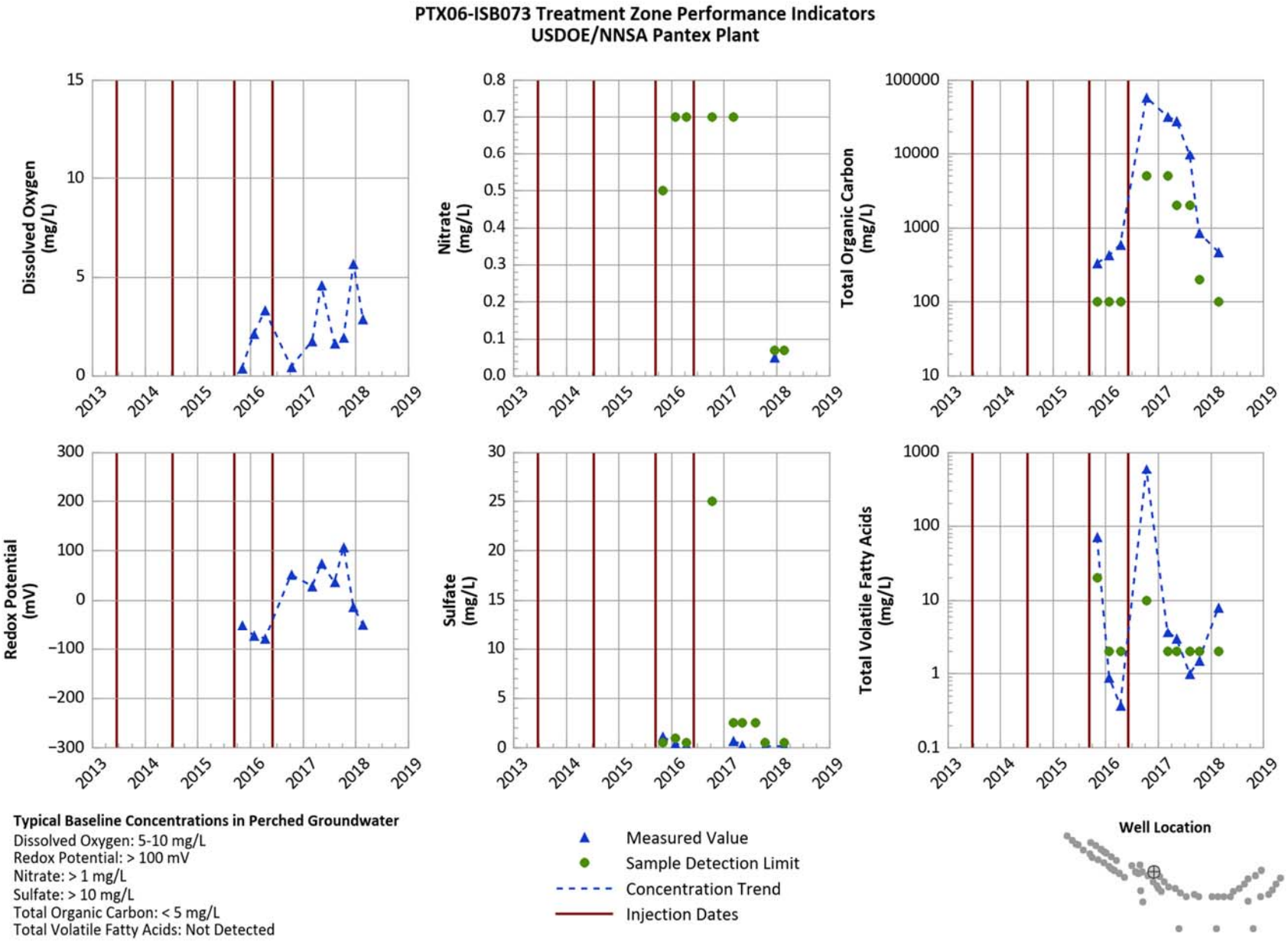
PTX06-ISB071 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



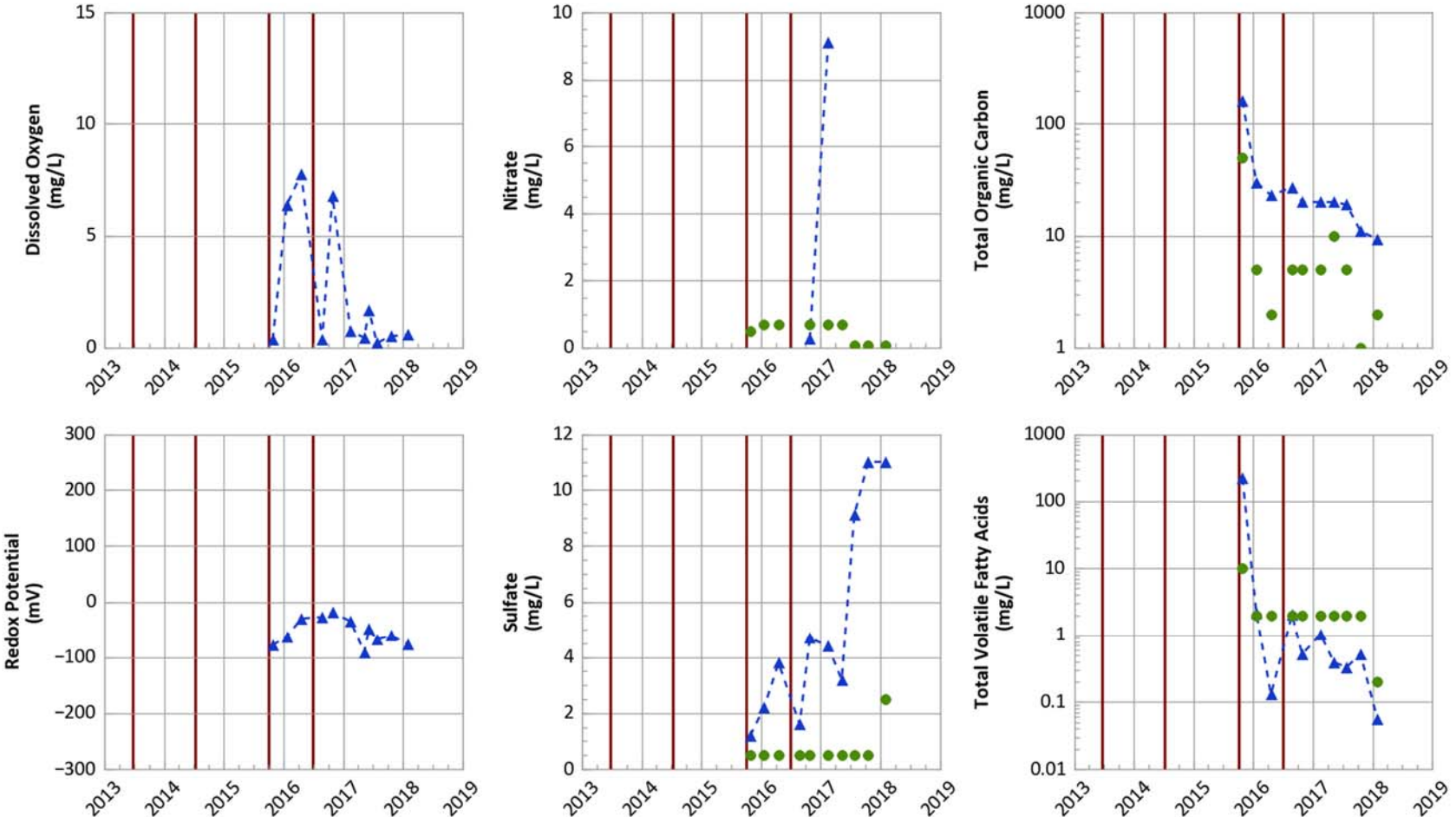
Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates




PTX06-ISB073 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
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

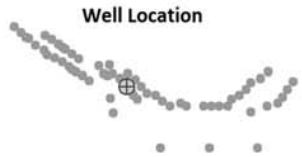
PTX06-ISB075 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant

