



PANTEX QUARTERLY PROGRESS REPORT

Remedial Action Progress

Second Quarter 2024

In support of Hazardous Waste Permit #50284 and
Pantex Plant Interagency Agreement
September 2024

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



UNCLASSIFIED

CERTIFICATION STATEMENT

Second Quarter 2024 Remedial Action Progress Report
Pantex Plant, September 2024

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.



09/19/2024

Jimmy C. Rogers

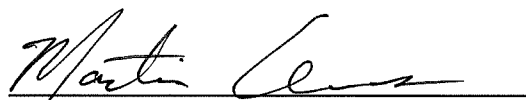
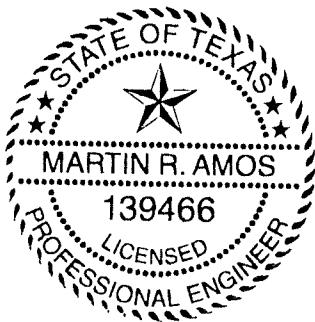
Date

Senior Director, Environment, Safety and Health
Consolidated Nuclear Security, LLC

**Remedial Action Progress Report
Second Quarter 2024
in Support of Hazardous Waste Permit #50284
and Pantex Plant Interagency Agreement
for the Pantex Plant, Amarillo, Texas
September 2024**

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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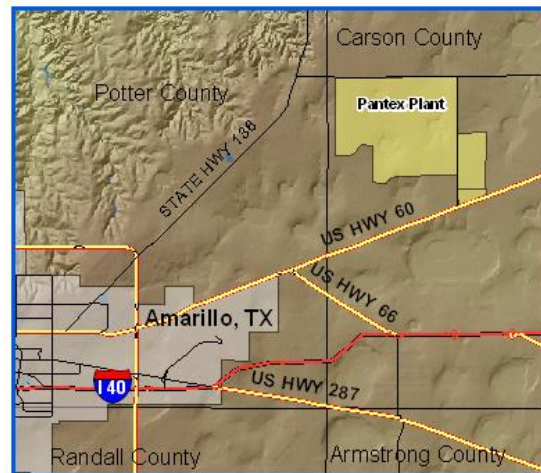
LIST OF ACRONYMS

µg/L	micrograms per liter
BTOC	below top of casing
COC	contaminant of concern
CP	Compliance Plan
Cr(VI)	hexavalent chromium
DCE	dichloroethene
DNT2A	2-amino-4,6-dinitrotoluene
DNT4A	4-amino-2,6-dinitrotoluene
EPA	United States Environmental Protection Agency
ETA	Eurofins Test America
FGZ	fine-grained zone
GEL	General Engineering Laboratory
GWPS	groundwater protection standard
HE	high explosive
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
ISB	<i>in situ</i> bioremediation
ISPM	<i>in situ</i> performance monitoring
lbs	pounds
MCL	Maximum Contaminant Level
MEW	mobile extraction well
Mgal	million gallons
MXN	hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine
mV	millivolts
ND	not detected
ORP	oxidation-reduction potential
P1PTS	Playa 1 Pump and Treat System
PCL	Protective Concentration Level
PFAS	per- and polyfluoroalkyl substances
PQL	practical quantitation limit
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
REC	recirculation well
SAP	Sampling and Analysis Plan
SE ISB	Southeast <i>In Situ</i> Bioremediation
SE ISB EXT	Southeast <i>In Situ</i> Bioremediation Extension
SEPTS	Southeast Pump and Treat System
SVE	soil vapor extraction
TAC	Texas Administrative Code
TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TNB135	1,3,5-trinitrobenzene
TNX	hexahydro-1,3,5-trinitroso-1,3,5-triazine

TZM	treatment zone monitoring
VOC	volatile organic compound
WWTF	wastewater treatment facility
Z11 ISB	Zone 11 <i>In Situ</i> Bioremediation

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 four areas. A soil vapor extraction (SVE) system was used to remediate volatile organic compounds (VOCs) in soils at the Burning Ground area. The SVE system is closed, but groundwater monitoring will continue in the area to evaluate the long-term effectiveness of the SVE. This quarterly report addresses progress achieved through implementation of the remedial actions for second quarter of 2024.



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 information required by Hazardous Waste Permit #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, and ISB systems. 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.

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 for irrigation, general Plant needs, and/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. Both systems now have the capability to release water to the new center pivot surface irrigation system. P1PTS can release water to the pivot irrigation system directly or to the wastewater treatment facility (WWTF) storage lagoons, which can discharge to Playa 1 or a subsurface drip irrigation system. Operational priorities for the pump and treat systems emphasize beneficial use of water. Operational goals were redeveloped in 2023 to also emphasize the operation of the SEPTS when water outlets are limited. P1PTS is shut down or operation is reduced when there are limited outlets for water. Those goals were approved by the Texas Commission on Environmental Quality (TCEQ) and the Environmental Protection Agency (EPA) in 2023.

The subsurface drip irrigation system was not utilized during the second quarter of 2024. Operation of the subsurface system is, and will continue to be, hindered by lowered lagoon storage capacity due to ongoing construction of repairs to the Plant’s WWTF storage lagoons. During periods the drip irrigation system is unavailable, Pantex continues to release WWTF water to Playa 1 as approved in the TCEQ wastewater permit (WQ0002296000). However, the permit restricts the amount of water that can be released to the playa, so pump and treat throughput is reduced if other outlets are not available for use. Pantex finished installation of an irrigation alternative on the property east of FM 2373 in August 2023 to provide additional long-term use of the treatment system water. A break at the pivot irrigation system wet well on December 7, 2023 required the P1PTS to be shut down until evaluation and repairs were complete. The system was repaired in March and was operated during the second quarter.

Pump and Treat System Second Quarter 2024 Operation	
<i>Playa 1 Pump and Treat System (P1PTS)</i>	
Days Operated	74
% Operation Time	76%
Volume Water Treated (Mgal)	18.1
HE Mass Removal (lbs)	3.8
Beneficial Use of Water	84%
<i>Southeast Pump and Treat System (SEPTS)</i>	
Days Operated	80
% Operation Time	84%
Volume Water Treated (Mgal)	27.2
HE Mass Removal (lbs)	111.7
Chromium Mass Removal (lbs)	11.7
Perchlorate Mass Removal (lbs)	9.3
Beneficial Use of Water	36.3%
<i>*Value below operational goals</i>	

During the second quarter, the SEPTS operated at a higher capacity using injection and release to the Pivot Lagoon. The throughput for SEPTS was at 84% of design, below the goal of 90% during the second quarter. This deficiency was due to the need to reduce flow to the pivot irrigation system during harvest season, scheduled granulated activated carbon exchanges, and nine extraction wells were undergoing repair/maintenance during part of May and all of June. Additionally, SEPTS could not operate for the first 12 days of June due to a plant power outage that caused a failure of the SEPTS computer hard drive, resulting in loss of the SCADA software that controls the SEPTS flow. P1PTS operated a majority of the second quarter after the system's call-

out alarms were repaired in April. The system was shutdown intermittently during the quarter for granulated activated carbon exchanges and scheduled plant electrical outages. The P1PTS flow was low during the second quarter because three wells were undergoing repair/maintenance for all of April and May. P1PTS operations were stopped in mid-June due to Pivot Pond water limits and the goal to prioritize SEPTS operations.

Graphs of monthly operation and throughput are included in Appendix B. The SEPTS wellfield had four wells that were repaired in June and then five other wells were locked out to perform repair. Repairs are expected to be complete before the end of third quarter. P1PTS has one well undergoing repair during the third quarter.

Together the systems treated about 45.3 million gallons (Mgal) during the second quarter. P1PTS primarily treats RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine) and other high explosives (HEs), and SEPTS primarily treats RDX and other HEs, hexavalent chromium [Cr(VI)], and perchlorate. Figures 1 and 2 provide mass removal information for RDX and HEs, Cr(VI), and perchlorate for the second quarter, as well as totals since system startup. Concentrations near

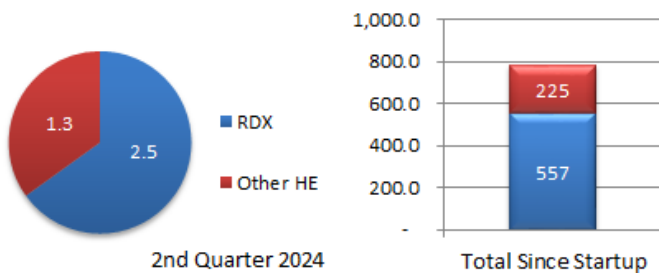


Figure 1. P1PTS Mass Removal

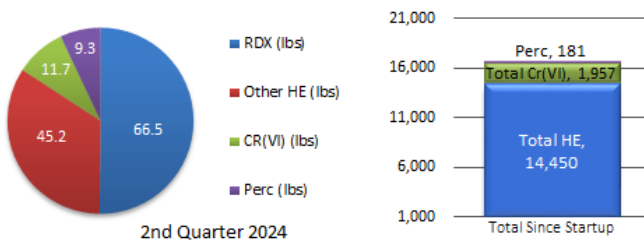


Figure 2. SEPTS Mass Removal

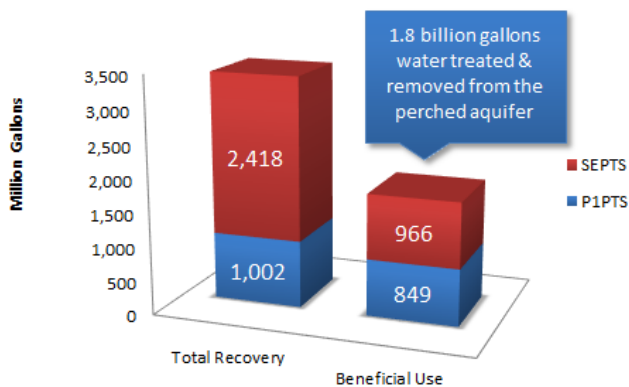


Figure 3. System Recovery and Use

Playa 1 are much lower due to declining source concentrations resulting in reduction of mass removal at P1PTS. Overall, the systems have removed over 17,370 pounds (lbs) of HEs, chromium, and perchlorate contaminants from perched groundwater since operations began.

As discussed in the *2023 Annual Progress Report* (June 2024), Pantex began investigating for the presence of per- and polyfluoroalkyl substances (PFAS) in the perched groundwater pump and treat systems. Both systems treat PFAS; however, concentrations are very low; mass removal is only calculated to be approximately one pound per year, at each system, and is not tracked in the mass removal totals.

The total recovery and treatment from both systems since startup has been calculated at about 3.4 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 over 1.8 billion gallons of treated water beneficially used since startup of the subsurface irrigation system. The recovery and beneficial use totals are presented in Figure 3. SEPTS effluent was sent to the Pivot Irrigation Lagoon for beneficial use or to the injection well field to supply water to the Zone 11 ISB. The majority of P1PTS flow was sent to the center pivot irrigation system in the second quarter and those totals were included in the beneficial use numbers. Evaluation of effluent data from SEPTS and P1PTS indicates that all COCs were treated to levels below the groundwater protection standard (GWPS). Detected PFAS are treated below current Texas Risk Reduction Protective Concentration Levels (PCLs) or newly promulgated drinking water Maximum Contaminant Levels (MCLs). One detected PFAS, 6:2FTS, has no PCL or MCL available.

ISB SYSTEMS

Four ISB systems (Zone 11 ISB, Southeast ISB, Southeast ISB Extension, and Offsite ISB) were operating at Pantex during the second quarter of 2024. 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 are 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 Cr(VI). The primary COC at the Southeast ISB Extension and the Offsite ISB is RDX.

The following section provides an understanding of the expected conditions at the ISB systems and downgradient concentrations of COCs. For the treatment zone wells, this report evaluates whether the conditions are present, including oxidation-reduction (i.e. redox) potential (ORP) and the reduction of electron acceptors (i.e. dissolved oxygen and nitrate), to degrade the COCs in each area. The presence of gases, such as methane, can also be an indication of deeper reducing conditions. The presence of a continued food source (total organic carbon) for the microbial reduction of COCs is also evaluated. Strong reducing conditions (ORP below -50 millivolts (mV) to reduce RDX and TCE and near 0 mV to reduce hexavalent chromium and perchlorate) are required to adequately reduce COCs. Figure 4 presents the redox ranges for the reduction of various COCs. Dissolved

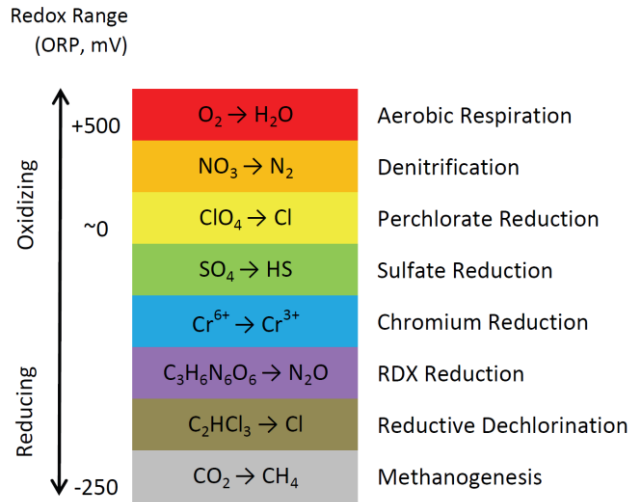


Figure 4. Redox Range for COCs

gases, redox potential, nitrate, and TOC are evaluated in the ISB treatment zone performance wells to determine if the treatment zone is rebounding to baseline conditions, thus requiring amendment injection.

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.

ISB INJECTION ACTIVITIES

Sampling of the ISB systems has been reduced to a semi-annual frequency. As system data are not always available for quarterly evaluation, only new and complete data sets for each system will be assessed during the current quarter. Over the first and second quarters, all systems were sampled completely and all data for those quarters are discussed in this report. Table 1 summarizes the injection activities for 2024. Well maintenance and injection activities continued at the Offsite ISB and Zone 11 ISB. Injection of the Southeast ISB Extension is scheduled for the third quarter.

Table 1. ISB Systems Activities

Month (2024)	SE ISB EXT	SE ISB	Z11 ISB	Offsite ISB ¹
January				
February				
March				Injection/Sample
April	Sample	Sample	Rehab/Sample	Injection/Sample
May	Sample	Sample	Rehab/Sample	Injection
June			Injection	
July	Rehab/Injection		Injection	
August	Injection		Injection	Injection/Sample
September	Sample			Injection/Sample
October	Sample	Sample	Sample	Injection/Sample
November	Sample	Sample	Sample	
January				

¹All sampled wells in the Offsite ISB are extraction wells (REC) and (MEW) and are not injected; therefore, injection will not affect the sampling of the REC and MEW wells.

SE ISB EXT = Southeast ISB Extension

SE ISB = Southeast ISB

Z11 ISB = Zone 11 ISB

SOUTHEAST ISB REMEDIAL EFFECTIVENESS

The Southeast ISB was installed in 2007. Eight injection events have been completed at this system at the time of this report. The Southeast ISB continues to demonstrate declining water levels at the system; as a result, only 60% of the system was injected during the 2022 injection event. The inability to sample or inject into these wells is expected to persist with continued upgradient removal of water by the SEPTS. Pantex injected the system in early 2022 with molasses, as recommended in the *Fourth Quarter 2018 Progress Report*, but further injections may be limited or unnecessary.

Three injection wells and three downgradient ISPM wells were sampled at Southeast ISB between the first and second quarter. Three ISPM wells (PTX06-1118, PTX06-1045 and PTX06-1123) have gone dry or did not have sufficient water to be sampled. Analytical data indicate that reducing conditions continue at the treatment zone in all sampled ISB wells. All three wells have total organic carbon to allow continued treatment. Downgradient wells indicate that complete treatment is occurring at all but one well, PTX06-1153. PTX06-1153 indicates partial treatment, as the breakdown products of RDX are present; RDX continues to slowly decline at this location. Pantex has requested removal of PTX06-1153 from permit HW-50284 so the monitor well can be used for injection. Pantex has also applied for use of this well under the underground injection control permit. Further recommendations will be made as injection occurs and more data are collected.

ZONE 11 REMEDIAL EFFECTIVENESS

Installation of the Zone 11 ISB remedial action was completed in 2009, and an expansion to the northwest of PTX06-ISB083 was completed in early 2015 and 2019 (see Appendix A maps). Another expansion was completed in late 2021 to address the southeast moving TCE plume. Fifteen injection events (with the sixteenth in progress) have been completed at the time of this report. Pantex has moved to the use of a more soluble carbon source, molasses, as studies conducted at the Zone 11 ISB in 2018 indicated that molasses distributed between widely-spaced injection wells at a much higher concentration than emulsified vegetable oil (EVO). More frequent injections are required for molasses and have been planned annually for the Zone 11 ISB to maintain reducing conditions. The latest expansion of a second row of wells on the south side of the system is closely spaced to allow injection of the longer lasting EVO. For the 2023 injection at Zone 11, injection on the west side of the system continues to use molasses as amendment. Pantex will continue to evaluate the system to ensure appropriate timing of injections and the most effective amendment.

The Zone 11 ISB has a well-established treatment zone in the original portion of the system, where injection has occurred since 2009. Reducing conditions are established for the expansion areas, due to multiple injections or their placement downgradient of injected portions of the system. Four injected wells, eight treatment zone monitoring (TZM) wells, and nine downgradient ISPM wells were sampled in the Zone 11 ISB system in the second quarter.

Reduction of nitrate and the measured ORP indicate whether conditions across the treatment zone are present for reductive dechlorination. Evaluation of data in the treatment zone indicates mild to strong reducing conditions, with ORP ranging from -122 to -53.4 mV across the Zone 11 ISB. Monitored conditions inside the treatment zone indicate nitrate was reduced at all sampled wells and negative ORP was measured in all wells, indicating deeper reducing conditions in most areas. Soluble metals (arsenic and manganese) increased and methane was measured in all treatment zone wells, indicating that deeper reducing conditions are established. TCE continues to be reduced to cis-1,2-dichloroethene (DCE), with TCE concentrations below GWPS in nine monitored wells inside of the treatment zone and cis-1,2-DCE present at concentrations below the GWPS in eleven of twelve monitored wells in the treatment zone. 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 eight sampled wells inside the treatment zone, but ethene was only detected in one well. These results indicate that TCE is being completely degraded in most areas of the treatment zone. Perchlorate was reduced in all wells across the treatment zone.

Pantex evaluates performance at nine downgradient ISPM wells for the Zone 11 ISB to determine whether complete treatment has occurred after the water leaves the active treatment zone. Eight of nine ISPM wells exhibit perchlorate concentrations below the GWPS in the second quarter. The ninth well has concentrations near the GWPS. TCE concentrations are at or below the GWPS in six of nine ISPM wells. The first breakdown product of TCE, cis-1,2-DCE, was below the GWPS in all nine downgradient wells. Data indicate that due to treatment, concentrations of TCE and its breakdown products are very close to meeting the GWPS. Two downgradient wells, PTX06-1149 and PTX06-1150, historically did not demonstrate strong treatment of TCE. These wells were downgradient of a single row of injection wells. In lieu of installing a recirculation system in 2021, Pantex drilled a second row of closely spaced wells across the southern portion of the ISB to address higher concentrations of TCE moving into those areas. Wells that can no longer be injected were infilled with new wells, rather than replacing the old wells. This allows for more even distribution of the amendment through the pore space and affects areas previously not impacted by injections. Current data at new treatment zone wells demonstrates that stronger treatment is beginning to occur so downgradient conditions will also improve as the water moves out of the treatment zone.

SOUTHEAST ISB EXTENSION REMEDIAL EFFECTIVENESS

The Southeast ISB Extension was installed in 2017 as an extension of the chosen remedy for the southeast perched groundwater. Four additional wells were installed in late 2020 and an additional two in 2021 along the eastern property line in a north-south alignment to further encompass the plume (Appendix A). These new wells were injected for the first time in April 2021, with the exception of PTX06-ISB331, which was injected in August 2022. Two treatment zone monitoring (TZM) wells were also installed in late 2021. Overall, seven injection events have been completed at this system, with the most recent injection finishing in September 2023. Due to the success with distribution of a more soluble carbon (molasses), Pantex began injection at the Southeast ISB Extension using only soluble carbon (molasses), as recommended in the *Fourth Quarter 2018 Progress Report*. Pantex plans to continue injection at this system using only molasses to improve

distribution and treatment. Because this system has not been treated with EVO, injections have been scheduled at approximately every twelve months.

Four ISB wells, two TZM wells and two downgradient ISPM wells were sampled during the first and second quarter of 2024. Treatment zone data indicates very strong to mild reducing conditions are present for treatment of HEs. ORP was between -126.6 mV and -24.5 mV and nitrate was reduced in all sampled wells. Soluble metals (arsenic and manganese) increased, indicating that reducing conditions are established. Total organic carbon results indicate that a sufficient food source is available for continued reducing conditions at the wells.

Downgradient wells demonstrated complete or partial treatment during this quarter. RDX is near the GWPS in one of the two wells sampled and is expected to decrease below GWPS in the near future. TOC has slightly increased in downgradient wells since beginning of sampling in 2018. Monitoring results for the system indicate that metals (i.e., arsenic and manganese) are starting to increase, indicating arrival of the treatment zone water.

OFFSITE REMEDIAL EFFECTIVENESS

The installation of the first phase of wells for the Offsite ISB system was completed in 2020. The first phase of the installation focused on treatment at the leading edge of the plume. Infrastructure to support an injection event was completed in June 2021, with first injection of molasses completed in October 2021 at the leading edge of the plume. Three new ISB wells were installed on the neighboring property in late 2021 and were injected in 2022. The system was further expanded in 2022 with nineteen new ISB wells, which were injected for the first time in 2023. The last phase of wells was installed in summer 2023, but not injected until spring 2024. Based on the use of molasses, injections are planned every six months at differing parts of the system. Injection plans will follow the schedule that was designed using fate and transport and optimization modeling.

All water used in the injection process must be withdrawn from beneath the offsite property, so downgradient ISB extraction wells were installed. These wells were installed at the very edge of the plume and assist in pulling the amendment towards the removal wells, providing an expanded zone for COC treatment. Seven ISB extraction wells (labeled REC wells due to the recirculation they provide) and one non-injected ISB well were sampled in the first and second quarter 2024. Seven TZM wells were also sampled. Evaluation of the baseline data from 2022 at these wells indicated very mild reducing conditions with ORP ranging from 19 to 281 mV. As of the end of second quarter 2024, reducing conditions improved and ORP ranged from -102.7 mV to 110.1 mV. Concentrations of HEs remain low in the REC wells at the leading edge of the plume. Total organic carbon was also present at a higher concentration in all seven REC wells. Treatment zone data for the new TZM wells does not indicate an established treatment zone, but portions of the plume are not expected to establish treatment until 2025 or later. Concentrations at the downgradient ISPM well PTX06-1215 indicate that all high explosives remain below the GWPS indicating that the system is arresting downgradient movement of the plume.

BURNING GROUND SVE

The Burning Ground SVE system began operation in 2002 to clean up soil gas and residual NAPL in soils for protection of groundwater resources. In August 2023 Pantex submitted a closure report for the Burning Ground SVE system since cleanup objectives were achieved. The closure report was approved by the EPA and TCEQ by the end of 2023, and the Burning Ground SVE operations were terminated. Pantex will continue to evaluate perched and Ogallala monitor wells in and near the Burning Ground for a period of time to ensure VOC concentrations do not rebound above the GWPS. Evaluation of those well data are included in the uncertainty management and early detection analysis in this report.

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.

This review is for unexpected conditions from past investigations. Data recently collected to investigate PFAS at select perched wells will be evaluated in a separate report and discussed in the next annual progress report.

Review of the uncertainty management/early detection data collected during the second quarter indicates unexpected conditions at four Ogallala Aquifer wells: PTX06-1056, PTX06-1076, PTX06-1223 and PTX06-1229. Detections in all of these wells exceeded the respective PQLs, with some analytes exceeding the GWPS in two wells. There were no unexpected conditions at perched uncertainty management wells in the second quarter. A summary of unexpected detections above the PQL is provided below.

4-amino-2,6-dinitrotoluene (DNT4A), a breakdown product of 2,4,6-trinitrotoluene (TNT), has been detected at PTX06-1076, with the initial detection occurring in June 2020. Sample results collected since that time have been variable, with values from May 2023 exceeding the PQL for the first time. As a result, a verification sample was completed at PTX06-1076 in August 2023. Results from the verification sample confirmed detections of DNT4A above the PQL. In accordance with the *Pantex Plant Ogallala Aquifer and Perched Groundwater Contingency Plan*, sampling was increased from semi-annual to monthly sampling for a three-month duration starting in October 2023. A final semi-annual sample of the well (summarized below) was taken in April 2024, with results consistent with previous samples. Review of installation logs for PTX06-1076 indicate that the well might not have been sealed properly at the fine-grained zone. Pantex is planning to plug and abandon this well and replace it with a new well downgradient of the present location in 2024.

Summary of Unexpected Ogallala Detections at PTX06-1076, Second Quarter 2024

Well ID	Sample Date	Analyte	Measured Value (µg/L)	PQL (µg/L)	GWPS (µg/L)
PTX06-1076	4/22/2024	DNT4A	0.158	0.102	1.2

PTX06-1056 continues to demonstrate detections of 4-amino-2,6-dinitrotoluene (DNT4A) above the GWPS. RDX continues to be detected above the practical quantitation limit (PQL), but below the GWPS.

Summary of Unexpected Ogallala Detections at PTX06-1056, Second Quarter 2024

Well ID	Sample Date	Analyte	Measured Value (µg/L)	PQL (µg/L)	GWPS (µg/L)
PTX06-1056	2/6/2024	DNT4A	2.15	0.103	1.2
		RDX	0.493	0.103	2

In response to the detections of high explosives in Ogallala Aquifer well PTX06-1056, Pantex installed three new Ogallala monitoring wells in 2023 to investigate nature and extent of the contamination (see Appendix A for well locations). The new wells were installed in areas identified in earlier plume modeling for being at risk of vertical contaminant migration from the perched to the Ogallala Aquifer and within the Ogallala flow path. Two wells were initially installed in May 2023. PTX06-1223 was installed upgradient of PTX06-1056 and PTX06-1224 was installed as a side gradient well to PTX06-1056. These wells were initially sampled in 2023 and will continue to be sampled semi-annually.

Initial results from PTX06-1223 measured DNT4A and RDX at similar concentrations to recent samples from PTX06-1056, though all concentrations were below the GWPS. TNX (hexahydro-1,3,5-trinitroso-1,3,5-triazine) was detected above the PQL but below the GWPS.

Summary of Unexpected Ogallala Detections at PTX06-1223, Second Quarter 2024

Well ID	Sample Date	Analyte	Measured Value (µg/L)	PQL (µg/L)	GWPS (µg/L)
PTX06-1223	4/23/2024	DNT4A	0.918	0.104	1.2
		RDX	1.19	0.102	2
		TNX	0.243	0.104	2

PTX06-1229 was installed in September 2023 as part of continuing efforts to investigate the detections in PTX06-1056. PTX06-1229 was installed north of PTX06-1223, after early sampling results indicated the presence of high explosives in PTX06-1223. Initial sampling results received in late December 2023 for PTX06-1229 indicated the presence of three high explosives constituents in the Ogallala Aquifer at concentrations above GWPS. This well was resampled in January to confirm those detections, with all detections confirmed. In accordance with the *Pantex Plant Ogallala Aquifer and Perched Groundwater Contingency Plan*, Pantex notified the EPA, TCEQ, Panhandle Groundwater Conservation District, Plant management and utilities. The nearby neighbors were also notified of the results.

Sampling was increased from semi-annual to monthly sampling for a three-month duration starting in April 2024. The monthly sampling results are summarized below.

Summary of Unexpected Ogallala Detections at PTX06-1229, Second Quarter 2024

Well ID	Sample Date	Analyte	Measured Value (µg/L)	PQL (µg/L)	GWPS (µg/L)
PTX06-1229 Upper Interval	4/24/2024	DNT2A	0.484	0.1	1.2
		DNT4A	5.5	0.502	1.2
		HMX	8.92	0.502	360
		RDX	313	10	2
		TNX	18.6	0.502	2
		DCA12	1.29	1	5
	5/21/2024	DNT2A	0.537	0.104	1.2
		DNT4A	5.19	0.1.04	1.2
		HMX	10.8	1.04	360
		MNX	0.152	0.104	2
		RDX	312	10.4	2
		TNX	15.5	1.04	2
	6/10/2024	DNT2A	0.533	0.102	1.2
		DNT4A	5.57	1.02	1.2
		HMX	9.08	1.02	360
		RDX	293	10.2	2
		TNX	16.1	1.02	2

During the second quarter, Pantex also collected samples at two depths (466' below top of casing (BTOC) and 492' BTOC) of the deeper sampling interval in PTX06-1229. The samples were split between two laboratories and results of analytes detected above the PQL are summarized below.

Results confirmed the presence of the HEs above the GWPS at similar concentrations to the samples in the upper sampling interval.

Well ID	Sample Date	Analyte	Measured Value GEL (µg/L)	Measured Value ETA (µg/L)	PQL (µg/L)	GWPS (µg/L)
PTX06-1229 466' BTOC	6/24/2024	DNT2A	0.322	0.491	0.102	1.2
		DNT4A	2.33	4.81	0.102	1.2
		HMX	10.9	8.88	1.02	360
		MNX	0.143	0.203	0.102	2
		RDX	277	338	10.2	2
		TNX	15.8	15	1.02	2
Duplicate 466' BTOC	6/25/2024	DNT2A	0.328	0.522	0.103	1.2
		DNT4A	2.37	4.79	0.103	1.2
		HMX	12.1	8.88	1.03	360
		MNX	0.136	0.144	0.103	2
		RDX	281	351	10.3	2
		TNX	17.6	14.4	1.03	2
492' BTOC	6/26/2024	DNT2A	0.322	0.487	0.103	1.2
		DNT4A	2.17	4.57	0.103	1.2
		HMX	11.2	9.27	1.03	360
		RDX	282	332	10.3	2
		TNX	15.7	14.8	1.03	2

Contaminants

ND - not detected
 DNT26 - 2,6-dinitrotoluene
 DNT2A - 2-amino-4,6-dinitrotoluene
 DNT4A - 4-amino-2,6-dinitrotoluene
 HMX - octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
 RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine
 TNX - hexahydro-1,3,5-trinitroso-1,3,5-triazine
 MNX - hexahydro-1-nitroso-3,5-dinitro-1,3,5-triazine
 TNB135 - 1,3,5-trinitrobenzene

Laboratories

GEL - General Engineering Laboratory
 ETA - Eurofins Test America

At this time, Pantex is investigating whether the detections at PTX06-1229 are a result of cross-contamination from a nearby perched well. The installation of a perched well (PTX06-1103, originally identified as PTX06-EW-52), located upgradient of PTX06-1229, may have created a previous preferential pathway for the migration of high explosive contaminants from the perched groundwater into the Ogallala Aquifer. The perched well in question was drilled in 2005 for the intent of extraction and treatment of contaminated perched groundwater and treatment in the Southeast Pump and Treat System. This well was plugged in October 2010 after indications that it

was acting as a preferential pathway to the Ogallala Aquifer. A verification sample was completed at PTX06-1229 in January 2024 that confirmed the high explosive detections above the GWPS. Pantex has requested special funding to implement measures to begin evaluating extent of the detections by installing three additional Ogallala monitor wells in 2024. Further installations will be evaluated after gaining information from the new wells. Further actions will be determined based on future sampling results and in accordance with the *Pantex Plant Ogallala Aquifer and Perched Groundwater Contingency Plan*.

OTHER UNEXPECTED CONDITIONS

Pantex routinely evaluates data received from the laboratory to determine if it presents off-trend, all-time high or new detection conclusions 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. No unexpected conditions were noted in the second quarter.

SCHEDULE UPDATE

Pantex provided a detailed schedule of upcoming work in the *2023 Annual Progress Report*. An update of the activities scheduled to be started or completed by the publication date of this report is provided below.

Items in progress during the completion of the *2023 Annual Progress Report* will not be complete until third quarter.

Items that are in progress are included below.

- ISB rehabilitation and/or injection at the Offsite ISB, Zone 11 ISB, and Southeast ISB Extension has started.
- PFAS sampling continues in accordance with the *Preliminary Per- and Polyfluoroalkyl Substances Sampling Plan* for the Pantex Plant. All planned groundwater well sampling is scheduled for completion in July.
- Pantex contracted for drilling of additional Ogallala wells to evaluate nature and extent of the Ogallala detections in PTX06-1229, new perched ISB and monitor wells, and for replacement of PTX06-1076. Drilling commenced in July and is scheduled for completion in October.
- Pantex contracted support for evaluation of mass at PTX06-1229 and Plume Seeker fate and transport modeling to determine optimal placement of future Ogallala wells for determination of plume extent. This work is scheduled for completion by the end of September.
- Pantex contracted for support to assist with completing an update to the *Long-Term Monitoring (LTM) Design for Groundwater*. The LTM Design is scheduled for completion by the end of September.
- The *Sampling and Analysis Plan (SAP)* update started in late June. The SAP and LTM Design is scheduled to be delivered to TCEQ and EPA by November 15, 2024.
- Pantex contracted for repair of Landfill 3. That work is scheduled for completion by the end of September.

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 from 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 existing remediation systems. Pantex has completed projects to provide new injection and irrigation capabilities for treated water injection and beneficial use to ensure consistent operation of the pump and treat systems.

The SEPTS continued to remove COC mass and water from critical areas in the perched aquifer; thus, decreasing head that drives vertical and lateral movement of perched groundwater. P1PTS ran approximately 75% of the second quarter providing water to the pivot irrigation system and WWTF.

Monitoring results for areas downgradient of the established ISB systems continue to demonstrate that treatment has been generally effective. COC concentrations meet the GWPS at the Southeast ISB at two downgradient wells, with a third dry well having previously met GWPS. One downgradient well (PTX06-1153) for the Southeast ISB is not responding to treatment as well as the others. Pantex has recommended removing PTX06-1153 from HW-50284 so the monitor well can be used for injection. Pantex has also requested to add this well to the underground injection control permit so the well can be used for injection. Further recommendations will be made based on evaluation of data over time.

Downgradient wells at the Zone 11 ISB are demonstrating treatment. Most downgradient wells meet or are near the GWPS for the primary contaminants and breakdown products. Pantex has changed the injection strategy at the Z11 ISB to attempt better distribution of amendment between wells and provide better treatment of TCE and perchlorate. Data indicates injection of a more soluble carbon source (molasses) has distributed widely where injected and that reducing conditions have improved in areas where wells are widely spaced. Molasses is the primary amendment used at the system, but a mixture of EVO and molasses was used at select wells during the 2023 injection to establish deeper reducing conditions at newer wells that are closely spaced. Pantex will continue to evaluate the data and make appropriate recommendations for treatment in the upcoming progress reports.

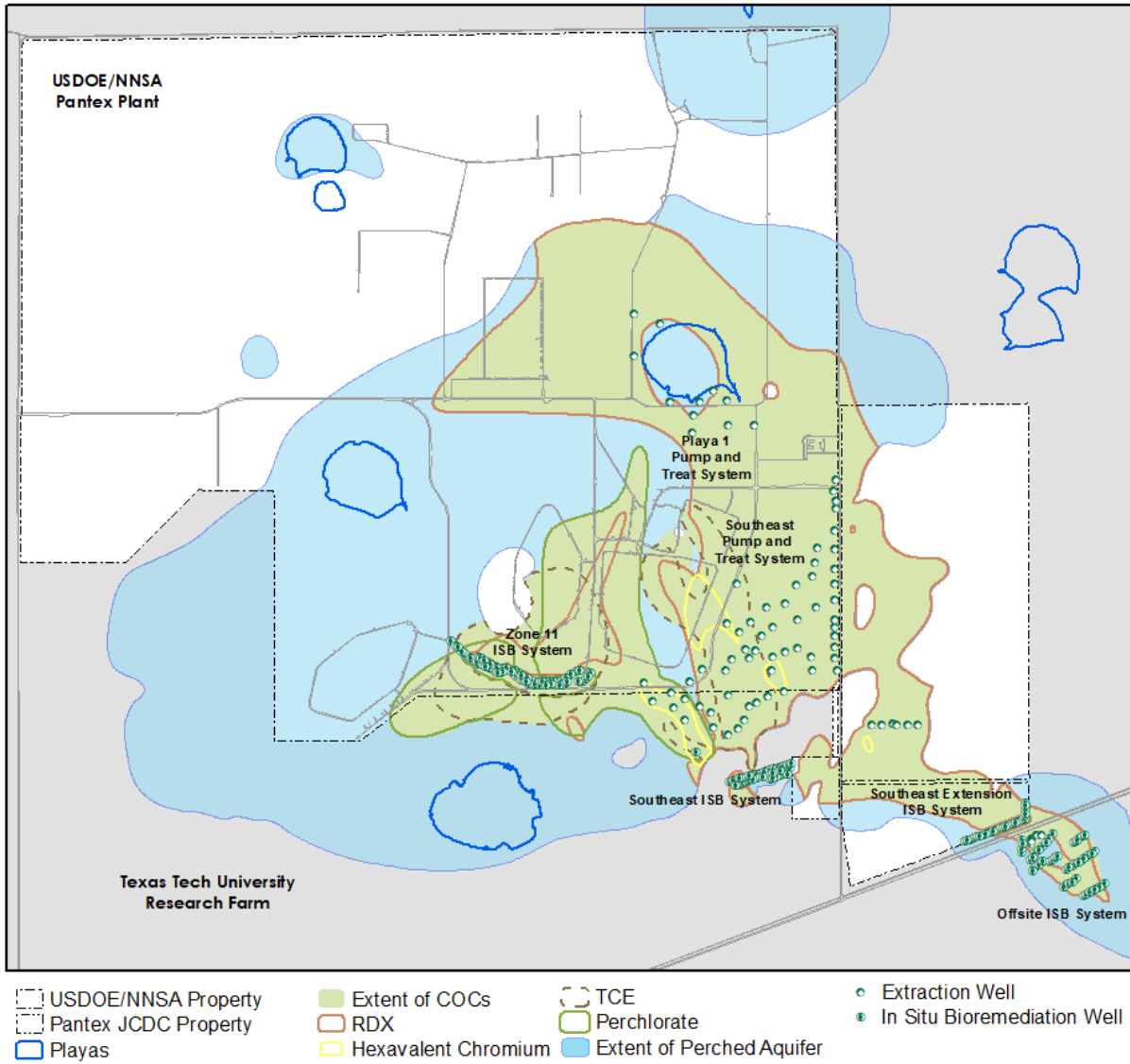
The Southeast ISB Extension was installed at the Pantex fence line to arrest the continued movement of COCs to offsite properties. The system has been operating and is being evaluated for its effectiveness at the offsite property. The Southeast ISB Extension is demonstrating treatment in the zone where injection has occurred, but downgradient monitoring wells are not expected to exhibit the effects of complete treatment until 2025. Pantex continues progress toward cleanup of the southeast lobe of perched groundwater. The Offsite ISB was designed to address HE contamination found beneath neighboring properties. Installation of infrastructure for Phase 1 and

2 of the Offsite ISB completed in 2021 and the first injection into the system was completed in October 2021, with semi-annual injections occurring afterward. Phase 3 well construction is also complete and construction of Phases 3 and 4 of the infrastructure was completed in September 2023. As more injections occur at the system, concentrations of HEs are trending downward in sampled REC wells, including those at the leading edge of the plume. The final downgradient monitoring well for the system indicates that all high explosives remain below the GWPS.

