



# PANTEX QUARTERLY PROGRESS REPORT

## Remedial Action Progress

### First Quarter 2023

In support of Hazardous Waste Permit #50284 and  
Pantex Plant Interagency Agreement  
June 2023

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

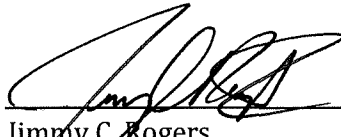




CERTIFICATION STATEMENT

First Quarter 2023 Remedial Action Progress Report  
Pantex Plant, June 2023

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.



Jimmy C. Rogers  
Senior Director, Environment, Safety and Health  
Consolidated Nuclear Security, LLC

6/19/23

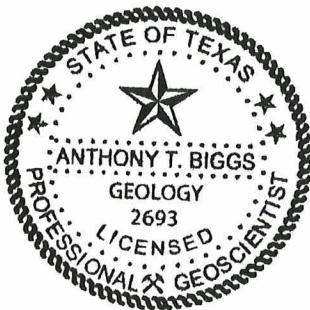
Date




**Remedial Action Progress Report  
First Quarter 2023  
in Support of Hazardous Waste Permit #50284  
and Pantex Plant Interagency Agreement  
for the Pantex Plant, Amarillo, Texas  
June 2023**

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

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



  
\_\_\_\_\_  
Tony Biggs  
Licensed Professional Geologist No. 2693  
Environmental Projects  
Consolidated Nuclear Security, LLC

  
\_\_\_\_\_  
Date

Project Team: Tony Biggs  
Dr. Maeghan Brundrett  
Michelle Jarrett



## LIST OF ACRONYMS

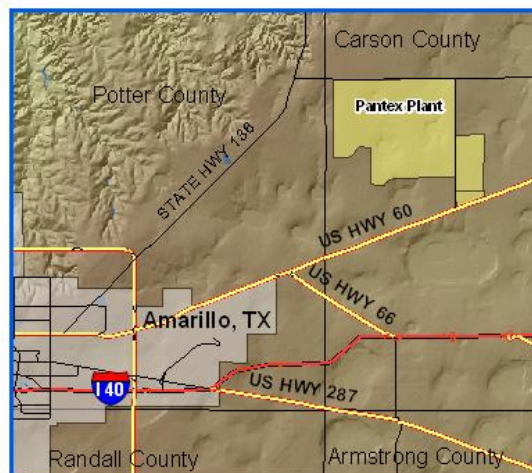
µg/L	micrograms per liter
CatOx	catalytic oxidation
COC	contaminant of concern
CP	Compliance Plan
Cr(VI)	hexavalent chromium
DCE	dichloroethene
DNT4A	4-amino-2,6-dinitrotoluene
EVO	emulsified vegetable oil
FGZ	fine-grained zone
GWPS	groundwater protection standard
HE	high explosive
ISB	<i>in situ</i> bioremediation
ISPM	<i>in situ</i> performance monitoring
Lbs	pounds
MEW	mobile extraction wells
Mgal	million gallons
mV	millivolts
NAPL	non-aqueous phase liquid
ORP	oxidation-reduction potential
P1PTS	Playa 1 Pump and Treat System
ppmv	parts per million by volume
PQL	practical quantitation limit
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
REC	recirculation extraction well
SAP	Sampling and Analysis Plan
scfm	standard cubic feet per minute
SE ISB	Southeast <i>In Situ</i> Bioremediation system
SE ISB EXT	Southeast <i>In Situ</i> Bioremediation Extension system
SEPTS	Southeast Pump and Treat System
SVE	soil vapor extraction
TAC	Texas Administrative Code
TCE	trichloroethene
TZM	treatment zone monitoring
VOC	volatile organic compound
WWTF	wastewater treatment facility
Z11 ISB	Zone 11 <i>In Situ</i> Bioremediation system





## 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 has been installed to remediate volatile organic compounds (VOCs) in soils at the Burning Ground area. This quarterly report addresses progress achieved through implementation of the remedial actions for first quarter of 2023.



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

## PUMP AND TREAT SYSTEMS

The groundwater remedial action at the Pantex Plant includes two pump and treat systems: Southeast Pump and Treat System (SEPTS) and Playa 1 Pump and Treat System (P1PTS). The pump and treat systems are designed to extract water and remove contaminant mass from the water before the effluent is beneficially used for irrigation, general Plant needs, or for amendment injections at the ISB systems. The systems were also designed to remove water from the perched aquifer to reduce saturated thickness. This reduction in saturated thickness reduces migration of contaminants both vertically and horizontally so that natural breakdown processes can occur over time. Reducing migration provides protection for the underlying High Plains Aquifer (also known as and referred to herein as the Ogallala Aquifer). SEPTS has the capability to inject the treated water back into the perched aquifer when beneficial use is not possible. Operational priorities for the pump and treat systems emphasize beneficial use of water.

The subsurface drip irrigation system filter bank break that occurred in late June 2017 continued to impact operations of SEPTS and P1PTS during the first quarter of 2023. Due to the severity of the break, an engineering evaluation, contracting, and major repairs were required to restore the irrigation system. Repairs to the filter bank were completed in May 2019 and after completion of startup testing and repairs on the communication systems, a portion of the system became operational in March 2022. However, in April 2022, the communication interface on the system failed. System repairs were completed and the system became operationally available in late September 2022. However, a mishap with a bird caused an electrical failure of the system in early December 2022. The system is currently under repair. Operation of the subsurface system is also currently 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 Texas Commission on Environmental Quality 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.

Current and future operations of both pump and treat systems will be impaired by the permit-restricted flow to Playa 1 until the subsurface drip and/or new center pivot irrigation systems are fully operational. The SEPTS system has operated at a higher capacity using injection, release to

### Pump and Treat System First Quarter 2023 Operation

#### *Playa 1 Pump and Treat System (P1PTS)*

Days Operated	0
% Operation Time	0%
Volume Water Treated (Mgal)	0
HE Mass Removal (lbs)	0
Beneficial Use of Water	0%

#### *Southeast Pump and Treat System (SEPTS)*

Days Operated	86
% Operation Time	92%
Volume Water Treated (Mgal)	29.5
HE Mass Removal (lbs)	104.9
Chromium Mass Removal (lbs)	11.8
Perchlorate Mass Removal (lbs)	7.6
Beneficial Use of Water	0%

\*Value below operational goals

Playa 1, and scheduled shutdowns of P1PTS. Reduction of operational time at P1PTS allows SEPTS to operate at a greater capacity and support capture of water along the FM 2373 fence line, at wells east of FM 2373, and at the highest plume concentrations to the south on Texas Tech property. When P1PTS is operational, SEPTS is operated at a lower capacity to meet permit requirements. However, P1PTS was shut down at the end of April 2022 to construct the connection to the new center pivot irrigation system east of FM 2373. The system remained down during the first quarter. The connection to the pivot system is expected to be complete in summer 2023, allowing P1PTS to begin operation.

Graphs of monthly operation and throughput are included in Appendix B. The SEPTS wellfield had four wells that required repair during the first quarter due to electrical and equipment issues. Pantex has issued a contract to address the problems, and most wells will be operational by summer of 2023.

SEPTS treated about 30 million gallons (Mgal) during the first quarter. Almost 70% of the treated water was released to Playa 1, with the remaining 30% injected into one of SEPTS injection wells (PTX06-INJ10). SEPTS primarily treats RDX and hexavalent chromium [Cr(VI)]. Figure 1 provides SEPTS mass removal information for RDX, other high explosives (HEs), perchlorate, and Cr(VI) for the first quarter, as well as totals since system startup.

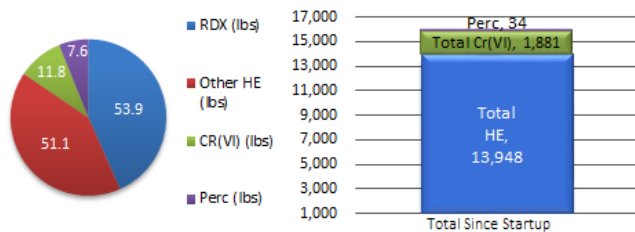


Figure 1. SEPTS Mass Removal

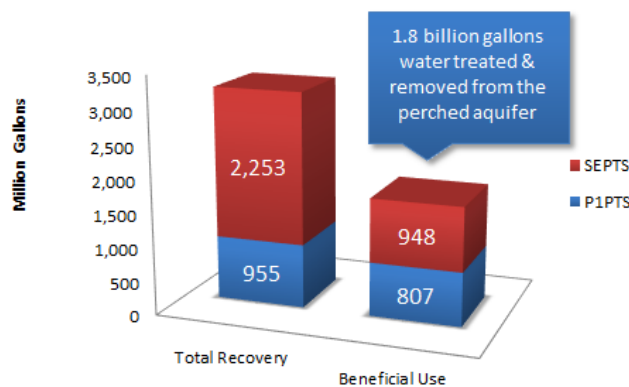


Figure 2. System Recovery and Use

P1PTS was not operated during the first quarter, but had previously removed over 770 pounds (lbs) of high explosives (HEs). Overall, the systems have removed over 16,500 lbs of HEs and chromium contaminants from perched groundwater since operations began.

The total recovery and treatment from both systems since startup has been calculated at about 3.2 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 irrigation system. The recovery and beneficial use totals are presented in Figure 2. Currently, the systems are releasing water to the WWTF and then to Playa 1 or to SEPTS injection wells, so there was no beneficial reuse in the first quarter.

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

Pantex is currently installing an irrigation alternative on the property east of FM 2373 to provide additional long-term use of the treatment system water. Funding was requested in fiscal year 2021 to design and construct infrastructure for irrigation of land east of FM 2373 using five center pivot sprinklers. The design of the new irrigation system was completed in May 2021 and a new construction contract was awarded in August 2021. Construction on the system began in November 2021 and is expected to be operational in the summer of 2023. The first irrigated crops are expected to be planted for the fall 2023 growing season.

Pantex also identified funding to design and construct three new perched injection wells to the east of Playa 2; northwest of the Zone 11 ISB System. Construction of the injection wells and infrastructure was completed in February 2022 and operation of the system began in March 2023. The Playa 2 injection wells will provide a consistent outlet for a portion of the treated water from SEPTS when irrigation is not an available method for beneficial use of the treated water. These wells will also provide a method to inject the treated water without affecting movement and capture of plumes in the southeast area.

## ISB SYSTEMS

Four ISB systems (Zone 11 ISB, Southeast ISB, Southeast ISB Extension, and Offsite ISB) were operating at Pantex during the first quarter of 2023. 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, sulfate, 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 3 presents the redox ranges for the reduction of various COCs. Dissolved 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

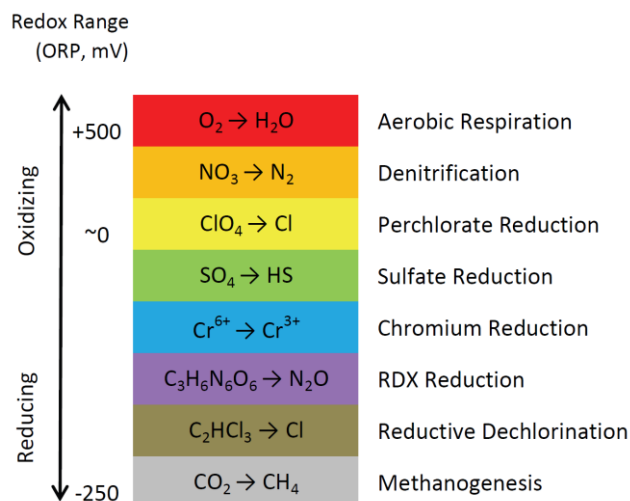


Figure 3. Redox Range for COCs

requiring amendment injection. At this time, sulfate is not used as an indicator of reducing conditions, due to potential addition of high level of sulfates in the treatment zone from molasses used during injections.

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 a system’s data is not always available for quarterly evaluation, only new and complete data sets for each system will be assessed during the current quarter. In the 1st quarter, the Southeast ISB system was sampled completely. Table 1 summarizes the injection activities for 2023. Well maintenance activities were started at the Zone 11 ISB and completed at the Offsite ISB in the first quarter to prepare wells for injection events scheduled in late spring and summer 2023.

Table 1. ISB Systems Activities

Month (2023)	SE ISB EXT	SE ISB	Z11 ISB	Offsite ISB <sup>1</sup>
January				
February		Sample		Maintenance
March	Sample	Sample	Maintenance	Injection
April	Sample		Sample	Injection
May			Sample/Injection	Sample/Injection
June			Injection	Sample/Injection
July	Sample/Maintenance		Injection	
August	Injection	Sample	Injection	Maintenance
September	Injection	Sample	Injection	Injection
October				Sample/Injection
November	Sample		Sample	Sample/Injection
December			Sample	

<sup>1</sup>All sampled wells in the Offsite ISB are extraction wells (REC) and (MEW) and 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.

Five injection wells and four downgradient ISPM wells were sampled at Southeast ISB in the first quarter. Two ISPM wells (PTX06-1118 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 four of five ISB wells. Mild reducing conditions were observed at PTX06-ISB042, a second row well, indicating that treatment may not be effective at that location. All five 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.

### **BURNING GROUND SVE**

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

The system did not operate during the first quarter of 2023. The SVE was shut down in October 2021 as part of the pulsing plan for path to closure of the system. The system was restarted in January 2022, but shutdown in March, when an unexpected failure of the catalytic oxidizer occurred. The system was restarted on August 22 and ran until the end of October when another failure of the catalytic oxidizer shutdown the system. The system is expected to be repaired and operational by fall 2023.

As total VOC concentrations remained below 100 ppmv in 2022, Pantex has been pulsing the system to determine current recovery efforts and feasibility of system closure. Pantex will request closure of the system with the renewal of the Hazardous Waste Permit. A more detailed discussion will be included in the *2022 Annual Progress 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.

Review of the uncertainty management/early detection data collected during the first quarter indicates unexpected conditions at one Ogallala Aquifer well, PTX06-1056. Detections exceeded the GWPS in one Ogallala Aquifer well. There were no unexpected conditions at perched uncertainty management wells in the first quarter.

4-amino-2,6-Dinitrotoluene (DNT4A), a breakdown product of 2,4,6-trinitrotoluene (TNT), has been detected at PTX06-1056, with the initial detection occurring in April 2014. Sample results collected since that time have been variable, with values exceeding the PQL since late 2016. A trend of DNT4A (performed using Mann-Kendall statistics) continues to indicate an increasing trend across all data. PTX06-1056 also continues to demonstrate detections of 1,2-dichloroethane (DCA12). DCA12 has been variably detected since August 2015, with the most recent detection below the PQL.

#### Summary of Unexpected Ogallala Detections, First Quarter 2023

Well ID	Sample Date	Analyte	Measured Value (µg/L)	PQL (µg/L)	GWPS (µg/L)
PTX06-1056	1/30/2023	RDX	0.167	0.104	2
	1/30/2023	DNT4A	1.87	0.104	1.2
	1/30/2023	DCA12	0.78	1	5

As of May 2020, Pantex went back to semi-annual sampling for PTX06-1056 as approved by regulatory agencies. The first quarter result detected DNT4A above the GWPS at 1.87 ug/L and RDX above the PQL (0.104 ug/L) at 0.167 ug/L. Pantex is responding by installing two additional Ogallala monitoring wells to help understand extent. Installation of these wells began in spring 2023 and sampling will occur in summer of 2023. 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 as 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 first quarter.

## SCHEDULE UPDATE

Pantex provided a detailed schedule of upcoming work in the *2022 Annual Progress Report*. An update of the activities scheduled to be started or completed by the publication date of this report is provided below.

Pantex completed the following:

- Pantex awarded a new well drilling contract in January 2023 with scope including installation of two new Ogallala monitoring wells in response to detections at PTX06-1056. Wells were completed in May 2023, but will require further development before sampling.

Pantex continues progress toward completion of the following items:

- The initial injection event was completed at the northern Offsite ISB wells in May 2023 and well maintenance activities were completed at the southern Offsite wells in preparation for injection in June 2023.
- Pantex awarded a contract to build two mobile pump and treat systems that will be used at the Offsite Remediation System and in other areas where plume control may be required. Design was completed in April 2022 and construction of the systems was completed in March 2023. Trailers were delivered to Pantex at the end of May and final commissioning will occur in July.
- Pantex submitted a Request for Proposal for the design of the upgrade to the SCADA system for SEPTS and P1PTS. The contract was awarded in September 2022 and the 60% design was submitted and approved in March. Due to funding expectations in the upcoming fiscal years, a phased design approach is being added. The final phased design is expected to be completed by September 2023.
- The design of the new center pivot irrigation system planned to be installed east of FM 2373 was completed in May 2021. The new construction contract was awarded in August 2021 and construction began in November 2021. Operation of the system is expected by late summer 2023.
- Construction of Phase 3 and 4 infrastructure for the Offsite ISB System commenced in August 2022. Work is anticipated to be completed for Phase 3 in June 2023, and Phase 4 in September 2023.
- Work began to evaluate the Pantex perched groundwater network, acquire LiDAR Survey information for assessing landfill cover deficiencies and acquisition of new toxicity data for Pantex COCs for use in evaluating its effect on risk in Five-Year Review. The Five-Year Review activities were initiated on August 1, 2022. A draft report was submitted to Pantex in February. Pantex reviewed, signed and submitted a draft final report to TCEQ and EPA in May. The final report is expected to be complete by September.
- Pantex awarded a contract for construction of two new ISB injection trailers to be used for future injection events. One trailer was delivered to Pantex in May 2023 and the second trailer is anticipated to be delivered July 2023.



- Pantex awarded a new well drilling contract in January 2023. The new contract includes scope for all Phase 4 wells for the Offsite ISB. Drilling on these wells commenced in April 2023 with anticipated completion in September 2023.

The following items are upcoming work to be completed by Pantex:

- Pantex is planning to inject the Southeast ISB Extension in late July/early August 2023 and Zone 11 ISB in May 2023.

## 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 an existing remediation system. Pantex is also working to extend treated water injection and beneficial use to new areas to ensure consistent operation of the pump and treat systems.

The Southeast Pump and Treat System 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. Pantex will continue to inject and release water to Playa 1 until the subsurface irrigation system is fully operational or construction of other options finish.

System repairs were completed at the subsurface irrigation system, with limited operation starting in March 2022. The system ran during the month of March, but an issue with the communication system caused the system to be shutdown. System repairs were completed and the system became available in late September 2022. Full operation of the subsurface system is currently hindered by lowered lagoon storage capacity due to ongoing repair of the WWTF's storage lagoons and an electrical failure caused by wildlife. Pantex has installed perched injection wells east of the Playa 2 area, as previously recommended. These wells will help provide a consistent outlet for release of treated water from SEPTS when beneficial use is not possible. Pantex is injecting approximately 150 gpm of treated perched groundwater as of March 2023. Pantex completed the design and started the construction of a center pivot irrigation system east of FM 2373, with an anticipated completion date of late summer 2023.

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 injected molasses during the 2019 and 2022 injection event to attempt better distribution of the amendment and will continue to monitor the results over time to determine if the injection will affect the water moving into that area. Monitoring will continue at PTX06-1153 as described in the SAP. Further recommendations will be made based on evaluation of data over time.

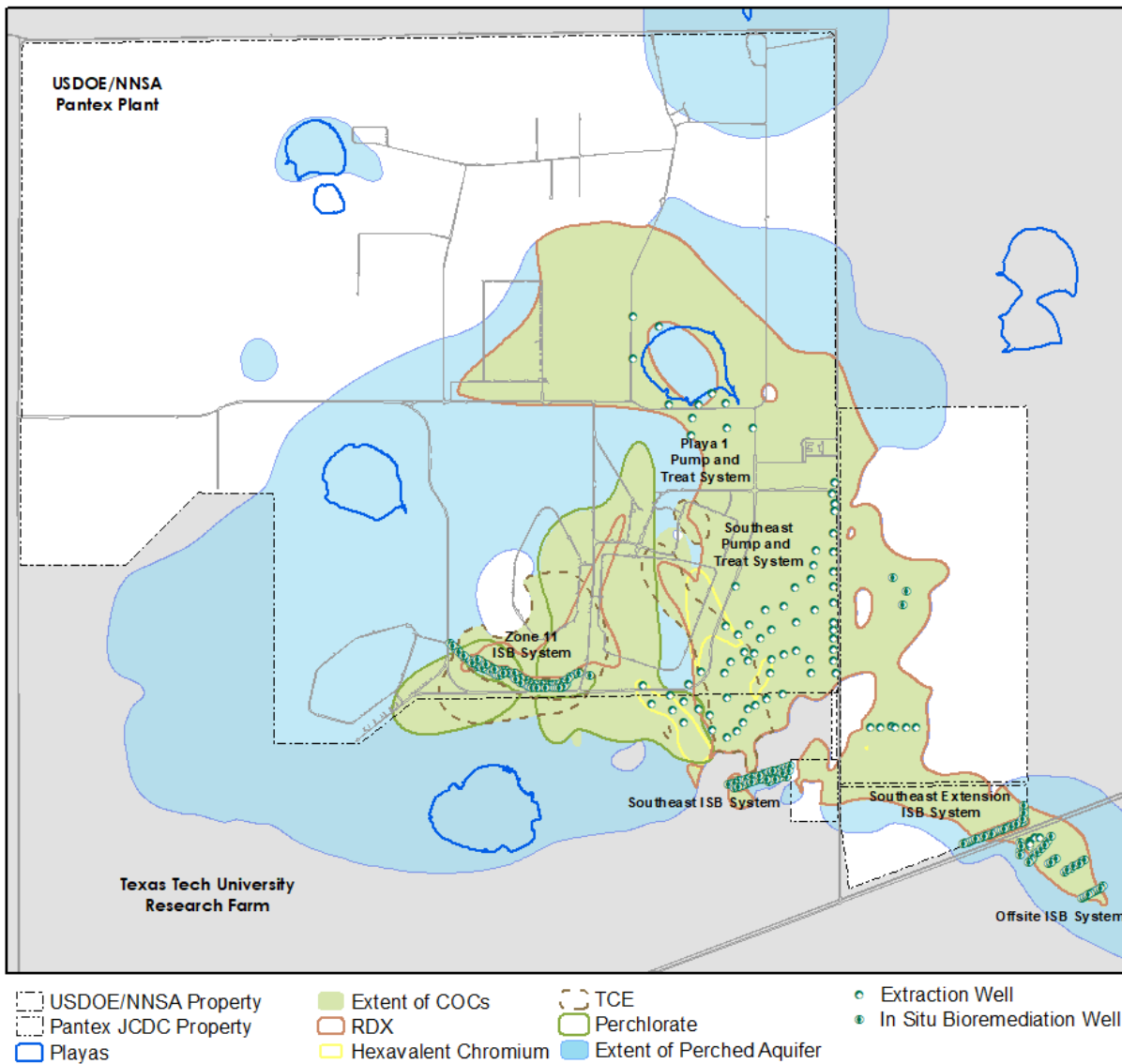
Since 2002, the SVE system has treated soil gas and residual NAPL in the solvent evaporation pit/chemical burn pit area of the Burning Ground, mitigating vertical movement of VOCs to groundwater. Pantex was unable to complete rebound tests successfully, and was unable to prepare a path to closure as recommended in the first Five-Year Review. Therefore, Pantex has evaluated other paths to closure for this system. In May 2017, Pantex completed a modification to six inactive SVE extraction wells surrounding the active extraction well SVE-S-20 to open the wells to ambient air. This modification enhances airflow through the formation while the system is operating. The airflow increased from 32 scfm to about 44 scfm over time. Evaluation of hourly VOC removal indicates that the mass removal rate initially increased with the increase in influent airflow; however, influent concentrations and mass removal have greatly decreased since the system was modified. Pantex is actively pulsing the system to evaluate final closure of the system. Based on data collected since 2020, Pantex is planning to recommend closure of the system the upcoming renewal of the Hazardous Waste Permit.

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. Additional investigation of the area of the Ogallala Aquifer near PTX06-1056 began in early 2023 with installation of two new monitoring wells.

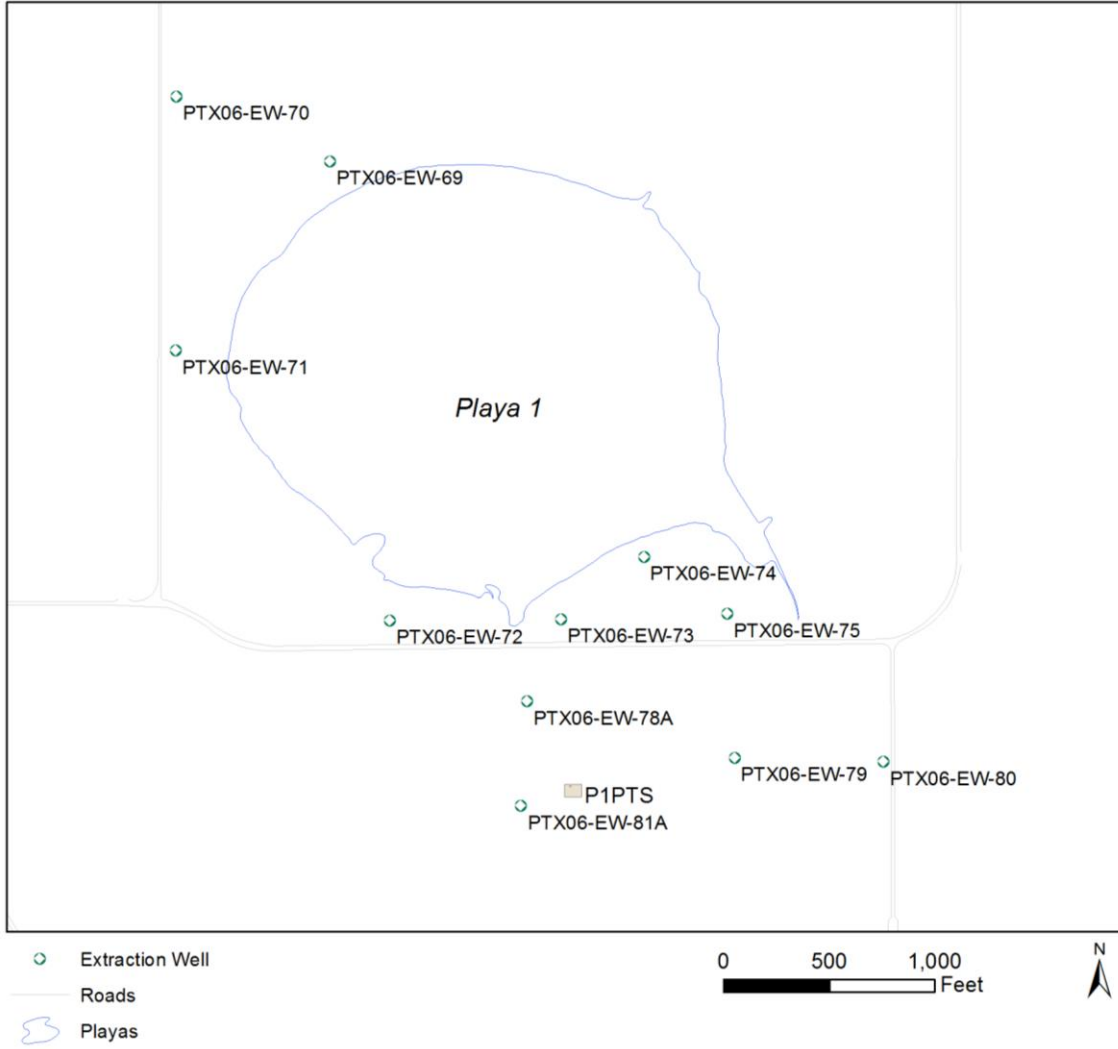
## **Appendix A**

### **Maps**

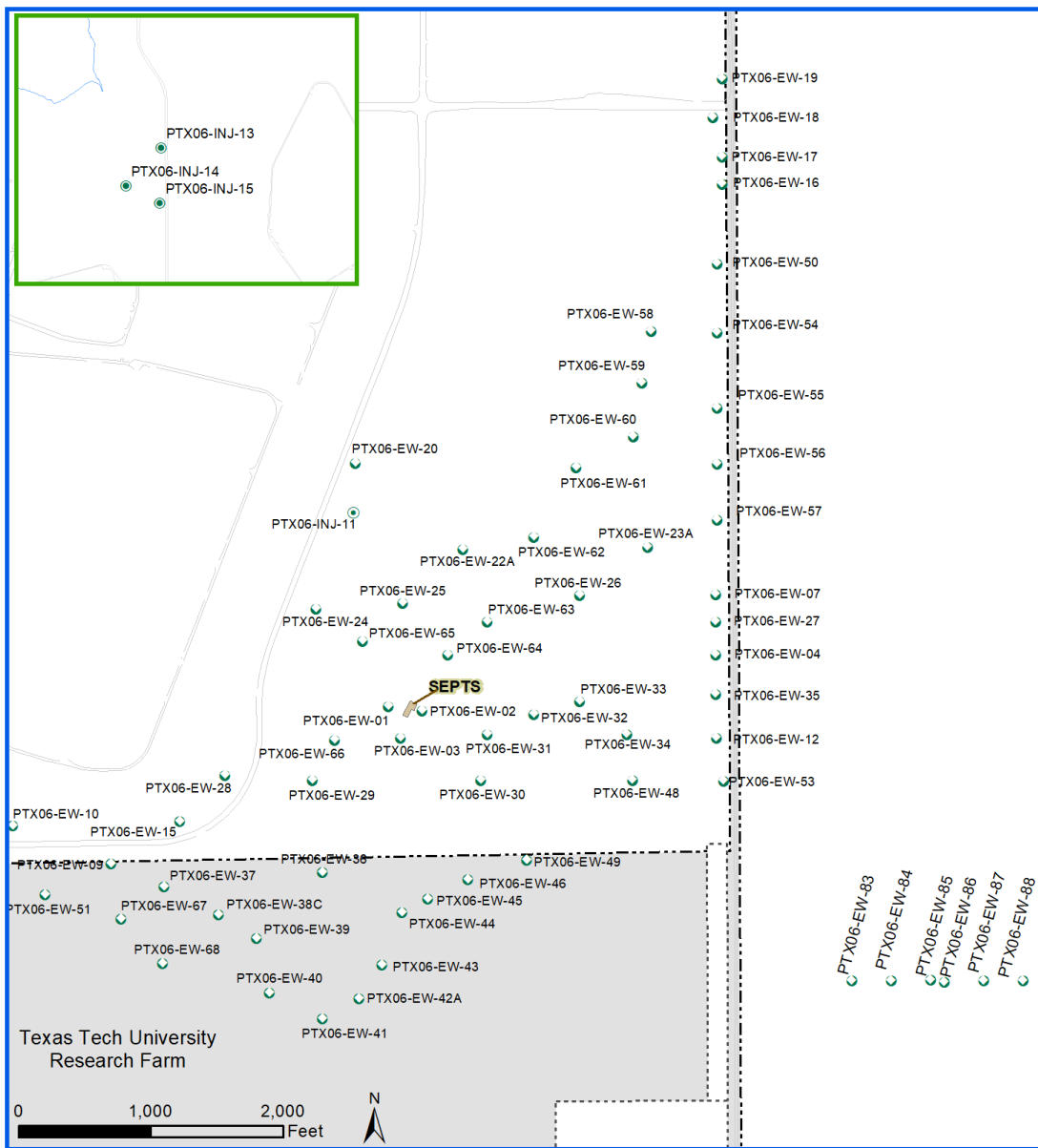




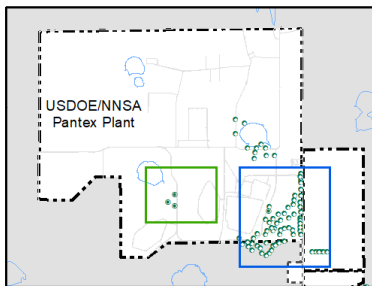
Extent of Perched Groundwater and Contaminant Plumes



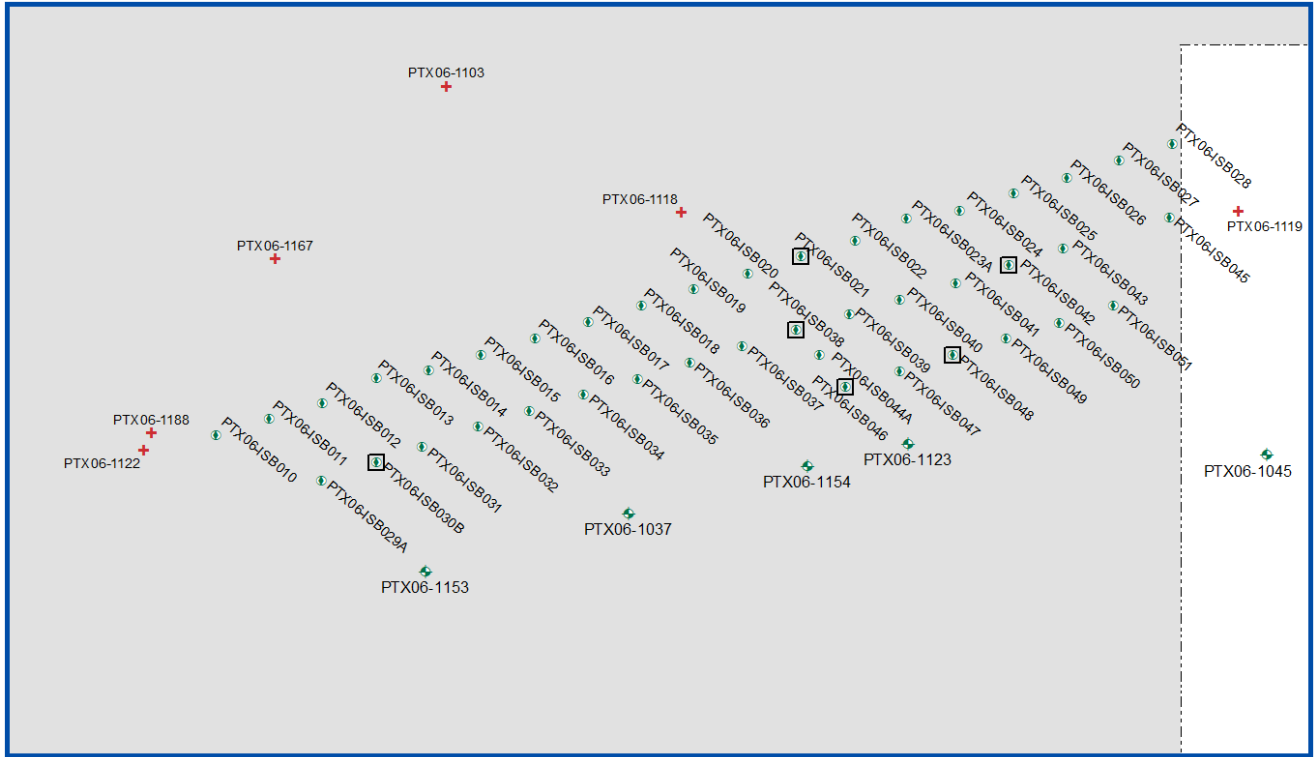
Playa 1 Pump and Treat System Wells



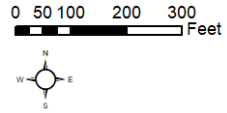
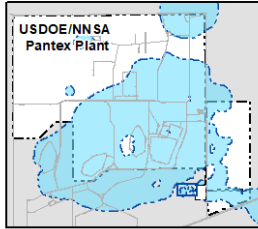
- Extraction Well
- Injection Well
- Roads
- DOE Property
- Pantex ASC LLC Property



