



**US Army Corps
of Engineers**®
Omaha District

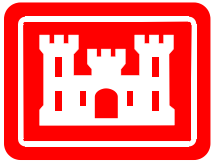


Operable Units 1 and 3 Program Update – October 2021 through October 2022

**Cornhusker Army Ammunition Plant
Grand Island, Nebraska**

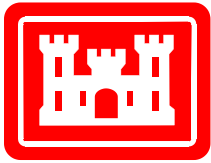
10 November 2022

**Prepared by:
Brice Engineering and
AECOM**

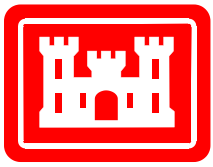


Agenda

- **Year in Review: Oct 2021 – Oct 2022**
 - **OU1 Rebound Study**
 - Temporary shutdown of extraction well EW7 and Groundwater Treatment Facility (GWTF)
 - Quarterly Groundwater Monitoring
 - **OU1 Subsurface Injections (Completed in 2019 and 2020)**
 - Quarterly Groundwater Performance Monitoring
 - **Annual OU1 and OU3 Groundwater Monitoring**
 - May 2022 Annual Sampling Event
 - Groundwater Modeling
 - Institutional Controls Review
- **Up Next: Oct 2022 – Oct 2023**

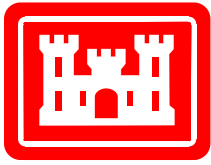


Year in Review – OU1 Rebound Study



OU1 Rebound Study

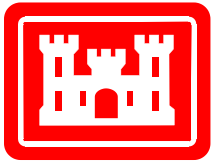
- **Objective – Optimize the Remedy**
 - Decreasing explosives concentration trends and numerical modeling simulations suggested that groundwater extraction/treatment was no longer needed to prevent plume migration
 - Shutting down energy-intensive extraction and treatment operations decreases carbon footprint and reduces associated operations and maintenance (O&M) costs
 - Concurrent OU1 subsurface injections will decrease overall remedial timeframe and lifecycle costs through in situ biodegradation



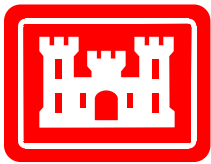
OU1 Rebound Study

- **OU1 Rebound Study Components**

- Temporary shutdown of pump and treatment operations (EW7 and GWTF)
 - Maintain routine O&M: monthly inspections and compressor bumps, mowing, pest control, security, etc.
 - EW7 and GWTF will remain in standby status for resumption of operation, if necessary
- Quarterly Groundwater Monitoring
 - Track stability of explosives plume
 - 30 on- and off-post wells (explosives and MNA analysis)
 - Direct-push off-post location sampling (explosives analysis only)
 - Monitor off-post concentrations/trends and verify horizontal extent
 - Vertical profile sampling
 - Completed all 8 events to date (Oct 2019, Feb 2020, May 2020, Sep 2020, Feb 2021, May 2021, Oct 2021, and Feb 2022)

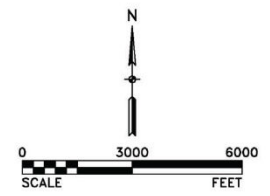
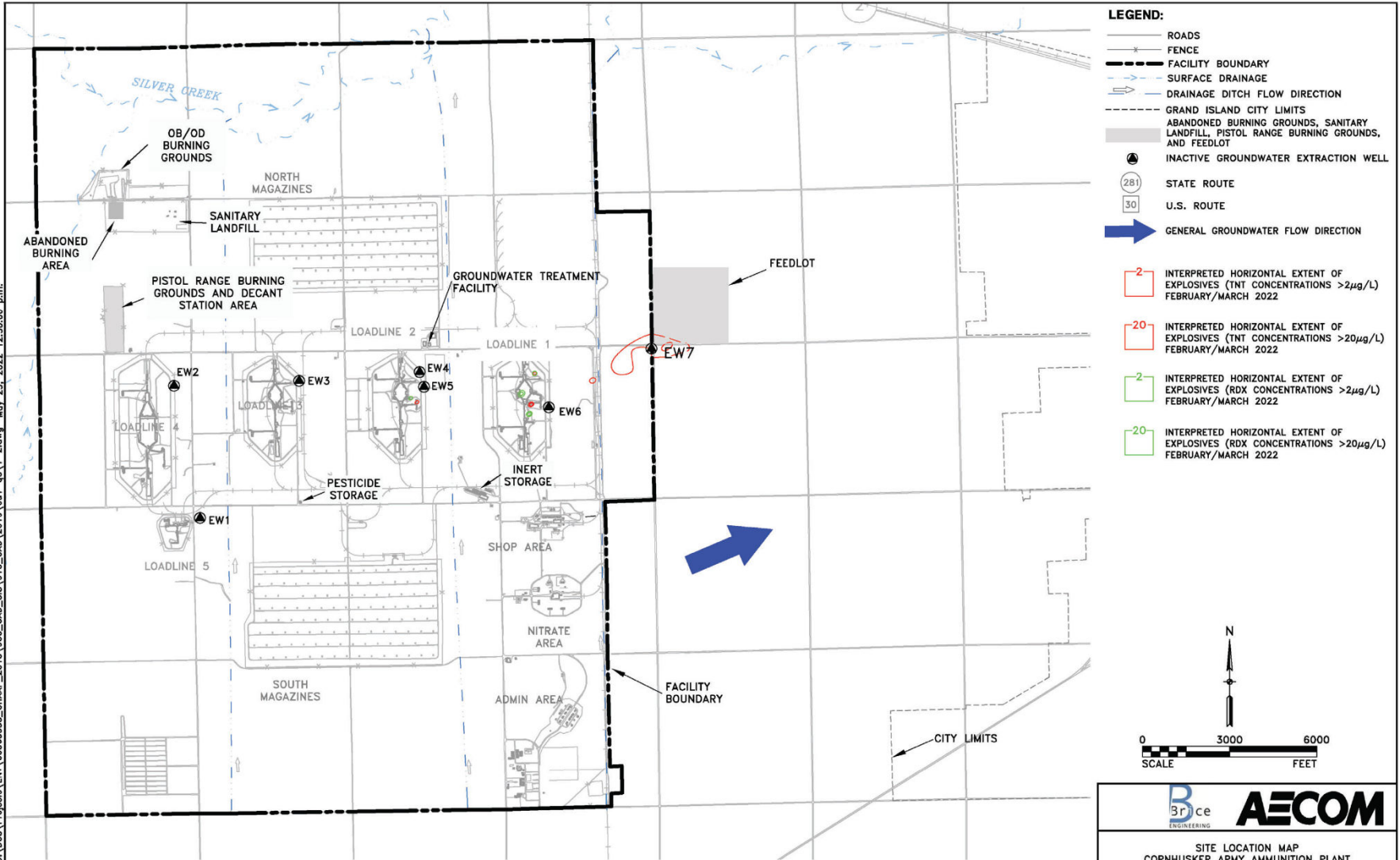


Year in Review – OU1 Rebound Study/Injection Results



2022 Explosives Plume

Drawing: C:\DCSY\Projects\ENV\60565355_CHAAP_2018\900_CAD_GIS\910_CAD\2019\out\1-rb\1-2.dwg May 23, 2022 12:50:00 p.m.