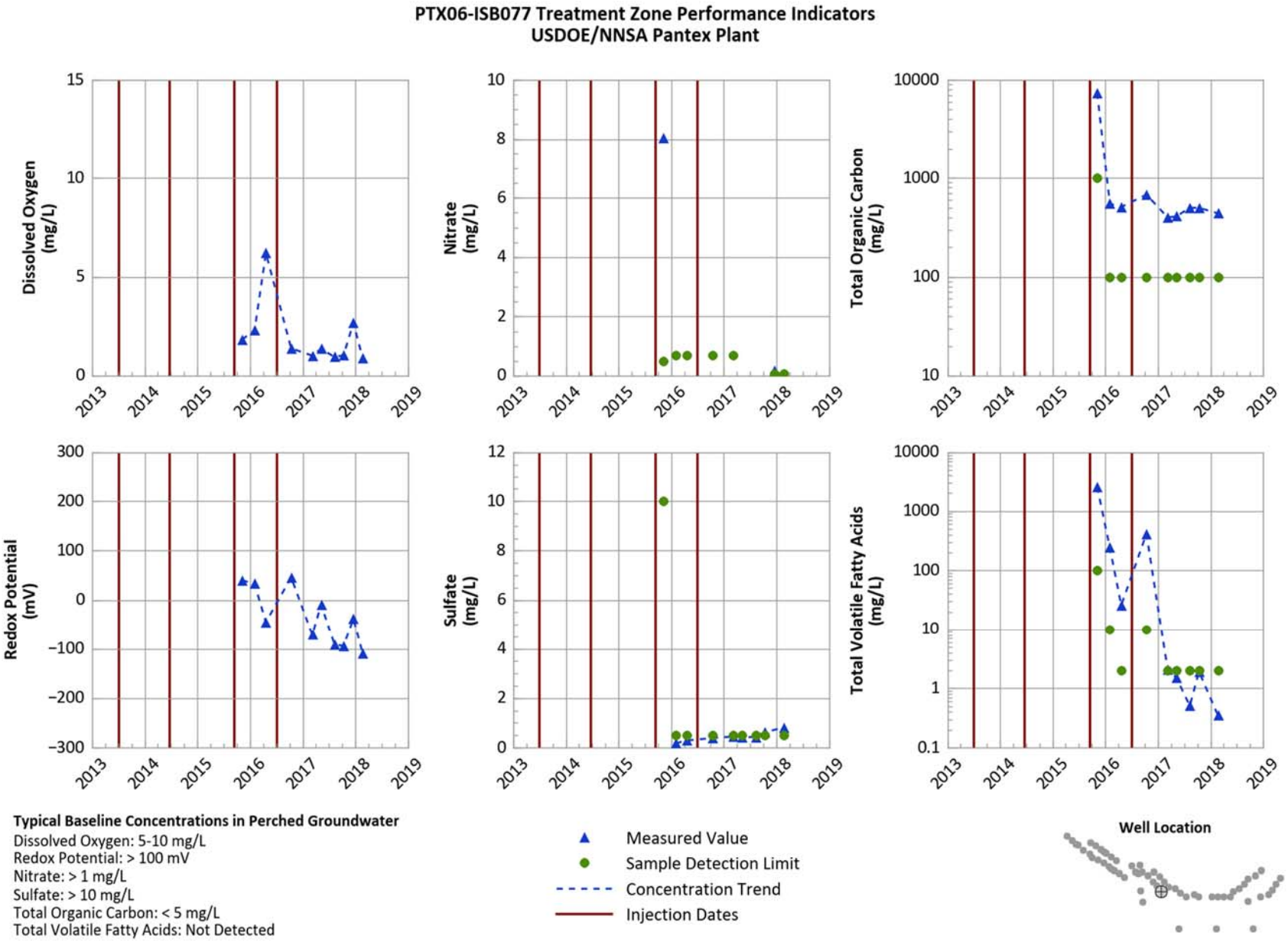


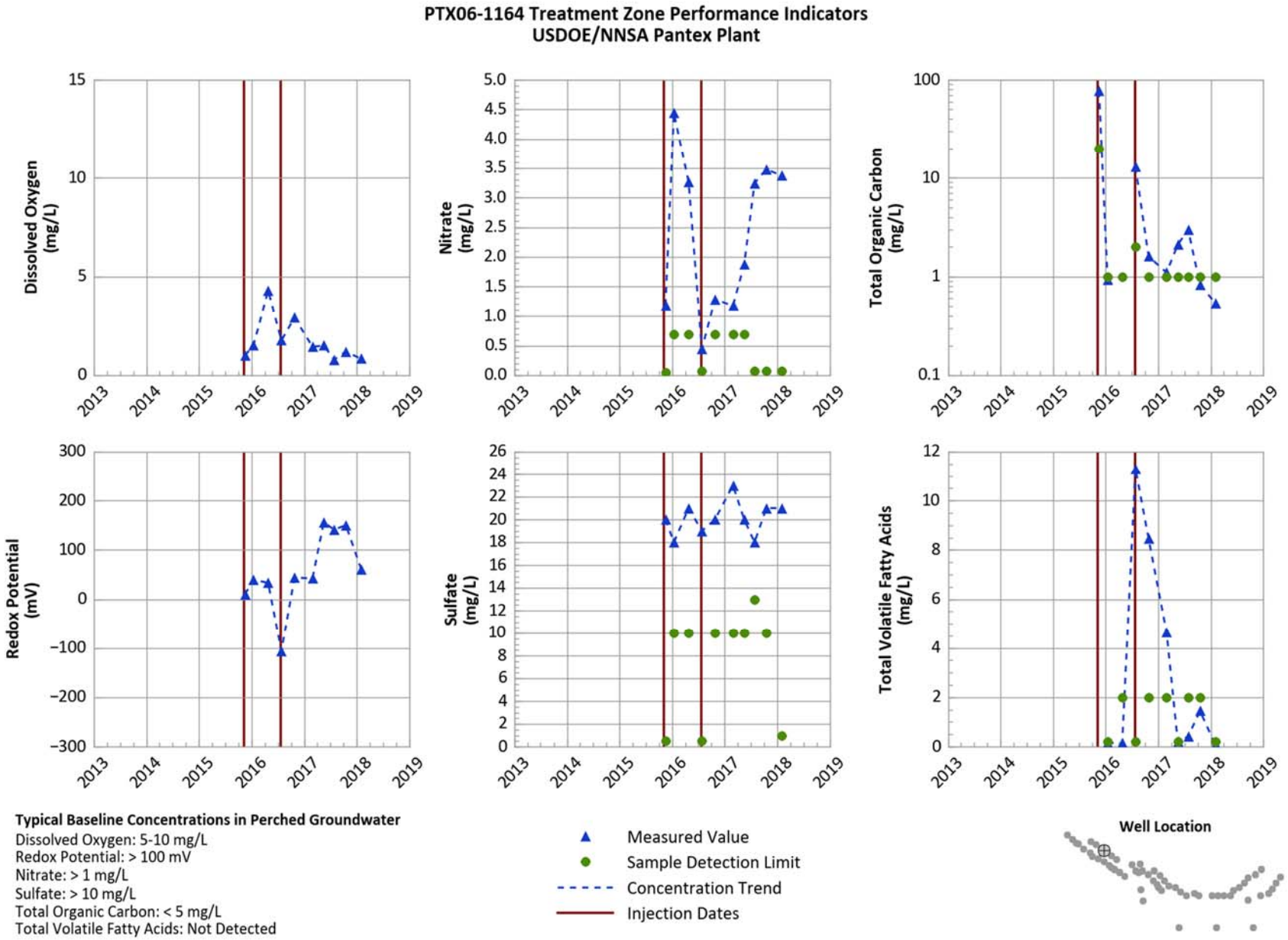
Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

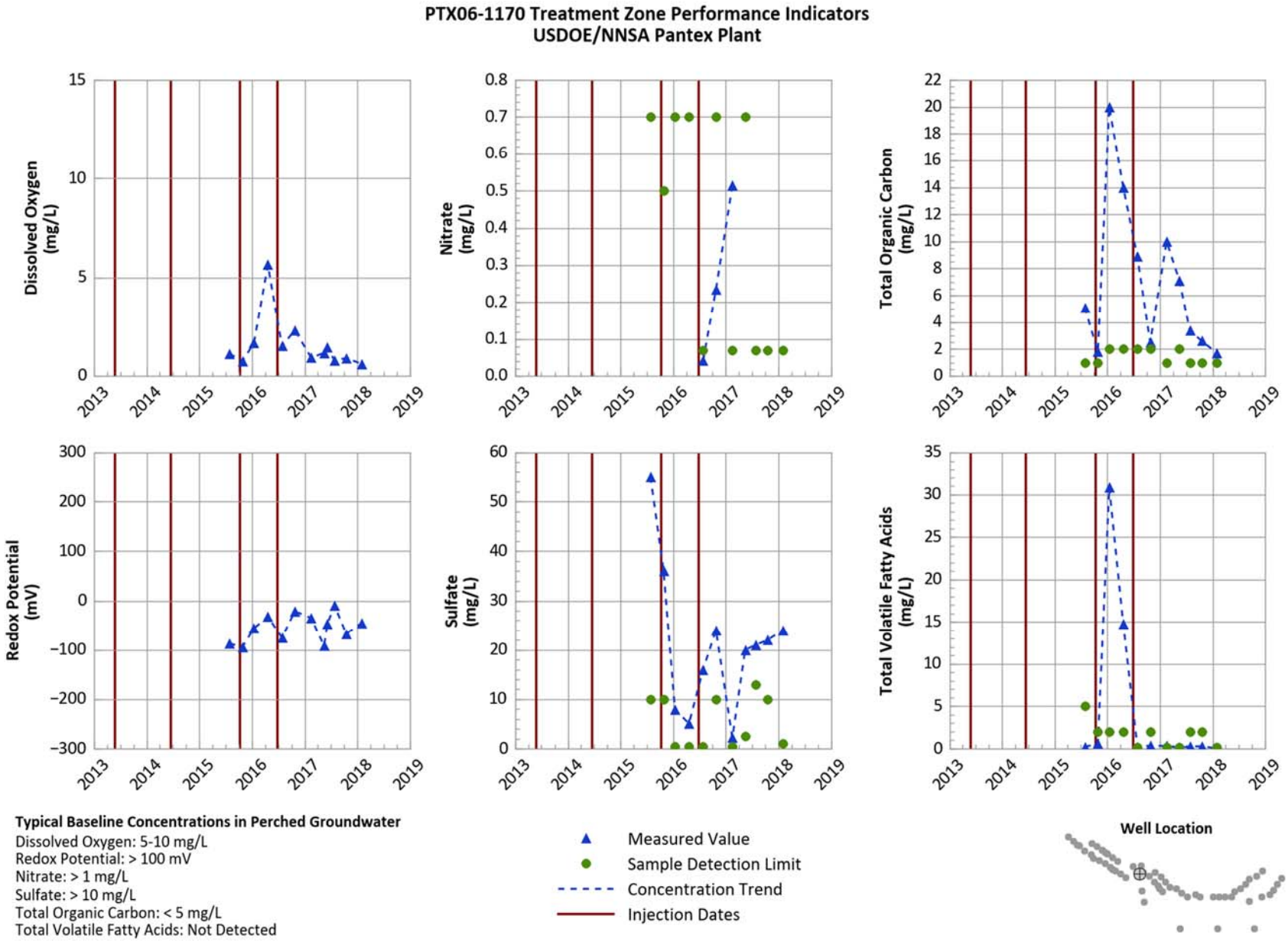
Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

