Managed and Operated by PanTeXas Deterrence, LLC

Environmental Projects: Public Meeting

November 7, 2024

Martin Amos

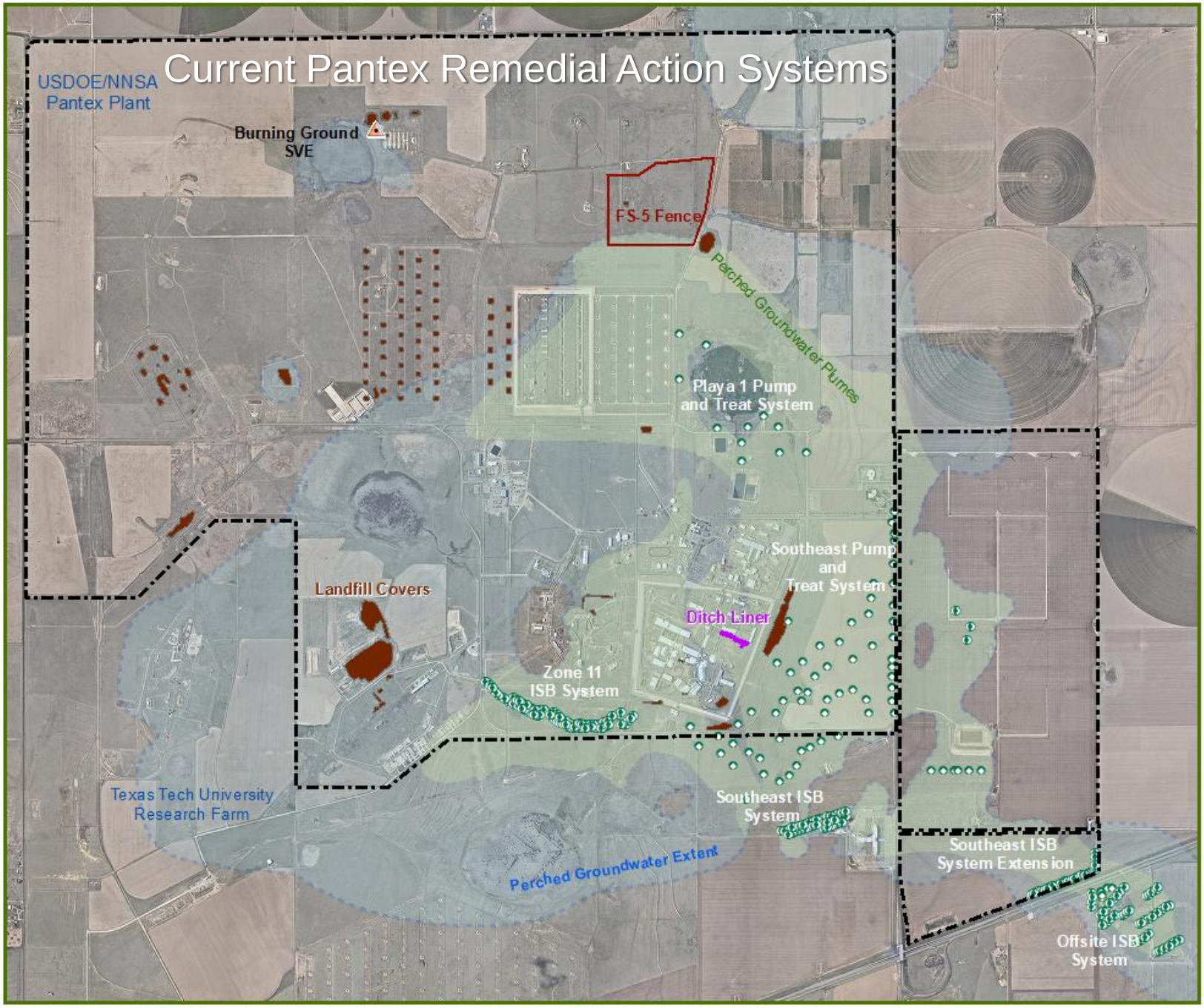
Environmental Projects Department Manager

Presentation Highlights

Pantex Overview

Remedial Action Status at Pantex

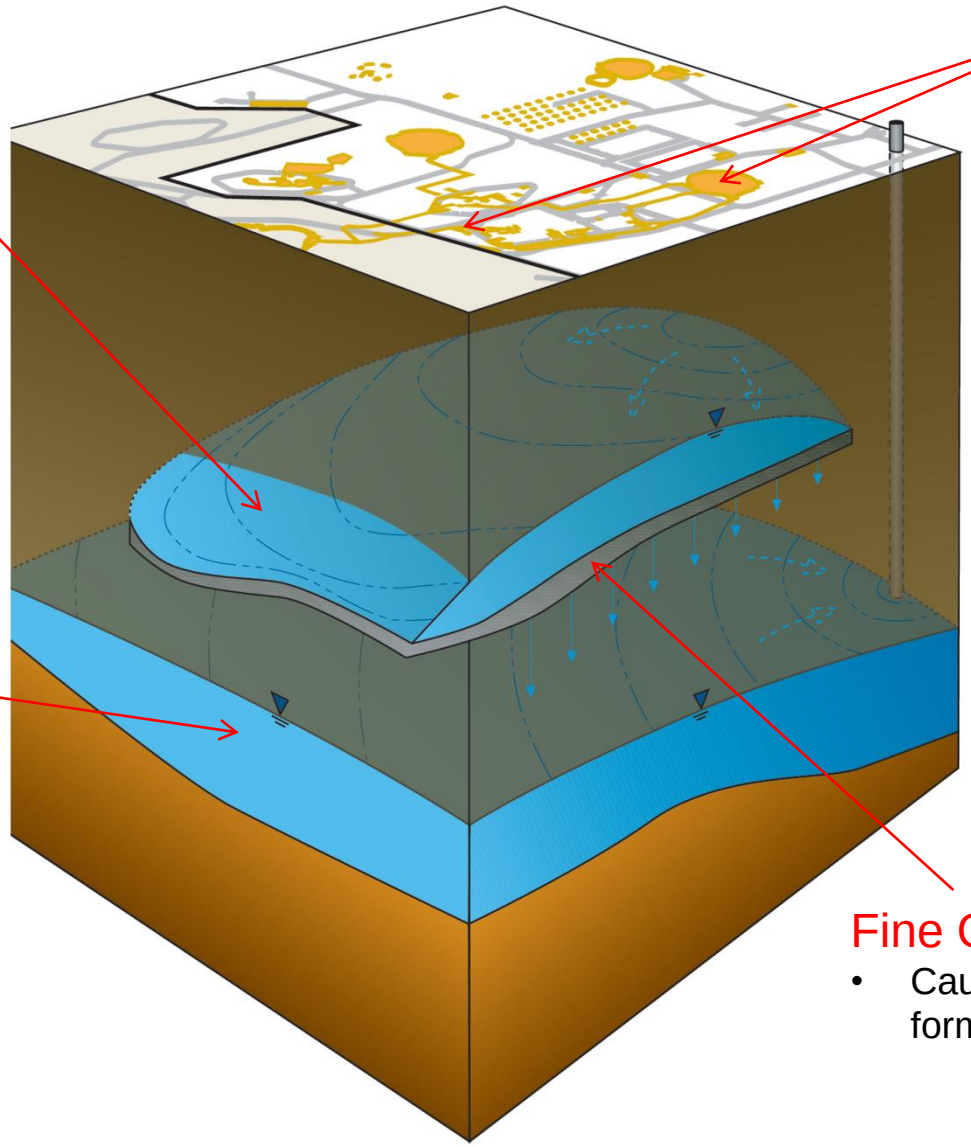
- Cleanup Actions and Accomplishments for 2023
  - Current Status
  - Pump and Treat Systems
  - *In Situ* Bioremediation Systems
  - Soil Vapor Extraction System
  - Ogallala Detection Monitoring
- Emerging contaminants – Per- and Polyfluoroalkyl Substances (PFAS)
- Five-Year Review (FYR)
  - 3rd FYR – Findings and Conclusions


Current Pantex Remedial Action Systems
USDOE/NNSA
Pantex Plant
Burning Ground
SVE
FS-5 Fence
Perched Groundwater Plumes
Playa 1 Pump
and Treat System
Southeast Pump
and
Treat System
Landfill Covers
Ditch Liner
Zone 11
ISB System
Texas Tech University
Research Farm
Southeast ISB
System
Southeast ISB
System Extension
Perched Groundwater Extent
Offsite ISB
System

Groundwater Flow at Pantex

Perched Aquifer

- Depth: 200-300 ft bgs
- Saturated thickness: <1 to 75 ft (avg 15 -20')



Playas/Ditches

- Past discharges of legacy wastes expanded our perched aquifer and contributed high explosives, solvents, perchlorate and chromium to perched groundwater

