



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

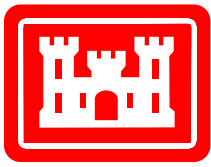


# **Operable Units 1 and 3 Program Update – November 2022 through November 2023**

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

**29 November 2023**

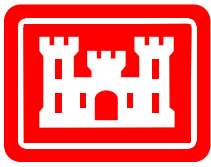
**Prepared by:  
Brice Engineering**



# Agenda

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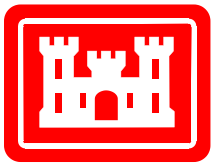
- **Site Background**
- **Water Level Measurements**
  - Number of Wells Measured and Dry Wells
- **Monitoring Well Inspection and Maintenance**
  - Planned Maintenance and Recommended Future Repairs
- **Summary of Samples Collected**
  - OU1 and OU3
- **OU1 Results**
  - Analytical Results, Compounds Detected, Frequency of Detections, Detections above HALs and Concentration Range (2022 compared to 2023)
- **OU1 Explosives Plume**
- **OU3 Results**
- **Institutional Controls Review**
- **Wells with Concentrations Less Than HALs for 5+ Years**
- **2024 Recommendations**
- **OU1 Path Forward**



# Site Background

- CHAAP became a Superfund Site in 1990 and cleanup is being completed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act.
- The cleanup at CHAAP is managed and funded by the U.S. Army Corps of Engineers and the U.S. Army Environmental Command, with oversight by the U.S. Environmental Protection Agency (USEPA) Region VII and the Nebraska Department of Environment and Energy (NDEE).
- OU1 consists of explosives-contaminated groundwater plumes exceeding Action Levels. Action Levels were established in the 1994 Record of Decision and the Subsequent 2001 Record of Decision Amendment and approved by the Army, USEPA and NDEE.
- USEPA Health Advisory Levels (HALs) were established as Action Levels for hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), 2,4,6-trinitrotoluene (TNT), and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX). The HALs for RDX and TNT are 2 micrograms per liter ( $\mu\text{g/L}$ ) and 400  $\mu\text{g/L}$  for HMX.
- OU3 consists of volatile organic compound (VOC) contaminated groundwater plumes exceeding Action Levels. Action levels are USEPA maximum contaminant levels (MCLs).
- The on-post remedy for OU1 is groundwater extraction with treatment. Temporary shutdown of all extraction wells and the pump and treatment system occurred in Nov 2019 and remains in standby status. The OU1 on-post remedy is being changed.

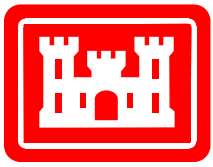




# Water Level Measurements

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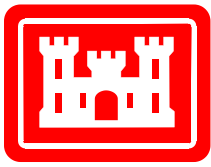
- **Water Level Measurements Completed on 19 and 20 June 2023**
- **Number of Wells Measured (104 Wells)**
  - OU1 Off-Post – 11 Wells
  - OU1 On Post (Between EW6 and EW7) – 24 Wells, PZs, and OWs
  - OU1 On Post (LL1) – 23 Wells, PZs, and OWs
  - OU1 On Post (LL 2) – 24 Wells, PZs, and OWs
  - OU1 On Post (LL 3) – 3 Wells and PZs
  - OU1 On Post (LL 4) – 1 Well
  - OU1 On Post (LL 5) – 3 Wells and PZs
  - OU1 On Post (Decant Station) – 7 Wells
  - OU3 On Post – 8 Wells
- **Number of Dry Wells**
  - OU1 Off-Post – 1 (CA210)
  - OU1 On Post – 2 (G0079 [Between EW6 and EW7] and EW4-OW4A [LL2])
- **Water Levels Were Down 1.5 Feet Compared to 2022**



# Well Inspection and Maintenance

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- **Monitoring Well Inspection and Maintenance Completed Between 19 and 29 June 2023**
- **Planned Maintenance in December 2023**
  - 14 OU1 On-Post Wells and PZs
  - Straighten bollards, seal/caulk cracked pads, and fill animal burrows.
- **Recommended Future Repairs or Abandonments - 2024**
  - Abandon G0089 due to down hole blockage (confirmed bentonite-backfill material inside the well)
  - Repair protective casing metal lids not closing or with broken hinge at 6 OU1 On-Post Wells (G0066R, G0077, G0078, G0093, G0117, and G0123).
- **Recommendations were provided in the Final Monitoring Well Inspection and Maintenance Letter Report, Groundwater Monitoring at OU1/OU3**



# Summary of Samples Collected

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- **Summary of Samples Collected**