Southeast Pump and Treat System Wells

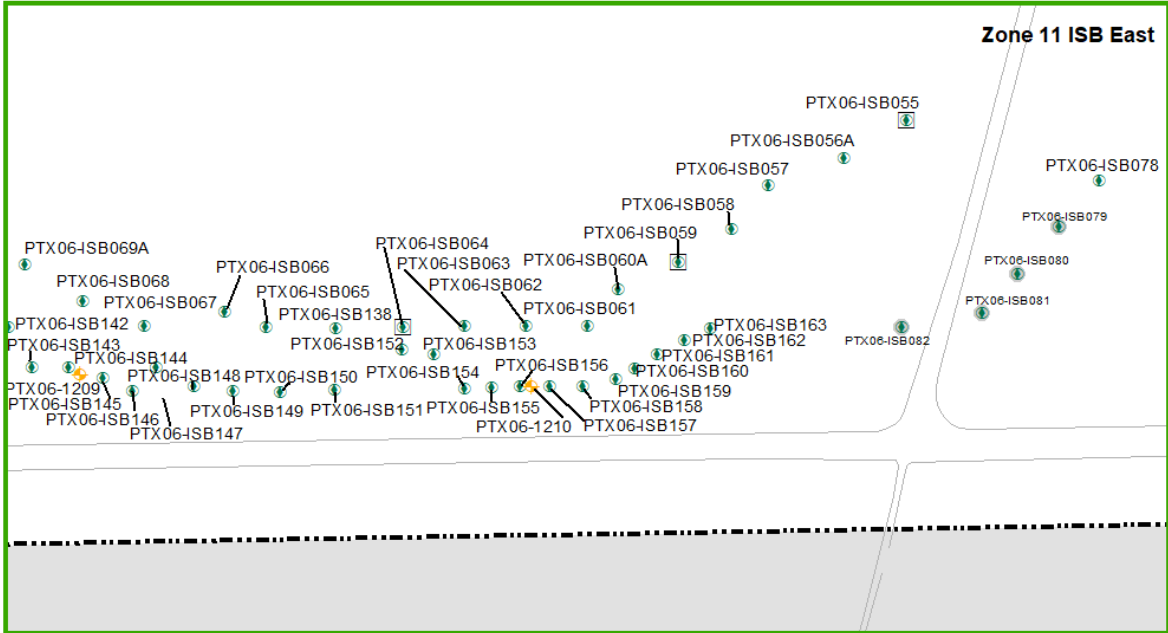
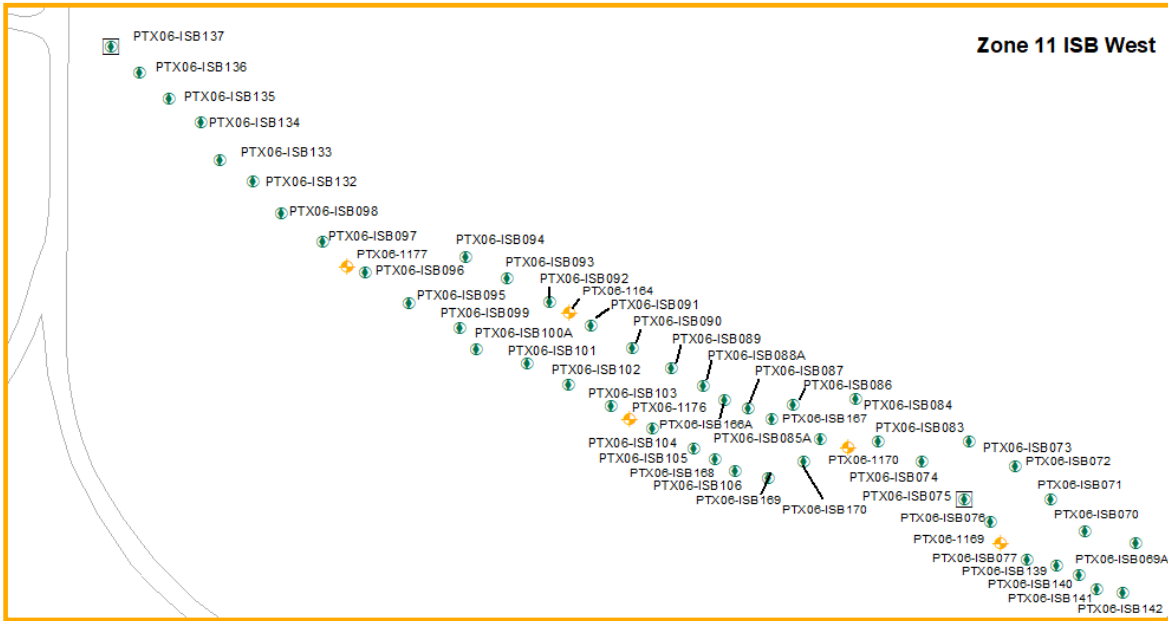


- + ISPM Well
- ISB Injection Well
- Sampled ISB Injection Well
- + Dry Monitoring Well
- Pantex ASC Property
- DOE Property

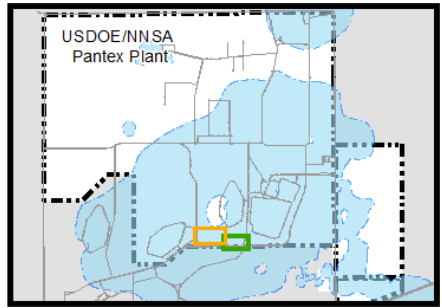


**Southeast ISB Wells and Sampling Locations**

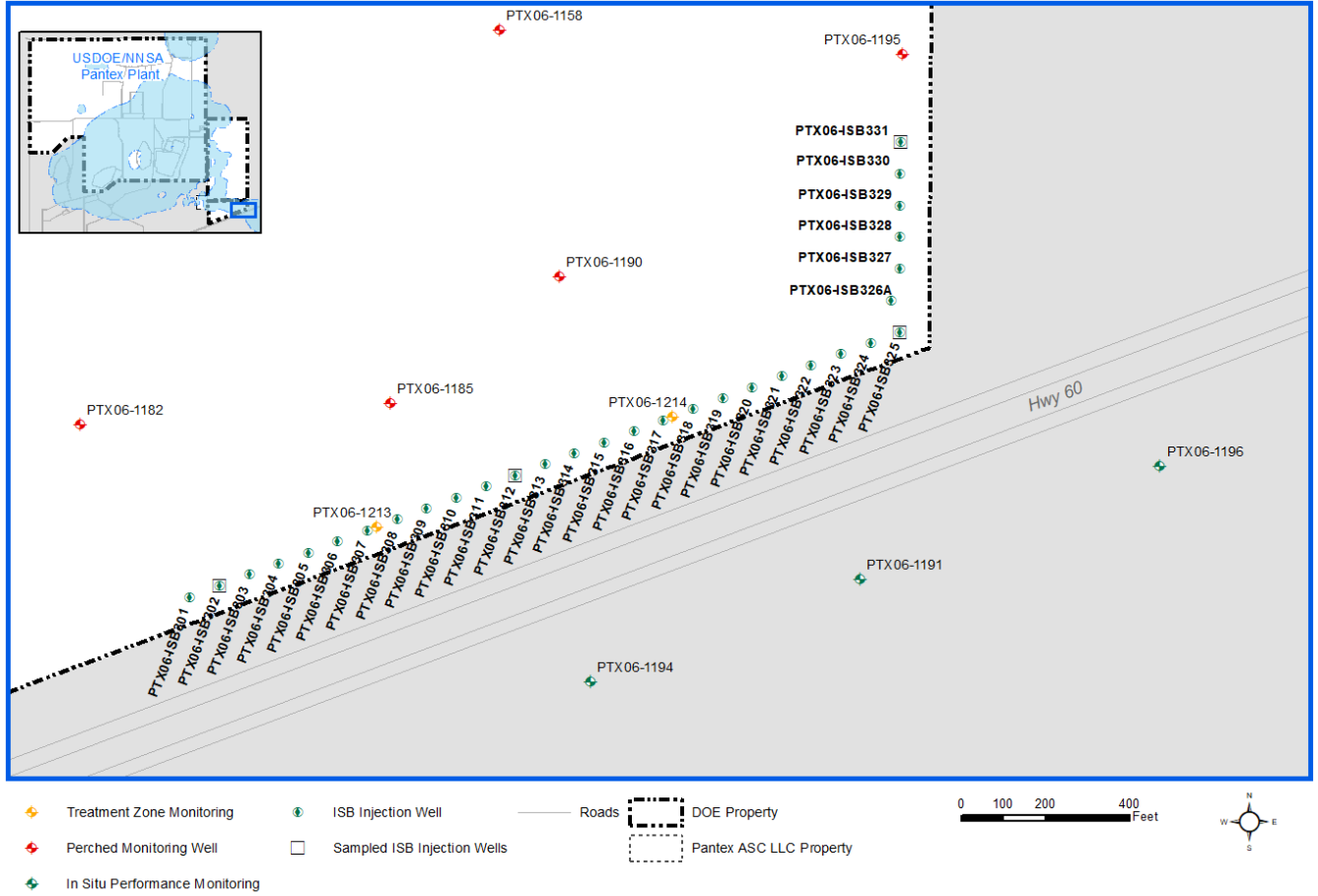




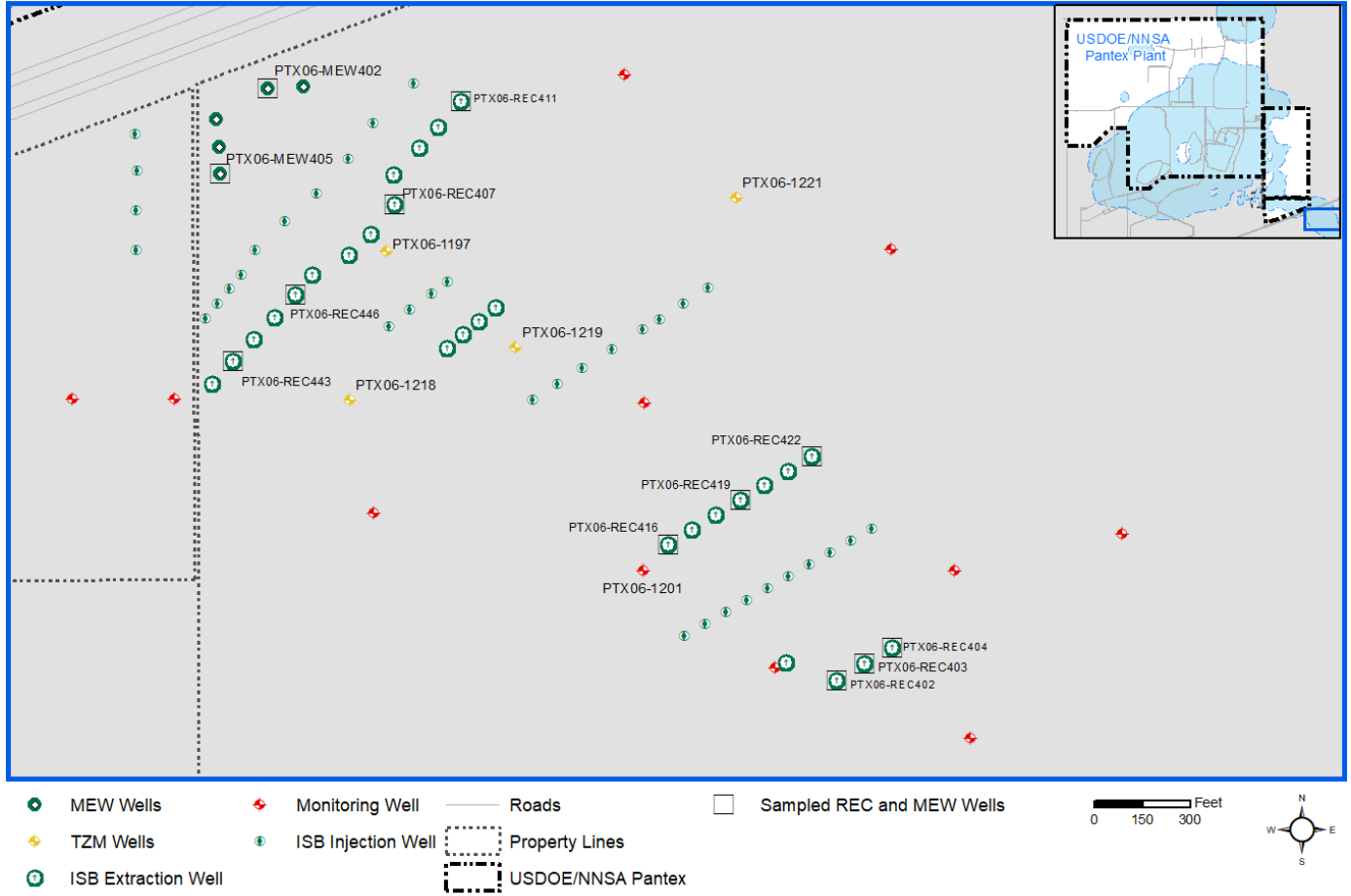
- ◆ Treatment Zone Monitoring
- ISB Injection Well
- ISB Inactive Injection Well
- ◻ Sampled ISB Injection Wells
- ⊠ DOE Property
- Roads



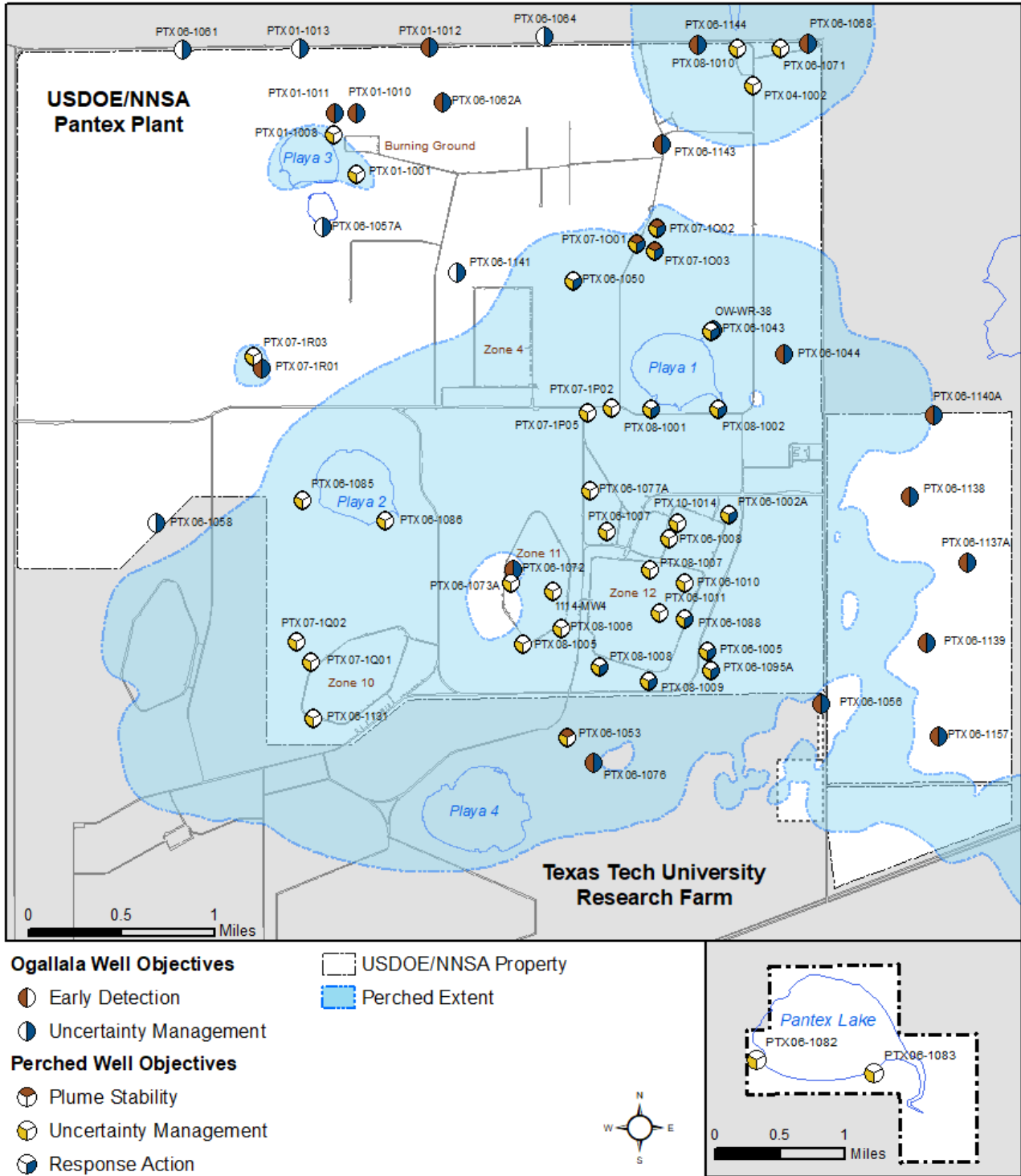
Zone 11 ISB Wells and Sampling Locations



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

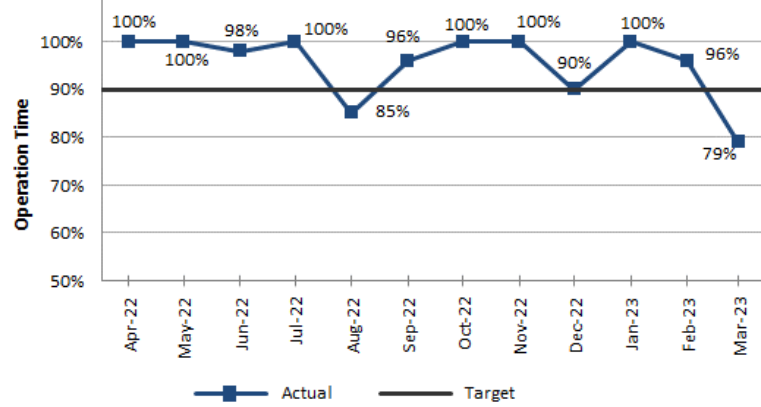
**Appendix B**  
**Pump and Treat System Graphs**



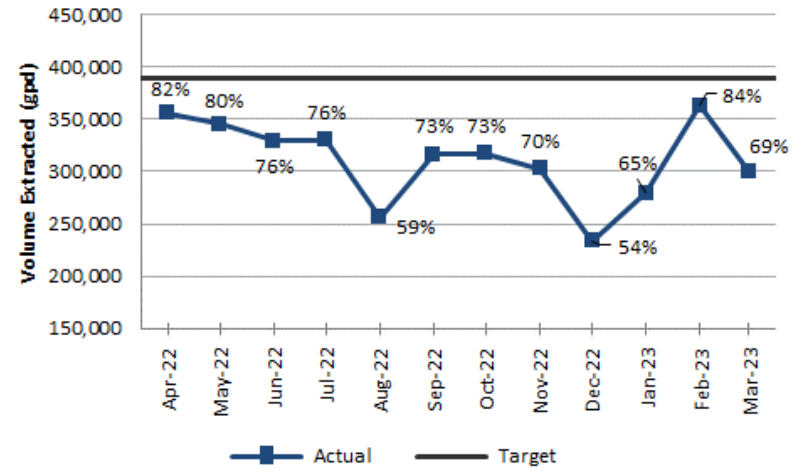
## **Southeast Pump and Treat System Graphs**



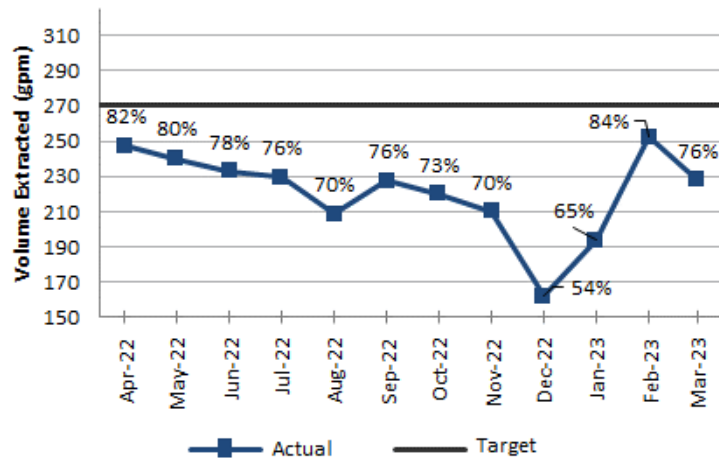




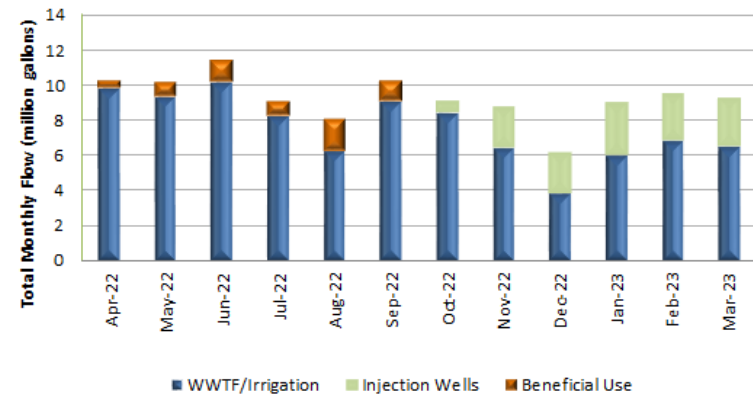
SEPTS Operation Time vs Target



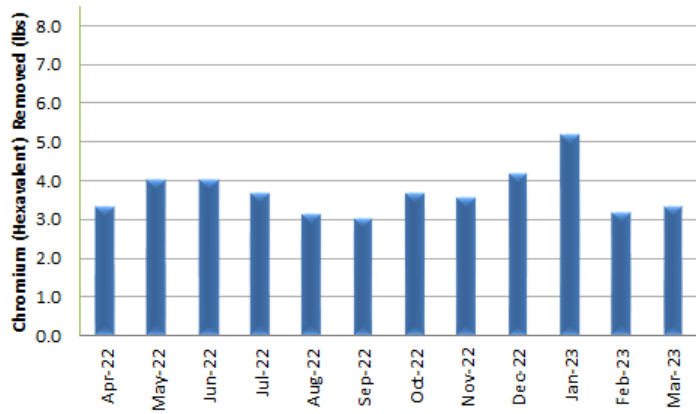
SEPTS GPD and % Capacity



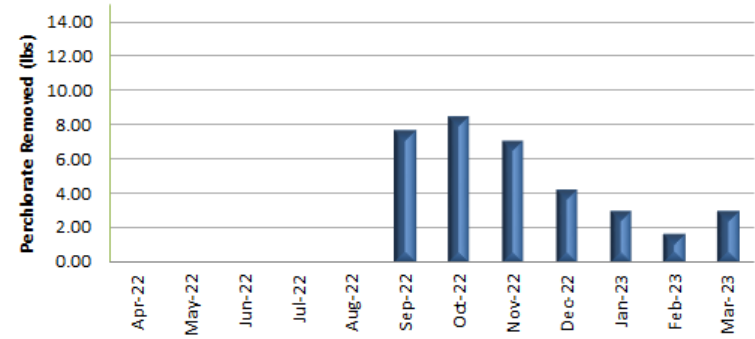
SEPTS Average GPM and % Capacity



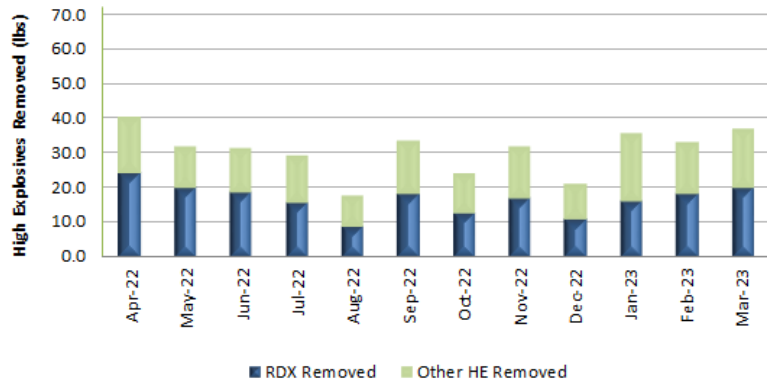
SEPTS Monthly Total Flow



SEPTS Chromium Removal by Month



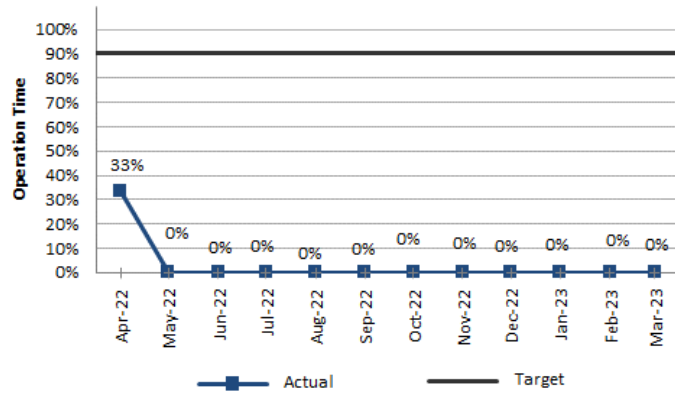
SEPTS Perchlorate Removal by Month



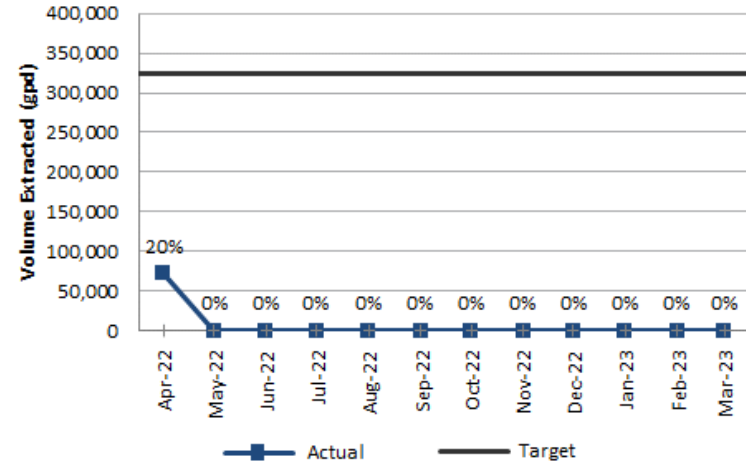
SEPTS HE Removal by Month

## **Playa 1 Pump and Treat System Graphs**

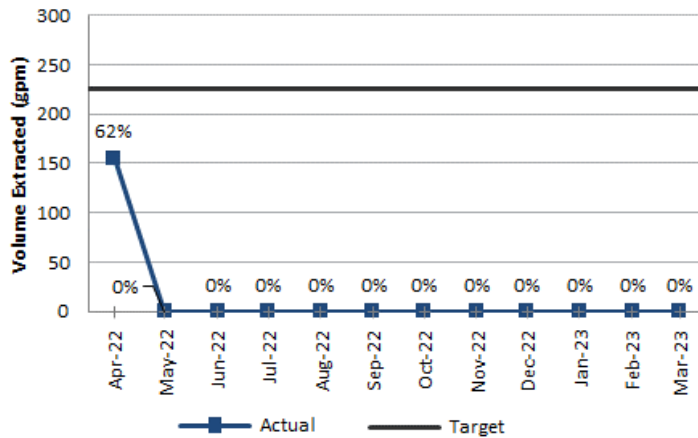




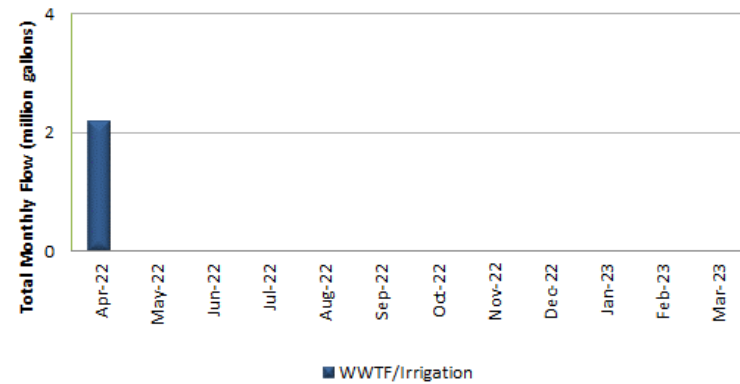
P1PTS Operational Time Vs Target



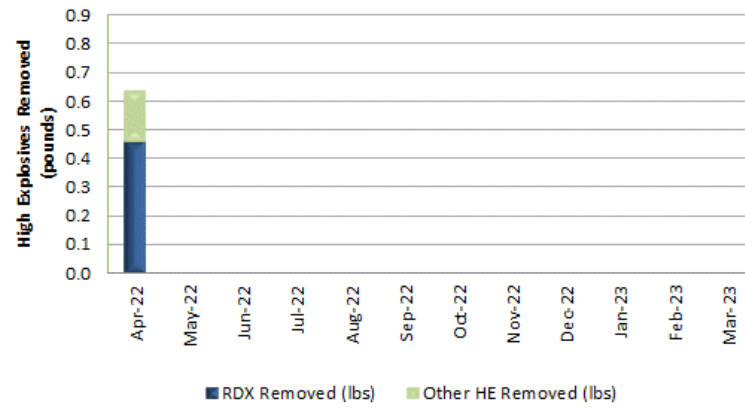
P1PTS Average GPD and % Capacity



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.

Page left intentionally blank.