Well Location

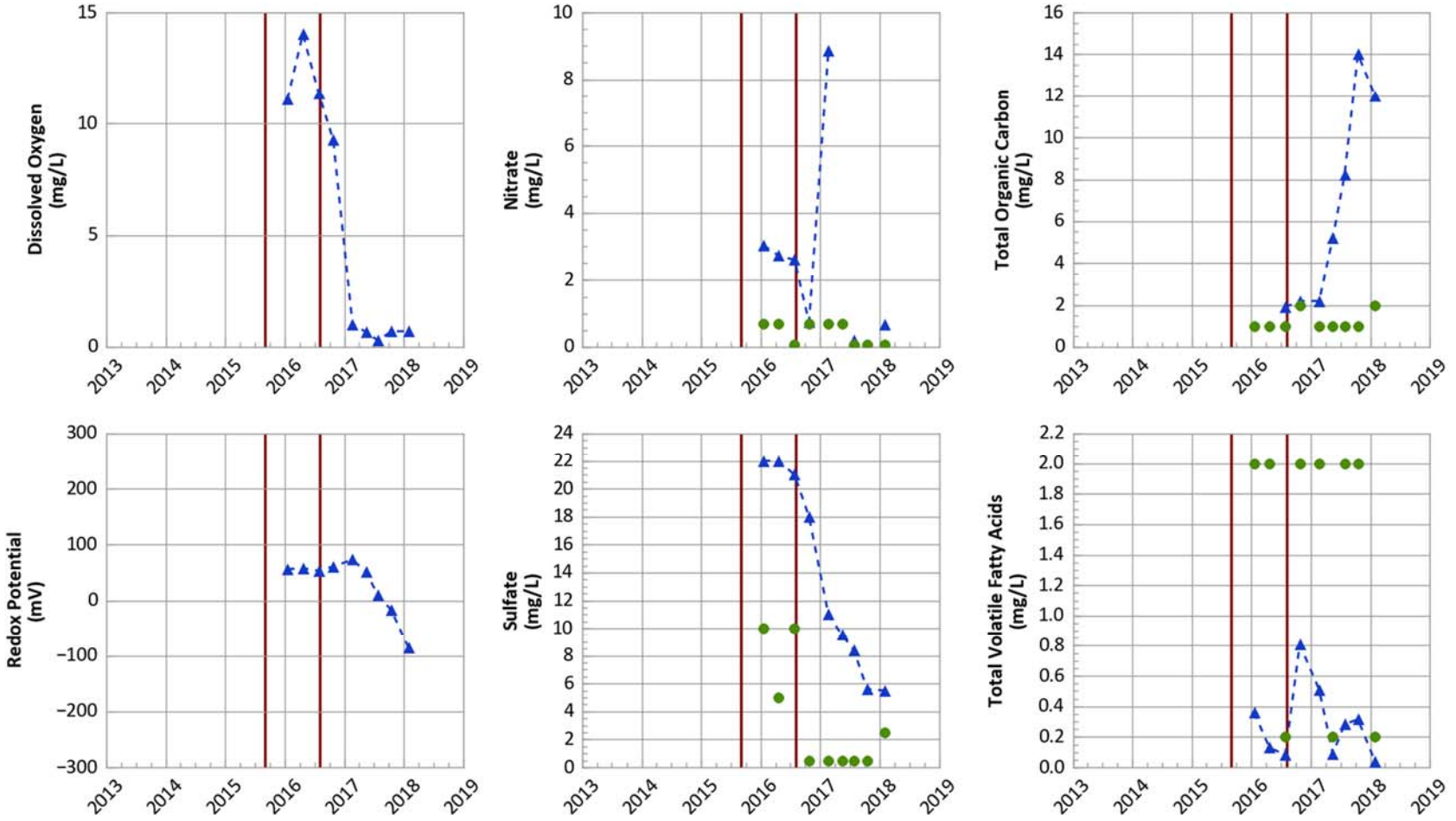



PTX06-ISB077 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
Typical Baseline Concentrations in Perched Groundwater
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


PTX06-1164 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
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


PTX06-1170 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
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

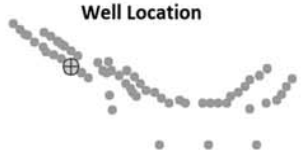
PTX06-1176 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant

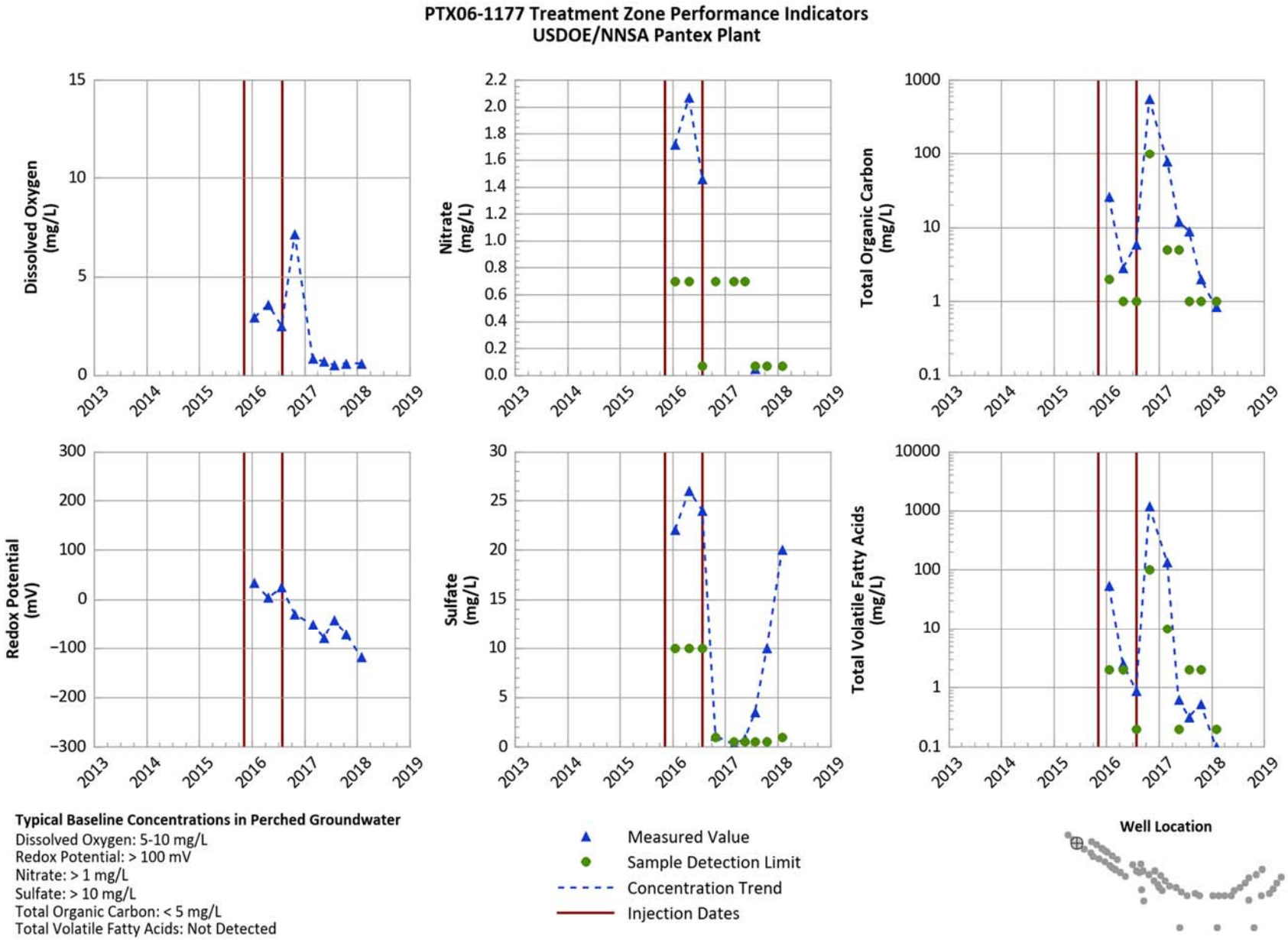


Typical Baseline Concentrations in Perched Groundwater
Dissolved Oxygen: 5-10 mg/L
Redox Potential: > 100 mV
Nitrate: > 1 mg/L
Sulfate: > 10 mg/L
Total Organic Carbon: < 5 mg/L
Total Volatile Fatty Acids: Not Detected