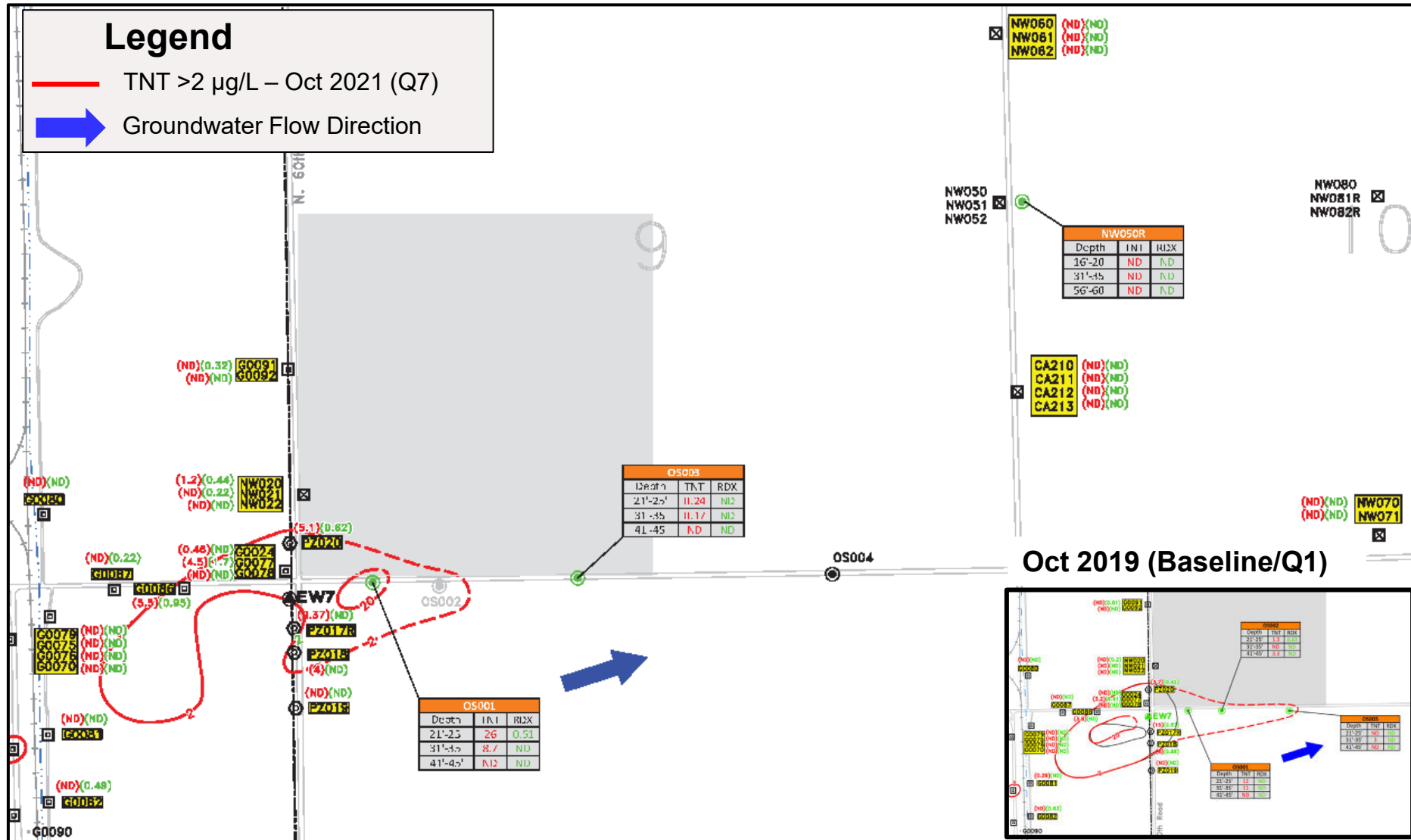


Brice ENGINEERING **AECOM**

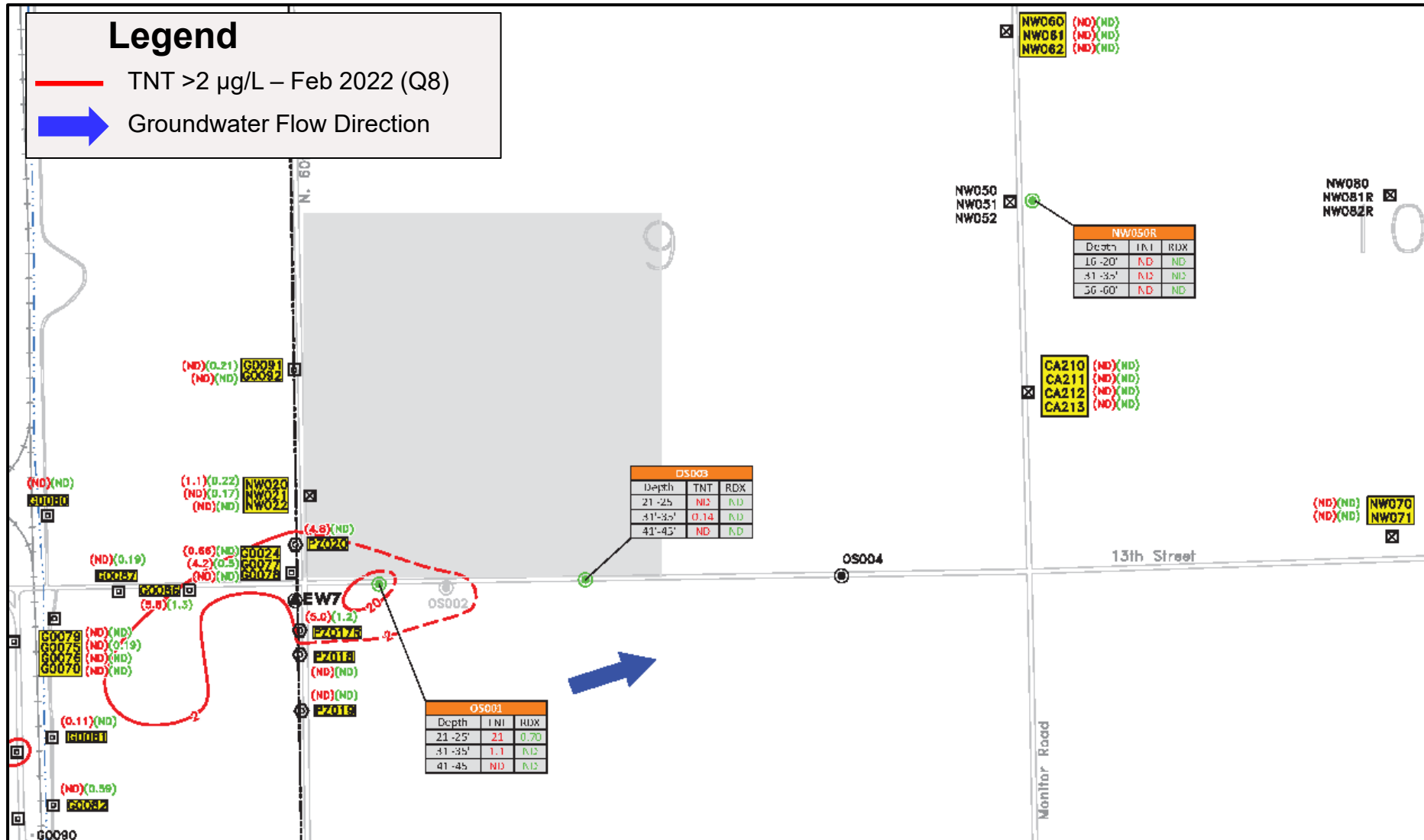
SITE LOCATION MAP
CORNHUSKER ARMY AMMUNITION PLANT

DRN. BY: DPG	DATE: 05/23/22	PROJECT NO. 60565355	FIG. NO. 1-2
CHK'D. BY: DC	DATE: 05/23/22		

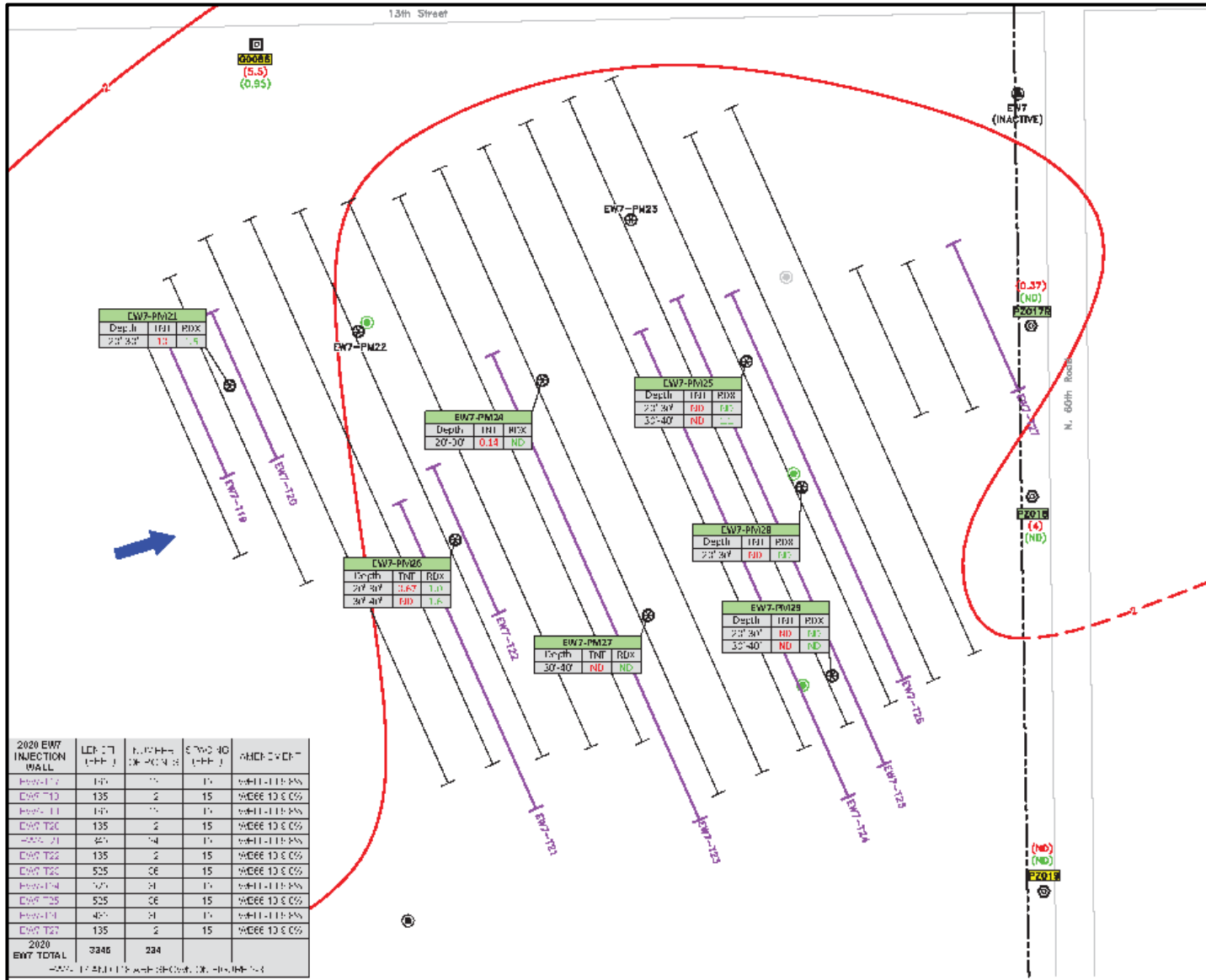
Oct 2021 (Q7) Explosives Plume



Feb 2022 (Q8) Explosives Plume



Oct 2021 (Q7) Plume Core – Near EW7



Observations

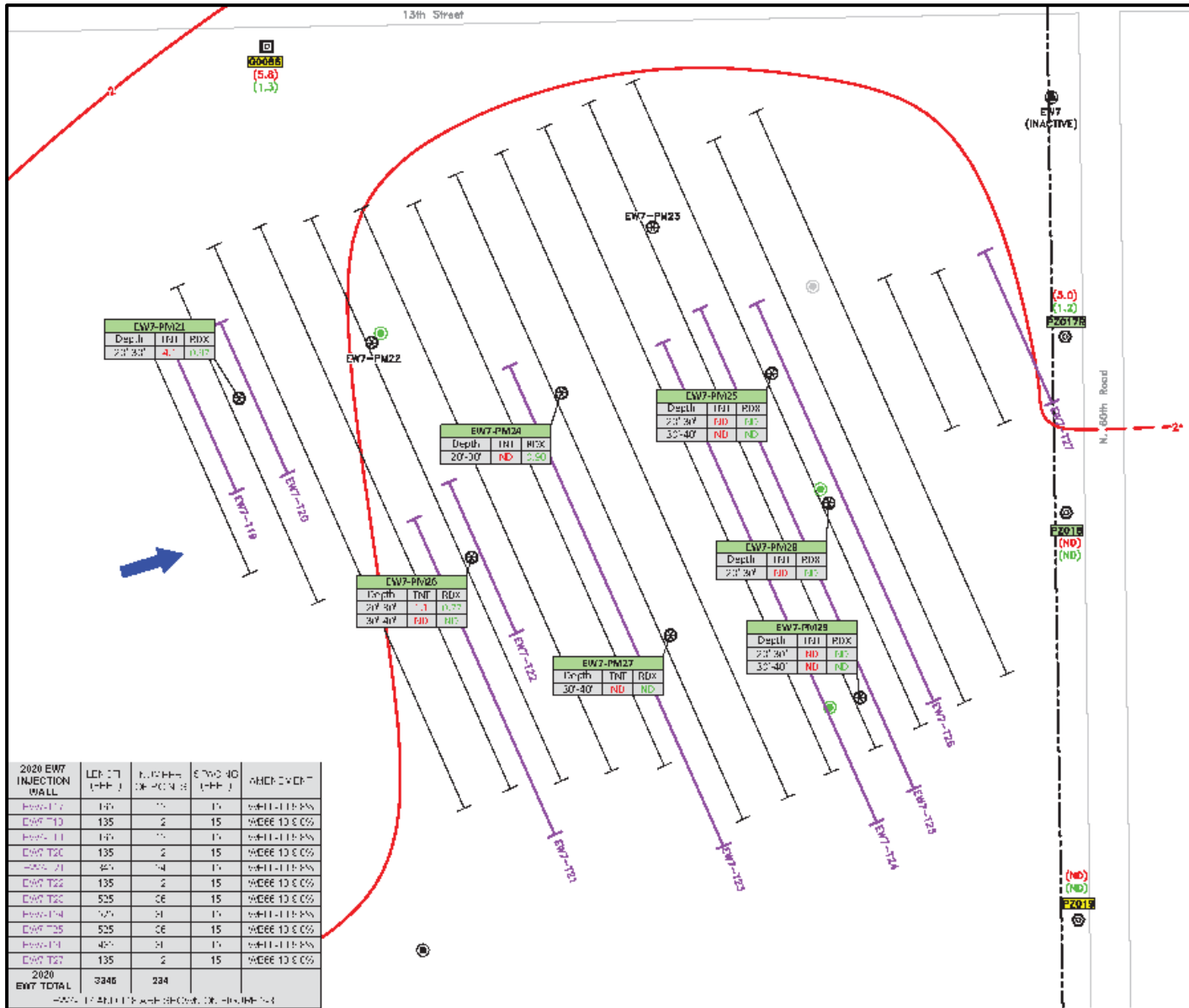
- Concentrations have been substantially reduced within the injection area since 2019.
- RDX below HAL at all PM wells.
- Strong anaerobic geochemical conditions persist.

Legend

- TNT >2 µg/L
- 2020 Injections
- 2019 Injections
- Groundwater Flow Direction

Note: Health Advisory Level (HAL) for TNT and RDX = 2 µg/L

Feb 2022 (Q8) Plume Core – Near EW7



Observations

- TNT decreases at 4 wells with 11 of 13 wells below HAL. Only 2 wells increased, only 1 increased above HAL.
- RDX still below HALs at all PM wells. RDX decreased at 5 wells. RDX increased at only 2 wells.