## **Appendix C**

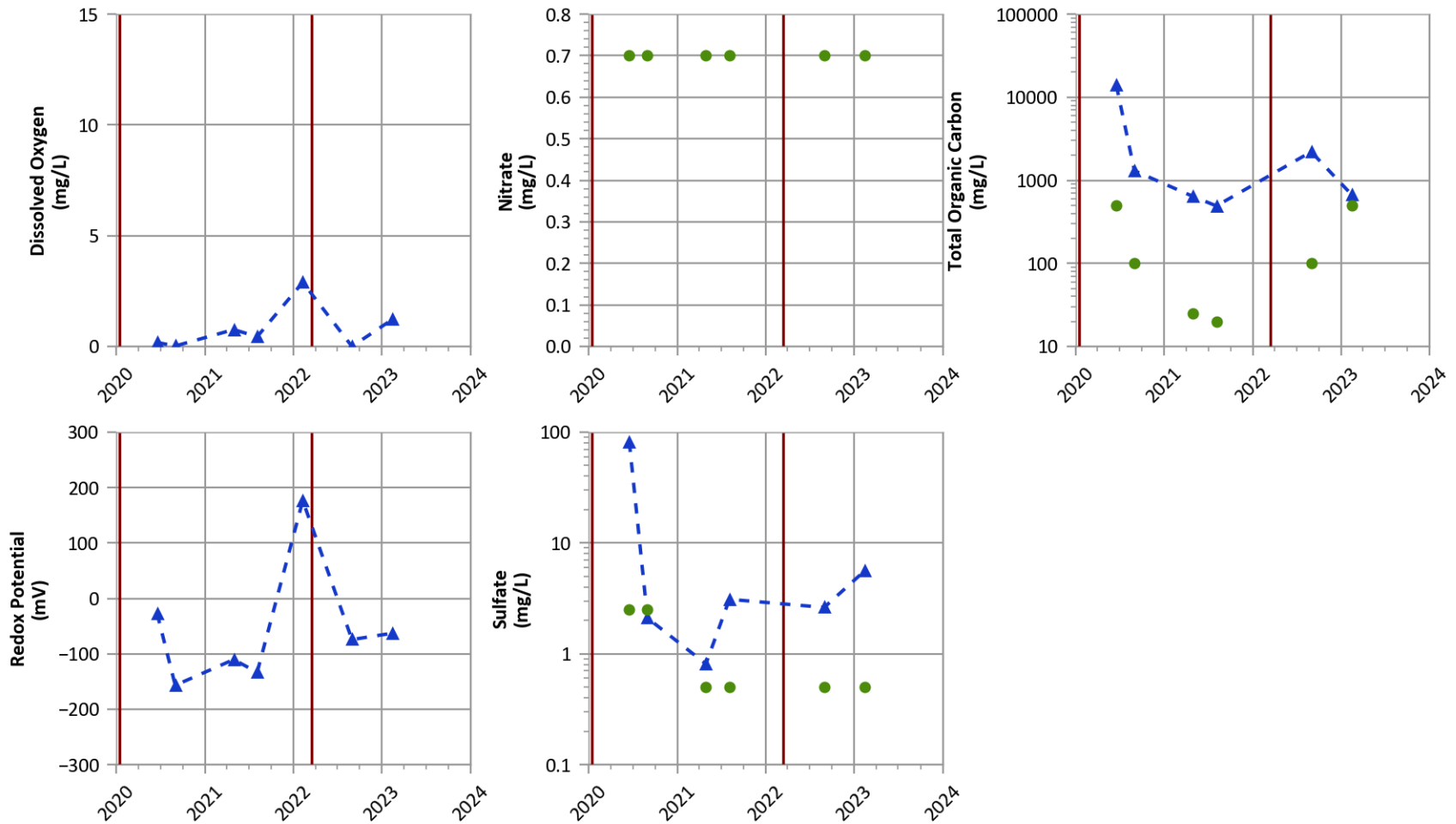
### **ISB Graphs**



## Southeast ISB Graphs



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



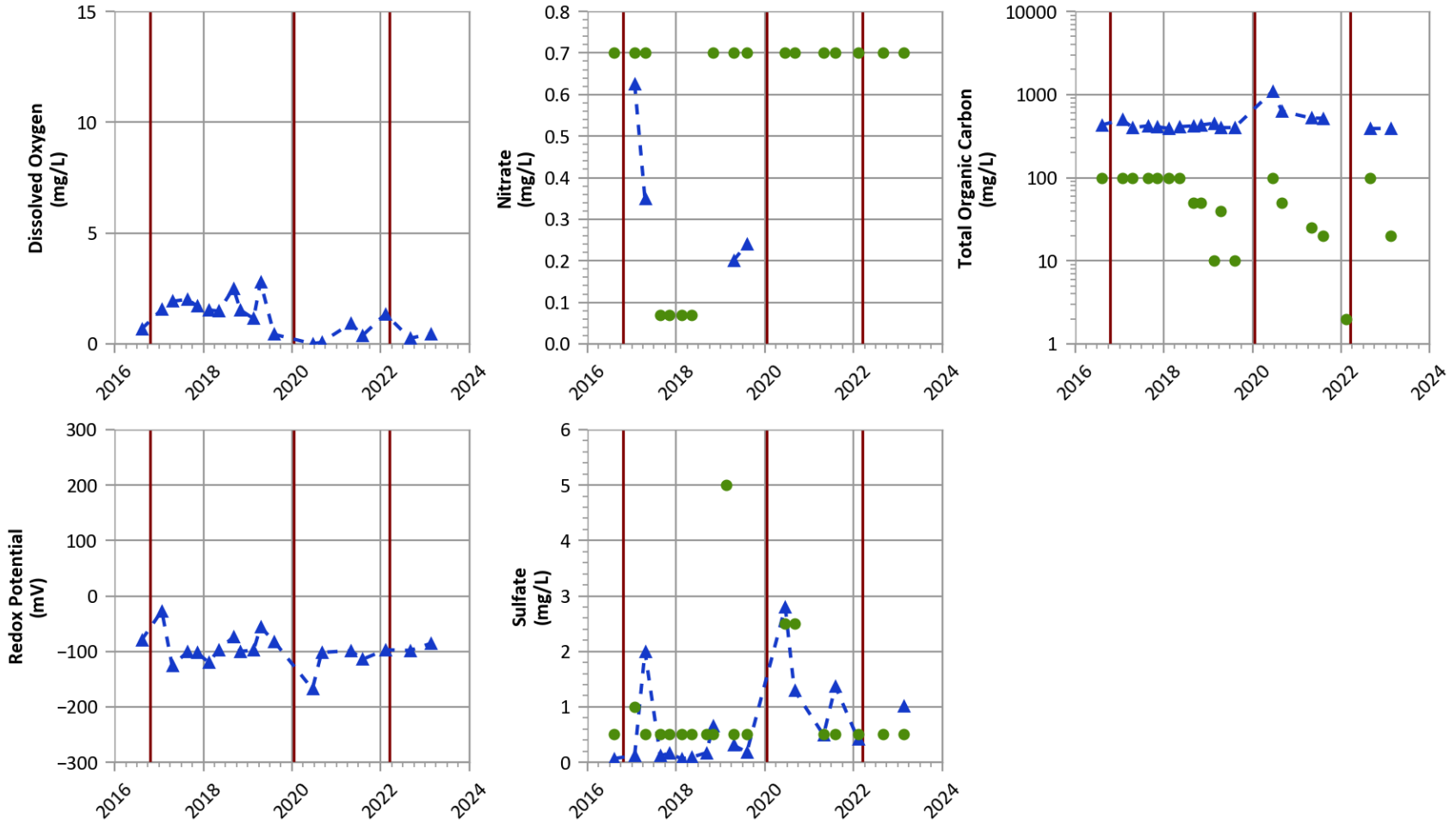
**Typical Baseline Concentrations in Perched Groundwater**

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



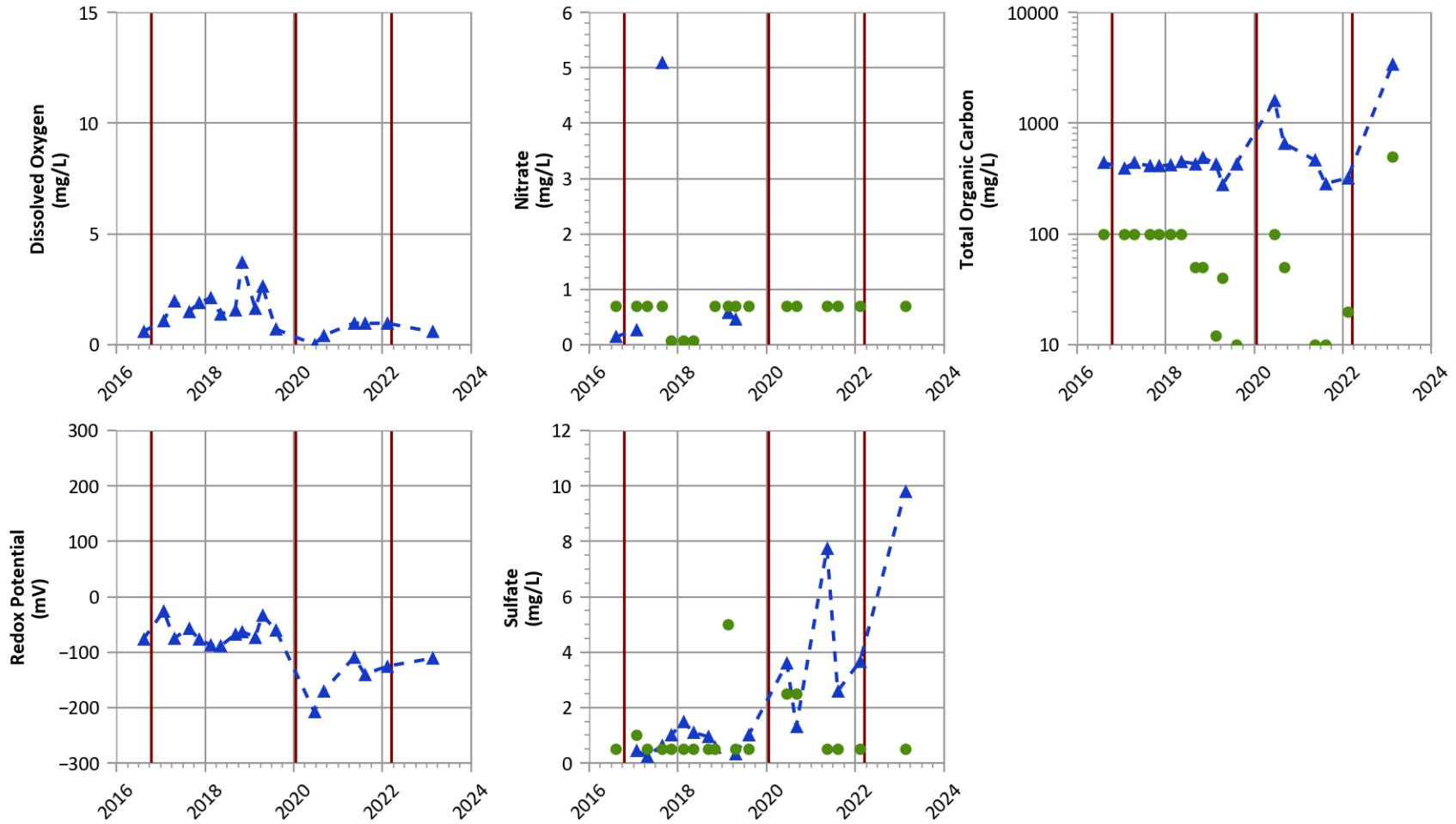
Typical Baseline Concentrations in Perched Groundwater

- 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



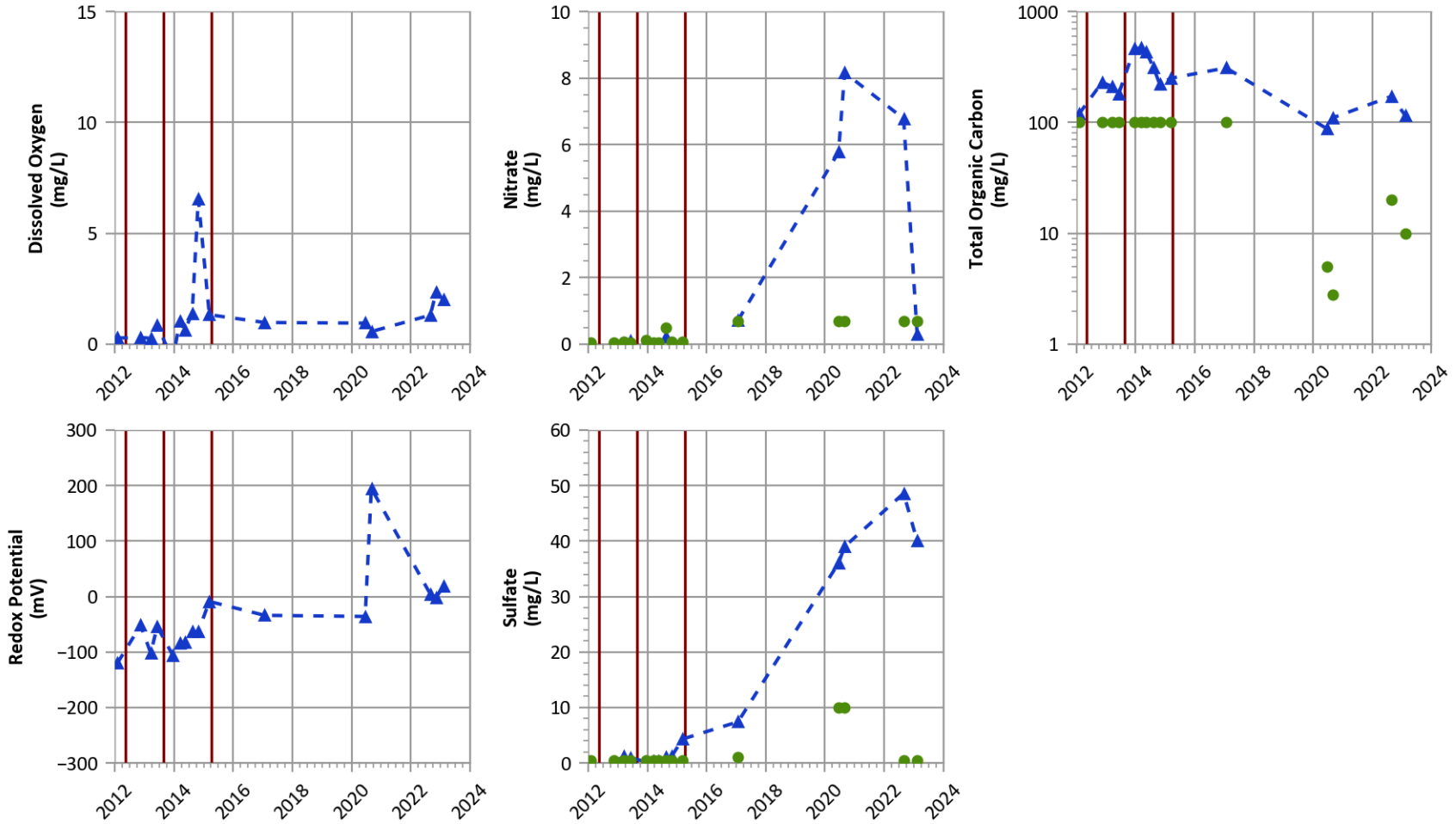
Typical Baseline Concentrations in Perched Groundwater

- 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



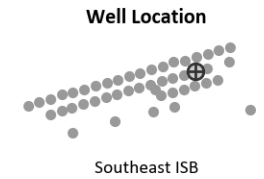
PTX06-ISB042 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



Typical Baseline Concentrations in Perched Groundwater

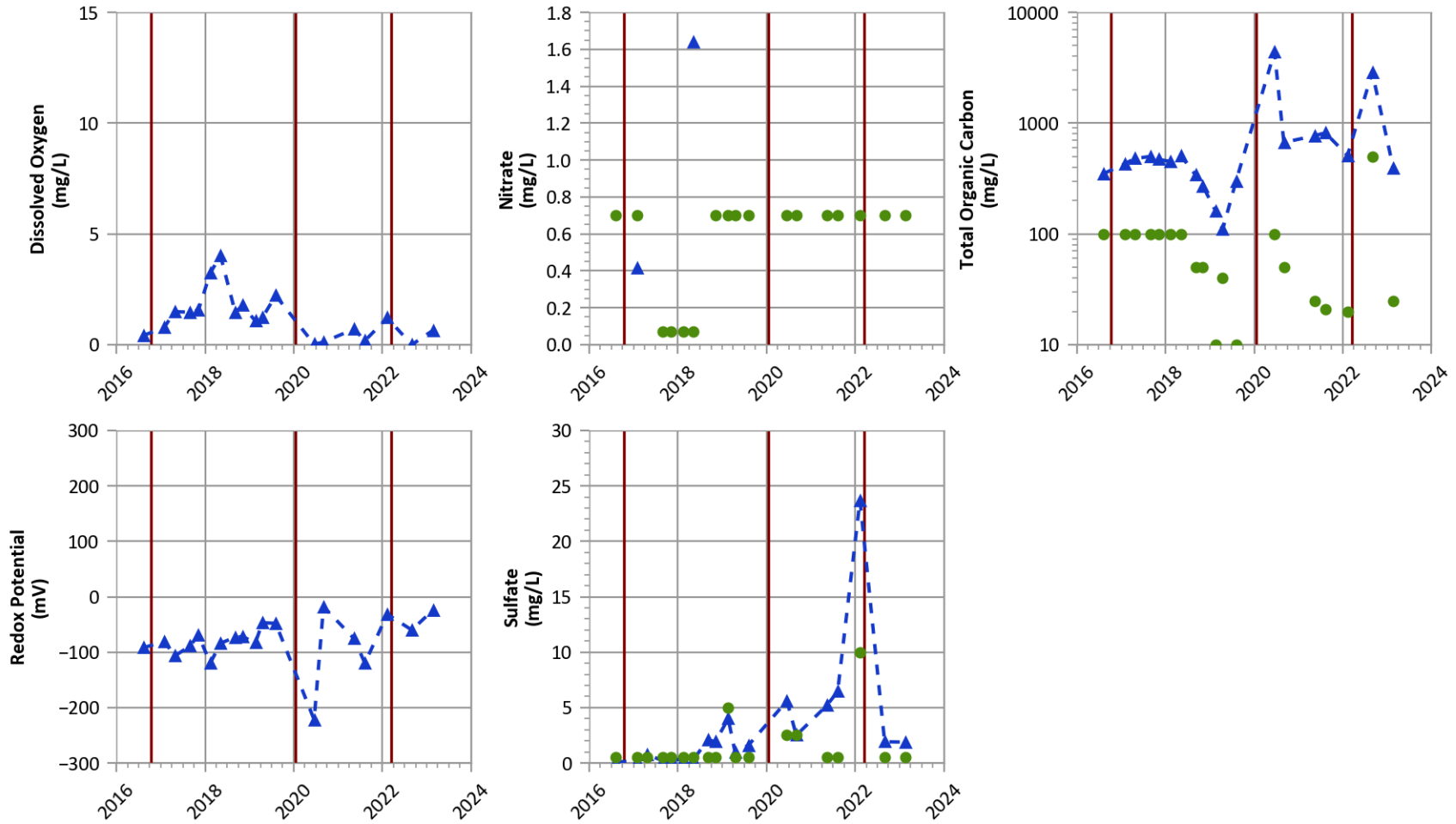
- Dissolved Oxygen: 5-10 mg/L
- Redox Potential: > 100 mV
- Nitrate: > 1 mg/L
- Sulfate: > 10 mg/L
- Total Organic Carbon: < 5 mg/L
- Total Volatile Fatty Acids: Not Detected

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





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



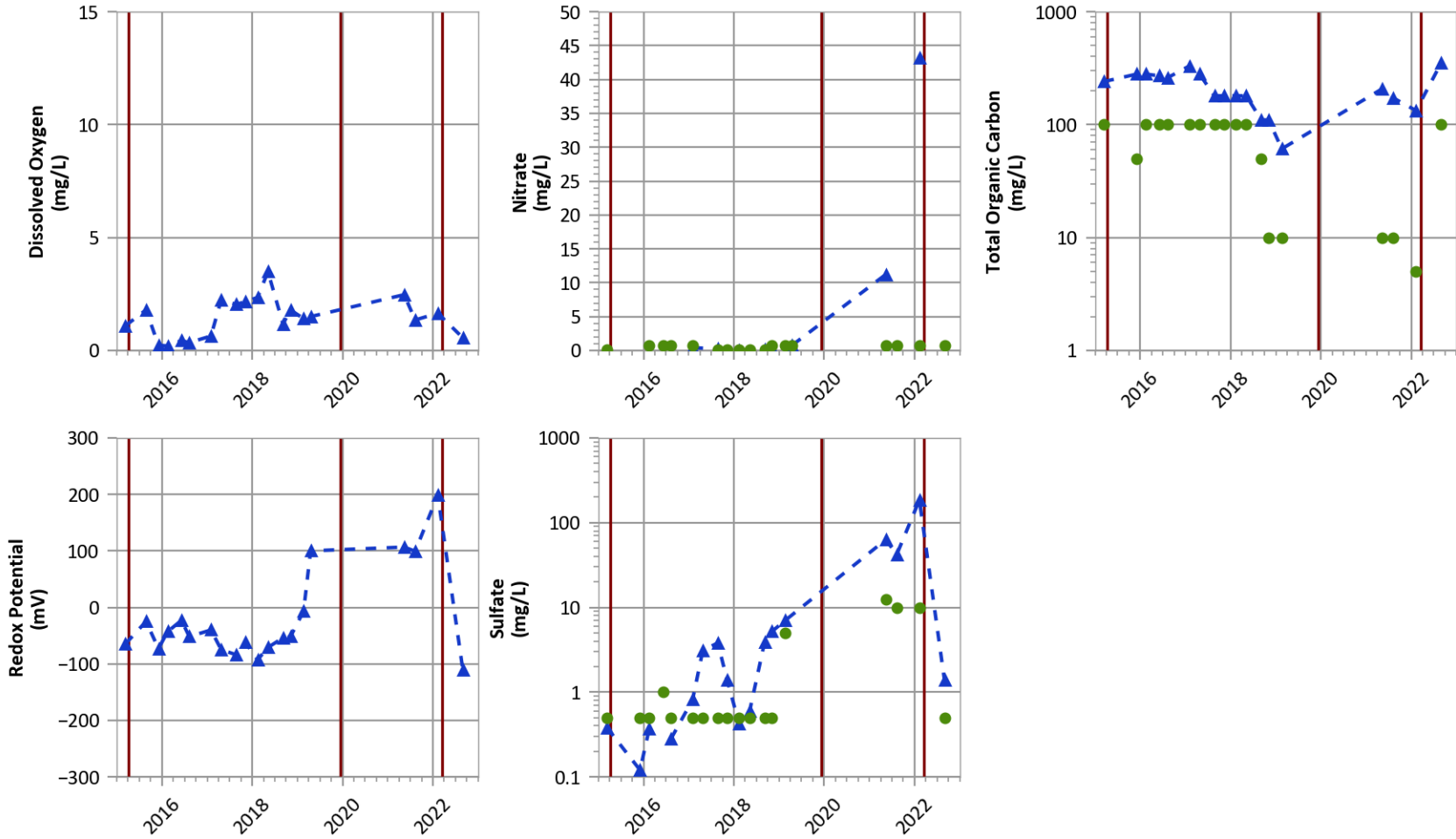
Typical Baseline Concentrations in Perched Groundwater

- 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



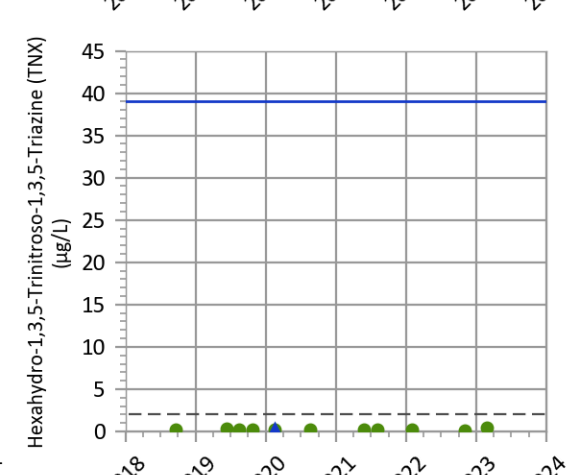
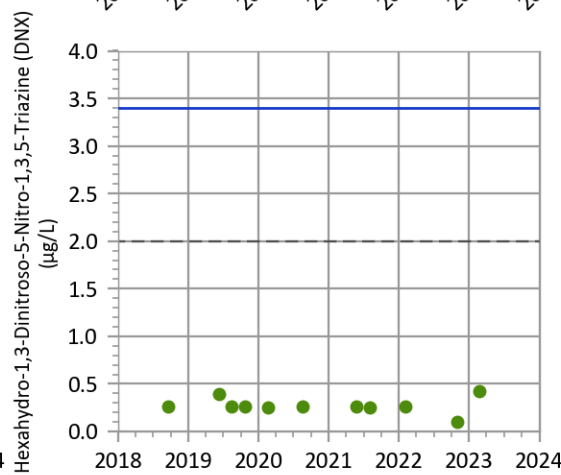
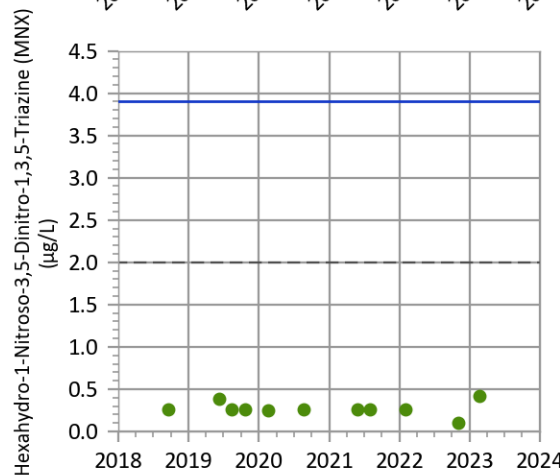
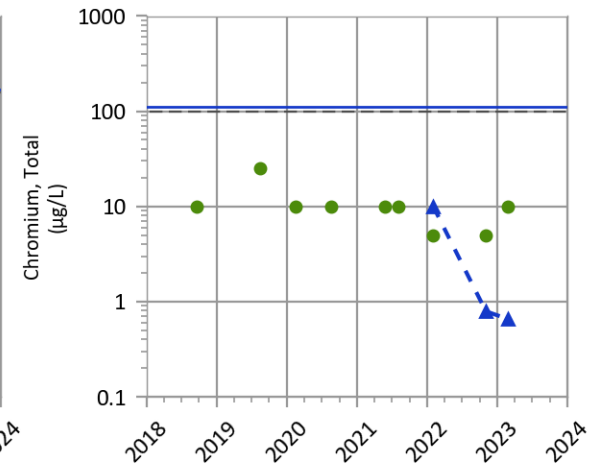
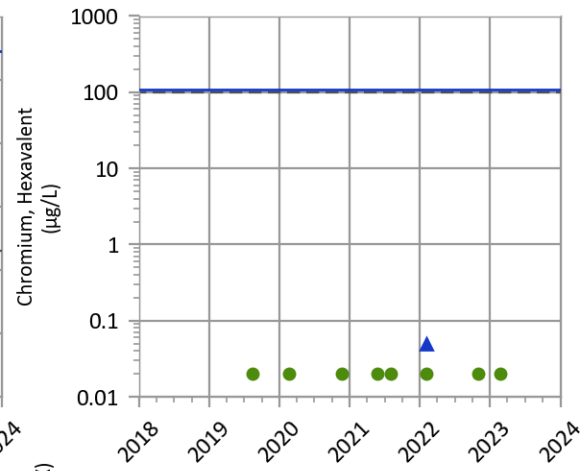
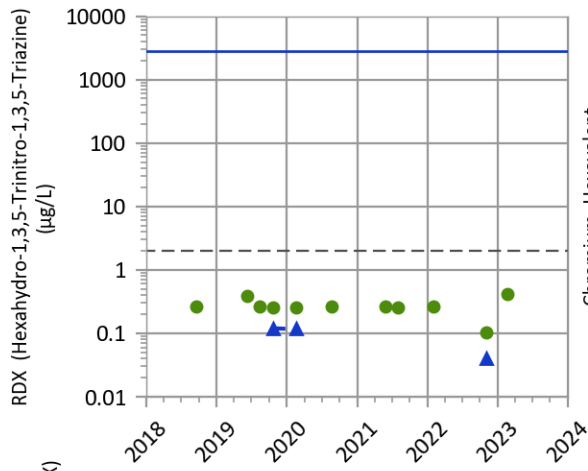
Typical Baseline Concentrations in Perched Groundwater

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



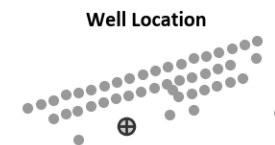
**PTX06-1037 Downgradient Performance Indicators  
Southeast In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



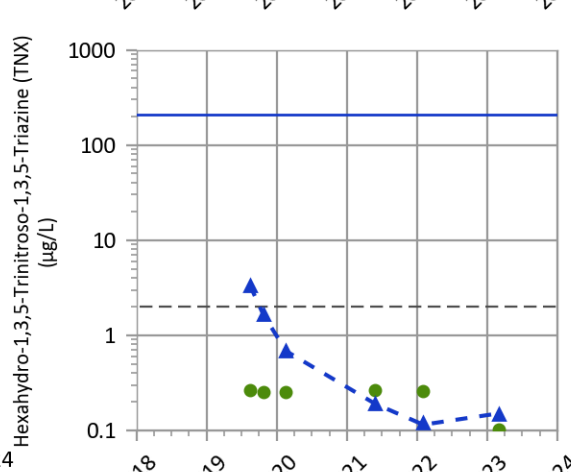
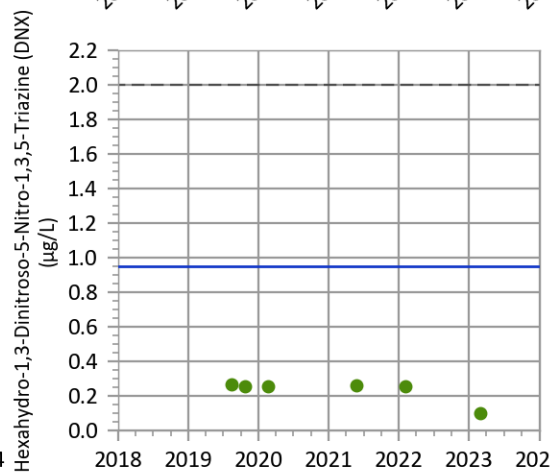
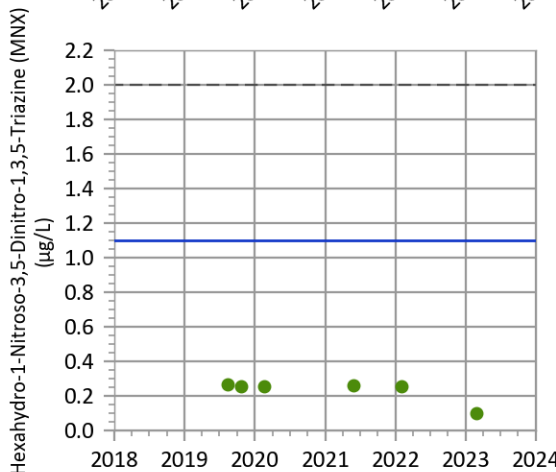
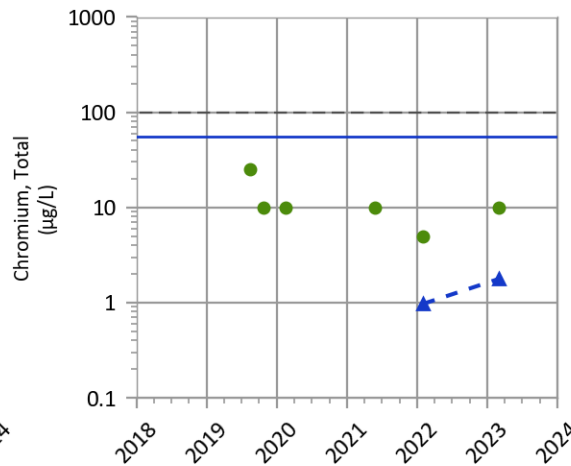
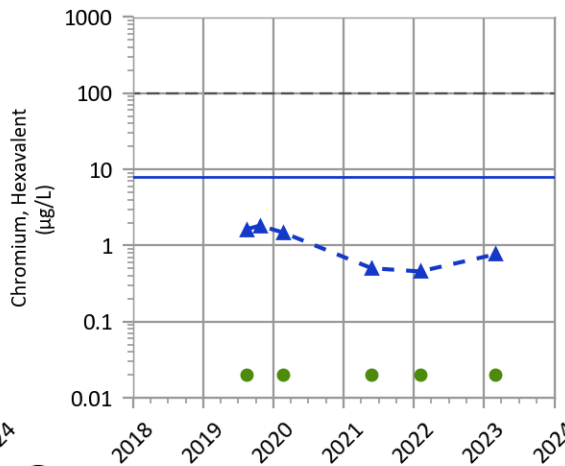
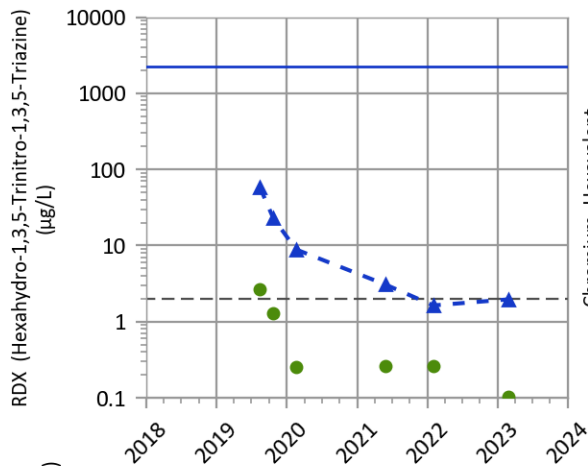
Most Recent Measured COC Concentrations (Feb 18, 2020)

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	0.66	100.0
TNX	Non-Detect	2.0

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



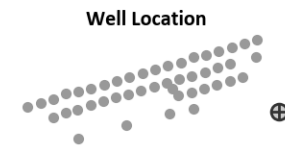
**PTX06-1045 Downgradient Performance Indicators  
Southeast In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