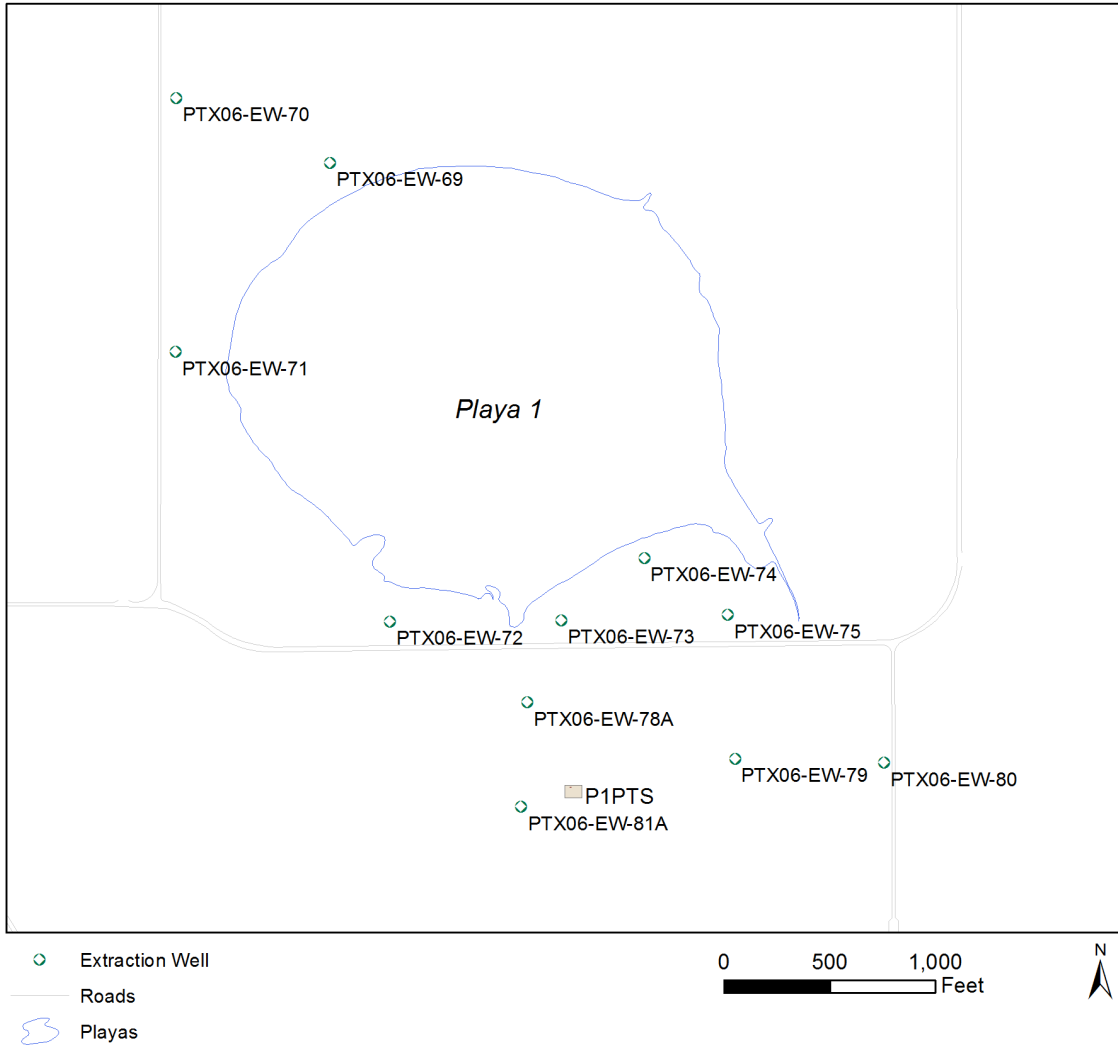
The groundwater remedies are considered protective for the short-term, as untreated perched groundwater usage is controlled to prevent human contact and monitoring data continue to indicate that the remedial actions remain generally protective of the Ogallala Aquifer. Based on review of construction logs, Pantex is planning to plug and abandon PTX06-1076 well and replace it with a new well downgradient of the present location in 2024. Additional investigation of the area of the Ogallala Aquifer near PTX06-1056 began in 2023 with installation of three new monitoring wells. Initial detections at one of the new wells, PTX06-1229, indicate the presence of high explosives above the GWPS. Pantex continues to evaluate the detections at this well and is planning to install additional wells in 2024 to further evaluate nature and extent of the detections at PTX06-1229. The wells affected by high explosives are distant from Pantex or neighboring water sources. Samples collected at other Ogallala wells near the boundary of Pantex do not indicate the presence of high explosives indicating there is no endangerment of Pantex or neighboring water resources. At this time, Pantex believes the detections may be related to a previous preferential pathway from a now plugged perched well. Further actions at PTX06-1056 and PTX06-1229 will be determined based on future sampling results and in accordance with the *Pantex Plant Ogallala Aquifer and Perched Groundwater Contingency Plan*.

Appendix A

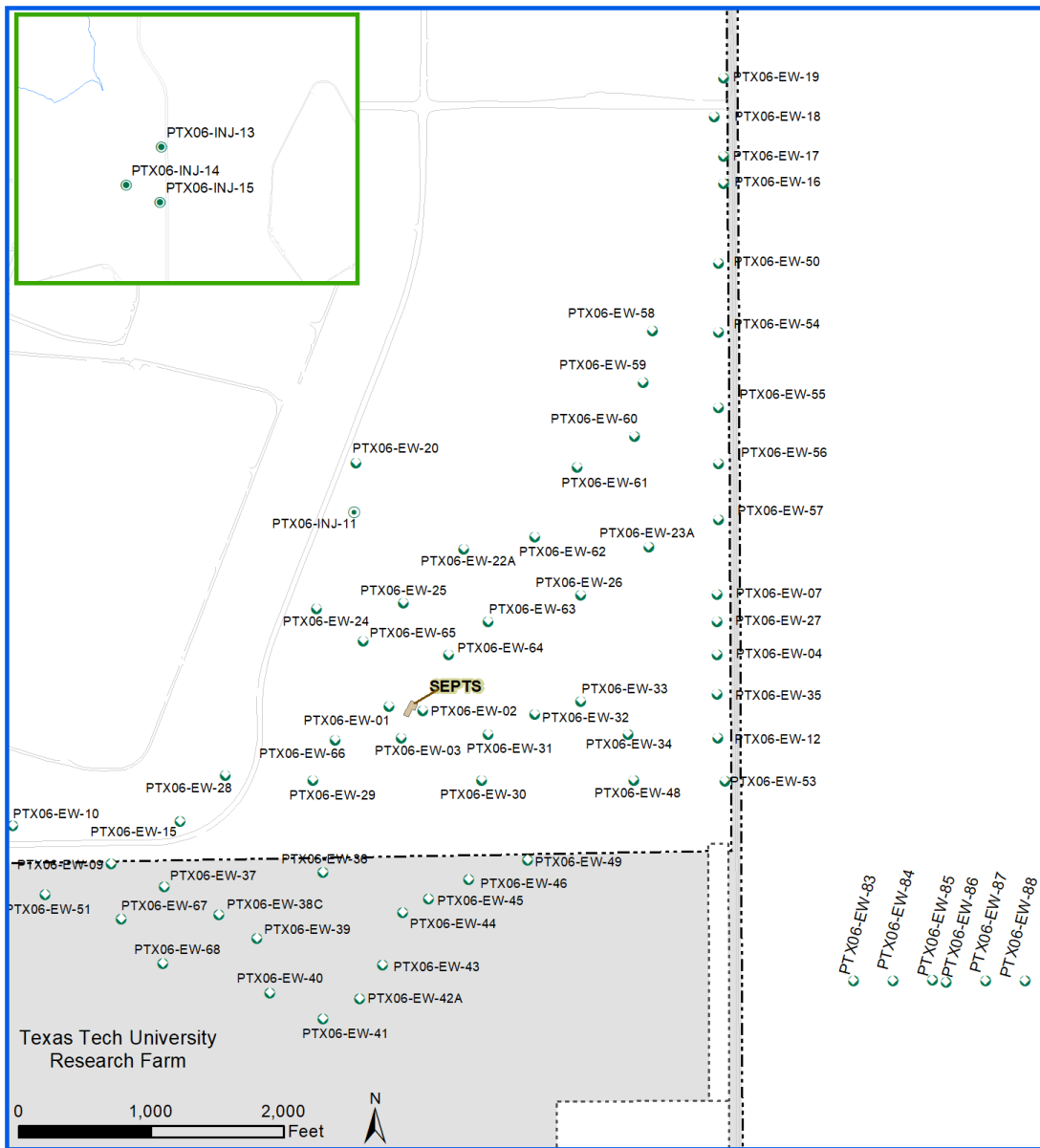
Maps



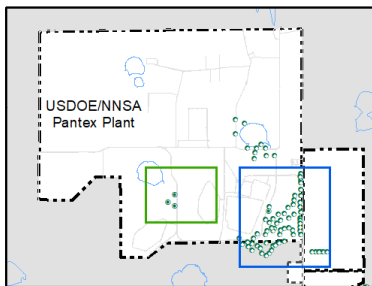
Extent of Perched Groundwater and Contaminant Plumes



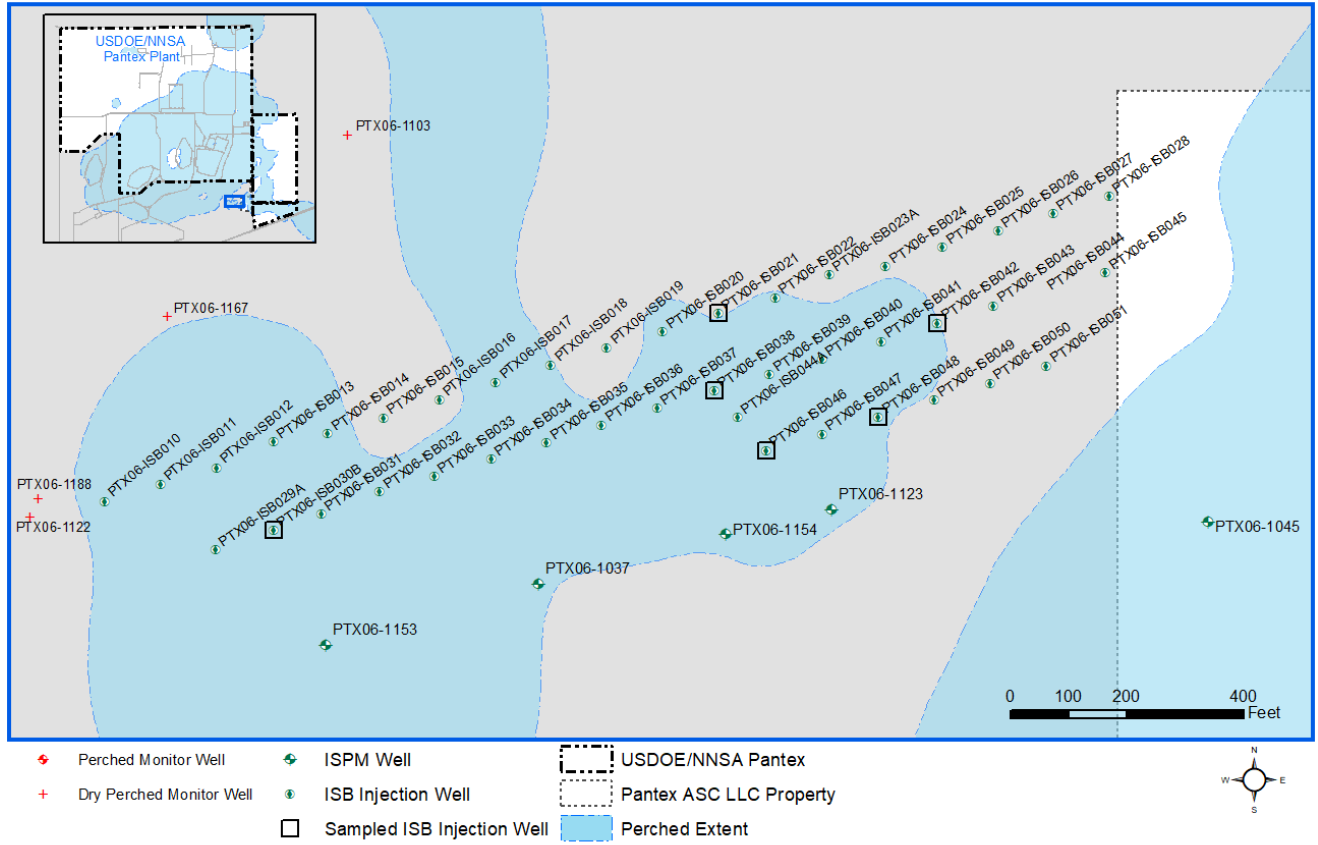
Playa 1 Pump and Treat System Wells



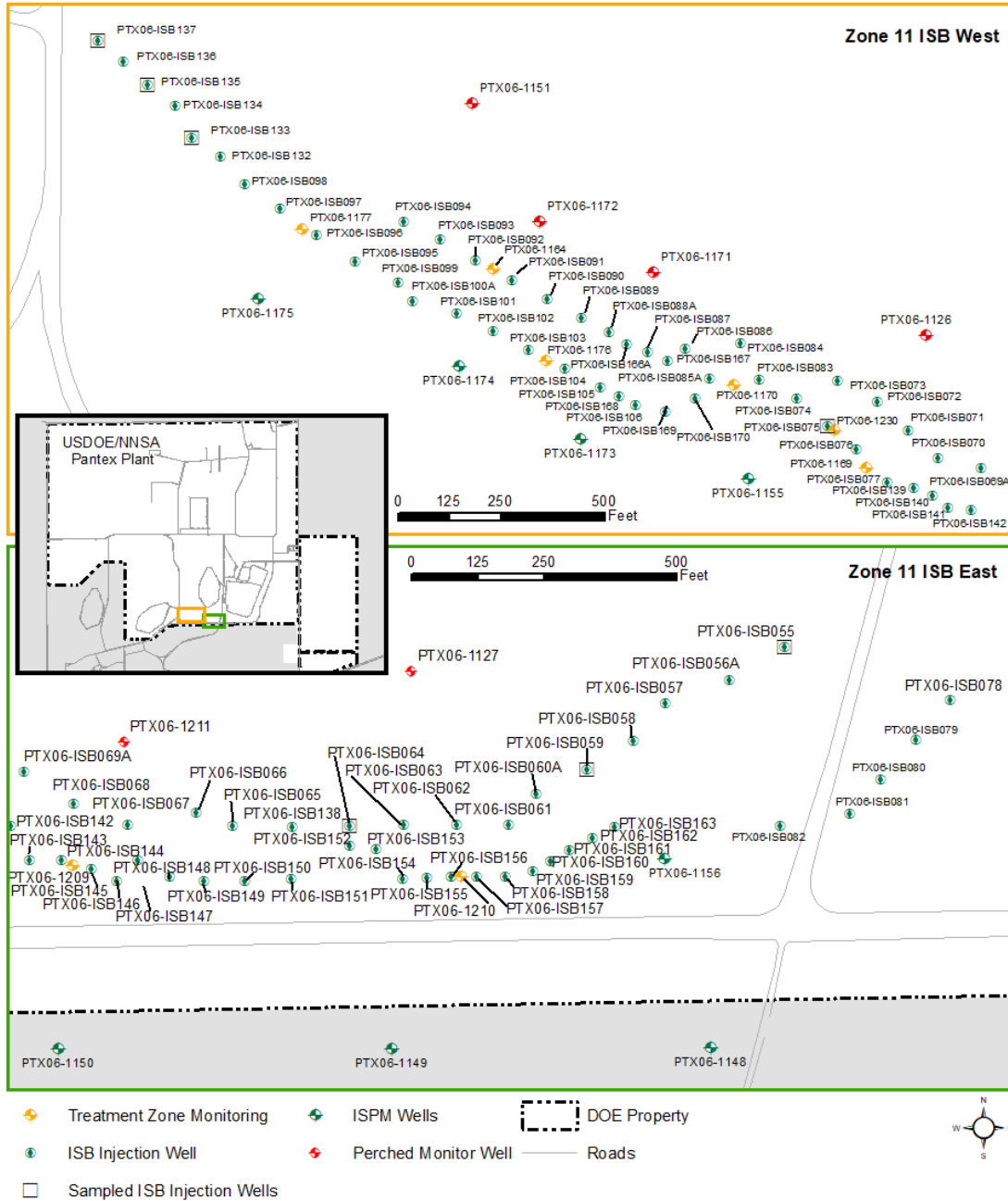
- Extraction Well
- Injection Well
- Roads
- - - DOE Property
- - - Pantex ASC LLC Property



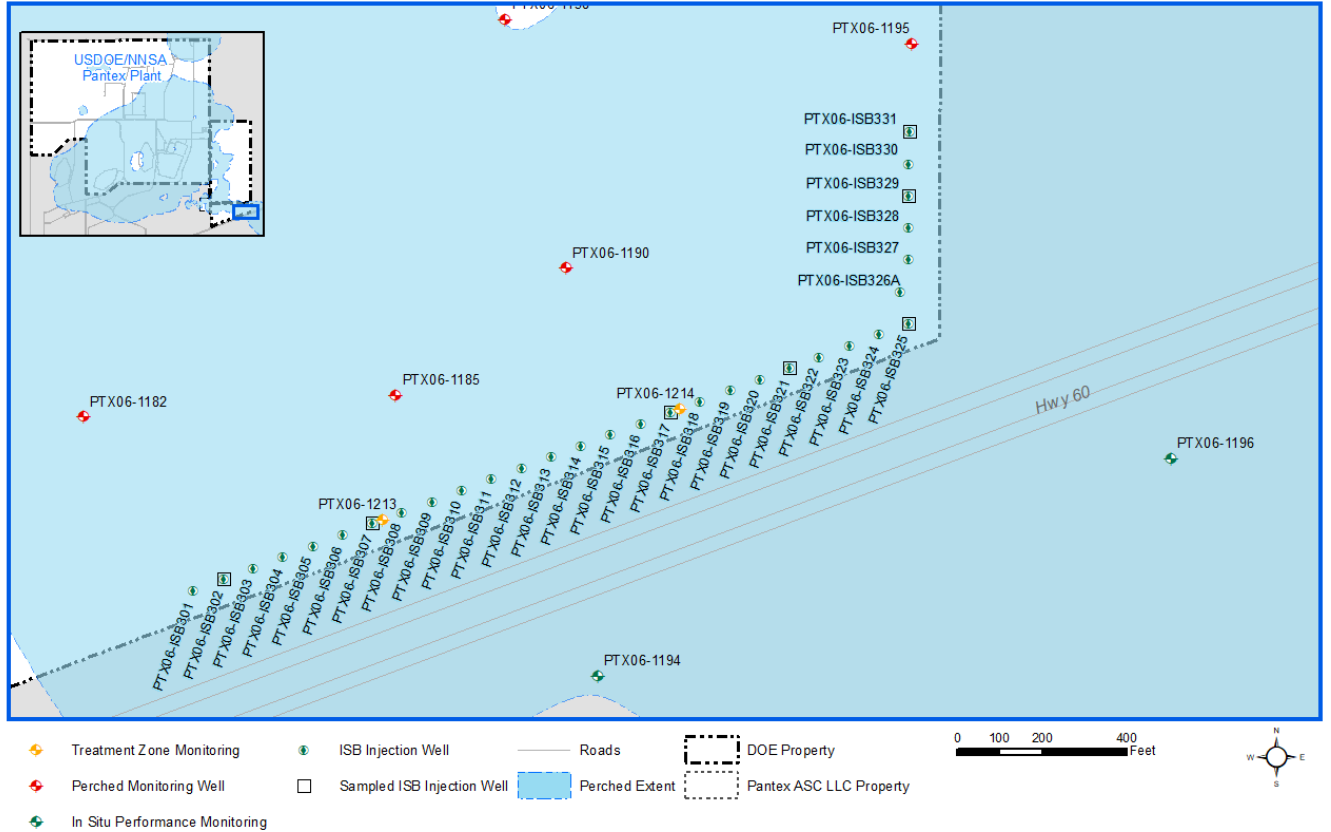
Southeast Pump and Treat System Wells



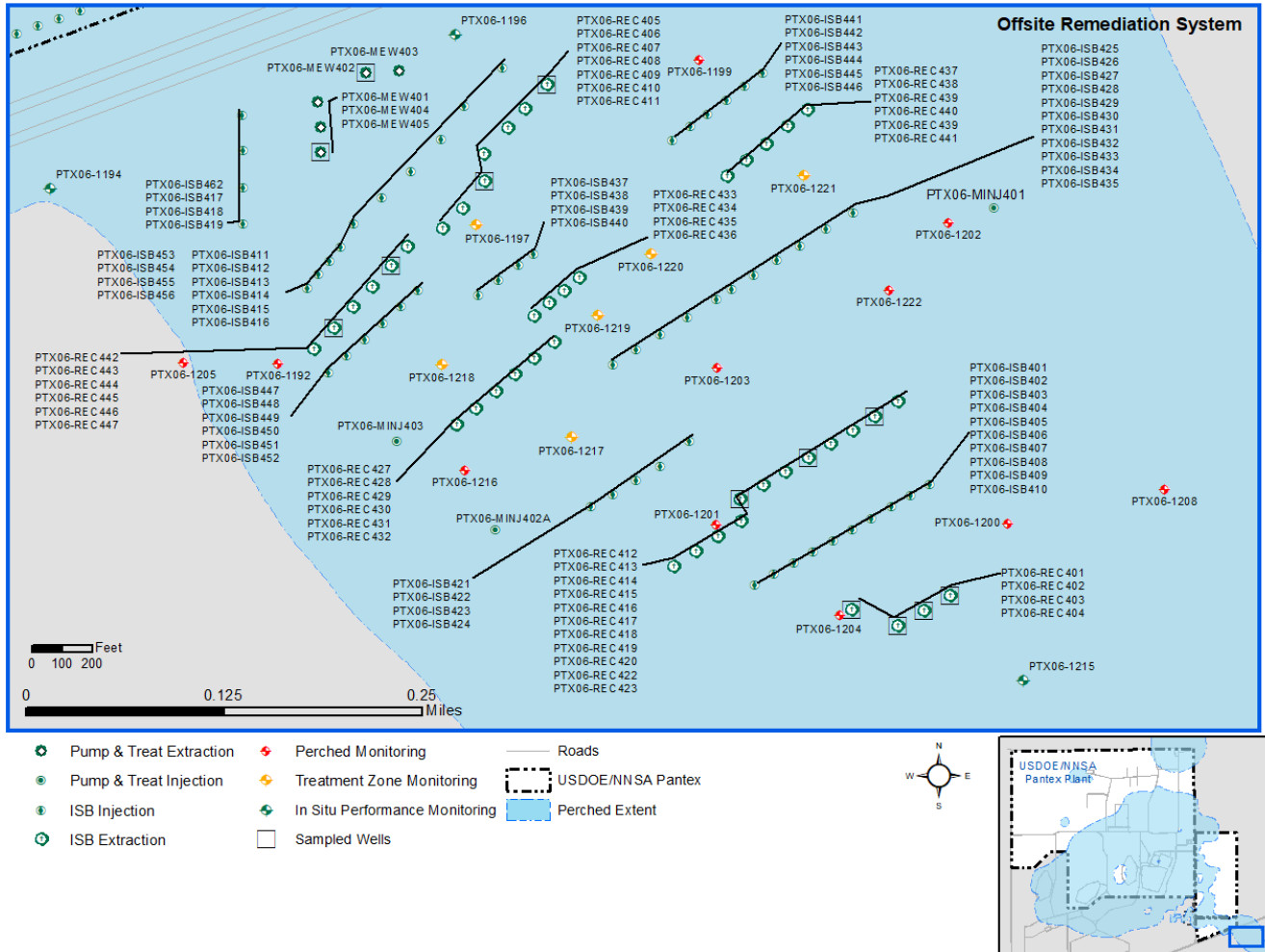
Southeast ISB Wells and Sampling Locations



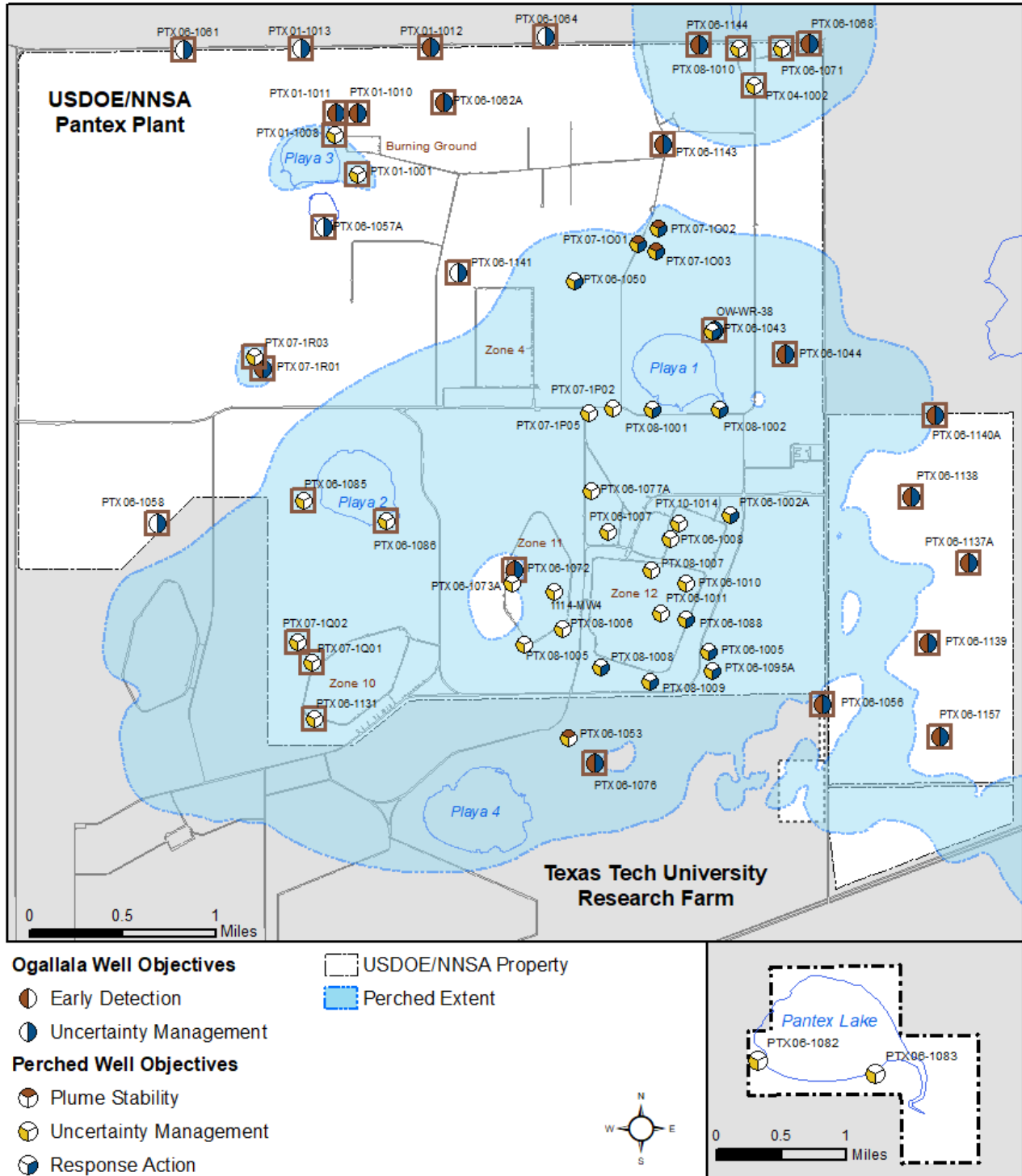
Zone 11 ISB Wells and Sampling Locations



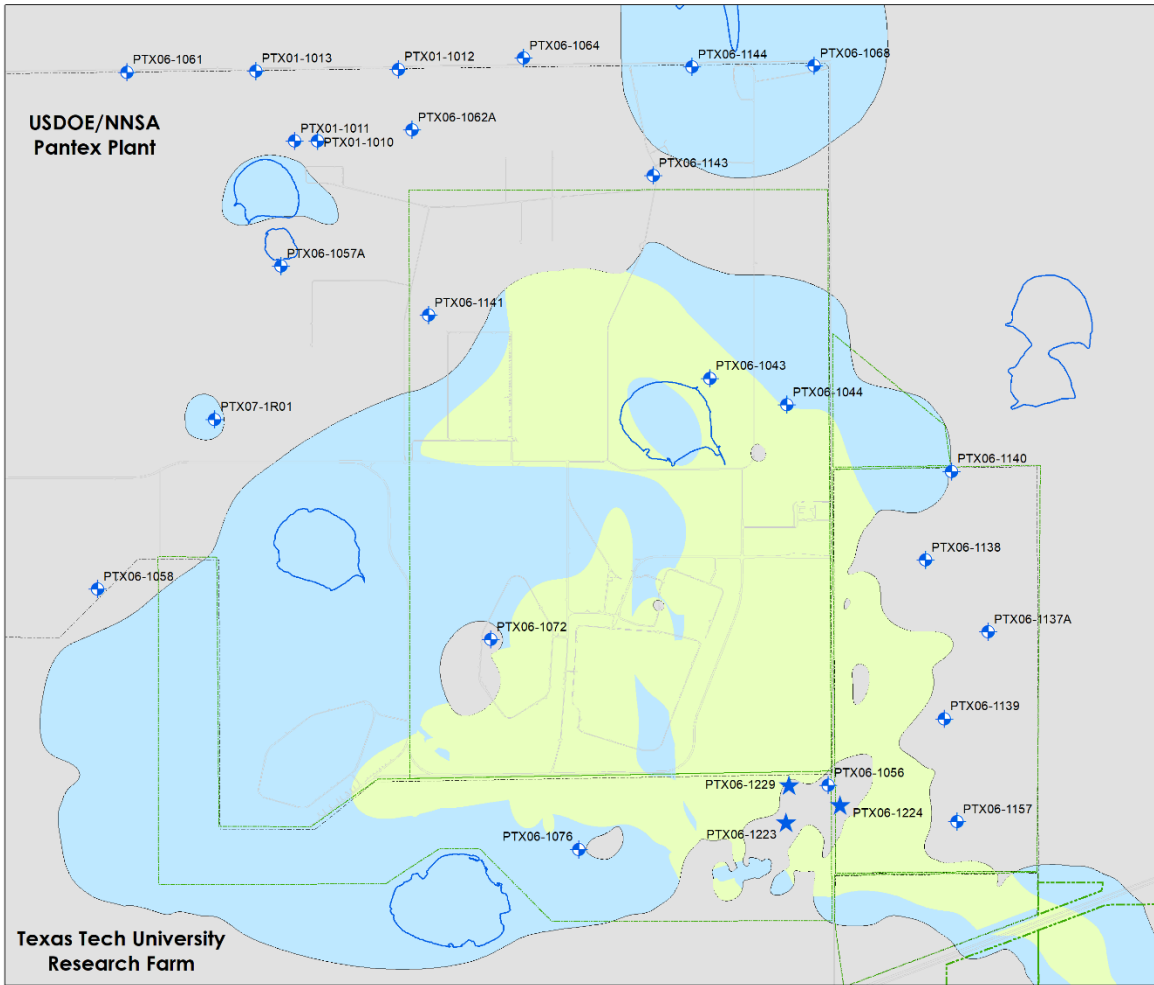
Southeast ISB Extension Wells and Sampling Locations



Offsite ISB Wells and Sampling Locations



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



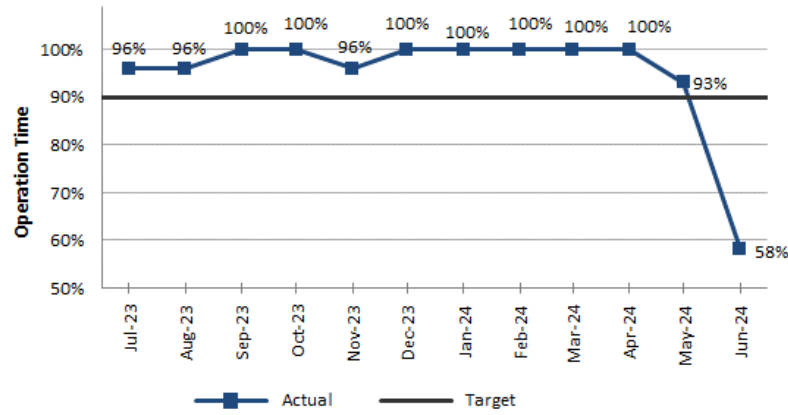
- USDOE/NNSA Property
- Extent of Perched Contamination
- Extent of Perched Aquifer
- Playas
- GW Deed Restriction Areas
- Ogallala Monitor Well
- New 2023 Ogallala Wells

Location of Ogallala Wells Installed in 2023

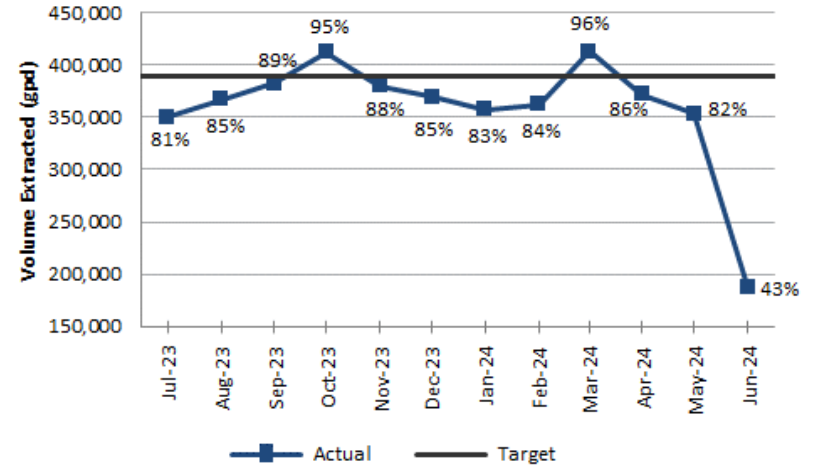
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Appendix B
Pump and Treat System Graphs