Legend

- TNT > 2 µg/L
- 2020 Injections
- 2019 Injections
- ➔ GW Flow

Note: Health Advisory Level (HAL) for TNT and RDX = 2 µg/L

Oct 2021 (Q7) Plumes – Load Lines

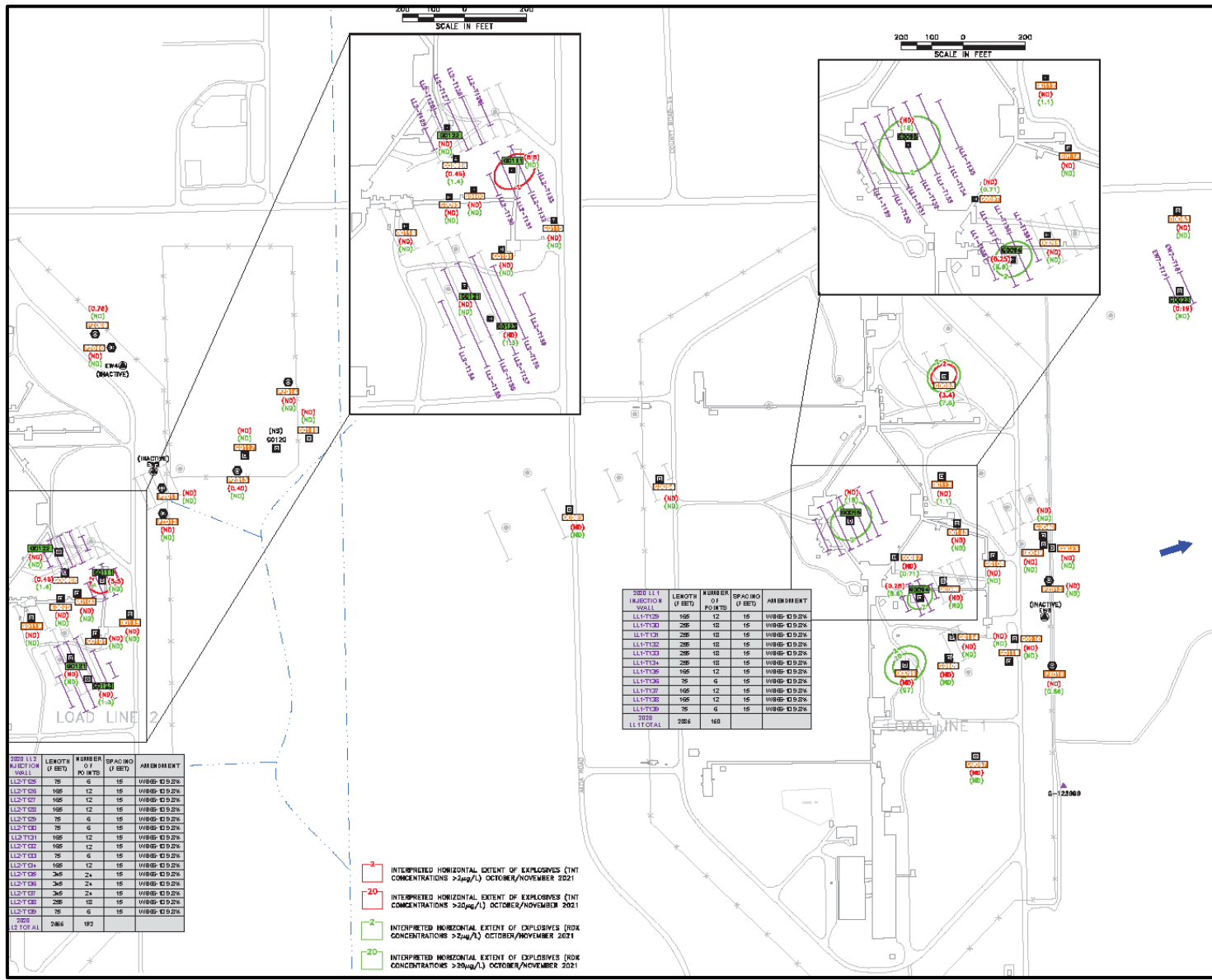
Observations

- Small isolated plumes remain in the Load Lines, primarily near former source areas
- No injections since 2016, anaerobic geochemical conditions have diminished

Legend

- TNT >2 µg/L
- RDX >2 µg/L
- 2020 Injections
- 2016 Injections
- ➔ Groundwater Flow Direction