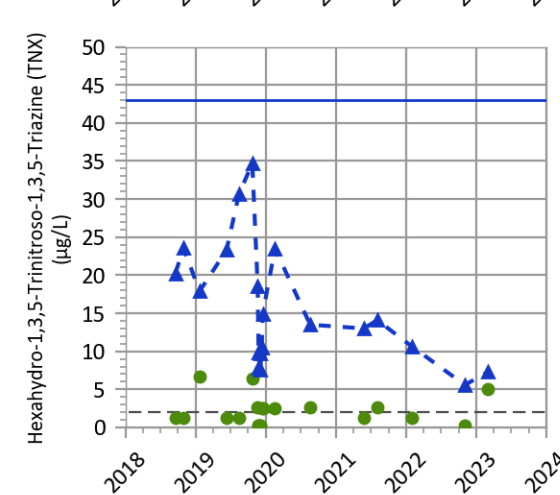
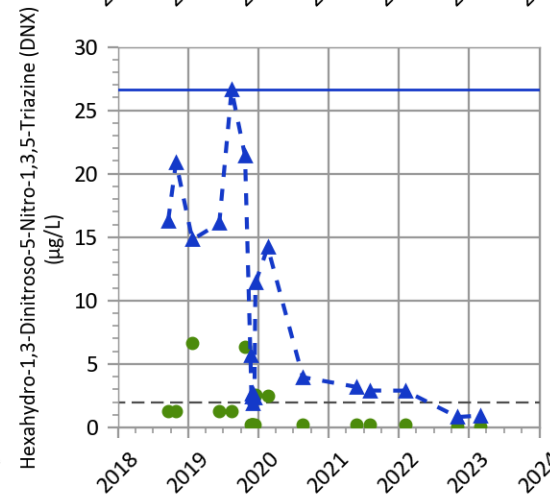
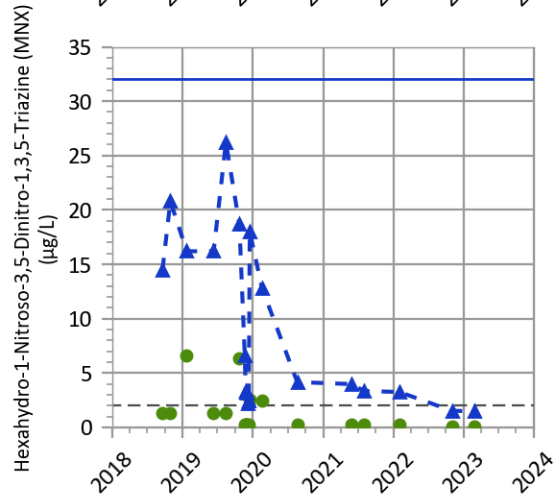
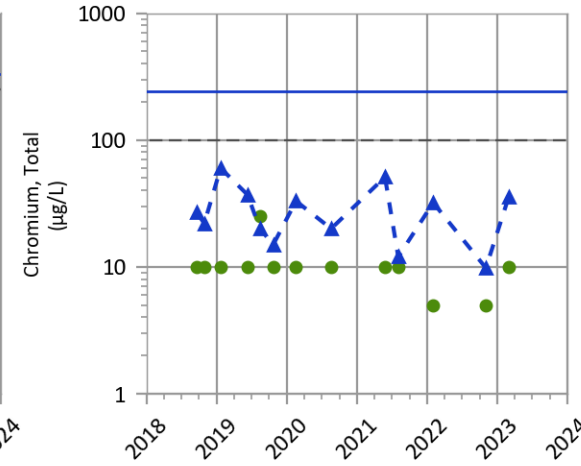
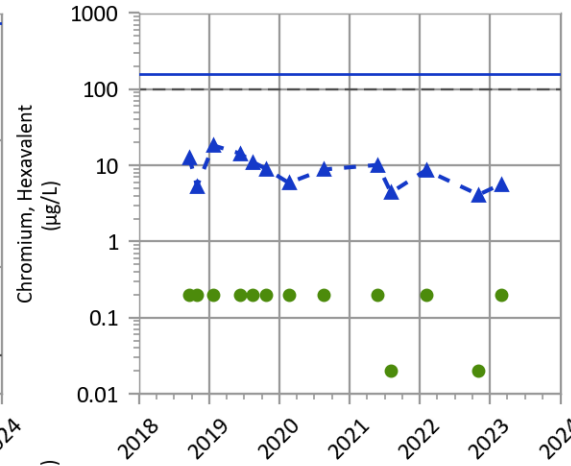
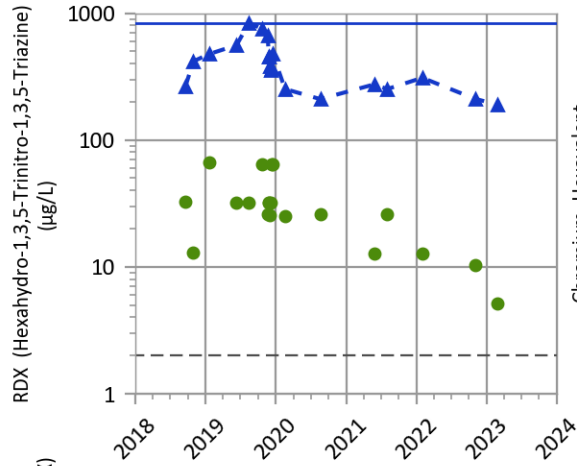
Most Recent Measured COC Concentrations (Feb 28, 2023)

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



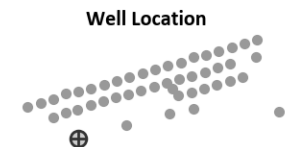
**PTX06-1153 Downgradient Performance Indicators  
Southeast In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



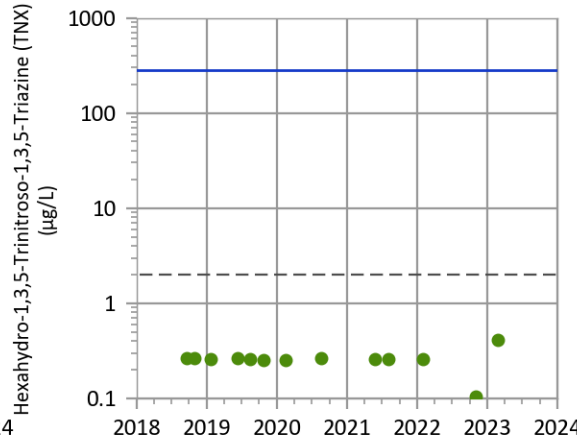
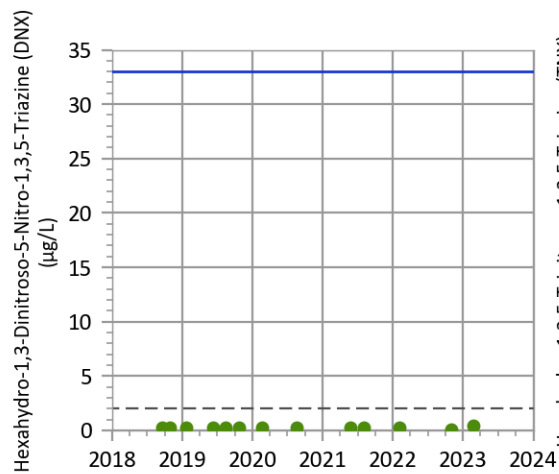
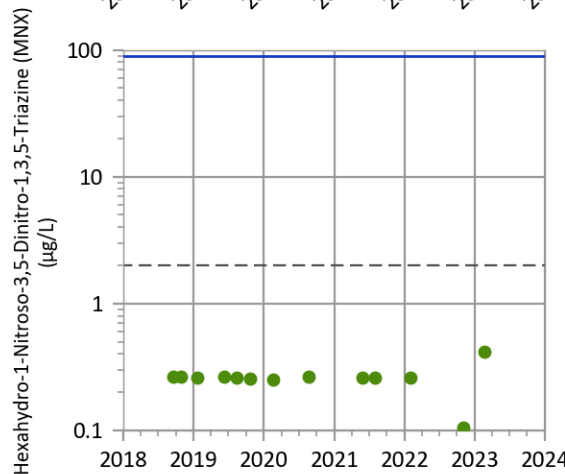
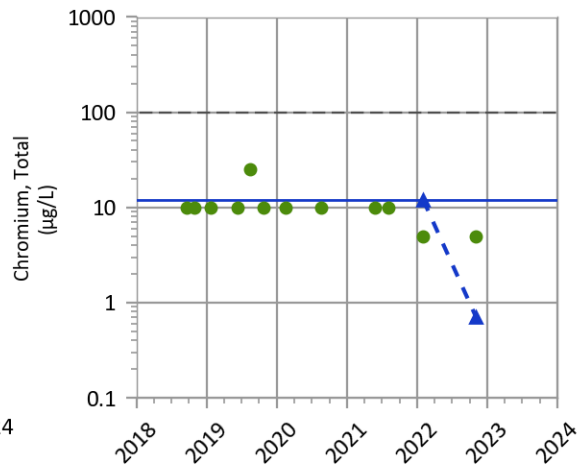
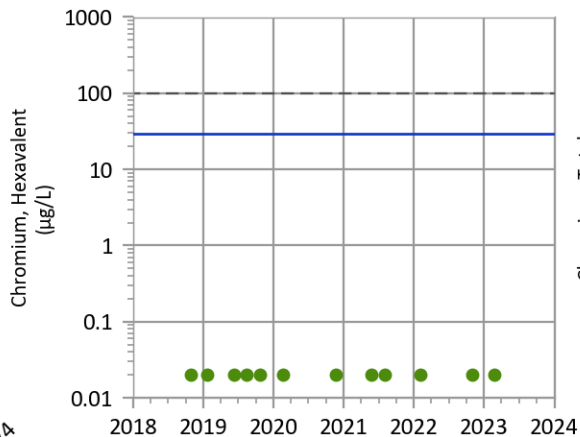
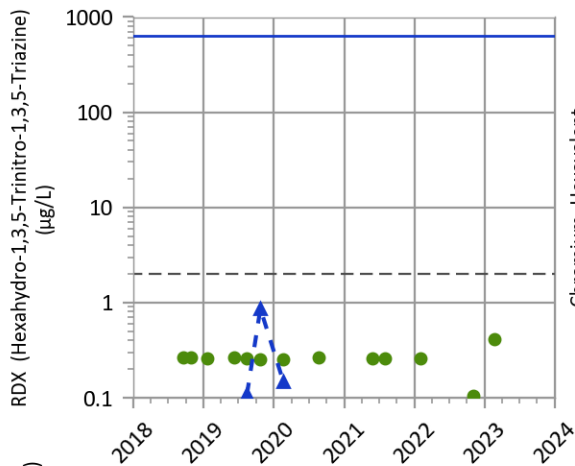
Most Recent Measured COC Concentrations (Feb 28, 2023)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	190.0	2.0
MNX	1.49	2.0
CR-6	5.68	100.0
DNX	0.94	2.0
CR	35.3	100.0
TNX	7.28	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 (Feb 22, 2023)

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	0.71	100.0
TNX	Non-Detect	2.0

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

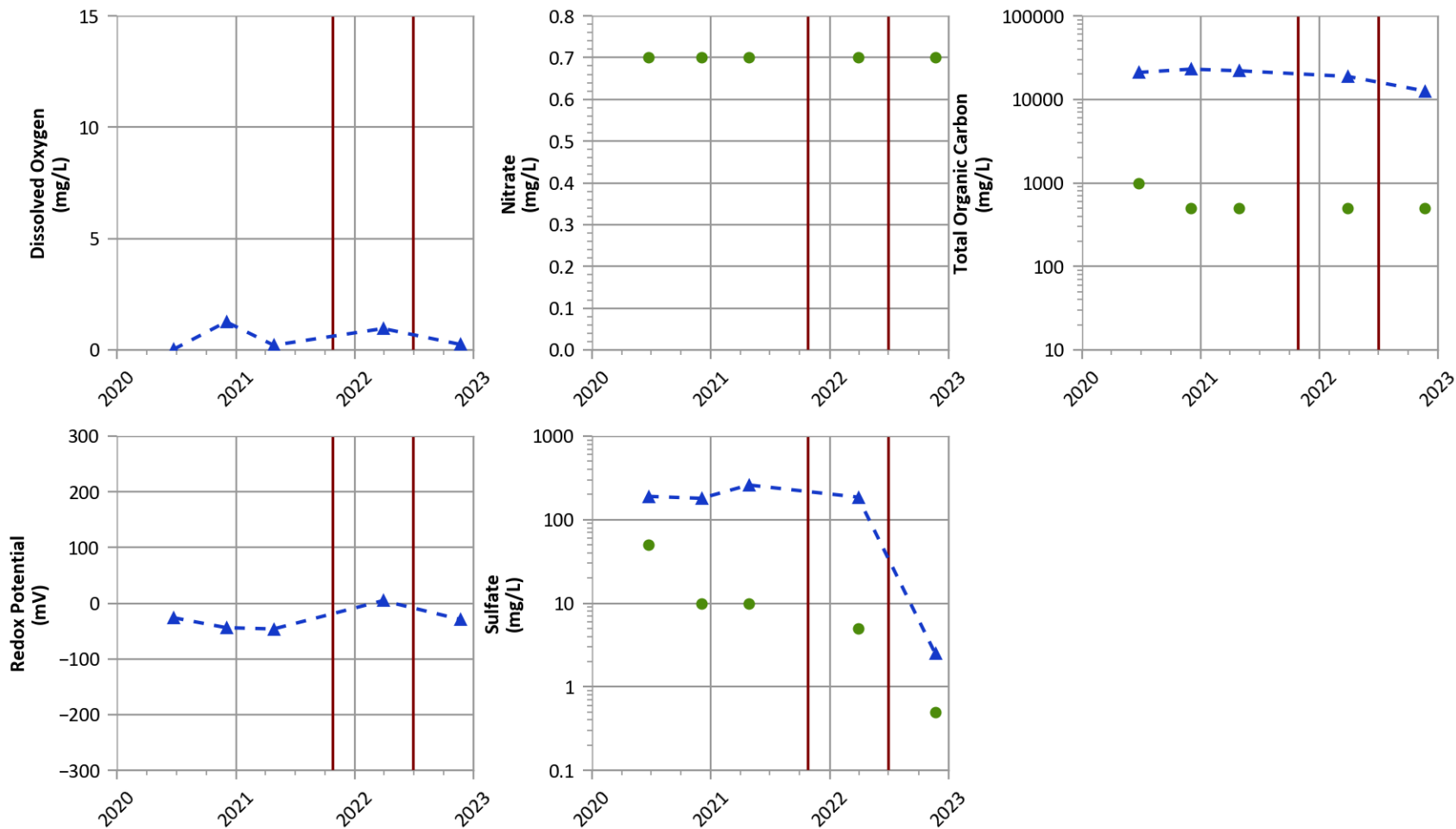


## Zone 11 ISB Graphs





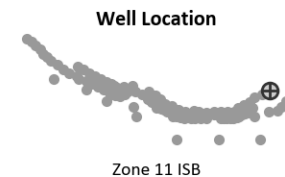
PTX06-ISB055 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



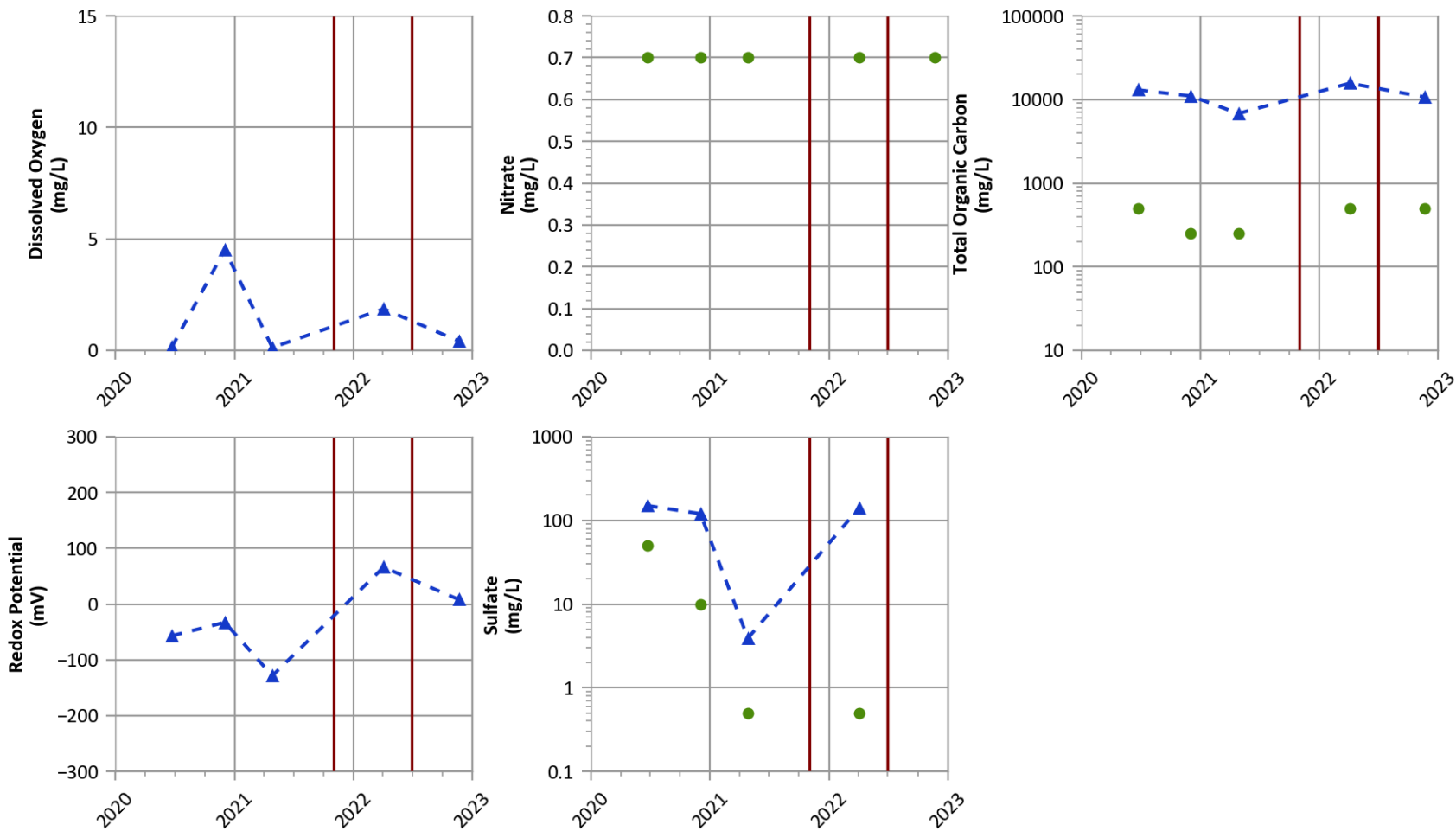
Typical Baseline Concentrations in Perched Groundwater

- 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



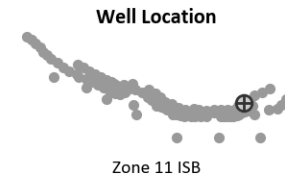
PTX06-ISB059 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



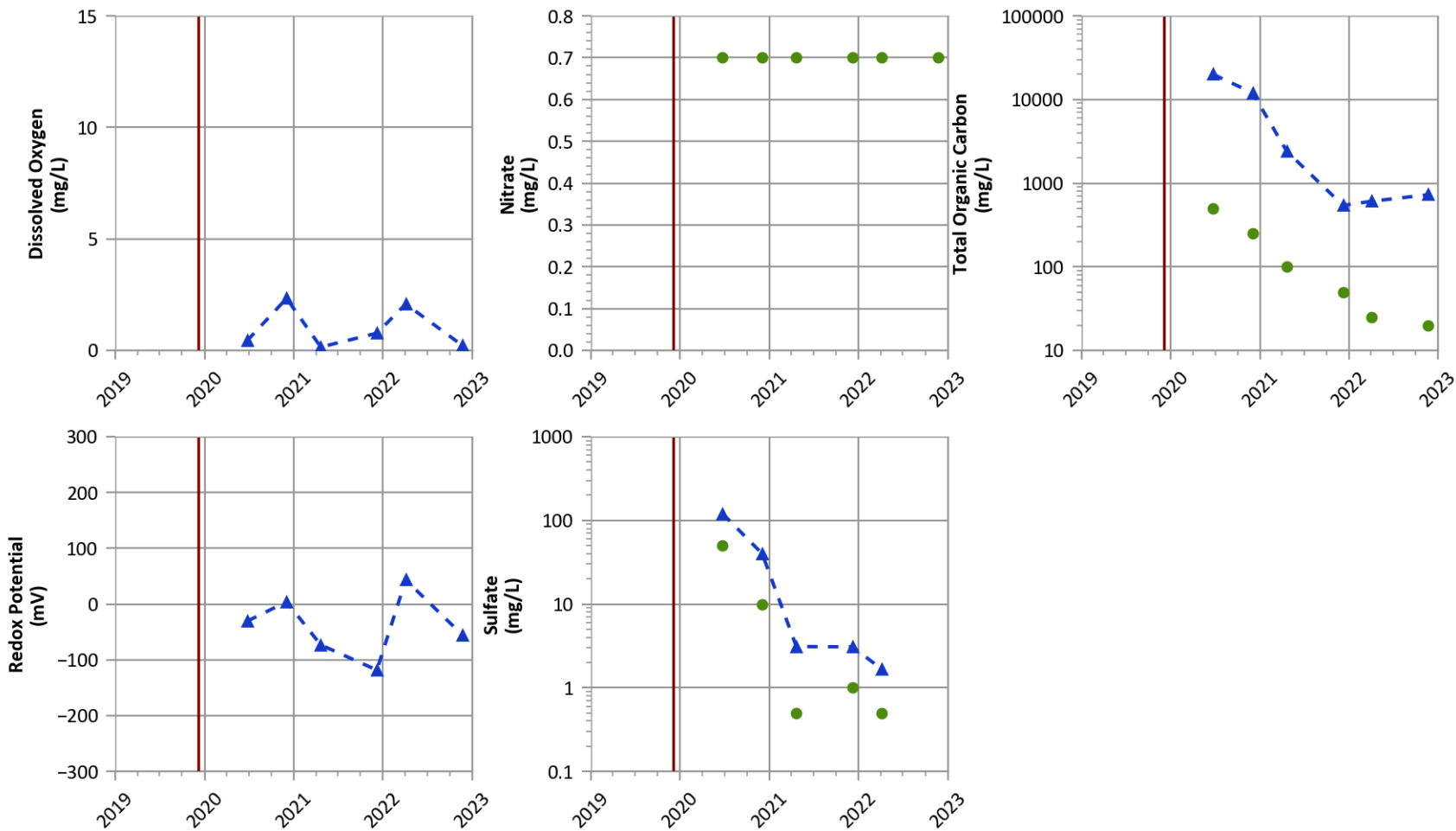
Typical Baseline Concentrations in Perched Groundwater

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



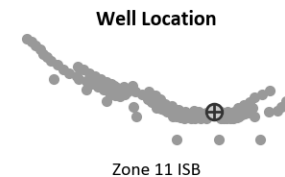
PTX06-ISB064 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



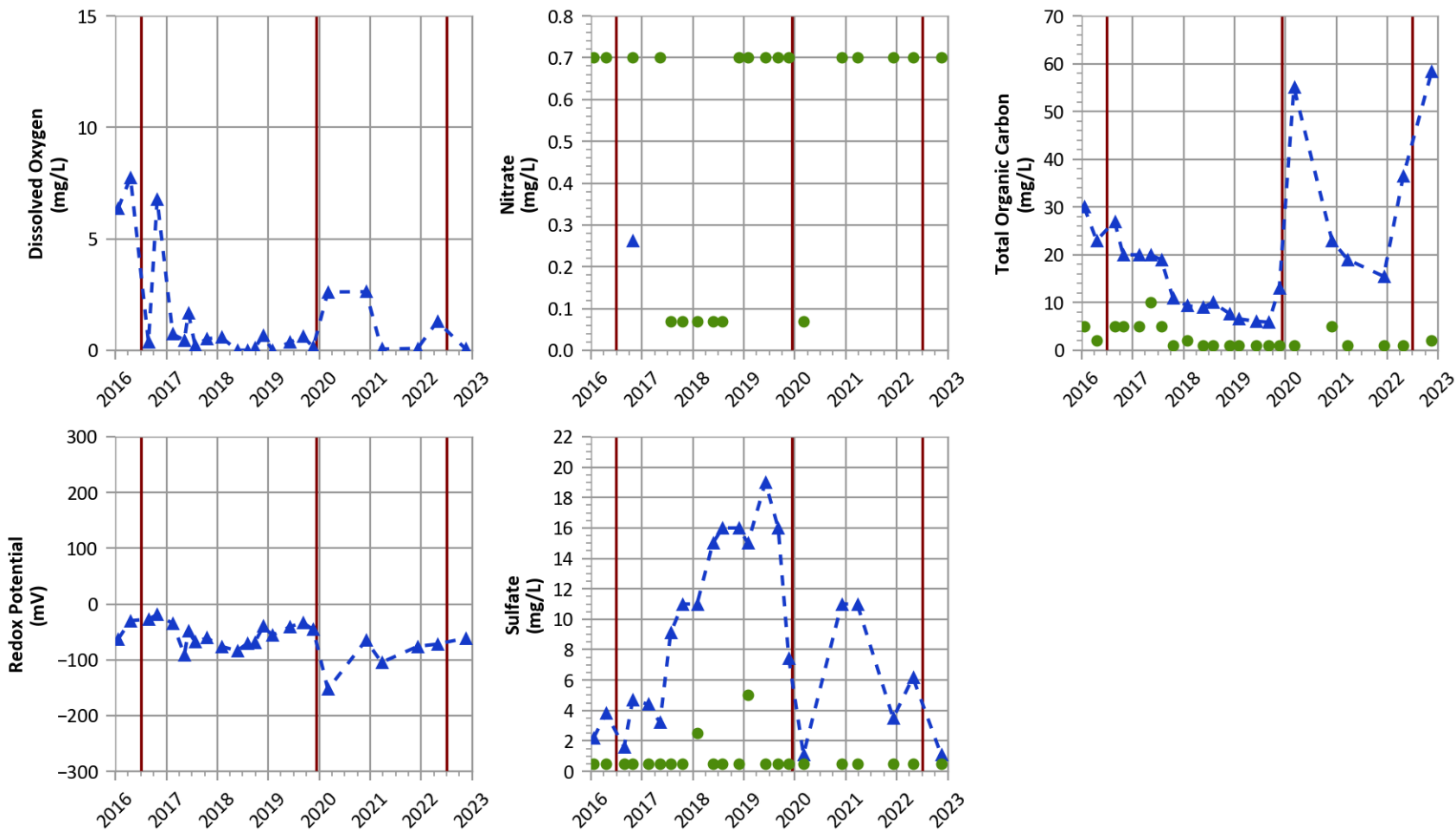
Typical Baseline Concentrations in Perched Groundwater

- 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



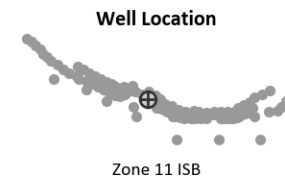
PTX06-ISB075 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



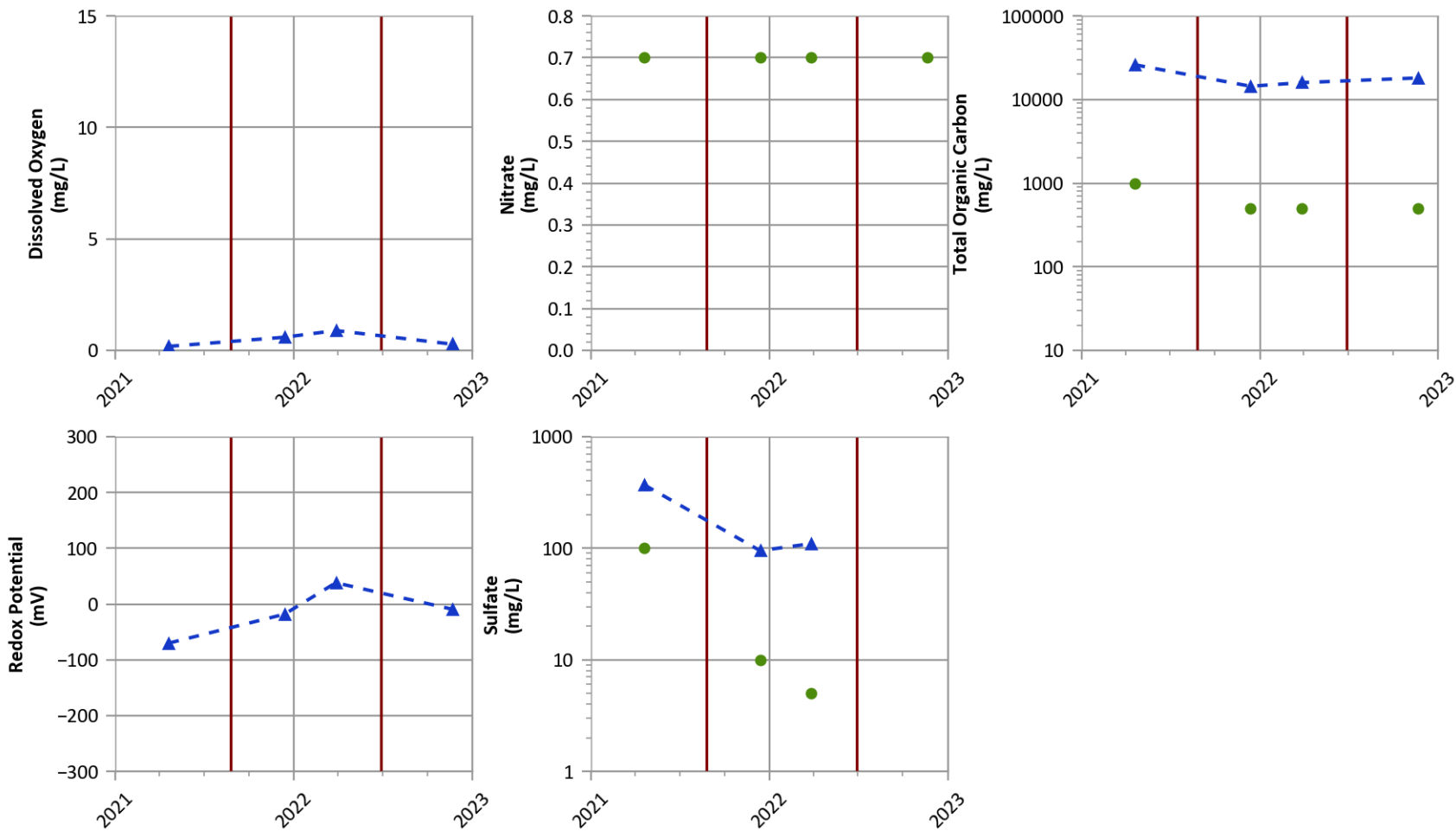
Typical Baseline Concentrations in Perched Groundwater

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

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



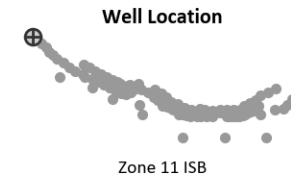
PTX06-ISB137 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



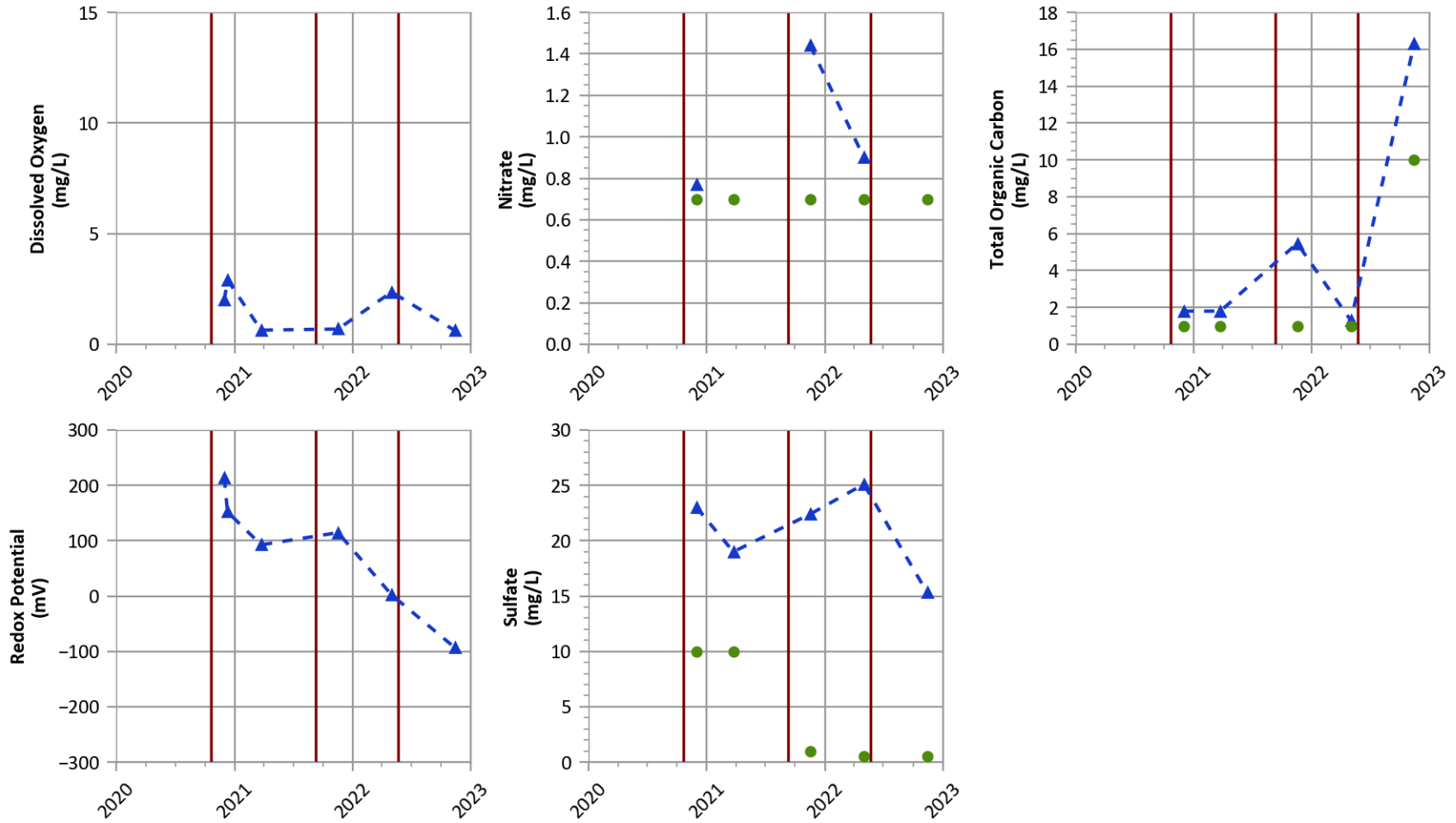
Typical Baseline Concentrations in Perched Groundwater

- 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



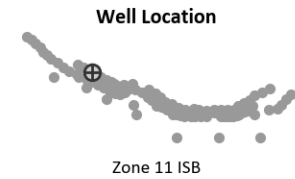
**PTX06-1164 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