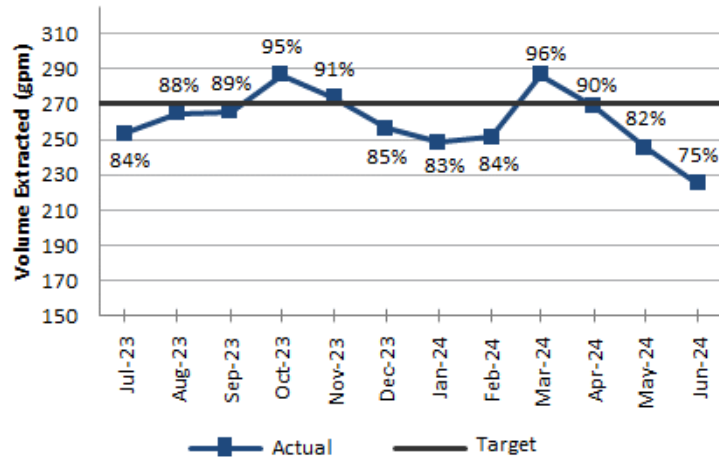
Southeast Pump and Treat System Graphs



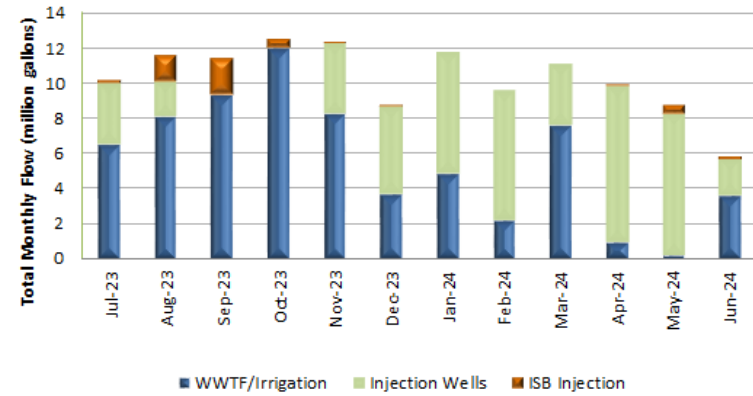
SEPTS Operation Time vs Target



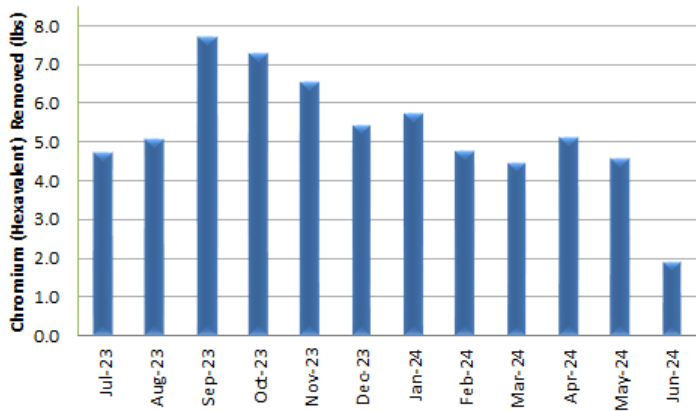
SEPTS GPD and % Capacity



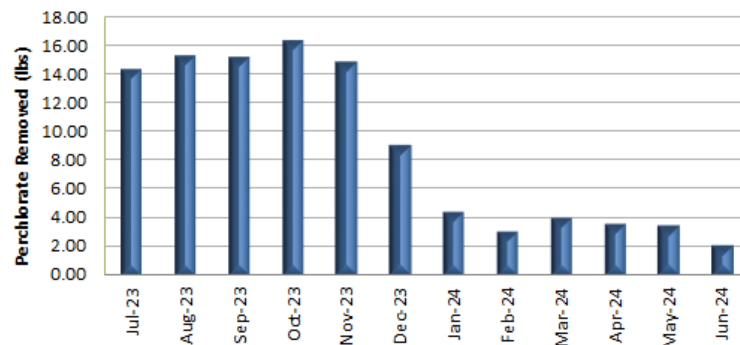
SEPTS Average GPM and % Capacity



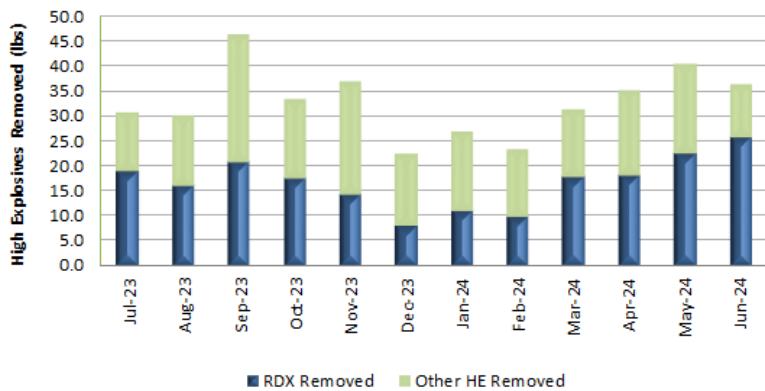
SEPTS Monthly Total Flow



SEPTS Chromium Removal by Month

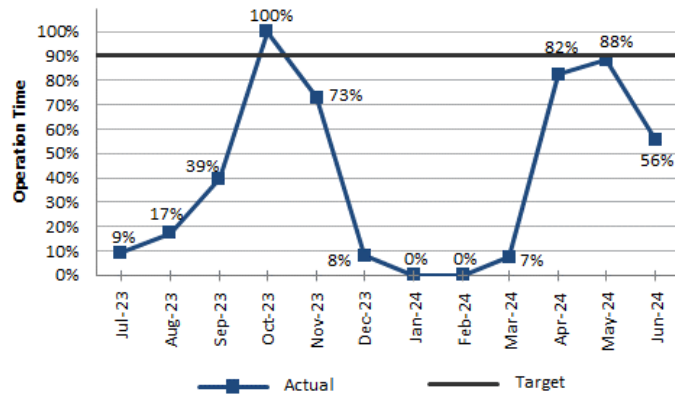


SEPTS Perchlorate Removal by Month

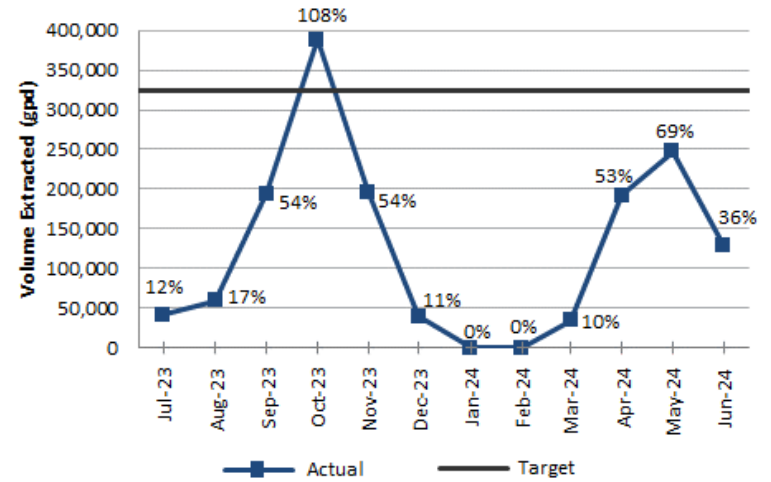


SEPTS HE Removal by Month

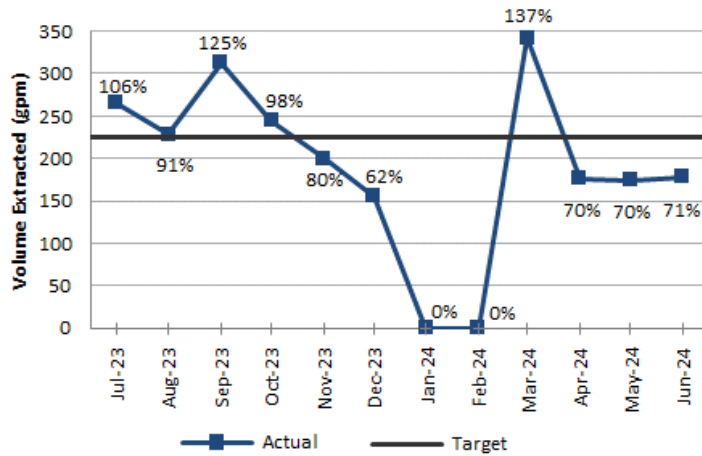
Playa 1 Pump and Treat System Graphs



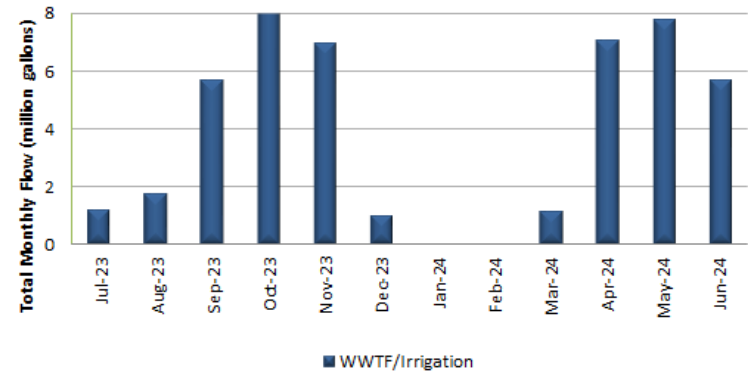
P1PTS Operational Time Vs Target



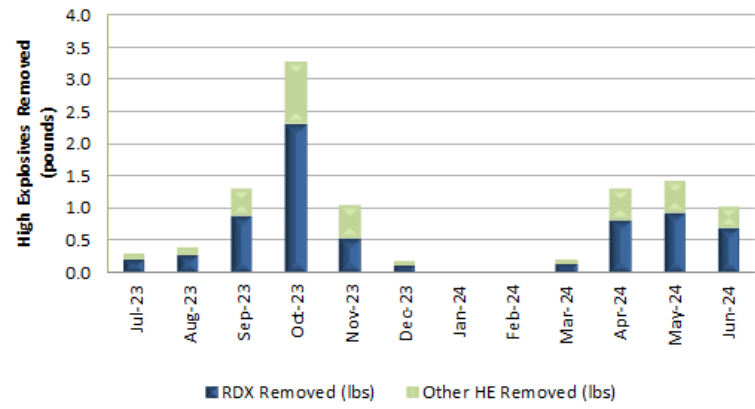
P1PTS Average GPD and % Capacity



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.

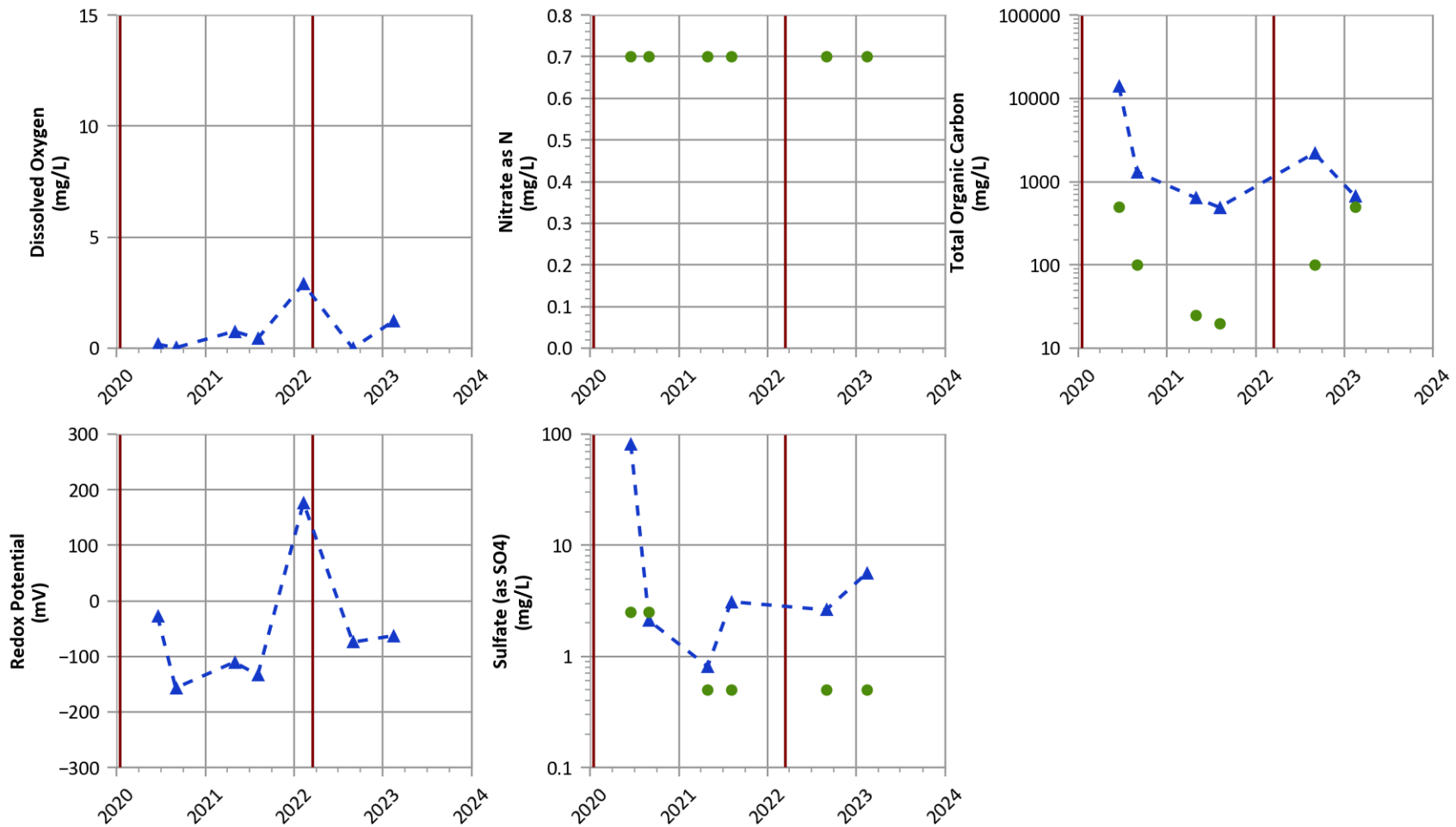
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Appendix C

ISB Graphs

Southeast ISB Graphs

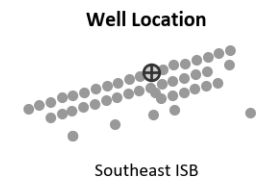
**PTX06-ISB021 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



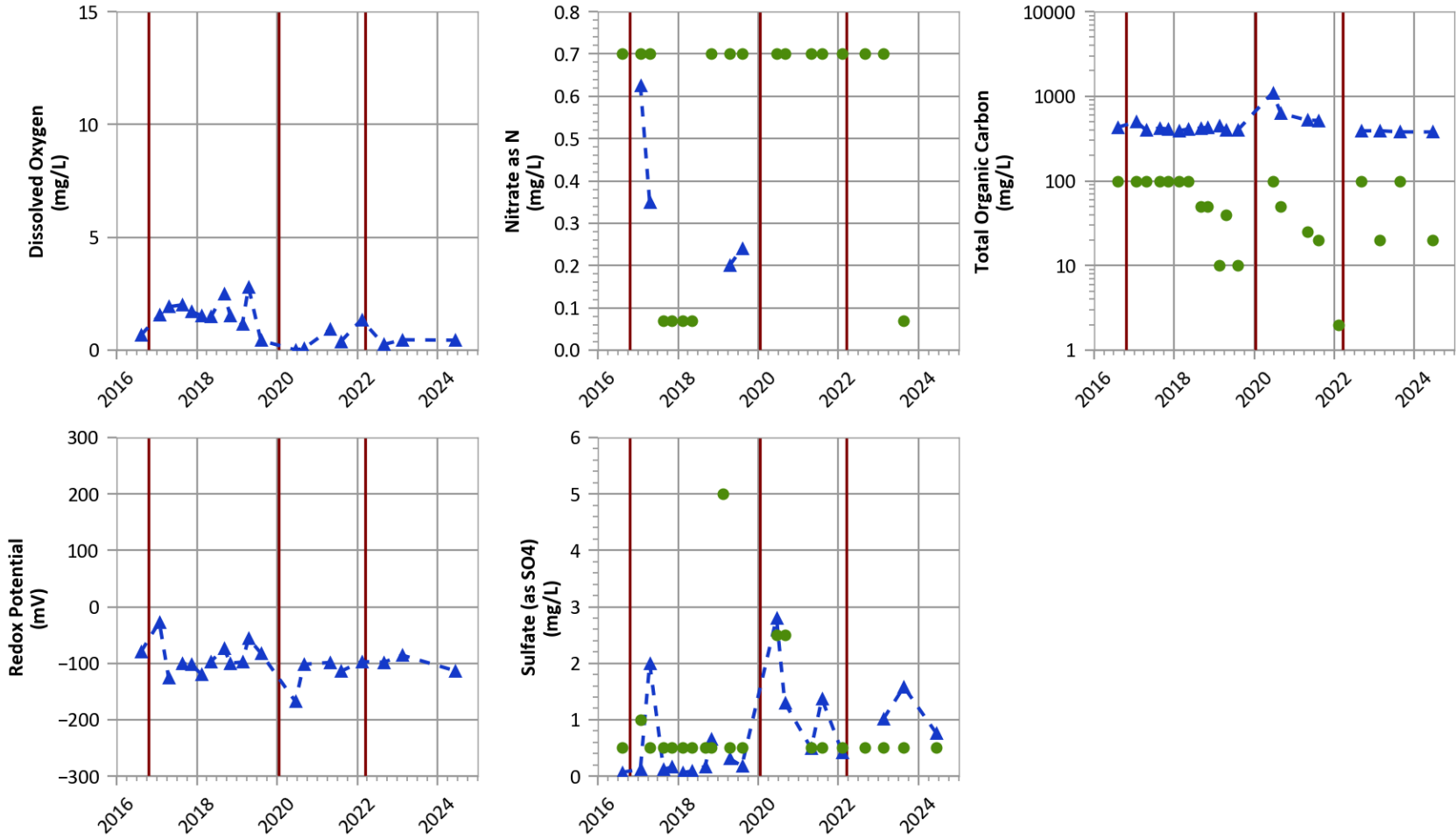
Typical Baseline Concentrations in Perched Groundwater

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



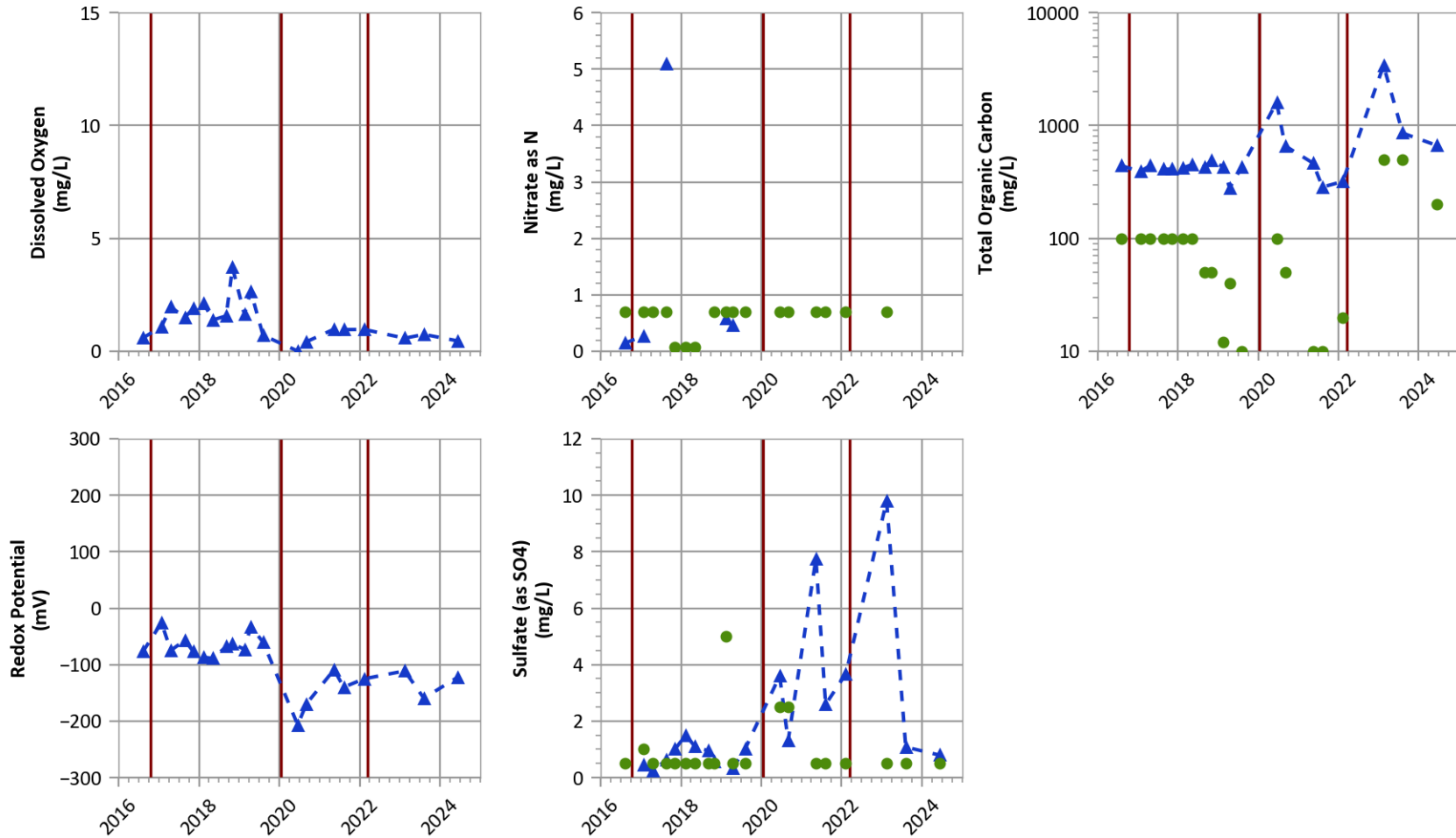
Typical Baseline Concentrations in Perched Groundwater

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



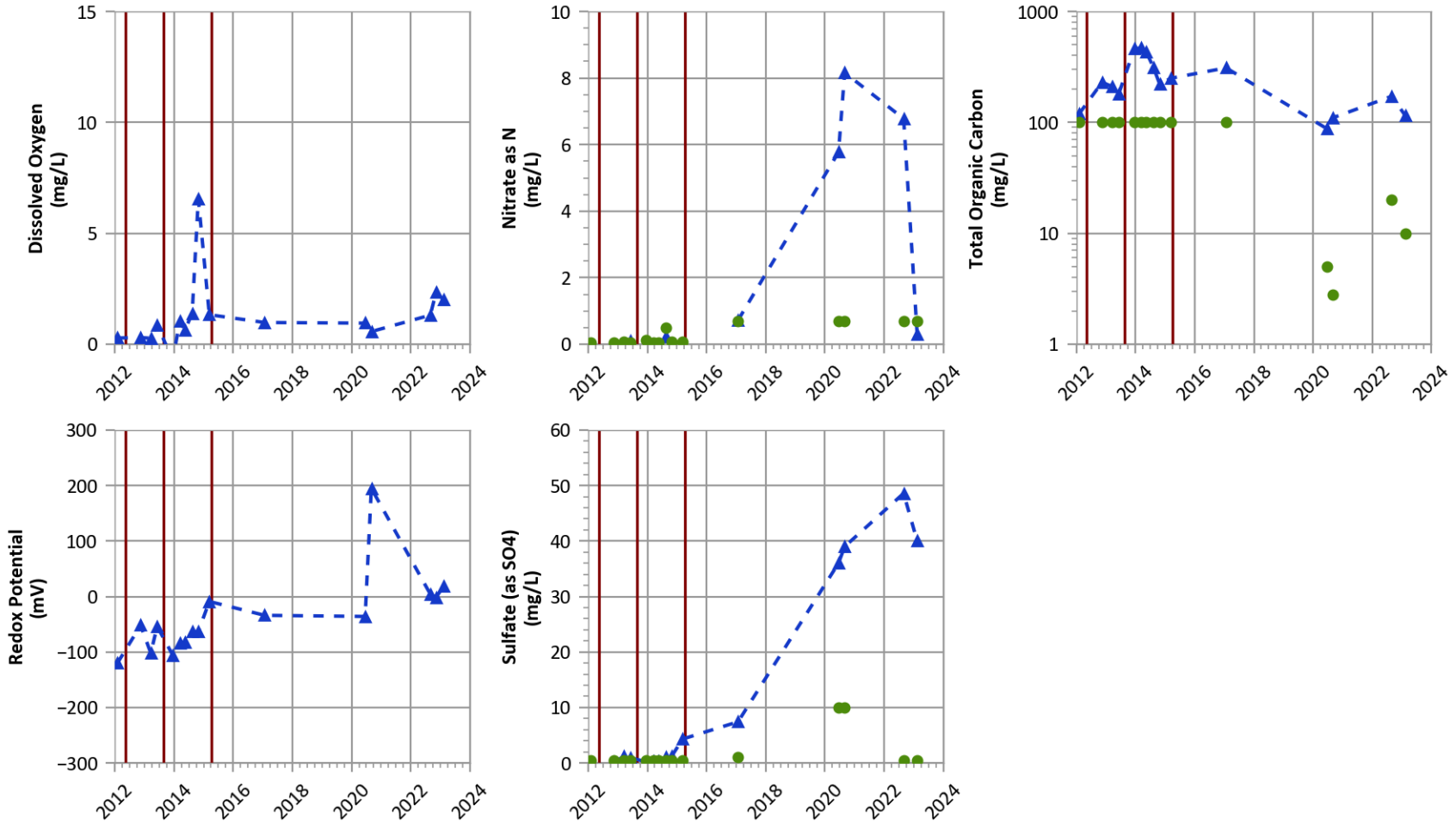
Typical Baseline Concentrations in Perched Groundwater

- 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



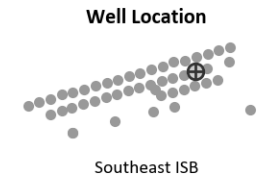
PTX06-ISB042 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



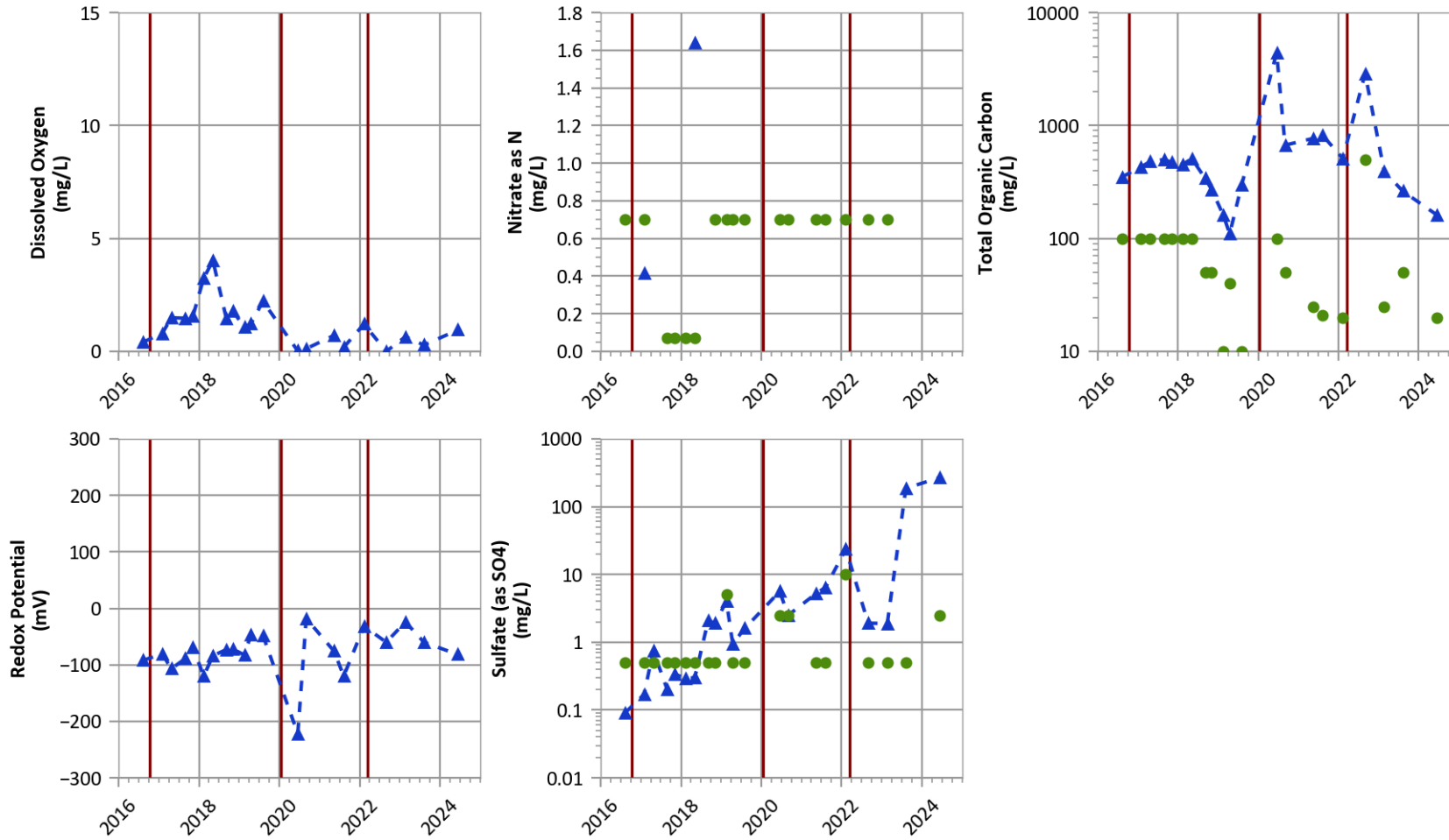
Typical Baseline Concentrations in Perched Groundwater

- 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

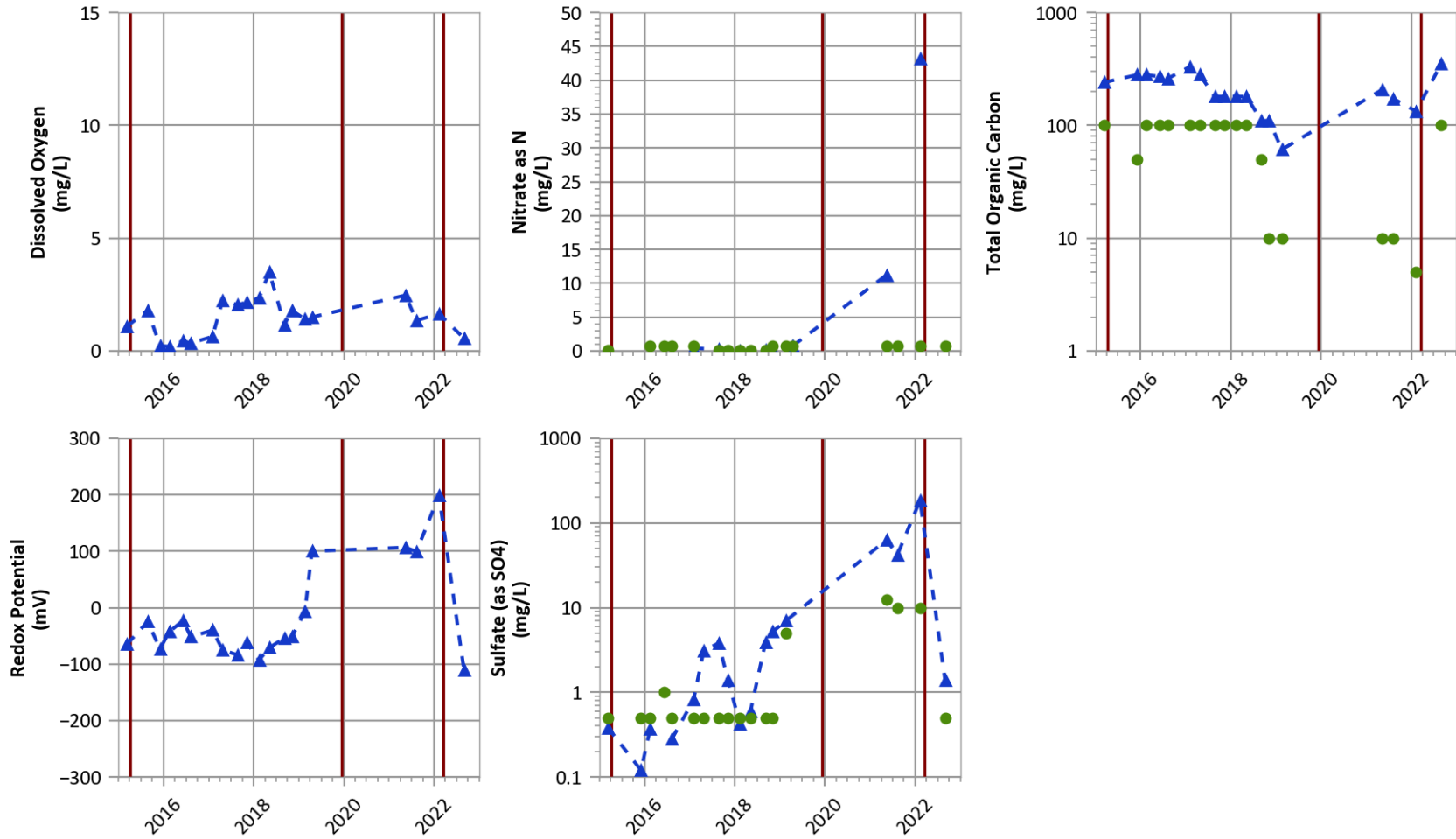


Typical Baseline Concentrations in Perched Groundwater
 Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

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



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



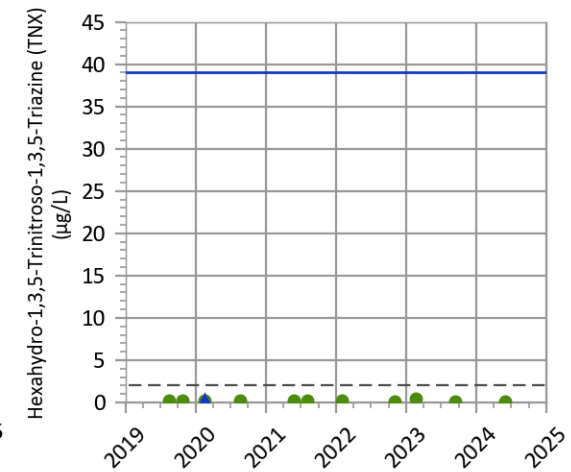
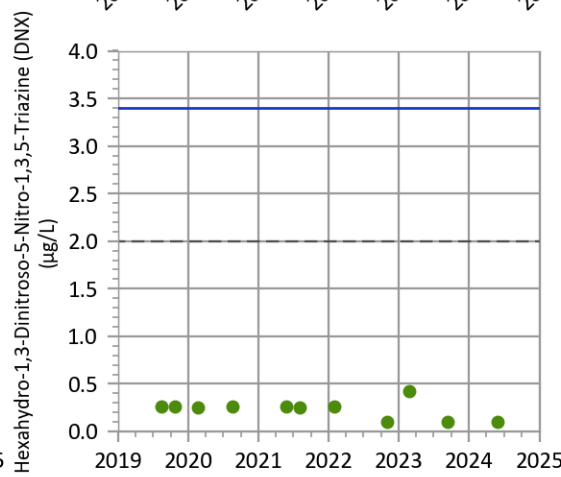
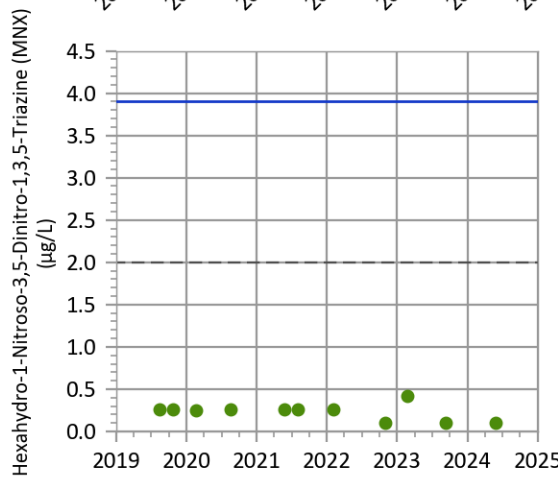
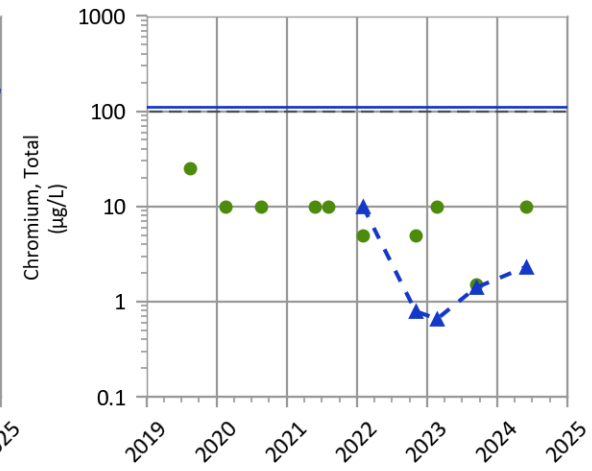
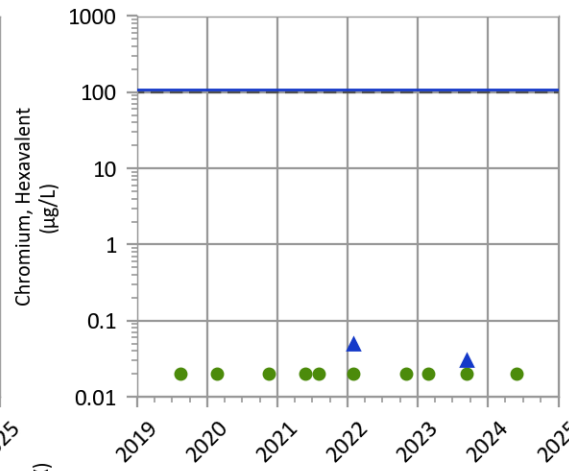
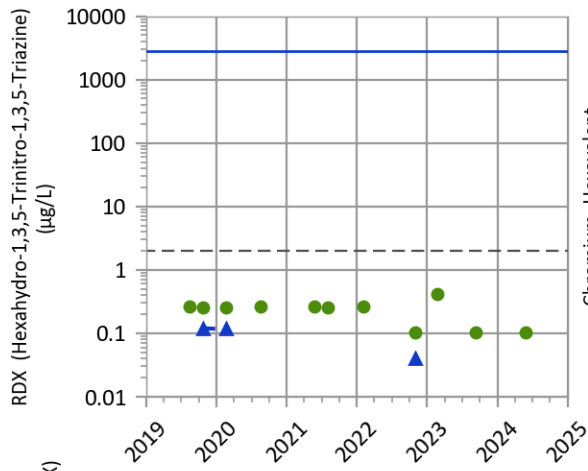
Typical Baseline Concentrations in Perched Groundwater

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



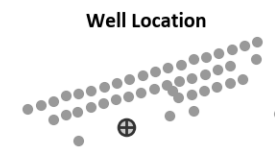
**PTX06-1037 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



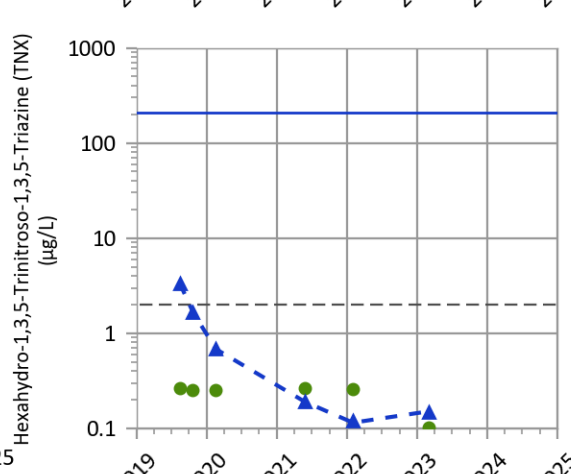
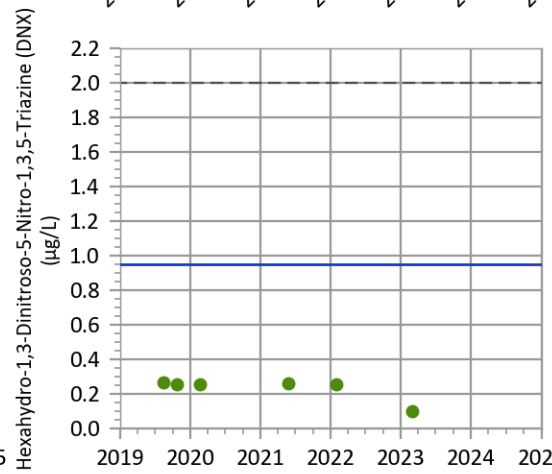
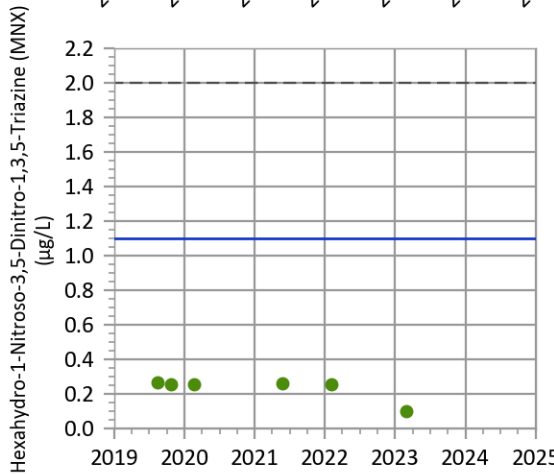
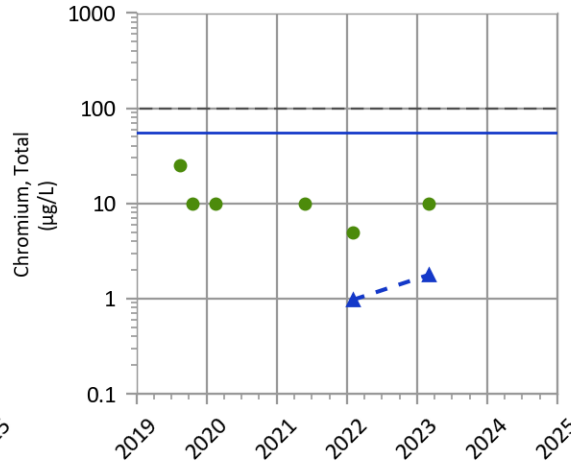
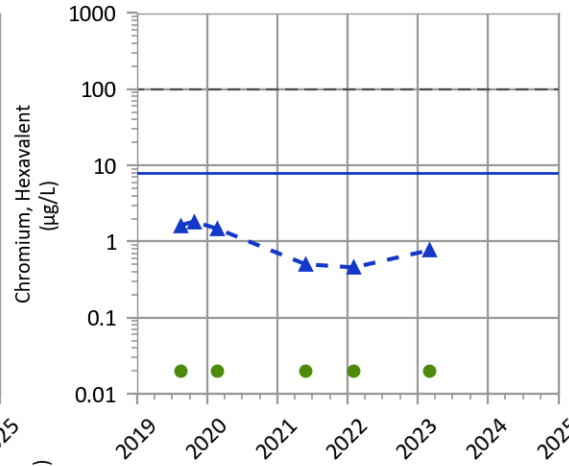
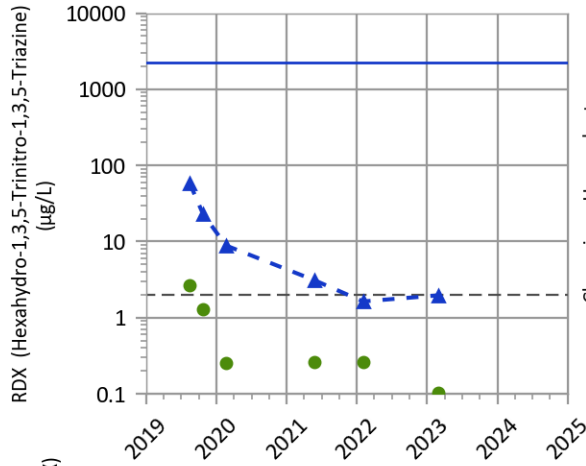
Most Recent Measured COC Concentrations (Feb 18, 2020)