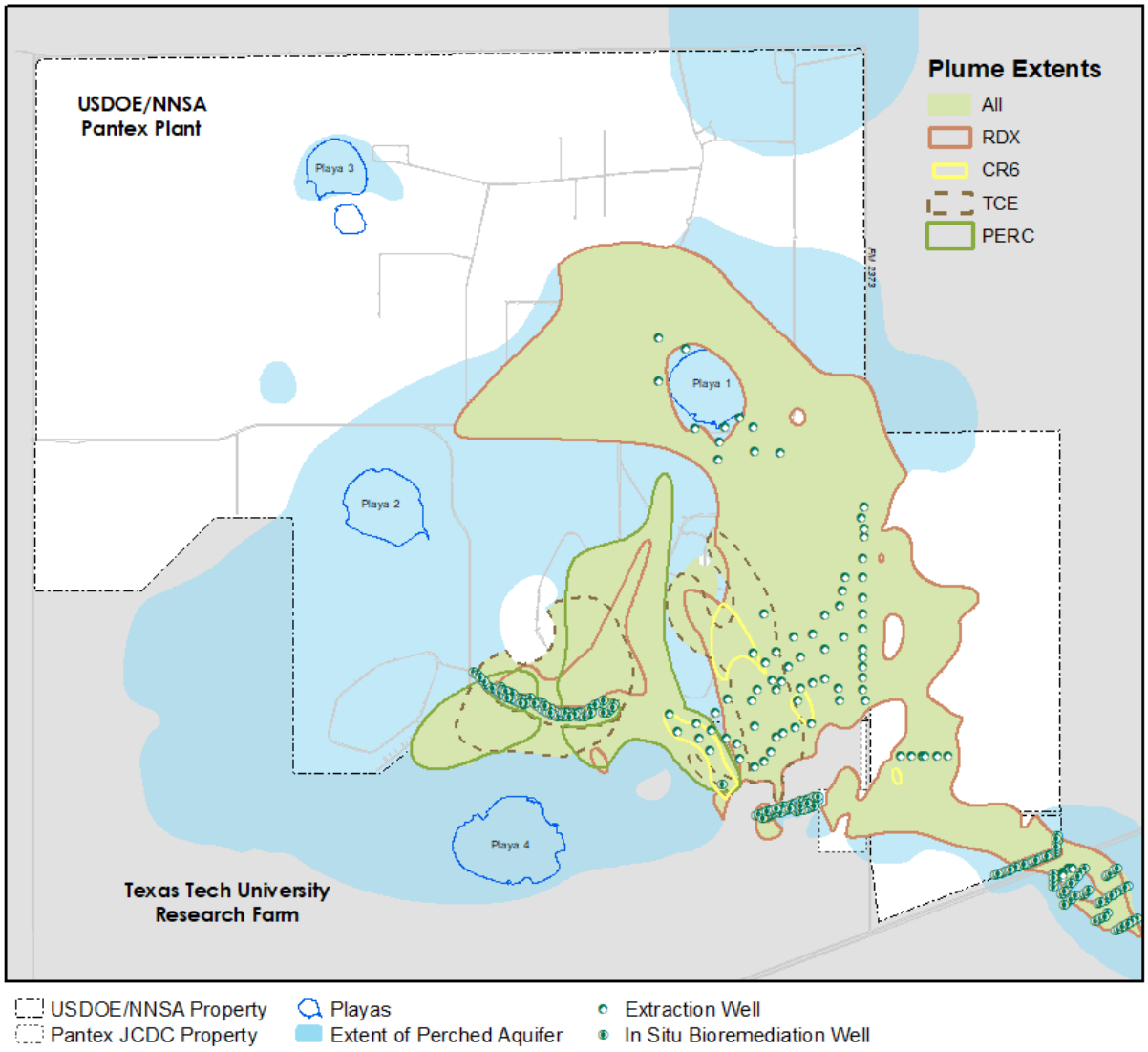
Ogallala Aquifer

- Regional drinking water resource
- Depth: 400-500 ft bgs
- Saturated thickness ranges from 100-400 ft occurs 100-200 ft beneath perched aquifer

Fine Grained Zone (FGZ)

- Causes perched water to form

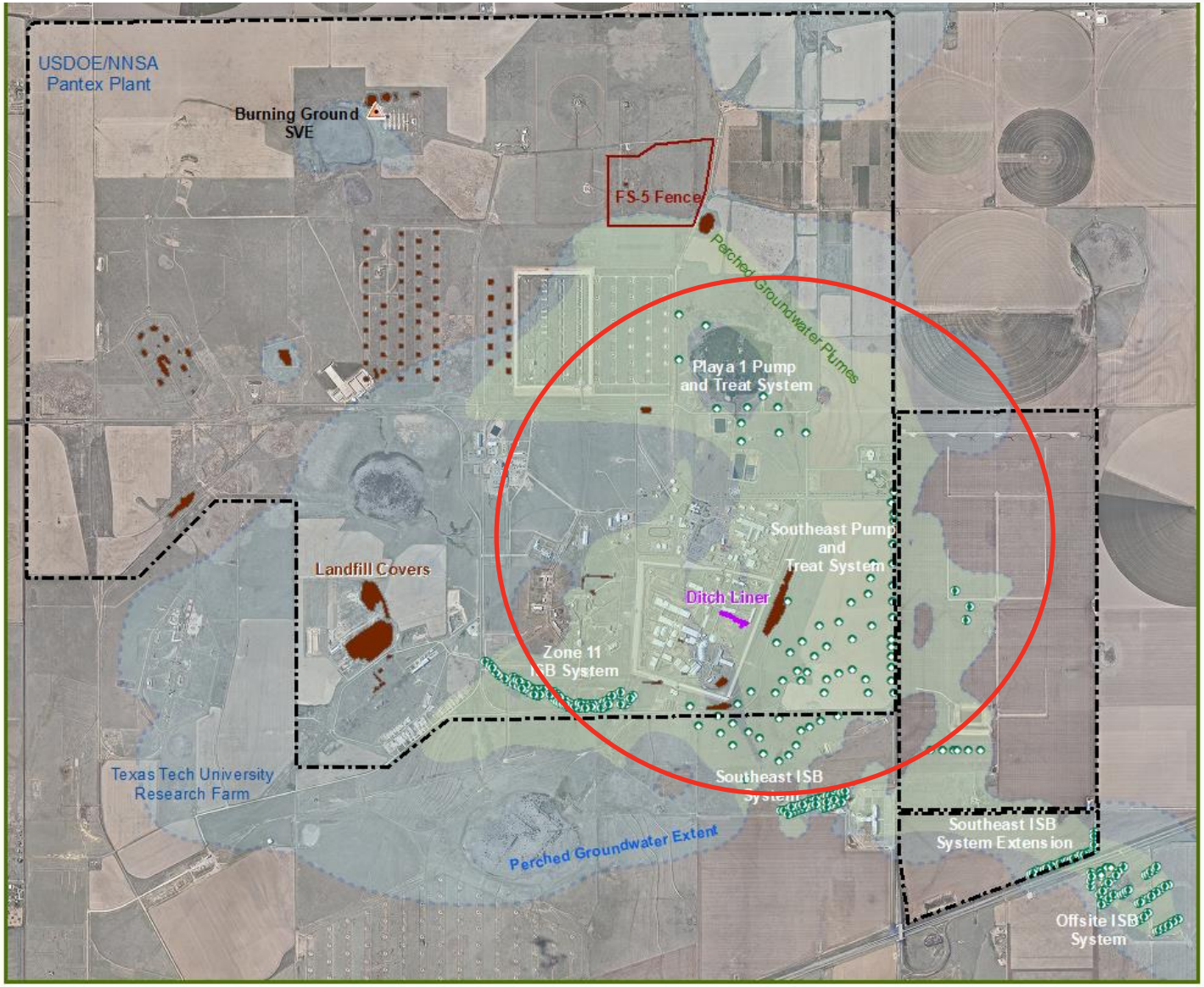
Groundwater Plumes at Pantex



- Perched Groundwater Extent as of Dec 2023
- Main contaminants:
  - High explosives (RDX)
  - Metals (Cr^{+6})
  - Solvents (TCE)
  - Perchlorate
- Mainly contained within DOE controlled boundaries; one area of migration offsite requiring action.