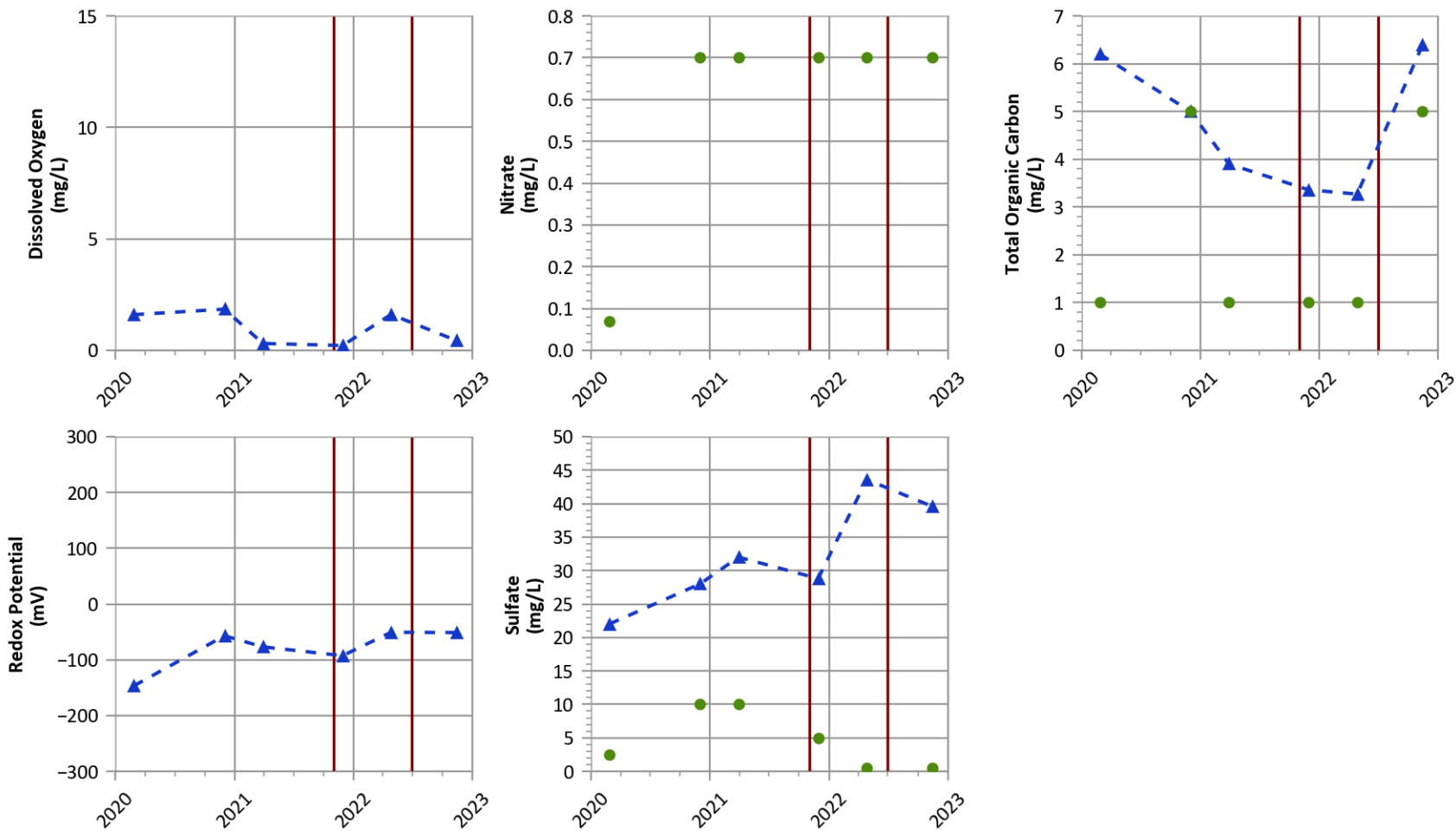
**Typical Baseline Concentrations in Perched Groundwater**

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



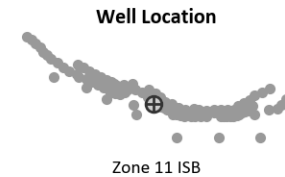
PTX06-1169 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



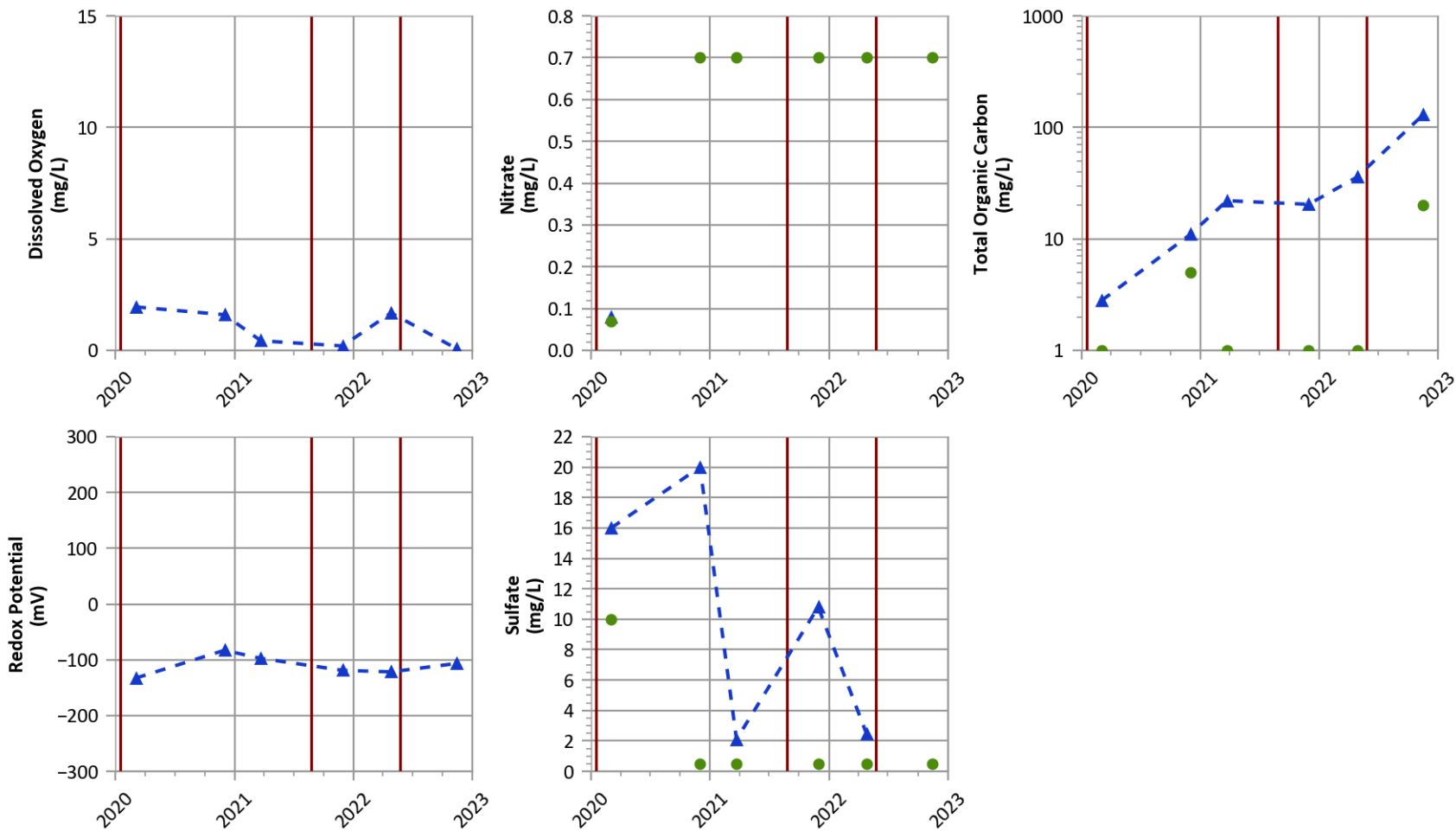
Typical Baseline Concentrations in Perched Groundwater

- 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



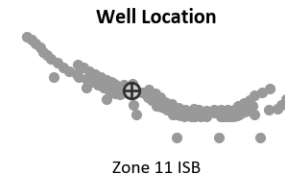
**PTX06-1170 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



**Typical Baseline Concentrations in Perched Groundwater**

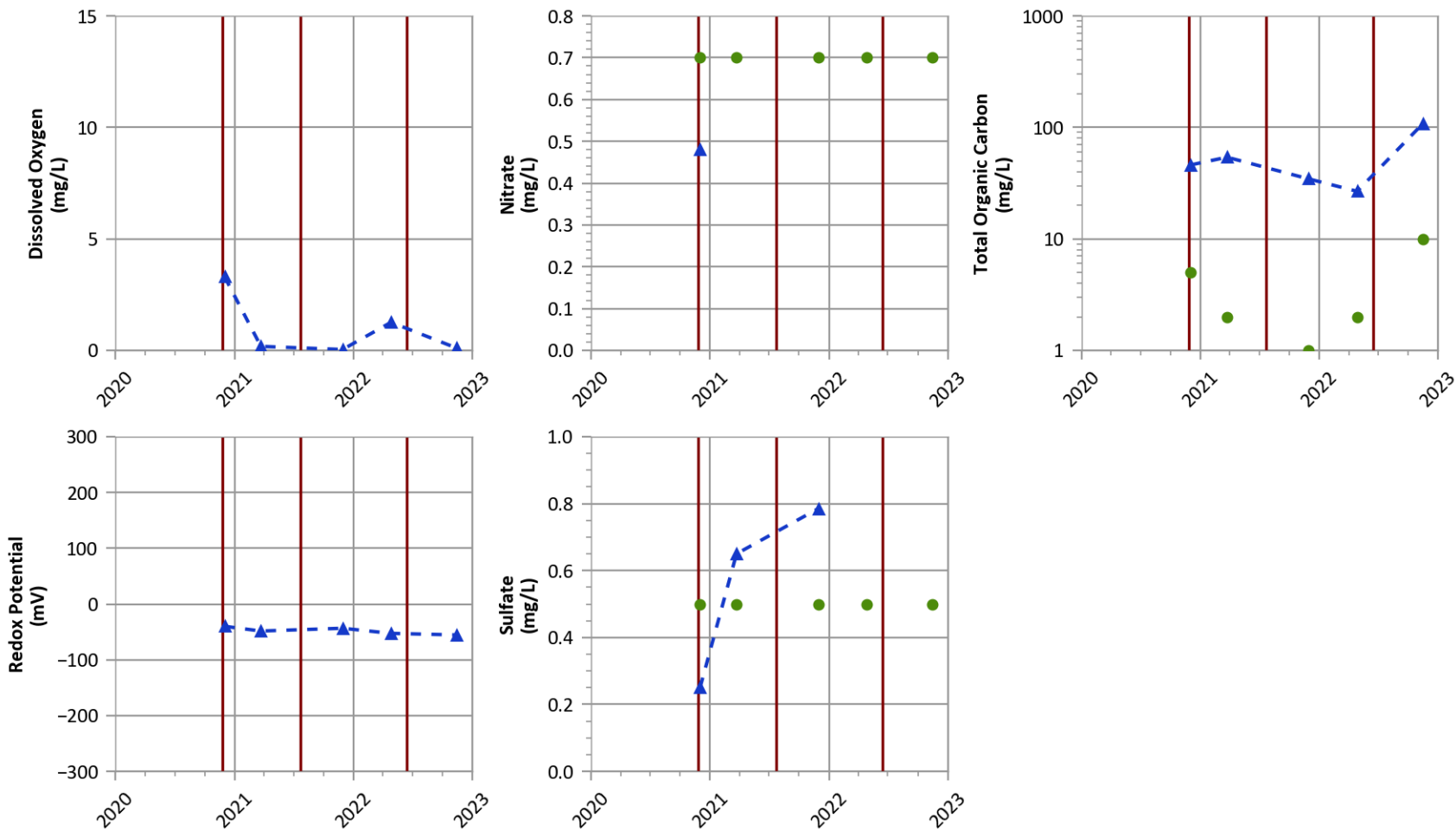
Dissolved Oxygen: 5-10 mg/L  
 Redox Potential: > 100 mV  
 Nitrate: > 1 mg/L  
 Sulfate: > 10 mg/L  
 Total Organic Carbon: < 5 mg/L  
 Total Volatile Fatty Acids: Not Detected

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





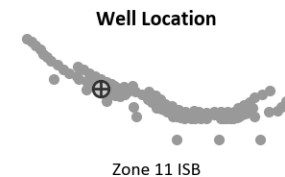
**PTX06-1176 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



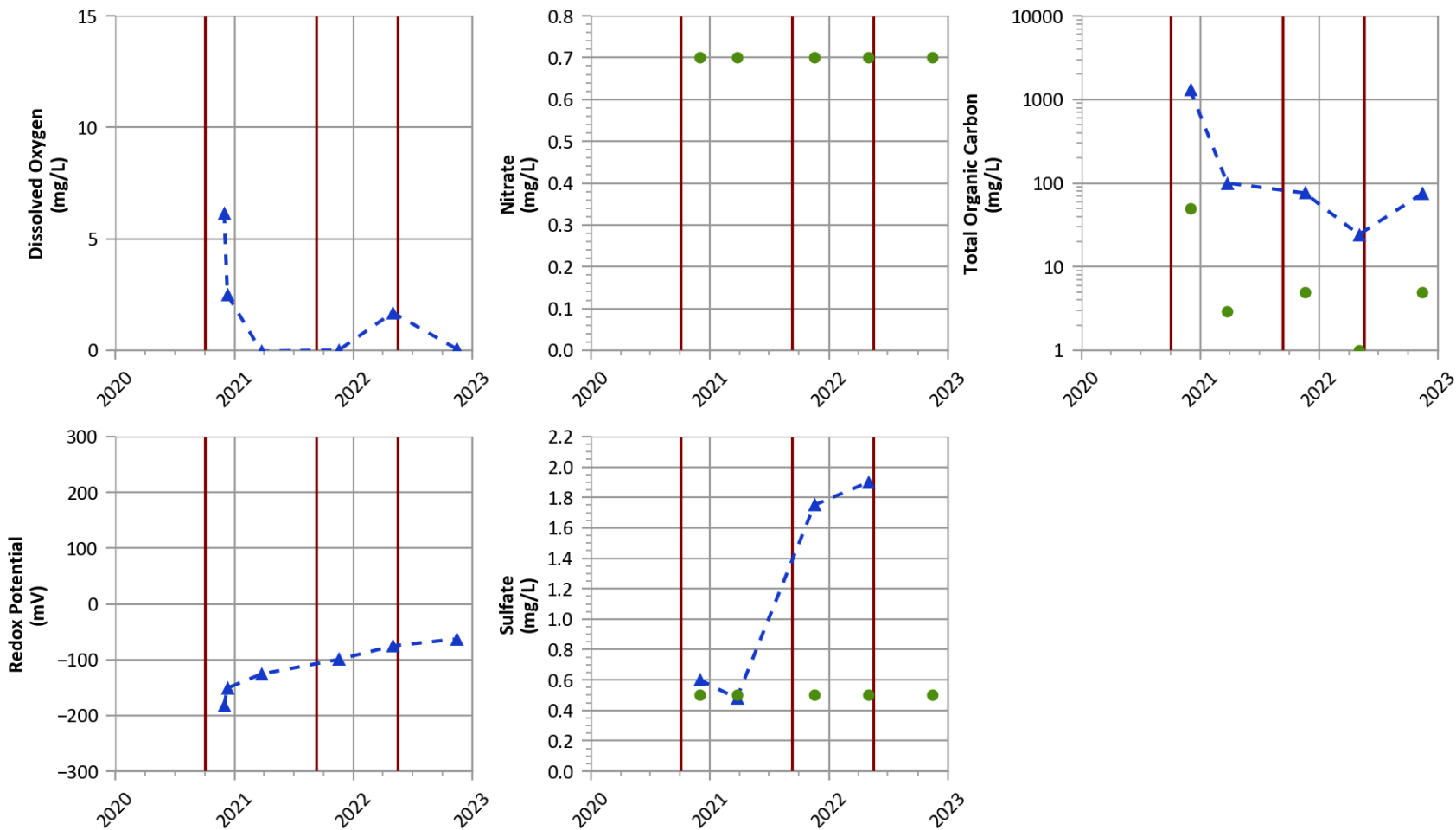
**Typical Baseline Concentrations in Perched Groundwater**

- 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



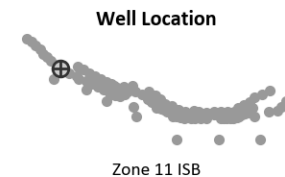
**PTX06-1177 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



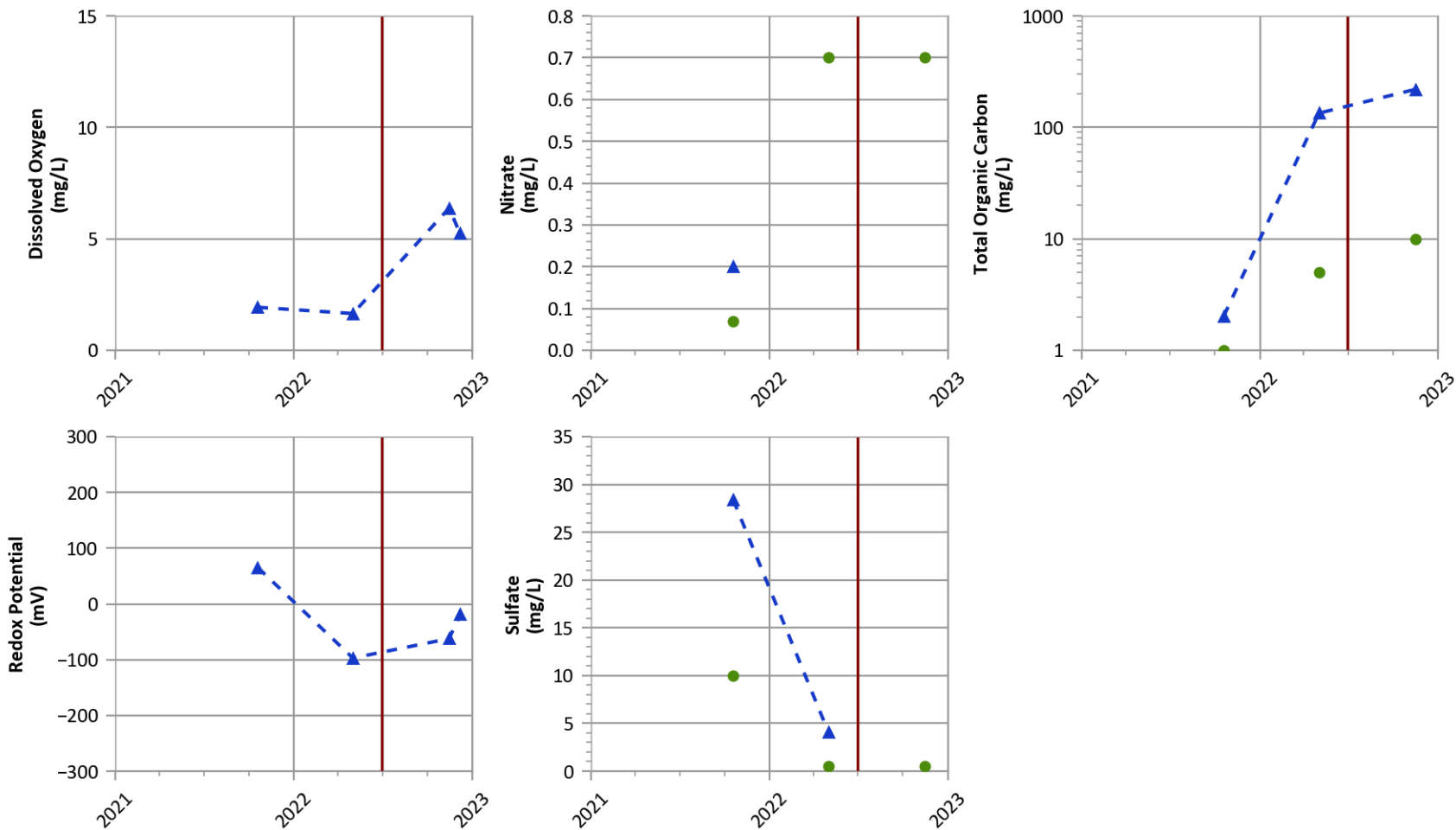
**Typical Baseline Concentrations in Perched Groundwater**

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



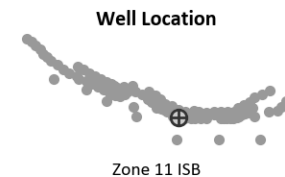
**PTX06-1209 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



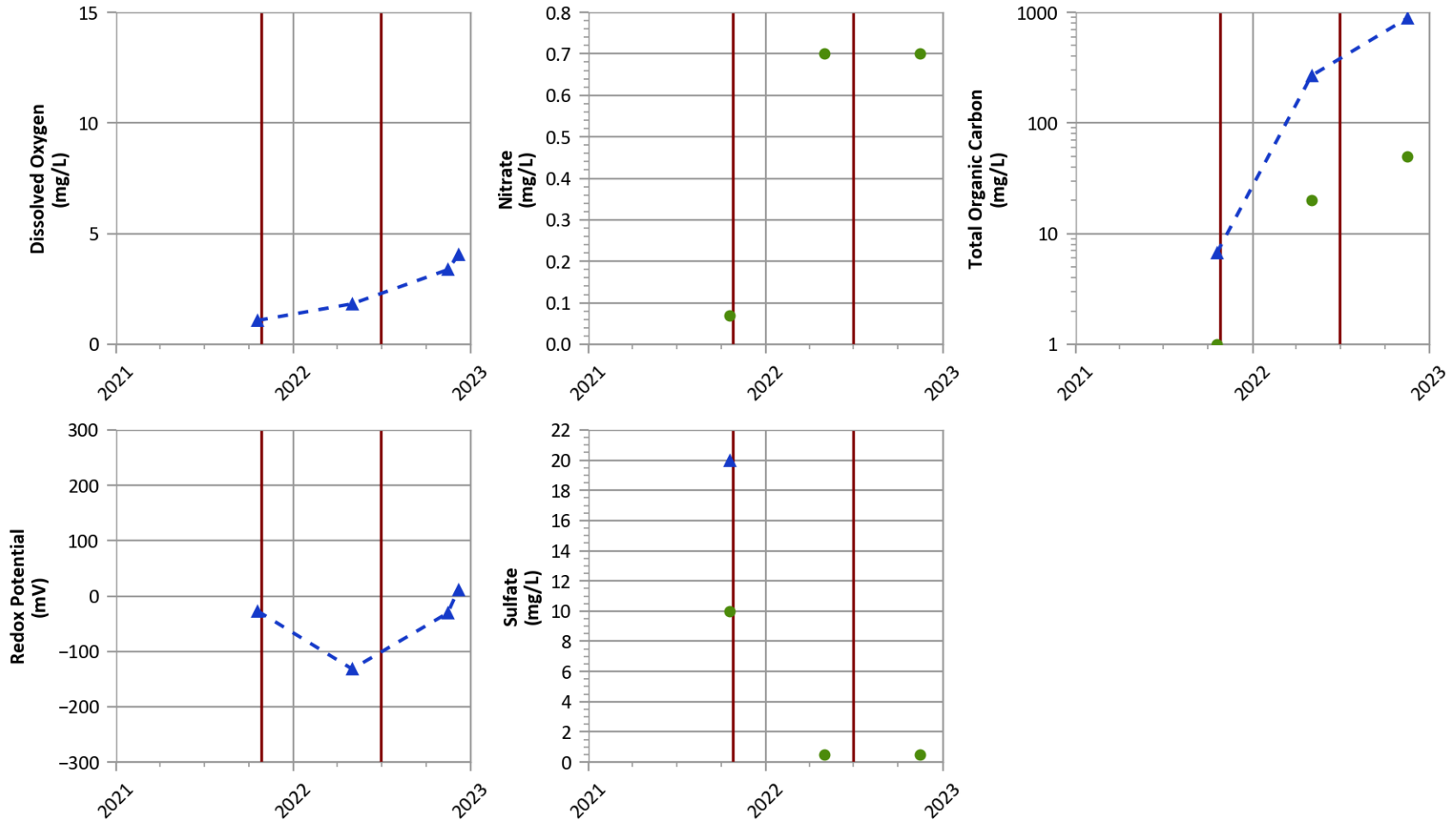
**Typical Baseline Concentrations in Perched Groundwater**

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



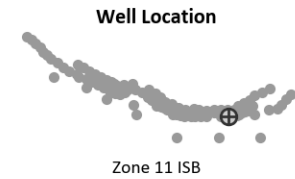
**PTX06-1210 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



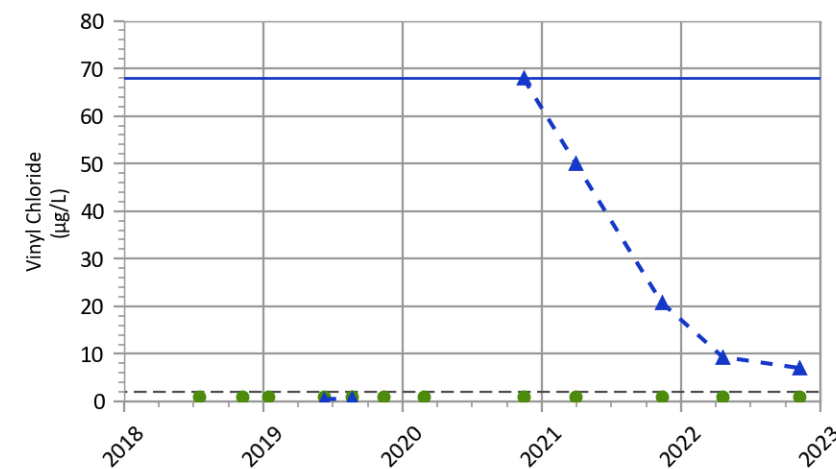
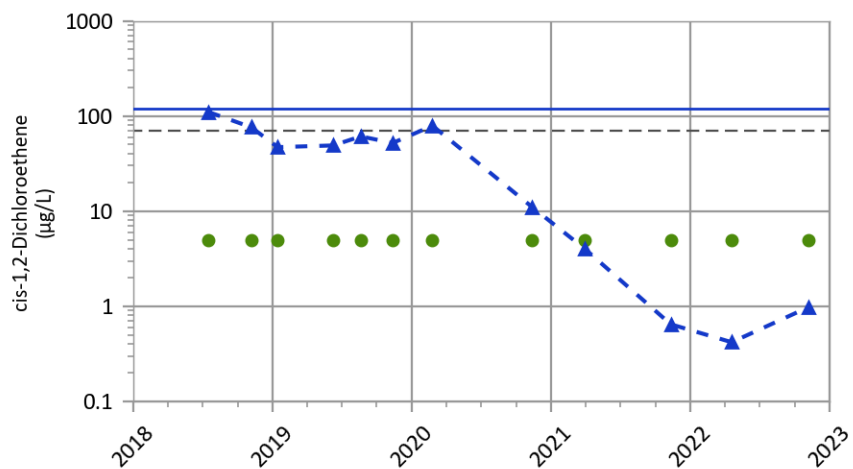
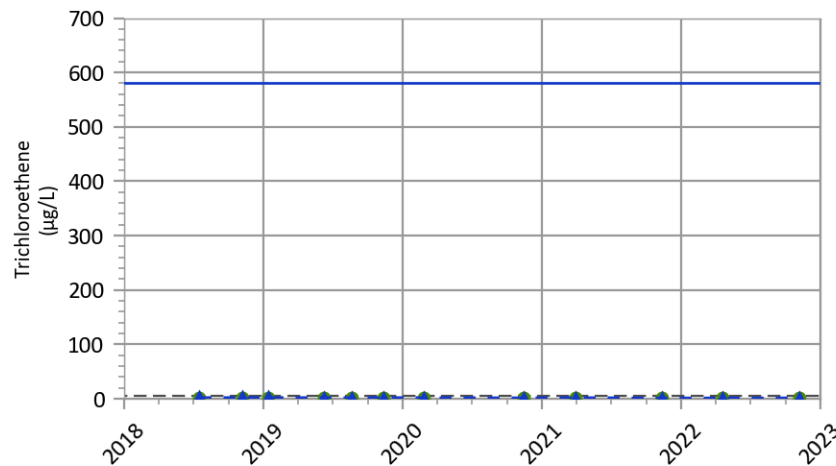
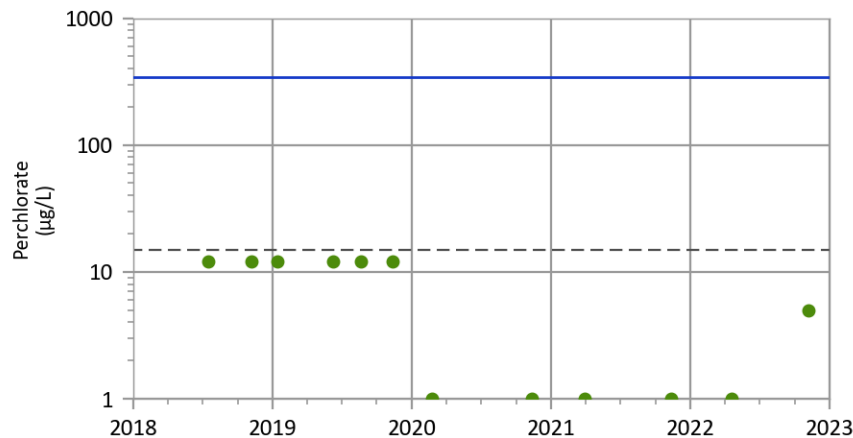
**Typical Baseline Concentrations in Perched Groundwater**

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



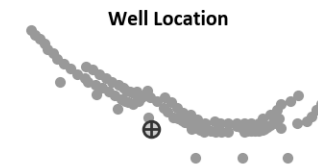
**PTX06-1012 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



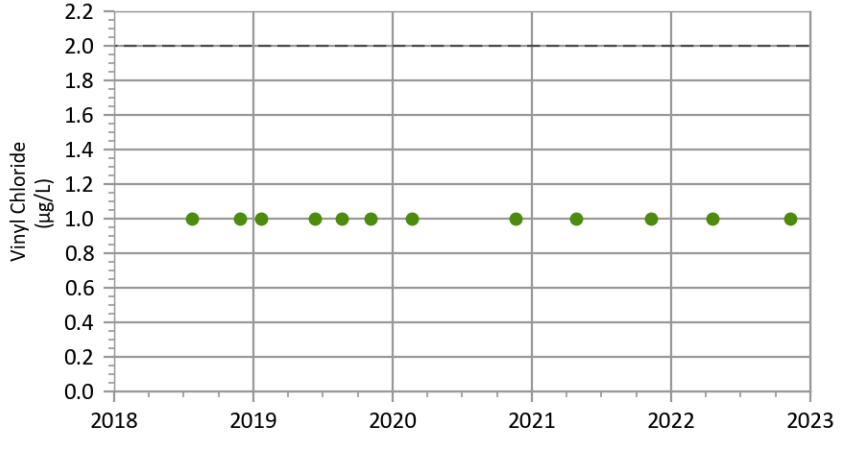
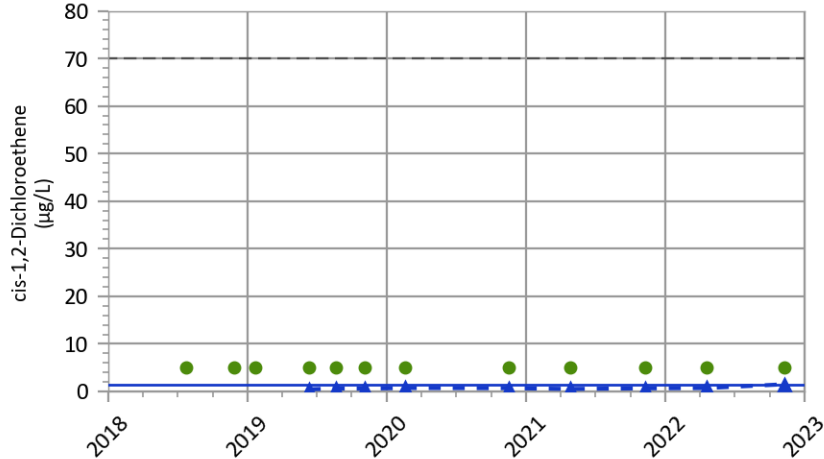
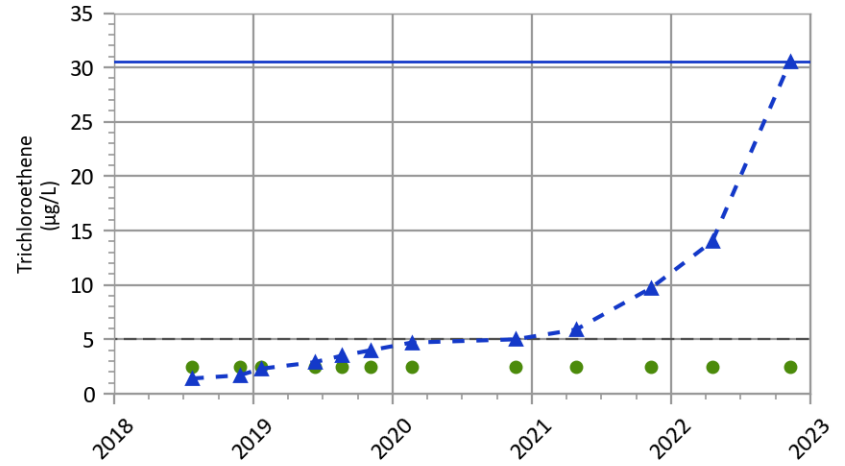
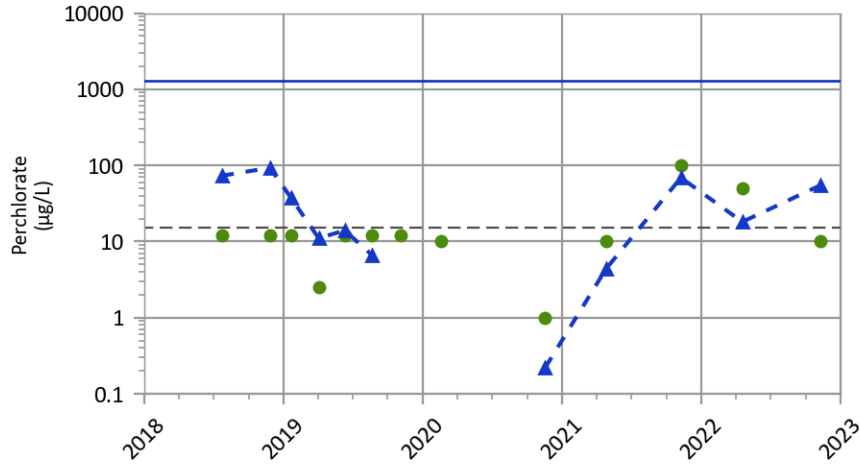
Most Recent Measured COC Concentrations (Nov 07, 2022)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	0.981	70.0
TCE	0.399	5.0
VC	7.02	2.0