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	2.31	100.0
TNX	Non-Detect	2.0

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



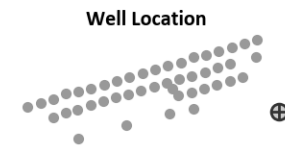
**PTX06-1045 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



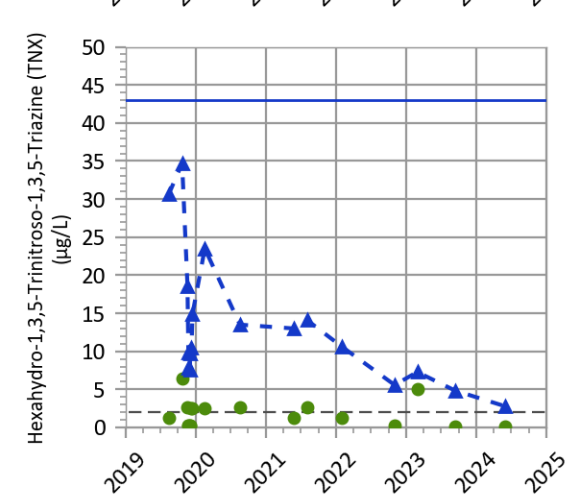
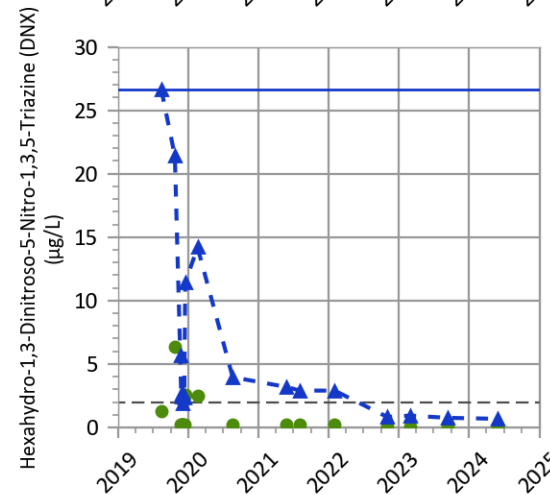
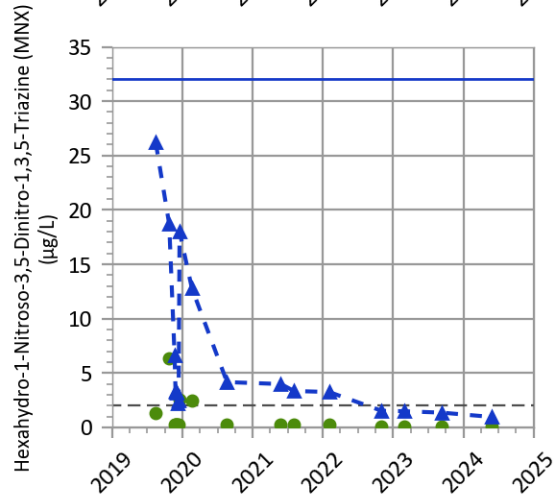
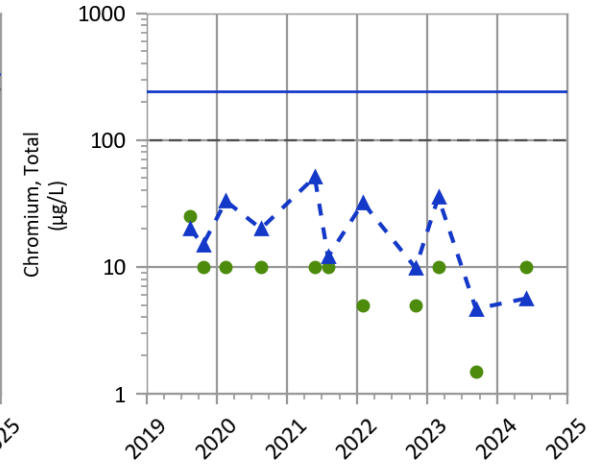
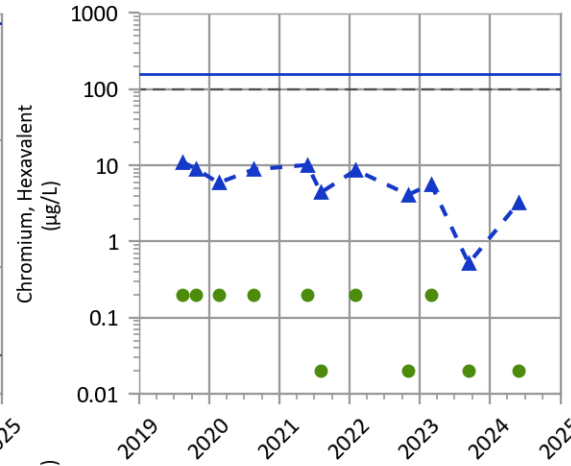
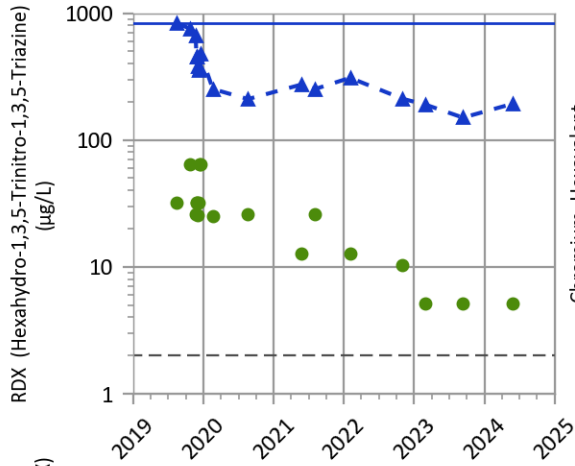
Most Recent Measured COC Concentrations (Feb 28, 2023)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	1.96	2.0
MNX	Non-Detect	2.0
CR-6	0.77	100.0
DNX	Non-Detect	2.0
CR	1.77	100.0
TNX	0.15	2.0

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



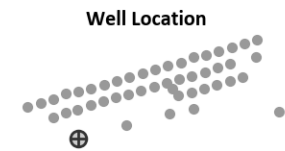
**PTX06-1153 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



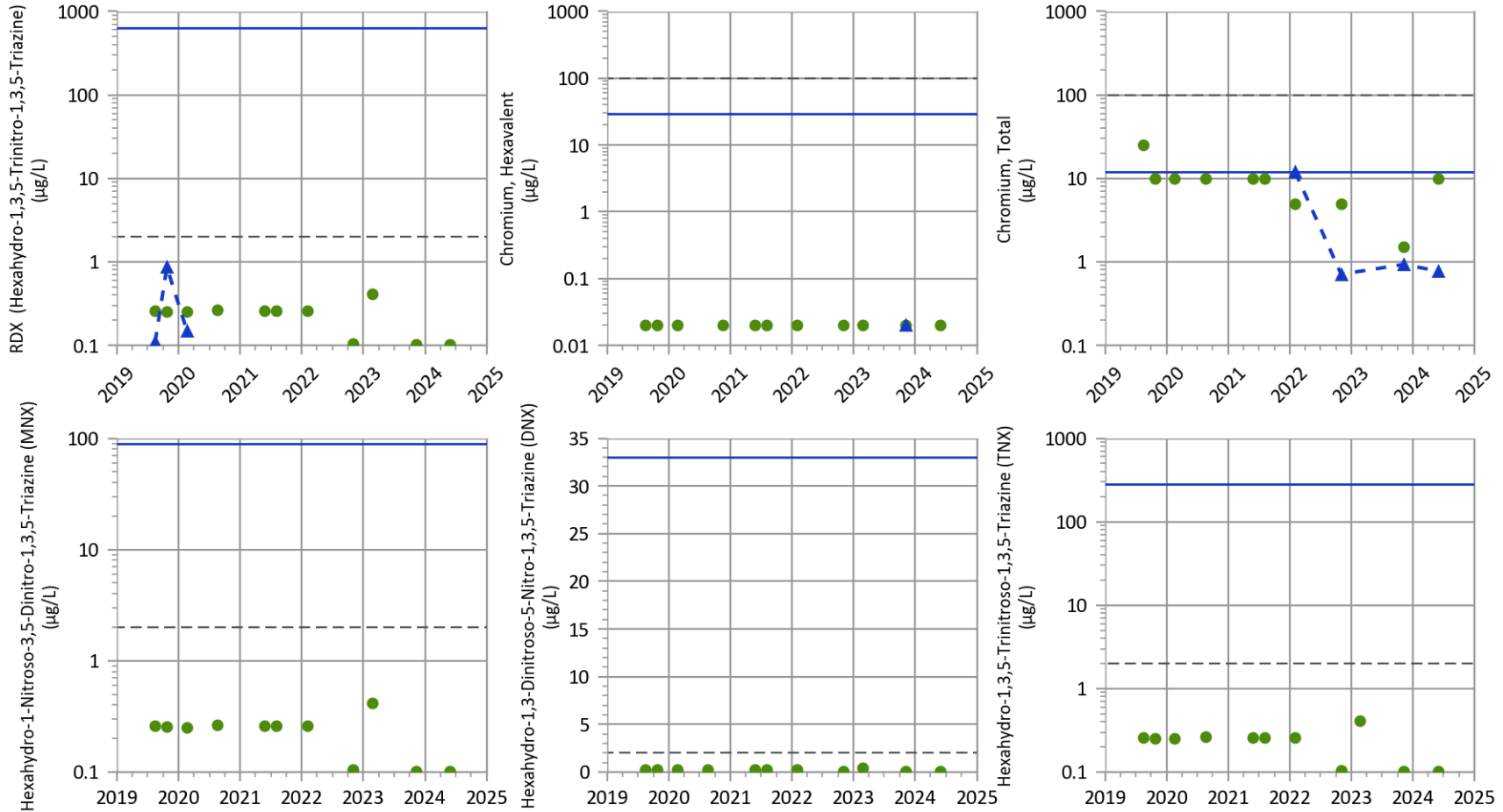
Most Recent Measured COC Concentrations (May 28, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	193.0	2.0
MNX	0.96	2.0
CR-6	3.21	100.0
DNX	0.68	2.0
CR	5.63	100.0
TNX	2.8	2.0

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



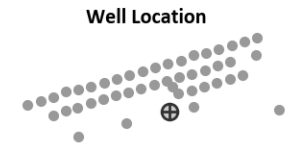
**PTX06-1154 Downgradient Performance Indicators
Southeast In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (May 28, 2024)

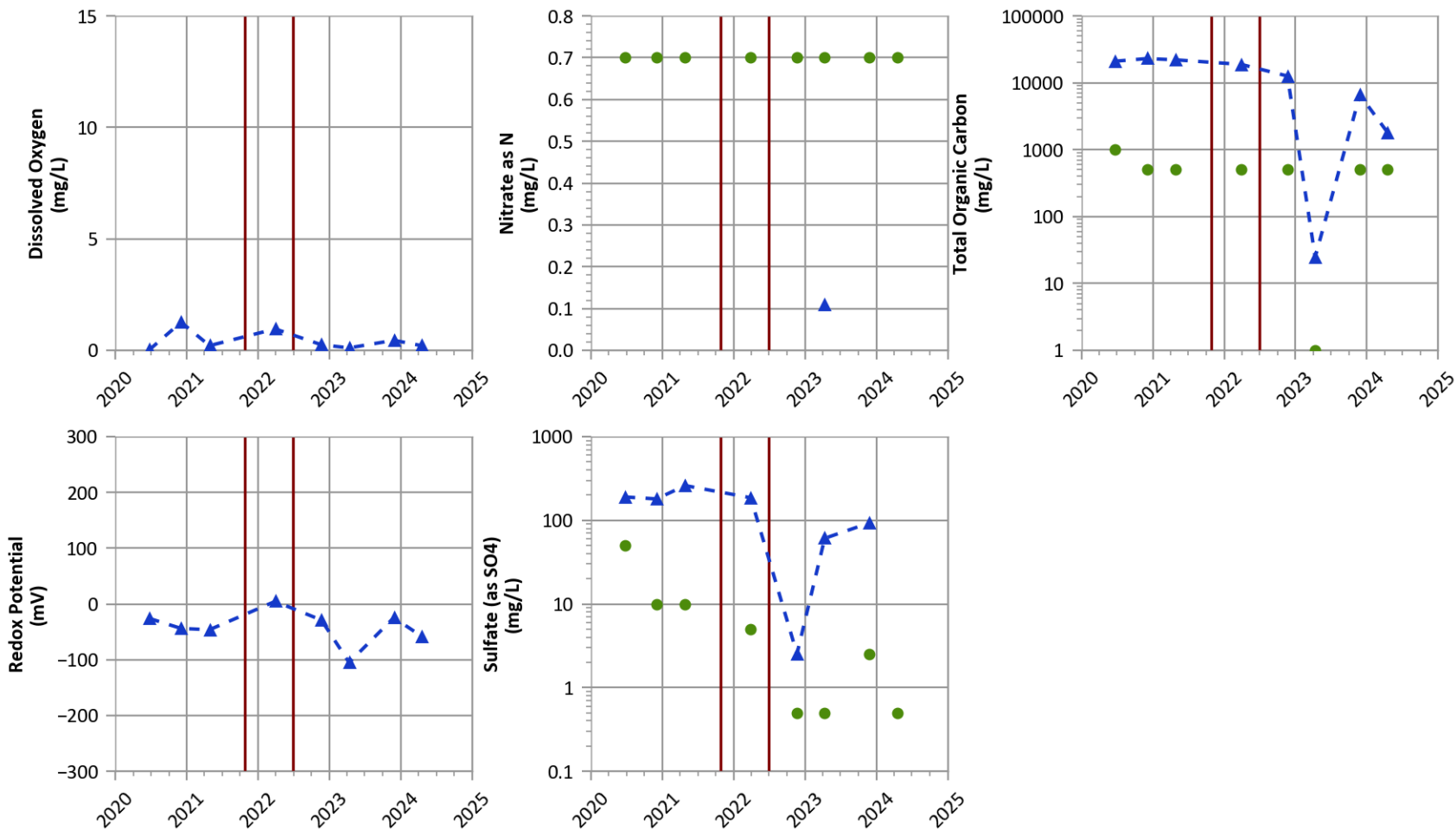
COC	Concentration ($\mu\text{g/L}$)	GWPS ($\mu\text{g/L}$)
RDX	Non-Detect	2.0
MNX	Non-Detect	2.0
CR-6	Non-Detect	100.0
DNX	Non-Detect	2.0
CR	0.78	100.0
TNX	Non-Detect	2.0

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



Zone 11 ISB Graphs

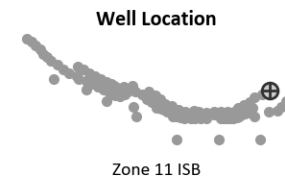
PTX06-ISB055 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



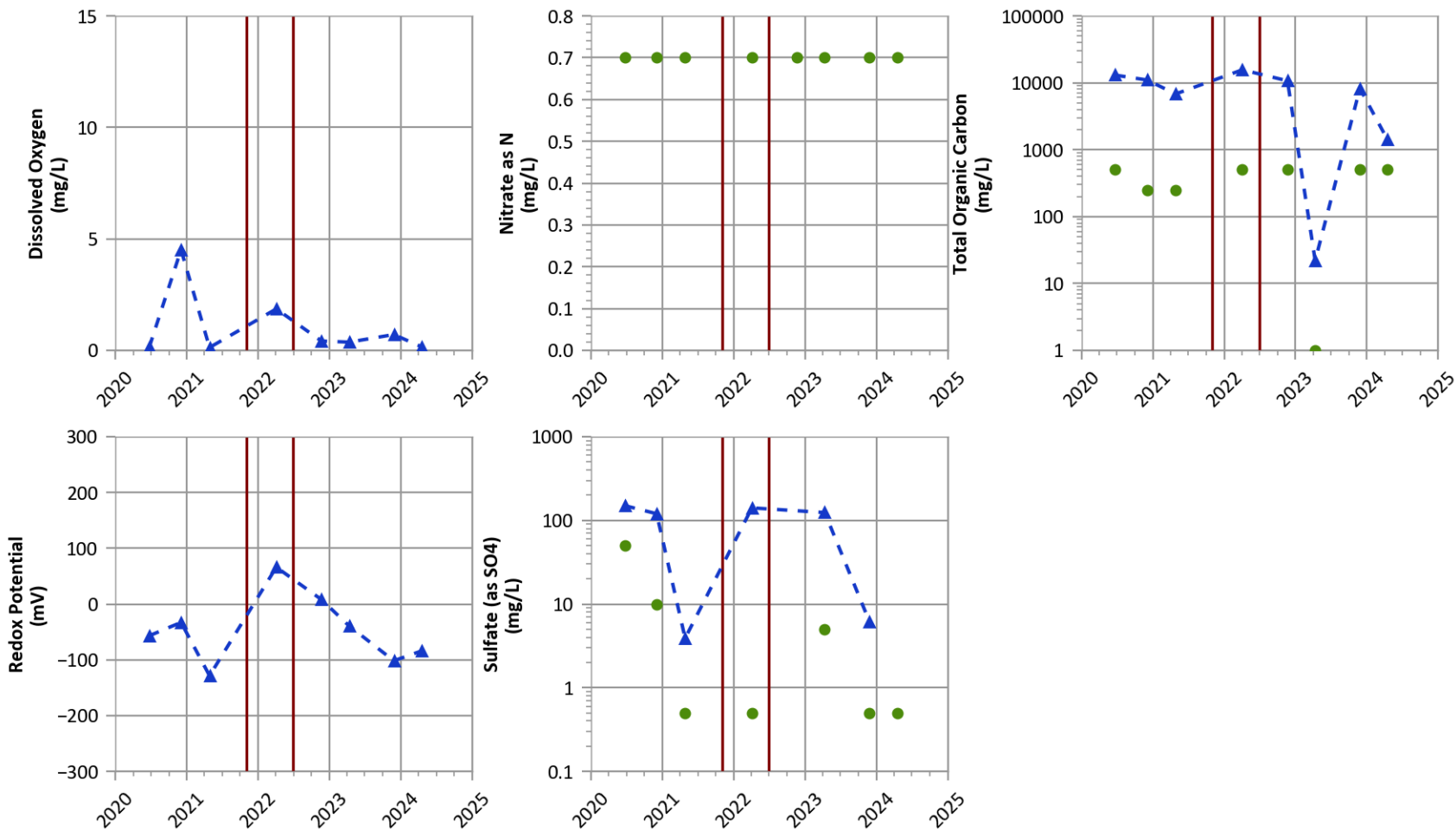
Typical Baseline Concentrations in Perched Groundwater

- 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



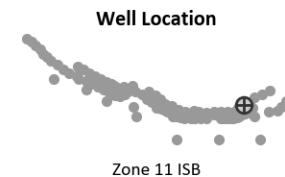
**PTX06-ISB059 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



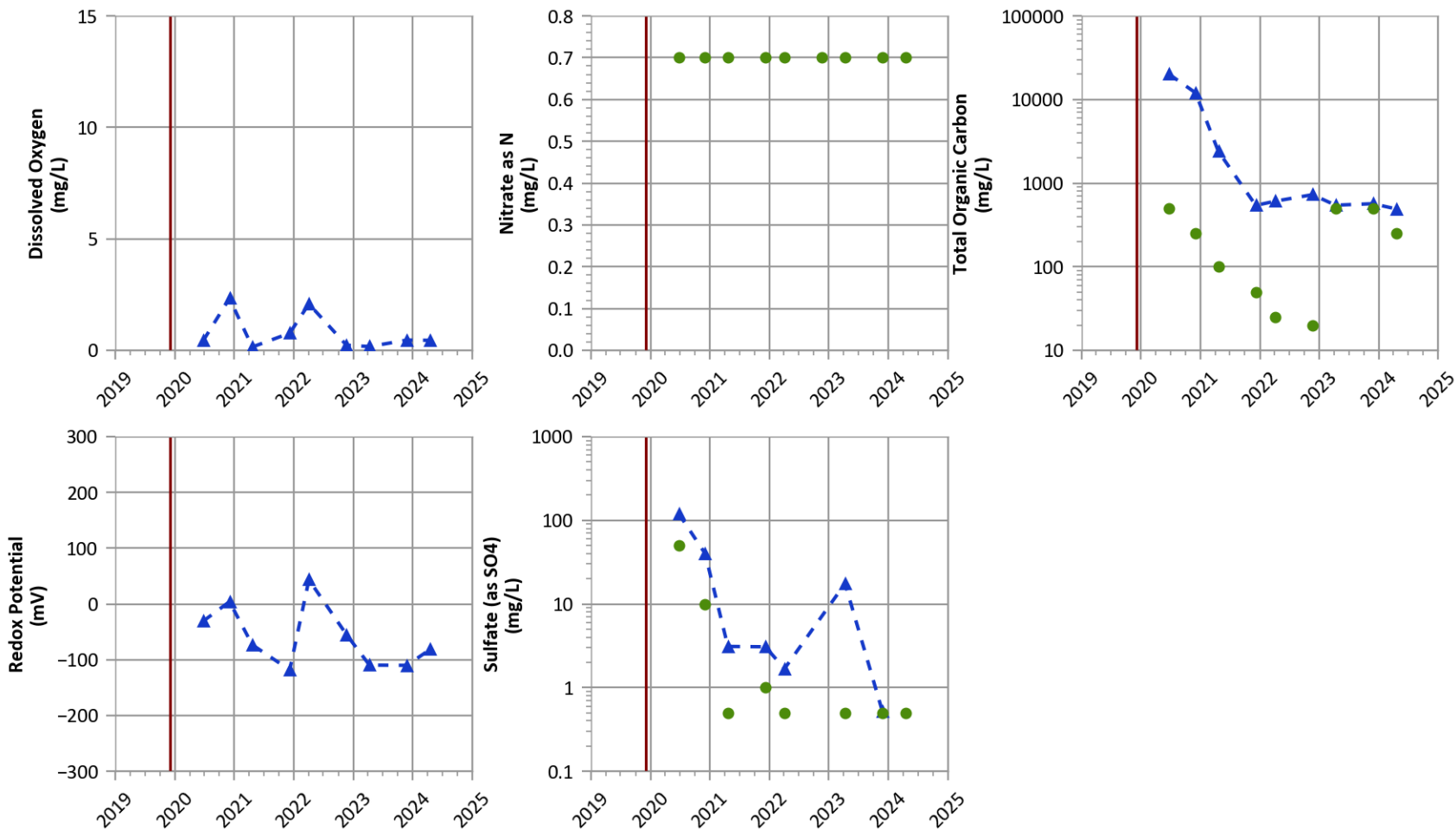
Typical Baseline Concentrations in Perched Groundwater

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



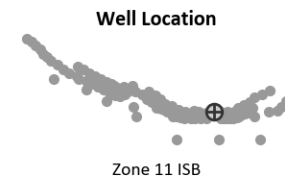
PTX06-ISB064 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



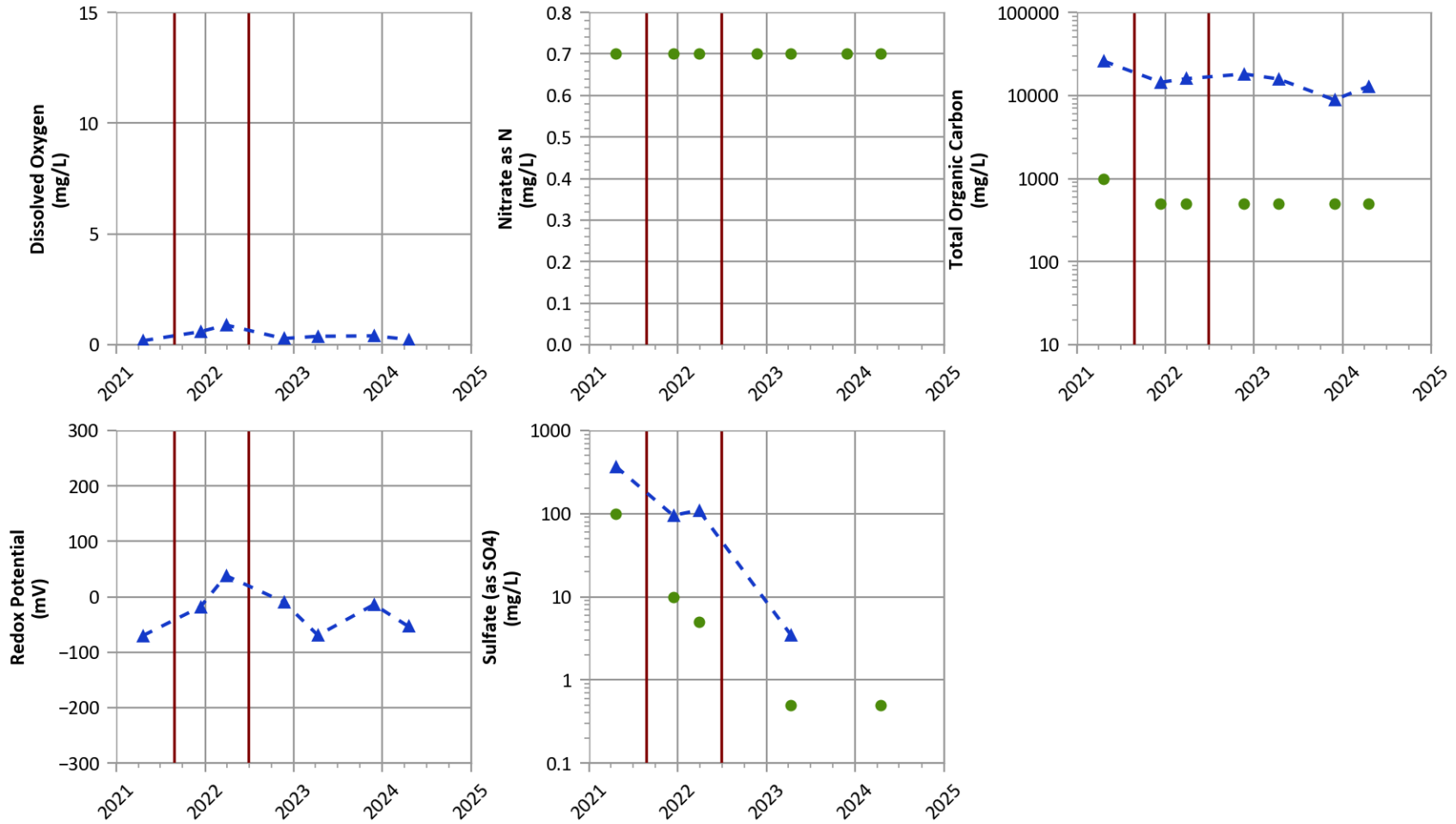
Typical Baseline Concentrations in Perched Groundwater

- 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



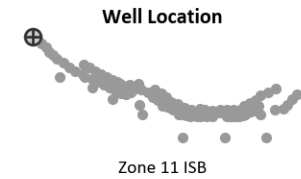
PTX06-ISB137 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



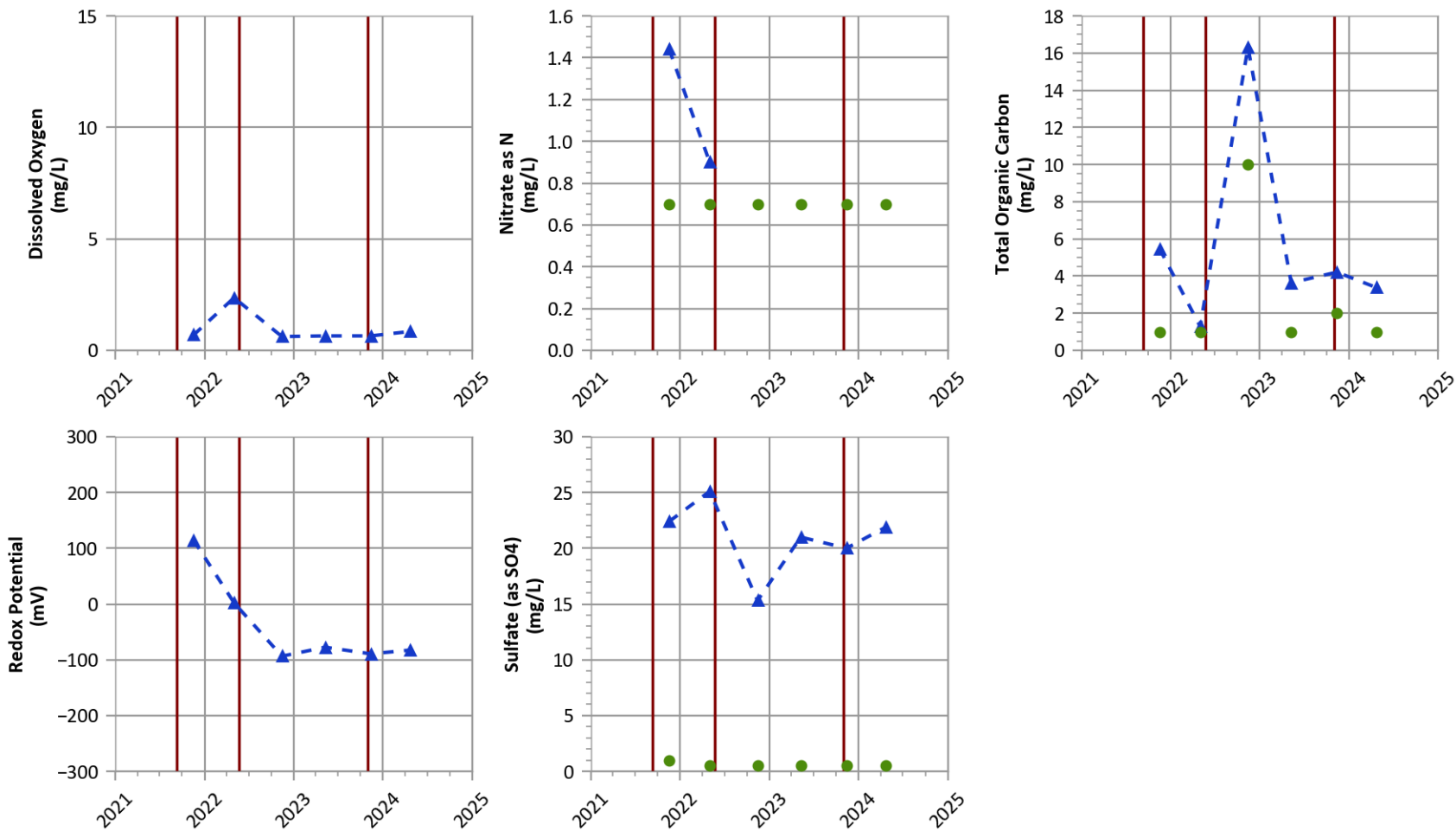
Typical Baseline Concentrations in Perched Groundwater

- 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



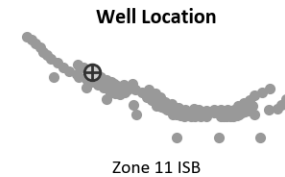
**PTX06-1164 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



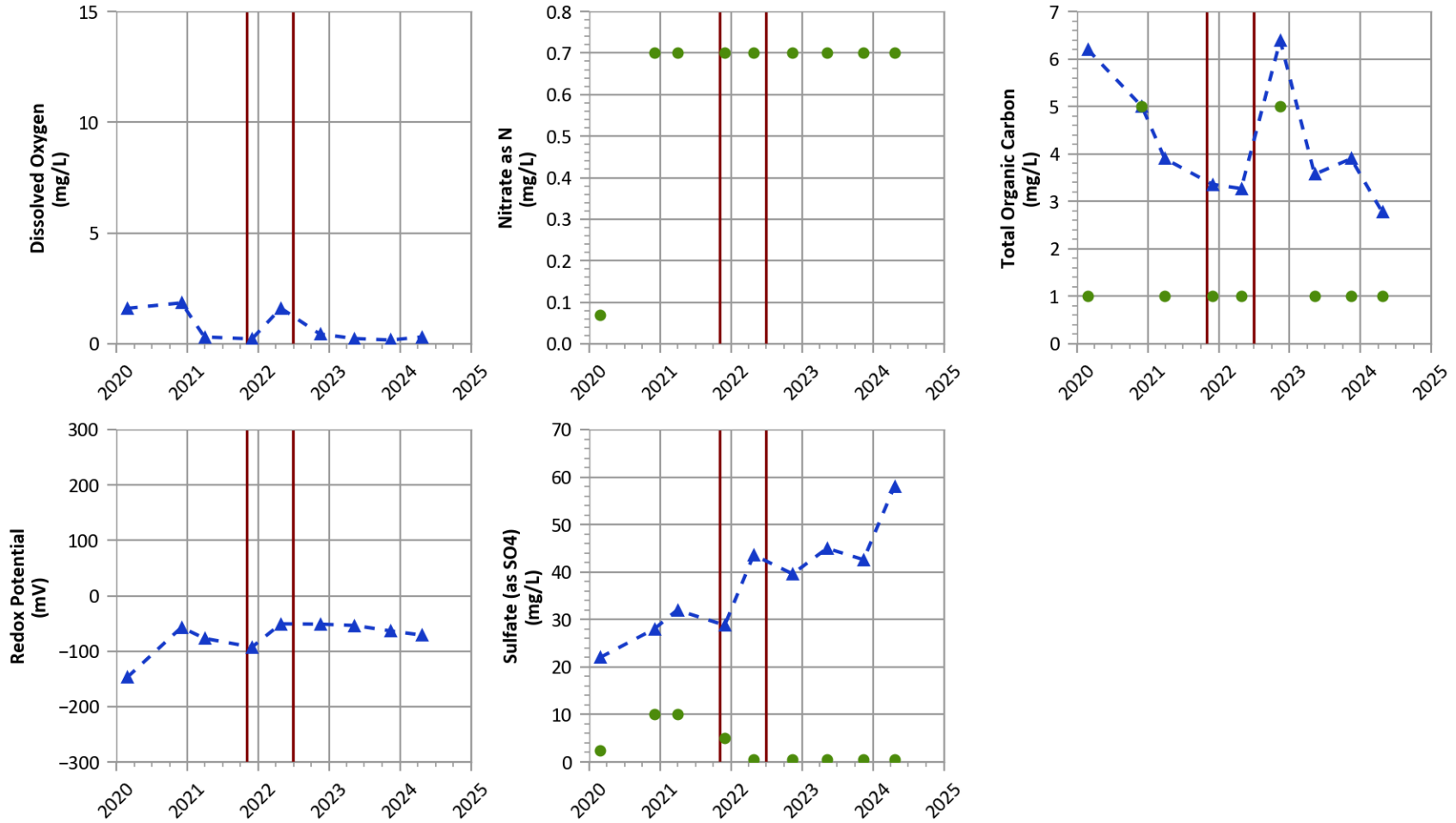
Typical Baseline Concentrations in Perched Groundwater

- 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



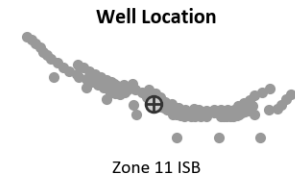
**PTX06-1169 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



