Final

Record of Decision Amendment 2

Operable Unit 1 On-Post Explosives Plume

Cornhusker Army Ammunition Plant

Grand Island, Nebraska

Contract W9128F21D0063

Task Order W9128F22F0145

December 2025

Prepared for:

US Army Corps of Engineers®
Omaha District

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
amsl	above mean sea level
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
Brice	Brice Engineering, LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHAAP	Cornhusker Army Ammunition Plant
COC	contaminant of concern
CPNRD	Central Platte Natural Resource District
DWEE	Nebraska Department of Water, Energy, and Environment
EPA	U.S. Environmental Protection Agency
EW	extraction well
FFS	Focused Feasibility Study
FUDS	Formerly Used Defense Sites
GAC	granular activated carbon
GWTF	Groundwater Treatment Facility
HAL	Health Advisory Level
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
LL	Load Line
LUC	land use control
MNA	monitored natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
No.	number
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
O&M	operations and maintenance
OU	Operable Unit
RAO	remedial action objective
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
TBD	to be determined
TMV	toxicity, mobility, or volume
TNT	2,4,6-trinitrotoluene
URSGWCFS	URS Greiner Woodward-Clyde Federal Services
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
WJE	Watkins-Johnson Environmental, Inc.

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1.0 DECLARATION OF RECORD OF DECISION AMENDMENT 2

1.1 Site Name and Location

Operable Unit I
7502 West 13th Street
Cornhusker Army Ammunition Plant
Grand Island, Hall County, Nebraska 68803

1.2 Statement of Basis and Purpose

This Record of Decision (ROD) Amendment 2 for Operable Unit (OU) 1 presents the amended remedy for on-post groundwater at OU1 at the Cornhusker Army Ammunition Plant (CHAAP) west of Grand Island, Nebraska (Figure 1). The amended remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This ROD Amendment 2 provides the rationale for amending the original ROD signed on 29 September 1994, as amended by the ROD Amendment signed on 26 September 2001 and for replacing the existing remedy selected. This decision is based on the site Administrative Record, which contains information supporting the amended remedy for OU1. The purpose for the response actions selected in the ROD and its Amendments has been and continues to protect public health and welfare from actual or threatened releases of hazardous substances into the environment. The U.S. Environmental Protection Agency (EPA) Region 7 and the Nebraska Department of Water, Energy, and Environment (DWEE) concur with the amended remedy.

1.3 Assessment of the Site

OU1 at CHAAP consists of five former load lines (LL), LL1 through LL5 (Figure 1). Residual source areas include LL1 and LL2; however, contaminant transport modeling used to predict long-term contaminant transport conditions indicate there is no further off-post migration of hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) or 2,4,6-trinitrotoluene (TNT; Brice-AECOM 2023). Additional details and information are presented in the Rebound Study (Brice-AECOM 2022).

Currently, activities at CHAAP are limited to groundwater remediation at the Groundwater Treatment Facility (GWTF); remedy selection and implementation at seven sites located on U.S. Army property that are associated with the Military Munitions Response Program (MMRP); leasing property for agriculture; leasing buildings for storage and limited manufacturing; wildlife management; and minor maintenance of the grounds, roads, and leased facilities.

The majority of CHAAP property has been transferred to the public over the past 10 to 15 years. The current and expected future land use at OU1 is agricultural and industrial. The response actions selected in ROD Amendment 2 for OU1 are necessary to protect the public health and welfare from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Amended Remedy

The amended remedy is fundamentally different from previous remedies at the site while slightly revising the remedial action objectives (RAOs) set forth for OU1 in the 1994 Interim ROD, which were based on

the EPA Health Advisory Levels (HALs) for the contaminants of concern (COCs). The revised RAOs for CHAAP groundwater are:

- Restore groundwater contaminated with TNT, RDX, and octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) to concentrations less than their respective EPA HALs (2 micrograms per liter [µg/L] for TNT, 2 µg/L for RDX, and 400 µg/L for HMX) to support unlimited use and unrestricted exposure and protect human health from ingestion of contaminated groundwater
- Monitor concentrations of TNT, RDX, and HMX in groundwater until remediation objectives have been achieved, and verify that the site no longer poses a threat to human health or the environment. Monitoring will continue for 3 years after remediation objectives have been achieved to ensure that concentration levels are stable and remain less than target levels
- Prevent human exposure to groundwater contaminated with TNT, RDX, and HMX at concentrations exceeding their respective HALs through the implementation, maintenance, and enforcement of institutional controls that restrict the use of groundwater for potable purposes until safe for human consumption

The amended remedy replaces groundwater extraction and treatment with in situ bioremediation of groundwater by promoting the flourishment of indigenous bacteria, which break down the contaminants in place at an accelerated rate. A Rebound Study (Brice-AECOM 2022) was completed to verify the effectiveness of the in situ bioremediation while discontinuing groundwater extraction and treatment. The Rebound Study showed that injecting the aquifer with a molasses-based amendment would create conditions necessary for degrading the contaminants by in situ bioremediation. An almost immediate breakdown effect was observed when those conditions were induced along staggered subsurface injection treatment walls. The Rebound Study, completed over a span of 2 years, showed a marked decline in explosives contamination levels and plume extent (Brice-AECOM 2022). Therefore, this amended remedy will treat COCs at the site, specifically lowering the concentrations of RDX and TNT to less than HALs. The on-post portion of the plume will be treated until the RAOs for OU1 are achieved, with the assumption that the treatment will migrate off-post.

The amended remedy retains annual groundwater monitoring and land use controls (LUCs) enacted by the first ROD Amendment. Annual groundwater monitoring verifies that downgradient plume migration and contaminant rebound are not occurring. The LUCs restrict residential use of on-post groundwater (by deed restriction). The U.S. Army has been and continues to be responsible for implementing and maintaining the effectiveness of LUCs.

1.5 Statutory Determinations

The amended remedy will protect human health and the environment, comply with federal and state applicable or relevant and appropriate requirements (ARARs) unless a statutory waiver is permissible, is cost-effective, and utilizes permanent solutions. Because this remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health; the statutory review will be completed as part of the Five-Year Reviews for OU1, which will continue on the established schedule (i.e., next FYR due in September 2030). The following subsections discuss how the amended remedy meets the statutory requirements.

1.5.1 Protection of Human Health and the Environment

The amended remedy will protect human health and the environment through the treatment of on-post explosives contamination using injection technology for in situ bioremediation using indigenous bacteria. No untreated waste such as granular activated carbon (GAC) will be generated or will accumulate as a result of the application of the amended remedy. Contaminant fate and transport modeling indicate the explosives plume is not continuing to migrate off-post from the upgradient source area. The 2022 Rebound Study showed the efficacy of induced in situ bioremediation to reduce plume contamination levels and extent within the vicinity of and downgradient from the treatment walls (Brice-AECOM 2022). On-post and off-post groundwater monitoring will continue until the plume naturally attenuates.

The amended remedy will reduce the excess cancer risks from exposure to less than $1x10^{-6}$ and the non-carcinogenic hazard indexes to less than 1.0. This level falls less than the EPA target risk range of $1x10^{-6}$ to $1x10^{-4}$. There are no short-term threats associated with the amended remedy, nor are any adverse cross-media impacts anticipated.

1.5.2 Compliance with Applicable or Relevant and Appropriate Requirements

The amended remedy including in situ bioremediation and groundwater monitoring with LUCs complies with all ARARs. ARARs for this action are listed in Appendix A.

1.5.3 Long-Term Effectiveness and Performance

The U.S. Army Corps of Engineers (USACE) has determined that the amended remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a practicable manner at the site.

The amended remedy treats the source materials that constitute the principal threats to achieve significant reductions in explosives concentrations. The amended remedy also satisfies the criteria for long-term effectiveness by permanently reducing and eliminating the explosives plume through natural means using indigenous bacteria. The amended remedy does not present short-term risks different from other treatment alternatives and even reduces risks associated with other remedies (e.g., untreated waste media). Residual contamination will pose no unacceptable human health or environmental risk.

1.5.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Previous implementation of the amended remedy has shown that the total mass of the COCs in groundwater will be reduced by enhancing naturally occurring processes. Hot spots of the explosives plume can be targeted to promote the growth of indigenous bacteria, which will cometabolically biodegrade the explosives plume. Modeling indicates that the plume reduction would be immediate and that reduction in mass will continue for a sustained period of time.

1.5.5 Short-Term Effectiveness

The plume exists away from residential areas and potential short-term impact on the community is low. The potential for short-term impact to the environment is also low because the plume exists below areas of intensive agriculture.

1.5.6 Implementability

The amended remedy is technically feasible using conventional and available equipment for subsurface injections and the existing monitoring well network for in situ bioremediation and groundwater monitoring. In situ bioremediation and groundwater monitoring are unlikely to affect natural resources and require limited operations and maintenance (O&M). In situ bioremediation is field-proven at CHAAP, sampling and analysis are easily implemented, subsurface injections are easily implemented, and personnel, equipment, and materials are readily available. In situ bioremediation with groundwater monitoring and LUCs is also administratively feasible. No permit is required for subsurface injections, however, work will be performed in accordance with the substantive portions of the DWEE UIC program, Title 122-Rules and Regulations for Underground Injection and Mineral Production Wells. Existing deed restrictions, the Hall County Zoning Plan, and well drilling records are easily accessible to verify LUCs continue to restrict access to groundwater contaminated with COCs at concentrations greater than the HALs.

1.5.7 Cost-Effectiveness

USACE considers the amended remedy to be cost effective and represents a reasonable value for the money to be spent. The definition under National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 300.430(f)(1)(ii)(D) was used to make this determination. This was accomplished by comparing the costs associated with previous remedies at the site to the costs associated with the amended remedy because the overall effectiveness of all remedies satisfied the threshold criteria (i.e., protective of human health and the environment and ARAR-compliant). Overall effectiveness was determined by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, or volume (TMV) through treatment; and short-term effectiveness).