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



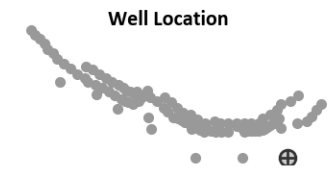
**PTX06-1148 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



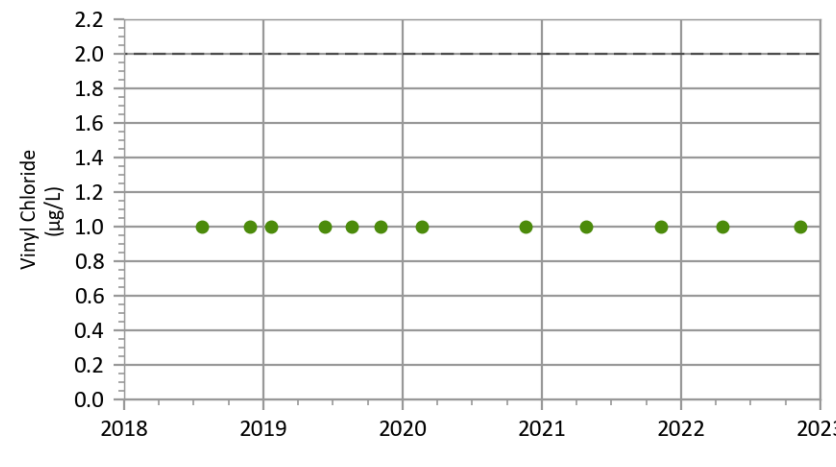
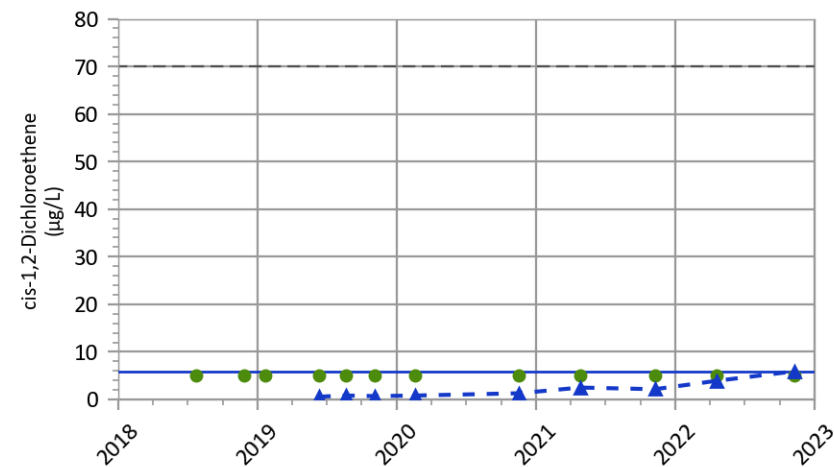
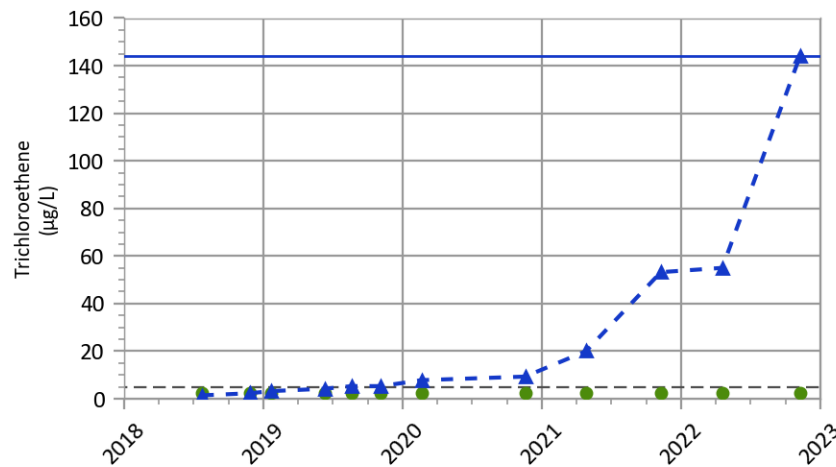
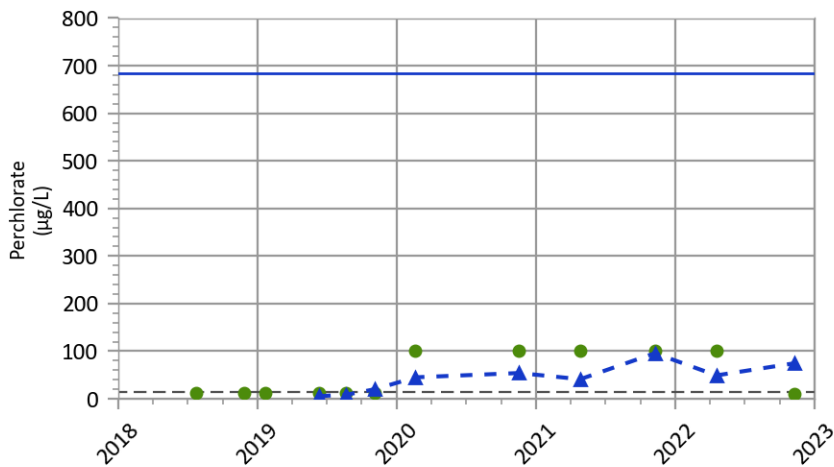
Most Recent Measured COC Concentrations (Nov 08, 2022)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	54.4	15.0
DCE12C	1.5	70.0
TCE	30.5	5.0
VC	Non-Detect	2.0

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



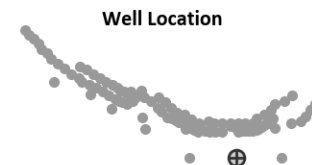
**PTX06-1149 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



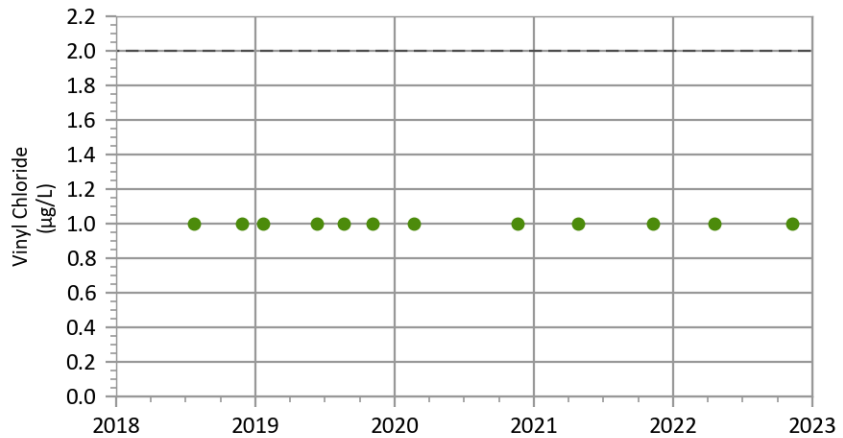
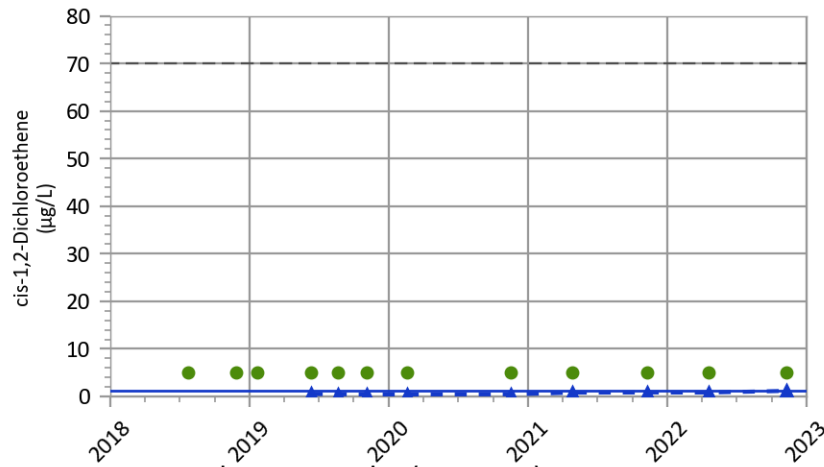
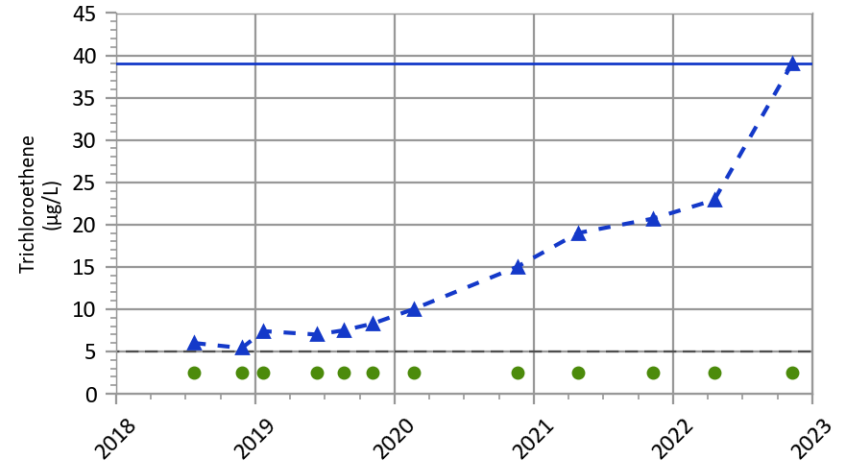
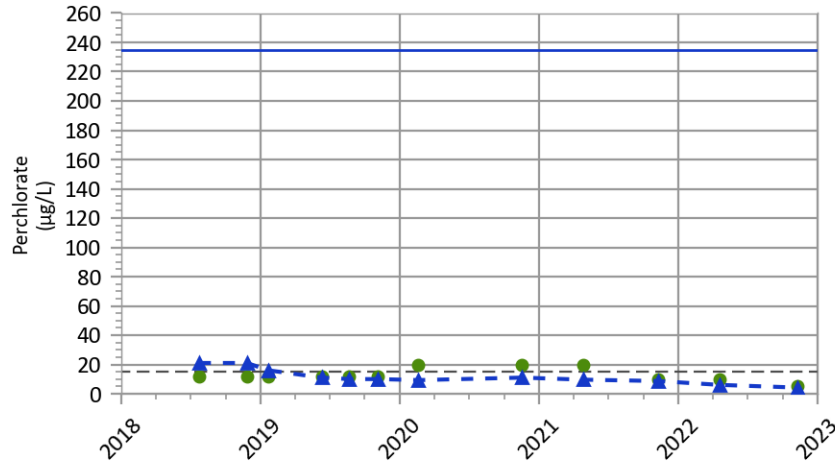
Most Recent Measured COC Concentrations (Nov 08, 2022)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	74.4	15.0
DCE12C	5.9	70.0
TCE	144.0	5.0
VC	Non-Detect	2.0

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



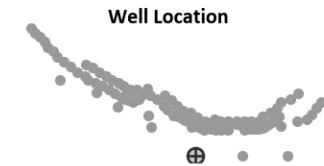
**PTX06-1150 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (Nov 08, 2022)

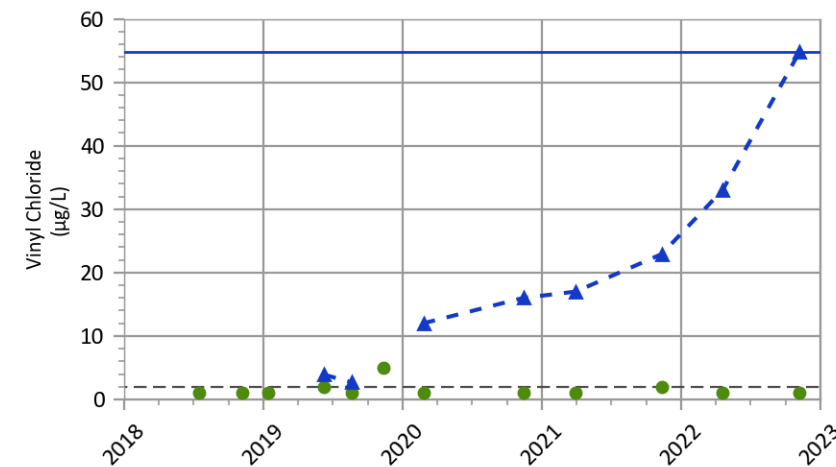
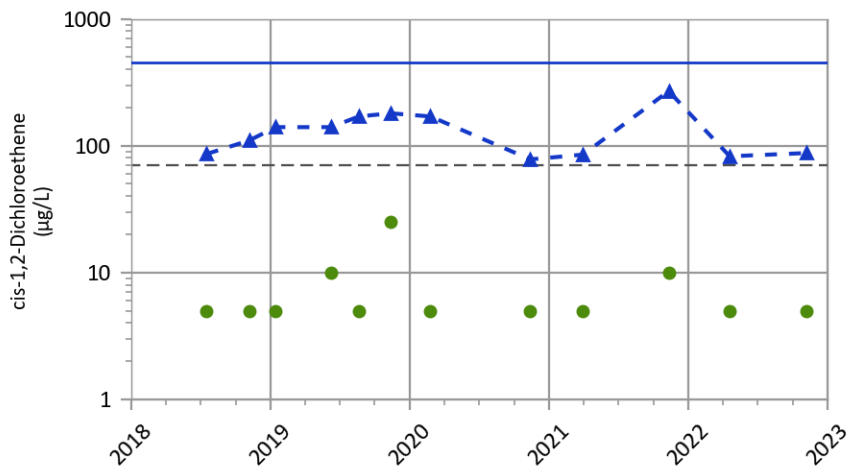
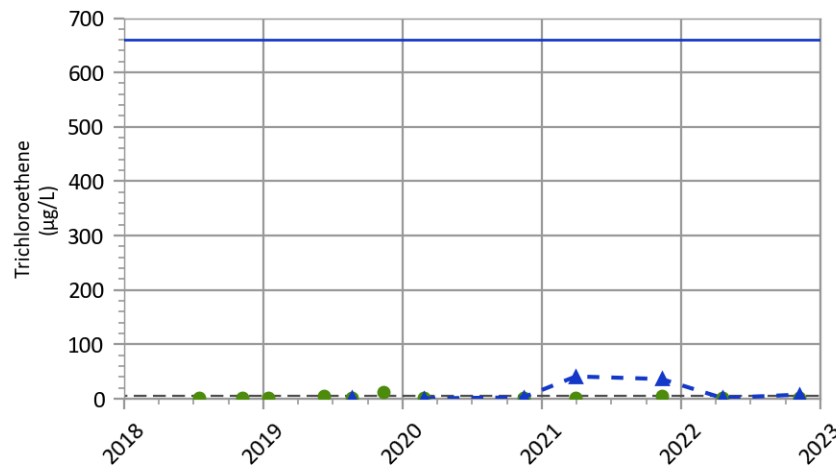
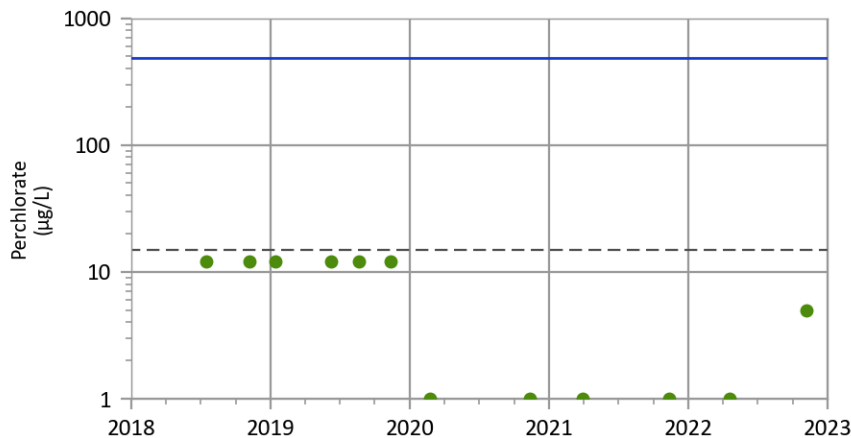
COC	Concentration (µg/L)	GWPS (µg/L)
PERC	4.2	15.0
DCE12C	1.17	70.0
TCE	39.0	5.0
VC	Non-Detect	2.0

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





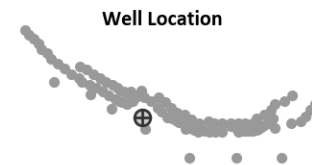
**PTX06-1155 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



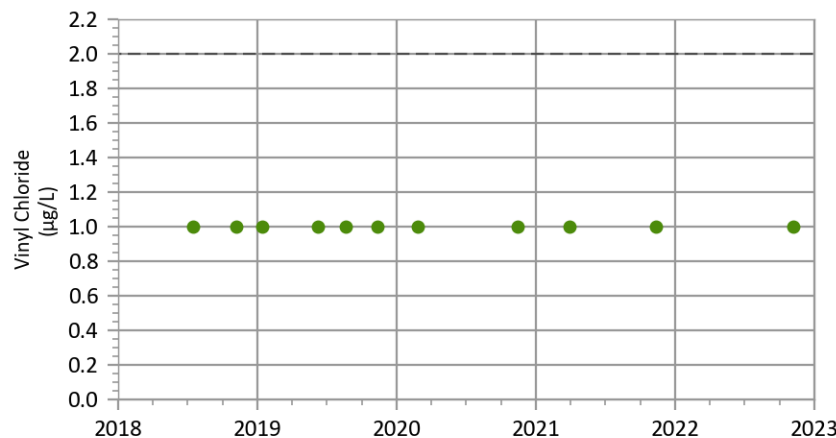
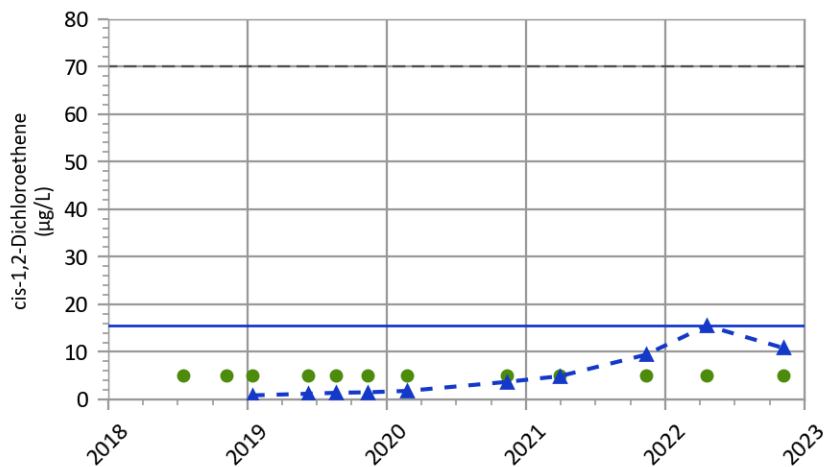
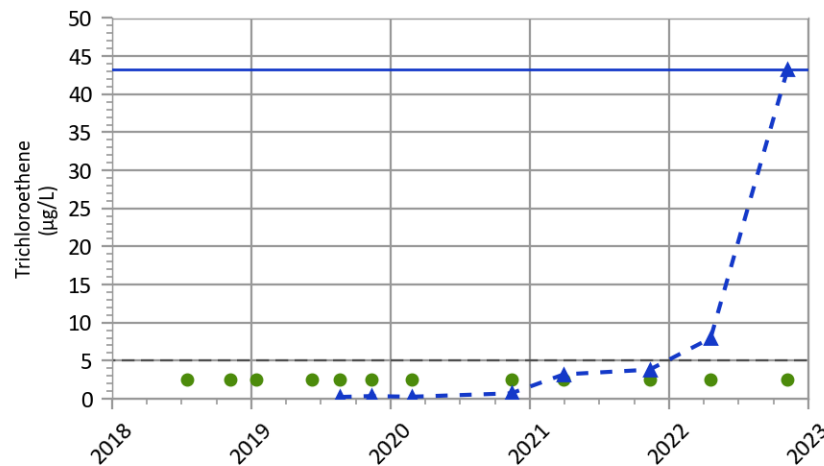
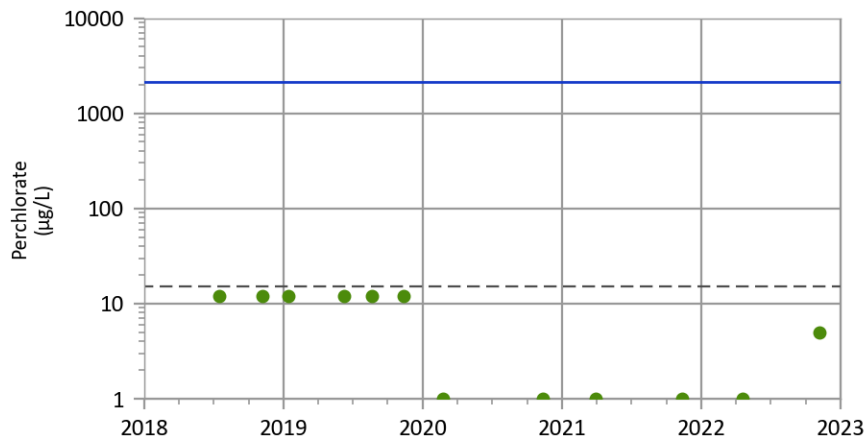
Most Recent Measured COC Concentrations (Nov 07, 2022)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	87.5	70.0
TCE	7.6	5.0
VC	54.8	2.0

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



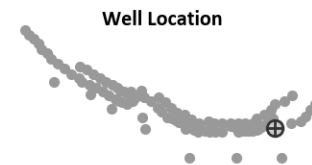
**PTX06-1156 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



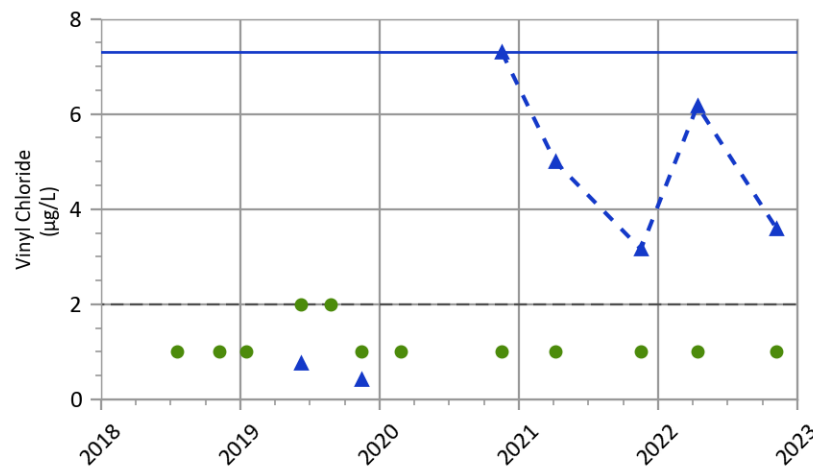
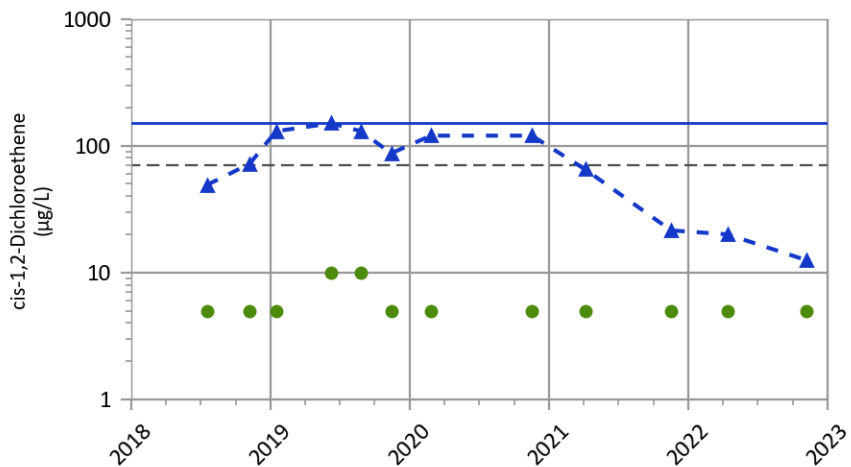
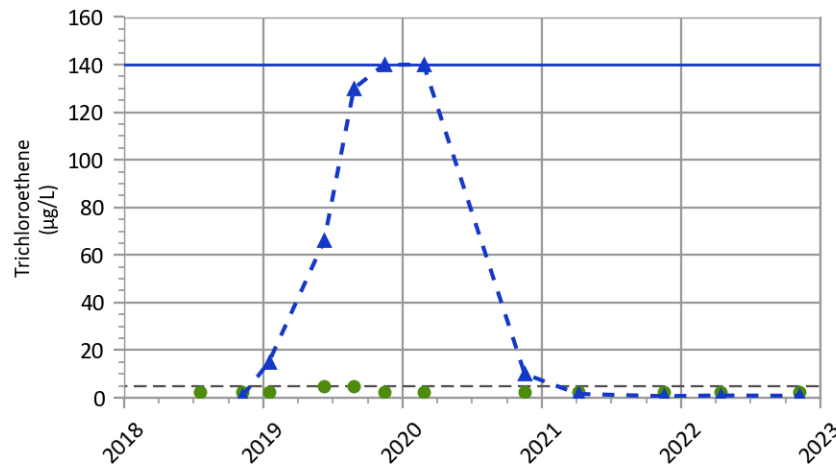
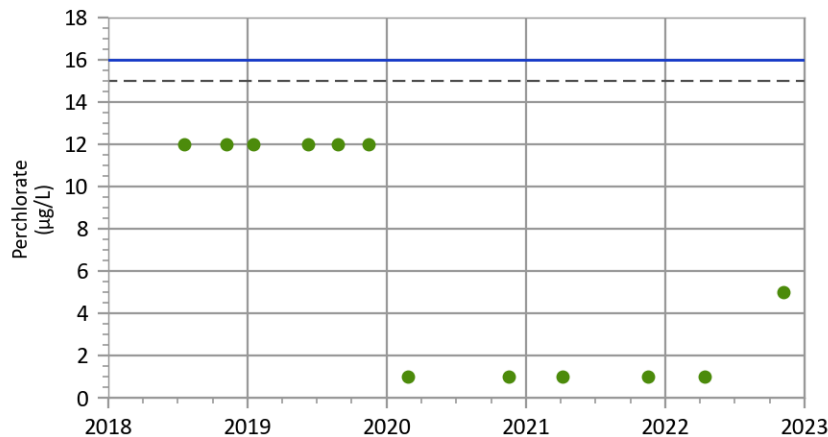
Most Recent Measured COC Concentrations (Nov 07, 2022)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	10.8	70.0
TCE	43.3	5.0
VC	Non-Detect	2.0

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



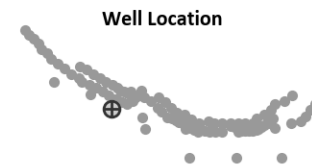
**PTX06-1173 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



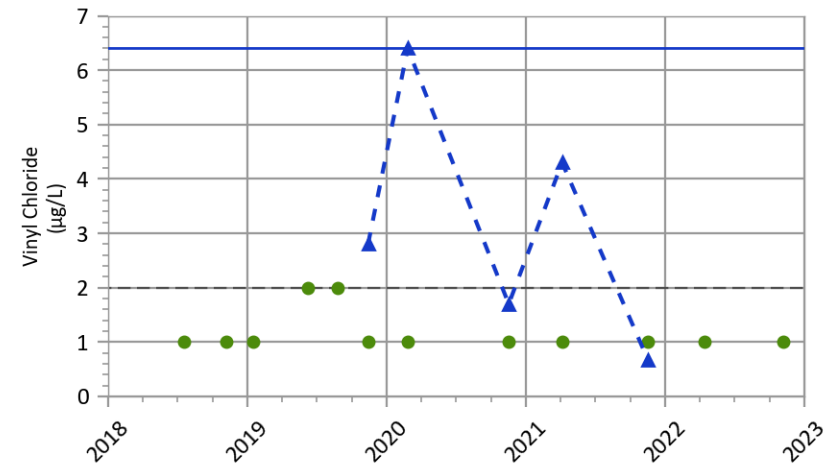
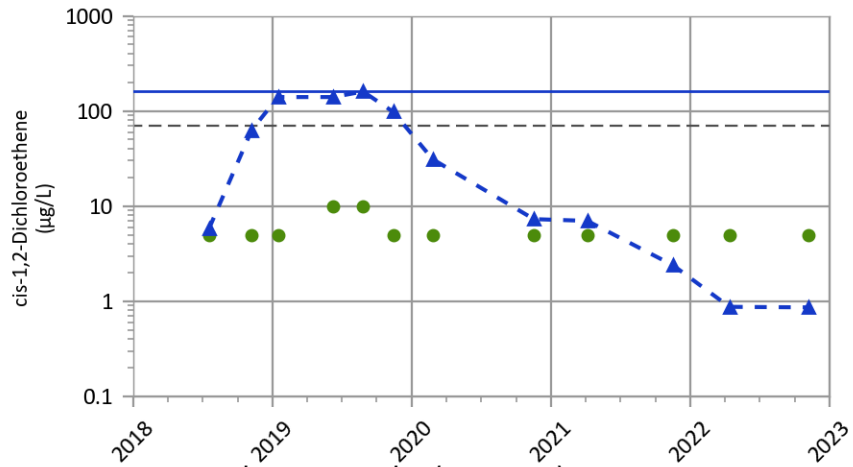
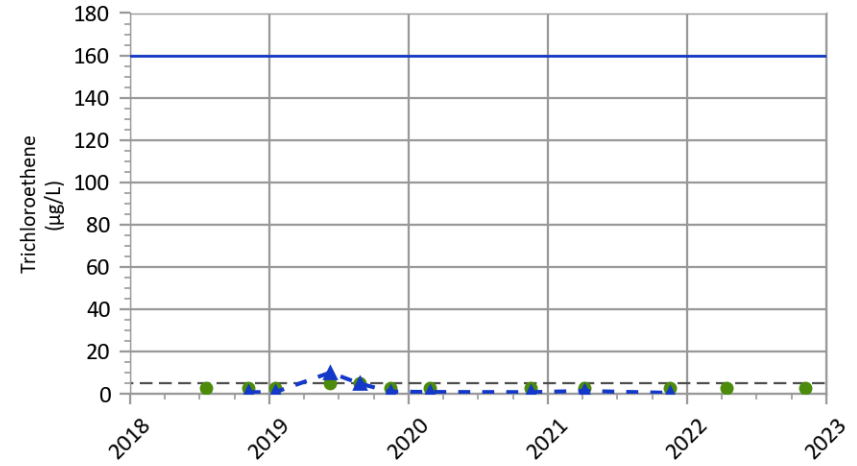
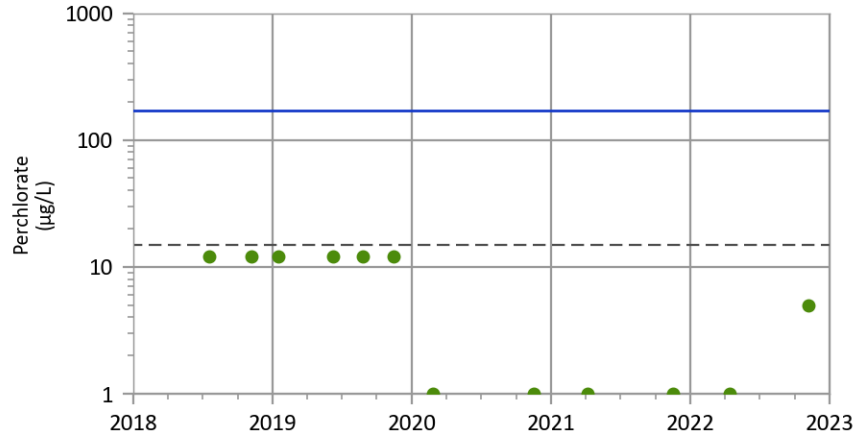
Most Recent Measured COC Concentrations (Nov 07, 2022)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	12.5	70.0
TCE	0.829	5.0
VC	3.59	2.0

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



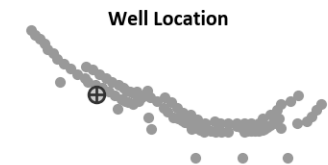
**PTX06-1174 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