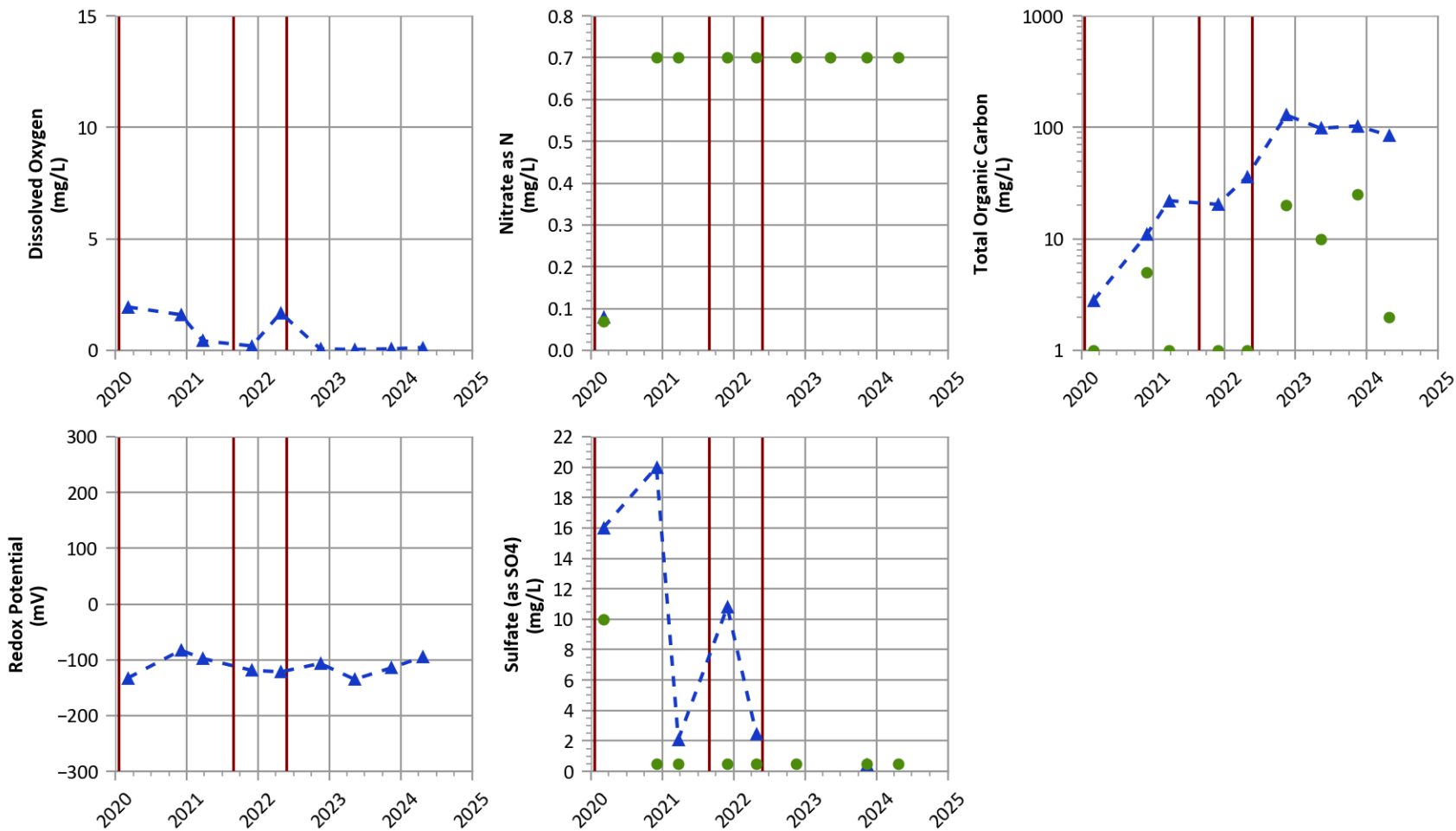
Typical Baseline Concentrations in Perched Groundwater

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



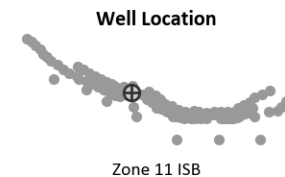
PTX06-1170 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



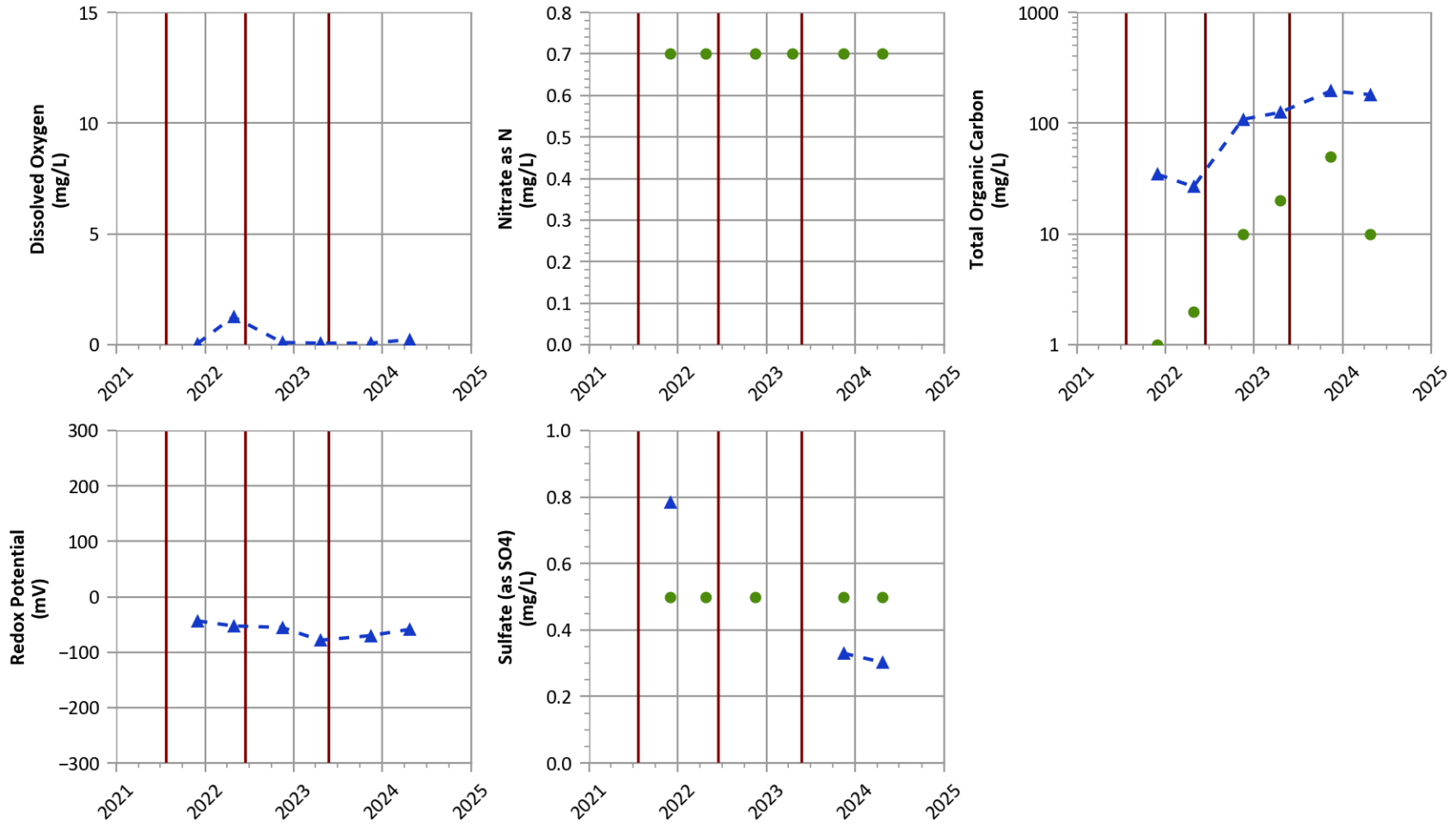
Typical Baseline Concentrations in Perched Groundwater

- 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



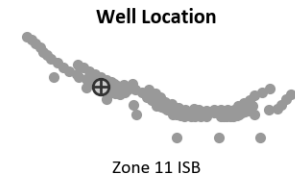
**PTX06-1176 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



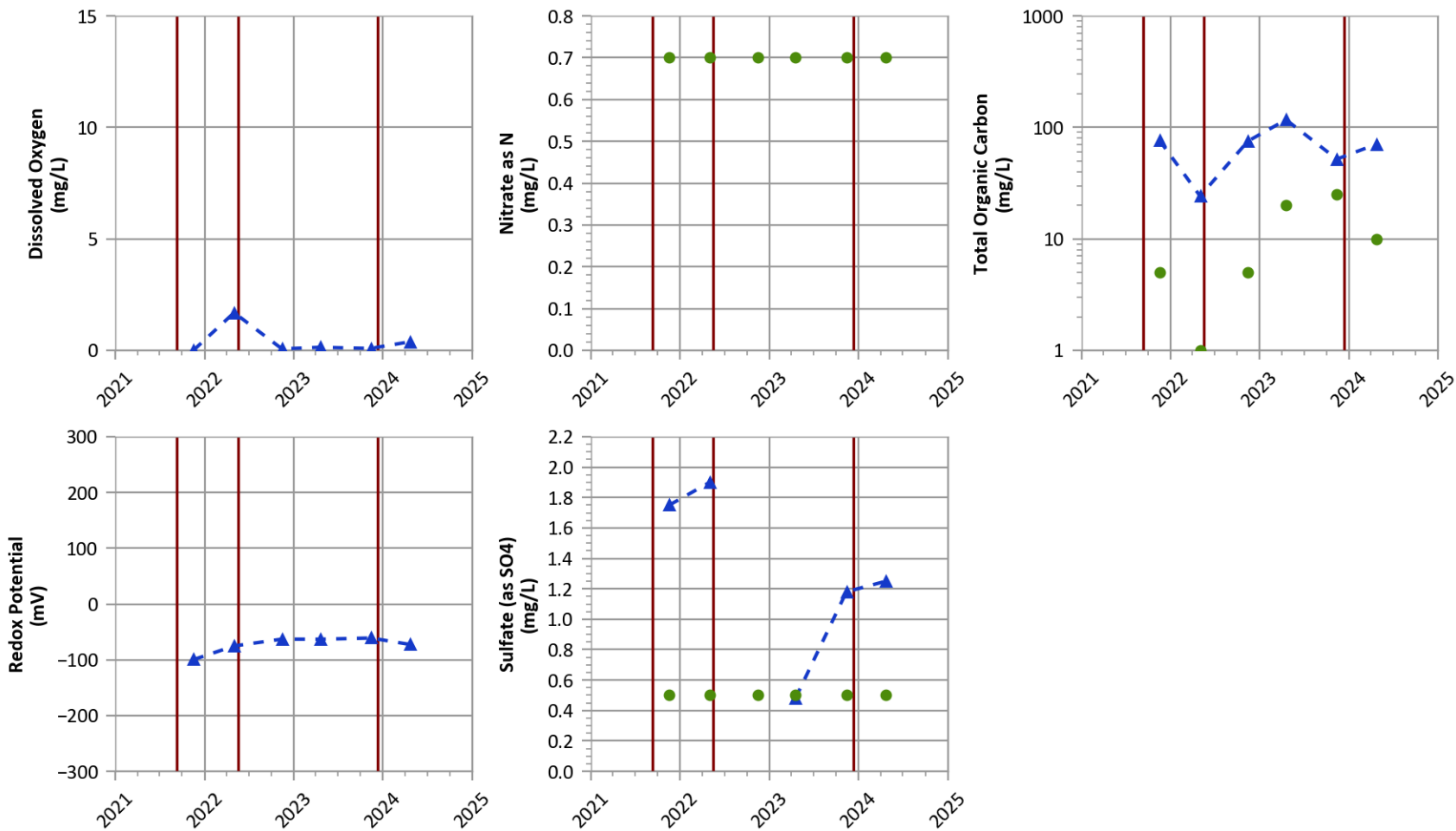
Typical Baseline Concentrations in Perched Groundwater

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



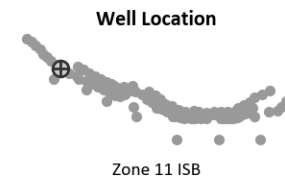
PTX06-1177 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



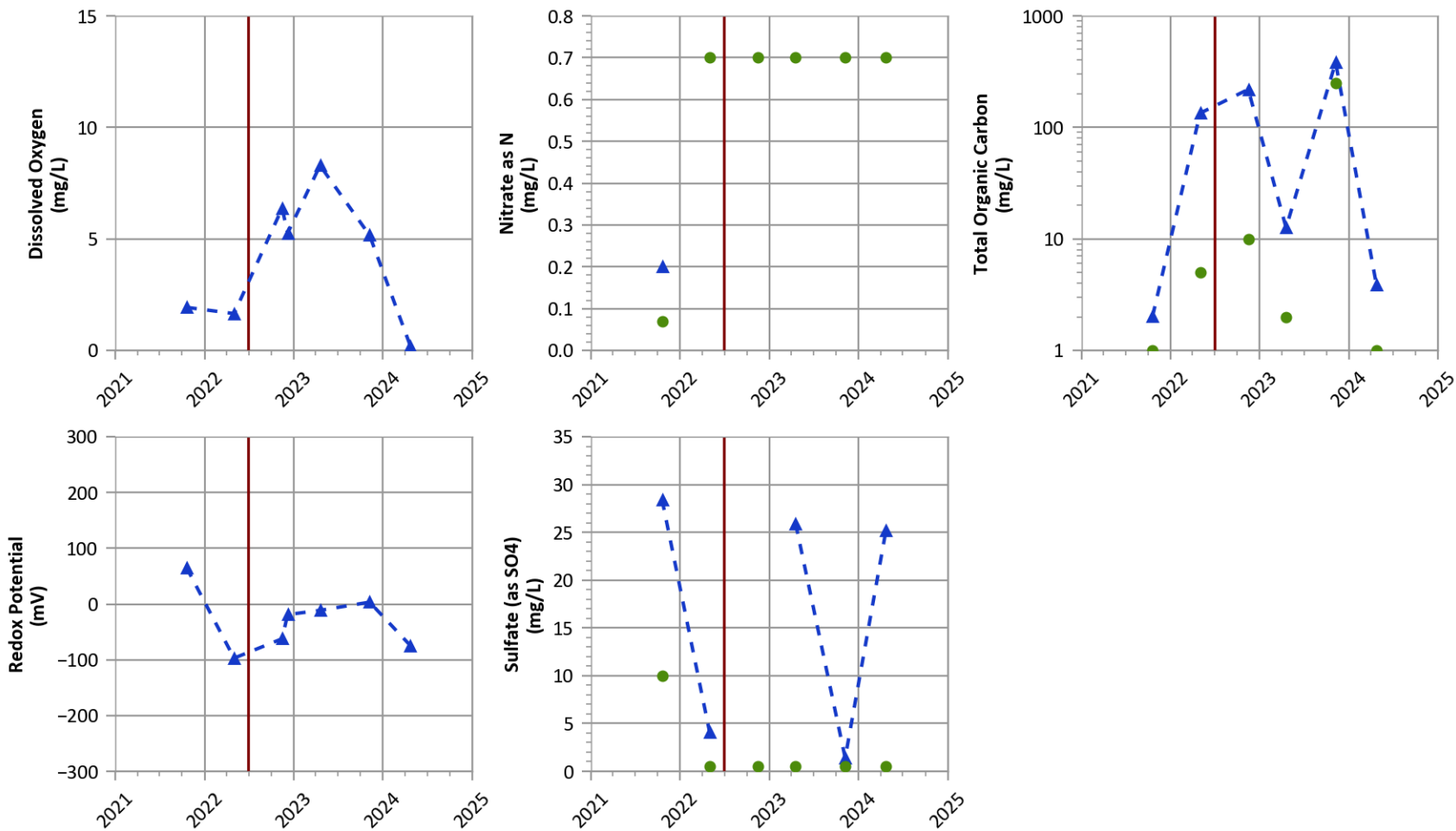
Typical Baseline Concentrations in Perched Groundwater

- 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



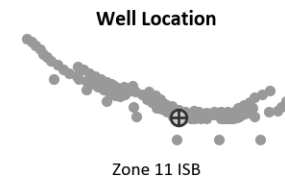
**PTX06-1209 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



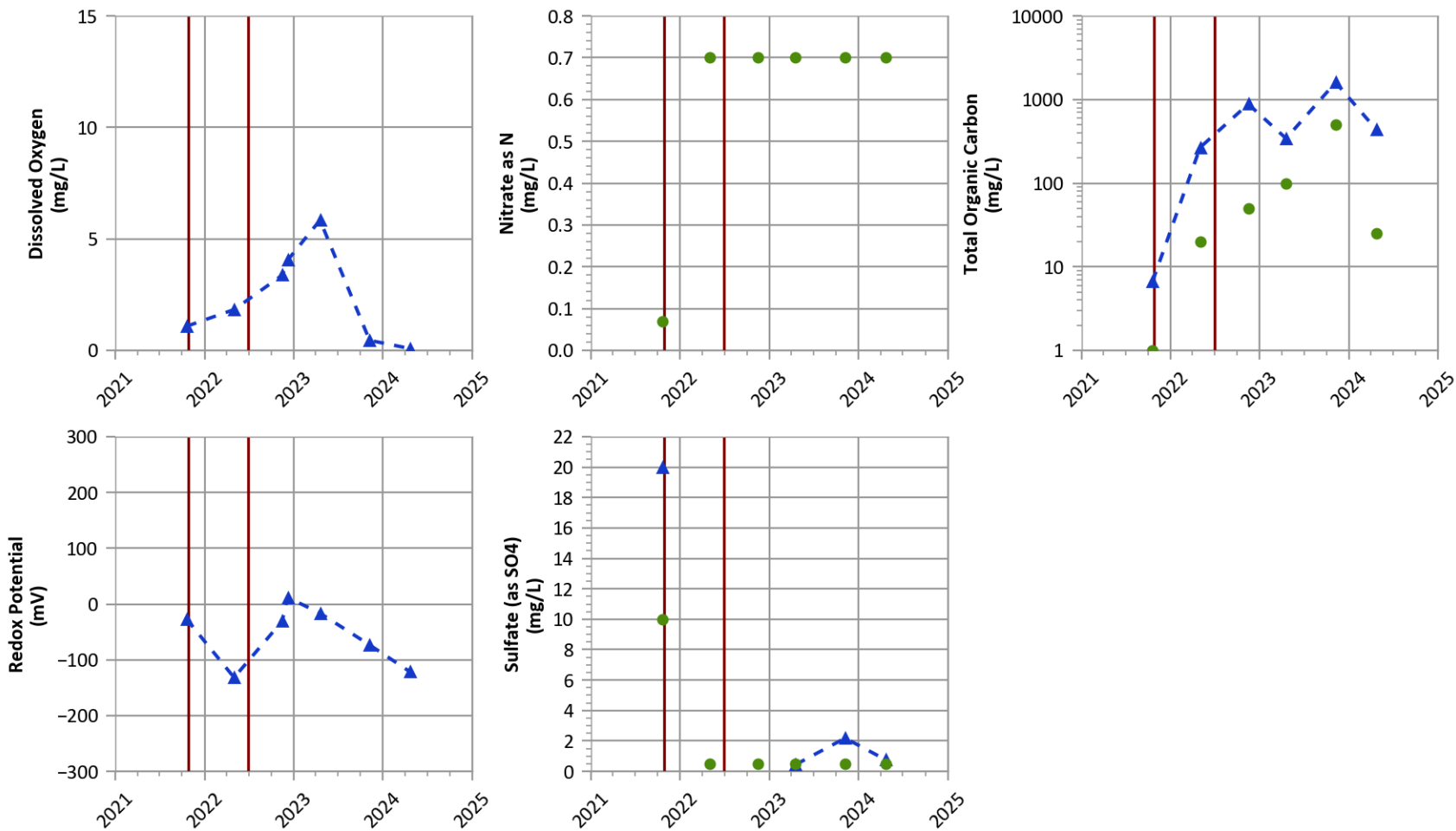
Typical Baseline Concentrations in Perched Groundwater

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



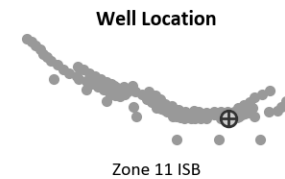
PTX06-1210 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



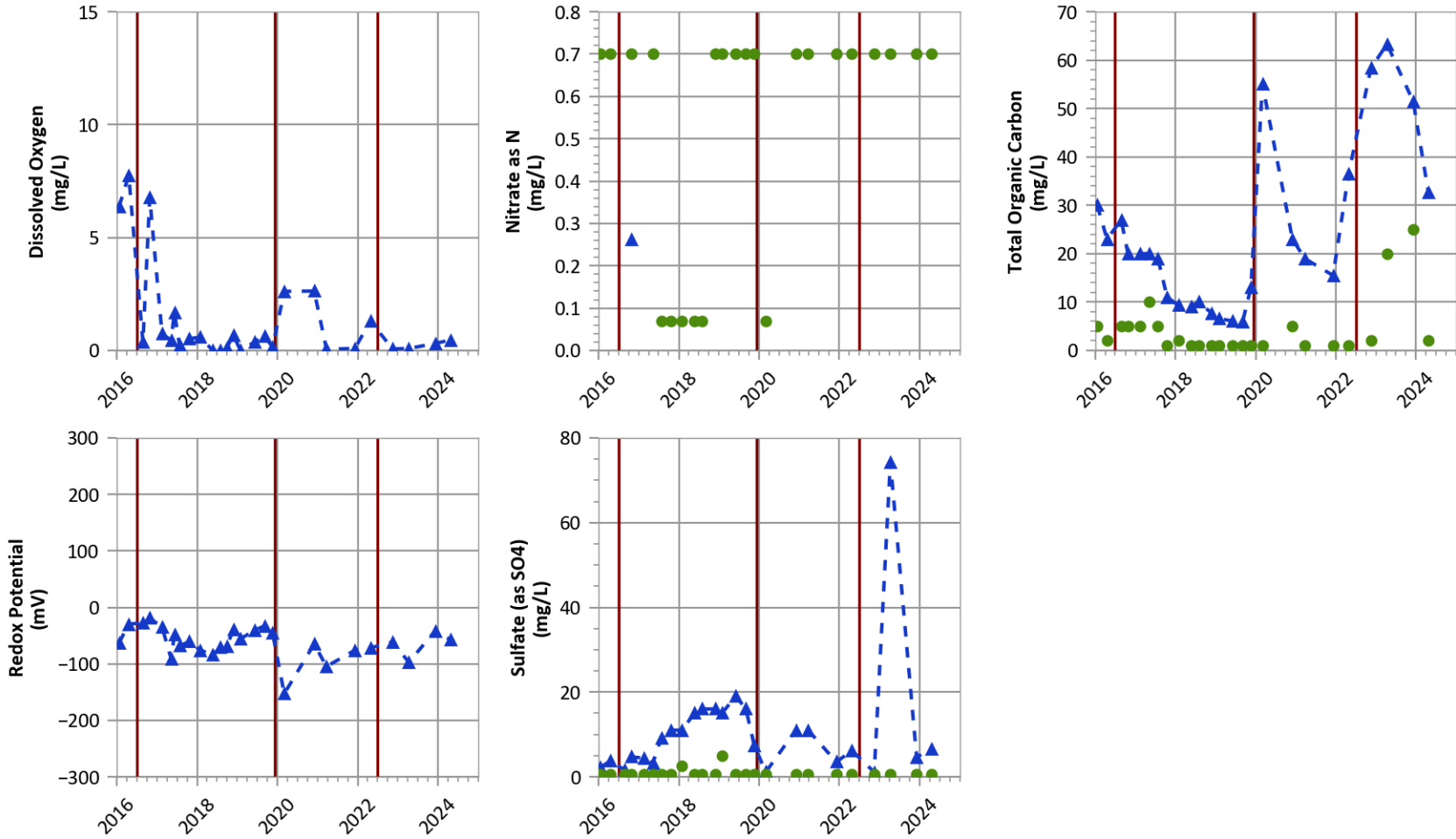
Typical Baseline Concentrations in Perched Groundwater

- 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



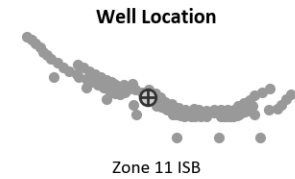
**PTX06-1230 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



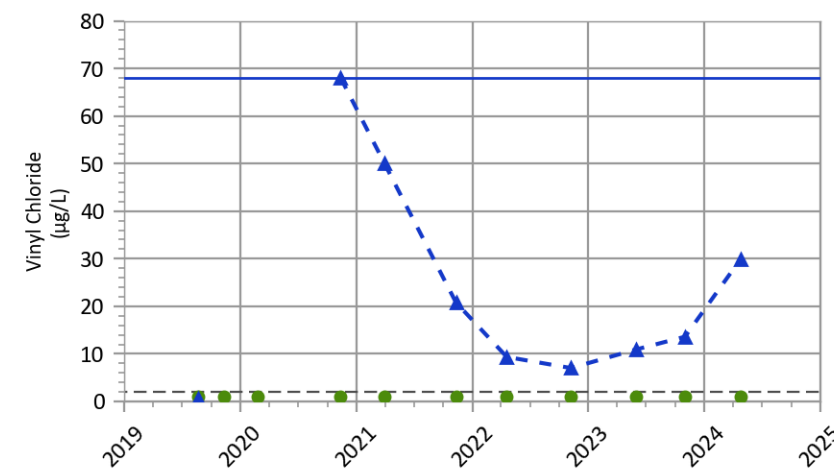
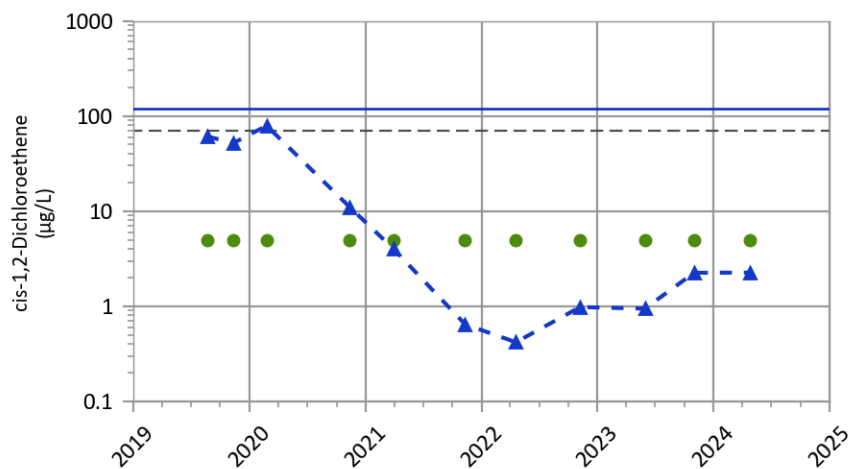
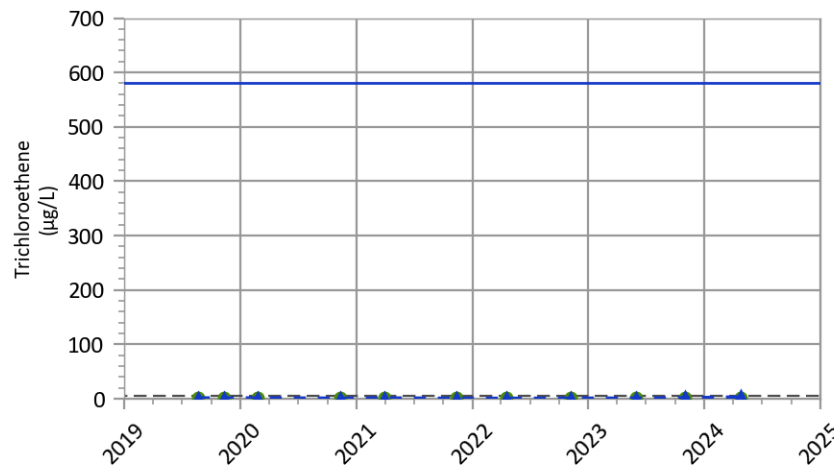
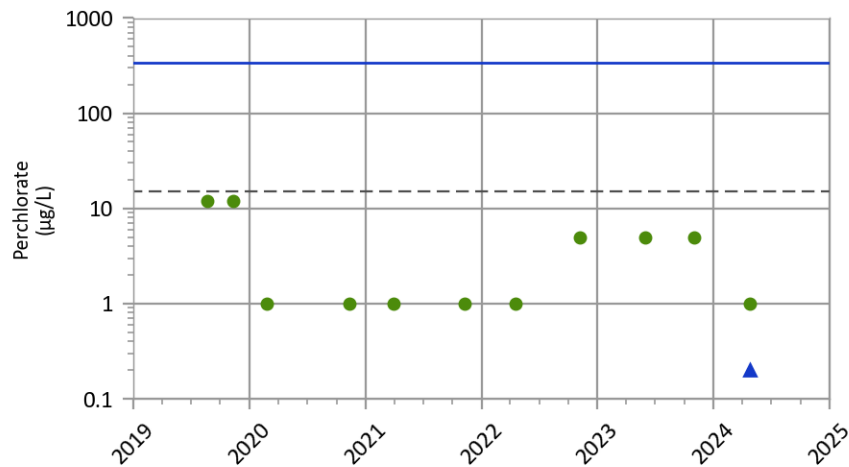
Typical Baseline Concentrations in Perched Groundwater

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



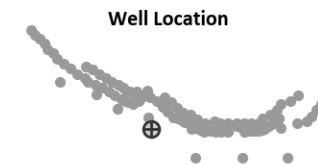
**PTX06-1012 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



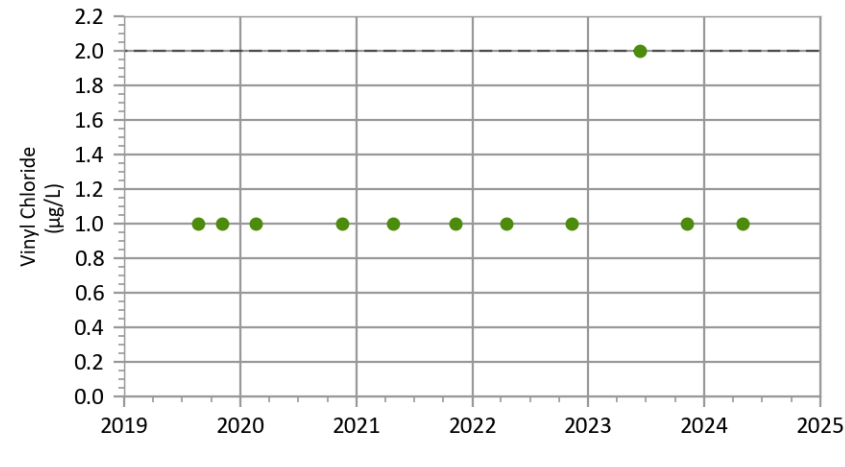
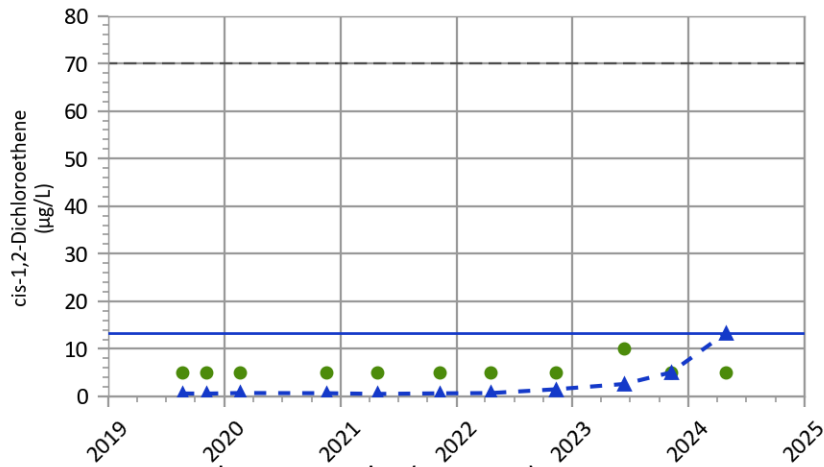
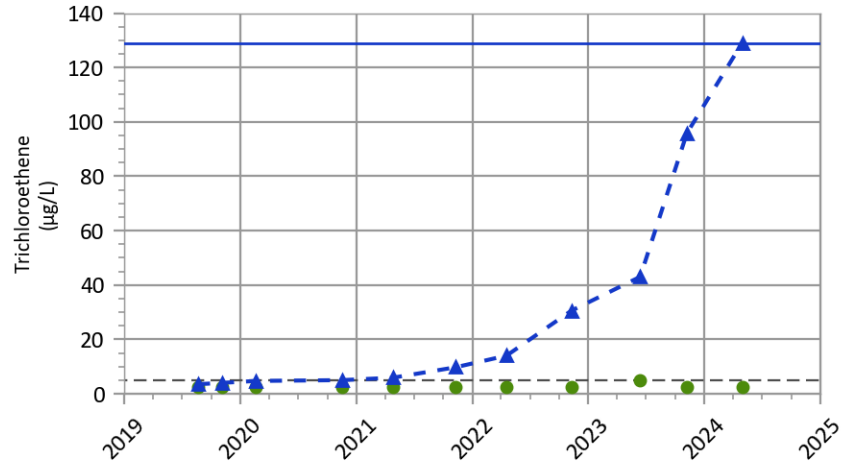
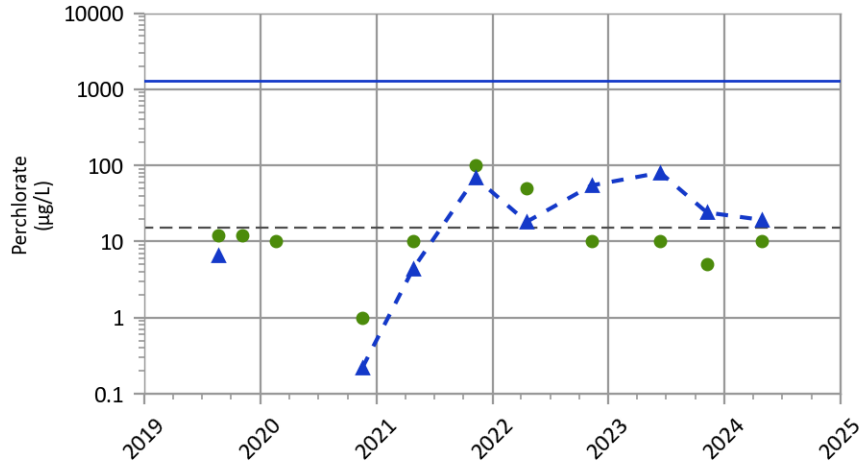
Most Recent Measured COC Concentrations (Apr 24, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	0.203	15.0
DCE12C	2.26	70.0
TCE	2.65	5.0
VC	29.9	2.0

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



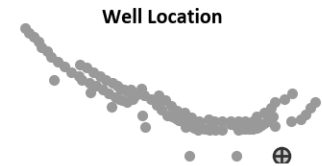
**PTX06-1148 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



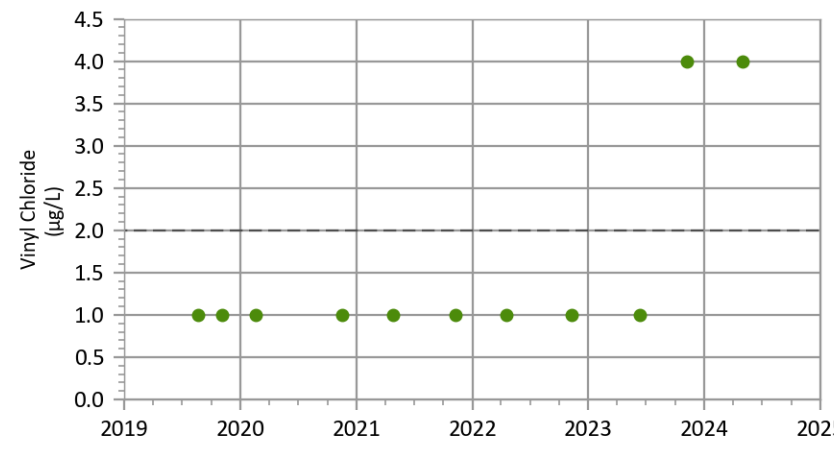
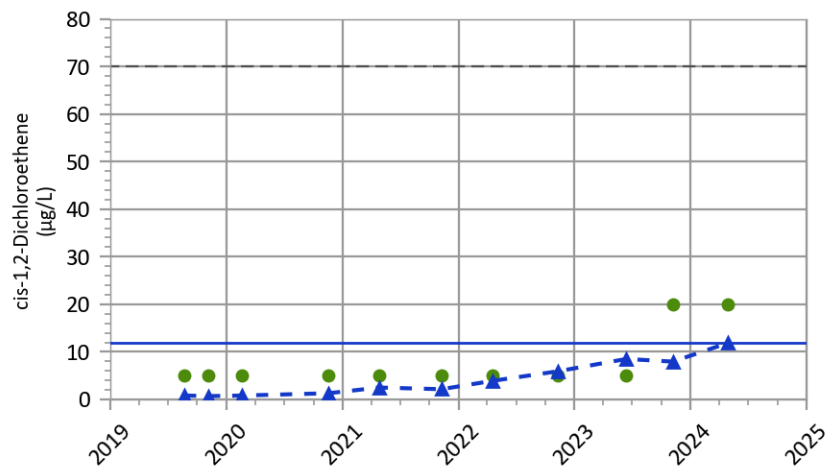
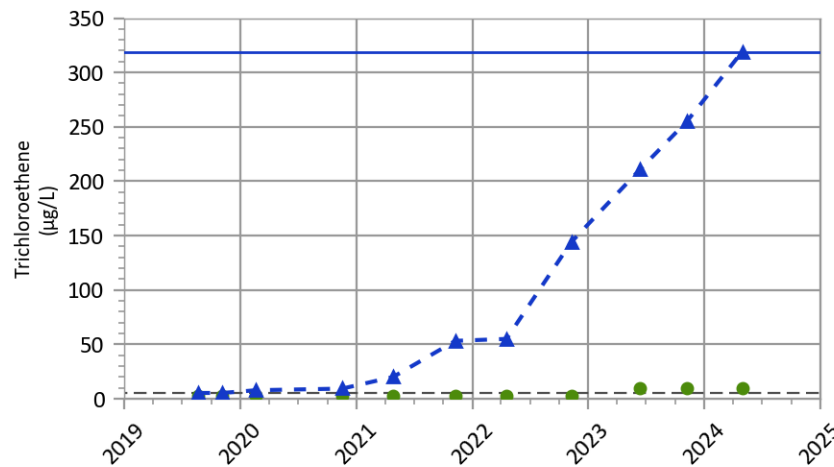
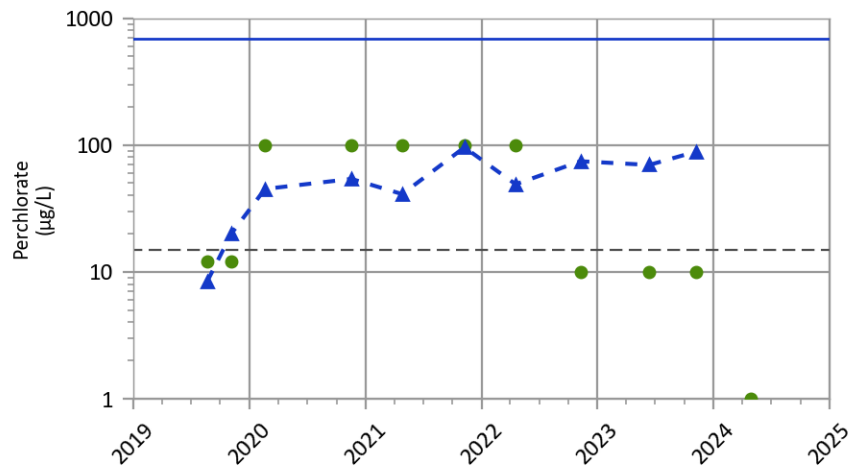
Most Recent Measured COC Concentrations (Apr 29, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	19.2	15.0
DCE12C	13.4	70.0
TCE	129.0	5.0
VC	Non-Detect	2.0

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



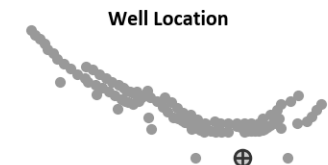
**PTX06-1149 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