The estimated present value of the amended remedy is $10.7 million over 16 years (averaging $669,000 per year). Previous remedies were valued at $26 million (based on a 20-year valuation) for an average annual cost of $1.3 million, showing a reduced cost to perform the amended remedy and to achieve site goals over a shorter period of time in comparison with the previous remedies. USACE finds that the amended remedy will provide an overall level of protection to human health and the environment comparable to the original selected remedy at a significantly lower cost.

1.5.8 Regulatory Acceptance

The amended remedy has been presented to EPA and the DWEE as part of the Focused Feasibility Study (FFS) and the Proposed Plan for the amended remedy, and approval from each agency has been received. EPA and DWEE support the amended remedy and find that in situ bioremediation will lead to restoration of the aquifer to the HALs in an acceptable timeframe. EPA and DWEE also agree that the LUCs will minimize the threat of human exposure to contaminated groundwater before complete restoration is achieved. EPA and DWEE will continue to monitor the effectiveness of the amended remedy to confirm it remains protective of human health and the environment.

1.5.9 Community Acceptance

The Proposed Plan for the amended remedy was presented to and evaluated by the public at a meeting scheduled on 4 March 2025. Public comments were accepted during a 30-day period beginning on 17 February 2025 (following a public notice in the Sunday edition of the *Grand Island Independent* newspaper). No public comments were received during the public comment period.

1.6 ROD Data Certification Checklist

- COCs (Section 2.0)
- Baseline risk presented by the COCs (Section 2.0)
- COCs cleanup levels and basis
- Current and reasonably anticipated future land use assumptions
- Potential land use as a result of the amended remedy
- Estimated capital, annual O&M, total present value costs, and number of years of which the amended remedy costs are projected
- Key factors leading to the amended remedy

1.7 Authorizing Signatures

APPROVED

NEWBAUER.ROBERT.JULIAN.1097058934 Digitally signed by NEWBAUER.ROBERT.JULIAN.1097058934 Date: 2026.03.03 13:58:31 -06'00' 3/3/26

Robert J. Newbauer — Date
USACE Omaha District Commander

ROBERT JURGENS Digitally signed by ROBERT JURGENS Date: 2026.03.31 09:57:46 -05'00' 3/31/26

Robert D. Jurgens — Date
EPA Director of Superfund and Emergency Management Division

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2.0 DECISION SUMMARY

This document is issued by the U.S. Army (the owner of the site) with concurrence from EPA Region 7 and DWEE. The U.S. Army is choosing to implement the amended remedy presented in this ROD Amendment in accordance with Section 117 of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, and to the extent practicable, Section 300.435(c)(2)(ii) of the NCP.

This ROD Amendment summarizes information that is presented in greater detail in the 1994 Interim ROD (signed on 29 September 1994), the 2001 ROD Amendment 1 (signed 26 September 2001), the 1996 Remedial Investigation/Feasibility Study (RI/FS), and annual groundwater monitoring reports. All documents are included in the Archive Repository for this site (in accordance with Section 300.825(a)(2) of the NCP).

This ROD Amendment will become part of the Archive Repository file, which includes all documents associated with the site. EPA and DWEE encourage the public to review these documents to gain a more comprehensive understanding of site remediation activities. The Archive Repository, including all referenced documents, for CHAAP is available at:

Grand Island Public Library
1124 W 2nd Street, Grand Island, Nebraska 68801
Phone: (402) 385-5333
Hours:
Monday-Tuesday: 9:00AM – 8:00PM
Wednesday-Thursday: 9:00AM – 6:00PM
Friday: 9:00AM – 5:00PM
Saturday: 11:00AM – 3:00PM
Sunday: 1:00PM – 5:00PM

2.1 Site Name, Location, and Description

Table 1 Project Information

SITE INFORMATION:	
Site Name:	Cornhusker Army Ammunition Plant – Operable Unit 1
FUDS Project Number:	W9128F21D0063
EPA ID	NE2213820234
Coordinates:	40°55'55.0"N, 98°28'59.3"W
Site Addresses:	7502 West 13th Street, Grand Island, Nebraska
PROJECT MANAGER:	
Telephone:	Rogan Maxwell
Email:	rogan.e.maxwell@usace.army.mil
Mailing Address:	1616 Capital Drive, Omaha, Nebraska 68102-4901

Notes:
For definitions, refer to the Acronyms and Abbreviations section.

2.2 Site History and Enforcement Activities

CHAAP is located on an 11,936-acre tract approximately 2 miles west of Grand Island, Nebraska (Figure 1). The area surrounding CHAAP is primarily rural and agricultural. The City of Grand Island, with a population of approximately 50,000, lies directly east of the plant.

2.2.1 Site Operations History

CHAAP was constructed and became fully operational in 1942 as a U.S. government-owned, contractor-operated facility. From September 1945 to February 1950, the plant was declared surplus, then placed in standby status under the control of the Ordnance Corps, U.S. Army. Use of the buildings was primarily for grain storage, except for the Nitrate Area, which was used to manufacture fertilizer until April 1948. In April 1950, CHAAP again became an active installation with the rehabilitation of LL1 and applicable operations for the production of 3.5-inch-high explosive rockets. The plant was laid away in 1974 but maintained in a high state of readiness until January 1989 when the plant was declared excess.

The primary explosive compounds used during munitions production at CHAAP were RDX, TNT, and, to a lesser extent, HMX. Munitions production was supported by other chemicals, including freon, paints, grease, oil, and solvents.

Major operations at LL1 through LL4 that generated explosives dust included screening, melting and mixing, rod and pellet manufacturing, and remelting and refilling. Dust was removed from the air using ventilation systems outfitted with Schneible wet scrubber units. Process water from these units was circulated through settling tanks and recycled through the scrubbers. Wastewater generated from this process was disposed of via interior building open drains, which led to concrete pits equipped with filtration bags (i.e., sack pumps). The sack pumps consisted of canvas-like material and were designed to filter out solid explosive particles. Filtered wastewater then flowed through open concrete channels, which dumped into circular cesspools. Wastewater was also generated from periodic washing of machinery, interior building surfaces, and munitions transport carts and added to the cesspools. The cesspool walls were masonry lined and the bottom was open to sand and gravel strata. Water that did not infiltrate the strata traveled through an overflow pipe, which led to a leaching pit.

The effectiveness of the sack pumps to filter contaminants was limited, allowing explosive particles to migrate into the earthen strata. Residues that were removed periodically from the bottom of the cesspools and from the leaching pits underwent combustion at the facility burning grounds.

2.2.2 Investigation History

Contamination originating from activities conducted at CHAAP resulted in the facility being placed on the National Priorities List on July 22, 1987, and a Federal Facilities Agreement was signed in September 1990 by the Department of Defense (DoD), EPA, and DWEE (then the Nebraska Department of Environmental Quality) to address the environmental impacts from historical operations and waste disposal practices conducted at the facility (EPA 1990).

From 1987 to 1988, the U.S. Army completed an incineration project designed to excavate and treat soil beneath the unlined leach pits and cesspools at the CHAAP LLs to remove soil sources of explosives contamination. The project reduced the explosives contamination at these source areas; however, explosives concentrations exceeding the action levels remain below the water table and may represent continuous source areas until source area final remedial actions are completed (e.g., subsurface injections for in situ bioremediation). Since completion of the soil excavation project, groundwater is considered the only potentially contaminated media.

Annual groundwater monitoring of the OU1 on-post explosives plume was initiated in 1994 and includes measuring of site-wide water levels and sampling of monitoring wells throughout the OU1 on-post explosives plumes. Groundwater monitoring has continued annually and results are documented in annual reports and presented at annual stakeholder and public meetings.

Other various sampling efforts were completed between 1991 and 1994 and summarized in the RI/FS Report (ICF Kaiser 1996). This report indicated that unacceptable levels of adverse non-carcinogenic effects associated with explosives in groundwater may occur. As a result, the OU1 Interim ROD was signed in 1994 and selected groundwater extraction and treatment as the remedy for the OU1 on-post groundwater explosive plume. The OU1 ROD Amendment was subsequently signed in 2000 and revised the remedy to include optimized groundwater extraction rates and Extraction Well (EW) 7.

2.2.3 Remediation Activity History

The original remedy for the on-post area of OU1 was the construction of the GWTF to operate under the direction of USACE. The GWTF operated full-time beginning in December 1998 and entered standby status in October 2019. Routine maintenance to maintain the operational capability of the GWTF is ongoing.

The remedy selected by the Interim ROD differentiated between the source area and the distal end of the explosives plume due to differences in the groundwater quality between the two areas (U.S. Army Environmental Center [USAEC] 1994). Groundwater was extracted from six wells at a combined flowrate of 750 gallons per minute. Extracted groundwater was treated with GAC for explosives, granular media filtration for suspended solids, chemical precipitation, and wetlands for nitrate reduction. The distal end treatment system was less extensive and only demanded treatment for explosives using GAC. Any discharges were required to fall under limits set by the National Pollutant Discharge Elimination System (NPDES). The first ROD Amendment added an additional EW and optimized extraction rates while maintaining the same overall flowrate (URS Greiner Woodward-Clyde Federal Services [URSGWCFS] 2001).

The GWTF treated groundwater for explosives using GAC absorption technology, then discharged the treated water to the two on-post drainage canals leading to Silver Creek. Pumping to the GWTF at three EWs (off-post) was discontinued in 2000 due to non-detection of explosive compounds; however, pumping at the four remaining EWs continued. In 2009, pumping was discontinued at EW4, EW5, and EW6 to allow source treatment via subsurface injection, and the pumping rate at EW7 was increased to maintain hydraulic control. Based on subsequent monitoring and modeling, EW7 pumping and GWTF operations ceased in October 2019. The system was placed in “standby” status to accommodate an OU1 Rebound Study and additional injections.

Between 2000 and 2005, thermal decomposition, demolition, decontamination of property, facilities, equipment, and soil were performed at LL1, LL2, LL3, and LL4 to reduce remaining explosives hazards and prepare for reuse. Additionally, explosives-contaminated soil investigations and soil excavations at LL1, LL2, and LL3 were completed in 2006 and at LL4 in 2007. These excavations addressed explosives-contaminated surface soil and subsurface soil at previously identified source areas. Soil with explosives concentrations greater than the CHAAP industrial risk soil remediation levels was excavated and disposed of at an approved offsite disposal facility.