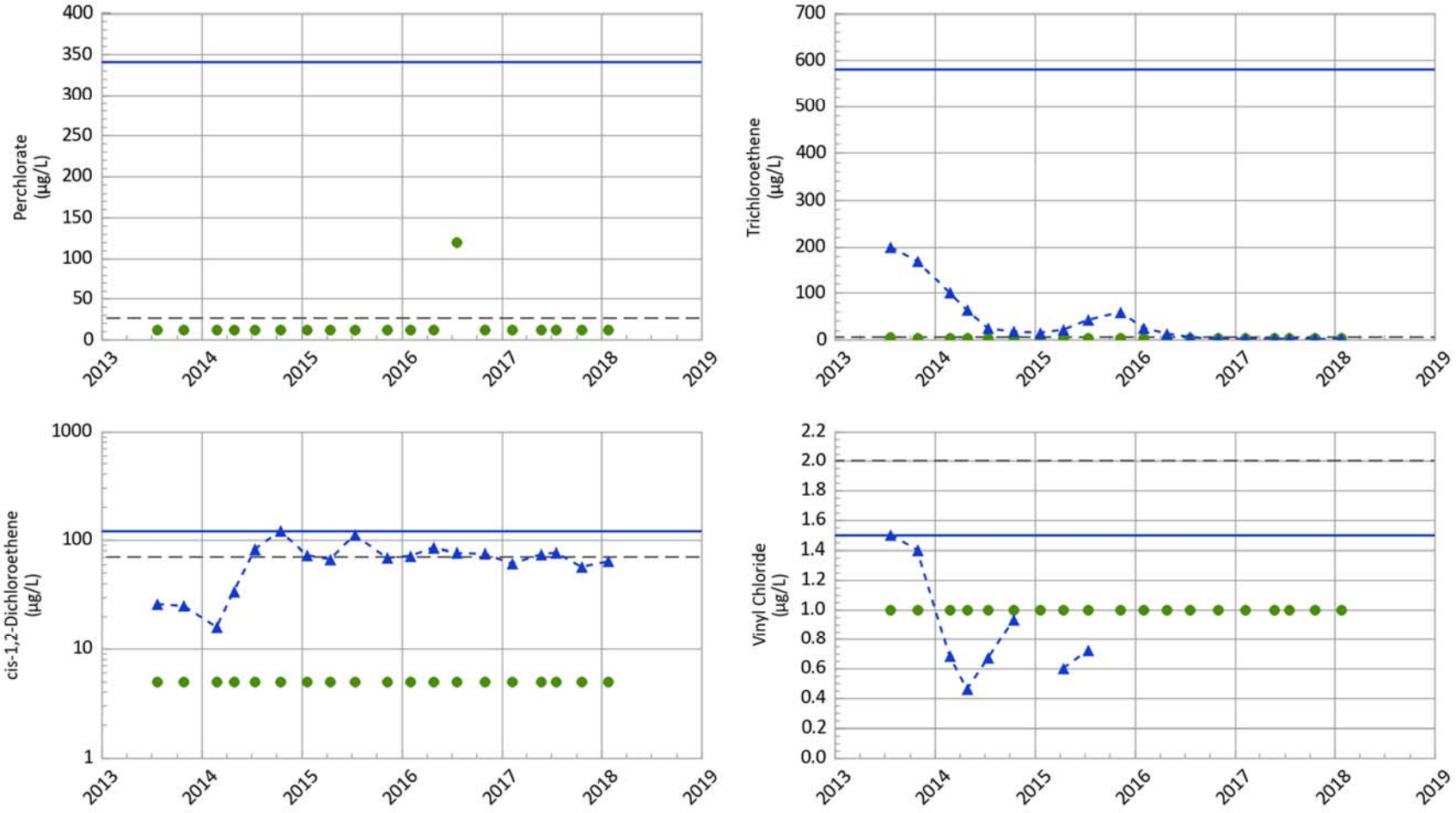
Measured Value
Sample Detection Limit
Concentration Trend
Injection Dates

Well Location



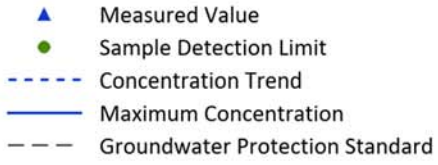

PTX06-1177 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant
Dissolved Oxygen (mg/L)
Nitrate (mg/L)
Total Organic Carbon (mg/L)
Redox Potential (mV)
Sulfate (mg/L)
Total Volatile Fatty Acids (mg/L)
2013
2014
2015
2016
2017
2018
2019
Typical Baseline Concentrations in Perched Groundwater
Dissolved 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

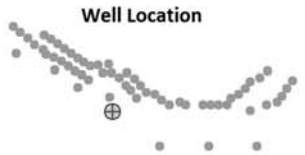
PTX06-1012 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant



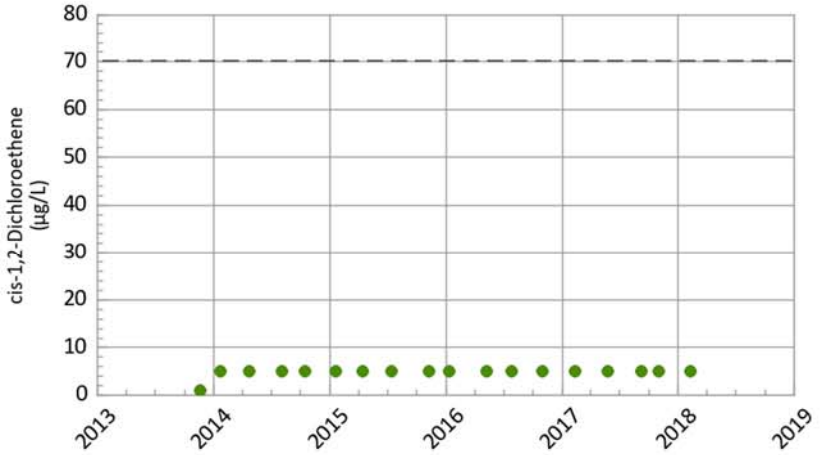
Most Recent Measured COC Concentrations (Jul 13, 2015)

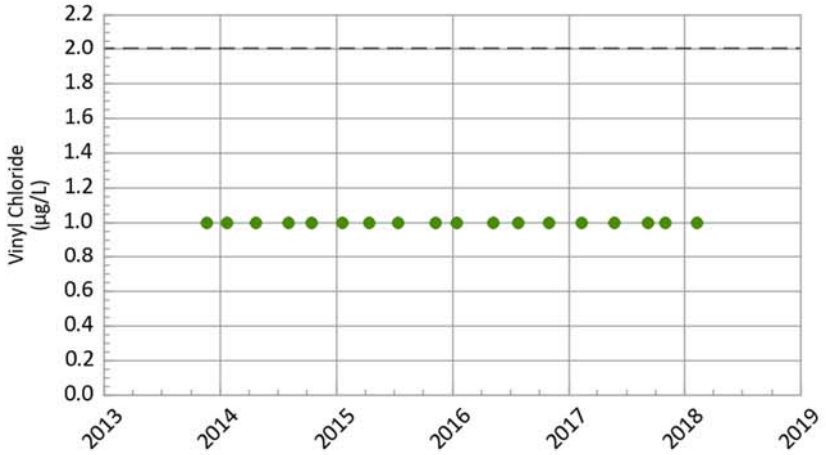
COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	64.0	70.0
TCE	1.4	5.0
VC	Non-Detect	2.0





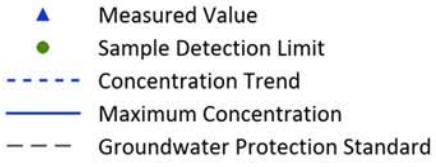
PTX06-1148 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant

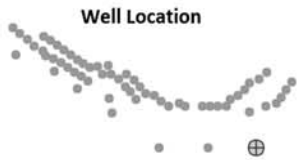




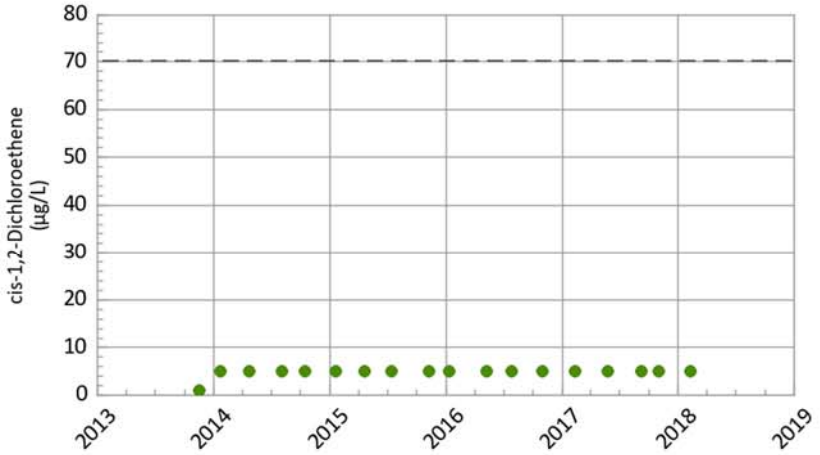
Most Recent Measured COC Concentrations (Feb 07, 2018)