Pump and Treat Systems

Pantex Plant Remedial Action Systems



Pump and Treat Systems

2023 Accomplishments:

- 160 Mgal treated
- 616 lbs of contaminants removed

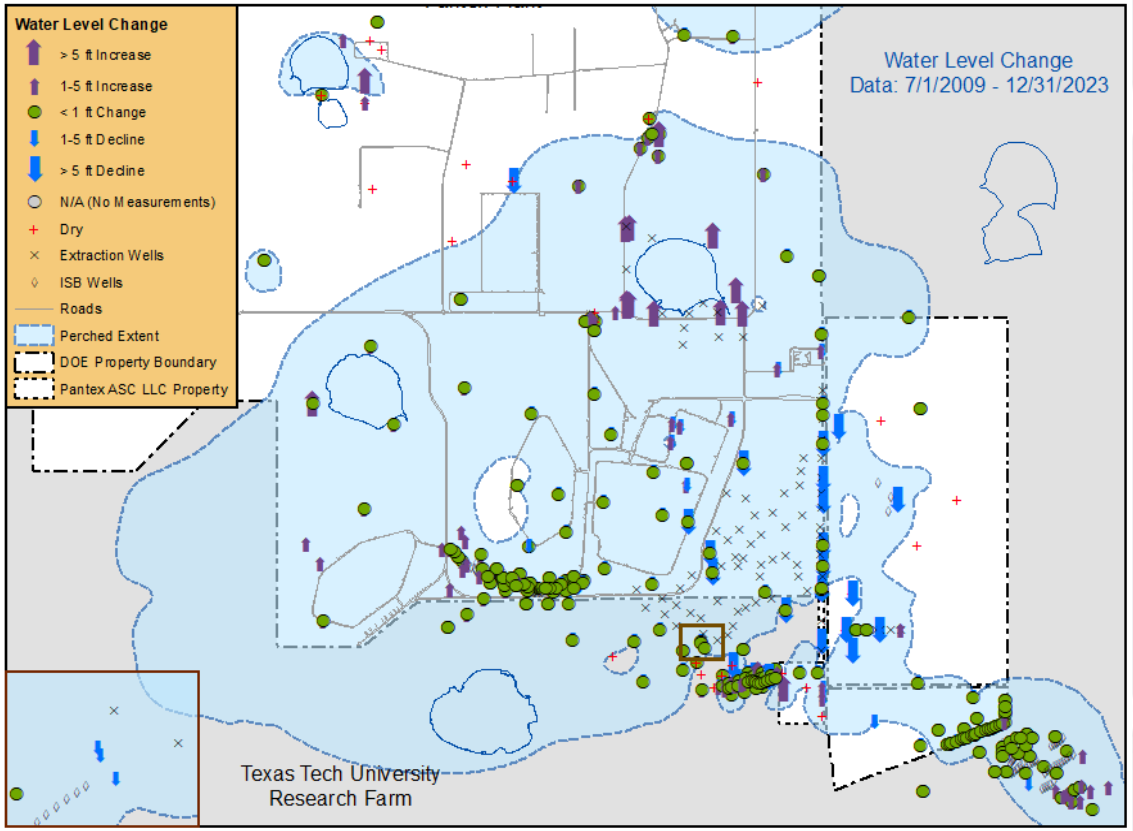
Accomplishments

Since startup:

- 3.3 billion gallons treated
- 1.8 billion gallons beneficially used
- 17,127 lbs of contaminants removed

Challenges:

- **Limited water storage capacity at the Waste Water Treatment Facility (WWTF) due to lagoon repairs**
  - Resolution: Utilize the Pivot Irrigation system as a treated water outlet
  - Resolution: Utilize drip irrigation system once lagoon repairs are complete
- **Aging infrastructure at SEPTS and P1PTS**
  - Resolution: Ongoing phased design to replace SCADA systems at pump and treat systems
- **Limitations on pumping at extraction wells**
  - Resolution: Implementing new operational goals for the systems



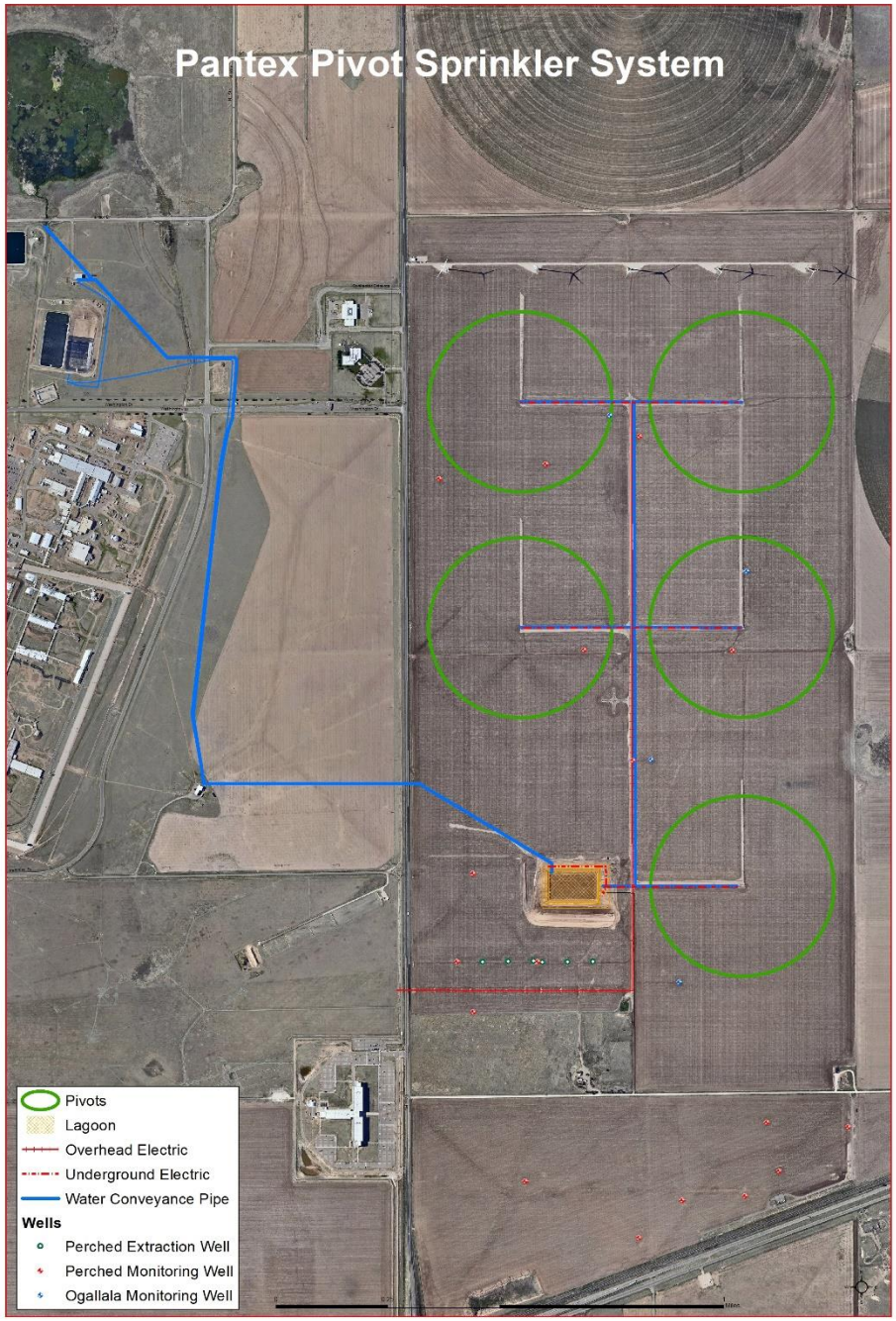
Pivot Sprinkler East of FM 2373

Milestones:

- First crop (winter wheat) planted in October 2023 and harvested in June 2024 – 26 Million gallons of treated water sent to pivot in 2023
- Planted grain sorghum in June 2024 to be harvested in November
- Second crop of winter wheat to be planted in November