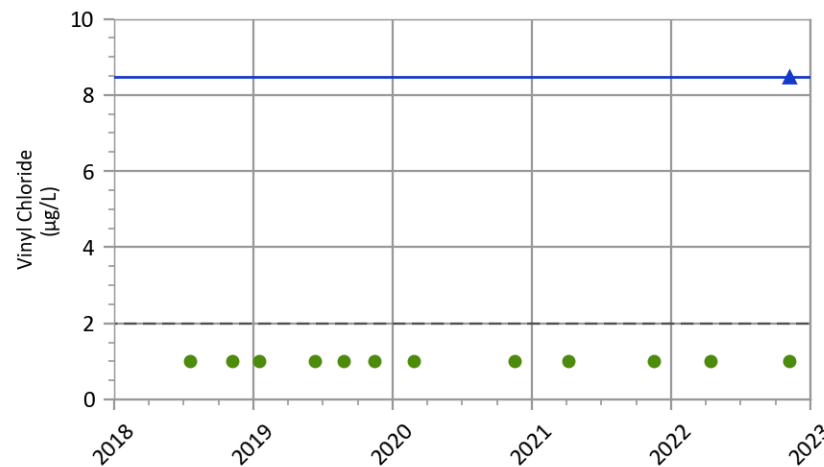
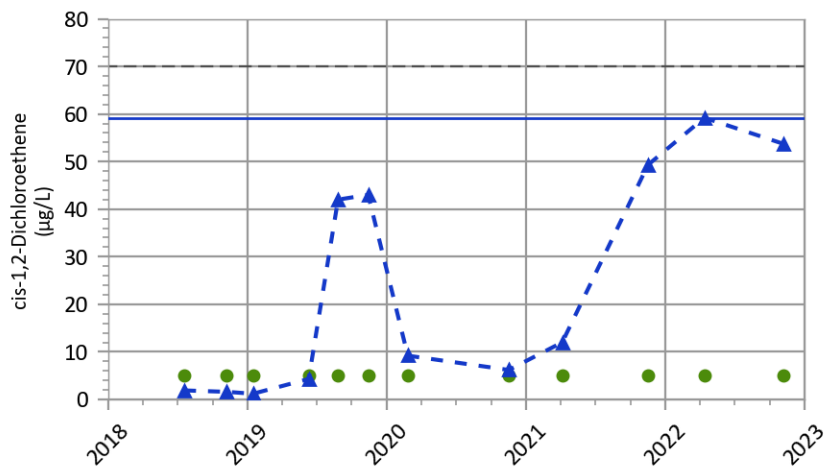
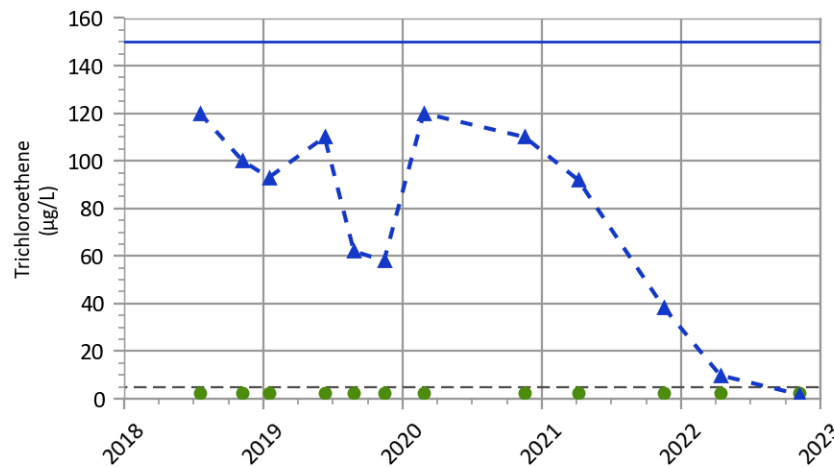
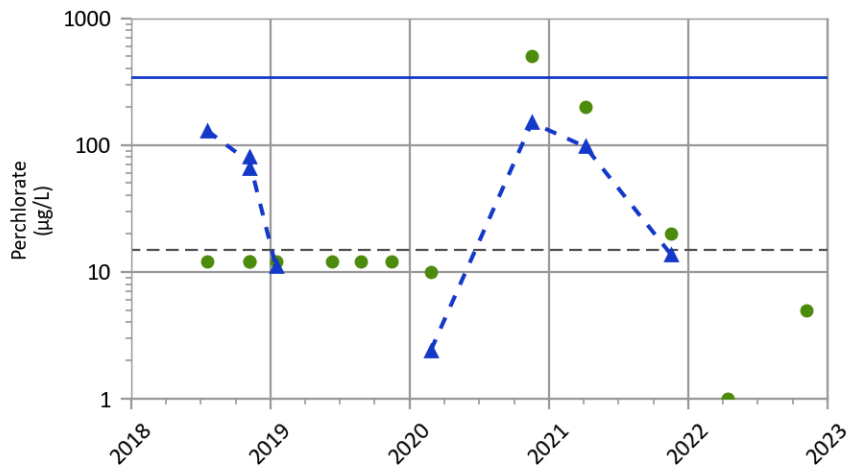
Most Recent Measured COC Concentrations (Nov 16, 2021)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	0.863	70.0
TCE	Non-Detect	5.0
VC	Non-Detect	2.0

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



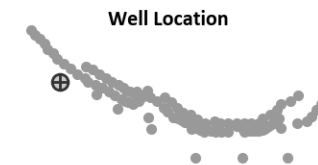
**PTX06-1175 Downgradient Performance Indicators  
Zone 11 In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (Nov 07, 2022)

COC	Concentration (µg/L)	GWPS (µg/L)
PERC	Non-Detect	15.0
DCE12C	53.7	70.0
TCE	1.77	5.0
VC	8.47	2.0

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



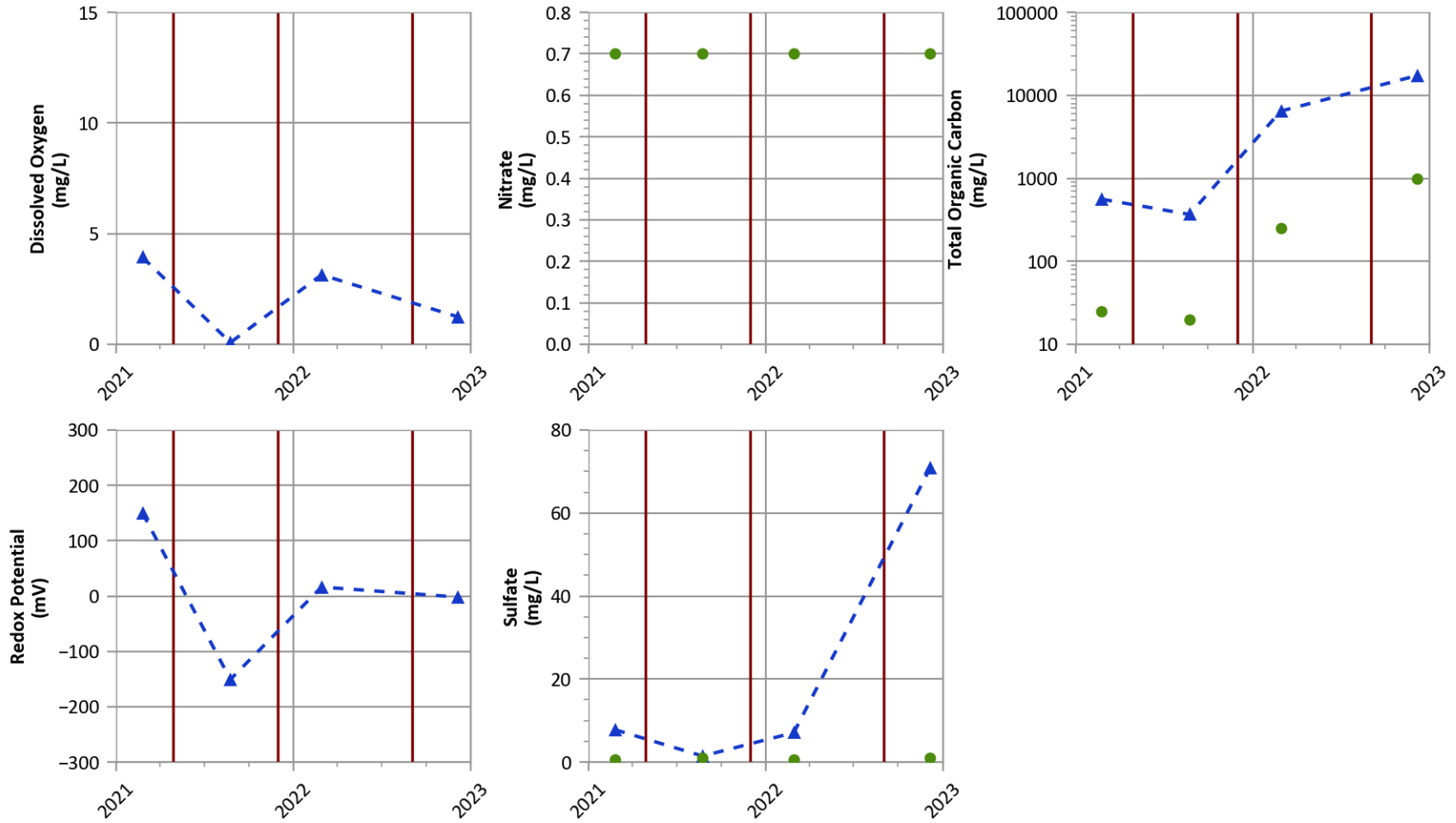


## **Southeast ISB Extension**





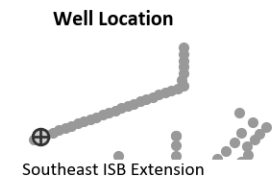
PTX06-ISB302 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



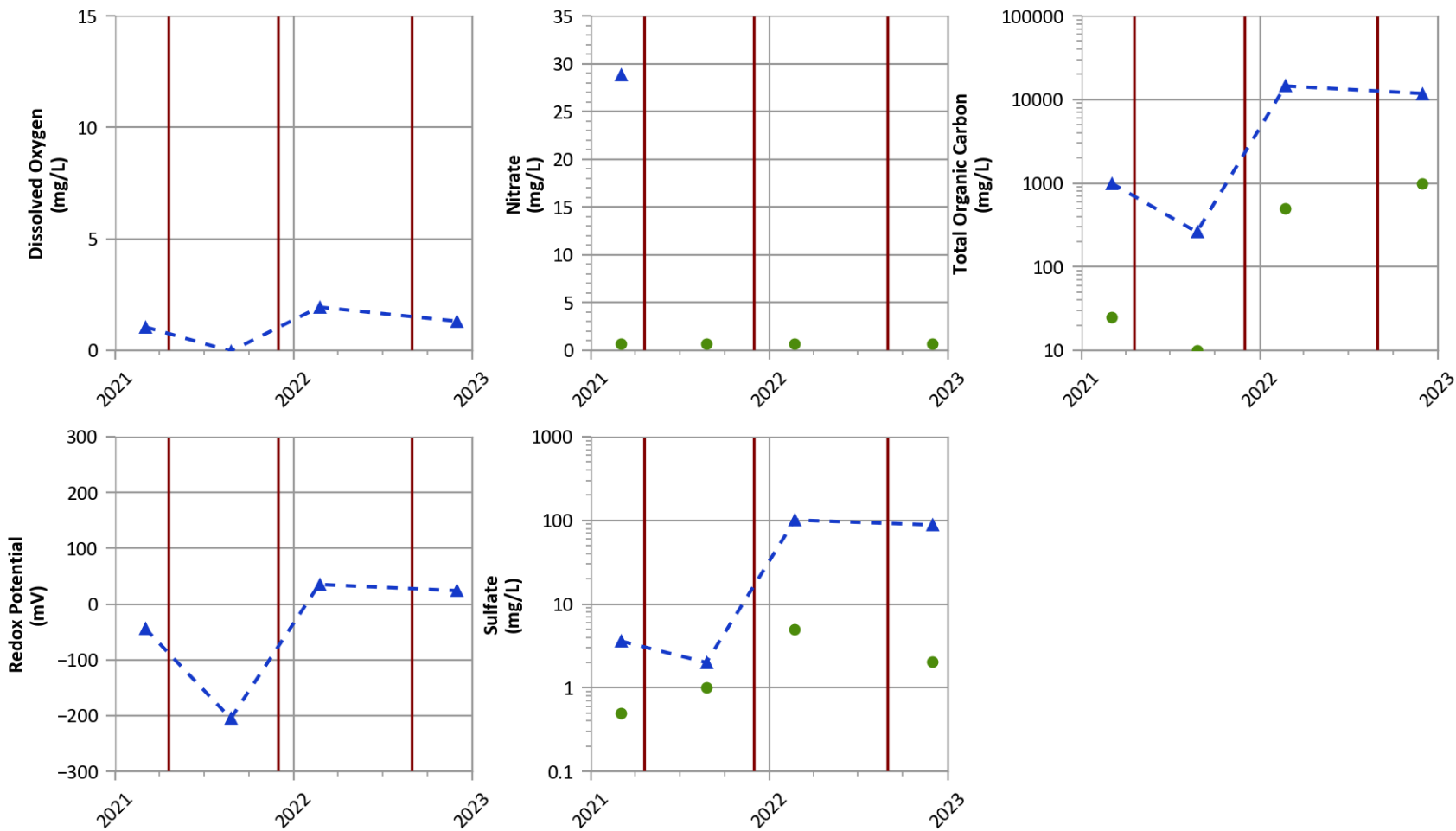
Typical Baseline Concentrations in Perched Groundwater

- 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



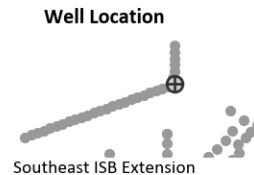
**PTX06-ISB325 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



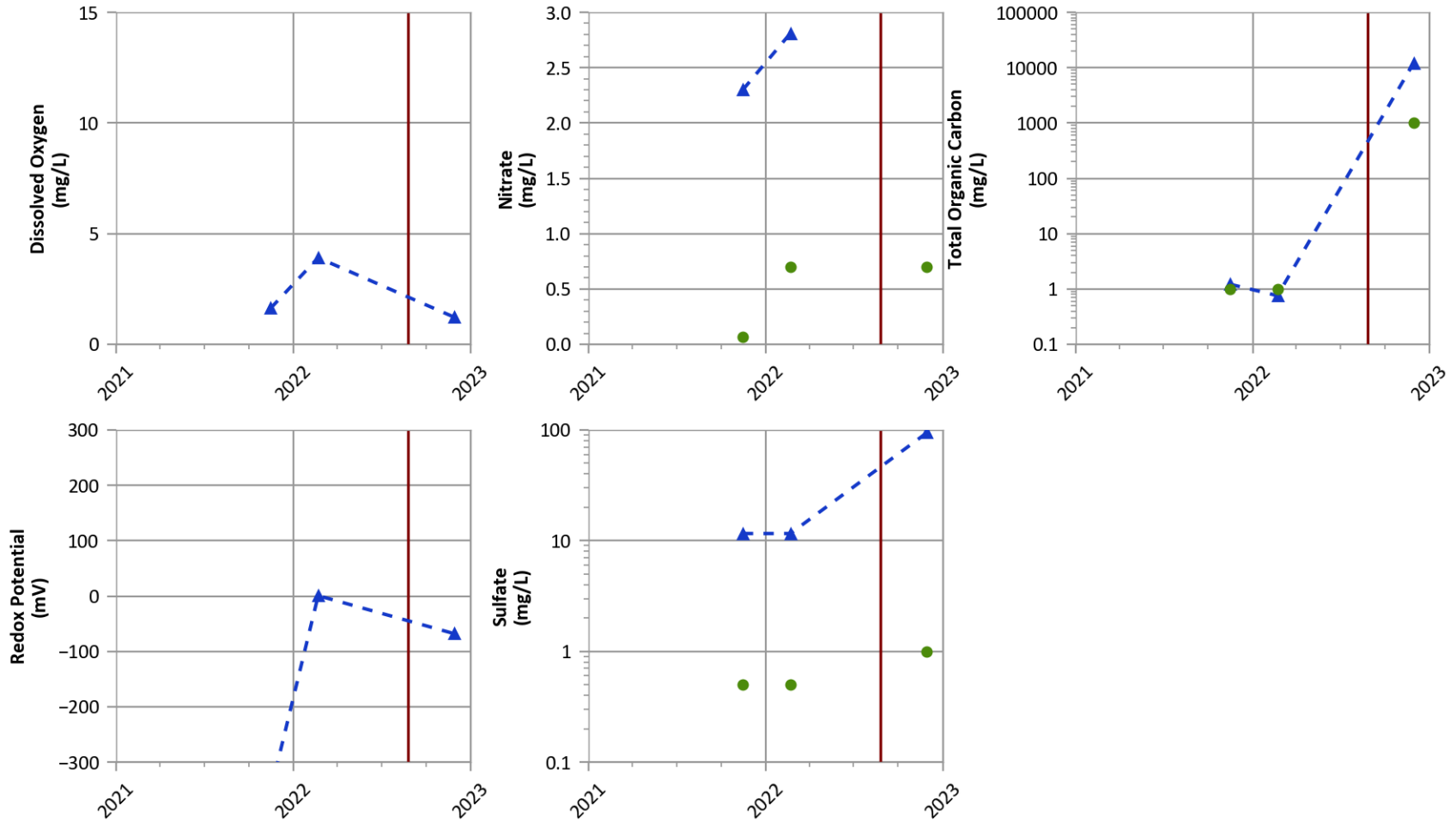
**Typical Baseline Concentrations in Perched Groundwater**

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



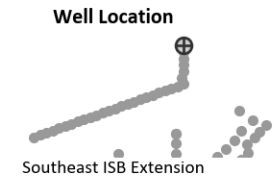
PTX06-ISB331 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant



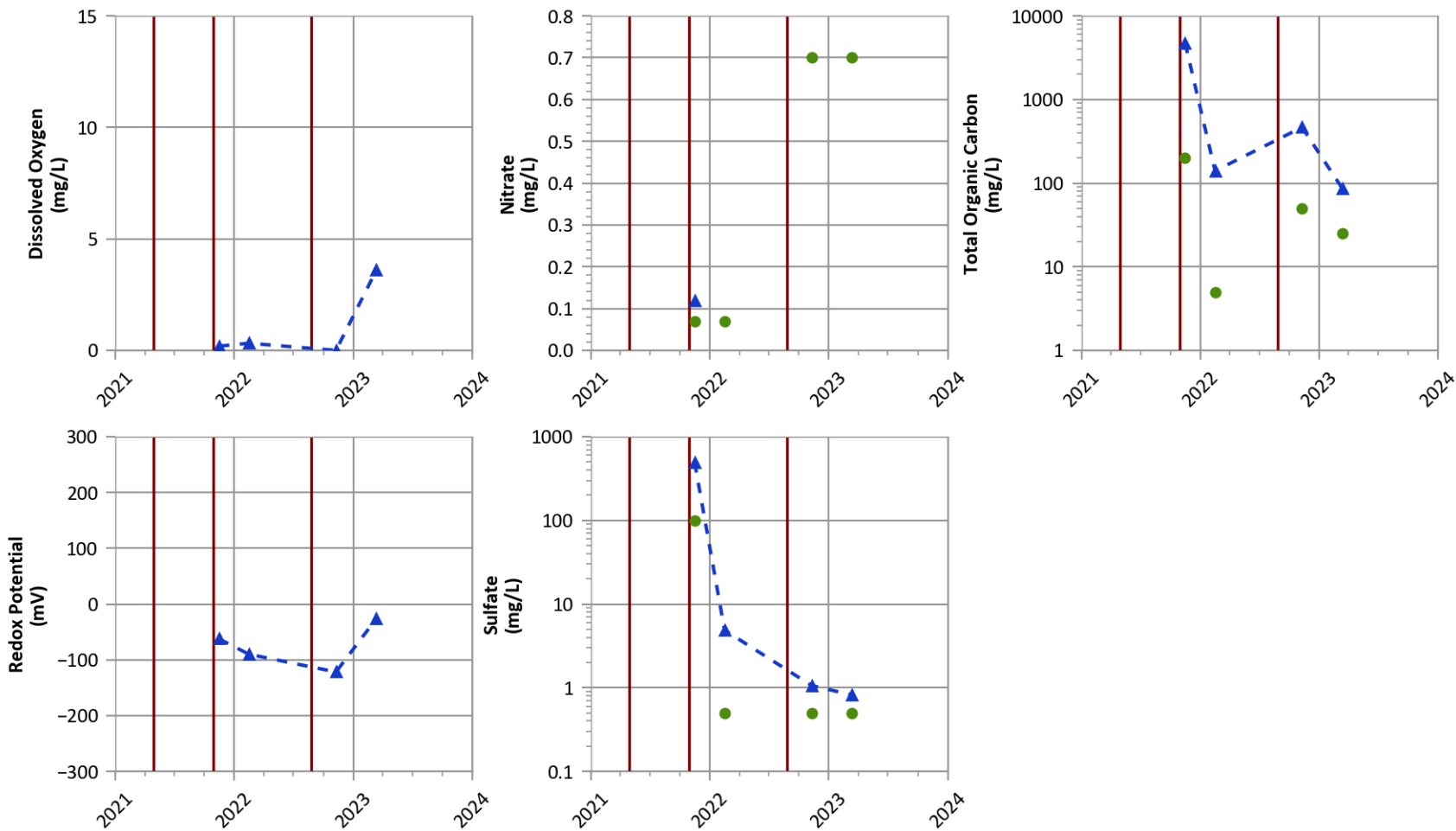
Typical Baseline Concentrations in Perched Groundwater

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



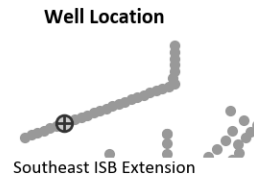
**PTX06-1213 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



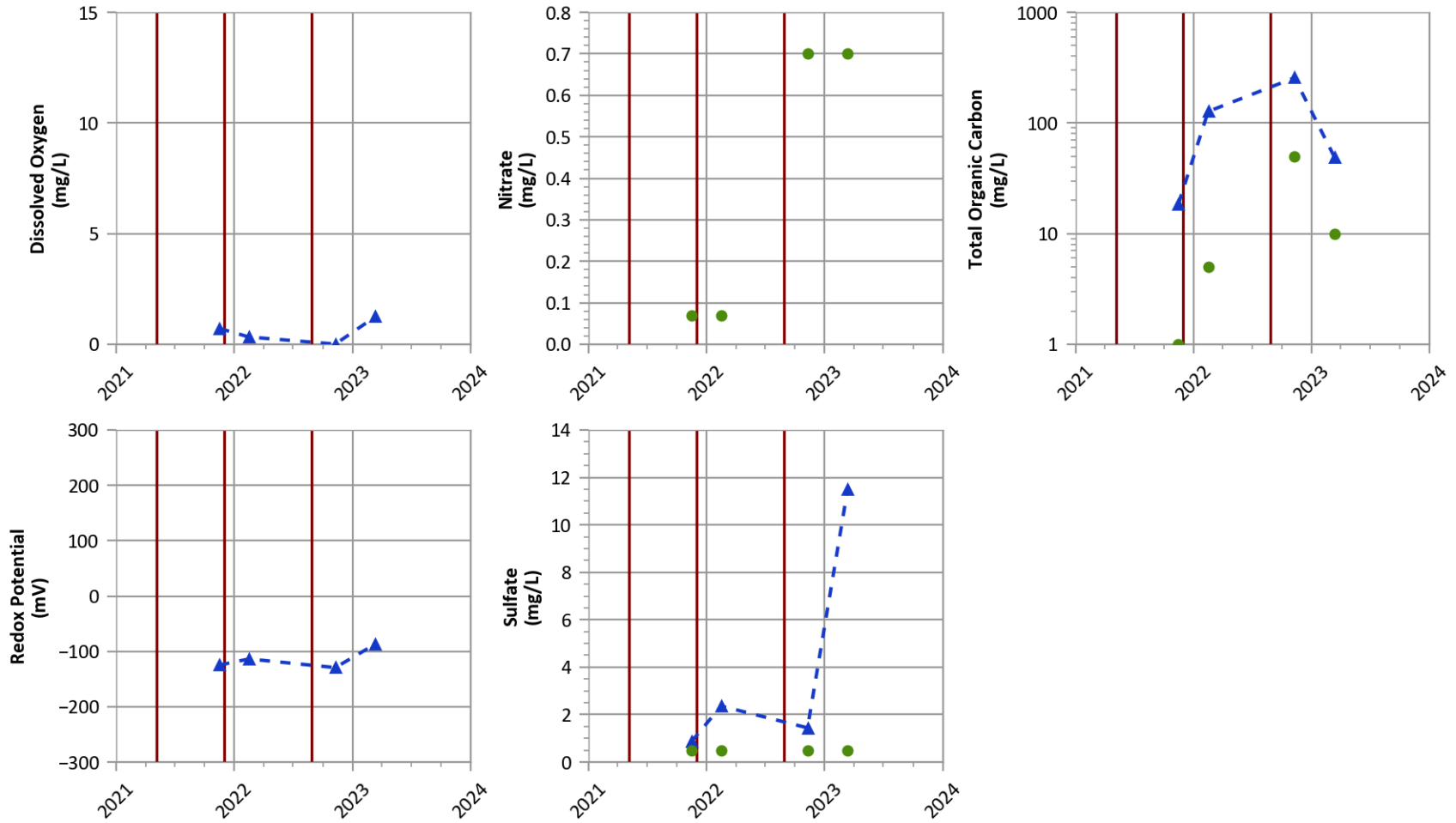
**Typical Baseline Concentrations in Perched Groundwater**

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



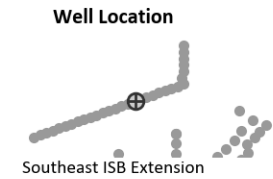
**PTX06-1214 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



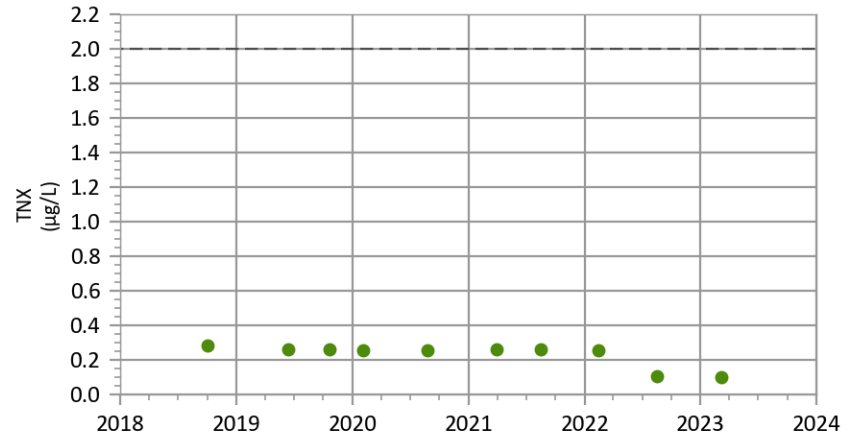
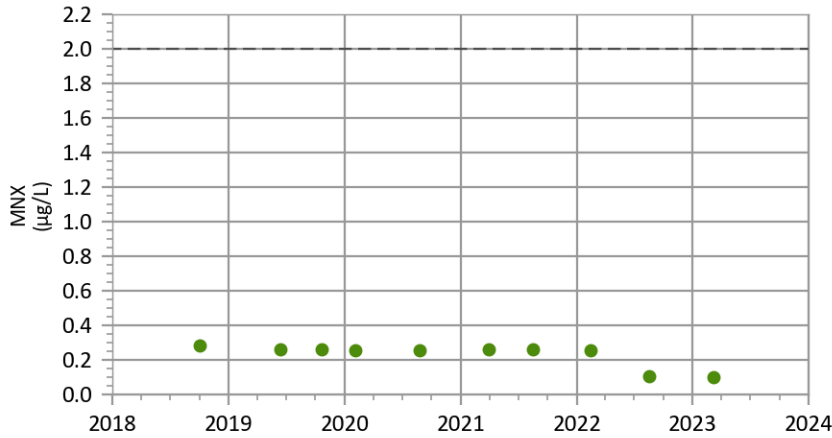
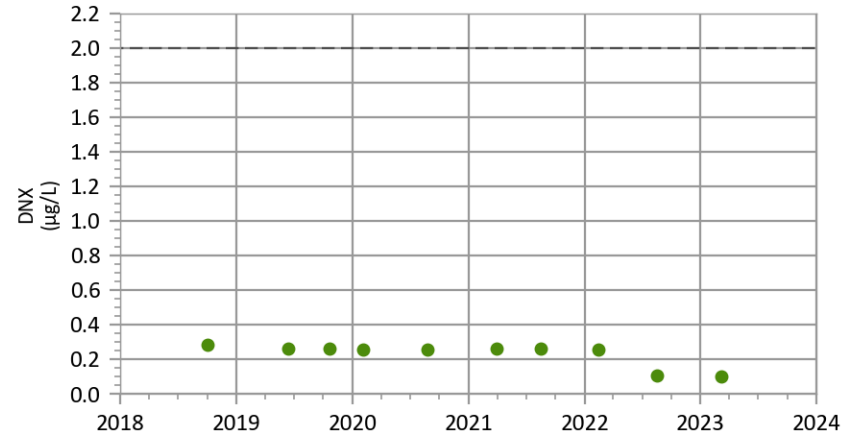
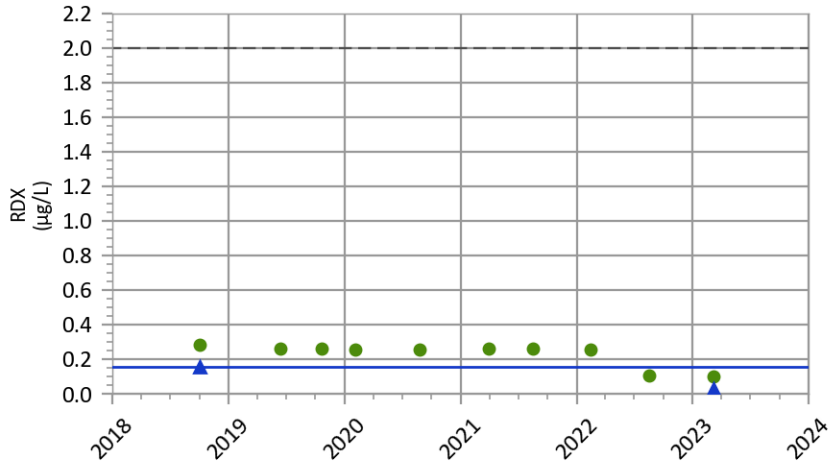
**Typical Baseline Concentrations in Perched Groundwater**

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**



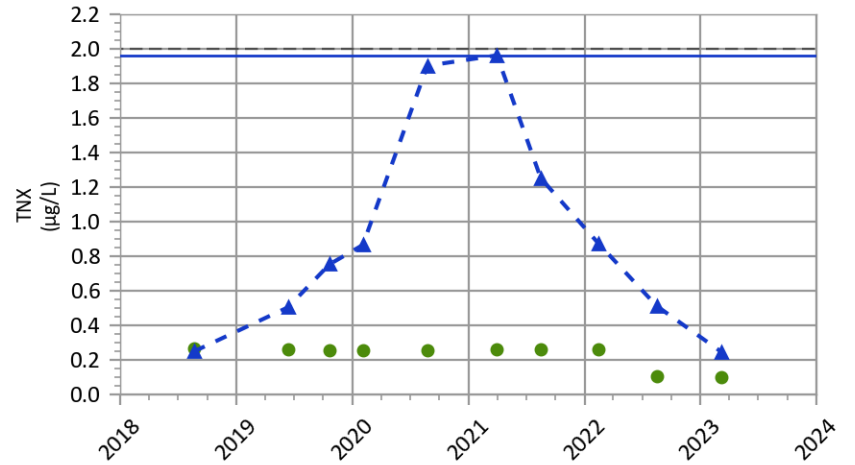
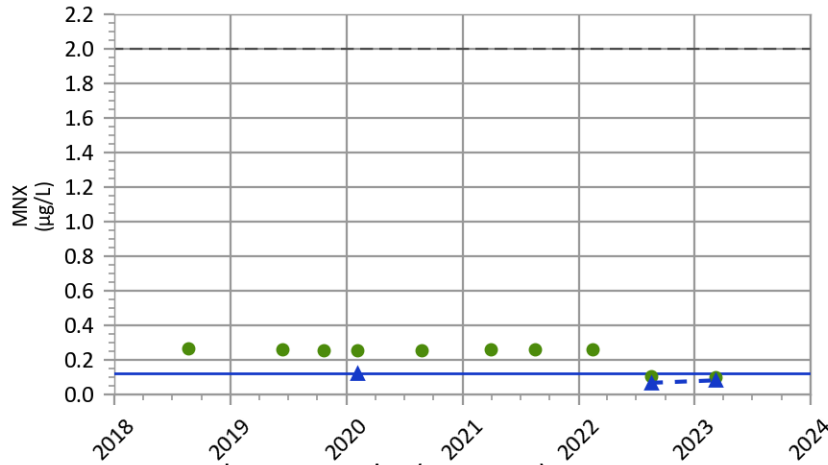
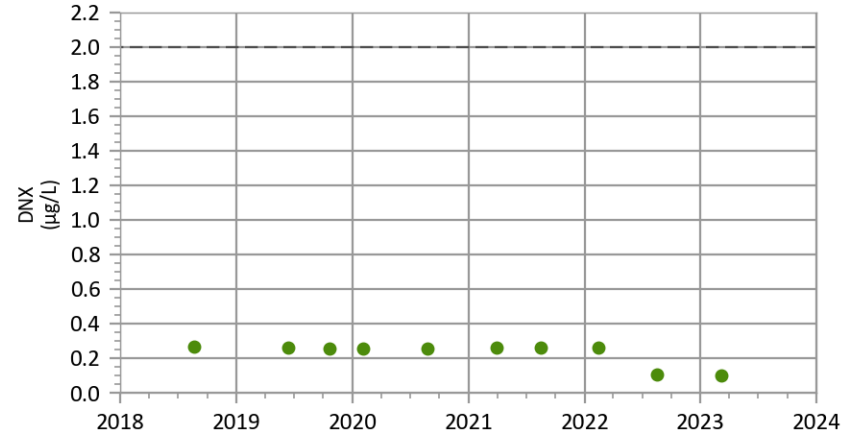
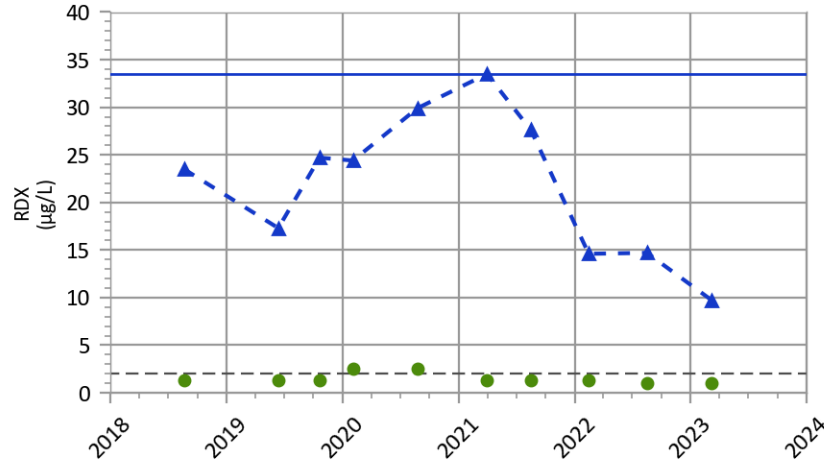
**Most Recent Measured COC Concentrations (Mar 08, 2023)**