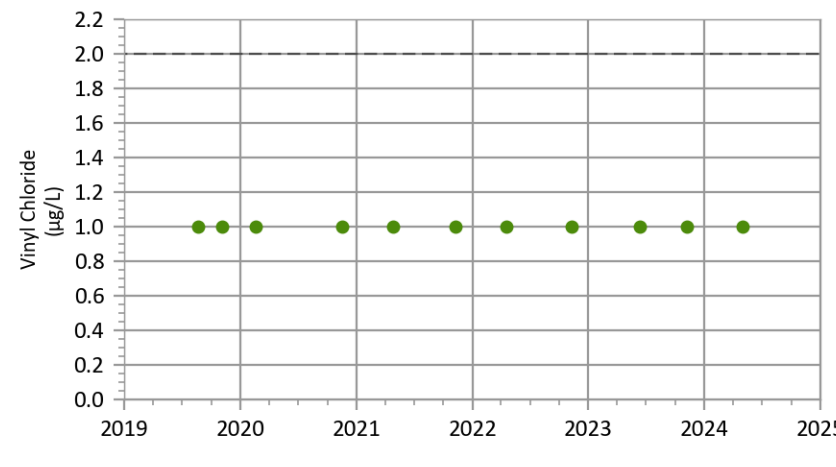
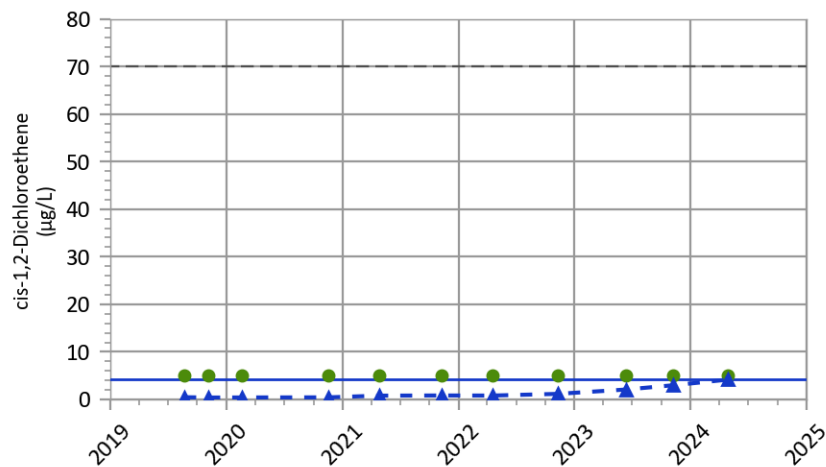
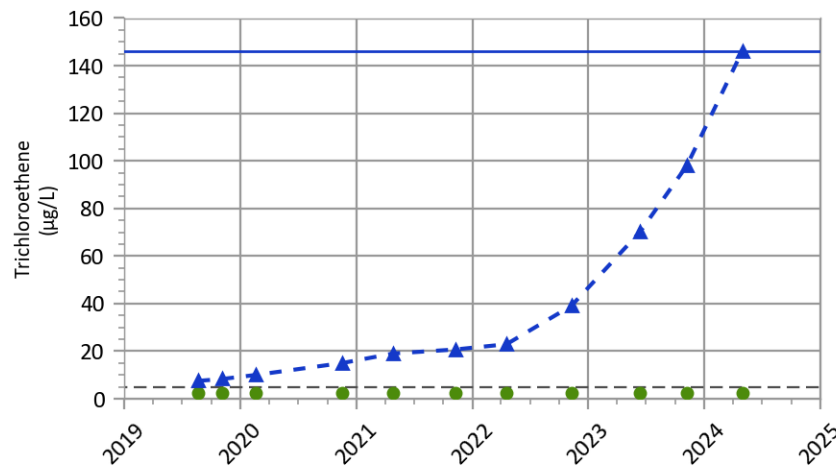
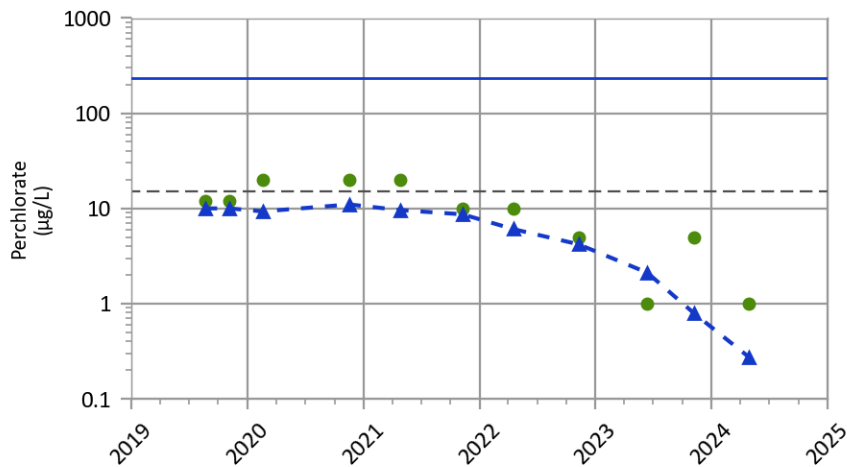
Most Recent Measured COC Concentrations (Apr 29, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	11.9	70.0
TCE	319.0	5.0
VC	Non-Detect	2.0

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



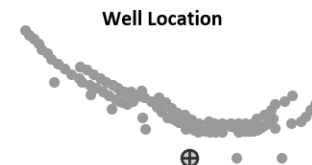
**PTX06-1150 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



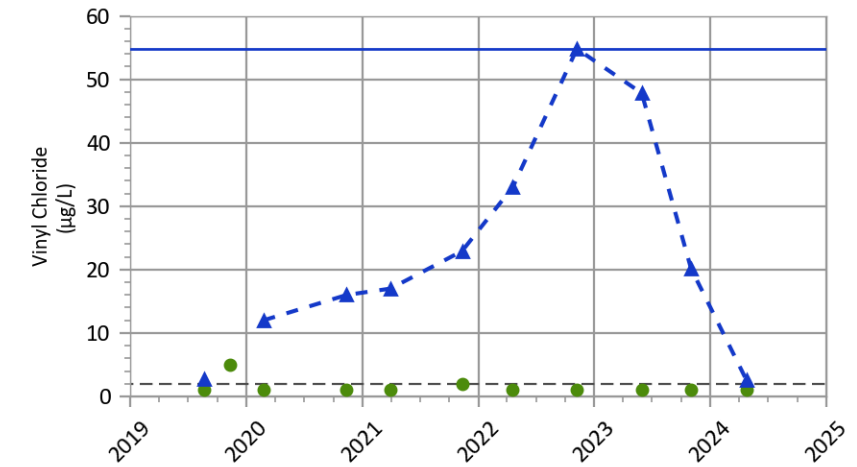
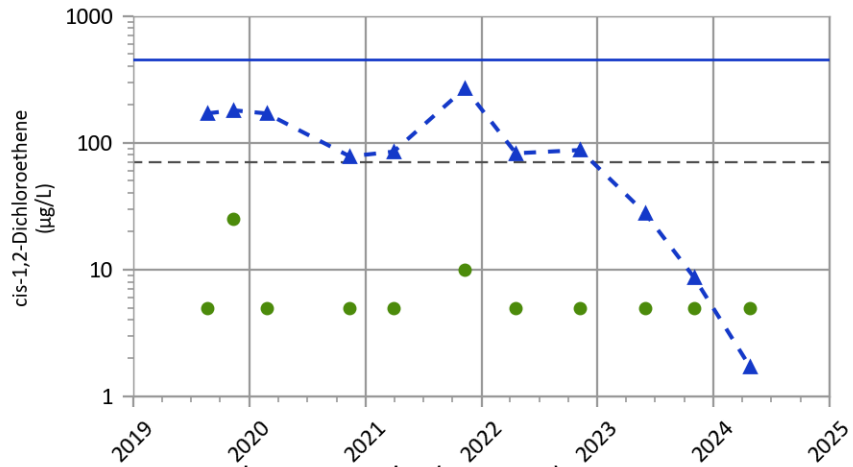
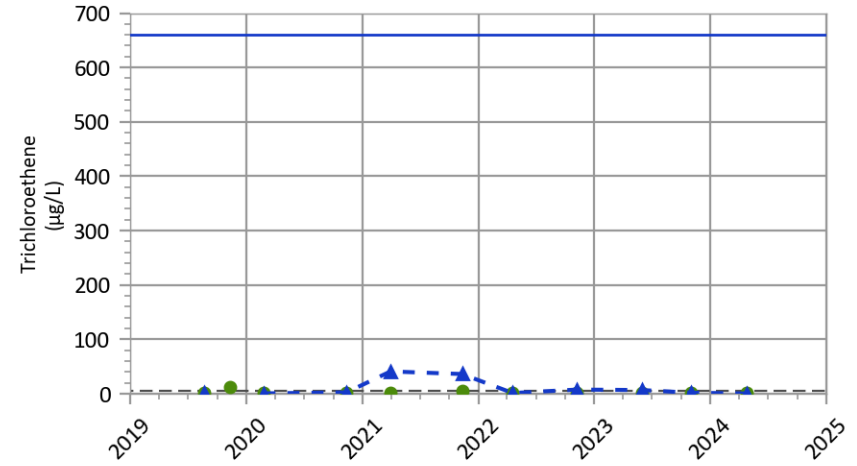
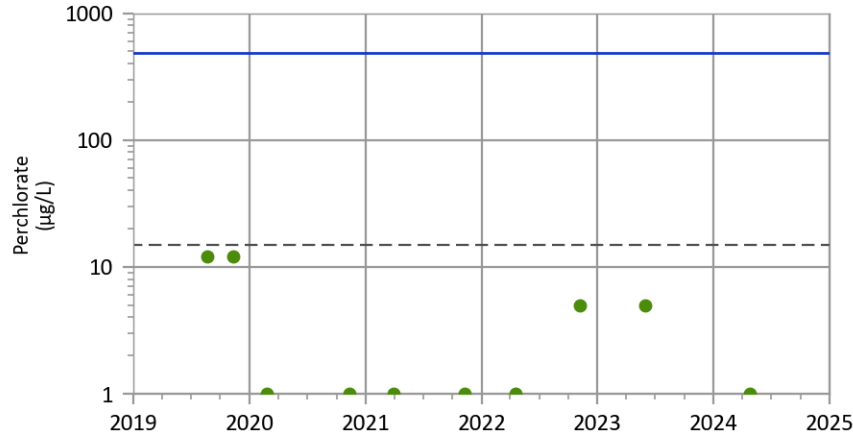
Most Recent Measured COC Concentrations (Apr 29, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	0.272	15.0
DCE12C	4.17	70.0
TCE	146.0	5.0
VC	Non-Detect	2.0

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



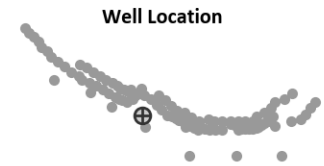
**PTX06-1155 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



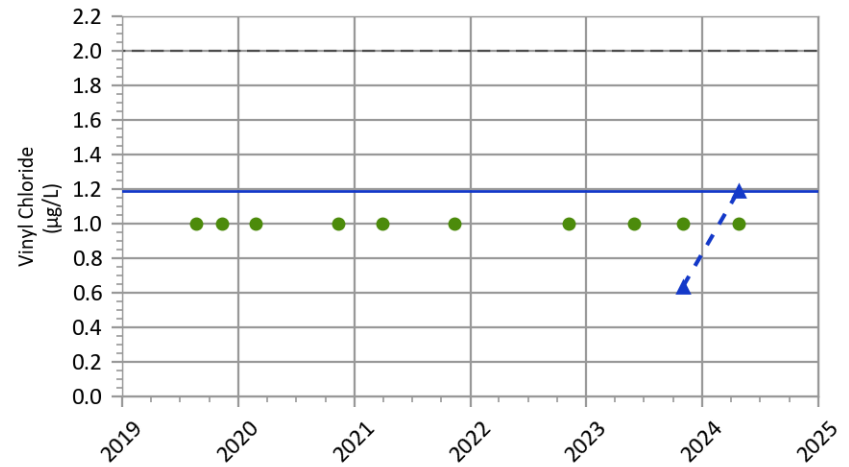
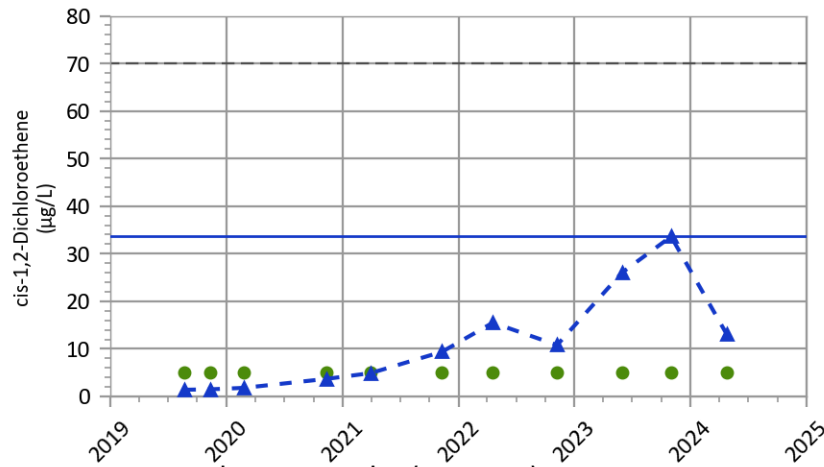
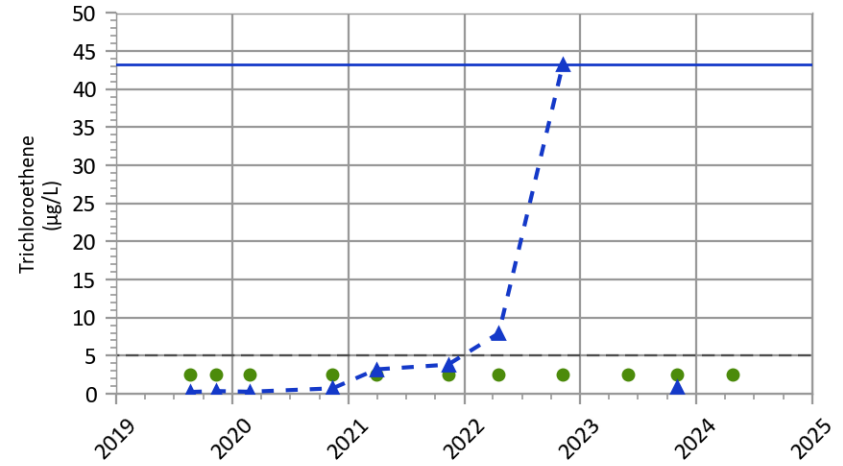
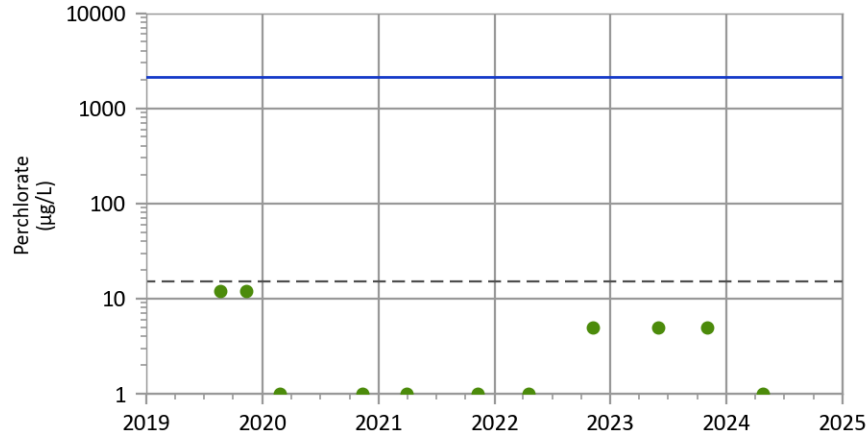
Most Recent Measured COC Concentrations (Apr 24, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	1.73	70.0
TCE	0.465	5.0
VC	2.55	2.0

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



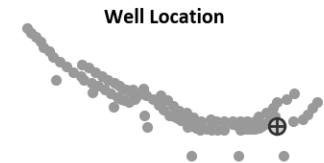
**PTX06-1156 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



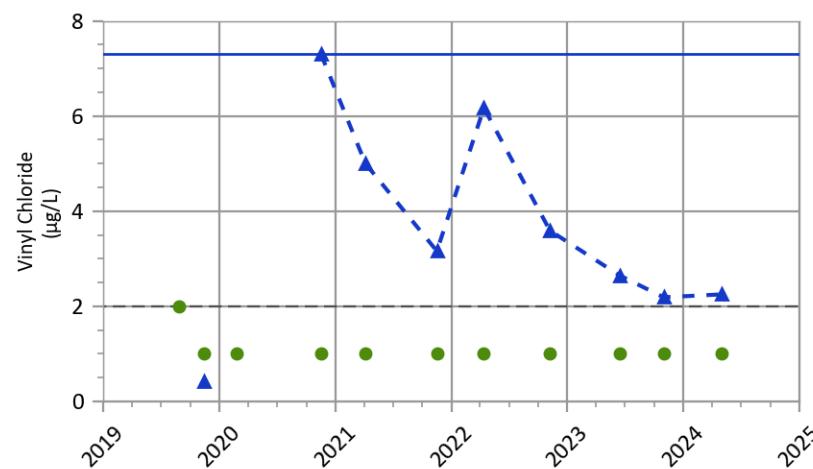
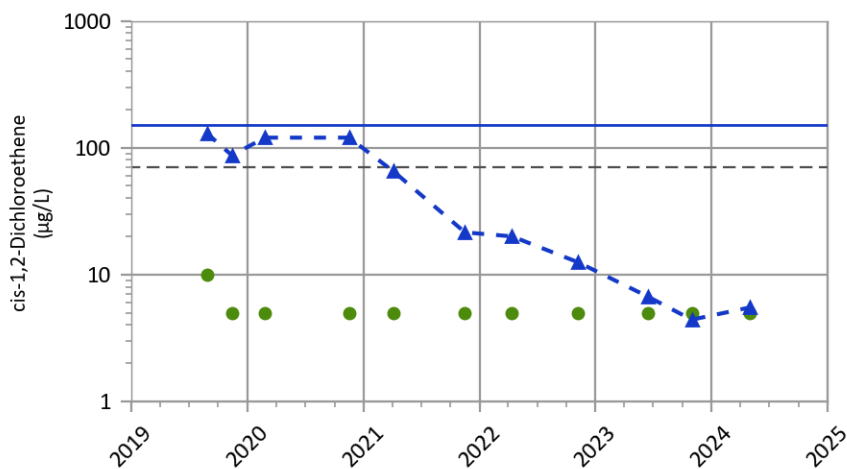
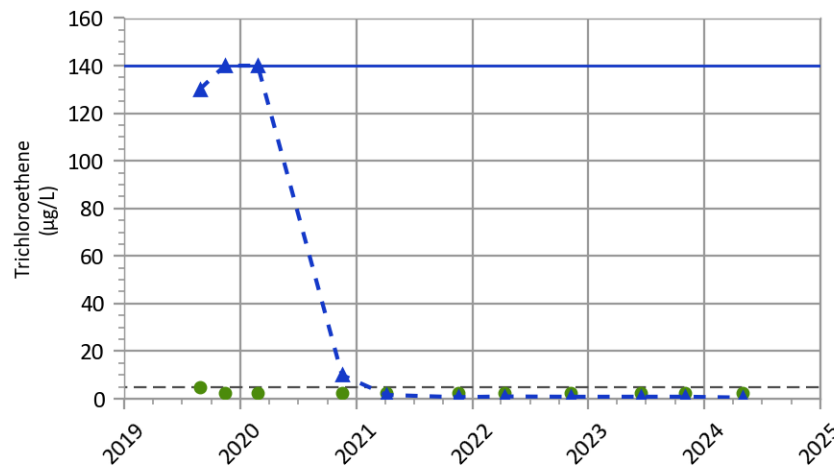
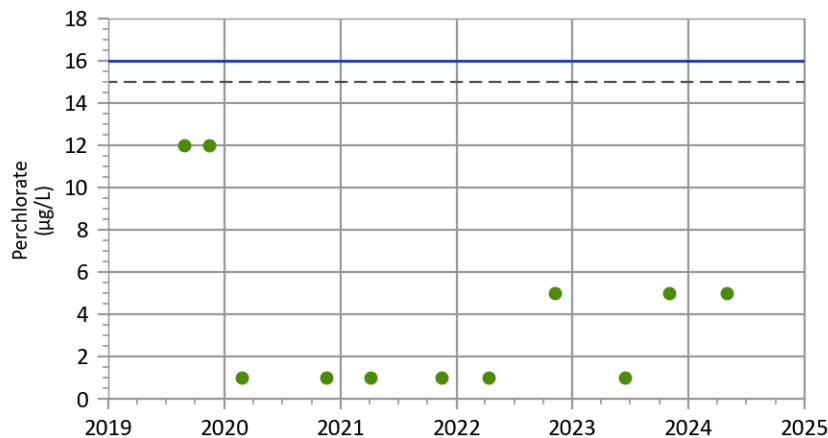
Most Recent Measured COC Concentrations (Apr 24, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	13.1	70.0
TCE	Non-Detect	5.0
VC	1.19	2.0

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



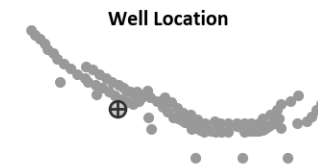
**PTX06-1173 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



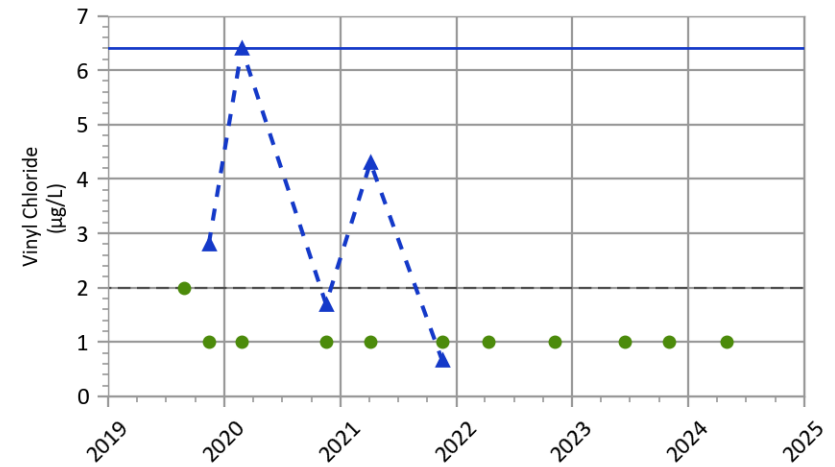
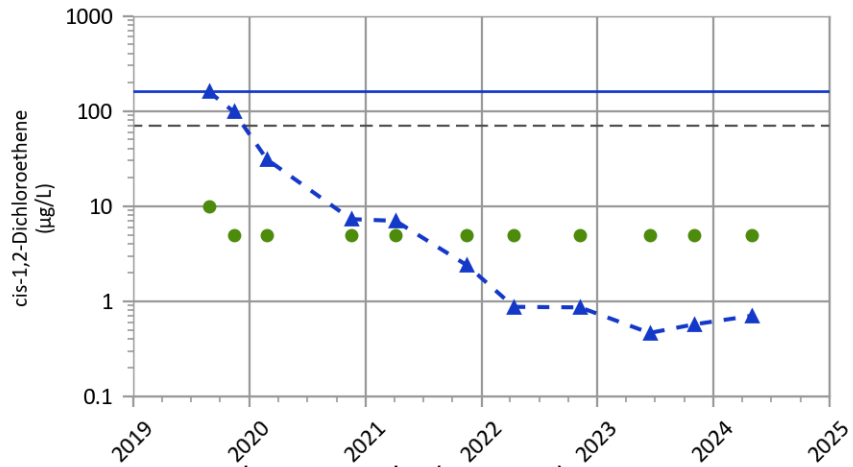
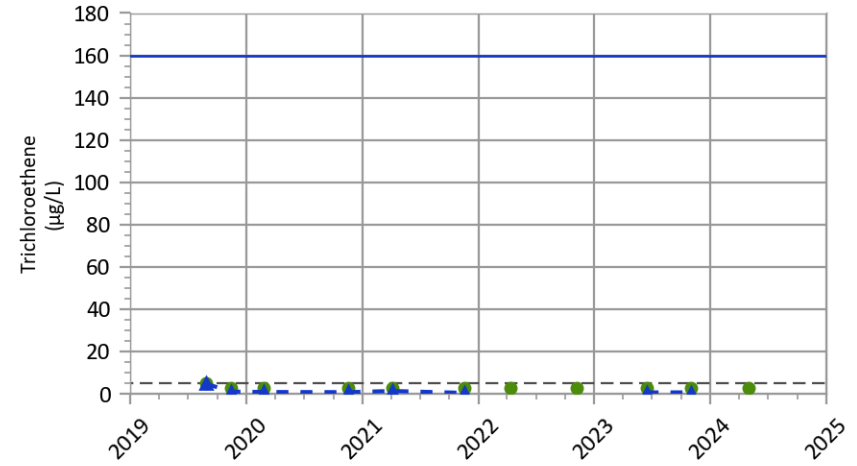
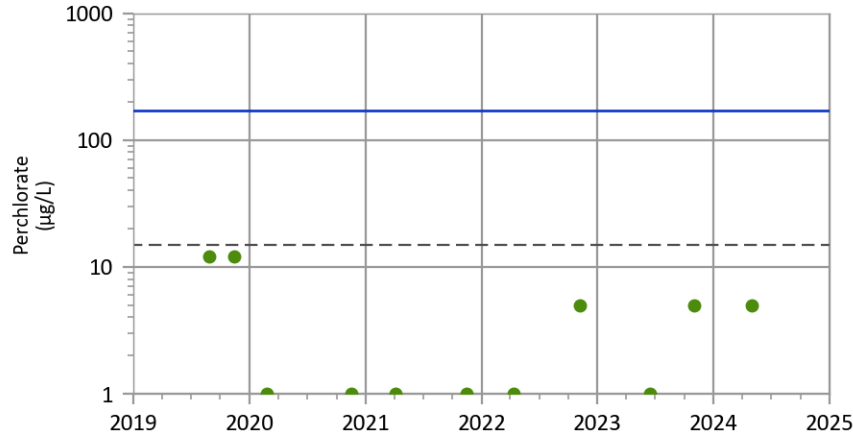
Most Recent Measured COC Concentrations (Apr 30, 2024)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	5.5	70.0
TCE	0.494	5.0
VC	2.25	2.0

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



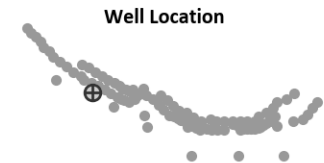
**PTX06-1174 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



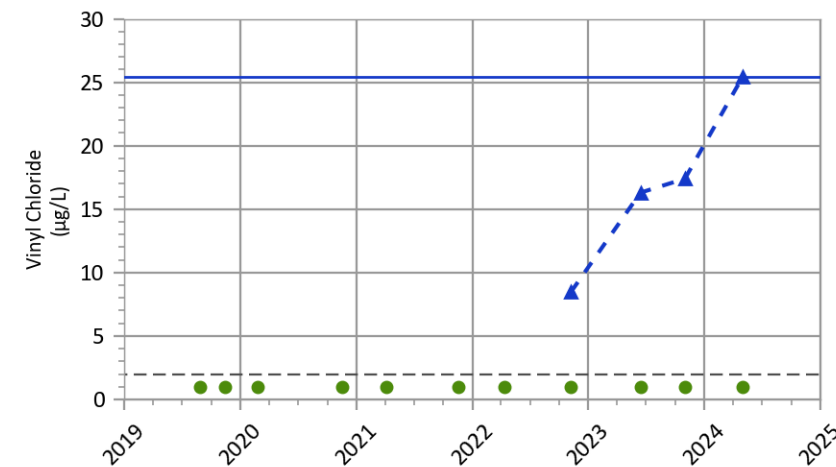
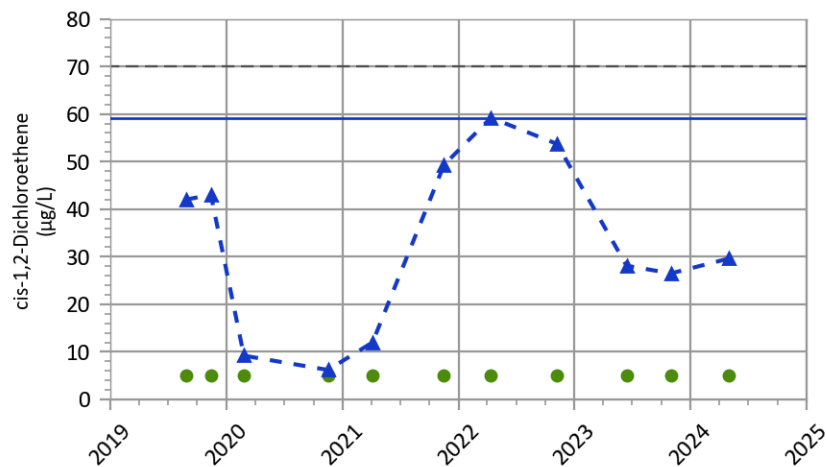
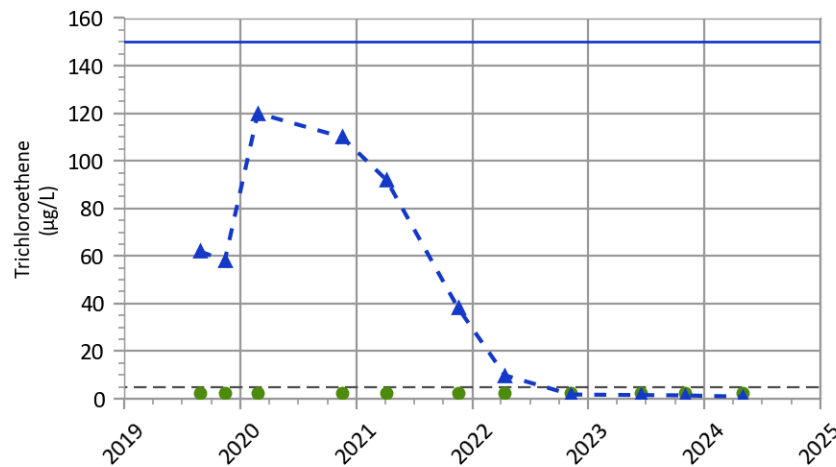
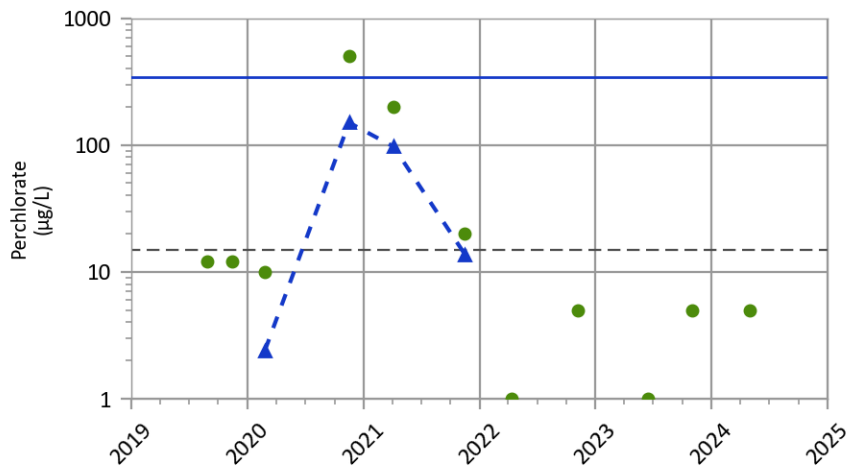
Most Recent Measured COC Concentrations (Nov 16, 2021)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	0.704	70.0
TCE	Non-Detect	5.0
VC	Non-Detect	2.0

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



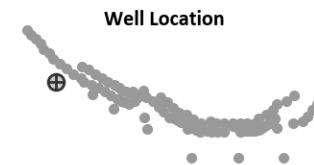
**PTX06-1175 Downgradient Performance Indicators
Zone 11 In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (Apr 30, 2024)

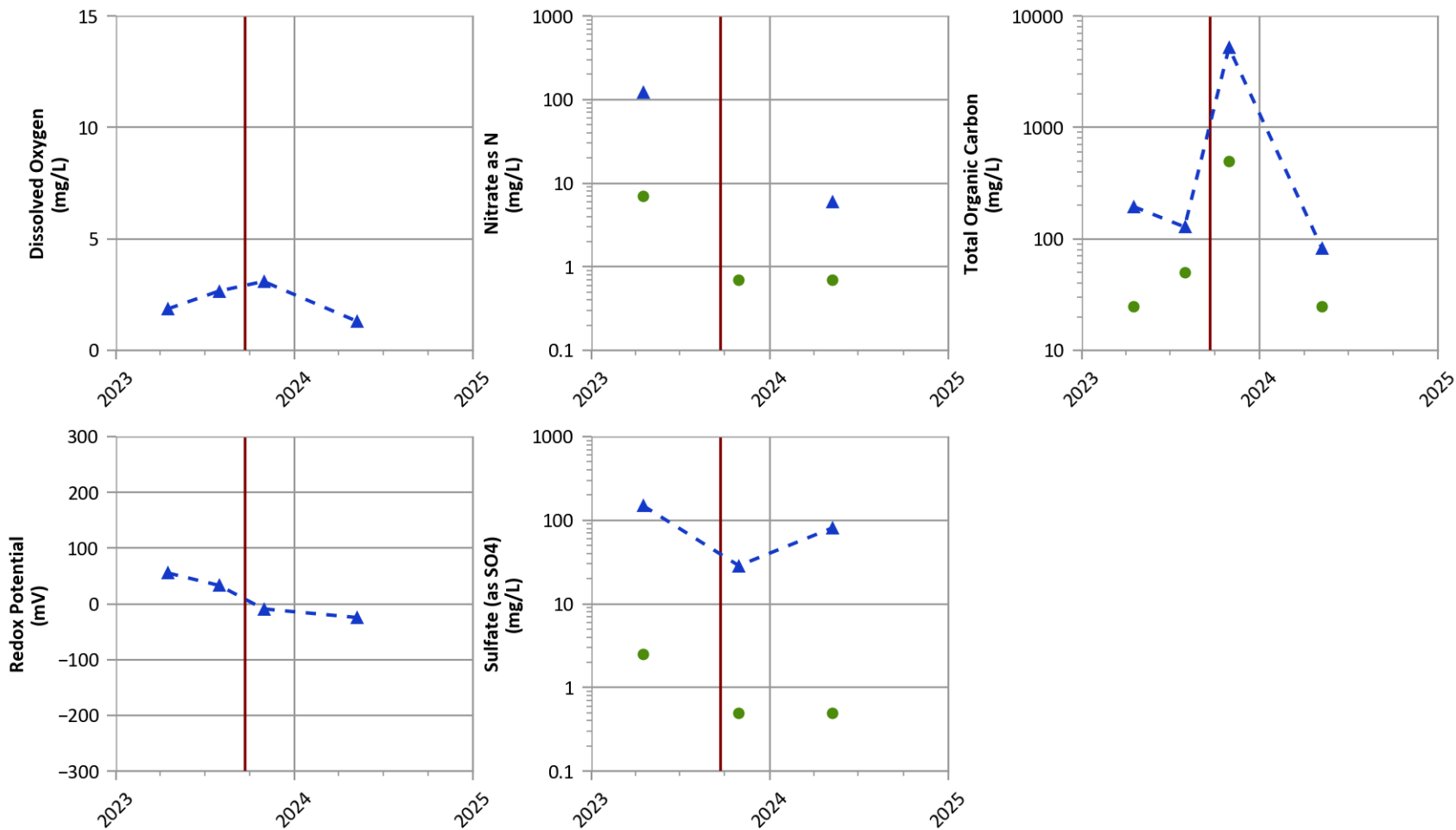
COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	29.6	70.0
TCE	0.859	5.0
VC	25.4	2.0

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



Southeast ISB Extension

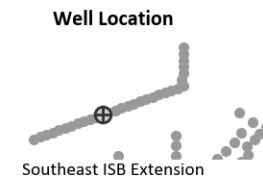
**PTX06-ISB312 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



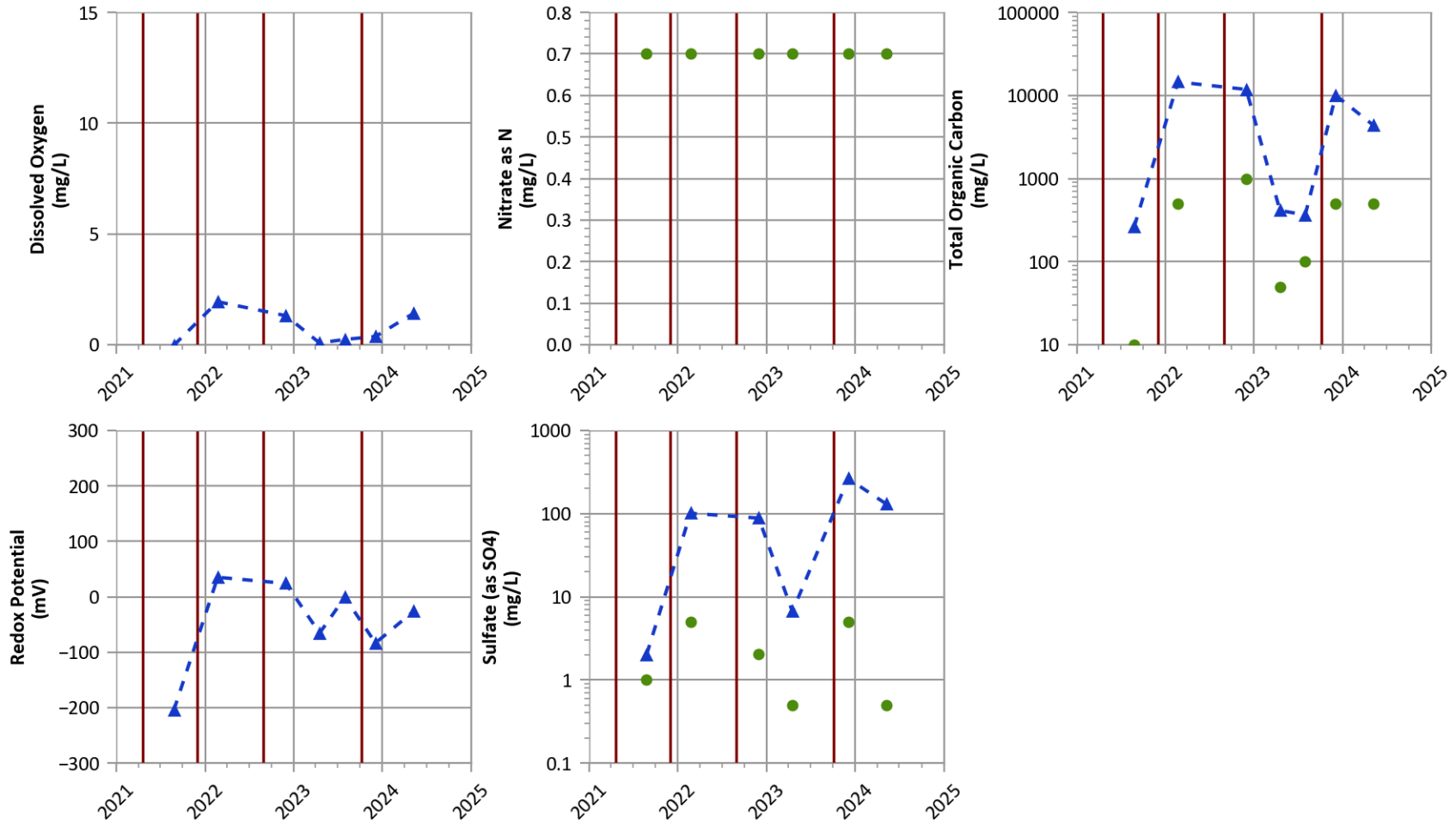
Typical Baseline Concentrations in Perched Groundwater