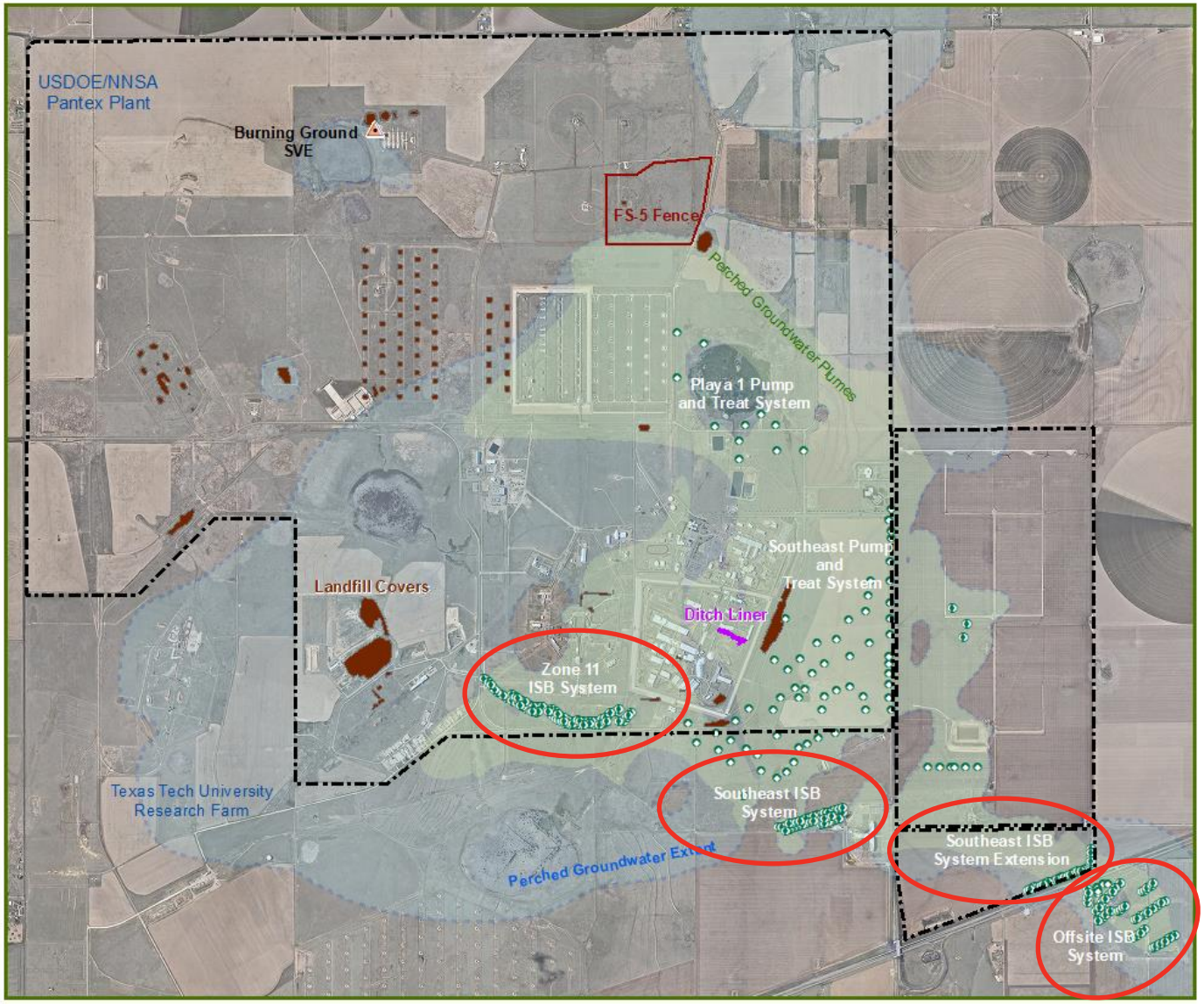
System Components:

- 5 pivot sprinklers, subsurface conveyance line and lagoon pond
- Pivot SCADA system to communicate with SEPTS and P1PTS



In Situ Bioremediation Systems

Pantex Plant Remedial Action Systems



In Situ Bioremediation (ISB) Systems

(1) Zone 11 ISB:

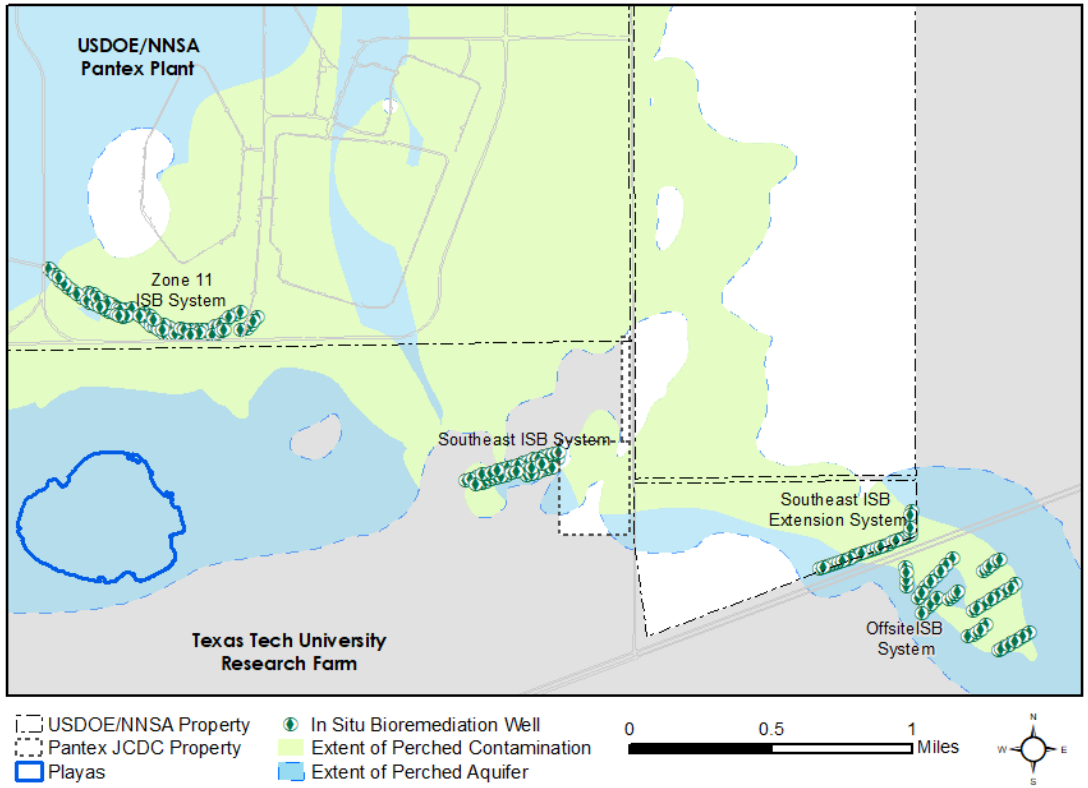
- Perchlorate and TCE reduced near or below groundwater protection standards (GWPS) at most wells

(2) Southeast ISB:

- High explosives reduced below groundwater protection standards (GWPS) at most wells
- Hexavalent chromium reduced in all wells.

(3) Southeast Extension ISB:

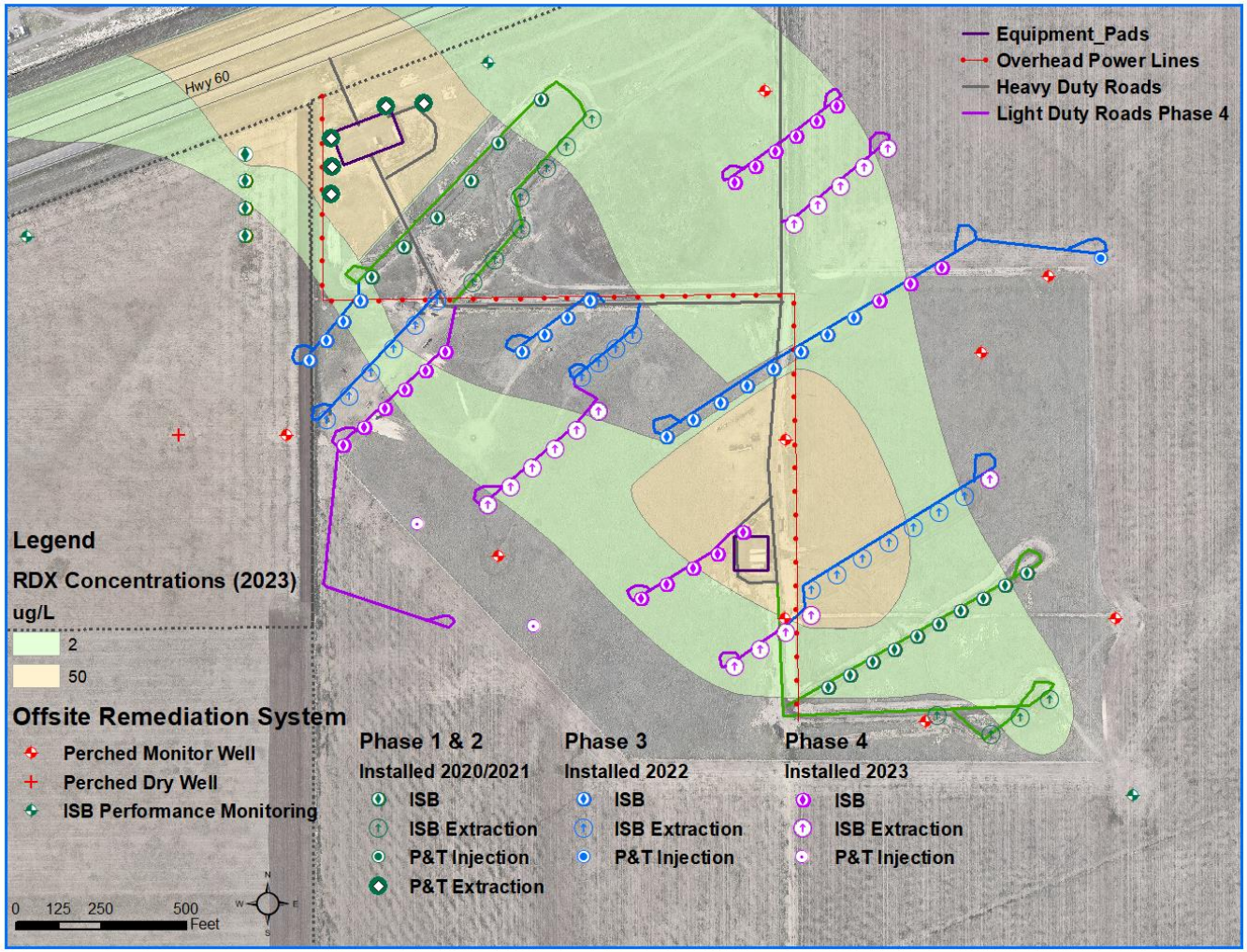
- Continued reduction of HE expected in 2024 – early indications of treatment in Offsite Treatment System wells near the northern boundary