Note: Health Advisory Level (HAL) for TNT and RDX = 2 µg/L



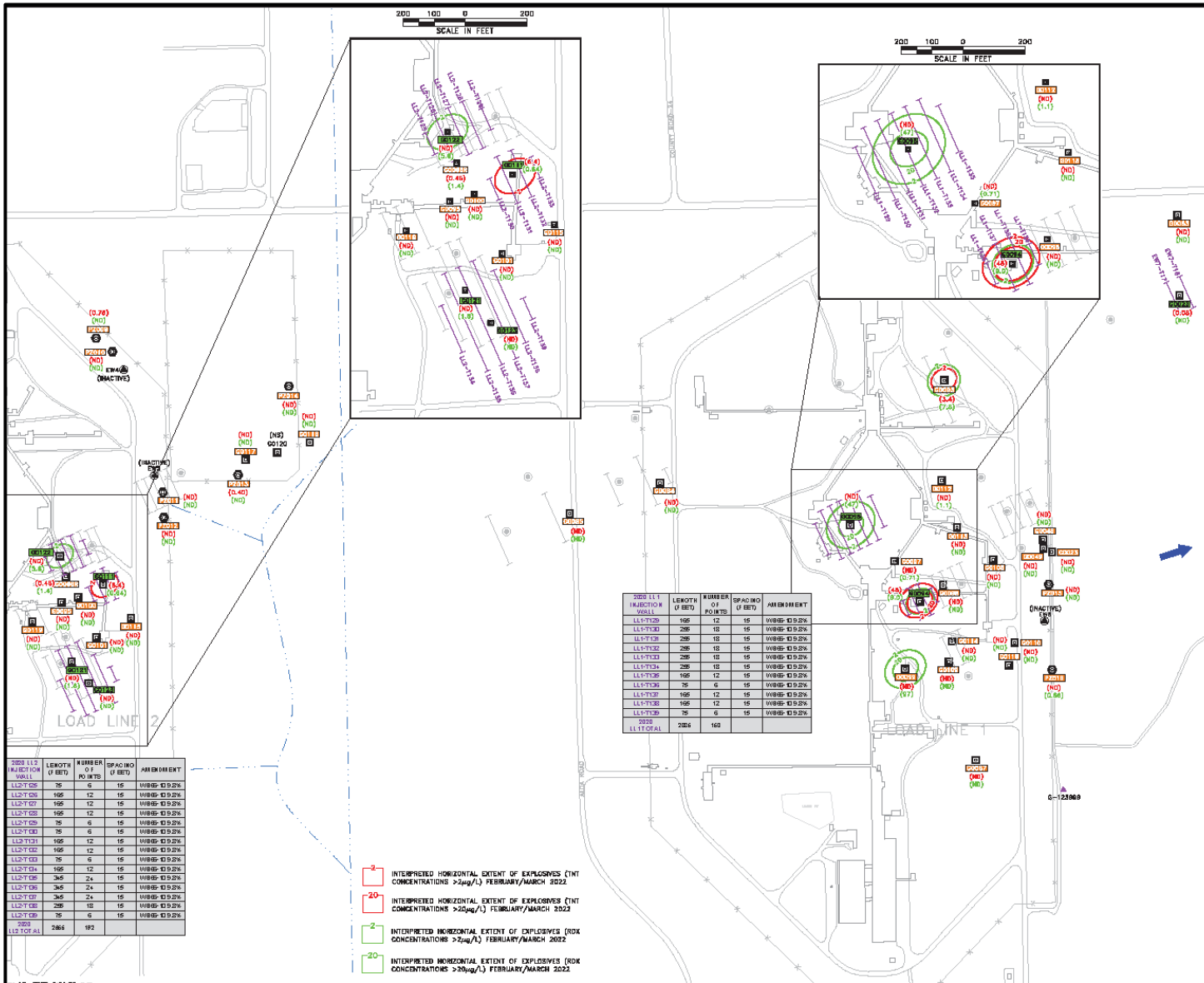
Feb 2022 (Q8) Plumes – Load Lines

Observations

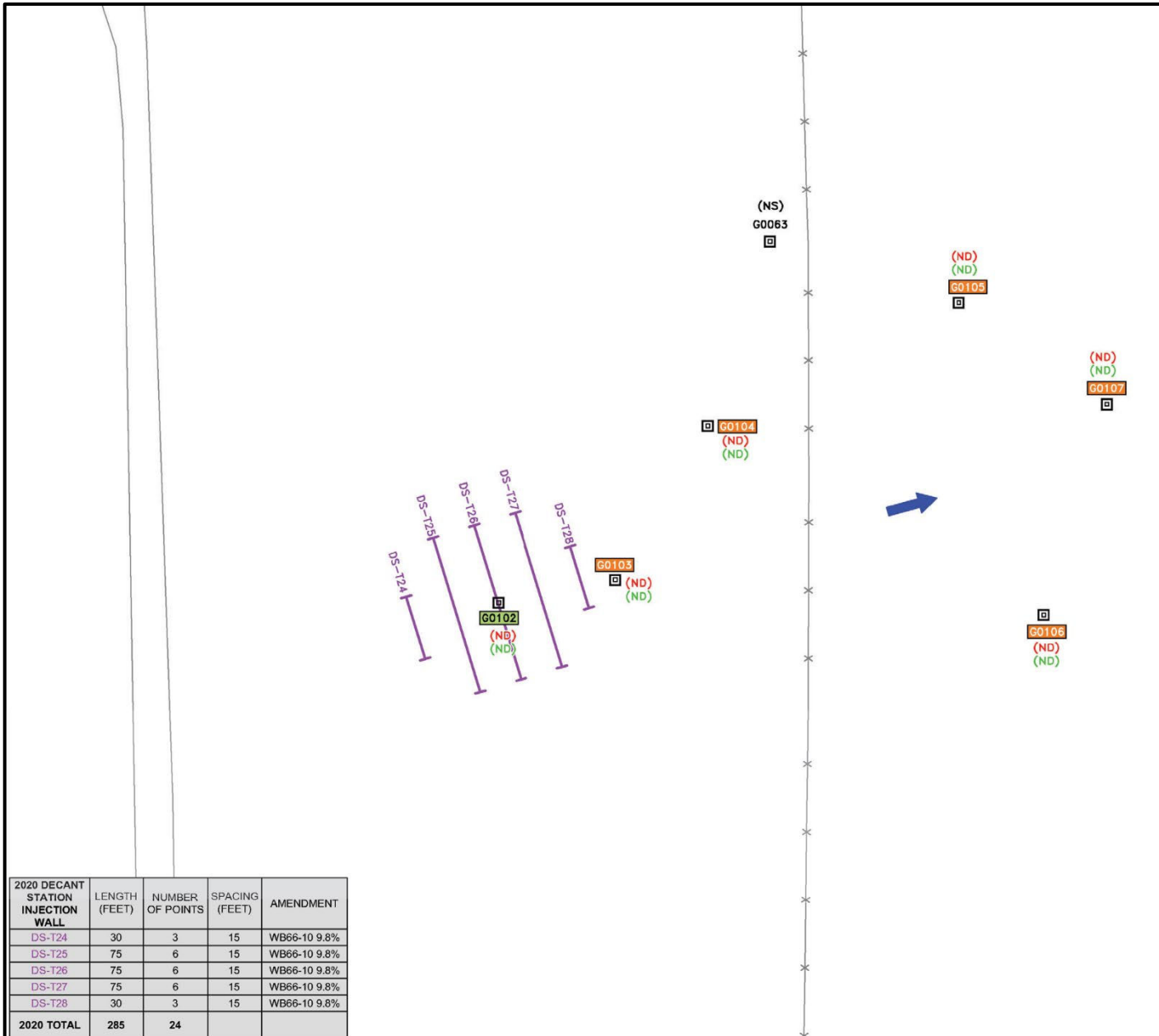
- TNT concentrations increased at 2 wells (both above the HAL). TNT concentrations remained ND at 4 wells.
- RDX decreased at 1 well.
- RDX increased at 5 wells, but only 3 wells are above the HAL.

Legend

- TNT >2 µg/L
- RDX >2 µg/L
- 2020 Injections
- 2016 Injections
- Groundwater Flow Direction



Oct 2021 (Q7) Plume – Decant Station



Observations

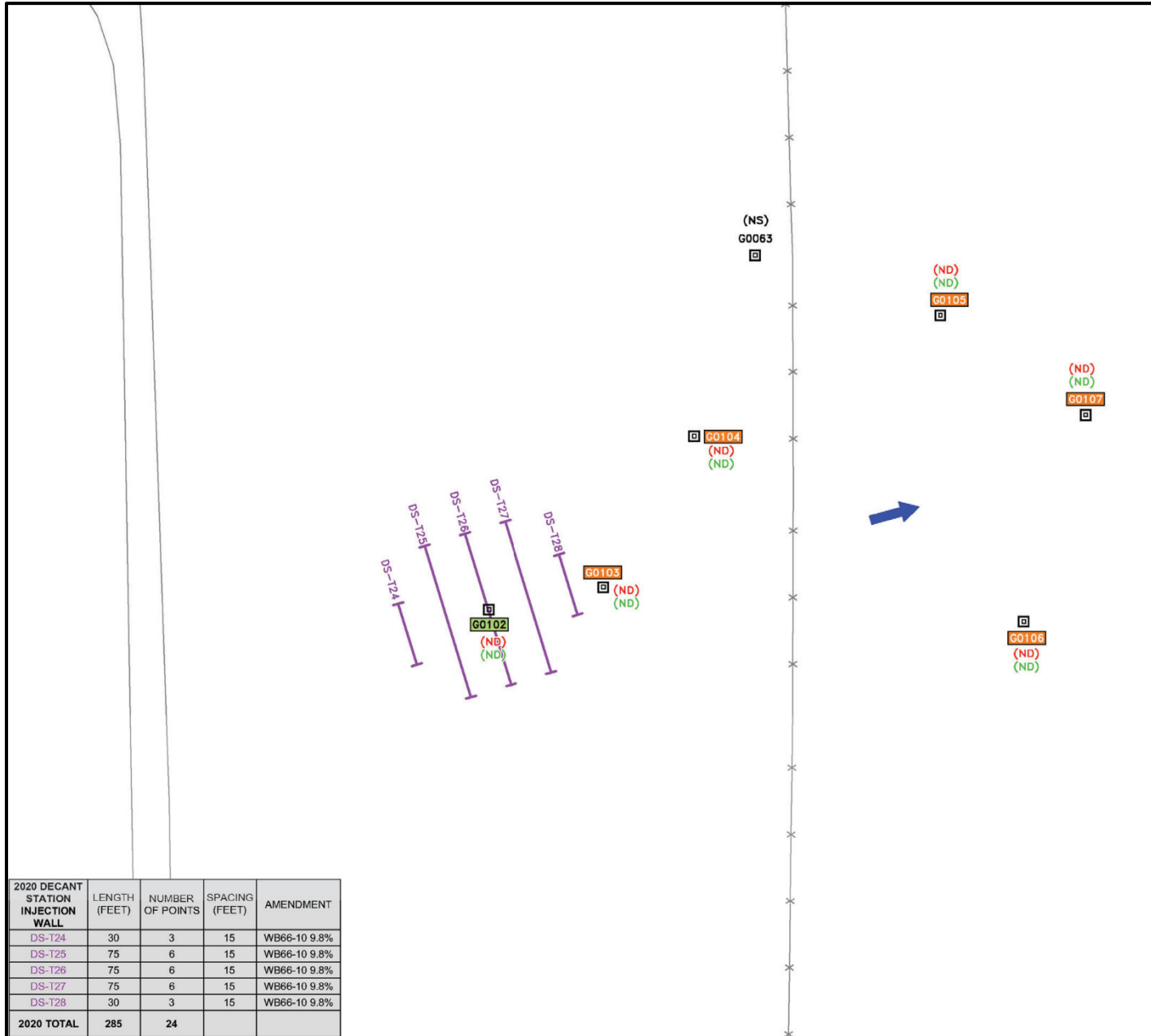
- All concentrations are ND.
- Most recent detection was May 2021 (Q6).