- Samples collected from permanent wells between 20 and 28 June 2023
- Direct push groundwater samples collected at 13 locations (10 on-post locations - 21 samples, 3 off-post locations – 9 samples) between 13 and 18 November

- **OU1 Off-Post Wells:**

- Sampled for Explosives only at 11 locations
- CA210 was dry

- **OU1 On-Post Wells:**

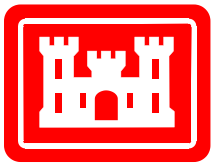
- Sampled for Explosives and MNA Parameters at 71 locations
- G0048 had insufficient water to sample and G0079 was dry.
- G0089 and G0090 were damaged with down hole blockage (confirmed bentonite-backfill material inside the well) and unable to be sampled. (G0089 is recommended for abandonment, G0090 was abandoned).

- **OU3 On-Post Wells:**

- Sampled for VOC and MNA Parameters at 2 locations
- SHGW03 also sampled for TPH-DRO





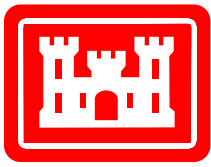


# OU1 Results

- **OU1 Results**

- Off-post:

- TNT and RDX in all off-post annual LTM permanent wells below HALs (2 µg/L); have been below HALs since 2014
- TNT and RDX were below HALs in OS003.
- Results for OS001 and NW50R are pending.
- It is anticipated that that TNT will be above HAL in OS001 near the facility boundary.
- It is anticipated that TNT and RDX will be less than the HALs in NW050R.

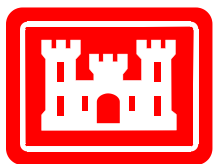


# OU1 Results

- **OU1 Results**

- On-post:

- TNT and RDX concentrations generally continued decreasing trends or remain below HALs
    - 11 of 71 wells above HALs in June 2023
    - Maximum concentrations in wells:
      - TNT = 35 µg/L at G0094 at LL1 (historic high at G0094, 156 µg/L in 2011)
      - RDX = 27 µg/L at G0093 at LL1 (next highest concentration recorded at 14 µg/L in 2016 at G0093)
      - Max concentrations near EW7 are TNT = 6.1 µg/L and RDX = 1.4 µg/L at G0077
    - 7 of 10 direct push locations (10 of 21 samples) above HALs in November 2023. Detections above HALs were generally found in the 25' and 35' sample intervals.



# OU1 Results

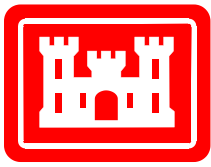
## Compounds Detected, Detections above HALs, Frequency of Detections, and Concentration Range – OU1 Wells

### 2022 Results

### 2023 Results

Compound Detected	CHAAP HALs	Detections above HALs	Frequency of Detects <sup>1</sup>	Concentration Range (µg/L)
<b>On-Post Wells</b>				
1,3,5-Trinitrobenzene	NA	-	10/74	0.36 to 22
1,3-Dinitrobenzene	NA	-	1/74	8.1
TNT	2	8	11/74	0.18 to 39
2,4-Dinitrotoluene	NA	-	2 / 74	0.79 to 0.85
2-Amino-4,6-dinitrotoluene	NA	-	20 / 74	0.076 to 45
4-Amino-2,6-dinitrotoluene	NA	-	21 / 74	0.088 to 47
HMX	400	0	14 / 74	0.14 to 19
MNX	NA	-	1 / 74	0.65
RDX	2	4	20 / 74	0.15 to 37
<b>Off-Post Wells</b>				
2-Amino-4,6-dinitrotoluene	NA	-	2 / 12	0.99 to 1.4
4-Amino-2,6-dinitrotoluene	NA	-	2 / 12	0.81 to 1.1
RDX	2	0	2 / 12	0.22 to 0.29