2023 Accomplishments :

- Zone 11 ISB
  - Completed one injection event on both sides of system (east and west)
- Southeast ISB Extension
  - Completed one injection event in 2023
- Southeast ISB
  - Planned injection event in 2025
  - Continuing to monitor system for treatment

Offsite Plume Remediation



2023 Accomplishments:

Injections

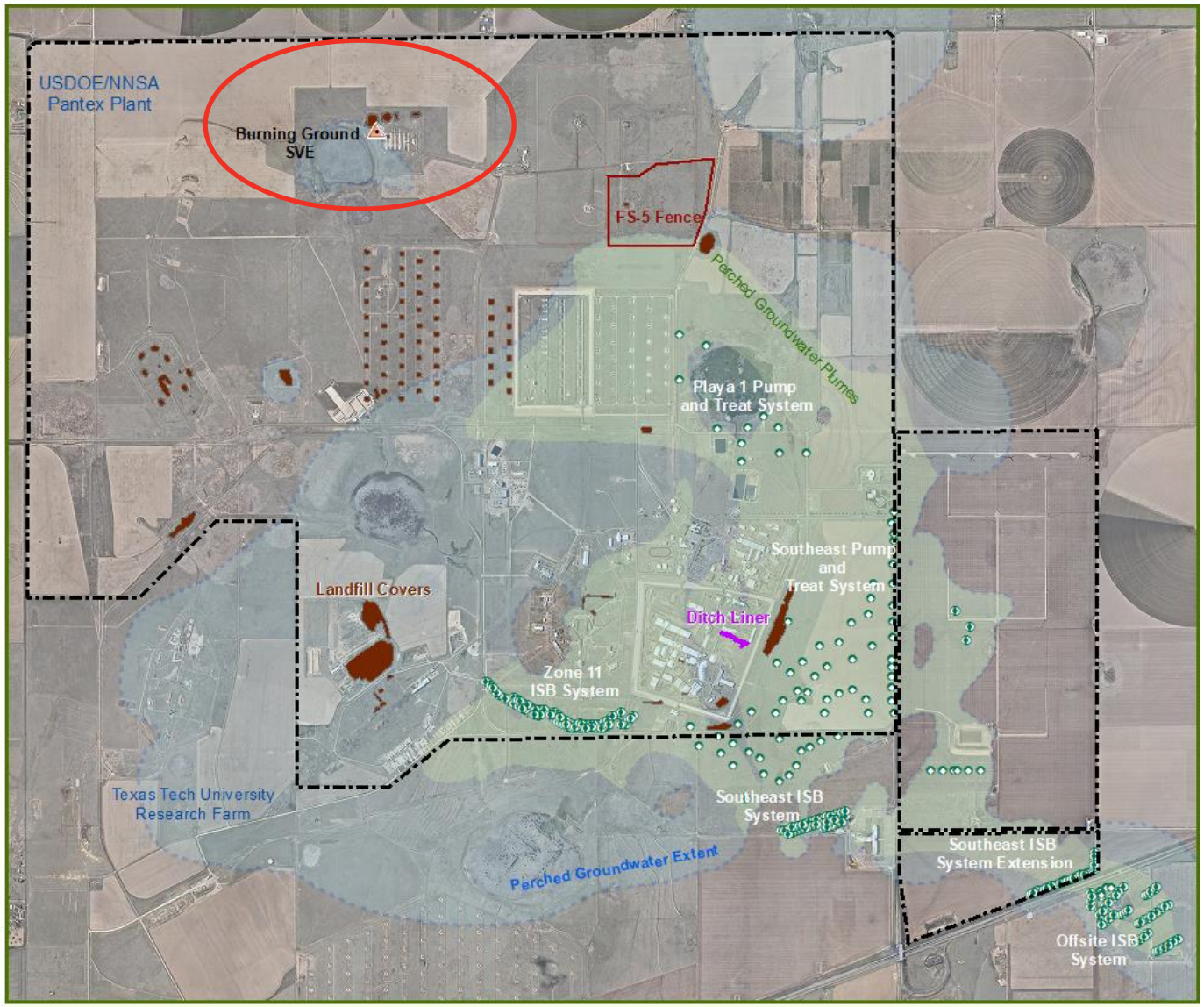
- Completed two injections at toe of the plume
- Injected 32 wells

Infrastructure

- Completed final phase of installation for Offsite infrastructure in 2023
- System consists of 56 injection wells, 44 ISB extraction wells, mobile pump and treat unit, 5 pump and treat extraction wells and 3 pump and treat injection wells
- Mobile Pump and Treat Unit was complete in 2023
- 2 new ISB trailers were completed in 2023

Soil Vapor Extraction System

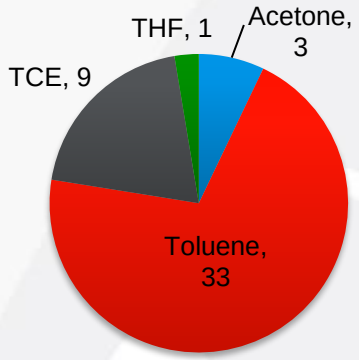
Pantex Plant Remedial Action Systems



Soil Vapor Extraction System

Installed in February 2002

- Remedial goal to reduce the mass of Volatile Organic Compounds (VOCs) – highest historical Toluene concentration ~ 1845 ppmv; highest current concentration ~ 59 ppmv



2023 Accomplishments

Operations:

- Pulsed system in 2020 - 2023
- Closure report provided to EPA and TCEQ in August 2023 and approved in December 2023