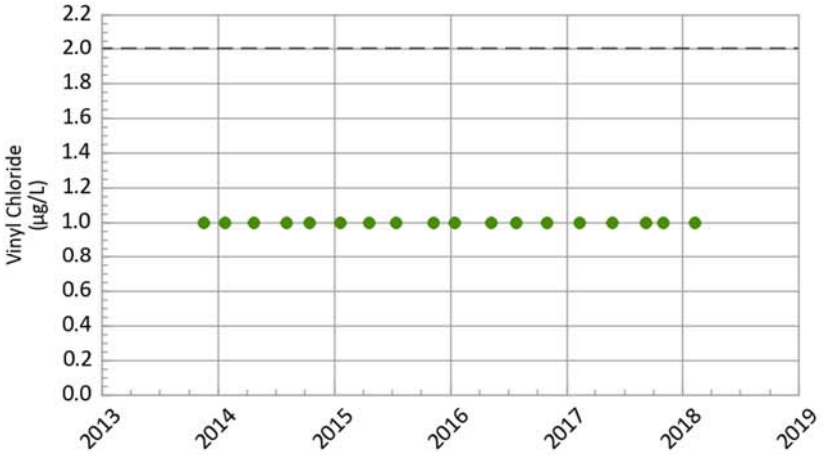
COC	Concentration (µg/L)	GWPS (µg/L)
PERC	230.0	26.0
DCE12C	Non-Detect	70.0
TCE	1.6	5.0
VC	Non-Detect	2.0





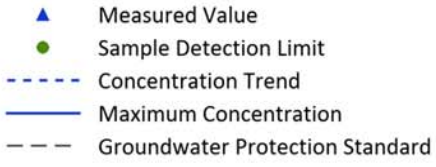
PTX06-1149 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant

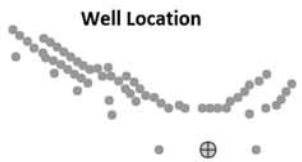




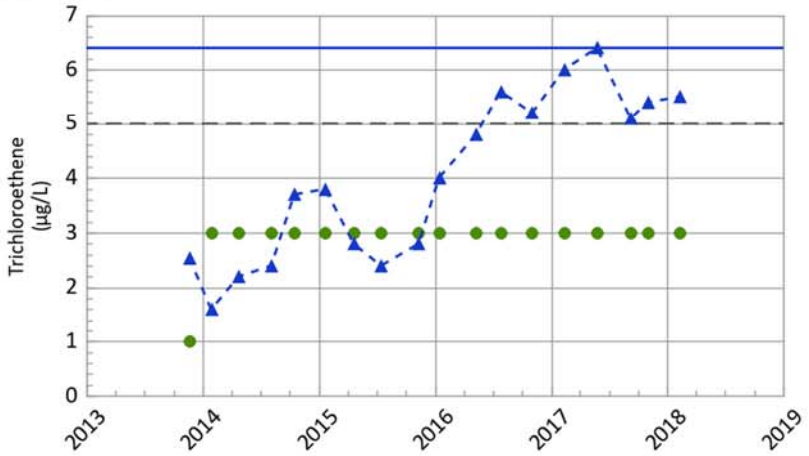
Most Recent Measured COC Concentrations (Feb 07, 2018)

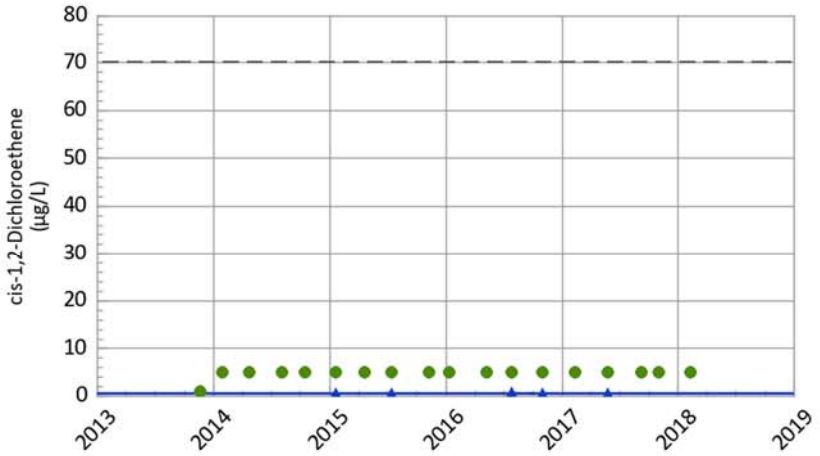
COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	Non-Detect	70.0
TCE	0.8	5.0
VC	Non-Detect	2.0

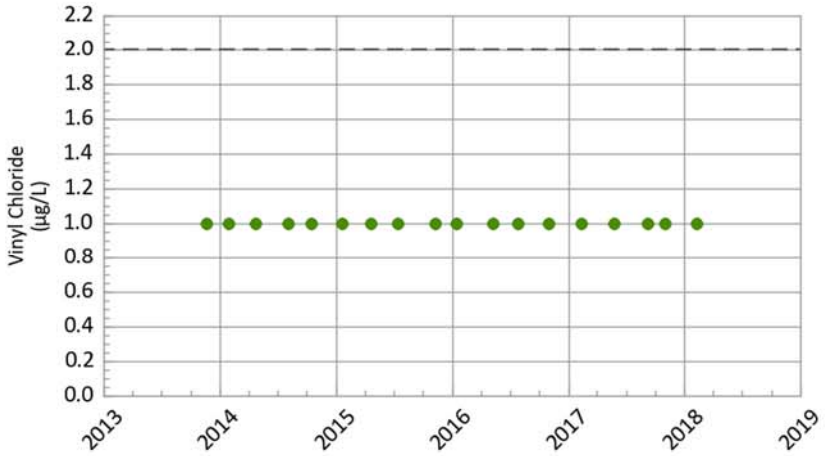




PTX06-1150 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant

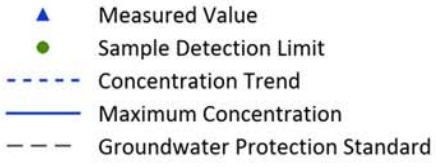


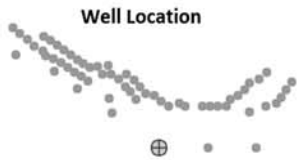




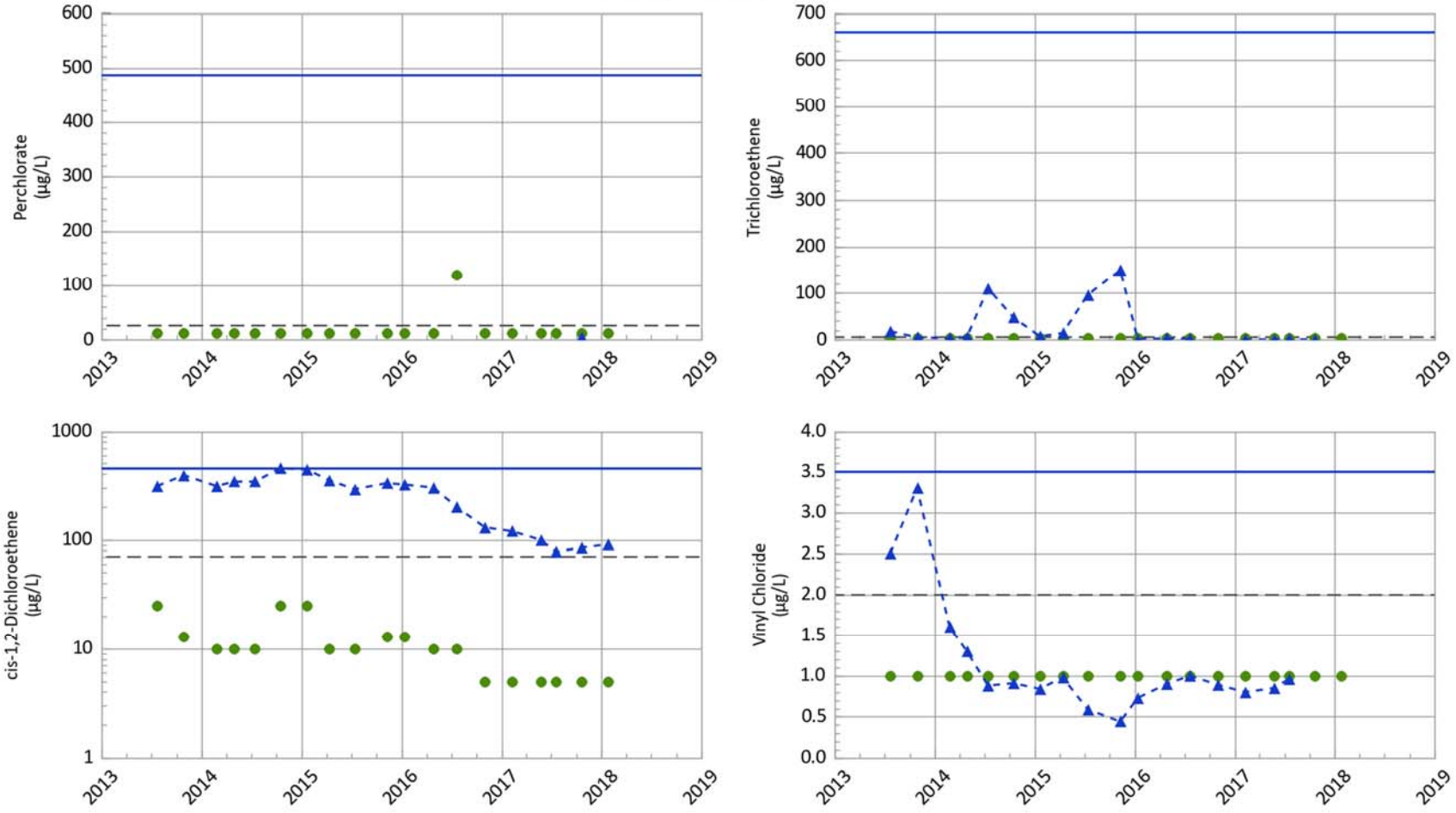
Most Recent Measured COC Concentrations (Feb 07, 2018)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	36.0	26.0
DCE12C	Non-Detect	70.0
TCE	5.5	5.0
VC	Non-Detect	2.0