The OU1 Final Remedial Action-Operations subsurface injection project was implemented to determine if the remediation of groundwater at CHAAP could be expedited through the use of subsurface injection of molasses mixture, which facilitated enhanced bioremediation of the explosives plume. The subsurface injection project began in Spring 2007, continuing through 2016, and again performed in 2019 and 2020. The purpose is to enhance anaerobic in situ bioremediation processes and cometabolically degrade RDX

and TNT at the primary source areas near EW1, EW4, EW5, and EW6 (2007 through 2016), and residual concentrations near EW7 (in 2019 and 2020).

In the first 3 years of completing subsurface injections, contaminant mass was reduced over 90% in the treatment zones. Implementation of the subsurface injection project also resulted in the shutdown of three EWs (EW4, EW5, and EW6) in the first 5 years. Injections completed in 2019 and 2020 have significantly reduced contaminant mass near EW7 and reduced RDX concentrations to less than the HAL of 2 µg/L. Groundwater contaminant fate and transport modeling has shown that the site remediation timeframe has been significantly reduced as a result of the subsurface injections. Results of the subsurface injections are documented in annual reports and presented at annual stakeholder and public meetings.

Based on previous statistical analysis and historical numerical groundwater modeling simulations, an OU1 Rebound Study was initiated in 2018 to temporarily discontinue pumping at EW7 and monitor groundwater near the former facility boundary. Concurrent with the OU1 Rebound Study, subsurface injections were completed in 2019 and 2020 to accelerate remedial timeframes. Based on the OU1 Rebound Study results, it was recommended to discontinue the OU1 Rebound Study, continue annual groundwater monitoring at OU1, and proceed with an FFS (Brice 2023). Results of the OU1 Rebound Study were documented in the quarterly OU1 Rebound Study reports and were presented at annual stakeholder and public meetings.

A Preliminary Assessment/Site Inspection to evaluate the potential for the presence of per- and polyfluoroalkyl substances was completed in 2023.

2.2.4 Land Use Controls and Actions

LUCs and actions designed to help prevent exposure to contaminated groundwater until the groundwater restoration remedial action is complete have been guided by the 2001 ROD Amendment (URSGWCFS 2001). The 2001 ROD Amendment included the following institutional controls and actions:

- Off-post, the U.S. Army will assist the City in establishing a City "Overlay Zone" Ordinance for an institutional control area prohibiting drinking water supply well drilling in the plume area. The City will monitor and enforce the Ordinance by denying plumbing permits to hookup residences to private wells in the "Overlay Zone."
- Off-post, the City of Grand Island will continue to provide water supply to all residences in the plume area.
- Off-post, the U.S. Army will continue to communicate plume locations, concentrations, and drinking water hazards to the public through Press Releases in the Grand Island Independent newspaper. The paper will be notified when the annual monitoring report is issued at the conclusion of each annual sampling round.
- On-post, land use restrictions will be placed on excessed property. The land use restrictions will include: 1) Restrictive covenants or easements prohibiting drinking water supply well drilling in the plume vicinity until groundwater is cleaned up to health advisory levels, and 2) Restrictive covenants or easements prohibiting the use of the property for residential purposes.
- On-post, the Hall County Reuse Plan will enforce excessed CHAAP land designation for agricultural and industrial zoning.
- On-post, for U.S. Army property, water supply well drilling will continue to be prohibited in the plume area.

The effectiveness of the institutional controls is monitored annually and results are provided in the annual groundwater monitoring reports.

The following subsections expand on individual LUCs.

2.2.4.1 *Deed Restrictions*

When property in the vicinity of the plume is excessed, the deed restrictions include: (1) restrictive covenants prohibiting drinking water supply well drilling in the plume vicinity until groundwater is cleaned up to HALs; (2) restrictive covenants prohibiting the use of the property for residential purposes; and (3) right-of-entry to the property by USACE (and their contractors) to perform environmental restoration work.

2.2.4.2 Hall County Zoning Plan

The Hall County Reuse Plan will enforce excessed CHAAP land designation for agricultural, recreational, and industrial zoning. The Hall County Reuse Plan is still in place and the excessed CHAAP land is being used for agricultural, recreational, and industrial purposes.

2.2.4.3 City of Grand Island "Overlay Zone"

The City of Grand Island established an "Overlay Zone" Ordinance that designates an IC area (Groundwater Control Area No. 2) within the corporate limits and additional zoning jurisdiction (2 miles outside city limits) of the City of Grand Island, in which it prohibits drilling drinking water supply wells. Per Grand Island City Code, chapter 35, article VII. Groundwater Control Area No. 2, the boundaries of Groundwater Control Area No. 2 will be maintained in the Hall County – City of Grand Island Cooperative Geographic Information System (GIS) using information supplied annually by the U.S. Army and modified in accordance with periodic monitoring data prepared by the U.S. Army and reviewed by EPA and DWEE (City of Grand Island 2025). Prior to finalizing the annual groundwater monitoring reports and submittal of the Overly Zone, new contaminant plume maps are generated and presented to all stakeholders (USACE, USAEC, EPA, DWEE, CPNRD, Hall County, SPPD, and others) during the Annual Stakeholder Meetings typically held within the same calendar year as sample collection. During the Annual Stakeholder Meeting, the new plume maps are reviewed and if there are significant plume changes that may pose a risk to exposure, the City of Grand Island will be contacted and plume maps will be immediately provided to ensure the ordinance is properly enforced. Since 2014, when all off-post wells were found to be less than the EPA HALs, there have not been any changes to the off-post plume that may pose a risk to exposure (i.e., concentrations continue to decline and the plume continues to shrink). The Grand Island city limits with Overlay Zone are shown on Figure 2.

Although all off-post monitoring well explosives concentrations are less than the HALs, the City of Grand Island continues to monitor and enforce the ordinance by denying plumbing permits to connect residences to private wells near the previous explosives plume.

2.2.4.4 Residential Water Supply

The City of Grand Island continues to supply potable water to all residences in the plume area and designated Overlay Zone. On 17 January 2025, the City of Grand Island Building Department was contacted, and it was confirmed that all residences in the historic plume area (and the Overlay Zone) are currently supplied with water from the City of Grand Island.

2.2.4.5 Central Platte Natural Resources District Drilling Prohibition

Following established deed restrictions and permitting approval process through Central Platte Natural Resources District (CPNRD), water supply well drilling is prohibited within 2,500 feet of the plume area.

Effective 5 January 2016, the CPNRD suspended drilling of new wells and the issuance of permits to construct new wells for groundwater use in fully and over appropriated areas in Grand Island and surrounding areas, which includes 6 to 8 miles along the Platte River throughout the CPNRD. This suspension is for the installation of all wells including municipal, industrial, and irrigation wells and remains in effect. CPNRD's *Groundwater Quality Management Plan* (CPNRD 2023) provides current rules and regulations for transfers, variances and offsets, and exemptions for groundwater use in the designated area. The CPNRD suspension of new well installations includes, but is not specific to, the CHAAP plume area.

2.2.4.6 Hazard Communication

The U.S. Army will issue press releases to the *Grand Island Independent* newspaper regarding plume locations, concentrations, and potential drinking water hazards when the Annual Report is completed. The Annual Report is typically released within one year of annual groundwater sampling activities.

2.3 Site Characteristics

2.3.1 Climate

The climate of Grand Island, Nebraska, is classified as a humid continental climate, characterized by hot summers and cold winters. This climate type is typical for much of the Great Plains region (National Oceanic and Atmospheric Administration 2025).

The hottest average temperatures occur in the summer (June through August) with highs typically in the 80s and 90s Fahrenheit (°F) and occasionally above 100°F. Nights tend to cool down to around 60°F. July has the highest average temperature at 77.0°F (National Weather Service [NWS] 2025).

The coldest temperatures are experienced in the winter (December through February) when average highs usually rest between the upper 20s and lower 40s°F and lows average in the 10s and 20s°F. January has the coldest normal average temperature at 25.9°F (NWS 2025).

The average annual precipitation for the area is 26.61 inches. The month of May tends to display the highest average precipitation for the year at 4.70 inches. The driest months occur during winter with the lowest average precipitation experienced in January at 0.61 inches (NWS 2025).

Winds in the region are relatively common, especially in spring and fall. These winds can contribute to rapid weather changes in the area.

2.3.2 Topography

CHAAP is situated within the alluvial plain of the Platte River basin. Most of the ground surface within the OU1 RAO LL Treatment Areas is relatively flat, with an elevation range from approximately 1,895 feet above mean sea level (amsl; at the northeast corner of LL1) to 1,917 feet amsl (at the southwest corner of LL4). Silver Creek drains a small area on the west and north sides of the facility. Large drainage ditches on the east side of LL1 and LL2 flow from south to north and drain surface water to Silver Creek. Groundwater flow direction is generally toward the northeast within the OU1 RAO LL Treatment Areas.

At LL1 through LL5, few site features remain that are related to former site activities, with the exceptions of asphalt and gravel access roads and EW buildings associated with the groundwater extraction system (i.e., EW1 through EW6). LL properties have been sold to the public and redeveloped, including the removal of former site features, modification to existing utility configurations, and conversion to strictly agricultural cropland. Only LL3, purchased by Hornady Manufacturing, has been developed to support manufacturing, research and development, and storage processes, which included the construction of multiple buildings, utility modifications (i.e., electric, natural gas, and supply water), and fencing/access restrictions. Additionally, multiple irrigation wells and center pivot systems have been installed on the agricultural cropland where fertilizer applications are likely conducted. Where undeveloped, the LLs support a grass-dominated vegetation community with minimal trees and shrubs.

2.3.3 Geology

The general geology summarized here was interpreted from soil boring logs completed during the installation of on- and off-post monitoring wells (Watkins-Johnson Environmental, Inc. [WJE] 1994; Woodward-Clyde 1999) as well as regional data from the Soil Survey for Hall County (U.S. Department of Agriculture 2004). In general, the geologic units underlying the CHAAP study area include (in descending order from the surface) the following:

- Alluvial silty clay and topsoil near the ground surface (from ground surface to approximately 5 feet below ground surface [bgs]).
- Alluvial sands and gravels of the Grand Island Formation (approximately 50 to 60 feet thick).
- A low-permeability, alluvial silty clay unit of the Fullerton Formation (approximately 5 to 15 feet thick; also referred to as the "blue clay" unit in previous reports [WJE 1994]).
- Alluvial sands and gravels of the Holdrege Formation (reported to be up to 200 feet thick).