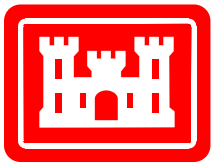
Compound Detected	CHAAP HALs	Detections above HALs	Frequency of Detects <sup>1</sup>	Concentration Range (µg/L)
<b>On-Post Wells</b>				
1,3,5-Trinitrobenzene	NA	-	11 / 71	0.19 to 19
1,3-Dinitrobenzene	NA	-	1 / 71	5
TNT	2	7	17 / 71	0.078 to 35
2,4-Dinitrotoluene	NA	-	3 / 71	0.041 to 1
2-Amino-4,6-dinitrotoluene	NA	-	16 / 71	0.13 to 36
2-Nitrotoluene	NA	-	18 / 71	0.12 to 9.9
4-Amino-2,6-dinitrotoluene	NA	-	17 / 71	0.25 to 35
HMX	400	0	17 / 71	0.23 to 10
MNX	NA	-	6 / 71	0.21 to 1.8
Nitrobenzene	NA	-	1 / 71	0.11
RDX	2	6	21 / 71	0.31 to 27
<b>Off-Post Wells</b>				
TNT	2	0	2 / 11	0.061 to 1.2
2,4-Dinitrotoluene	NA	-	1 / 11	0.069
2-Amino-4,6-dinitrotoluene	NA	-	2 / 11	0.79 to 1.5
4-Amino-2,6-dinitrotoluene	NA	-	2 / 11	0.62 to 1.6
RDX	2	0	2 / 11	0.2 to 0.37
HMX	400	0	1 / 11	0.15