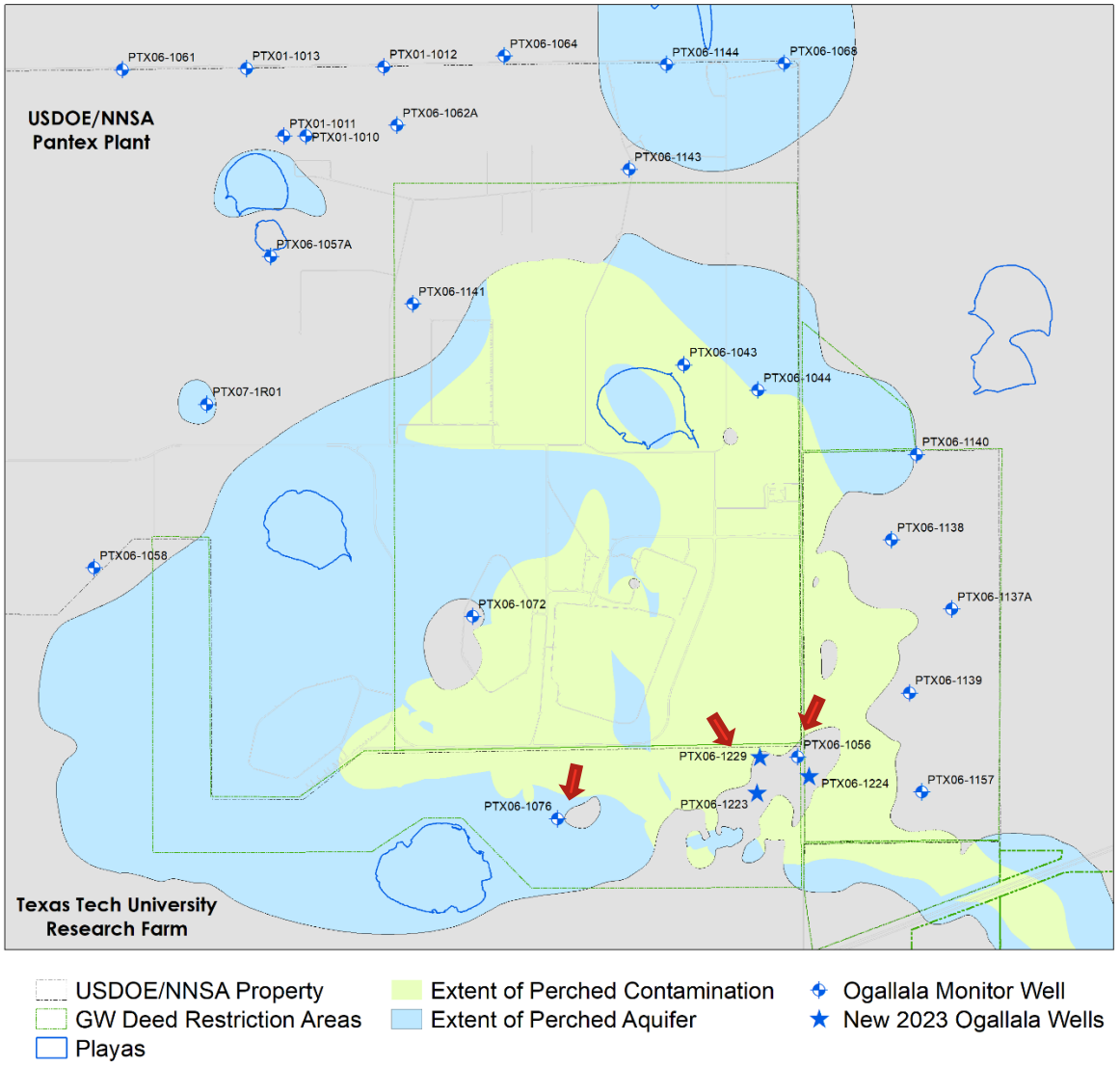
Ogallala Detection Monitoring

Monitoring Information:

- 30 wells monitored
  - Including one well located on neighboring property (PTX06-1064, located north of Pantex property) and 3 new Ogallala wells installed in 2023 (shown as blue stars on map)

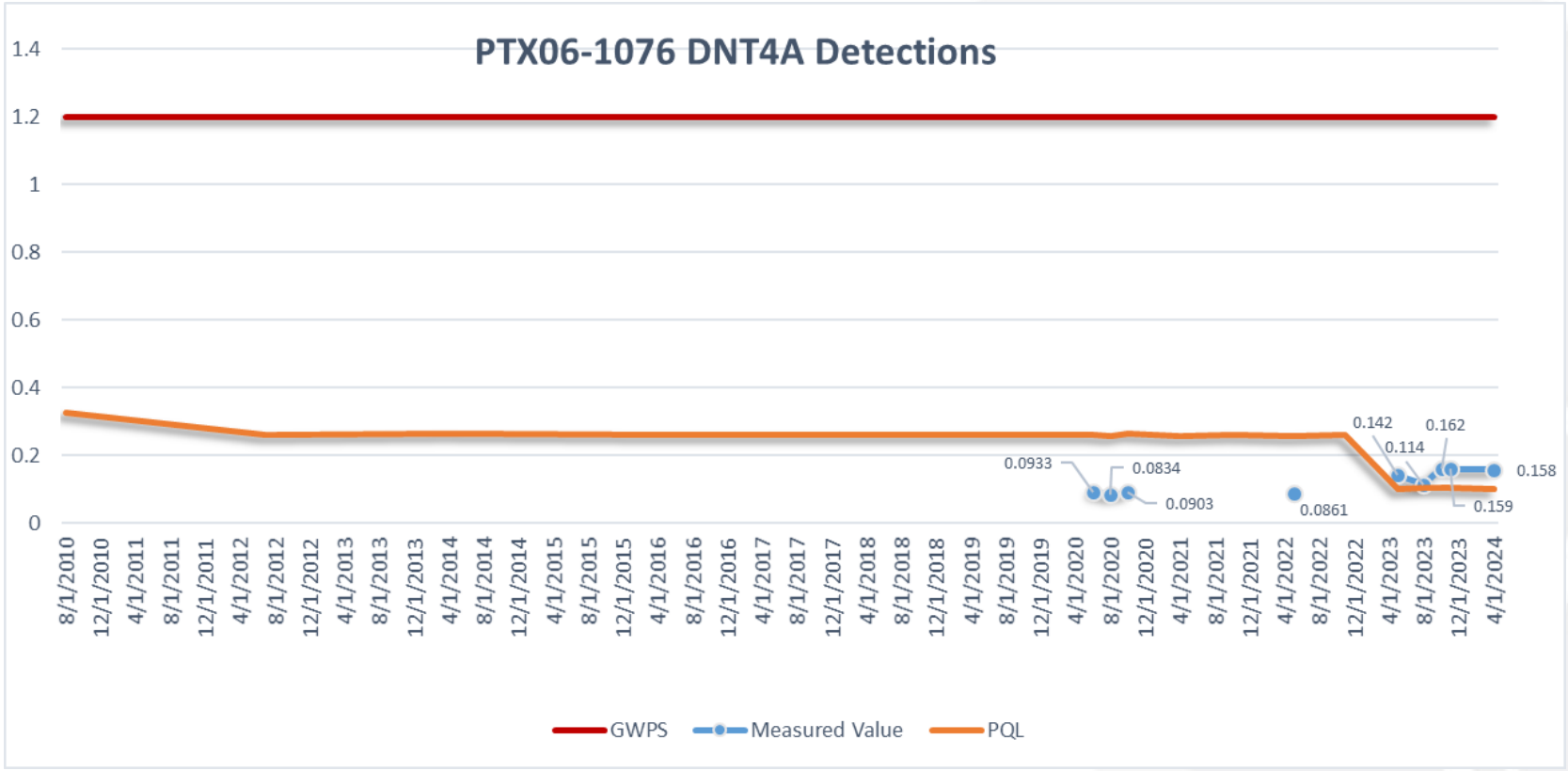
Challenges with Recent Detections

- PTX06-1076
  - DNT4A, a high explosive was detected below the GWPS through 2023
- PTX06-1056
  - DNT4A, a high explosive was detected below the GWPS through 2021 but was detected slightly above GWPS in 2022
  - In response, new Ogallala wells were installed
  - Unexpected results obtained from new Ogallala well (PTX06-1229)



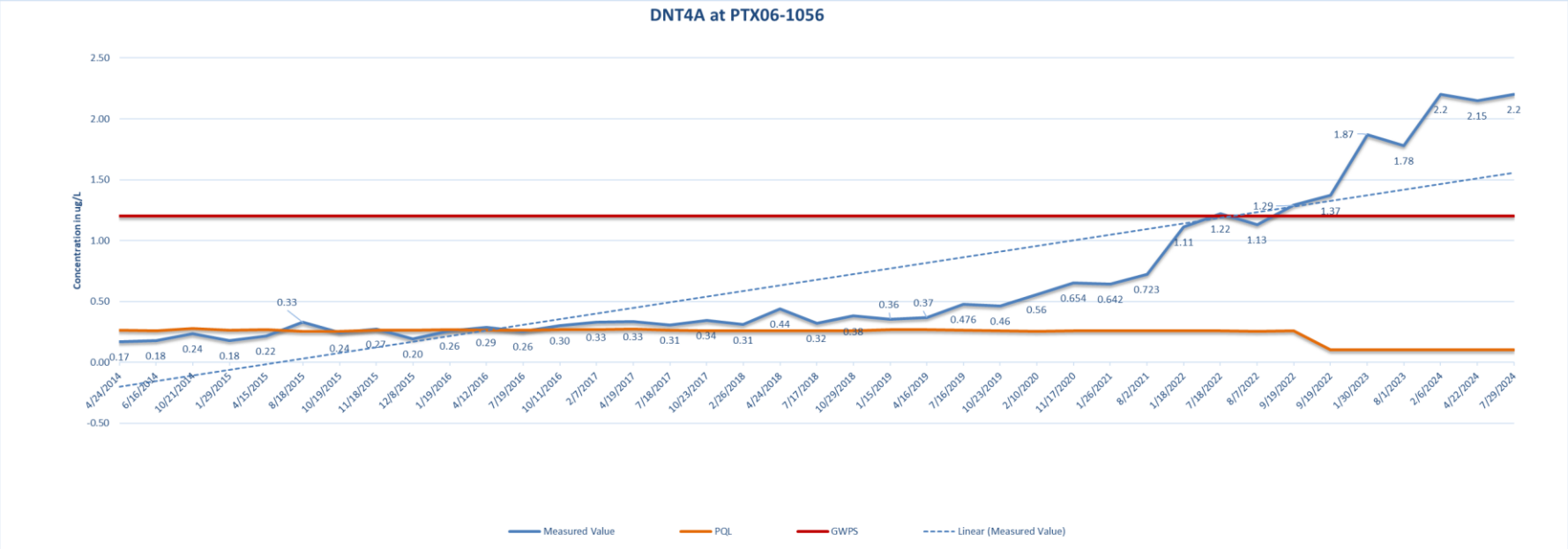
DNT4A – 4-amino-2,6-dinitrotoluene

Ogallala Detections (PTX06-1076)