These geologic units are laterally extensive across the CHAAP facility.

2.3.4 Hydrogeology

The following subsections summarize the hydrogeologic setting at CHAAP.

2.3.4.1 Grand Island Formation Aquifer

Shallow groundwater underlying CHAAP occurs as an unconfined water table aquifer within the alluvial sands and gravels of the Grand Island Formation. The total saturated thickness of the water table aquifer in the OU1 RAO LL Treatment Areas averages approximately 38 to 48 feet. Hydraulic conductivity values average 300 to 400 feet per day (URSGWCFS 2001).

The Grand Island Formation aquifer is used regionally as a water supply source for irrigation and potable water. Locally, there are only two active irrigation wells near the on-post plume (Nebraska Department of Natural Resources 2025). Historical contaminant migration data and plume geometry indicate irrigation wells have not significantly impacted the groundwater flow over time. Near the historic off-post plume, all private domestic water is supplied by the City of Grand Island. On-post LUCs prohibit the use of groundwater as a potable water source (and well drilling) within the plume areas.

2.3.4.2 Fullerton Formation Aquitard

The underlying Fullerton clay unit is a relatively low-permeability unit that appears to act as a barrier to groundwater flow (i.e., aquitard) in the CHAAP study area, and is continuous across the entire CHAAP

facility, extending to the northeast within the former OU1 plume boundary (up to 5 miles to the northeast of CHAAP). Justification for this interpretation includes:

- Monitoring well boring logs completed throughout the entire facility and extending to the northeast (up to 5 miles) consistently identified the Fullerton clay between 40 to 60 feet bgs. The lateral extent of the Fullerton clay was most recently presented on Figure 5-41 (Total Explosives Concentrations along Geologic Cross-Section G-G' [OU1] August 2016) of the Final 2016 Annual Groundwater Monitoring Report (Bay West, LLC and URS Group, Inc. 2017)
- The presence of head differences across the Fullerton clay unit, as measured between the Grand Island Formation aquifer and the underlying Holdrege Formation aquifer at locations with nested monitoring wells installed (i.e., one monitoring well screened within each formation)
- The absence of contamination below the Fullerton clay unit at locations where contamination is present at the base of the Grand Island Formation aquifer

2.3.4.3 Holdrege Formation Aquifer

The sands and gravels of the Holdrege Formation exist as a confined aquifer unit, confined by the overlying Fullerton clay unit throughout the entire CHAAP study area. Based on historical annual water level data from the deep monitoring wells, the Holdrege Formation is not hydraulically connected to the overlying Grand Island Formation, as proven by the head difference (slight upward hydraulic gradient, indicative of an confined aquifer condition) measured between the Grand Island Formation aquifer and the underlying Holdrege Formation aquifer and calculated as part of the annual groundwater monitoring reporting efforts. No explosives contamination has been detected in the wells screened in this deeper aquifer unit.

2.3.5 CERCLA Site Characterization

2.3.5.1 Groundwater

Table 2 2023 Maximum Contaminant of Concern Concentrations Detected in Groundwater

ANALYTE	MAXIMUM GROUNDWATER CONCENTRATION (µg/L)	GROUNDWATER SCREENING LEVEL[1] (µg/L)
RDX	27	2
TNT	35	2
HMX	10	400

Notes:
For definitions, refer to the Acronyms and Abbreviations section.
[1] Screening levels defined by EPA HALs which are the contaminant clean up levels established in this ROD

2.4 Current and Potential Future Land and Resource Uses

Currently, activities at CHAAP are limited to groundwater remediation at the GWTF; leasing property for agriculture; leasing buildings for storage and limited manufacturing; wildlife management; and minor maintenance of the grounds, roads, and leased facilities.

The majority of CHAAP property has been transferred to the public over the past 10 to 15 years. The current and expected future land use at OU1 is agricultural, industrial, and potentially recreational (e.g., Husker Harvest Days, shooting club, special events).

2.5 Scope and Role of Response Action

The OU1 explosives plume is being managed under CERCLA at CHAAP and is the result of past explosives waste disposal practices. The amended remedy addresses the medium of concern (groundwater) as identified in previous investigations and will be the final remedial action for the COCs identified. The amended remedy will include annual monitoring of the OU1 explosives plume to evaluate attenuation of explosives contamination using the existing monitoring well network. Monitoring will include collecting groundwater elevations, monitored natural attenuation (MNA) screening data, and groundwater samples for laboratory analysis of explosives and MNA parameters.

Subsurface injections will be completed in the upgradient areas of the plume to inhibit increasing explosives concentrations or explosives plume migration further into the off-post area. Subsurface injections will also be used to reduce the overall site remediation timeframes and move the site one step closer to site closeout. Anaerobic conditions are created by introducing a carbon source into the aquifer, which indigenous microbes use as an energy source. The microbes couple the oxidation of organic compounds or hydrogen to the reduction of an electron receptor to generate energy in a process called microbial respiration. The reduction of oxygen is the most energetically favorable and efficient metabolic pathway and results in oxygen being rapidly depleted in systems with an elevated organic content, rendering the environment anaerobic. An anaerobic environment is the appropriate environment for rapid and sustained cometabolic degradation of explosive compounds.

This approach was previously completed in 2019 with positive results concurrent with the Rebound Study performed under Contract W9128F-18-D-0020, Delivery Order Number F0041, a joint venture undertaken by Brice and AECOM Technical Services (Brice-AECOM 2022). Subsurface injections were performed immediately following a baseline groundwater sampling event with three subsequent quarterly groundwater sampling events to monitor performance of the subsurface injections and remediation of the RDX and TNT plumes and to document any changes in explosives concentrations in groundwater. An evaluation of injection performance reviewed concentrations of RDX and TNT in groundwater, along with key water quality parameters, and compared them with baseline conditions to assess the effectiveness of the groundwater amendment at creating anaerobic conditions within the treatment area and reducing the concentrations of RDX and TNT in groundwater.

The final remedial action will also include implementation of LUCs to confirm the existing LUCs continue to restrict access to groundwater contaminated with COCs at concentrations greater than cleanup goals.

2.6 Summary of Site Risks

As the lead agency, it is the current judgment of the U.S. Army that the amended remedy identified in this ROD Amendment, is necessary to protect human health or welfare from COCs in groundwater.

The RI/FS Report (ICF Kaiser 1996) included a risk assessment to estimate current and future risks to human health and the environment from exposures to contaminated groundwater. Although the levels of explosives in on-post groundwater were elevated, there are many uncertainties in predicting the risk estimates, including the assumption that residents would actually consume on-post groundwater affected by the plume. The annual groundwater monitoring wells off-post show plume concentrations there remain less than HALs. Potentially impacted off-post areas fall within the City of Grand Island “Overlay Zone,” which designates a LUC area where it is prohibited to drill drinking water supply wells. Annually, the City of Grand Island Building Department is provided georeferenced computer-aided drafting files and a copy of the offsite map containing the most recent off-post concentration levels. Additionally, effective 5 January 2016, the CPNRD suspended drilling of new wells and the issuance of permits to construct new

wells for groundwater use in fully and over appropriated areas in Grand Island and surrounding areas. This suspension is for the installation of all wells including municipal, industrial, and irrigation wells and is still in effect. CPNRD's Groundwater Quality Management Plan (CPNRD 2023) provides current rules and regulations for transfers, variances and offsets, and exemptions for groundwater use in fully and over appropriated areas, which includes 6 to 8 miles along the Platte River throughout the CPNRD and the CHAAP plume area. The CPNRD suspension of new well installation includes, but is not specific to, the CHAAP plume area.

Estimated risks for carcinogens (potentially cancer-causing chemicals) were compared to the NCP acceptable range (i.e., the target risk range of one in a million to one in ten thousand [$1x10^{-6}$ to $1x10^{-4}$] for human health protection at Superfund sites). Chemicals with completed pathways that exceed a risk of $1x10^{-4}$ usually warrant remedial action under ARARs. ARARs for this action are listed in Appendix A.

Since completion of the soil excavation project, during which soil exceeding the CHAAP industrial risk soil remediation levels was removed from the site, groundwater is considered the only contaminated medium. No risks are associated with soil at the site.

The following subsections summarize the estimation of groundwater risks presented in the 1996 RI/FS.

2.6.1 Estimated Groundwater Risks

For ingestion of explosives-contaminated on-post groundwater, the risk estimates indicated excess lifetime cancer risks greater than the $1x10^{-6}$ risk level. In addition, it was determined that unacceptable levels of adverse non-carcinogenic effects associated with explosives in groundwater may occur. This exposure pathway was eliminated, however, because CHAAP implemented deed restrictions prohibiting drinking water supply wells on excessed property (i.e., formerly owned by the government and part of CHAAP) in the vicinity of the plume. Although the OU1 Rebound Study and annual groundwater monitoring events completed since October 2019 have proven that the explosives concentrations continue to decline and the explosives plume is stable and not migrating, a change in site conditions (e.g., fluctuating groundwater levels) or restrictions may create potential for future offsite explosives plume migration or groundwater access, which could impact downgradient receptors.

- Future cancer risk estimates associated with the future ingestion of crops irrigated with on-post groundwater were at the low end of the $1x10^{-6}$ risk range, and the non-carcinogenic hazard indexes were less than 1.0. These low risk estimates demonstrate, based on the assumptions made in the risk assessment, that there are no unacceptable cancer risks and no unacceptable adverse health effects from exposure to explosives in vegetables that have been irrigated with CHAAP groundwater.
- There are no estimated risks to ecological receptors because on-post groundwater is inaccessible to ecological receptors at CHAAP.
- Risks associated with other organic and inorganic chemicals in groundwater were estimated to be at acceptable levels.