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

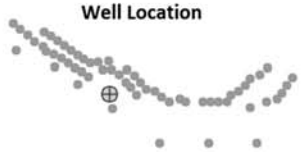


Most Recent Measured COC Concentrations (Jul 17, 2017)

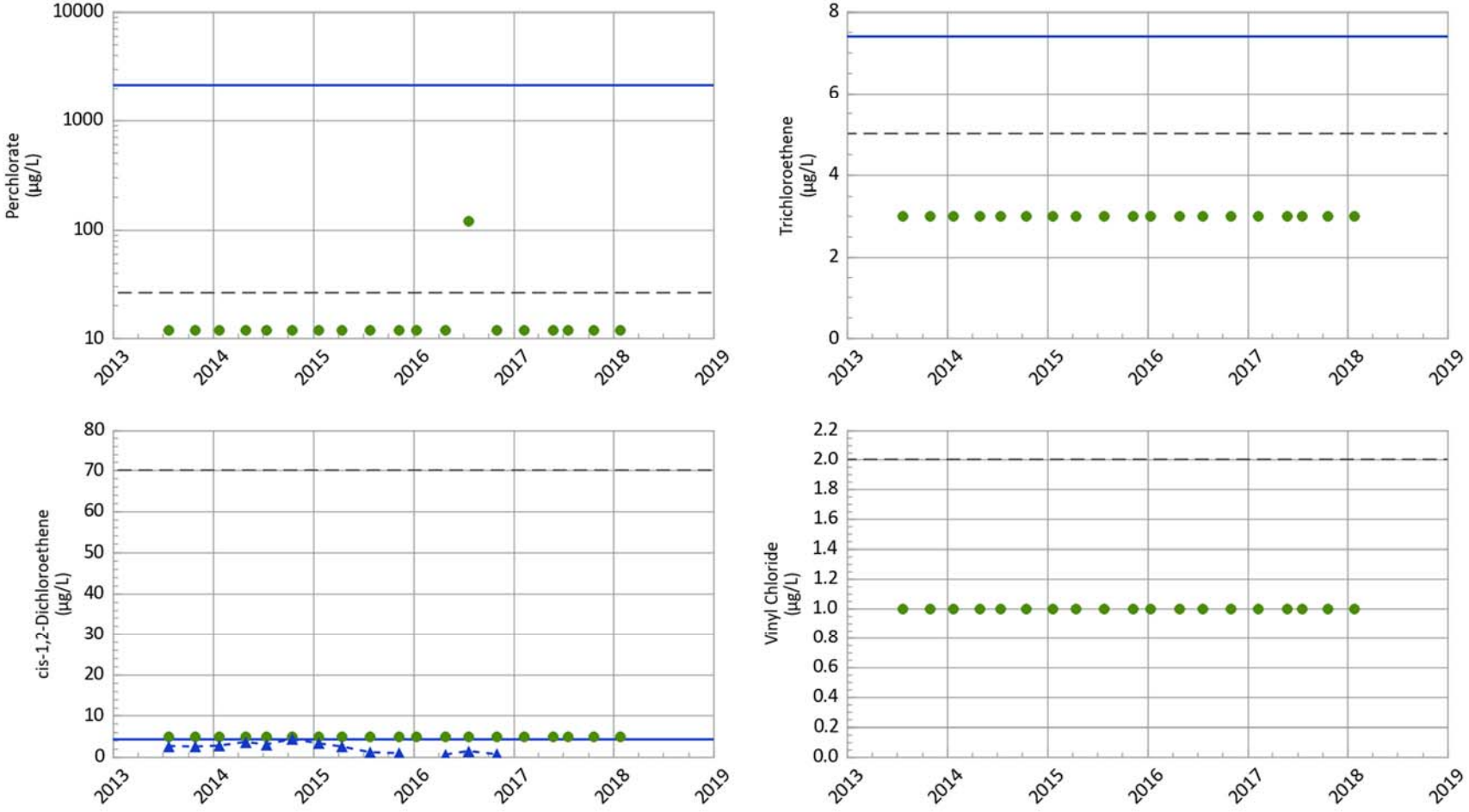
COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	91.0	70.0
TCE	Non-Detect	5.0
VC	Non-Detect	2.0

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

Well Location

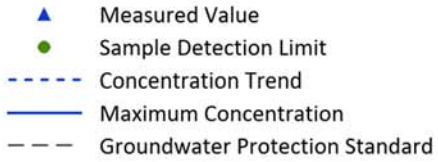


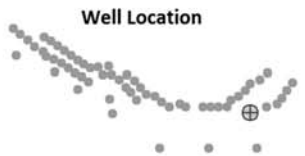
PTX06-1156 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant



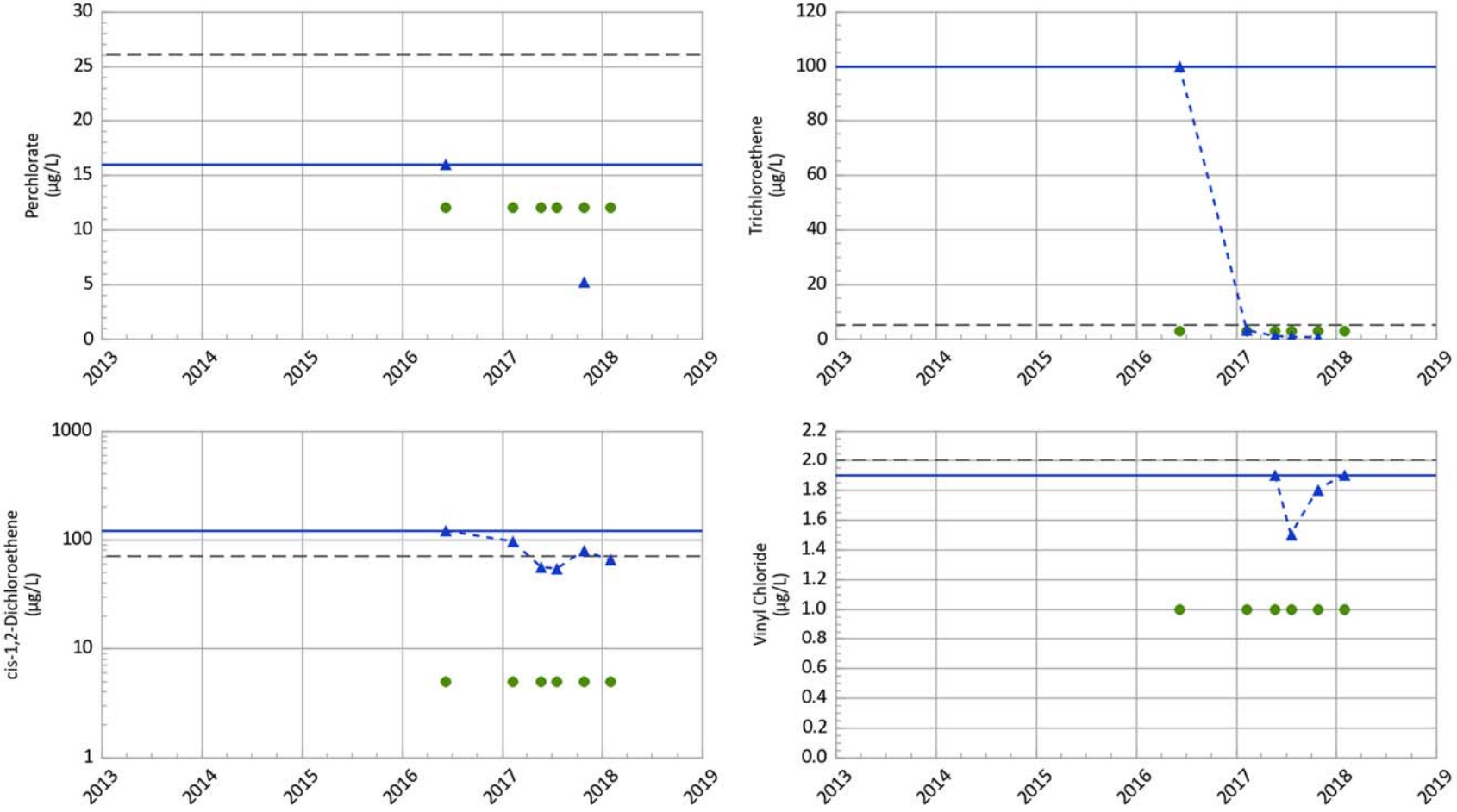
Most Recent Measured COC Concentrations (Jan 25, 2018)