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



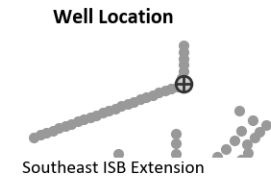
PTX06-ISB325 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



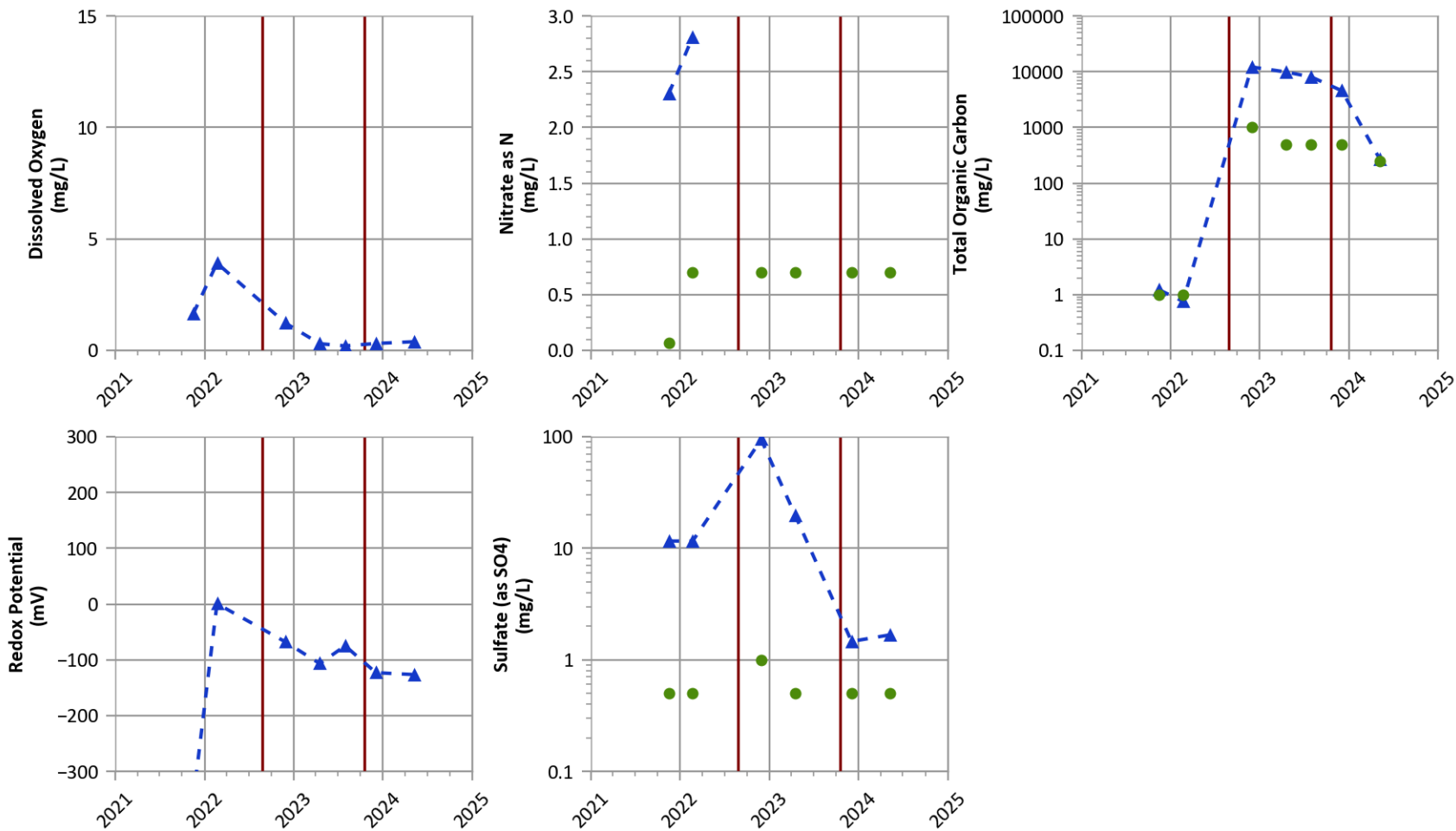
Typical Baseline Concentrations in Perched Groundwater

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



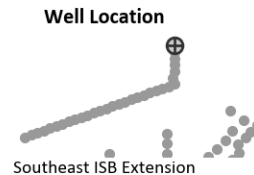
**PTX06-ISB331 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



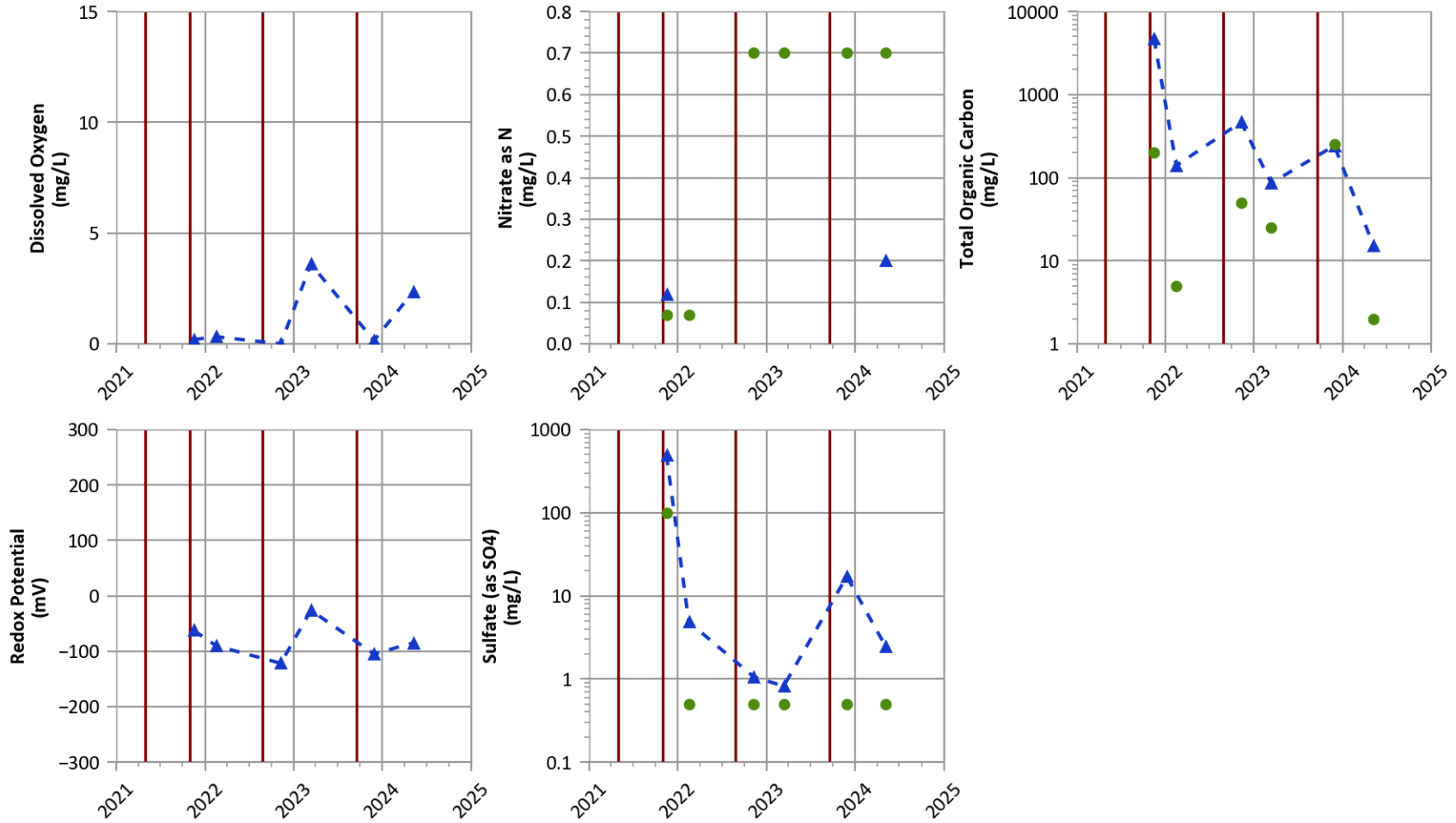
Typical Baseline Concentrations in Perched Groundwater

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

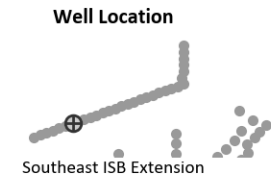


PTX06-1213 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant

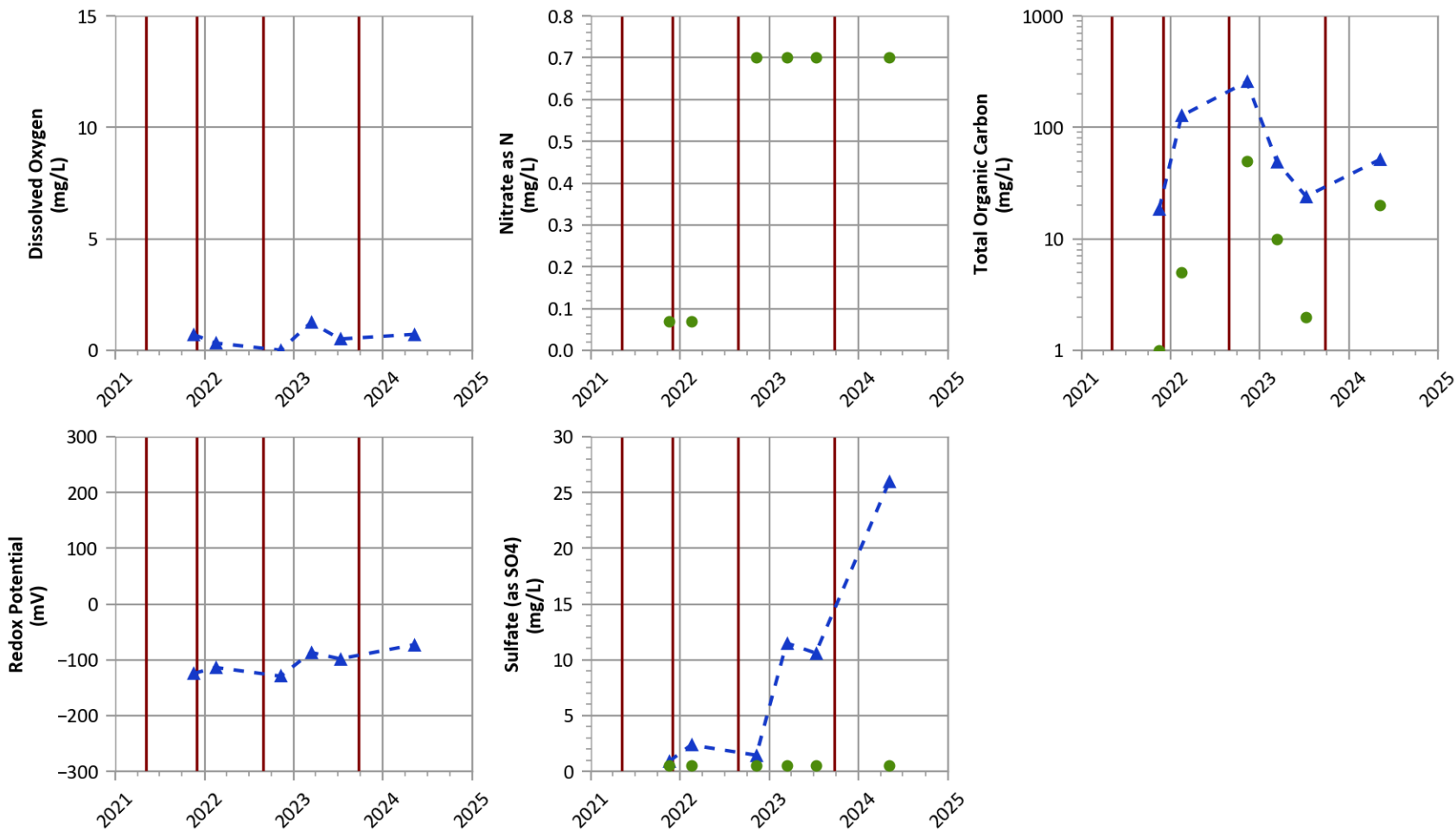


Typical Baseline Concentrations in Perched Groundwater
 Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

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



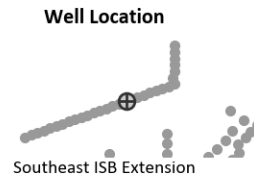
**PTX06-1214 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



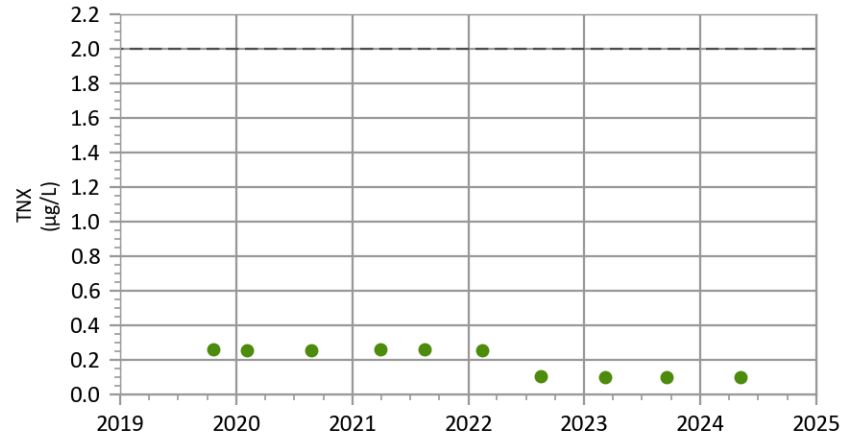
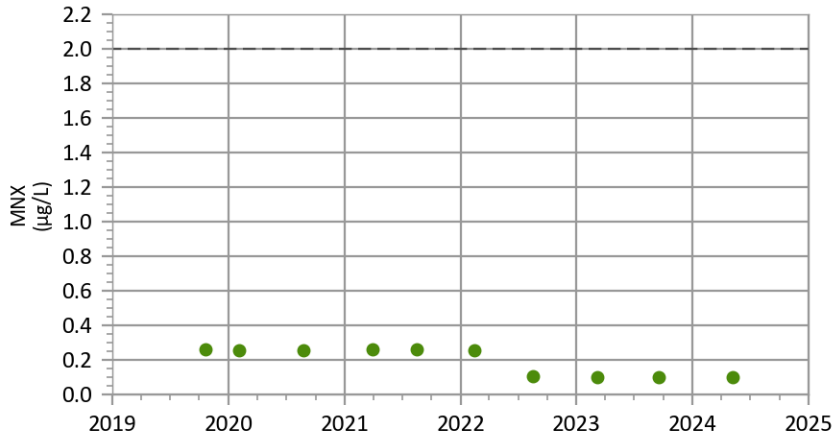
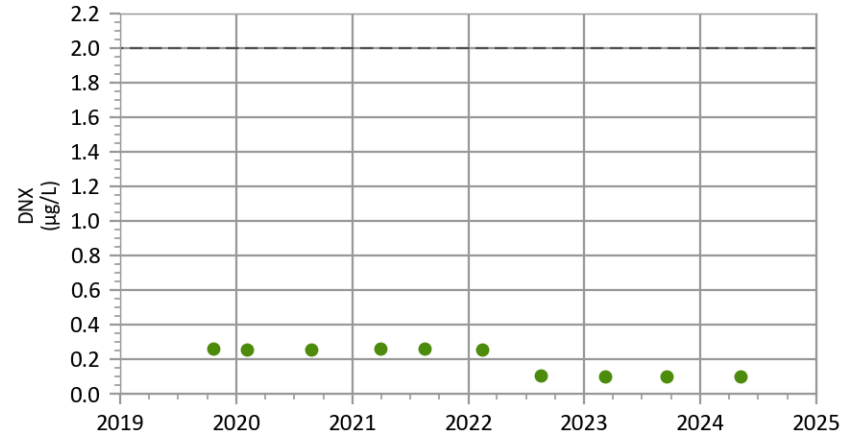
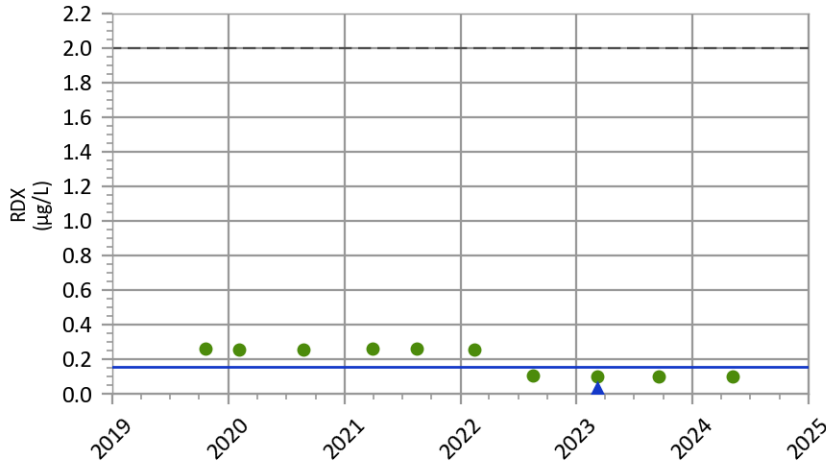
Typical Baseline Concentrations in Perched Groundwater

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



**PTX06-1194 Downgradient Performance Indicators
Southeast Ext In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



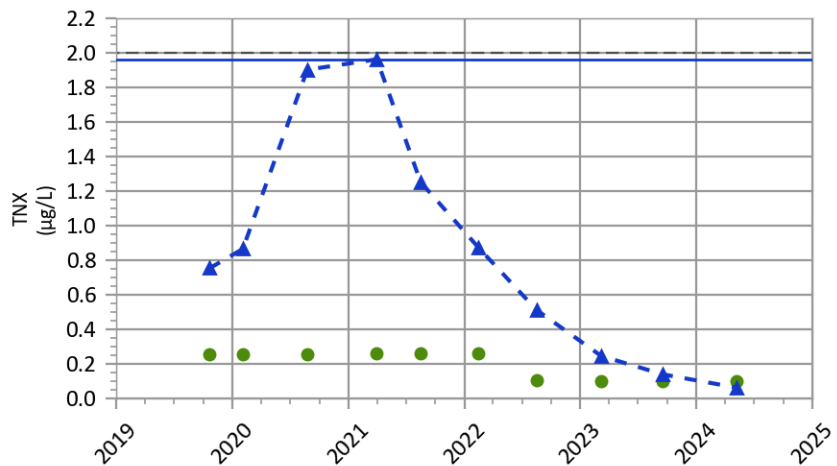
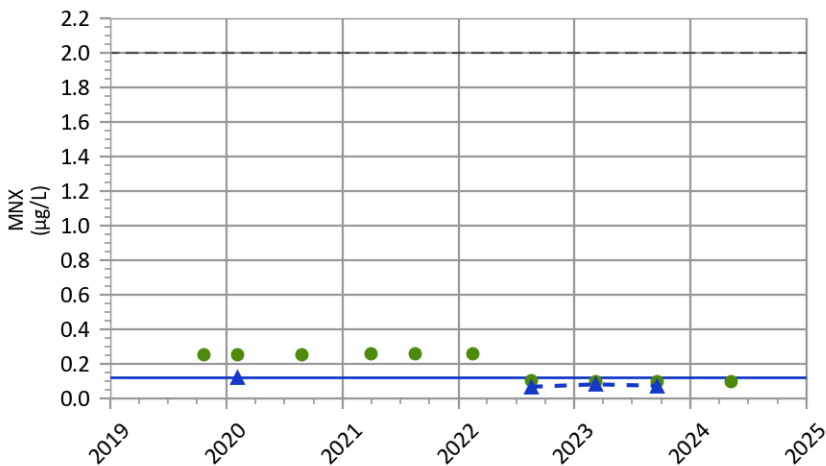
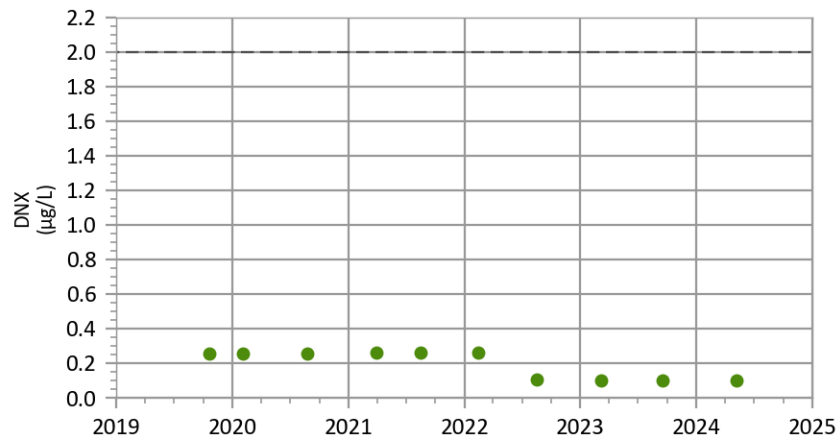
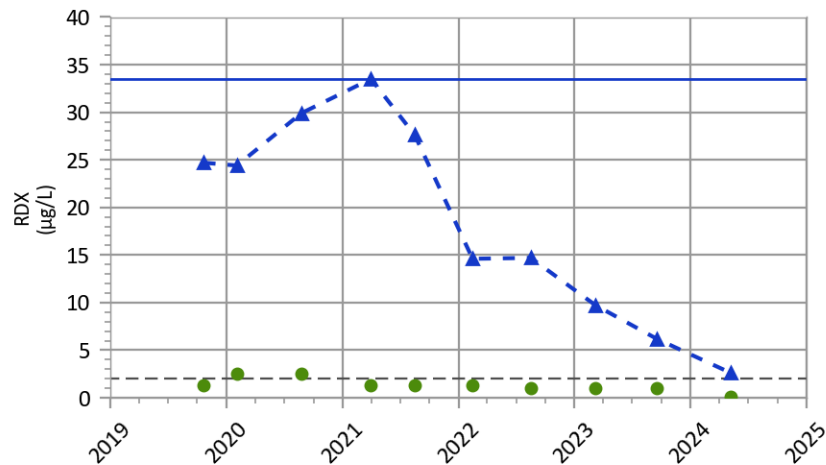
Most Recent Measured COC Concentrations (May 06, 2024)

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

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



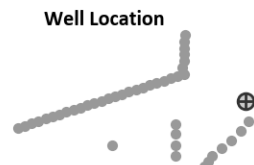
**PTX06-1196 Downgradient Performance Indicators
Southeast Ext In Situ Bioremediation System
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (May 06, 2024)

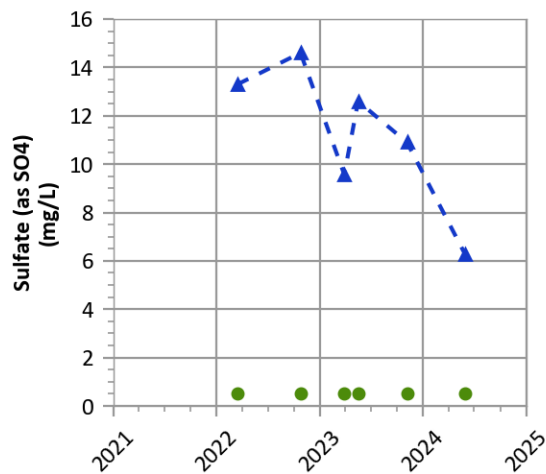
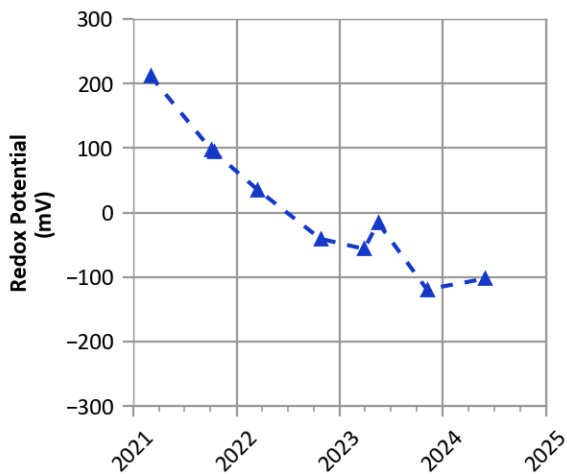
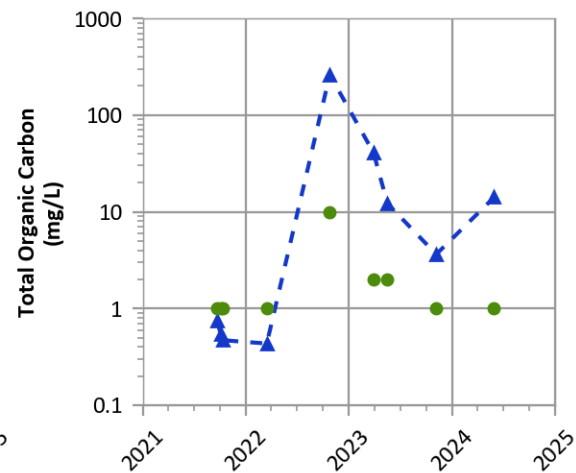
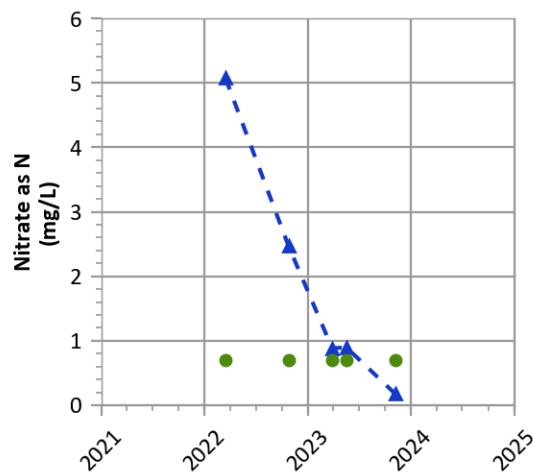
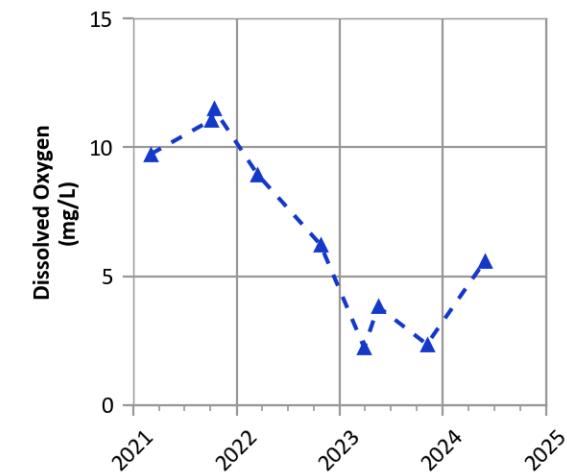
COC	Concentration (µg/L)	GWPS (µg/L)
RDX	2.62	2.0
MNX	Non-Detect	2.0
DNX	Non-Detect	2.0
TNX	0.0629	2.0

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



Offsite ISB

PTX06-REC402 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



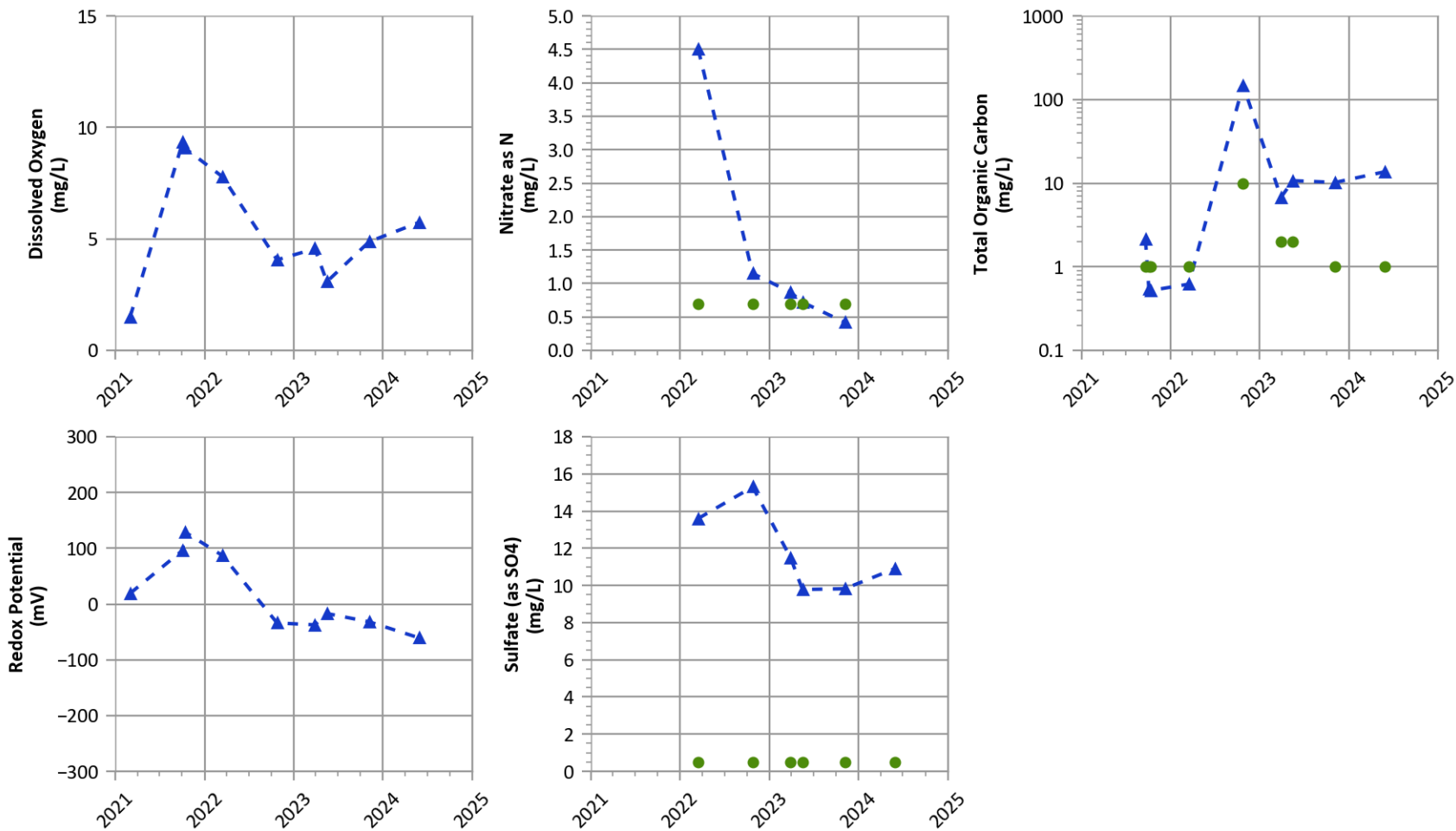
Typical Baseline Concentrations in Perched Groundwater

- 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



**PTX06-REC403 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



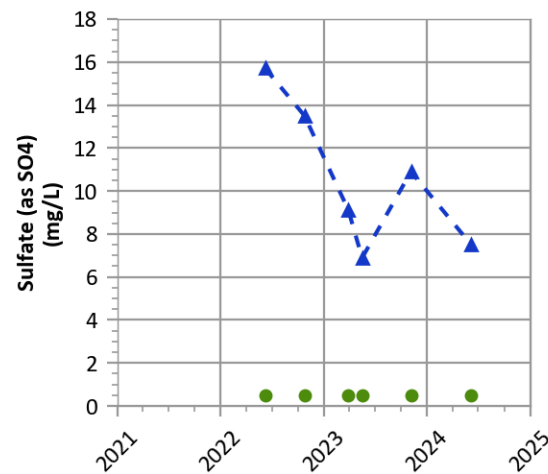
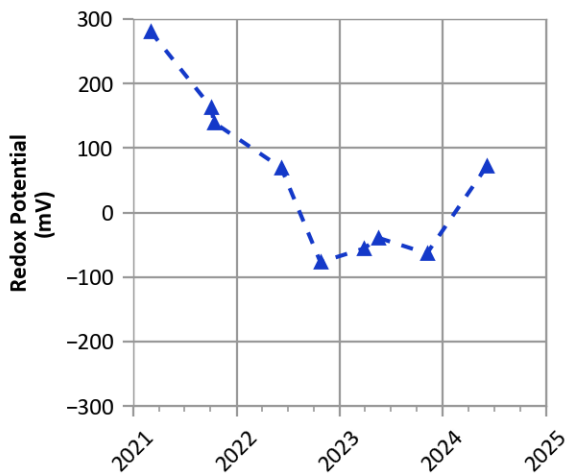
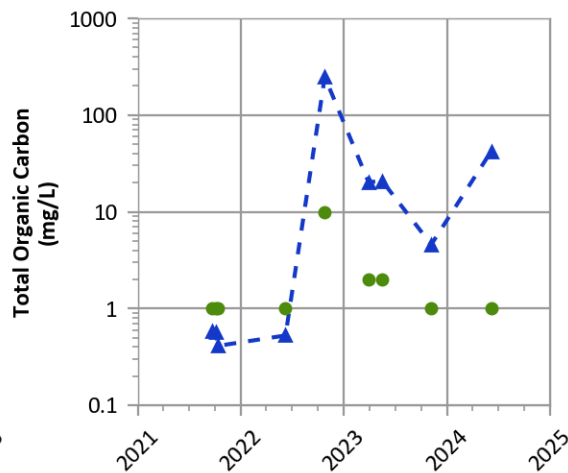
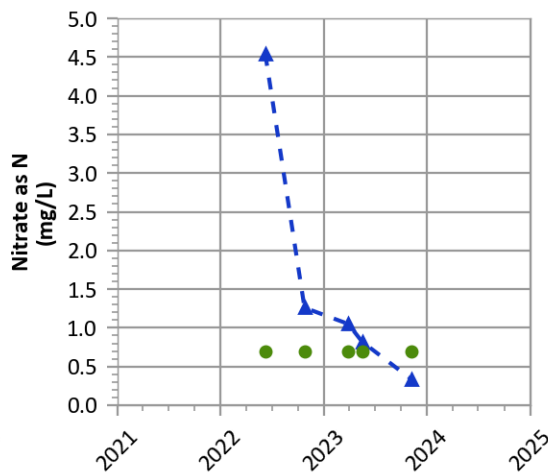
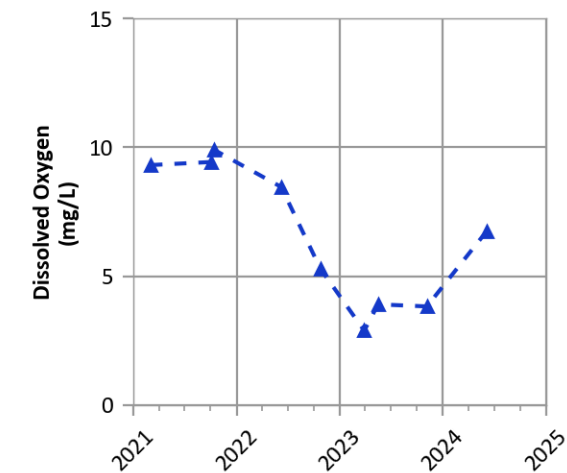
Typical Baseline Concentrations in Perched Groundwater

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



PTX06-REC404 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



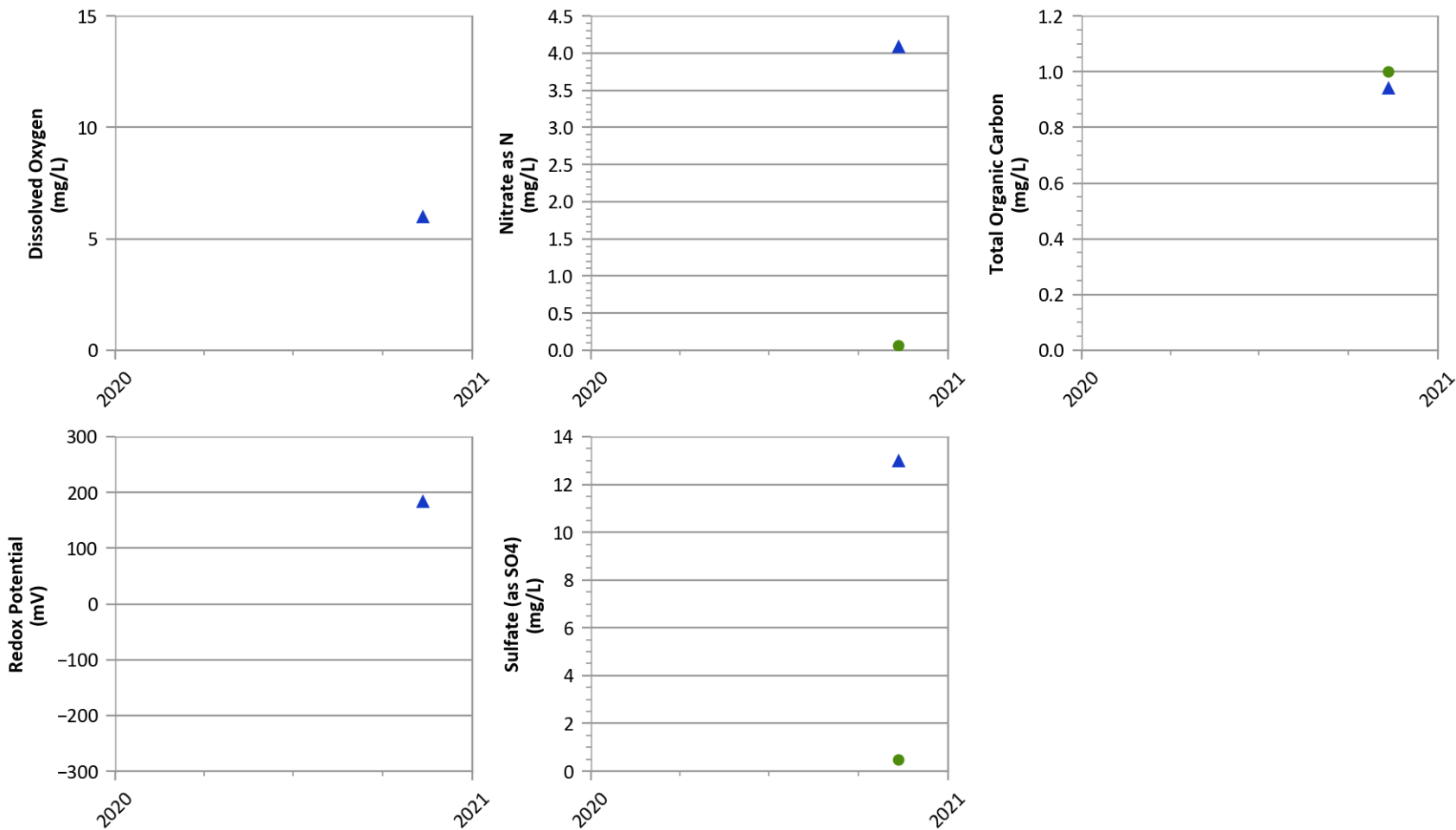
Typical Baseline Concentrations in Perched Groundwater