The COCs within the plume have been identified as RDX, TNT, and HMX. The most recent data shows that on-post concentrations of RDX and TNT are greater than HALs, ranging from 2.3 to 27 µg/L and 2.1 to 35 µg/L, respectively. HMX has never been detected above HALs at the site. Until the COCs are reduced to concentrations less than HALs, it is assumed that the deed restriction will remain in place and no development will be possible at the property due to the associated risks.

2.7 Remedial Action Objectives

The RAOs for CHAAP groundwater were previously consolidated and revised with more specific instruction and detail for each COC.

The original RAOs were established in the 1994 Interim ROD and reaffirmed in the 2001 ROD Amendment (WJE 1994; URSGWCFS 2001). The original RAOs for CHAAP groundwater are:

- Protect human health and the environment
- Clean up groundwater to less than HALs
- Contain high concentrations of explosives in groundwater on-post

The revised RAOs for CHAAP groundwater are:

- Restore groundwater contaminated with TNT, RDX, and HMX to concentrations less than their respective EPA HALs (2 µg/L for TNT, 2 µg/L for RDX, and 400 µg/L for HMX) to support unlimited use and unrestricted exposure and protect human health from ingestion of contaminated groundwater
- Monitor concentrations of TNT, RDX, and HMX in groundwater until remediation objectives have been achieved, and verify that the site no longer poses a threat to human health or the environment. Monitoring will continue for 3 years after remediation objectives have been achieved to ensure that concentration levels are stable and remain less than target levels
- Prevent human exposure to groundwater contaminated with TNT, RDX, and HMX at concentrations exceeding their respective HALs through the implementation, maintenance, and enforcement of institutional controls that restrict the use of groundwater for potable purposes until safe for human consumption

The listed RAOs have been amended from those presented in the Final FFS (Brice 2023) to further describe the criteria for what the proposed site cleanup is expected to accomplish and for determining when the cleanup is successfully complete.

2.8 Amended Remedy

OU1 encompasses the explosives groundwater plume both on-post and off-post. The COCs in the plume include the explosive materials RDX, TNT, and HMX. The amended remedy addresses the OU1 on-post plume.

The objective of the amended remedy is to reduce plume size and contaminant mass within the explosives plume, and to prevent further off-post plume migration. Annual groundwater monitoring will continue to verify the efficacy of treatment while LUCs will be maintained to restrict groundwater access.

The amended remedy provides an approach for removing contaminant mass from the explosives plume. This approach will control further migration of the plume and reduce the concentration levels of the COCs in groundwater through degradation using in situ bioremediation.

The amended remedy was developed to protect public health, welfare, and the environment by controlling migration and reducing the mass of COCs present in groundwater beneath and downgradient of OU1. The action for OU1 will be consistent with site RAOs.

The major components of the amended remedy include:

- **In Situ Bioremediation:** The on-post areas with remaining residual concentrations that pose a threat of potential off-post migration will be treated by injecting an amendment containing

blackstrap molasses whey, hydrolyzed vegetable oil, and corn steep into the aquifer. This amendment serves as a source of organic carbon for indigenous bacteria to consume, which produce enzymes that create the anaerobic environment allowing for anaerobic degradation of explosives in groundwater. Direct push technology will be used to inject the amendment along multiple, closely spaced transects placed perpendicular to the groundwater flow direction, creating a Treatment Zone for the plume to pass through to be treated.

- **Annual Groundwater Monitoring:** After injections are complete, groundwater monitoring will be implemented for the entirety of the plume using the monitoring well network comprised of 76 monitoring wells (Figure 3). Monitoring will include collecting groundwater elevations, MNA screening data (including field water quality measurements [pH, temperature, dissolved oxygen, oxidation-reduction potential, conductivity, turbidity, and ferrous iron]), and groundwater samples for laboratory analysis of explosives (including primary and secondary explosives breakdown products) and MNA parameters (alkalinity, carbon dioxide, dissolved organic carbon, methane, nitrate/nitrite, ammonia, sulfate, sulfide, and total organic carbon) at the monitoring wells. On-post groundwater monitoring will continue until the groundwater restoration remedial action is complete.
- **LUCs:** Existing LUCs (i.e., deed restrictions, Hall County Zoning Plan, City of Grand Island Overlay Zone, residential water supply, CPNRD drilling prohibitions, and hazard communication) will be maintained as outlined in the first ROD Amendment and will continue to restrict access to groundwater contaminated with COCs until the groundwater restoration remedial action is complete.

2.9 Basis for Remedial Action

The final remedial action for OU1 is in situ bioremediation with groundwater monitoring and LUCs. This final remedial action continues treatment of COCs in groundwater with subsurface injections inducing enhanced bioremediation with groundwater monitoring and LUCs to satisfy ARARs and To-Be-Considered criteria to achieve the project RAOs.

Based on the information currently available, the U.S. Army (the lead agency) finds that the final remedial action meets the threshold criteria and provides the best balance of tradeoffs with respect to the balancing and modifying criteria. The U.S. Army finds that the amended remedy satisfies the following applicable statutory requirements of CERCLA Section 121(b):

1. Be protective of human health and the environment.
2. Comply with ARARs (or justify a waiver).
3. Use permanent solutions and proven alternative treatment technologies (subsurface injections) to reduce the potential for offsite plume migration.
4. Satisfy the preference for treatment as a principal element and provide significant reduction of TMV of explosives in groundwater.
5. Provide short-term effectiveness and restrict access to explosives-contaminated groundwater at concentrations greater than cleanup goals.
6. Be easily implementable.
7. Be cost effective.
8. Have EPA and DWEE acceptance.
9. Have community acceptance.

The final remedial action is chosen based on historical evidence that it will reduce COCs less than HALs and that restoration of the site will occur at an accelerated rate compared with other alternatives. A detailed analysis of remedial action alternatives is available in Section 5 of the FFS (Brice 2023). A summary of remedial action alternatives is provided in Table 3.

Table 3 Summary of Remedial Action Alternatives

EVALUATION CRITERION	ALTERNATIVE 1: NO ACTION	ALTERNATIVE 2: MNA WITH LUCS	ALTERNATIVE 3: MNA WITH LUCS AND SUBSURFACE INJECTIONS
Overall Protection of Human Health and the Environment			
Human Health Protection	Would not reduce risk to human health.	Would reduce potential risk to human health by reducing the level of explosives in groundwater.	Would reduce potential risk to human health by reducing the level of explosives in groundwater.
Environmental Protection	The explosives are not expected to have a negative impact on the ecosystem because the groundwater is considered inaccessible to ecological receptors.	The explosives are not expected to have a negative impact on the ecosystem because the groundwater is considered inaccessible to ecological receptors.	The explosives are not expected to have a negative impact on the ecosystem because the groundwater is considered inaccessible to ecological receptors.
Compliance with ARARs			
Compliance with ARARs	Not applicable.	Would comply with ARARs.	Would comply with ARARs.
Appropriateness of Waivers	Not appropriate because equivalent standard of performance would not be attained.	None should be required.	None should be required.
Long-Term Effectiveness			
Magnitude of Residual Risk	Risks to potential future residents would remain indefinitely.	Residual contamination will pose no unacceptable human health or environmental risk.	Residual contamination will pose no unacceptable human health or environmental risk.
Adequacy and Reliability of Controls	Not applicable.	MNA is field proven and is expected to meet long-term remedial objectives.	MNA and subsurface injections are field proven and are expected to meet long-term remedial objectives.
Reduction of TMV			
Treatment Process Used	None.	MNA	MNA with injections and enhanced biodegradation
Reduction of TMV	None.	TMV would be slowly reduced by natural attenuation processes (i.e., biodegradation, dispersion, and dilution) over time.	TMV would be rapidly reduced by enhanced biodegradation (using subsurface injection) and natural attenuation of contaminants over time.
Short-Term Effectiveness			

Table 3 Summary of Remedial Action Alternatives

EVALUATION CRITERION	ALTERNATIVE 1: NO ACTION	ALTERNATIVE 2: MNA WITH LUCS	ALTERNATIVE 3: MNA WITH LUCS AND SUBSURFACE INJECTIONS
Time Required to Achieve ROQ	Indefinite.	The remediation timeframe for the plume is estimated at approximately 8 years based on groundwater modeling. The monitoring well network would be sampled annually for 11 years or until the groundwater restoration remedial action is complete. As the plume recedes, it is expected that the number of monitoring wells that require sampling and the frequency of sampling will decrease.	The remediation timeframe for the plume is estimated at approximately 6 years. The monitoring well network would be sampled annually for 9 years or until the groundwater restoration remedial action is complete. As the plume recedes, it is expected that the number of monitoring wells that require sampling and the frequency of sampling will decrease.
Protection of Community During Remedial Action	No action taken.	Because the plume is within base boundaries and away from residential areas, potential impact to community would be low.	Because the plume is within base boundaries and away from residential areas, potential impact to community would be low. Injections would be used to prevent migration of the plume.
Protection of Workers During Remedial Action	No action taken.	Workers would need to take proper safety precautions during site activities.	Workers would need to take proper safety precautions during site activities.
Implementability			
Ability to Construct and Operate	Not applicable.	Manpower is readily available. Sampling and analysis are easily implemented with existing monitoring well network.	Subsurface injection equipment, supplies, and manpower are readily available. Sampling and analysis are easily implemented.
Technical Feasibility	Not applicable.	Feasible.	Technology is reliable. Equipment and materials are available.
Cost			
Estimated Total Costs	$0	$8,735,185	$10,668,544

Notes:

For definitions, refer to the Acronyms and Abbreviations section**.**

2.10 Documentation of Fundamental Changes

The amended remedy relies on in situ bioremediation of groundwater by promoting the flourishing of indigenous bacteria, which break down the contaminants in place at an accelerated rate. This is facilitated by injecting the aquifer with a molasses-based amendment, thereby creating the conditions necessary for degrading the contaminants by in situ bioremediation. This is a fundamental change from previous remedial actions, which relied primarily on pump-and-treat technologies. Groundwater will be treated in place and no effluent discharges will occur. A summary of the previous remedies is provided in the following subsections.