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



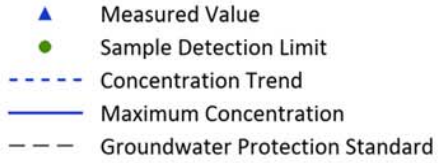


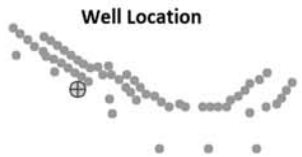
PTX06-1173 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant



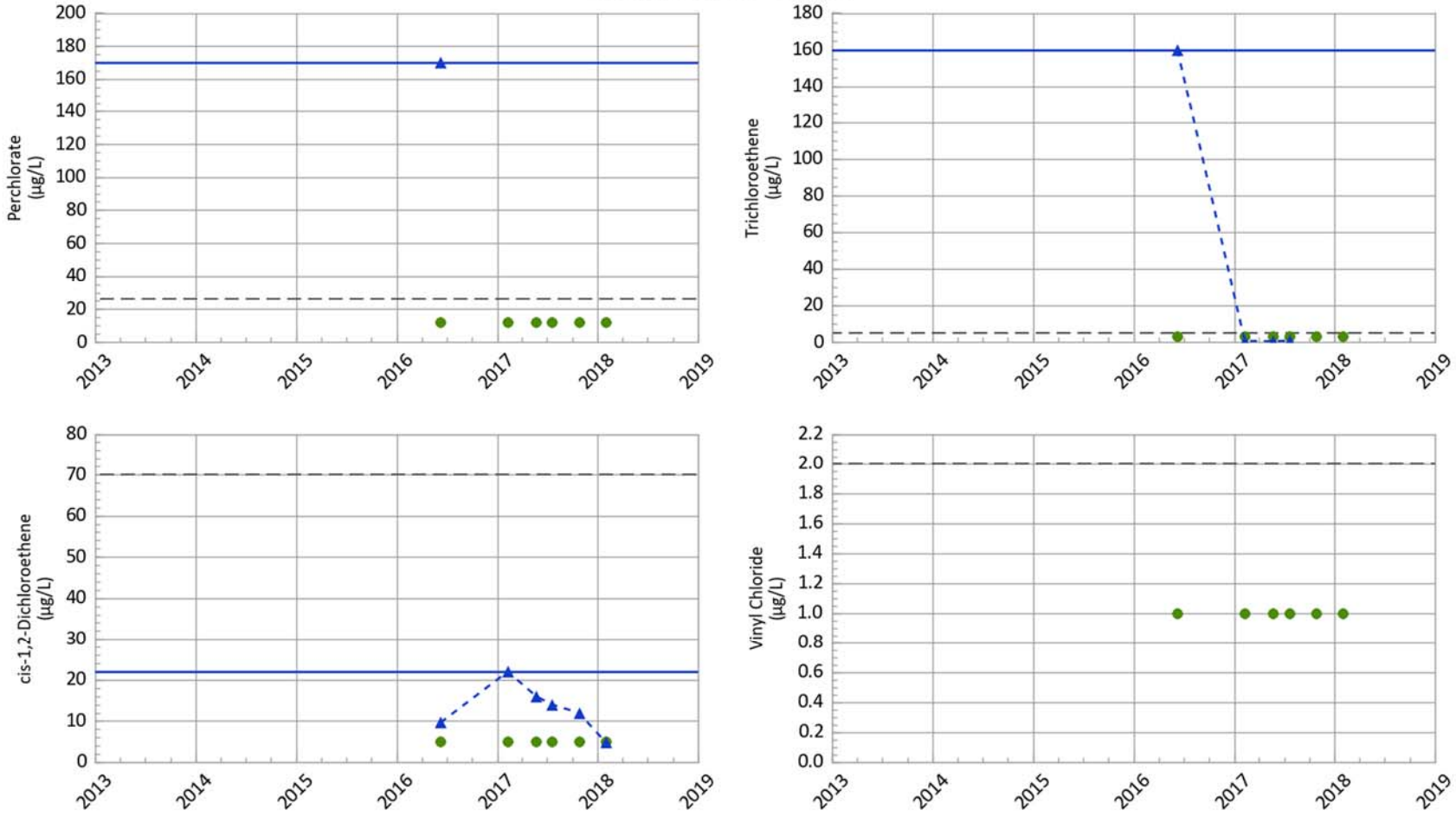
Most Recent Measured COC Concentrations (Jan 29, 2018)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	65.0	70.0
TCE	Non-Detect	5.0
VC	1.9	2.0





PTX06-1174 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant

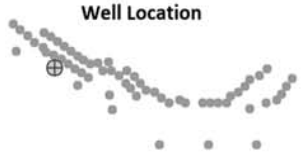


Most Recent Measured COC Concentrations (Jan 29, 2018)

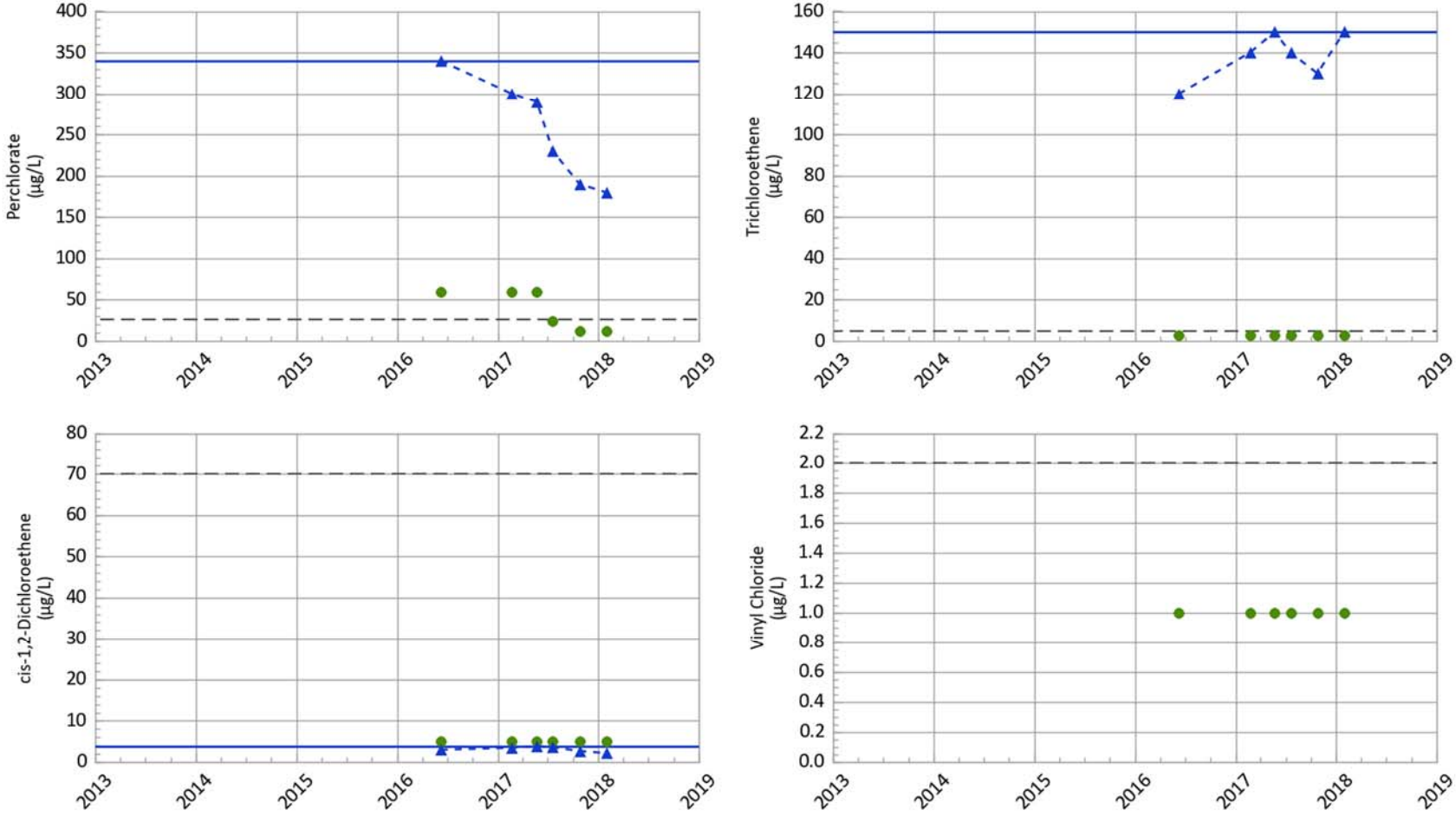
COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	26.0
DCE12C	4.9	70.0
TCE	Non-Detect	5.0
VC	Non-Detect	2.0