Legend

- 2020 Injections
- ➔ Groundwater Flow Direction

Note: Health Advisory Level (HAL) for TNT and RDX = 2 µg/L

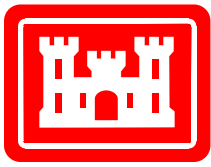
Feb 2022 (Q8) Plume – Decant Station



- ## Observations
- All concentrations remain ND.
 - Strong anaerobic conditions observed.

Legend

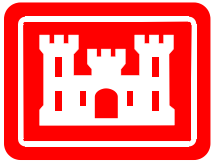
- 2020 Injections
- ➔ Groundwater Flow Direction



Rebound Study Results

- **Rebound Study**

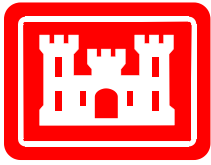
- Rebound Study results indicated:
 - The plume core is shrinking
 - Statistical analysis (Mann-Kendall Test) show concentrations are declining
 - There has been no further plume migration downgradient (further off-post).
 - EW7 and the pump and treat system can remain off
- In the Quarter 8 Technical Memorandum, the Army recommended continued annual groundwater monitoring and proceeding to the next phase of the cleanup process. USEPA and NDEE concurred.



On-Post Results

- **On-post**

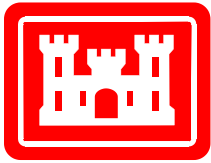
- Pervasive anaerobic conditions established in injection zones
- TNT concentrations continue to decrease
- Some TNT and RDX concentration increases due to mobilization resulting from injections
- Anaerobic conditions expected to reduce TNT and RDX mobilized from injections
- Permanent and temporary wells generally show decreasing or stable trends



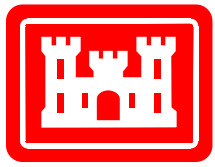
Off-Post Results

- **Off-post**

- All permanent off-post wells sampled as part of the OU1 Rebound Study remain below HALs
- Direct-push samples downgradient of EW7/south of feedlot (OS001, OS002, OS003, NW050R) collected as part of OU1 Rebound Study:
 - TNT concentrations above HALs at only OS001
 - Q7 maximum TNT = 26 µg/L
 - Q8 maximum TNT = 21 µg/L
 - RDX detected, but below the HAL of 2 µg/L
 - Q7 maximum RDX = 0.51 µg/L
 - Q8 maximum RDX = 0.7 µg/L
 - No evidence of plume mobilization and the plume is attenuating
 - Monitoring will continue



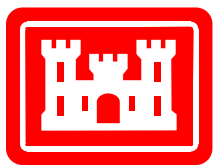
Year in Review – OU1 and OU3 Annual Groundwater Monitoring



OU1 and OU3 Groundwater Monitoring Program

- **May 2022 Annual Sampling Event**
 - Site-wide (OU1 and OU3) groundwater level measurements (108 wells)
 - OU1: Groundwater sampling at 74 on-post and 12 off-post wells
 - OU3: Groundwater sampling at 6 Shop Area wells
- **Groundwater Modeling**
- **Institutional Controls Review**





OU1 and OU3 Groundwater Monitoring Program

- **OU1 Results**

- Off-post:

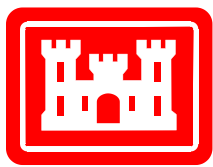
- TNT and RDX in all off-post annual LTM permanent wells below HALs (2 $\mu\text{g/L}$); have been below HALs since 2014
 - Note that TNT is above HAL in 1 off-post direct-push location (OS001) near the facility boundary associated with OU1 Rebound Study

- On-post:

- TNT and RDX concentrations generally continued decreasing trends or remain below HALs
 - 11 of 74 wells above HALs in May 2022

- Maximum concentrations in May 2022

- TNT = 39 $\mu\text{g/L}$ at G0094 at LL1 (historic high at G0094, 156 $\mu\text{g/L}$ in 2011)
 - RDX = 37 $\mu\text{g/L}$ at G0096 at LL1 (historic high at G0096, 78 $\mu\text{g/L}$ in 2012)
 - Both wells are located near 2020 injections - continued degradation expected
 - Max concentrations near EW7 are TNT = 7.7 $\mu\text{g/L}$ and RDX = 1.2 $\mu\text{g/L}$



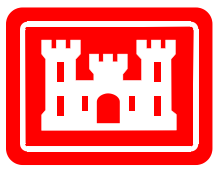
OU1 and OU3 Groundwater Monitoring Program

- **OU3 Results**

- VOC concentrations (1,1,2-TCA, 1,2-DCA) have, overall, decreased over time, but do fluctuate above/below maximum contaminant levels (MCLs) (5 µg/L)
 - Well SHGW02: VOCs below MCLs in May 2022 (above MCLs in 2018, 2016, 2014, 2010 and prior)
 - Well SHGW03: VOCs below MCLs in May 2022 (above MCLs in May 2021 and 2020, but below in 2019 and prior)
 - Downgradient wells G0053, G0069, SAMW1, and SHGW04 were sampled this year (currently on 3-year sampling frequency). Results continue to be below MCLs.

- **Sitewide Observation**

- Groundwater levels decreased approximately 5 feet since 2020, but there has been an overall increasing trend since 2014 (approximately 6 feet overall)



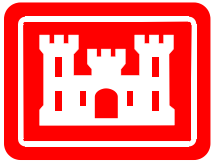
OU1 and OU3 Groundwater Monitoring Program

- **Groundwater Modeling**

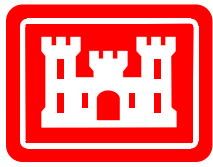
- The model-predicted results indicated no further off-post migration of RDX or TNT, and the on-post RDX and TNT concentrations are reduced to below the HALs in 8 years.

- **Institutional Controls Review**

- City Ordinance Institutional Controls: verified by contacting the City of Grand Island Building Department to confirm no plumbing permits for private well hookups were issued in the past 12 months. Also included a visual survey of land parcels near the historic plume.
- Water Supply Institutional Controls: verified by contacting the City of Grand Island Building Department to confirm all residents in the historic plume are currently supplied with city water.
- The institutional controls established in the OU1 ROD Amendment and the OU3 ROD for CHAAP are fully operative and effective. It can therefore be stated that the overall objective of the institutional controls, to help prevent exposure to contaminated groundwater at CHAAP, has been achieved through September 2022.