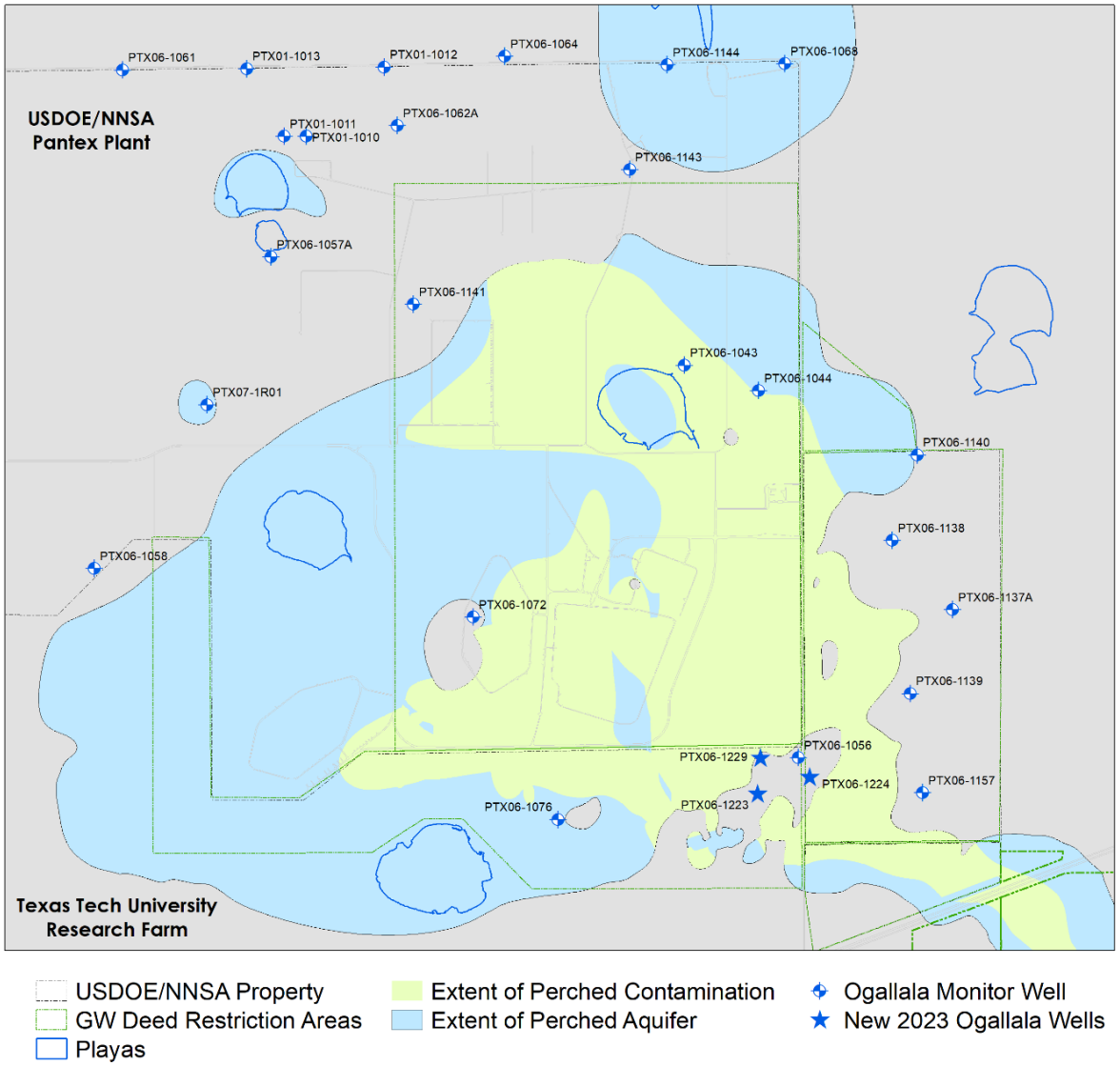
- **PTX06-1076 - (DNT4A)**
  - First detected in June 2020 at 0.09 ppb, below the practical quantitation limit (PQL) of 0.26 ppb. First detect above PQL (practical quantitation limit) was in May 2023
  - Review of installation logs for PTX06-1076 indicate that the well might not have been sealed properly 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

Ogallala Detections (PTX06-1056)



- **PTX06-1056 (DNT4A)**
  - First detected in April 2014 at 0.17 ppb, below the practical quantitation limit (PQL) of 0.262 ppb. Slow increasing trend throughout the years.
  - In response to the detections of HEs, Pantex installed three new Ogallala monitoring wells in 2023 to investigate nature and extent of the contamination.
  - 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 or within the Ogallala flow path.

New Ogallala Monitoring Wells



3 New Ogallala Wells installed in 2023 (*Blue Stars)

- PTX06-1223 was installed upgradient of PTX06-1056
  - Initial results - DNT4A and RDX at similar concentrations to recent samples from PTX06-1056
  - All concentrations were below the GWPS
- PTX06-1224 was installed as a side gradient well to PTX06-1056
  - Initial results non-detect for all COCs
- PTX06-1229 was installed north of PTX06-1223
  - Unexpected high explosives results above predicted values
  - Values exceeded GWPS

PTX06-1229 Data and Early Response

- **Sample Collection Sequence**

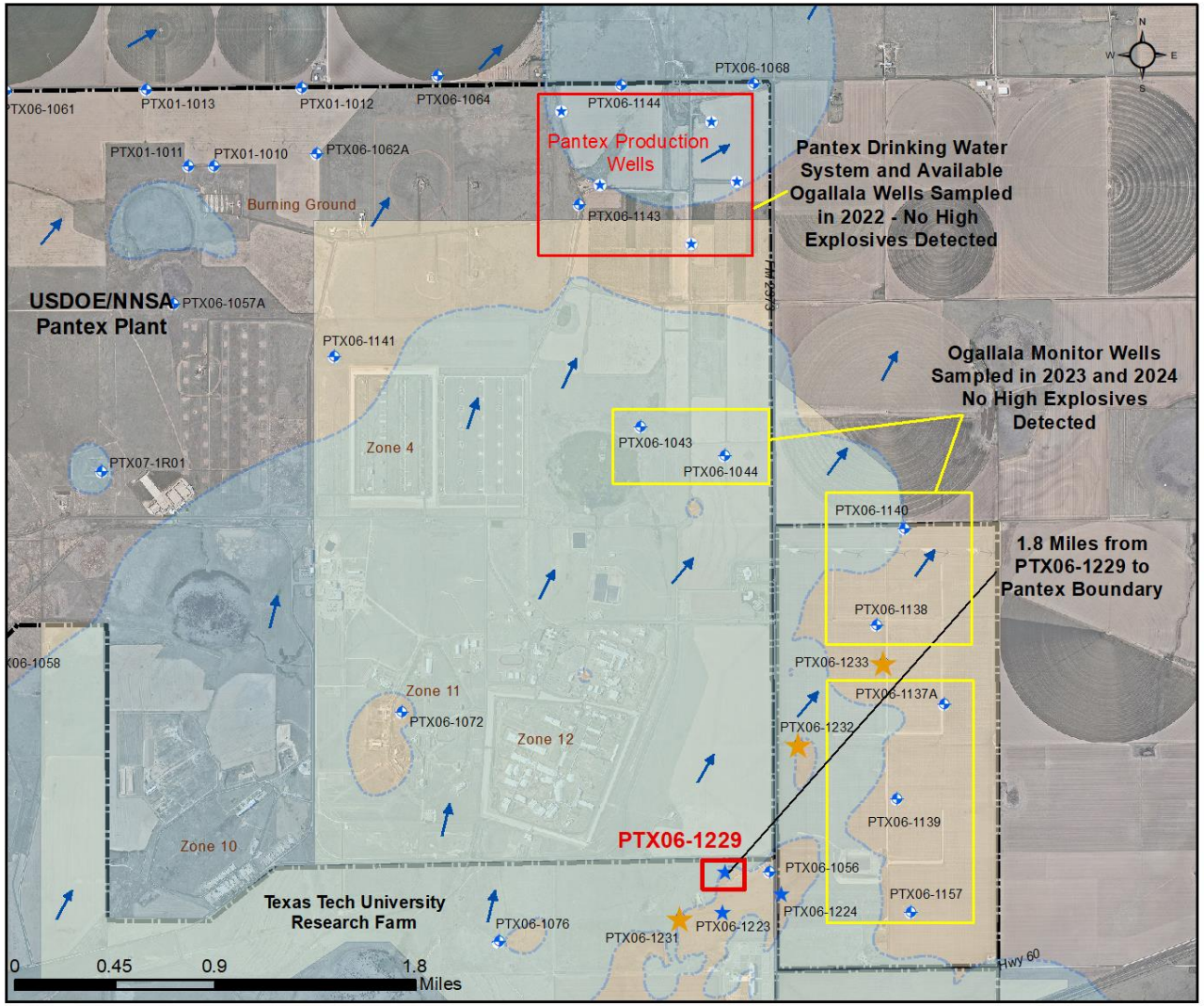
December 2023 Result

Analyte	GWPS (ug/L	Result (ug/L)
DNT4A	1.2	5.98
RDX	2	307
TNX	2	20

January 2024 Resample Results

Analyte	GWPS (ug/L)	Result (ug/L) – 1st Lab	Result (ug/L) – 2nd Lab
DNT4A	1.2	4.64	3.21
RDX	2	318	382
TNX	2	21.1	17.9