2.10.1 1994 Interim ROD Remedy

Under terms of the Interim ROD, the original remedy included:

- Extraction of contaminated groundwater
- Treatment of the extracted groundwater using GAC for explosives, granular media filtration for suspended solids, chemical precipitation as needed to meet NPDES discharge limits, and wetland construction to reduce nitrates
- Discharge of treated effluent to Silver Creek through two on-post drainage canals
- LUCs to prevent drilling wells to access on-post groundwater and hazard communication

2.10.2 Changes to Original Remedy by ROD Amendment 1

Changes made to the original remedy under ROD Amendment 1 included:

- Addition of a seventh EW to the on-post groundwater extraction system
- Discontinuing off-post groundwater extraction due to non-detection of COCs
- Expand LUCs including deed restrictions, establishment of the Overlay Zone, and enforcement of Hall County Zoning Plan

2.11 Community Participation

In accordance with 40 C.F.R. § 300.435(c)(2)(ii), U.S. Army, and regulatory agencies:

- Issued a public notice and brief description of the Proposed Plan for the amendment to the ROD, published on 17 February 2025 in the Sunday edition of the newspaper.
- Made the Proposed Plan for the amendment to the ROD and information supporting the decision available for public comment from 17 February 2025 to 19 March 2025.
- Have provided a reasonable opportunity, not less than 30 calendar days, for submission of written or oral comments on the revised Proposed Plan for the amendment to the ROD; upon timely request, the lead agency will extend the public comment period by a minimum of 30 additional days.
- Held a public meeting during the public comment period on 4 March 2025 at the CHAAP GWTF located at 7502 W 13th Street, Grand Island, NE 68803.
- Have kept a transcript of comments received at the public meeting held during the public comment period.
- Have included in the amended ROD a brief explanation of the amendment and the response to each of the significant comments, criticisms, and new relevant information submitted during the public comment period.
- Will publish a notice of the availability of the amended ROD in a major local newspaper of general circulation.
- Will make the amended ROD and supporting information available to the public in the Archive Repository and information repository prior to the commencement of the remedial action affected by the amendment.

3.0 RESPONSIVENESS SUMMARY

3.1 Public Involvement

In accordance with 40 C.F.R. § 300.435(c)(2)(ii), U.S. Army and regulatory agencies have performed the required public involvement as described in Section 2.11. This includes soliciting input from the community on the ROD Amendment 2. At this time, there have been no oral or written comments from the public on the ROD Amendment 2.

The Archive Repository, including all referenced documents, for CHAAP is available at:

Grand Island Public Library
1124 W 2nd Street, Grand Island, Nebraska 68801
Phone: (402) 385-5333
Hours:
Monday-Tuesday: 9:00AM – 8:00PM
Wednesday-Thursday: 9:00AM – 6:00PM
Friday: 9:00AM – 5:00PM
Saturday: 11:00AM – 3:00PM
Sunday: 1:00PM – 5:00PM

3.2 Technical and Legal Issues

There were no technical or legal issues identified during the public involvement process.

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FIGURES

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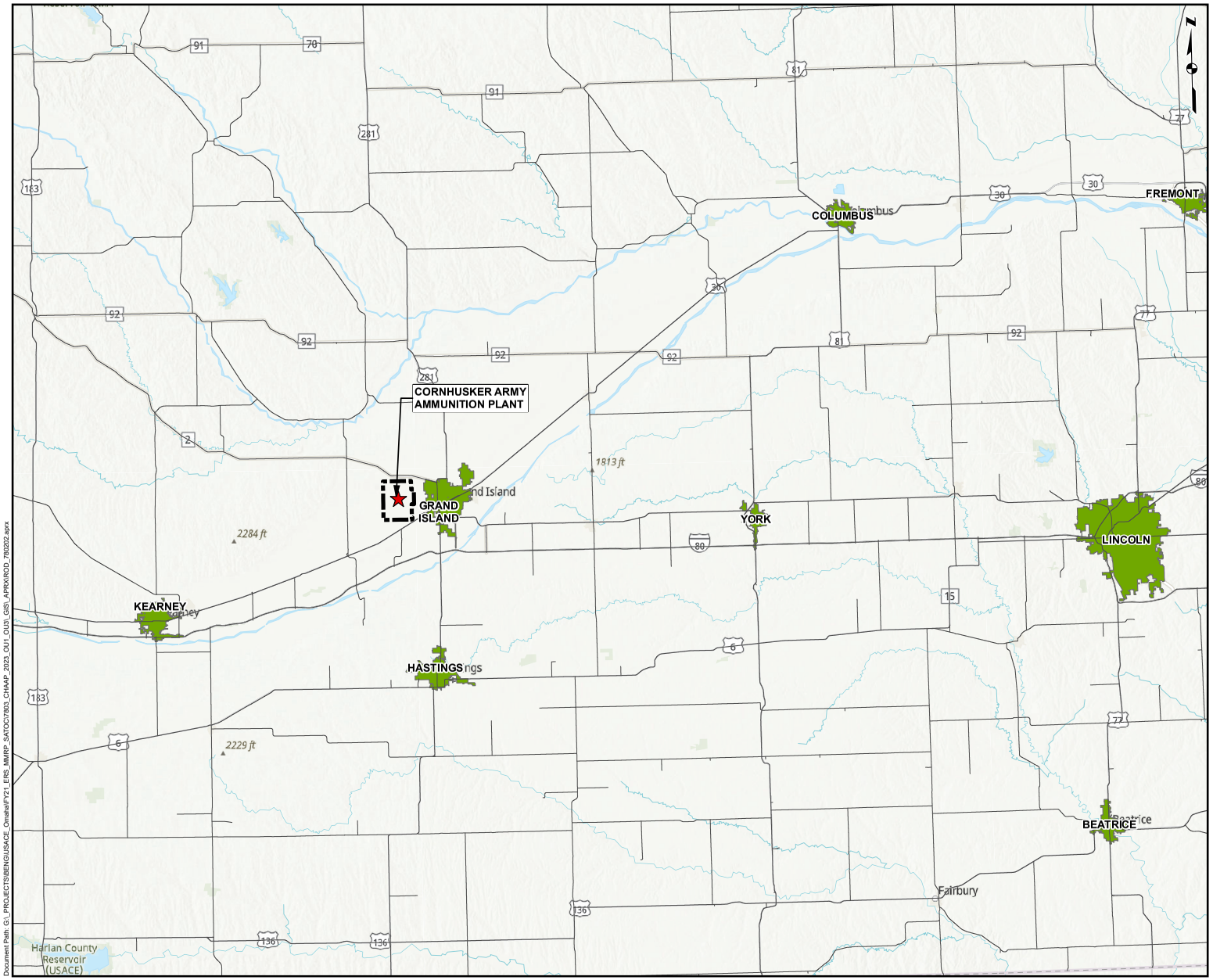
1 INCH

RECORD OF DECISION AMENDMENT 2
OPERABLE UNIT 1 ON-POST EXPLOSIVES PLUME
CORNHUSKER ARMY AMMUNITION PLANT
GRAND ISLAND, NEBRASKA

FACILITY LOCATION MAP



Legend

- Project Location
- Roads
- Project Boundary
- Nebraska Cities

Abbreviations
OU = Operable Unit

Notes
1. Site features and point locations data source: USACE Government Furnished Information provided in 2023.
2. For conceptual purposes only. All locations are approximate.

NEBRASKA STATE PLANE COORDINATE SYSTEM, U.S. SURVEY FEET
HORIZONAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

10 5 0 10 20
Miles

Bruce ENGINEERING ANC B(a)
Omaha Office
1229 Millwork Avenue,
Suite 305
Omaha, NE 68102

PROJECT No.:	DATE:	FIGURE:
780202	1/22/2025	1
P.M.: C.A.	DRAWN: R.R.	

Document Path: G:_PROJECTS\BENG\USACE_Omaha\FY21_ERS_IMIRP_SATOC\7803_CHAAP_2023_OU1_OUS_GIS_APRX\ROD_780202.aprx

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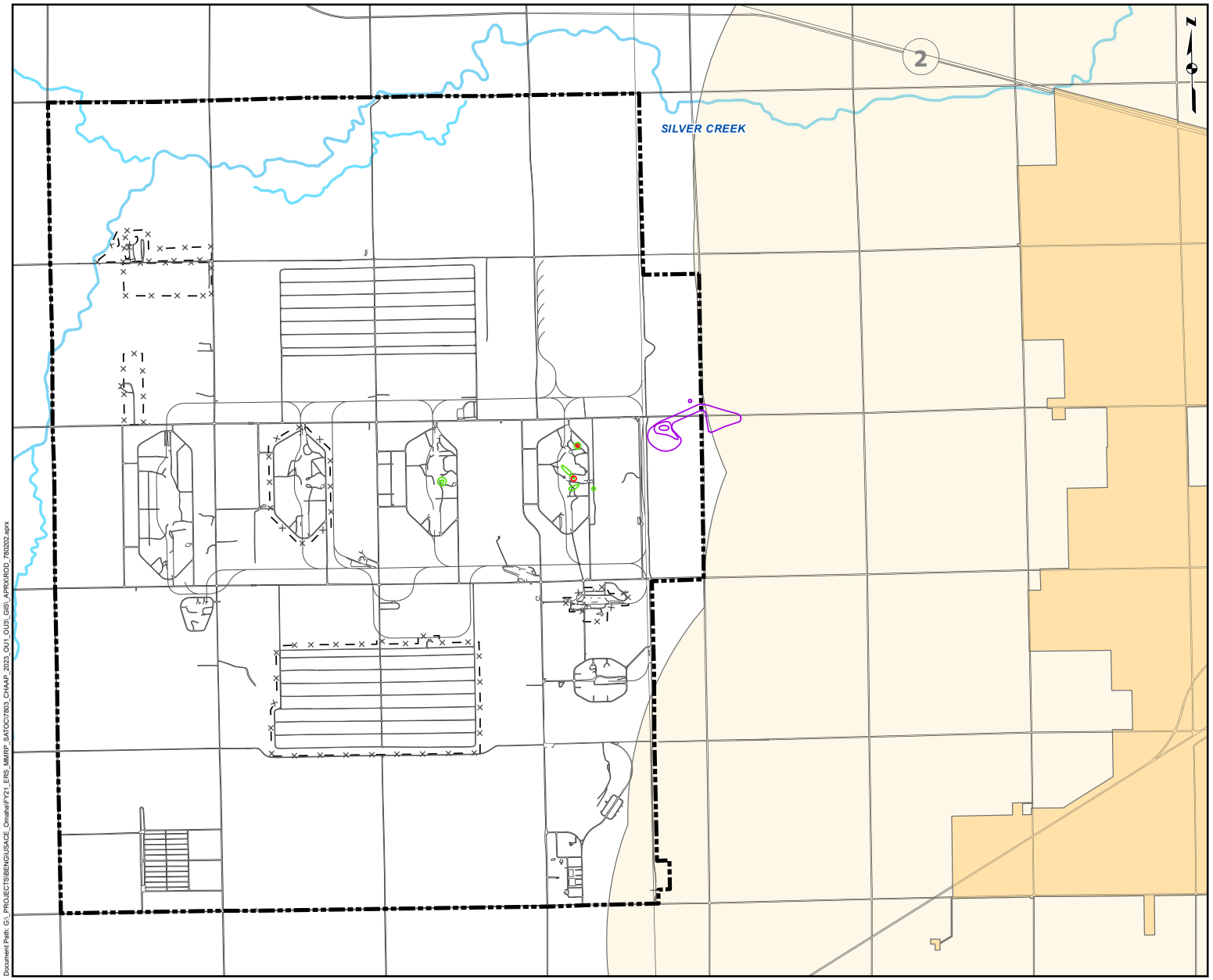
1 INCH