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

Well Location

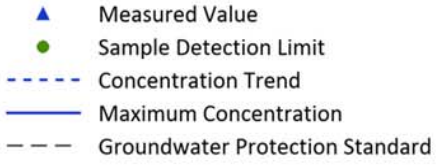


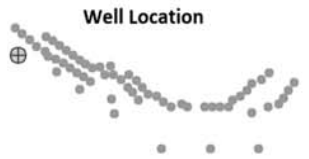
PTX06-1175 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant



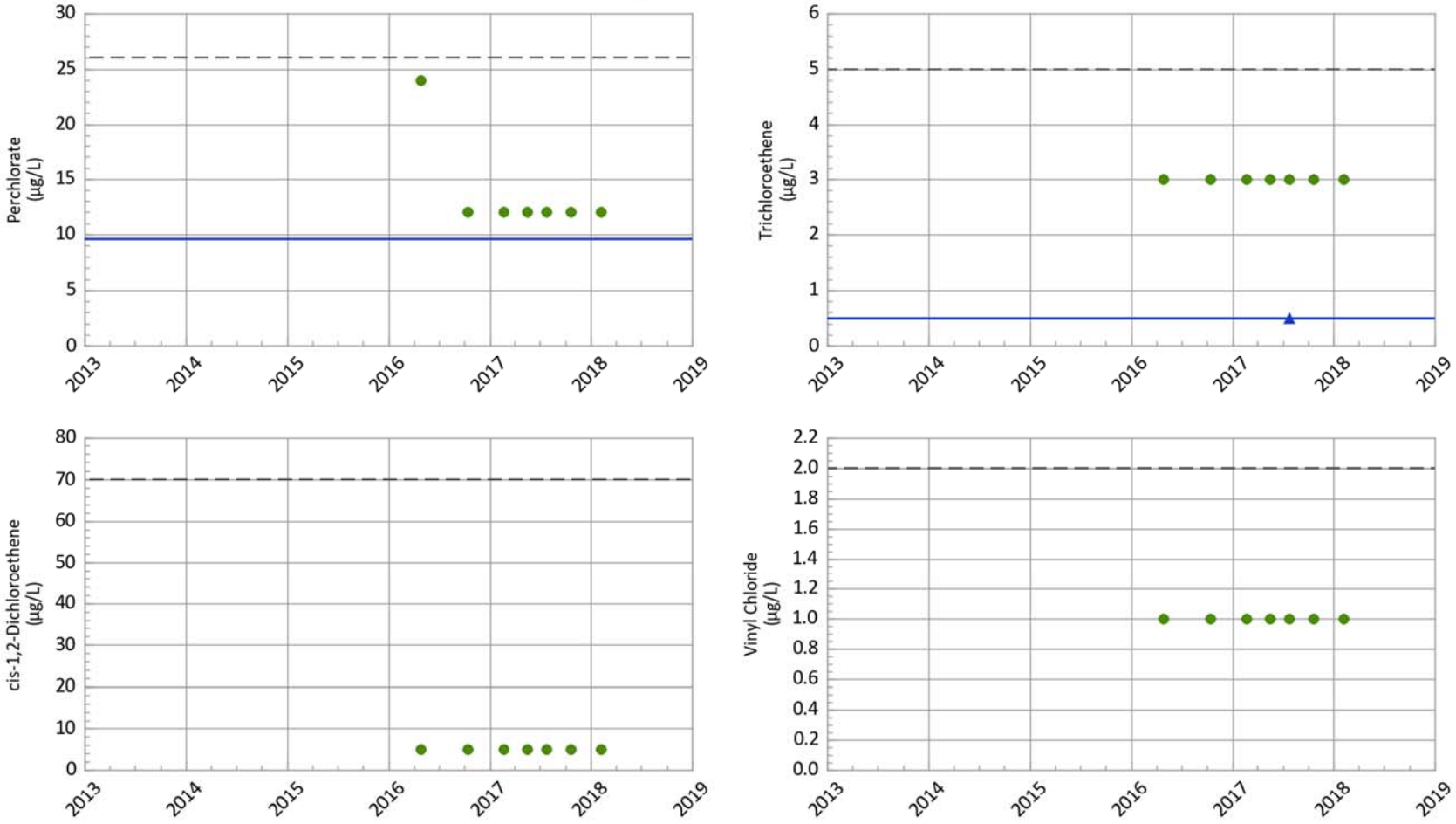
Most Recent Measured COC Concentrations (Jan 29, 2018)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	180.0	26.0
DCE12C	2.2	70.0
TCE	150.0	5.0
VC	Non-Detect	2.0



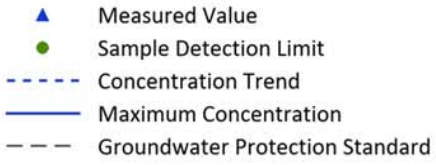


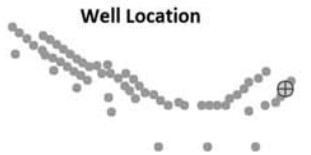
PTX06-ISB079 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant



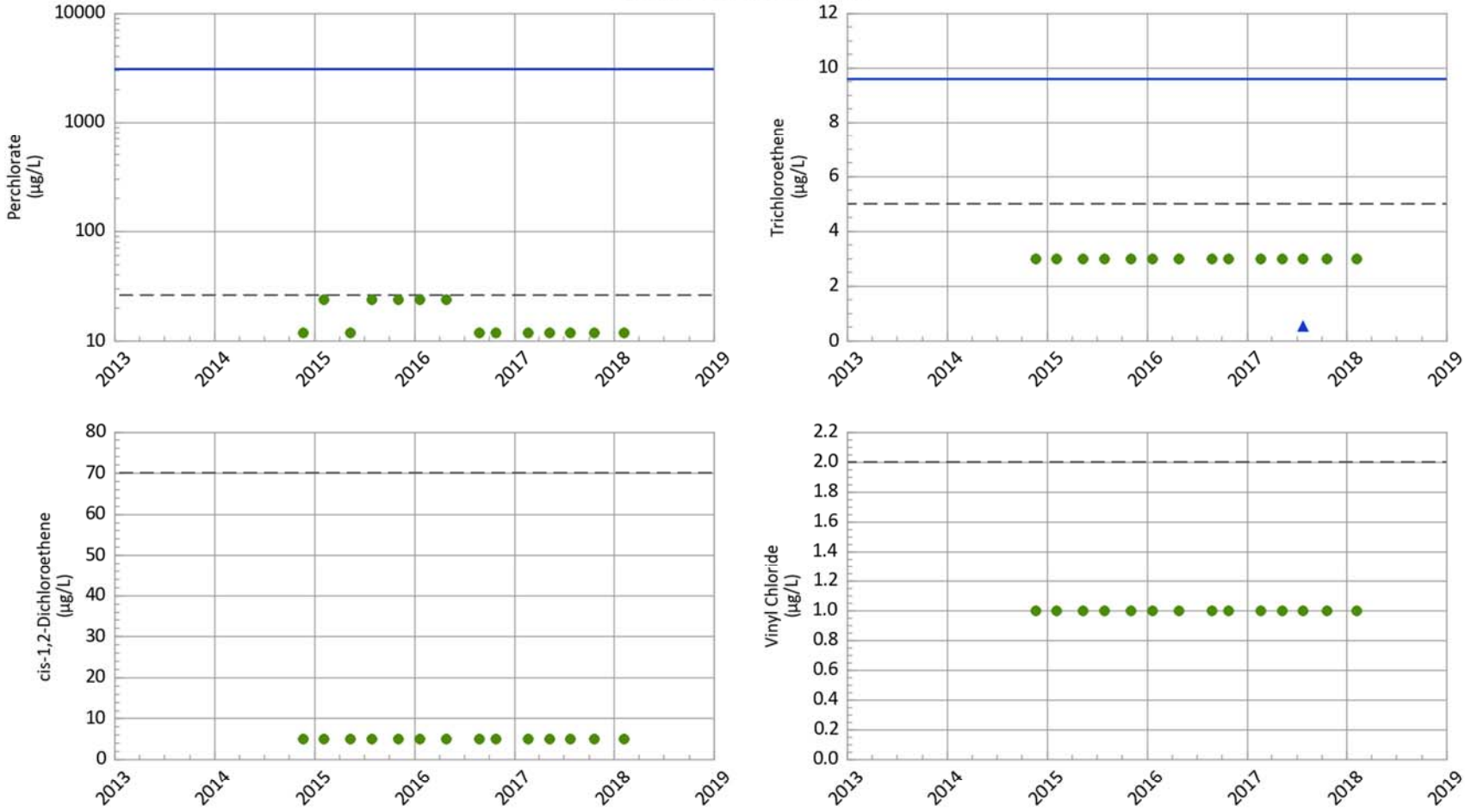
Most Recent Measured COC Concentrations (Feb 05, 2018)

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





PTX06-ISB082 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant



Most Recent Measured COC Concentrations (Feb 05, 2018)

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

Well Location