- **Actions Since January 2024**
  - Lower Interval Sampling in March
    - Results similar to upper interval
  - High Volume Purge/Time Series Sampling Event in March
    - Concentrations decreased at the end of the purge event
  - Monthly sampling in accordance with the Contingency Plan beginning in April, final sample collected June 10
    - All results were similar to initial detection
  - Contracted and began drilling three new Ogallala wells
  - Contracted fate and transport modeling to assist in determining best location for new wells to define nature and extent of the observed high explosives



Pantex Monitor Wells

- Ogallala Aquifer LTM Well
- 2023 Ogallala Wells
- 2024 Ogallala Wells

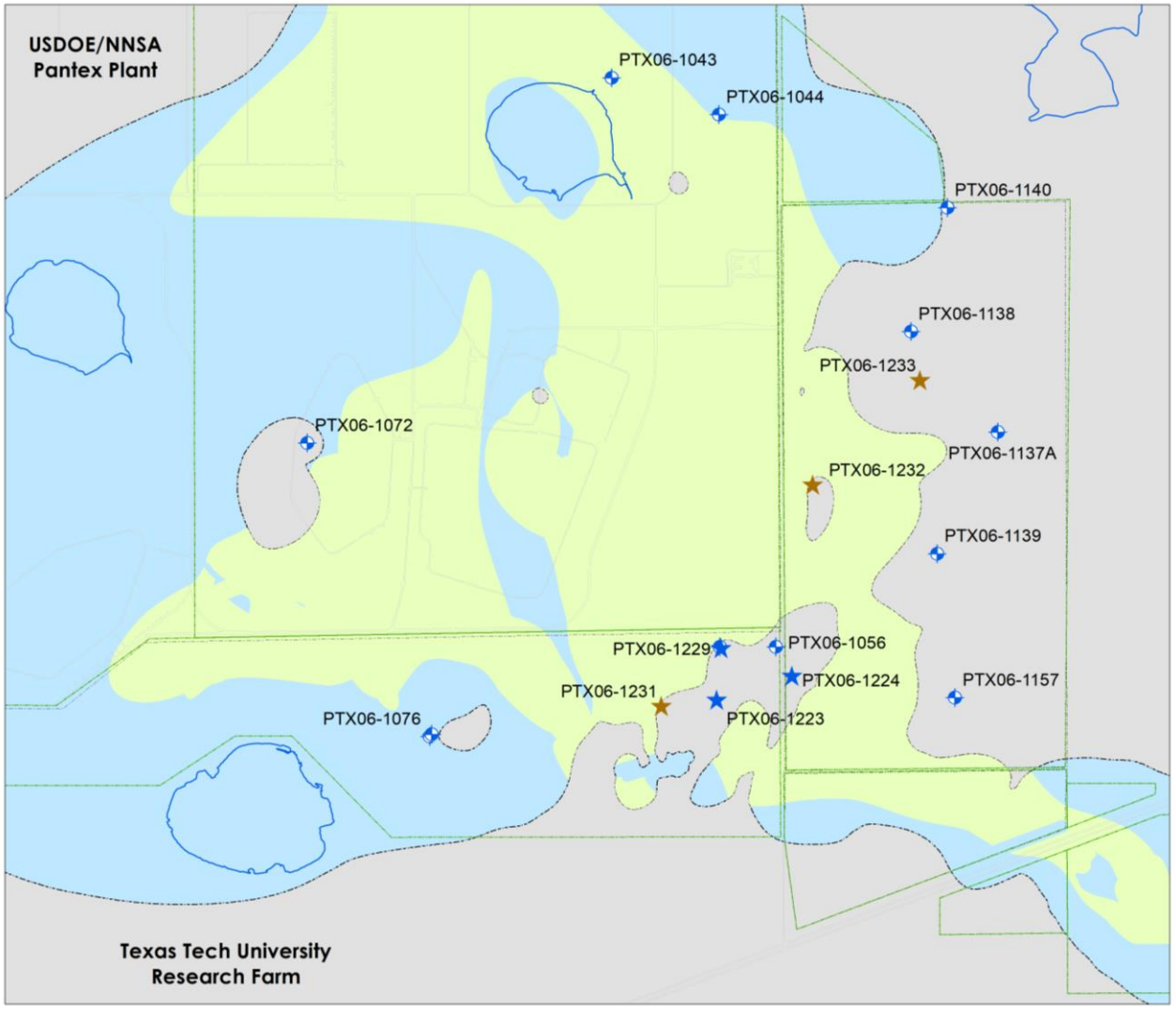
Water Supply Wells

- Pantex Water Supply

- Ogallala Aquifer Water Flow Direction
- Extent of Perched Aquifer
- Groundwater Deed Restrictions
- USDOE/NNSA Pantex Property

- **There is no imminent threat to existing drinking, irrigation or livestock water wells in the Ogallala Aquifer from these detections.**
  - 2023 and 2024 results from Ogallala monitoring wells to the north and east indicate no detections of high explosives
- **No high explosives have ever been detected in the Plant production wells or the water supply.**

3 New Ogallala Wells installed in 2024



3 New Ogallala Wells to be installed in 2024 (*Orange Stars)

- Due to high explosive detects at PTX06-1229, an additional 3 Ogallala monitoring wells are being installed
- All wells will be finished by the end of 2024
- First sampling scheduled for end of 2024
- Anticipate results will be available by June 2025
- Results will be made available on pantex.energy.gov|Mission |Environment| Environmental Cleanup Documents web page

Per- and polyfluoroalkyl Substances (PFAS)

- **PFAS is an emerging group of contaminants**
  - Common uses of PFAS include firefighting foams, non-stick cookware, waterproof gear and clothing, and grease-resistant packaging for fast food
  - Known as forever chemicals; regulatory agencies concerned with health issues and are in the process of developing regulations
  - Department of Energy (DOE) has developed a roadmap to address PFAS across the complex
  - TCEQ and EPA have released protection levels for PFAS
    - *TCEQ - Texas Risk Reduction Protective Concentration Levels (PCLs)*
    - *EPA - drinking water Maximum Contaminant Levels (MCLs)*

- **Following guidance from the DOE *PFAS Strategic Roadmap: DOE Commitments to Action 2022 – 2025***

  Pantex began investigating for the presence of PFAS in the perched groundwater
    - *Have detected PFAS in extraction well field for both pump and treat systems; both systems treat PFAS to below PCLs and MCLs*
    - *In process of implementing sampling plan to determine extent of PFAS contamination across perched groundwater monitoring network*
    - *Sampling began in late 2023 and will complete in 2025.*

3rd Five Year Review

- **The new FYR final report was submitted to TCEQ and EPA in September 2023**
  - EPA and TCEQ concurred with the report in September 2023
- **3rd Five Year Review Action Tracking:**
  - Issues to address:
    - Deficiencies in landfill soil covers and ditch liners
    - Area at the Southeast ISB that is not fully treated
    - Perched groundwater increases at Playa 1
    - Detections above GWPS in PTX06-1056
    - Begin evaluating the presence of PFAS in groundwater and whether our current remedies are removing PFAS
    - Areas within the Zone 11 ISB that indicate incomplete treatment of TCE
- **Overall Conclusion**

The remedial actions are protective in the short-term, but continued operation of Pump and Treat Systems and In Situ Bioremediation Systems are needed to achieve long-term protectiveness

3rd Five Year Review

- **2023 Completed Actions from the 3rd Five-Year Review**
  - Pantex completed cleanup and repair of the ditch liners in Zone 12
  - Pantex started operating the new Pivot Irrigation System which allows Pantex to:
    - Reduce reliance on Playa 1 for water management and
    - Operate Playa 1 Pump and Treat System consistently
  - Pantex put in three new wells to assess the detections at PTX06-1056 – sampling was completed at all wells by the end of 2023
  - Pantex has assessed the existing pump and treat systems to ensure that the GAC would remove the PFAS
  - PFAS groundwater sampling plan was developed in 2023 and implementation planned for completion in 2024
  - Pantex has reviewed injection volumes across the wells at the Zone 11 ISB to verify that sufficient volume of amendment water is being injected to distribute the amendment away from injection wells

Questions

Reports and slides can be found at:

http://pantex.energy.gov/mission/environment/environmental-cleanup-documents

Remediation Summary Booklet – available here and on our website

Fact Sheets – available here and on our website