RECORD OF DECISION AMENDMENT 2
OPERABLE UNIT 1 ON-POST EXPLOSIVES PLUME
CORNHUSKER ARMY AMMUNITION PLANT
GRAND ISLAND, NEBRASKA

SITE VICINITY MAP

Legend

- Fence
- Water
- Roads, Buildings, Etc.
- Facility Boundary
- RDX Concentration (µg/L)
- RDX and TNT Concentration (µg/L)
- TNT Concentration (µg/L)
- Grand Island 2-Mile Buffer Overlay Zone
- Grand Island Municipal Boundary

Abbreviations

OU = Operable Unit
RDX = Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
TNT = 2,4,6-Trinitrotoluene
µg/L = Micrograms per liter

Notes

1. Site features and point locations data source: USACE Government Furnished Information provided in 2023.
2. The 2023 Central Platte Natural Resources District Groundwater Management Plan includes a moratorium on the drilling of supplemental irrigation wells if groundwater levels fall more than 25% of the maximum acceptable declines. The restriction remains in effect unless water levels rise to less than 25% of the maximum acceptable declines for five consecutive years.

NEBRASKA STATE PLANE COORDINATE SYSTEM, U.S. SURVEY FEET
HORIZONAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

0.6 0.3 0 0.6 1.2
Miles

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PROJECT No.:	DATE:	FIGURE:
780202	8/21/2025	2
P.M.: C.A.	DRAWN: R.R.	

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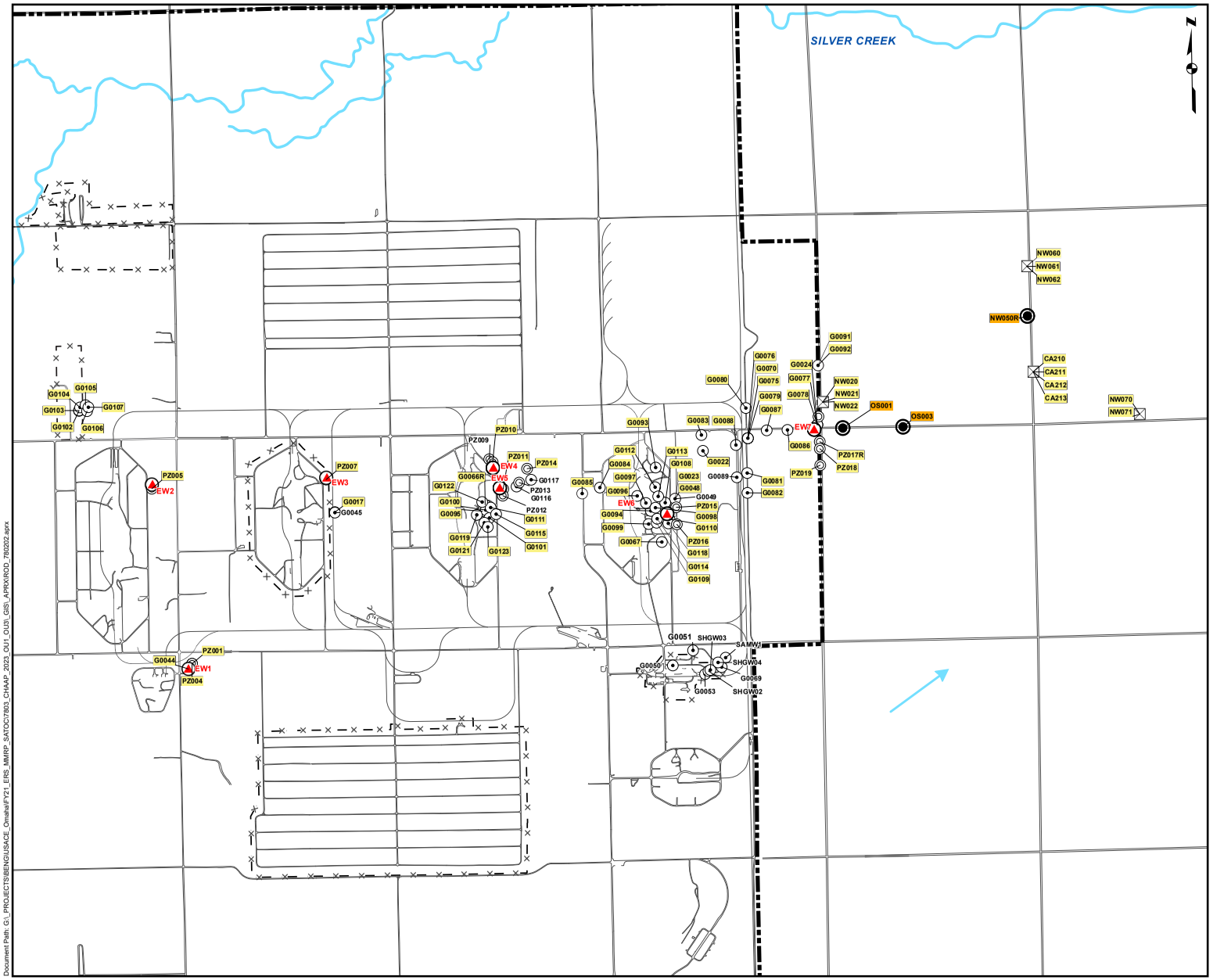
1 INCH



RECORD OF DECISION AMENDMENT 2
OPERABLE UNIT 1 ON-POST EXPLOSIVES PLUME
CORNHUSKER ARMY AMMUNITION PLANT
GRAND ISLAND, NEBRASKA

OU1 ON-POST MONITORING WELL NETWORK

Legend

- Off-Post Groundwater Monitoring Well
- On-Post Groundwater Monitoring Well
- On-Post Piezometer
- Inactive Groundwater Extraction Well
- Annual Direct Push Locations
- Fence
- Water
- Roads, Buildings, Etc.
- Interpreted Groundwater Flow Direction
- 2024 OU1 Direct Push Groundwater Sample Locations
- 2024 OU1 Groundwater Sampling Locations
- Facility Boundary

Abbreviations

OU = Operable Unit

Notes

1. Site features and point locations data source: USACE Government Furnished Information provided in 2023.
2. For conceptual purposes only. All locations are approximate.

NEBRASKA STATE PLANE COORDINATE SYSTEM, U.S. SURVEY FEET
HORIZONAL DATUM: NAD83 (2011) | VERTICAL DATUM: NAVD88

0.45 0.23 0 0.45 0.9
Miles

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PROJECT No.:	DATE:	FIGURE:
780202	8/19/2025	3
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APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

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Table A-1 Applicable or Relevant and Appropriate Requirements