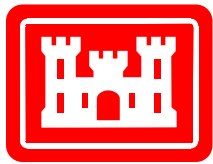


**Up Next – October 2022 through
October 2023**

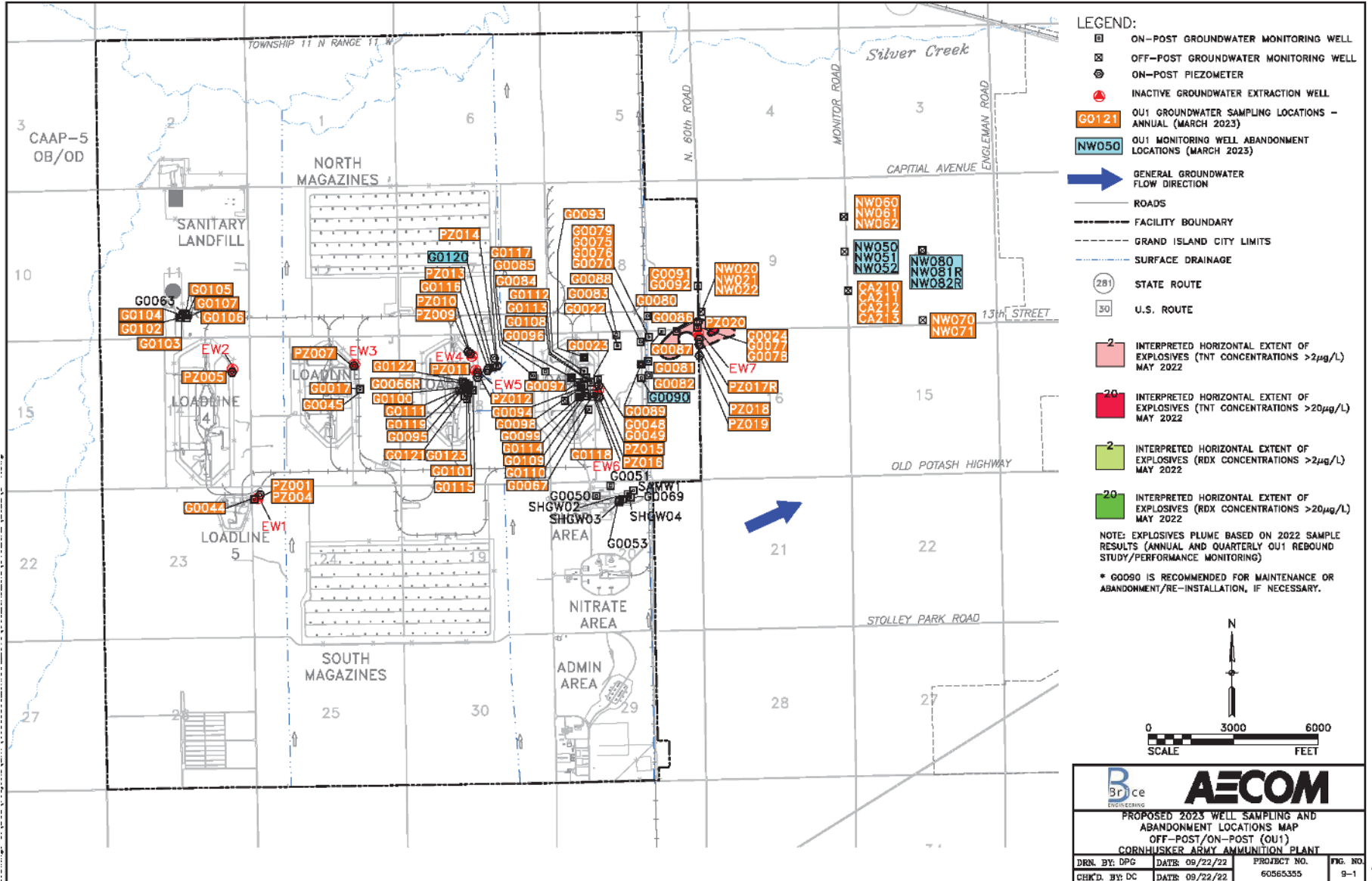


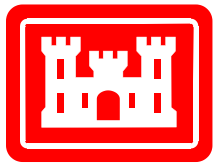
Up Next – October 2022 through October 2023

- **Annual OU1 and OU3 Groundwater Monitoring Recommendations**
 - Continue site-wide water level monitoring
 - Continue annual monitoring of explosives at 12 OU1 off-post wells, 59 OU1 on-post wells, and 16 OU1 on-post piezometers
 - Continue annual monitoring of VOCs at 2 OU3 Shop Area wells
 - Continue direct-push groundwater sampling at 3 former quarterly OU1 Rebound Study locations located off-post (3 samples per location)
 - Collect additional direct-push samples at 10 on-post locations (2 to 3 samples per location) to further define the horizontal and vertical extent, improve modeling accuracy and remediation timeframe estimates, and help direct future RAO activities (e.g., subsurface injections)
 - Abandon 7 monitoring wells (NW050, NW051, NW052, NW080, NW081R, NW082, and G0120). Perform well maintenance at 1 well (G0090).
 - Continue groundwater modeling to predict site remediation time frames
 - Continue institutional controls review to help prevent exposure to contaminated groundwater
 - Maintain shutdown of EW7 and GWTF

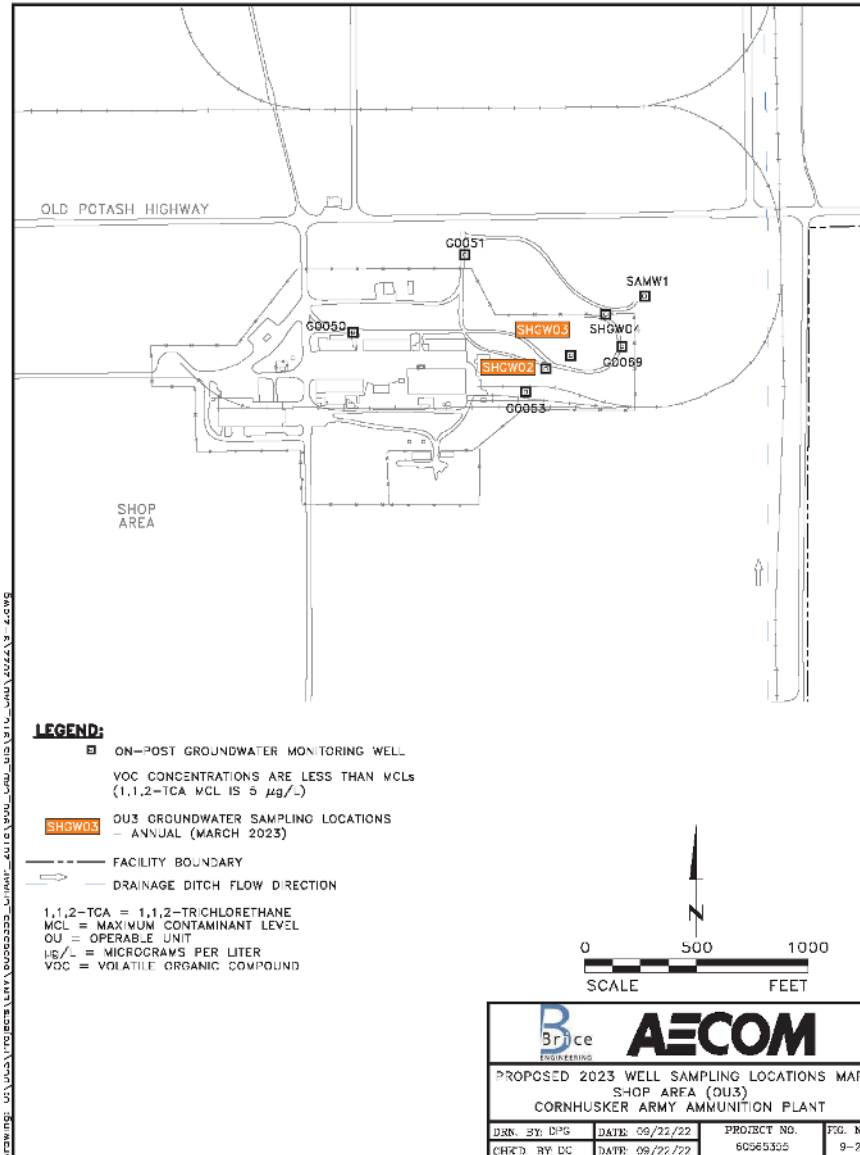


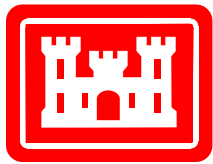
Up Next – October 2022 through October 2023