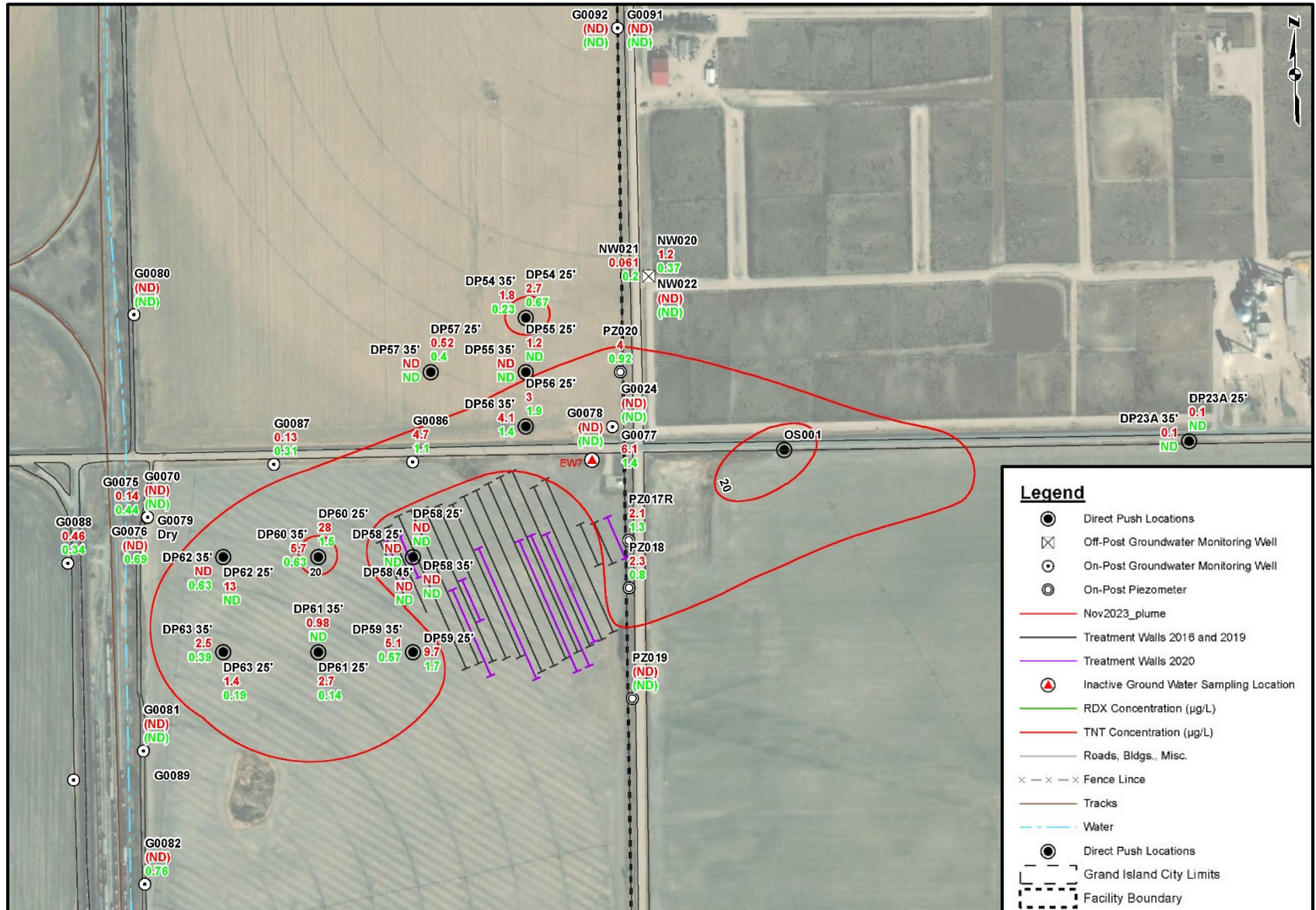
# OU1 Explosives Plume

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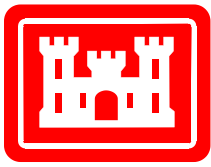
- **Off-Post**
  - The plume extent remains the same.
- **Area Between EW6 and EW7**
  - The plume extent remains about the same except the plume now extends upgradient around direct push location EW7-DP62 and EW7-DP63. Also, a 2 ug/L plume extends around EW7-DP54 and a 20 ug/L plume is now present around EW7-DP60.
- **LL1**
  - Small plumes continue to exist around wells G0093, G0094, G0096. New plumes exist around wells G0097 and PZ016. A plume no longer exists around well G0099.
- **LL2**
  - A small plume continues to exist around well G0122. A new plume exists around well G0066R (RDX+TNT). A plume no longer exists around well G0111
- **LL3, LL4, LL5, and Decant Station**
  - No explosives plumes exist



# OU1 Explosives Plume





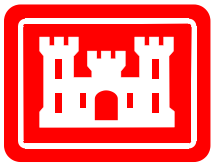


# OU3 Results

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- **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 June 2023 (above MCLs in 2018, 2016, 2014, 2010 and prior)
  - Well SHGW03: VOCs below MCLs in June 2023 (above MCLs in May 2021 and 2020, but below in 2019 and prior)
  - Downgradient wells G0053, G0069, SAMW1, and SHGW04 are currently on 3-year sampling frequency. Most recent results (2022) continue to be below MCLs.



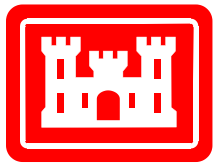
# Institutional Controls Review

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- **Institutional Controls Review**

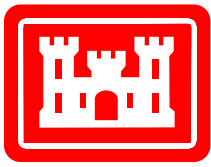
- City Ordinance Institutional Controls: verified by contacting the City of Grand Island Building Department to confirm no plumbing permits for private well hookups were issued in the past 12 months. Also included a visual survey of land parcels near the historic plume.
- Water Supply Institutional Controls: 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 November 2023.





# Wells with Concentrations Less Than HALs for 5+ Years

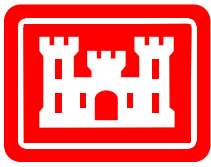
- **Evaluated Only OU1 On-Post Wells**
  - Fifty-four (54) OU1 On-Post wells had explosives concentrations less than the HALs for 5+ years
  - Continue sampling all OU1 Off-Post wells (12 locations + reoccurring DP samples)
  - Continue sampling OU3 On-Post wells (following the three-year sampling frequency [2 locations in 2024 and 6 locations in 2025])
- **All Seventy-Four (74) OU1 On-Post Wells Were Evaluated**
  - Continue sampling all wells with explosives concentration greater than HAL in the past 5 years – **19 wells**
  - Continue sampling all other wells between EW6 and EW7 – **15 wells**
  - Continue sampling wells within and downgradient from recent (2019 and 2020) injections location or potential future injection locations (LL1 and LL2 source areas) – **13 wells**
  - Continue sampling all wells at the Decant Station – **6 wells**
  - Discontinue sampling wells further downgradient from recent or future injections where upgradient monitoring locations exist – **13 wells**
  - Discontinue sampling wells at LL3, LL4, and LL5 – **7 wells**
  - Abandon well G0089 – **1 well**



# 2024 Recommendations

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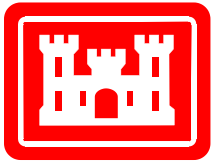
- **Annual OU1 and OU3 Groundwater Monitoring Recommendations**
  - Continue site-wide water level monitoring.
  - Continue annual monitoring of explosives off-post and explosives and MNA on-post. Reduce number of sampling locations from 86 to 65. Continue annual monitoring of VOCs and MNA at 2 OU3 Shop Area wells.
  - Continue direct-push groundwater sampling at 3 former quarterly OU1 Rebound Study locations located off-post (3 samples per location).
  - Abandon 1 monitoring well (G0089). Additional monitoring wells (21) meeting the criteria of less than HALs for 5+ years should also be considered for abandonment.
  - Complete 600 subsurface injection points in the residual explosives plume located between EW6 and EW7. Consider completing injections at higher concentration at LL1 and LL2.
  - 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.



# OU1 Path Forward

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- **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.



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# Questions?