Standard, Requirement, Criteria, or Limitation	Citation	Description	Rationale
Chemical-Specific ARARs/TBCs			
Federal			
Federal Health Advisory Levels (HALs)	Drinking Water Regulations and Health Advisories	Estimates of acceptable drinking levels for a chemical substance based on health effects information.	HALs are not included in a promulgated regulation. HALs are TBCs used as guidance to establish RAOs for chemicals without established MCLs.
Safe Water Drinking Act	42 USC Section 300		
National Primary Drinking Water Regulations and National Revised Primary Drinking Water Regulations	40 CFR Part 141	Establishes MCLs, health-based standards for specific contaminants. MCLs are applicable for drinking water as supplied to the end users of public water applies.	MCLs are relevant and appropriate for contamination of groundwater that is or may be used as drinking water. MCLs that have been published as final but are not yet in effect are TBCs. MCLs are relevant for deriving NPDES discharge levels.
National Primary Drinking Water Implementation Regulations	40 CFR Part 142	Establishes procedures for granting variances from MCL requirements. Specifies best technologies for treatment of various pollutants.	Requirements relevant and appropriate for determining cleanup goals for certain contaminants, if the MCL is not used or is available.
National Secondary Drinking Water Standards	40 CFR Part 143	Establishes secondary MCLs which are guidelines for public drinking water systems to protect the aesthetic quality of the water. Secondary MCLs are not Federally enforceable.	TBC if any of these constituents are addressed by a remedial action alternative, or if any treated and discharged groundwater is to be used as a source of drinking water. Relevant for deriving NPDES discharge levels.
Maximum Contaminant Level Goals (MCLGs)	40 CFR Parts 141, 142	Establishes non-enforceable health goals for drinking water quality at a level at which no adverse health effects may arise with an adequate margin of safety.	TBC for determination of groundwater cleanup levels and NPDES discharge levels. The MCL is the controlling ARAR.
Solid Waste Disposal Act, as amended	42 USCA Section 6901-6992K		
Identification and Listing of Hazardous Waste	40 CFR Part 261	Defines characteristics of hazardous wastes and provides lists of hazardous wastes. Identifies Solid wastes which are subject to regulations as hazardous wastes under 40 CFR Parts 124, 262-265, 268, 270, 271.	Applicable to wastes generated by remedial activities, including investigation-derived wastes, excavated soil, or solid wastes generated by treatment of soil, groundwater, or hazardous wastes.
Releases from Solid Waste Management Units	40 CFR Part 264.94	Subpart F (264.94) gives concentration limits in groundwater for hazardous constituents from a regulated unit.	Applicable if listed hazardous constituents are found in groundwater.
State			
Nebraska Environmental Protection Act	Neb. Rev. Stat. Chapter 81	State's policy on environmental control.	
Ground Water Quality Standards and Use Classification	Neb. Adm. Rules & Regs., Title 118	Establishes groundwater quality standards and use classifications for groundwater sources. Used to determine priorities for groundwater remedial actions.	State MCLs are ARARs for contaminated groundwater if the state MCL is more stringent than federal requirements. The antidegradation clause (Chapter 3) provides that if the existing quality of any groundwater is better than the MCLs, that the quality will be maintained and protected.
Rules and Regulations Pertaining to the Issuance of Permits under the NPDES	Neb. Adm. Rules & Regs., Titles 119 and 121	Establishes effluent limitations and procedures for determining effluent limitations.	Applicable if state standards are more stringent than federal requirements.
Effluent Guidelines and Standards	Neb. ADM. Rules & Regs., Title 170	Establishes MCLs for public water supply systems.	Relevant and appropriate for contaminated groundwater if the state MCL is more stringent than federal requirements.
Regulations Governing Public Water Supply Systems	Neb. ADM. Rules & Regs., Title 129, Chapter 32	Prohibits visible emissions of fugitive particulate matter beyond the premises where it originates.	Applicable if remedial activities, such as drilling, or soil excavation or grading, generate fugitive dust.
Location-Specific ARARs			
Federal			
Floodplain Management	Executive Order 11988 40 CFR Part 6, Appendix A and 40 CFR Part 6.302	Limits activities in a floodplain, which is defined as "the lowland and relatively flat areas adjoining inland and coastal waters including at a minimum that area subject to a 1 percent or greater chance of flooding in any given year" (the 100-year floodplain).	Applicable if remedial actions occur in the 100-year floodplain.
100-Year Floodplain Management	40 CFR 264.18(b)	RCRA treatment, storage, or disposal facility must be designed, constructed, operated, and maintained to avoid washout within 100-year floodplain.	Applicable if remedial actions occur in the 100-year floodplain.
Solid Waste Disposal Act, as amended	42 USCA Section 6901-6992K		

Table A-1 Applicable or Relevant and Appropriate Requirements

Standard, Requirement, Criteria, or Limitation	Citation	Description	Rationale
Floodplains	40 CFR Part 264.18(b)	RCRA treatment, storage, or disposal facility must be designed, constructed, operated, and maintained to avoid washout within 100-year floodplain.	Applicable if remedial actions occur in the 100-year floodplain.
Farmland Protection Policy Act	7 USC 420 *et seq.*	Establishes requirements for federal agencies for acquiring, managing, and disposing of lands and facilities; or provide criteria that identify and take into account the adverse effects of actions on the preservation of farmland.	Relevant and appropriate if project related activities affect farmland.
Fish and Wildlife Coordination Act	16 USCA Section 661 et seq. 33 CFR Parts 320-330 40 CFR Part 6.302	Establishes requirements for action taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources.	Applicable to effluent structures in or near a stream or river.
Archaeological and Historic Preservation Act of 1974	16 USCA Section 469; 36 CFR Part 65	Must recover and preserve artifacts in area where alteration of terrain threatens significant scientific, prehistorical, or archaeological data.	Applicable if artifacts are found during remedial activities.
National Historic Preservation Act of 1966, as amended	16 USCA Section 470 et seq. 36 CFR Part 800 40 CFR Section 6.301	Must preserve property in or eligible for National Register of Historic Places; actions should minimize harm to National Historic Landmarks.	Applicable if eligible property are potentially impacted during remedial activities.
National American Graves Protection and Repatriation Act	PL 101-601	Requires that if Native American remains or cultural items are found on federal lands, the appropriate tribe must be notified, and all activity in the area of discovery must cease for at least 30 days.	Applicable if Native American remains or cultural items are found during remedial activities.
Antiquities Act of 1906	16 USCA 431-433 43 CFR Part 3	Provides for protection of historic and prehistoric ruins and objects on Federal lands.	Applicable if historical ruins or objects are found during remedial activities.
State			
Nebraska Human Burial Sites Act	Neb. Rev. Stat. , Article 12, Sections 12-1201 to 1212	Provides protection for unmarked human burial sites on private and public lands.	Applicable if human burial sites are discovered during remedial activities.
Floodplains	Neb. Rev. Stat., Chapter 31, Article 10, Neb. Adm. Rules & Regs., Title 455, Chapters 1 through 7.	Regulates and requires permits for certain activities proposed to take place in a floodplain.	Applicable if remedial activities occur in the 100-year floodplain.
Action-Specific ARARs/TBCs			
Clean Water Act	**33 USCA Section 1251-1376**		
National Pollutant Discharge Elimination System	40 CFR Parts 122, 125	Requires permits for the discharge of pollutants from any point source into waters of the United States.	Substantive requirements applicable for remedial actions that involve point source discharges to surface waters. May be applicable to surface discharges.
	40 CFR Section 122.26(b)(14)(x)	Requires that stormwater runoff be monitored and controlled on construction sites greater than 5 acres.	Applicable if remediation site is greater than five acres, relevant and appropriate for smaller sites.
Wetland Protection	CWA 404 40 CFR 230.3(1) 33 CFR 328 (b)	Established requirements to avoid degradation of wetland due to construction activities.	Applicable to construction activities near wetlands which may be present along pipeline or well locations.
Hazardous Materials Transportation Act	40 USCA Section 1801-1813		
Hazardous Materials Transportation Regulations	49 CFR Parts 107, 171-177	Regulates transportation of hazardous materials.	Applicable for remedial actions that involve off-site transportation of hazardous materials. (e.g., spent carbon or sludge disposal).
Occupational Safety and Health Act of 1970	PL 91-596 29 USCA Section 651-678		
Safety and Health Regulations for Construction	20 CFR Part 1926	Establishes protection standards (e.g., hazard communication, excavation and trenching requirements) for workers involved in hazardous waste operations.	Applicable to onsite remedial activities.
State			
Nebraska Environmental Protection Act	Neb. Rev. Stat. Chapter 81 Article 15		
Nebraska Surface Water Quality Standards	Neb. Adm. Rules & Regs., Title 117	Establishes water quality standards and criteria for the surface waters of the state.	Applicable because groundwater is discharged into surface waters.
Ground Water Quality Standards and Use Classification	Neb. Adm. Rules & Regs., Title 118	Provides groundwater remedial actions protocol for point source groundwater pollution; defines Remedial Action Classes with basic requirements for remedial action.	Relevant and appropriate for remedial actions addressing groundwater pollution at this site.
Rules and Regulations Pertaining to the Issuance of Permits under the NPDES	Nebr. Adm. Rules & Regs., Title 119	Requires permit for discharging pollutants from a point source into the waters of the State.	Substantive requirements are applicable to point source discharge to surface waters.

Table A-1 Applicable or Relevant and Appropriate Requirements

Standard, Requirement, Criteria, or Limitation	Citation	Description	Rationale
Regulations for Underground Injections and Mineral Production Wells	Neb. Adm. Rules & Regs., Title 122	Contains rules and regulations governing injection wells and mineral production wells.	Applicable to subsurface injection of substances.
Rules and Regulations Pertaining to the Management of Wastes	Neb. Adm. Rules & Regs., Title 126	Requires permits for licenses for various waste management activities and establishes policy for releases of oil or hazardous substances and remediation of such releases.	Substantive requirements for spills/releases and remediation of spills/releases are given in Title 118 and Title 128.
Rules and Regulations Governing Hazardous Waste Management in Nebraska	Neb. Adm. Rules & Regs., Title 128	Establishes procedures for notification of hazardous waste activity, identification and listing of hazardous wastes, generators, and operators of treatment, storage, and disposal facilities.	Substantive requirements that are the same or more stringent than 40 CFR 261, 262, 263, 264, 268, 270 are applicable.
Air Pollution Control Rules and Regulations	Neb. Adm. Rules & Regs., Title 129, Chapter 2	Defines "major source" of hazardous air pollutants and major stationary sources of other pollutants, including fugitive dust and other particulate emissions.	Applicable to remedial activities generating fugitive dust, and potentially applicable to remedial alternatives involving volatilization or incineration.
	Neb. Adm. Rules & Regs., Title 129, Chapter 20	Prohibits visible dust beyond the limits of the property line where handling transportation, or construction is taking place.	Applicable to remedial activities generating fugitive dust.
	Neb. Adm. Rules & Regs., Title 129, Chapter 39	Limits visible emissions from diesel-powered vehicles on public streets or highways.	Applicable only when diesel-powered vehicles used during remedial activities are on public streets or highways.
Regulations Governing Licensure of Water Well Driller and Pump Installation Contractors and Certified of Water Well Drilling, Pump Installation, and Water Well Monitoring Supervisors or Water Well Monitoring Technician/Natural Resources Groundwater Technician	Neb. Adm. Rules & Regs., Title 178, Chapter 10	Contains rules governing the qualifications of contractors opening water well seal and installing water wells and pumps.	Applicable for opening of water well seal, installation of monitoring wells, extraction of recovery wells, and the installation of pumps.
Regulations Governing Water Well Construction, Pump Installation, and Water Well Abandonment Standards	Neb. Adm. Rules & Regs., Title 178, Chapter 12	Contains rules governing water well construction and abandonment and pump installation.	Applicable for installation of monitoring wells, extraction of recovery wells, and the installation of pumps.

Notes:

ARAR – applicable or relevant and appropriate requirement
CFR – Code of Federal Regulations
MCL – maximum contaminant level
Neb. Adm. – Nebraska Administrative
NPDES – National Pollutant Distribution Elimination System
RAO – remedial action objective
TBC – to be considered
USC - United States Code

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