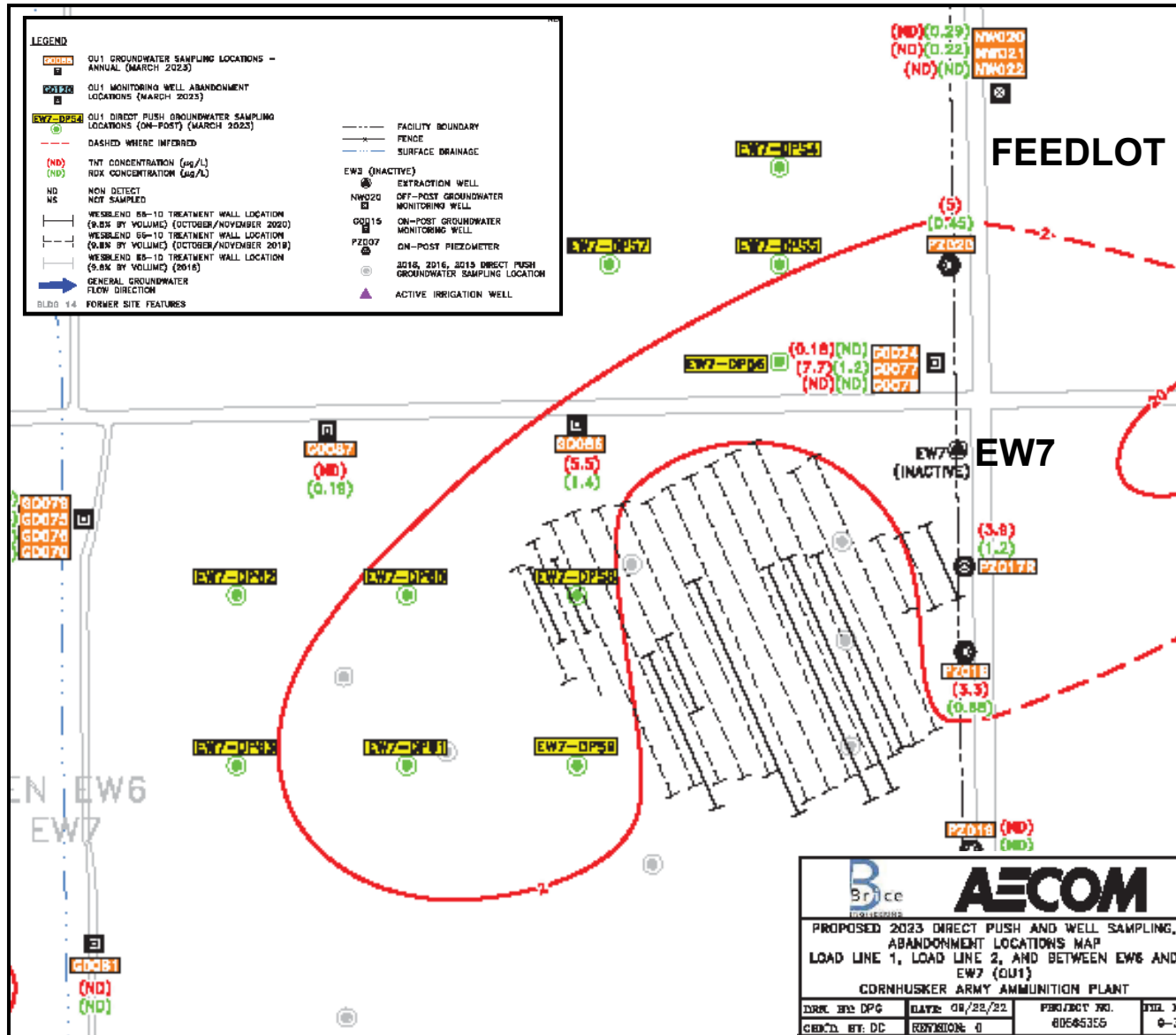


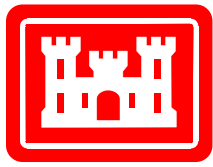
Up Next – October 2022 through October 2023



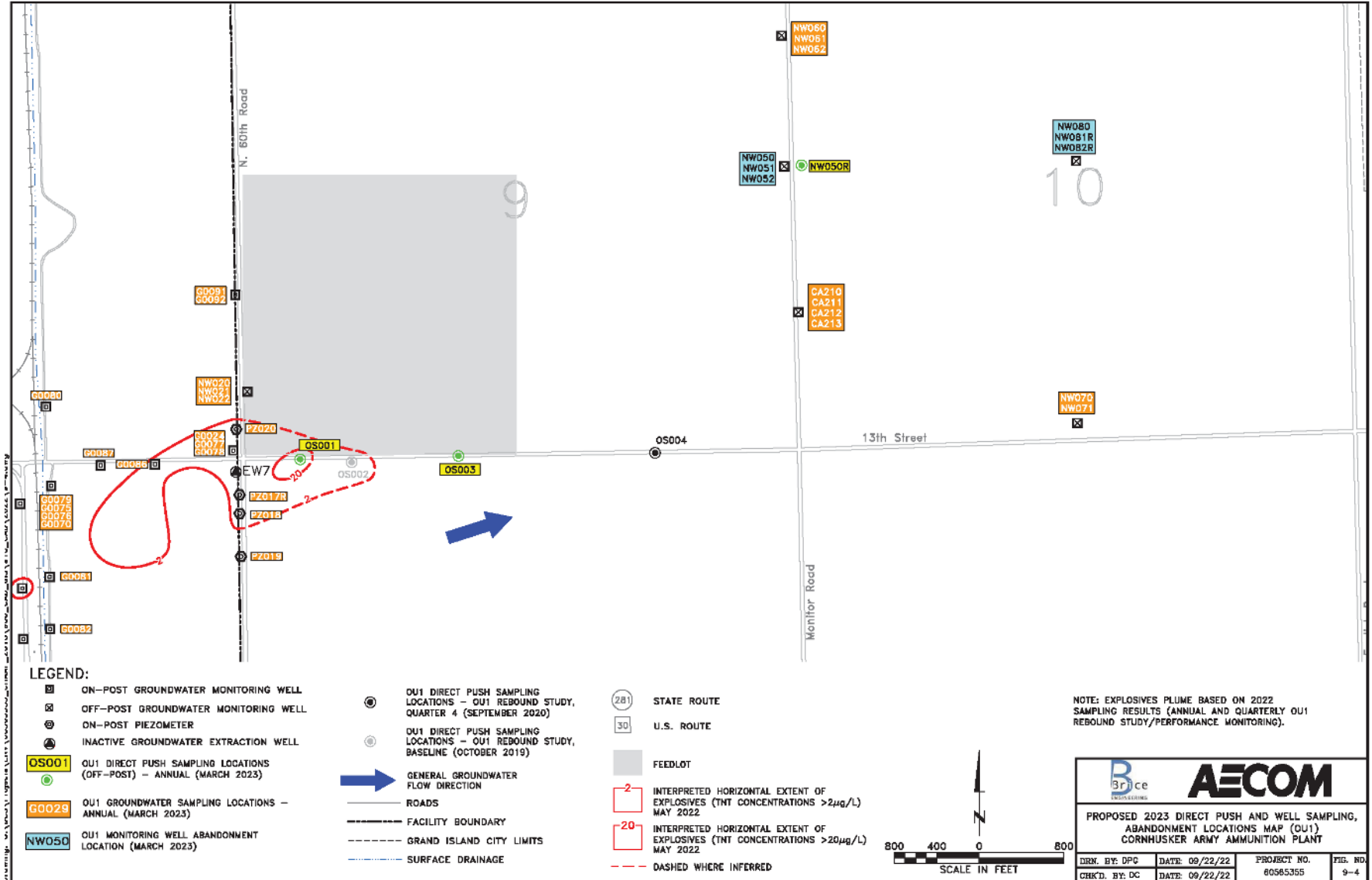


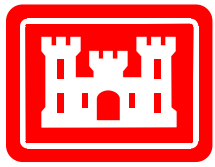
Up Next – October 2022 through October 2023





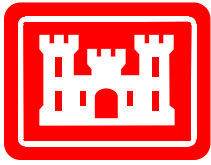
Up Next – October 2022 through October 2023





Up Next – October 2022 through October 2023

- **Next phase of cleanup for on-post plumes includes the preparation of the following documents:**
 - **Focused Feasibility Study:** develops and evaluates various remedial alternatives (cleanup strategies) to make sure they are protective of human health.
 - **Proposed Plan:** selects the preferred remedial alternative (cleanup strategy) for the on-post plume and includes a public meeting and public comment period. The Army invites and encourages public participation. The Proposed Plan phase provides an opportunity for the public to voice their support or concerns of the Army's proposed actions. If you provide your name and email address, the Army will let you know when the public comment period begins and where the documents can be reviewed. Otherwise, the announcement will be published in the local newspapers.
 - **Record of Decision Amendment:** officially modifies the remedial alternatives (cleanup strategies). This document is signed by Army and USEPA.



Questions?