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	0.0285	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



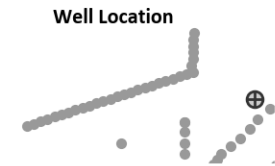
**PTX06-1196 Downgradient Performance Indicators  
Southeast Ext In Situ Bioremediation System  
USDOE/NNSA Pantex Plant**



Most Recent Measured COC Concentrations (Mar 08, 2023)

COC	Concentration (µg/L)	GWPS (µg/L)
RDX	9.72	2.0
MNX	0.0815	2.0
DNX	Non-Detect	2.0
TNX	0.245	2.0

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



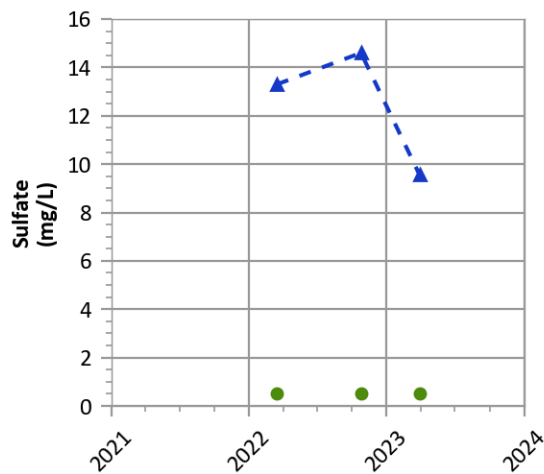
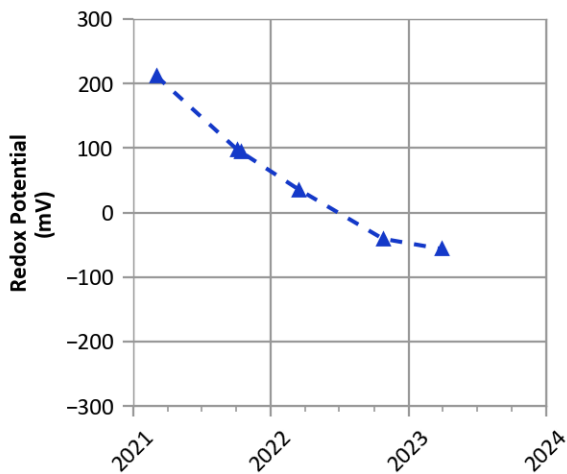
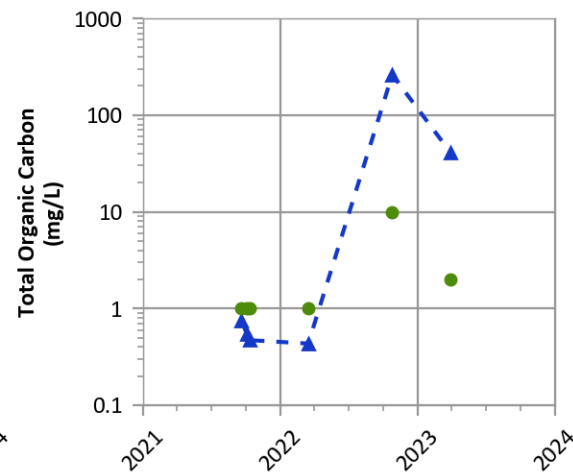
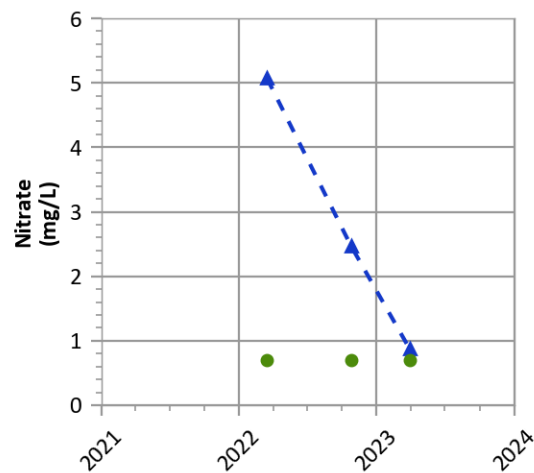
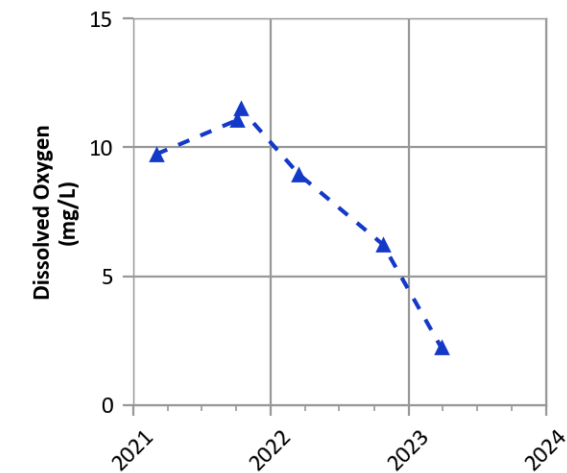




## Offsite ISB



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



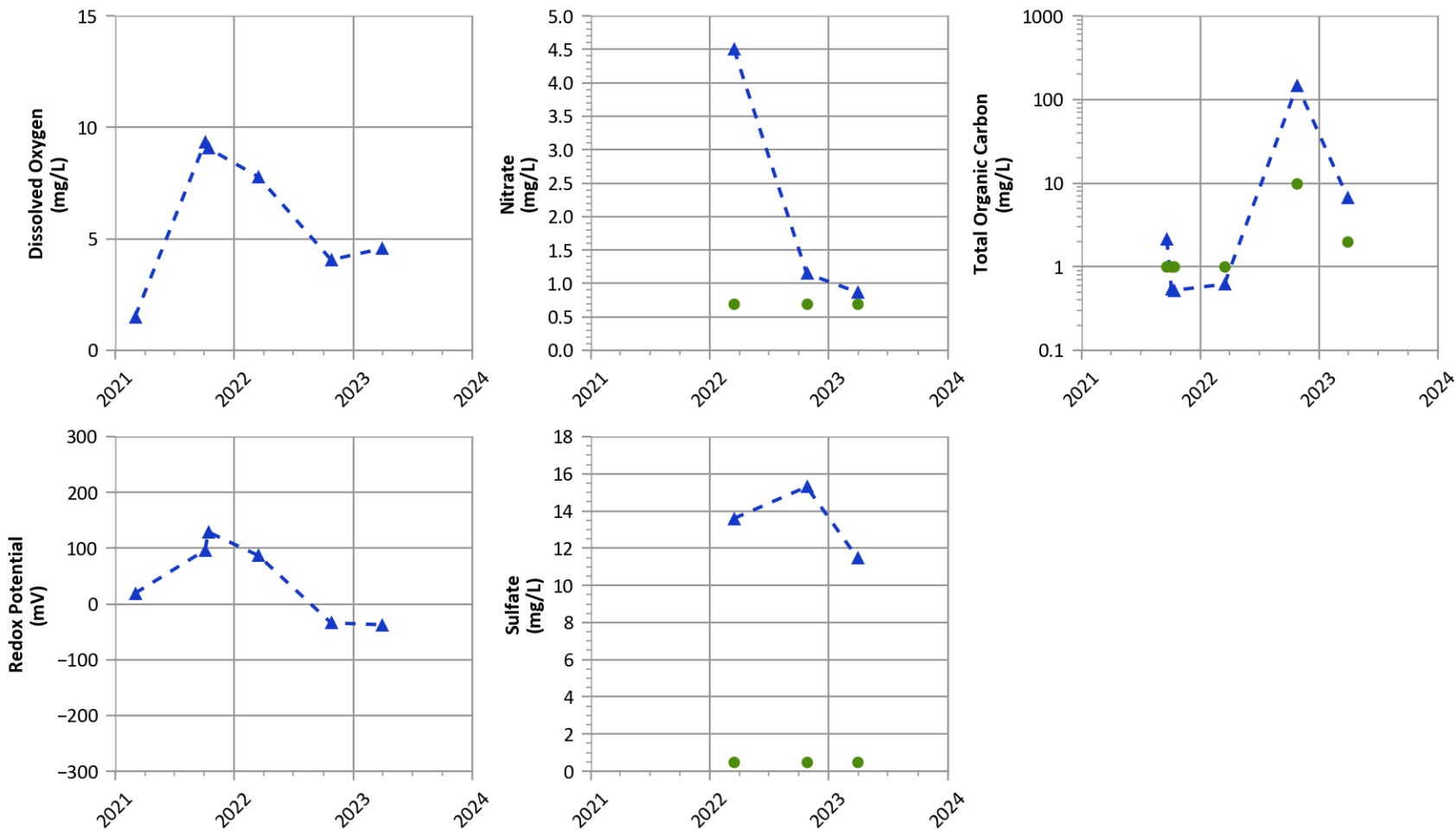
Typical Baseline Concentrations in Perched Groundwater

- 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**



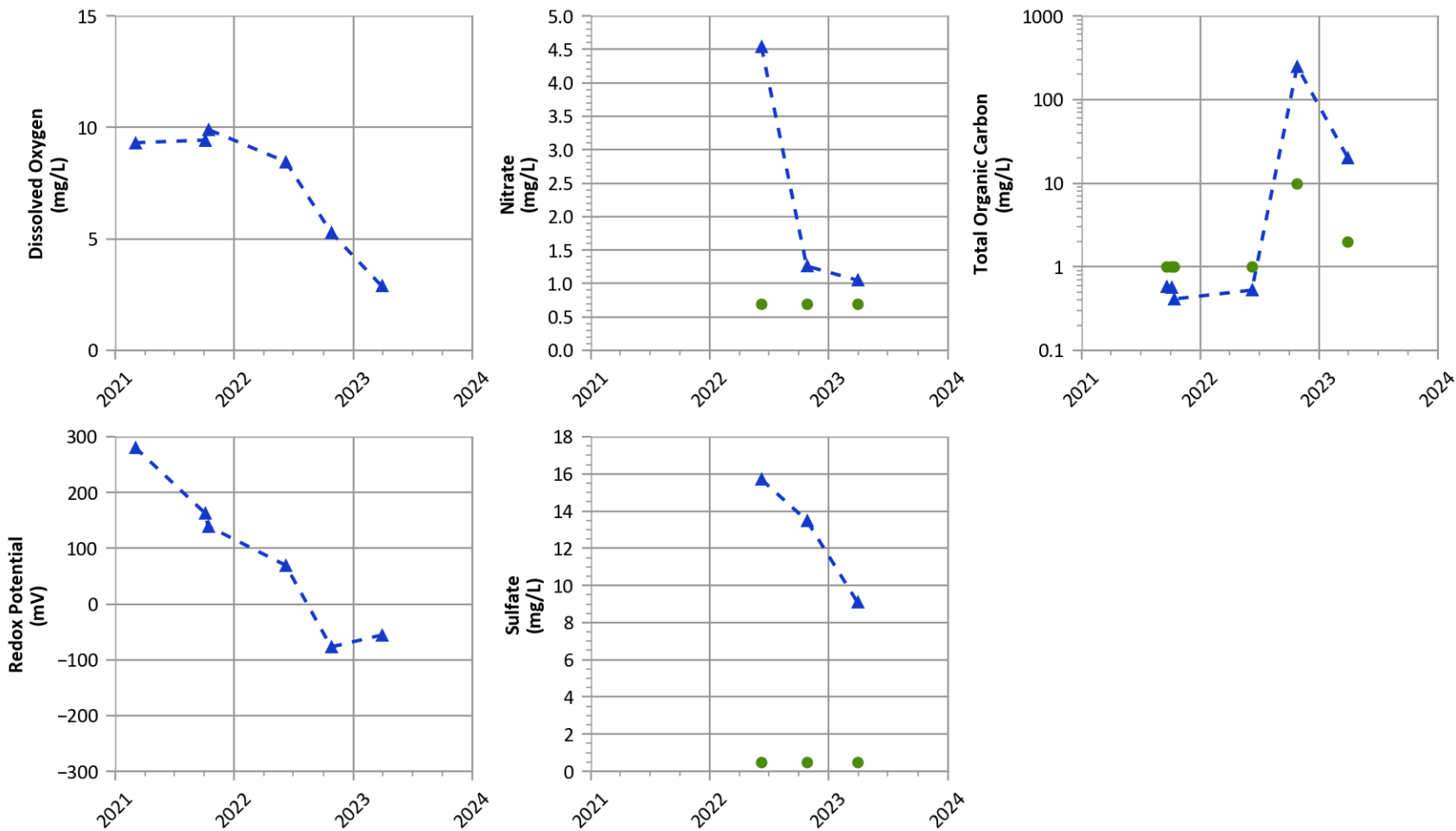
**Typical Baseline Concentrations in Perched Groundwater**

- 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



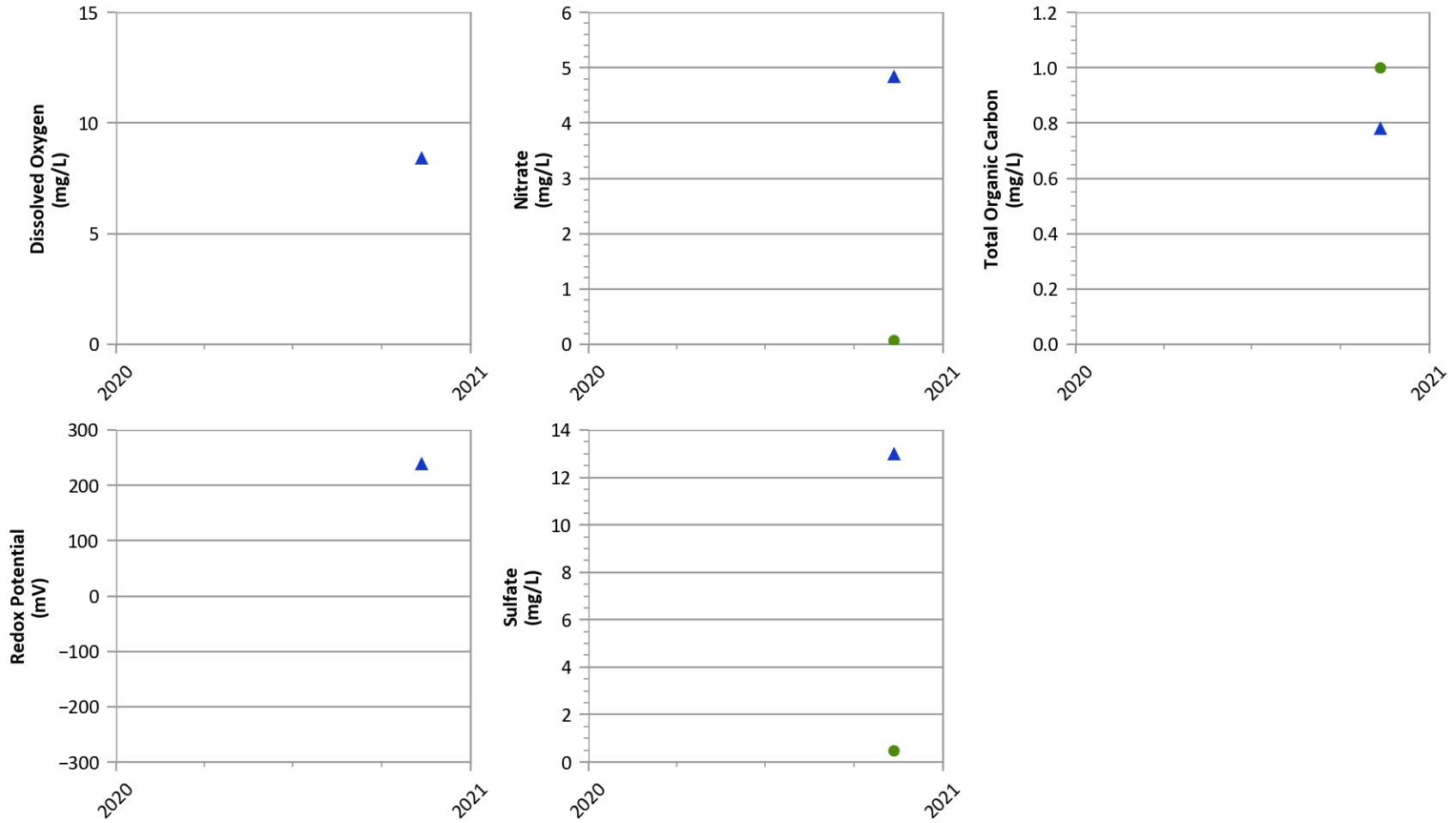
Typical Baseline Concentrations in Perched Groundwater

- 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-REC407 Treatment Zone Performance Indicators  
USDOE/NNSA Pantex Plant**



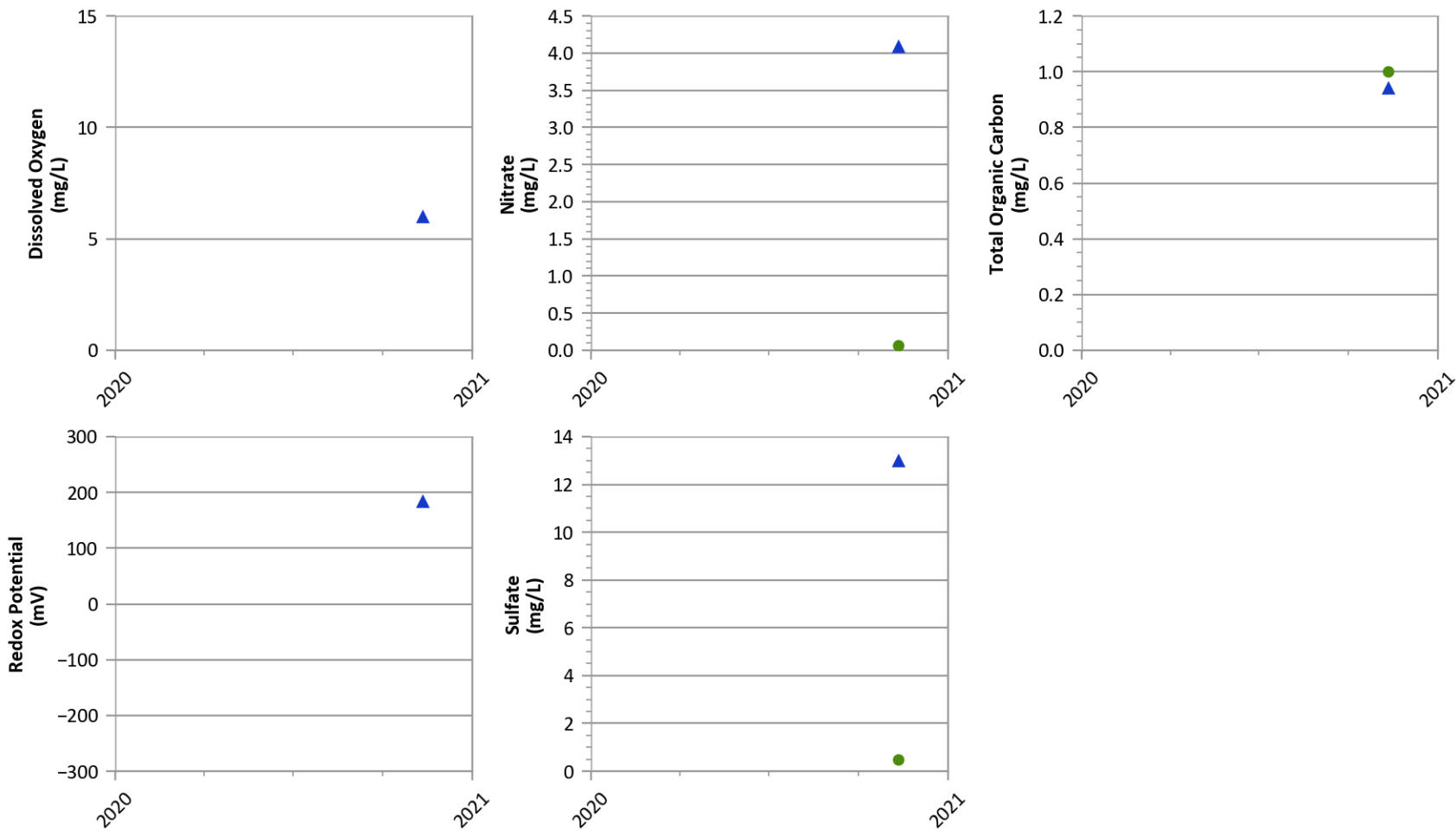
**Typical Baseline Concentrations in Perched Groundwater**

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**



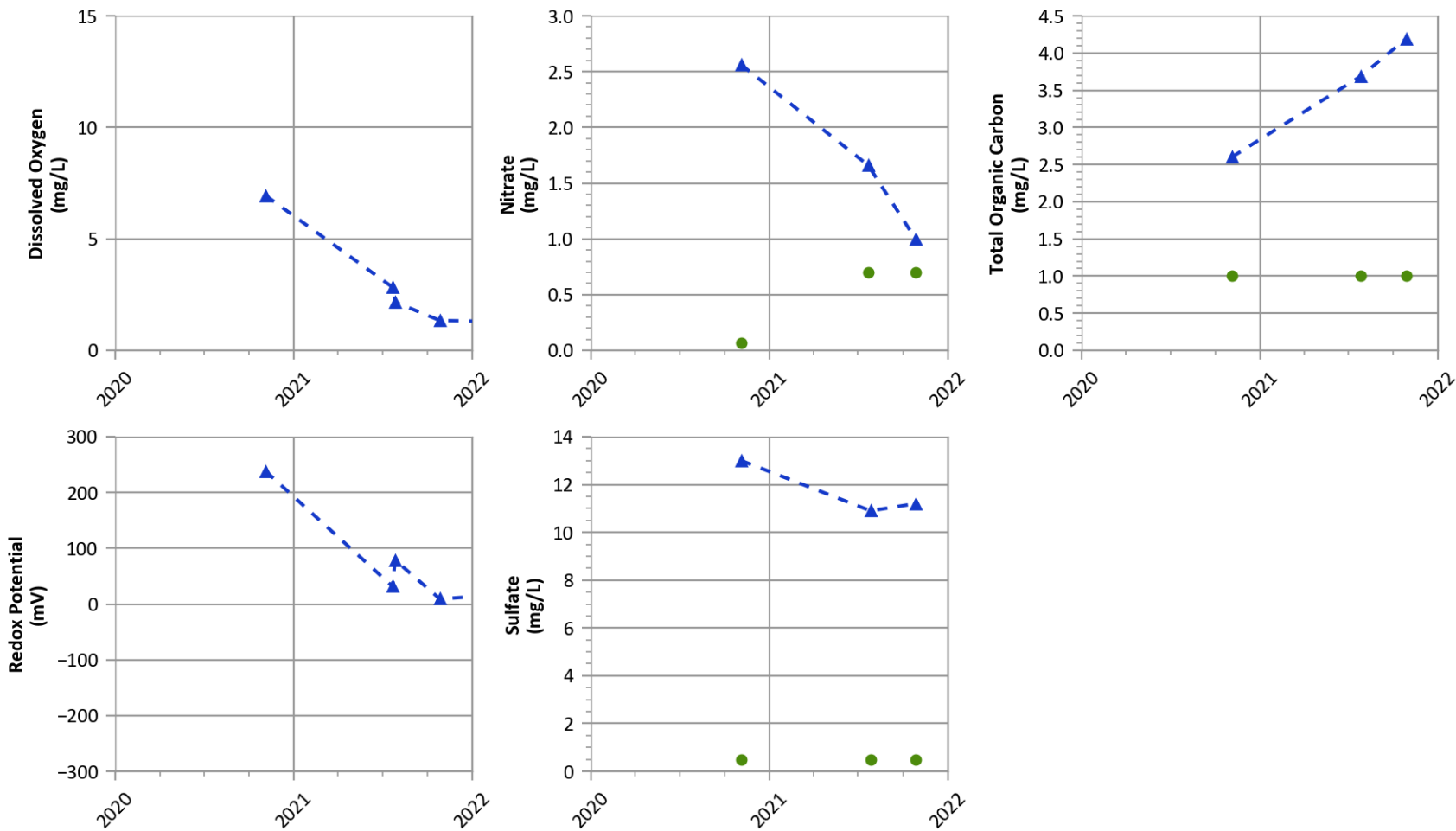
**Typical Baseline Concentrations in Perched Groundwater**

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



**Typical Baseline Concentrations in Perched Groundwater**

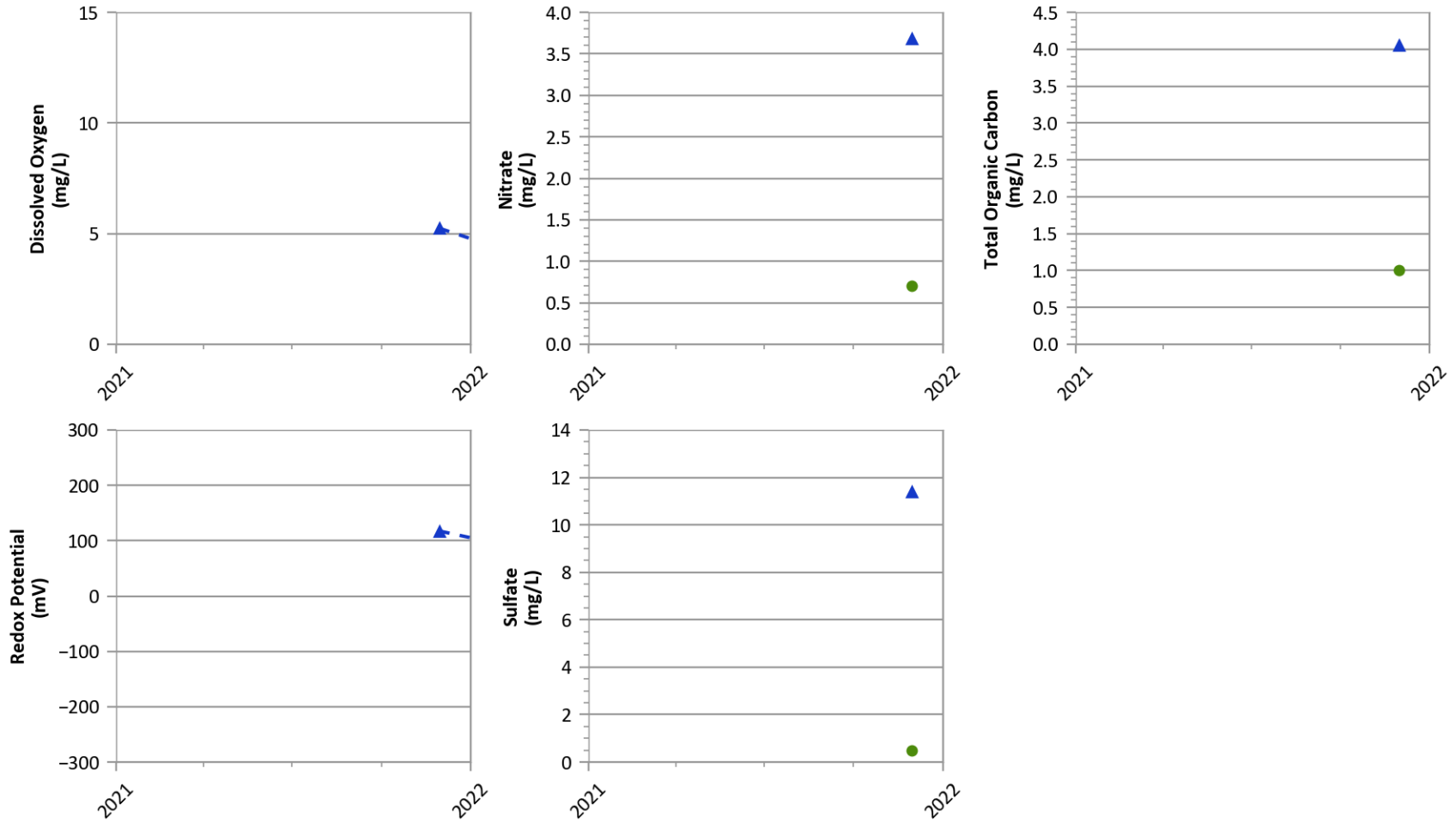
Dissolved Oxygen: 5-10 mg/L  
 Redox Potential: > 100 mV  
 Nitrate: > 1 mg/L  
 Sulfate: > 10 mg/L  
 Total Organic Carbon: < 5 mg/L  
 Total Volatile Fatty Acids: Not Detected

- ▲ Measured Value
- Sample Detection Limit
- Concentration Trend





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



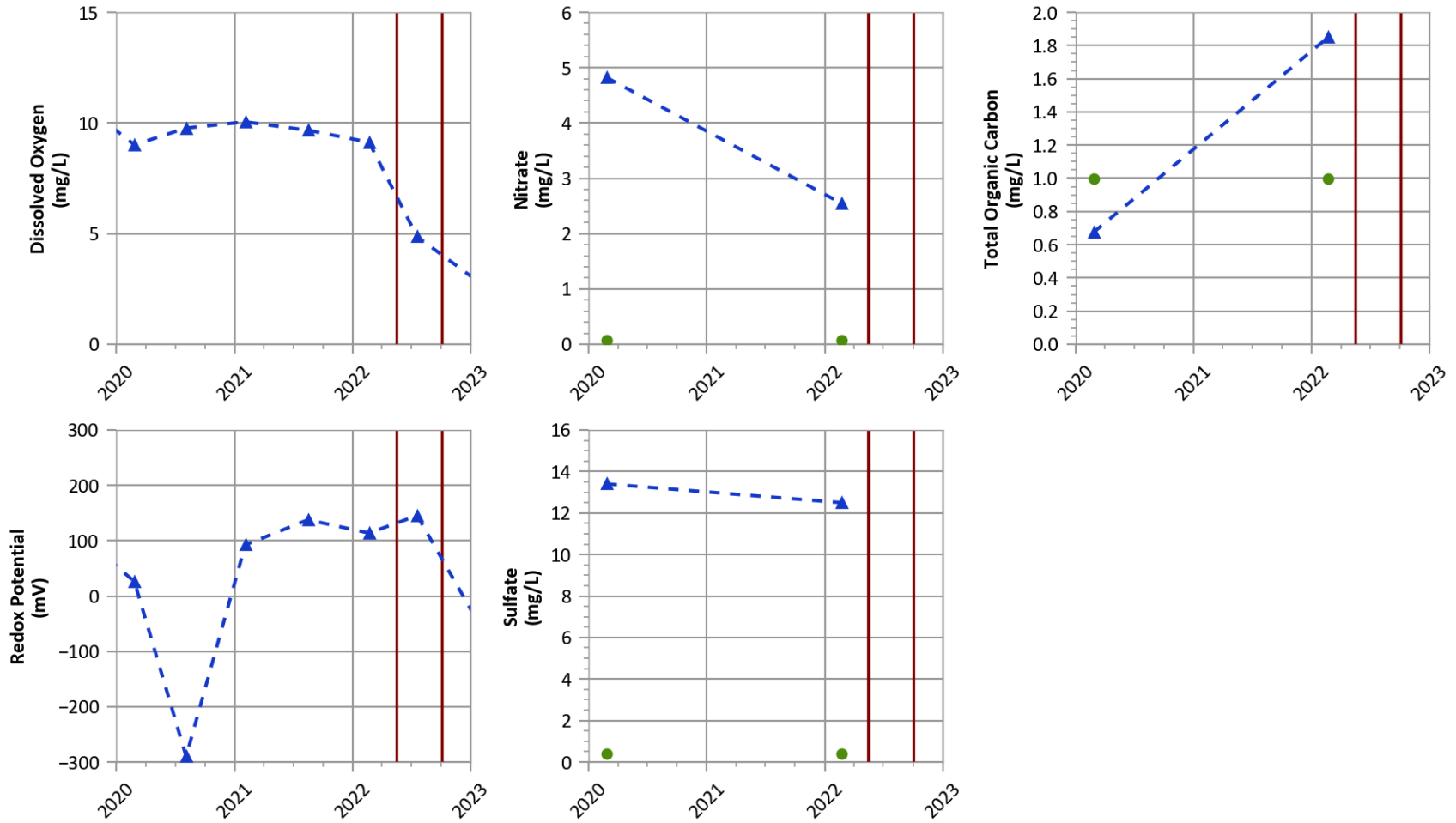
Typical Baseline Concentrations in Perched Groundwater

- 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
- Injection Dates