- 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



**PTX06-REC411 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



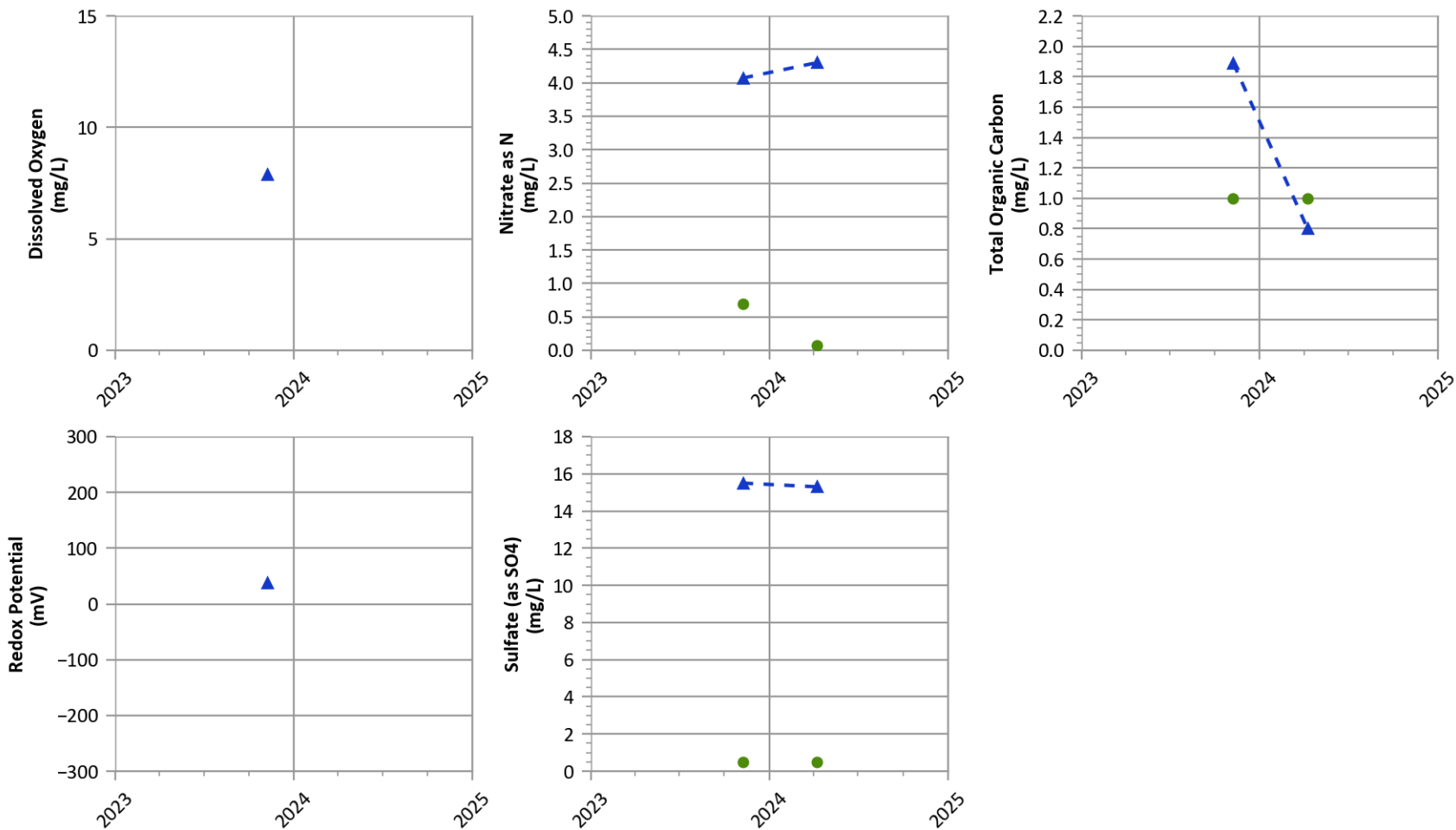
Typical Baseline Concentrations in Perched Groundwater

- 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



PTX06-REC412 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



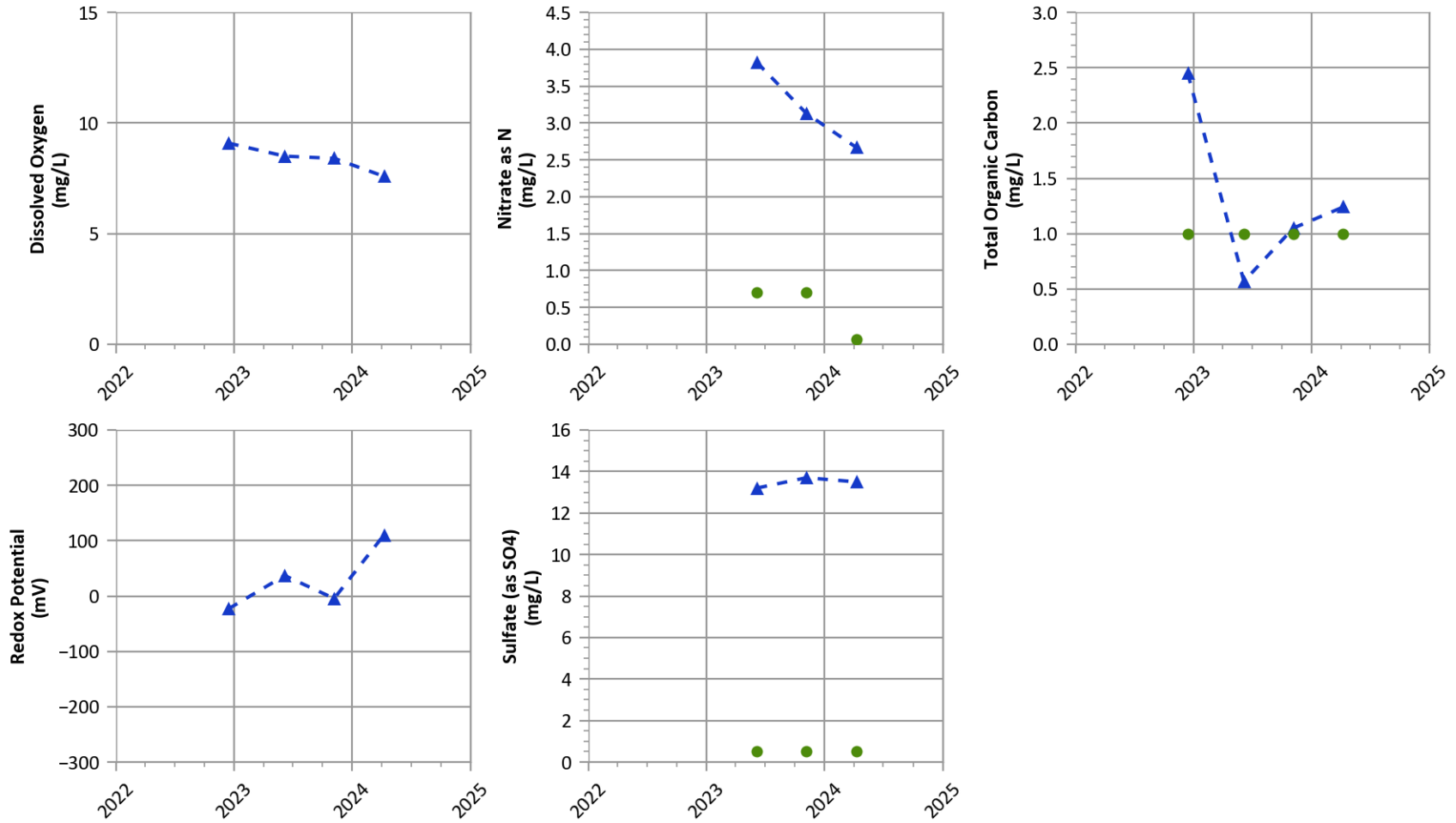
Typical Baseline Concentrations in Perched Groundwater

- 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

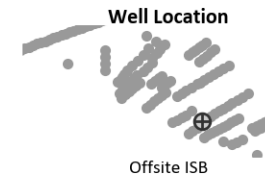


**PTX06-REC416 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**

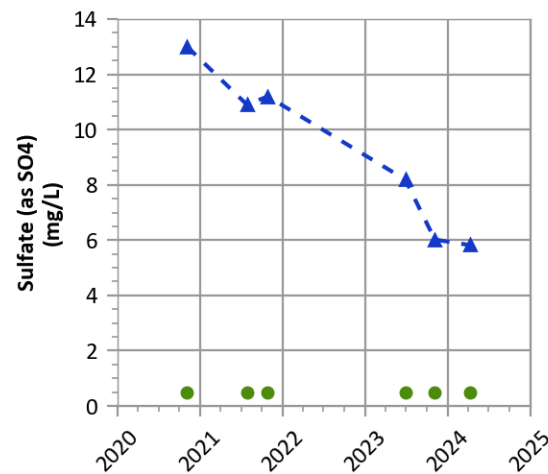
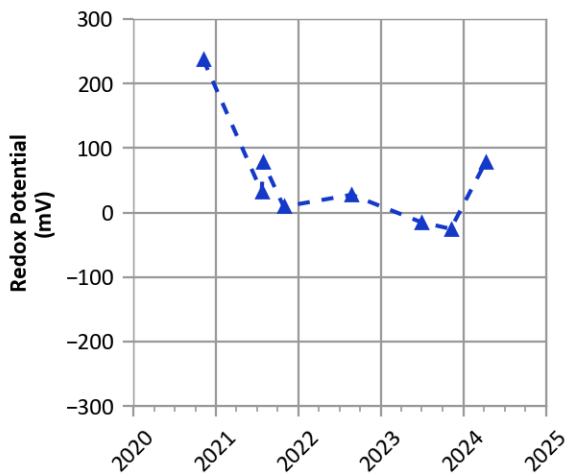
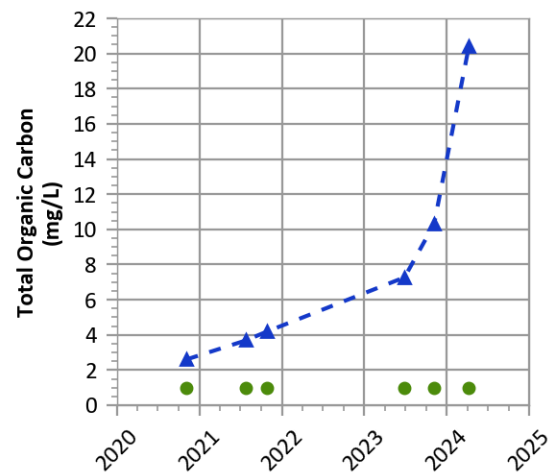
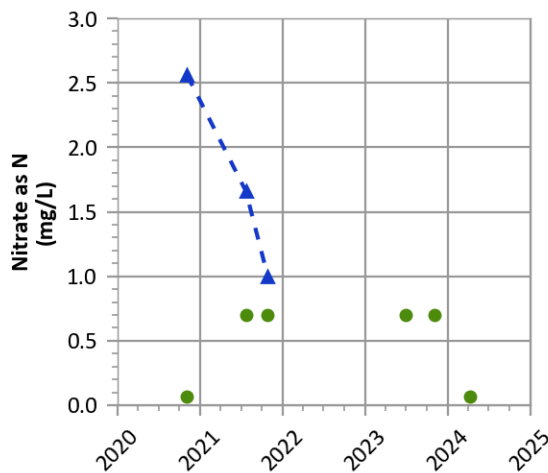
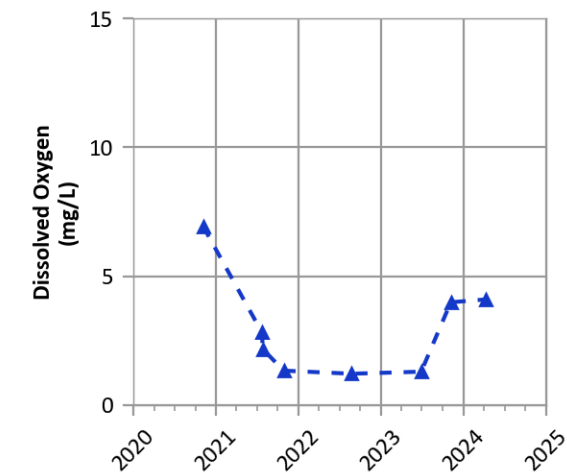


Typical Baseline Concentrations in Perched Groundwater
 Dissolved Oxygen: 5-10 mg/L
 Redox Potential: > 100 mV
 Nitrate: > 1 mg/L
 Sulfate: > 10 mg/L
 Total Organic Carbon: < 5 mg/L
 Total Volatile Fatty Acids: Not Detected

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



PTX06-MEW402 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



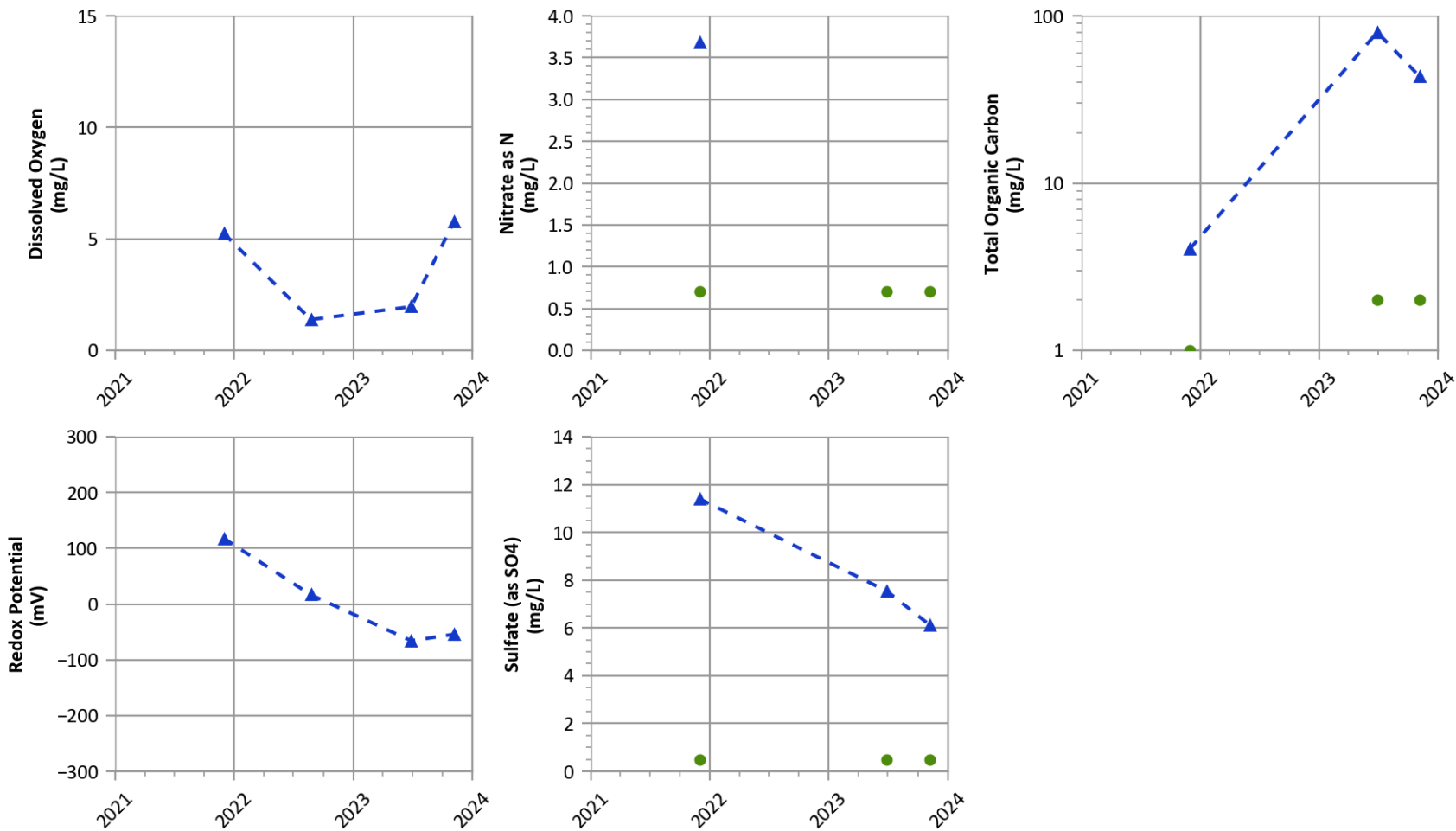
Typical Baseline Concentrations in Perched Groundwater

- 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



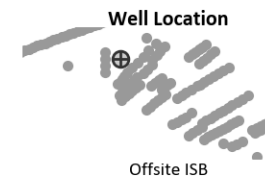
PTX06-MEW405 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant



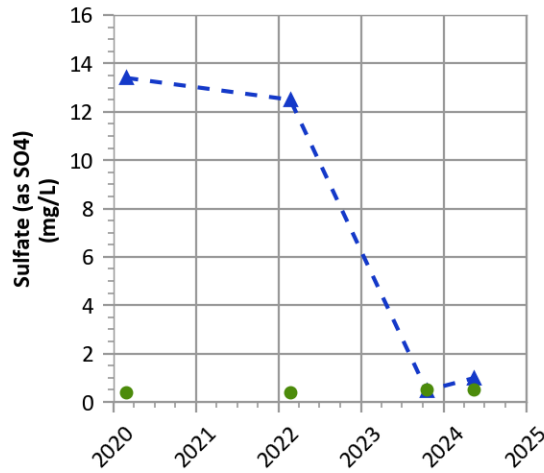
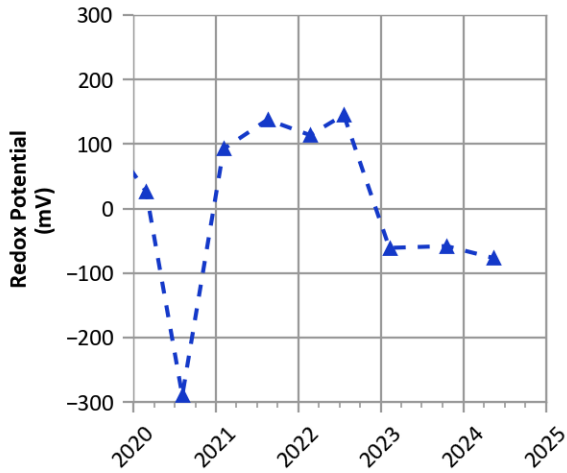
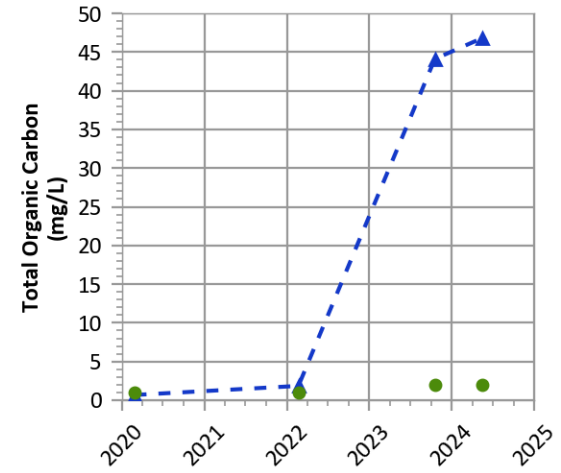
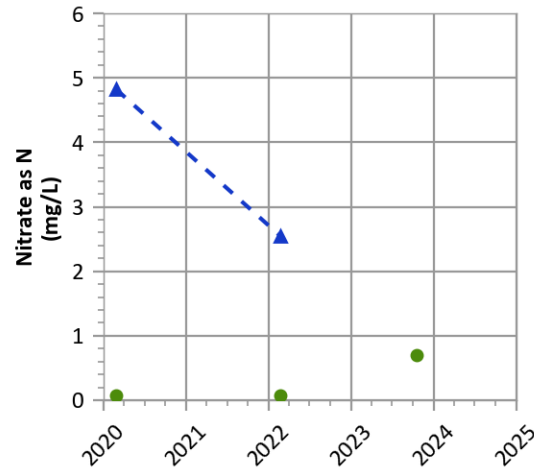
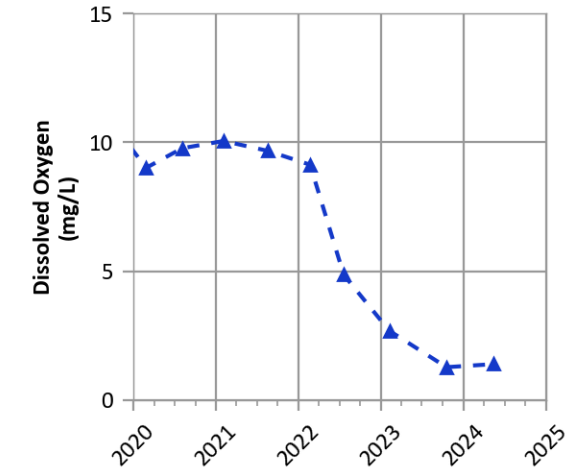
Typical Baseline Concentrations in Perched Groundwater

- 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



**PTX06-1197 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



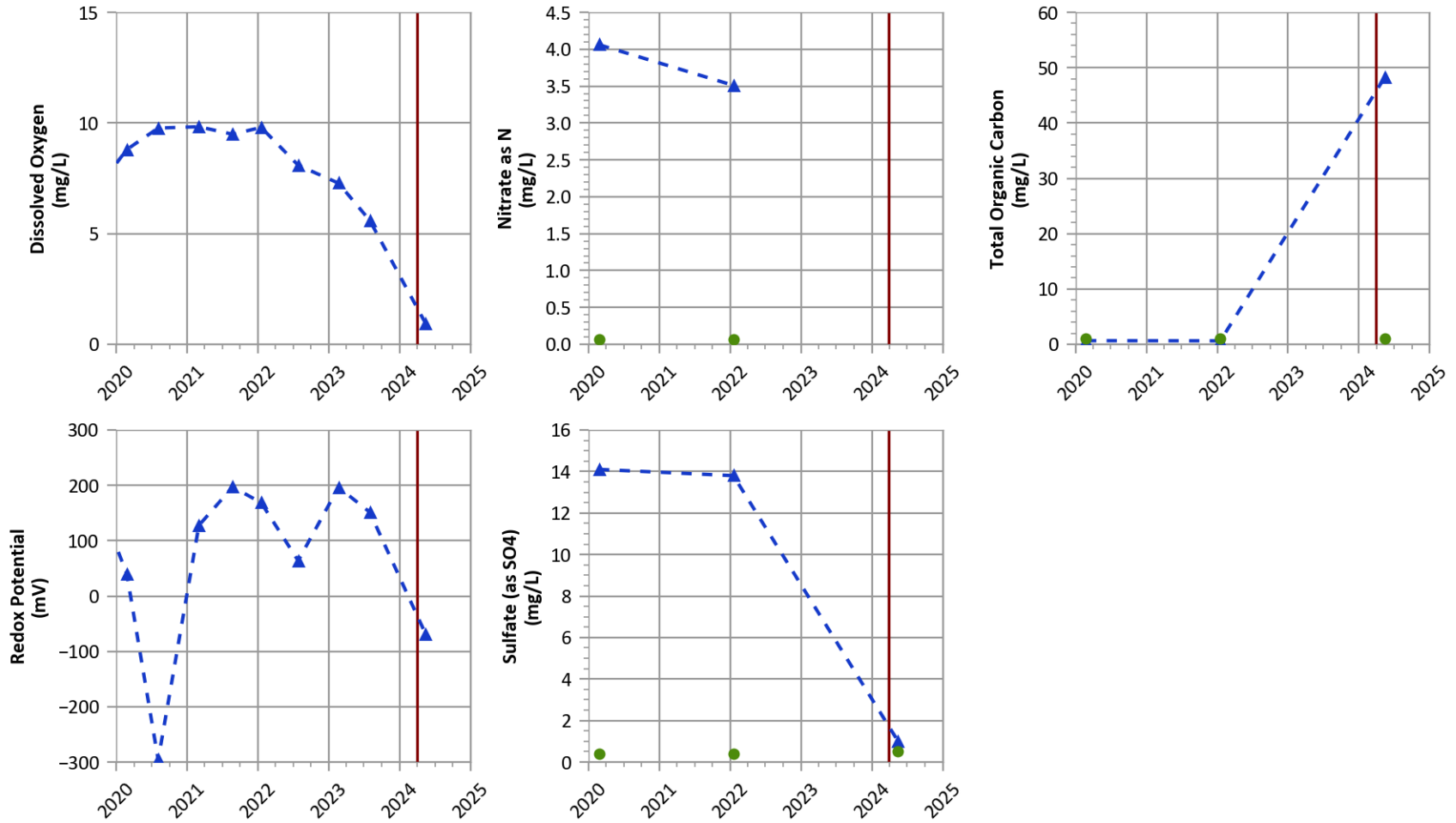
Typical Baseline Concentrations in Perched Groundwater

- 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



**PTX06-1203 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



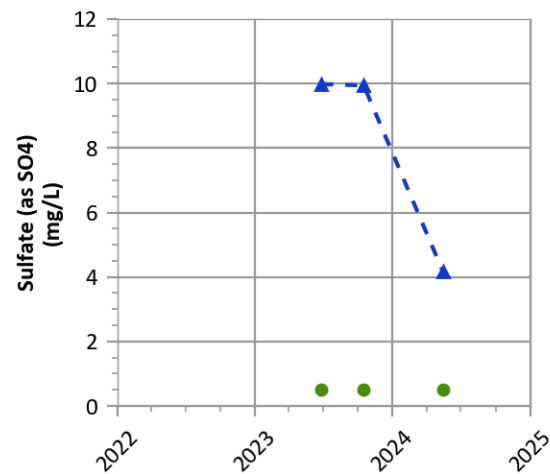
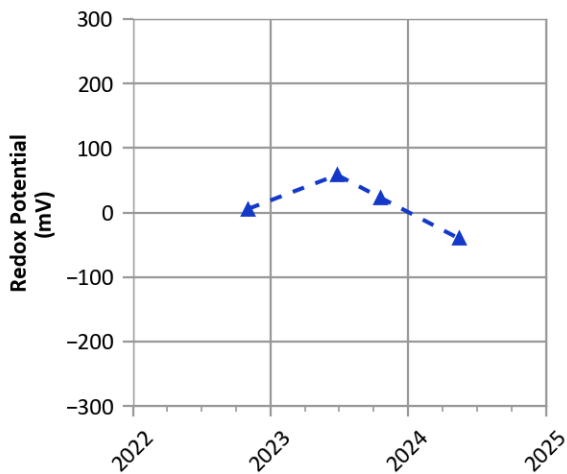
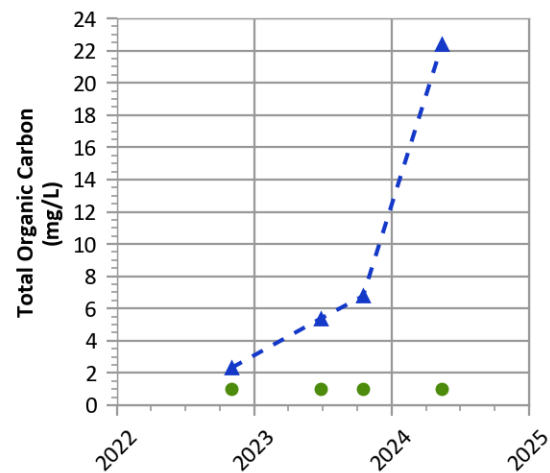
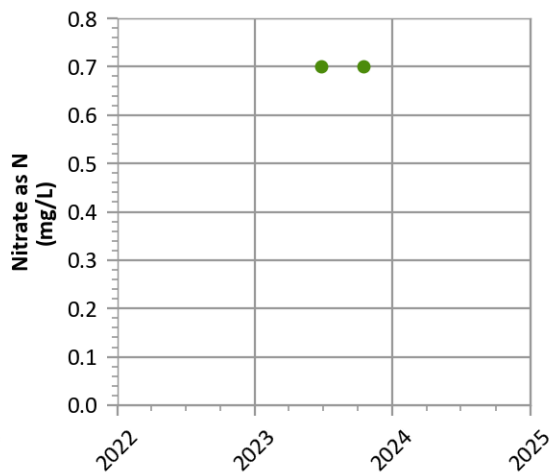
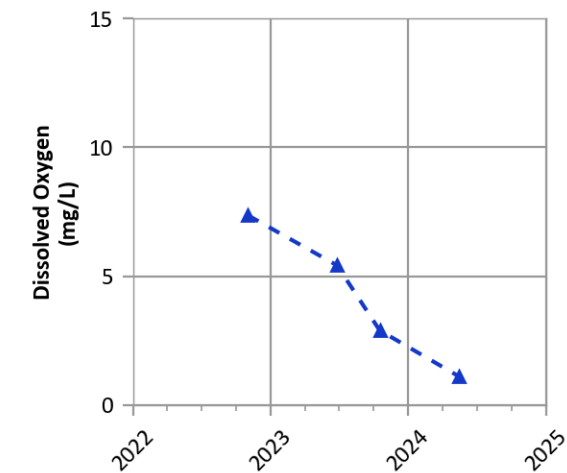
Typical Baseline Concentrations in Perched Groundwater

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



**PTX06-1218 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



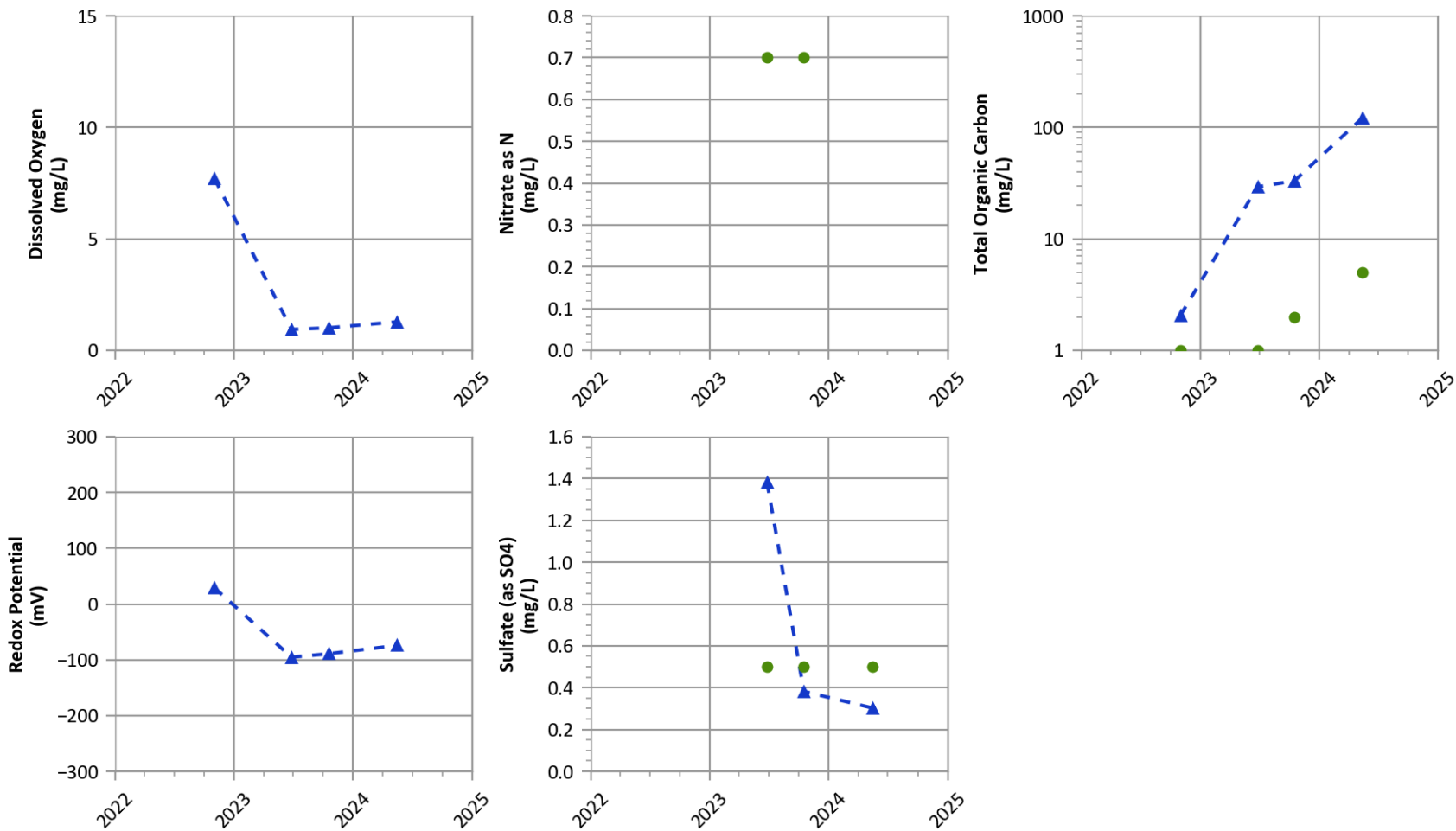
Typical Baseline Concentrations in Perched Groundwater

- 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



**PTX06-1219 Treatment Zone Performance Indicators
USDOE/NNSA Pantex Plant**



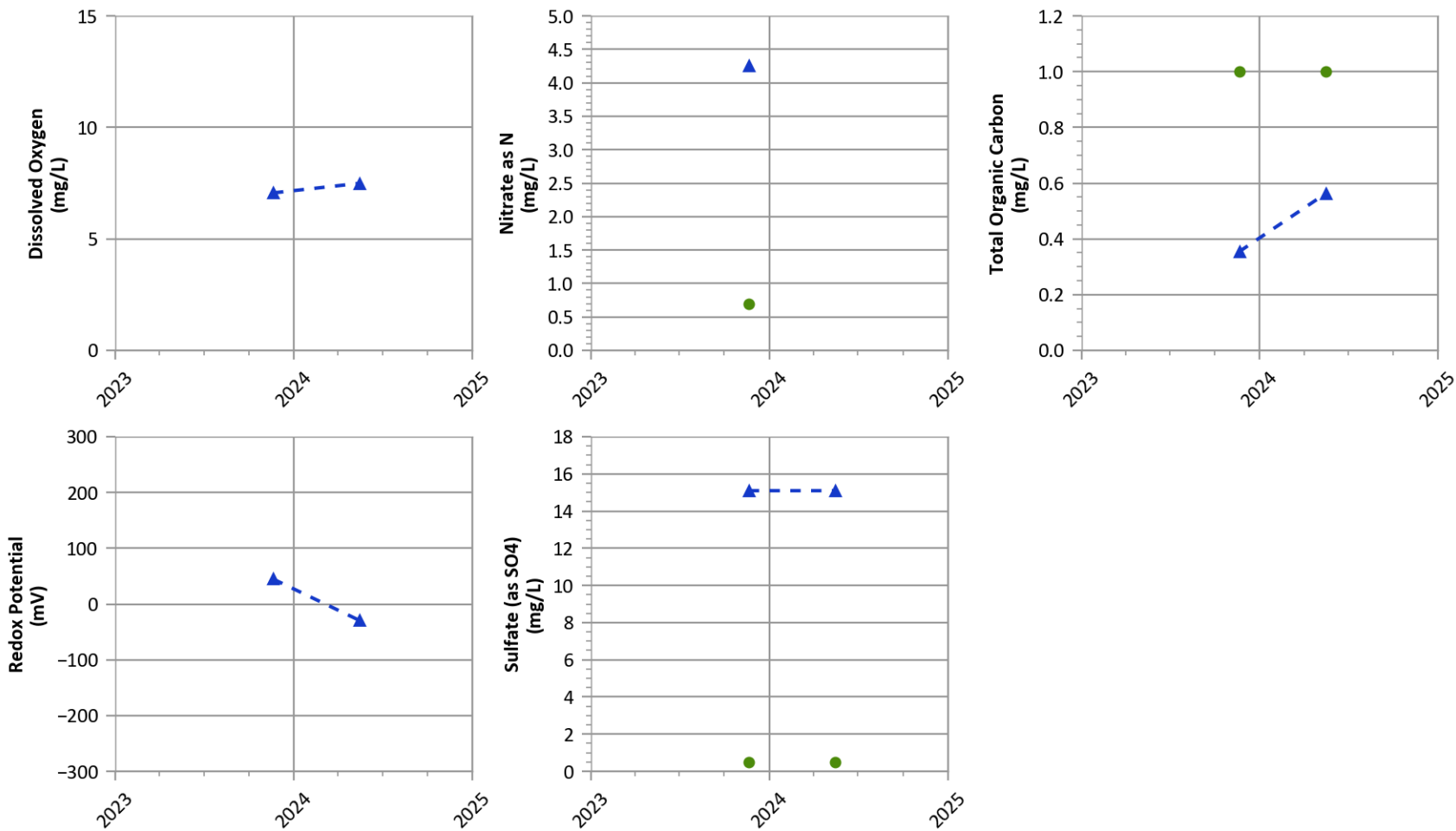
Typical Baseline Concentrations in Perched Groundwater

- 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



**PTX06-1221 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

